The Spirit in Human Evolution

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by

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It shows a classic biface handaxe, a core, and a wristwatch to show the scale.

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David S. Mitchell
For AWSNA Publications

Table of Contents

Foreword

The Evolution of a Book

A childhood visit to the caves at Altamira left a life-long impression. My feelings for the creations of our human ancestors have gradually moved from wonder, through hobby to serious scientific interest, without ever losing that sense of wonder. I still get a feeling of awed excitement when I visit a museum of prehistory and even more so when I get the opportunity to visit prehistoric sites.

My family has got used to my poking around the edges of ploughed fields, sifting silt newly washed out among rocks at the entrance to caves, in search of pieces of worked flint. An uncanny sense draws me to likely sites, a ledge overlooking the curve in a river, an overhang of rock on the side of a valley, the proximity of a spring. No doubt much of this is vivid imagination. Nevertheless, on occasion I have found a scattering of worked stone where I expected to. Once while visiting friends in southern Germany I came across a building site excavation and in the pouring rain dug away in a trench until the sides threatened to cave in. I came home, covered from head to foot in mud, with a piece of horn scored with rows of notches and several worked stones. Our friends were horrified.

I have collected stone tools for decades. My proudest find was a wonderful Acheulean biface/handaxe and a large fossilized tibia of a hippopotamus, which I came across in a spoil heap just outside the compound of the famous site of Olorgesailie in the Kenyan Rift Valley. In full knowledge that the removal of such artifacts is specifically forbidden, I debated long and hard with myself whether I should take the biface with me and smuggle it out of the country. I satisfied myself with a photograph and left the beauty in the fork of a small acacia tree for the next archaeologist or passing tourist to find.

I possess a large collection of tracings and sketches of prehistoric rock art, many of which I have made in situ or in museums. Whenever the Rawson family moves house we take with us large bundles of tracing paper containing an extensive record (running into dozens of meters in length) awaiting a suitable display space!

This life-long hobby took on a new dimension when I took a couple of years out of teaching to do the high school training at the Waldorf Teacher Training Seminar in Stuttgart. There I had the great fortune to have as tutor Wolfgang Schad, now professor of human evolution at Herdecke University in Germany. As an indomitable collector Professor Schad has accumulated an impressive collection of stone tools, casts of hominid fossils and casts of many works of Ice Age art, to which I had free access. Professor Schad has moved on but his collection has returned to Stuttgart, and I look forward to renewing my acquaintance with it when I return in the coming year to take up a teaching post at what is now the Freie Hochschule für Waldorf Pädagogik (Independent University for Waldorf Education). The reader will find Professor Schad frequently quoted in this book.

Indeed, given my approach, it would be hard not to. No one has done more in this field than he has. I learned much both from the rigor of his intellect and the warmth of his enthusiasm. Over the years he has supported and encouraged this present work and has offered valuable criticism. Over ten years ago I started to compile information on human evolution that might be of use to teachers. I was encouraged by the late Georg Kniebe, who led the Pedägogische Forschungstelle (Educational Research Department) in Stuttgart, a position I will shortly have the great honor to assume. He asked me to draw up a monograph with a bibliography as resource material for High School teachers interested in bringing aspects of human evolution into their lessons. I came as far as making a lengthy presentation to colleagues in Stuttgart, but pressure of work prevented me from producing the planned resource book. That collection expanded, contracted, metamorphosed and finally became something quite different.

Since the literature in this field is enormous and more appears all the time, I have been in doubt constantly as to whether there was any point in attempting to summarize it. The second major concept was to produce a critical review of Rudolf Steiner's work on the question of human evolution. What seemed worth attempting was a comparison of his work with the results of contemporary research. After a number of years of work, I eventually produced a massive manuscript containing extensive quotations from Steiner with suggestions as to how this might be interpreted in the light of modern anthropology. The publishers sent this to several specialist readers, and Nick Thomas, General Secretary of the Anthroposophical Society in the United Kingdom, worked through the text with a fine-tooth comb. The anthroposophical readers found it too scientific, the scientists found the anthroposophical arguments unconvincing. One reader thought it would make a good Ph.D. thesis but a boring book since it was so closely argued and supported with countless references. Such is the process of evolution; "hopeful monsters" have little chance of survival. An organism either creates a niche for itself or finds one that suits its characteristics. This hopeful monster finally became extinct as the consequence of a fatal computer crash, one of those periodic catastrophes that seem to have such an impact on evolution!

At which point I decided that what was needed was a totally new approach. Out went most of the Steiner. In came the intention of making the case for anthropology taking the human spirit seriously.

It was not vanity or ambition nor, I believe, folly (though elements of all three can certainly be found if I look hard enough) that led to the writing of this book. It was rather more of a grudging sense of responsibility. I knew it would be hard work. I knew I had other more pressing responsibilities. I knew it might probably end up in a drawer somewhere, as in fact several versions did! I kept hoping that someone better qualified than I would write what I had to say, thus relieving me of this obligation. I would have been disappointed to have failed by simply running out of steam but happy that the point had been made. So far I have yet to come across that other book (though I did get a shock when I saw that Ian Tattersall had published a book called *Becoming Human*, which had long been my working title). I readily acknowledge that in most respects I am wholly unqualified to tackle this subject, having no academic training in any of the fields associated with human evolution, except, that is, education. My credentials are those of the enthusiastic amateur (a figure not unknown in the history of paleoanthropology). I write this book as a practicing schoolteacher and university lecturer (in child development and education), not as an academic researcher. Teaching cultural history and human evolution to 14- to 18-year-olds in a Steiner Waldorf school

and education studies to university students forces one to wrestle daily with some fairly fundamental questions about the nature of human development. Many of the questions that led to this book and some of its insights come straight from the classroom.

Along the way many people have helped me in large and small ways. I have mentioned Wolfgang Schad, Georg Kniebe and Nick Thomas. I must add the name of my mother, Wilma Rawson, who read through the manuscript with her usual constructive but critical comments. Her scepticism in all matters of the spirit made some of this book a hard read for her but her comments were all the more useful for that.

My thanks also go to the Margaret Wilkinson Science Foundation who, long ago now, provided me with financial assistance for some of the research. I would also like to thank Maria Bargurdjian, Mike Eichner, Freddie Freije, Marianne Harman, Susanne Mainzer, Richard Masters of the Hermes Trust, Ivor Revere, Rose Schneider and Richard Zienko, all of whom supported the creation of this book financially. My family paid a price: "Daddy is working at the computer again." But I think they are proud of me.

David Mitchell at AWSNA Publications also deserves my profound thanks too. Alongside the countless other tasks he shoulders, he is one of the most creative publishers with whom I have had the privilege to work. This guy really gets things done!

Finally, my thanks go to Nic Poole at Camphill Press, Botton, who first gave me a computer, a desk and long term encouragement and spiritual support.

– Martyn Rawson
Forest Row, Sussex
Easter 2003

Introduction

The topic of human evolution has become one of the most exciting in science. It also produces a regular stream of popular science books and television series. The story is compelling, the arguments between the main protagonists vigorous and sometimes acrimonious. The theories behind this science swing to and fro with the interpretation of each new fossil find to such an extent, that it can bewilder the interested observer. Yet every new theory has one thing in common with all the others. They are all bound within a strictly materialistic paradigm. There is no spiritual interpretation. There is no spiritual dimension to the issue. Materialism or creationism, or materialistic creationist?

In the other camp, the creationists are marshalling an ever more comprehensive arsenal of arguments and pseudo-evidence. Their cause is surprisingly popular, as the strength of the creationist movement in the United States demonstrates. Growing creationist movements can also be found in the Netherlands, Canada, Australia and New Zealand. Many Islamic countries, of course, have their own version of creationism.[1] In many ways it is hard to understand this, given the rationalist approach we apply to so many other aspects of life. Of course, there are many shades of creationism, not all of which are as easy to dismiss from a scientific perspective as fundamentalist Bible literalism. Creationists often tend to equate Darwinian evolutionary theory with science, thus polarizing the arguments even further.

Modern creationism has, I think, emerged (one is tempted to say evolved) in response to two basic problems arising out of the scientific revolution: how to deal with the question of morality and how to explain God. If humanity has evolved by natural means from animals, what prevents us from behaving like animals? The theological answer has always been that we were created in God's image and therefore we have some form of access to divine knowledge, guidance or grace. The precondition for receiving this gift is faith. Without this we would have no more basis for morality than animals. The second problem is the reverse. Natural laws providing full explanation of evolution leave no room for God. If one acknowledges natural evolution, it is not logically possible to believe in a divine creator because such a being would be entirely redundant.

The materialistic view leaves spirituality, let alone divinity, entirely out of the picture. Creationism on the other hand is an exclusive view that seeks to base all knowledge on revelation. It says, in effect, either believe in science or religion.

This is, in its way, a totally fatalistic denial of what I would see as the creative, intelligent human spirit. It is true that many people (forty percent of Americans) believe

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[1] See *New Scientist*, April 22, 2000, for several articles on the subject of creationism as a challenge to the scientific approach.

in evolution and creationism by arguing that evolution was God's way of creating the world. Yet this is a self-defeating argument because it falls back on the old dualist argument, which says in effect, spirit and nature are two parallel universes; we can either live in the one or the other but not both at the same time. So most people believe in God but live their lives according to materialistic principles and practice. They live apparently easily within this paradox.

I would argue that the problem with both of these positions is their inability to see that spirit and nature are one integrated unity. This is to say that biology and culture are not parallel universes and that evolution and history are not consecutive, that is, history does not take over where evolution ends for all intent and purposes. Phylogeny, the evolution of species, and ontogeny, the maturation of individuals, are both expressions of a developmental process. Nor do nature (including human beings) and knowledge have to be seen as separate worlds but can be thought of as integrated, the latter being a state of the former (or vice versa).

My purpose here is to go beyond all dualistic approaches of mind and matter and to seek a path towards the possibility of understanding the universe as an integrated whole. As I see it, there are two fundamental obstacles to this path.

The first is materialism (especially in its mechanistic/reductionist form), the second is any form of dualism, either based on faith in divine creation or based on the philosophical cop-out summarized in the Latin word *ignorabimbus* (we cannot know) in other words, the mind can never know own its true nature. Our means of knowing this unity are, and have to be, scientific, but a scientific method that does not preclude a recognition of spiritual factors. The main argument of this book is that recognizing spiritual factors is important if our understanding of human nature and human evolution is to make sense of who we are. Only the spiritual dimension can complete the picture provided by genetics, psychology and anthropology. I argue that the image of the human being currently provided by materialistic science is fragmented and fails to provide us with an adequate basis for any real sense of meaning. As a teacher I am concerned with giving young people a range of options, including the possibility that humankind can and does develop out of its inner resources. By taking a developmental approach, we can overcome the problem of mechanistic reductionism and, I believe, begin to deal with dualism. Only through the recognition of truly developmental processes can we begin to find an objectively possible basis to think about spiritual factors. Briefly my argument will be as follows: the human being (indeed any organism) has a history of growth and development within a context. That context comprises an entire field of relationships. The individual is the locus of development with such a field. The field includes relationships not only with the external environment, physical, biological and social—but also the internal environment—genetic, biological, psychological—and, I argue, the spiritual environment, which has its personal and universal aspects.

The individual (and this goes for fruit flies, beavers and humans alike) is not merely the sum of an unfolding predetermined plan nor the product of environmental influences but possesses a real history (or rather biography) and yet bears within it the scope for future potential. The individual is always translating its real past history into its own future in context. The differences between fruit fly, beaver and human lie in the degree to which the individual can respond to the challenges of translating the past into the future. They lie in the scope for self-determined development.

Spiritual Selection

There is an alternative way of viewing human development and evolution that recognizes more than blind natural selection and selfish genes. This also goes beyond even the subtleties of the gene-environment feedback loop or the possibilities of gene-culture co-evolution. It includes the possibility that the individual can override such determining factors and influence his or her own development in unique ways. For humanity as a whole this alternative view suggests a spiritual-individualizing selection parallel to and interacting with the forces of natural selection. This "spiritual selection" is at the same time a progressive trend towards the emancipation of the individual from all forms of determinism. As an evolutionary dynamic it has always been and remains a trend towards the expression and revelation of potential. This potential does not have its origin in a predetermined model but in a lived past, in a history. Ultimately it is also a trend that creates the possibility for the individual human being to free him- or herself from the all cultural imperatives. It is a path of freedom and ethical individualism.

This approach sees development itself as something more than mere change, adaptation and growth. It sees development as the progressive emergence of an inner determining principle encountering and striving to individualize what it has inherited and what it meets in the world in order to come to ever more coherent form, to ever more complete expression. This principle of being exists in the form of potential. It can only come to realized form by virtue of natural means. Being can only become through life and life can only manifest in physical, biological form.

This inner principle is spirit. Spirit comes to individualized form through the birth and development of human beings. We see this in the development of each individual child. It is the manifest reality of the individual human spirit that gives us the clue to human evolution. Here is no simplistic form of recapitulation theory, nor a version of Haeckel's's biogenetic law[2] that states that ontogeny recapitulates phylogeny. The link between the development of the individual and the species is the concept of development I have sketched above. In both cases there is an inner principle seeking to come into being. That means the existence of intention acting within both development and evolution, though not necessarily consciously. The nature of such intention is akin to a natural law of being.

I can see evolutionists choking on this idea of intention in nature. However, what is the will or instinct to live and reproduce if it is not a kind of motivating, though unconscious, intention? As soon as the environment or the ecological context changes, that intention to survive becomes a selective pressure. That is naturally not the same as an organism influencing the emergence of any new trait. No amount of will can do that. Yet an organism's capacity to change, through whatever mechanism, is a form of plasticity. This plasticity already implies that the organism possesses greater potential than it has thus far manifested in actual forms or behavioral traits.

Life is imbued with being and therefore with intention. In the case of organisms striving to live, grow and reproduce, one could call this blind intention. All living beings possess greater (blind) potential than can be realized at any given moment. Were this

[2] Pioneer biologist Ernst Haeckel (1834–1909) became a champion of Darwin's theory of evolution. His work on morphology and anatomy led him to define his biogenetic law. Ontogeny is the developmental history of the individual organism (during embryogenesis); phylogeny is the evolutionary history of the species.

not the case development could not occur. The living world uses many mechanisms to express this intention of development; the best known of these is that of adaptation through natural selection. We tend to forget the other side to the natural selection coin, namely that of nature's abundance. Were nature not fecund, full of potential, there would be no scope for natural selection to function. Within this process are many subtleties, certainly not all of which have been discovered and recognized by biology. As our understanding of the vastly complex nature of biodiversity, ecology and evolution expands, so too will our recognition of the variety of mechanisms by which organisms develop.

Change and Potential

Change creates developmental opportunity. The fact that naturally generated organisms are not clones and continuously bring forth variation—an expression not only of vitality but of potential—means that the potential for development, through adaptation or exaptation (discussed in Chapter 2), is an active inner principle. Complexity has the tendency to leap beyond itself, to become more than the sum of its parts. The appearance of all the major organs and traits that have contributed to the story of human evolution, upright bipedal walking, tool making, cognitive development, language, even the eye and ear, reveal this quality of becoming something qualitatively more than the sum of their parts.

Long processes of evolution from simple to complex have borne within them latent qualities that have emerged, often suddenly at certain critical points. It is these emergent qualities that we need to identify if we wish to grasp what I am referring to as intention. Perhaps we will discover this when the laws of the developmental history of the individual organism (during its embryogenesis) and phylogeny, the evolutionary history of the species complexity, are more fully grasped. I would suggest that this complexity has inherently emergent properties.

Human beings certainly conform to all the known laws of biological evolution. But we have also evolved abilities not possessed by other organisms, and these make it possible for human development and human evolution to influence the process in unique ways. Foremost of these abilities are the faculties of speech, thinking, self-consciousness and free will. These abilities have contributed to what we generally term culture, and culture is a formative process, which, whatever biological underpinning it also possesses, is essentially a product of the human spirit. Culture, as an expression of and a medium for the human spirit, is no longer blind intention. Culture has obviously become a means by which human beings evolve and develop.

Spirit Made Flesh

Human evolution reveals the progressive emergence of faculties in human ancestors that led to an individualization process in which the human spirit arose in and through hominid "flesh," that is to say spirit incarnated in matter. This process reveals itself in stages of emancipation from a purely biological to an increasingly cultural determination. Yet rather than try to reduce the origins of cultural evolution to genetically prescribed behaviors selected by factors of population mechanics, we should see culture and nature in a far more integrated way. That is, not in the reductionist way of Neo-Darwinist biology, evolutionary psychology and anthropology. This way can explain a lot about this process of transformation, but not all.

While important aspects of human nature and behavior can be explained by the methods of these sciences, there are limits to their scope. The reason for this is that human nature itself has outgrown the realms that such methods can investigate. Nor does the story end here because human beings now have the further potential to increasingly emancipate themselves even from cultural determinants through their own inner endeavors. The developing human being can attain a state of relative inner freedom. I do not have to follow the dictates of my selfish genes, nor even be swayed by my instinctive reactions of fear and loathing, though unfortunately, I can and clearly do follow them at times. I can love my neighbor—or at least aspire to.

Rudolf Steiner

In developing this train of thought I follow the ideas of Rudolf Steiner (1860–1924), the Austrian philosopher, spiritual teacher, and founder of the worldwide educational movement usually referred to as Steiner or Waldorf education. Steiner's work also forms the basis for a complementary medical approach with many hospitals, clinics and therapeutic centres, the biodynamic agriculture movement, influential organizational development consultancies and many other fields of human endeavour.

Steiner taught that by following a modern path of spiritual development, the individual can attain degrees of freedom from inner and outer determination. Knowing that this is possible is essential if we are to find not only hope but also meaning in our lives. Only out of some degree of inner freedom can a human being make the kind of choices that are essential to social and ecological stability, if not actually to harmony. That is the goal. As I see it, only a conscious recognition and understanding of the spiritual potential in each person can release the potential to do good. And the world needs us to do good. Faith alone no longer helps. We must think it through on the basis of our own observations. We must base our actions on insight.

The Right Methods and the Right Questions

How are we to recognize this spiritual-individual factor? Indeed how do we know at all what it is to be human? Here lies a key problem of methodology that poses epistemological questions. To understand the soul-spiritual aspect of human nature requires a different methodology than that appropriate for observing the bodily processes and instincts. Ultimately we can only know the human being intuitively through direct mutual recognition. However this does not preclude our forming pictures of the qualities that come to expression through the human being.

Attempting to understand human nature in the same way that we try to understand other natural phenomena, that is by interpreting what is revealed through the senses (and their instrumental extensions), is too limited an approach. It is like trying to understand a painting by analyzing the chemistry of the paint and the physical forces that cause the paint to bind to the canvas. The painting is of a pictorial nature. This means that its content, its iconography, its message, its aura, the overall impression it makes on us in a holistic way, is not sense perceptible. It has to be intuitively and imaginatively grasped.

When we observe a human being, the physical appearance and behavior reveal only certain aspects of the inner nature of that individual, not the whole being. What we perceive are symptoms. Unlike a painting, a human being is continuously in a state of change. The picture revealed to our insight is not a static one but one continually in the process of becoming. Individuals develop, which, as we have seen above, means that they are in a process in which their inner nature is actively seeking to come to expression or, depending on the circumstances, withdrawing. Furthermore, behind what comes to expression in the developing individual is a creative process of formative forces. In our metaphor[3] of the painting, this would be like standing before a blank canvas with paints and brushes ready for use and observing the artist in the process of conceiving the picture. The creative activity implicit in such a situation is equivalent to human intentions.

If we are to understand the human being, we can only do so by recognizing this iconic aspect of human nature and proceed accordingly. We can "read" the human being only in the form of images, of pictures that express processes not visible to us. The same is true if I wish to recognize general processes within groups of people at particular times in history or prehistory. Perceiving the soul-spirit nature of the human being requires quite different abilities than observing physical or biological processes. We have to ask not only how did this come to be but also what comes to expression.

To answer these questions we are likely to get further with our intuition than with our rational intellect. In a way it does seem odd to have to try to justify recognition of the spiritual in the human mind. One could simply list dozens of great artists and ask, Are their achievements in their chosen media biologically or physically explicable? What is art about, if not the spiritual? What is creativity anyway, whether in science or art? Does it not involve some level of intuitive, spiritual activity? But I realize that argument does not help bridge the gulf between intuitive and rational thinking, because the hard line reductionist would only see the machine and not the ghost.

The interaction between soma and psyche, body and soul-spirit, requires that we build a bridge between several methods of understanding. Of course if you deny the reality of what I am calling here the soul-spirit dimension, explanations are much easier but, I would suggest, therefore also partial. According to Noam Chomsky, there is still a huge gap between current understanding of the brain and the mental aspects of the world for which the brain sciences are trying to account. His view is that the mind-body problem exists only because we have no coherent view of body. As he put it in a recent interview,[4] the problem is that many contemporary thinkers have still not really understood the significance of Newton's discovery of gravity: "The possibility of affecting objects without touching them just exploded physicalism and materialism. It has been common in recent years to ridicule Descartes' 'ghost in the machine' in postulating mind as distinct from body. Well, Newton came along and he did not exorcise the ghost in the machine: he exorcised the machine and left the ghost intact. So now the ghost is there and the machine isn't there. And the mind has mystical properties."

The bone I have to pick with current scientific thinking is that it precludes the option that the mind or soul-spiritual part of the human being can and should be taken into account. It washes its hands of the real issues and stubbornly turns a blind eye to half of life by reducing everything ultimately to blind mechanical forces. I seek to challenge current anthropology to get out of its materialistic Catch-22 and think contextually and imaginatively about the interaction of causes and effects, the mutual feedback of such processes and the influence of progressive self determination in both evolution and development. In short I ask that it take the reality of the mental or soul-spiritual side of human nature (what else is the mind, if not a soul-spiritual principle?), as existent in its own right and not merely as a product of physical forces.

[3] I take this metaphor from an essay by Rudolf Steiner, "Über die Bildnatur des Menschen," in *Anthroposophische Leitsätze*, May 18, 1924.
[4] *Guardian Education*, Tuesday, April 18, 2000.

Spiritual Science

Steiner called his approach spiritual science, but not all who follow his path take the scientific part as seriously as they should. I also challenge anthroposophists, that is those who follow and work with ideas of Rudolf Steiner, to break out of the introspection of Steiner exegesis and take note of the significance of the highly diverse approaches and data that modern science provides. What Steiner left as his greatest legacy were a methodology and a practical theory of knowledge. This, rather than the results of his research, is essentially what we have to work with.

The results of his spiritual research exemplify the methodology and are most usefully taken as such. It is the individualized application of Steiner's methodology that is the real challenge. To attempt to construct a body of knowledge out of such fragments involves the kind of mentality best suited to archivists and interpreters.

The largest (and without doubt valuable) part of anthroposophical secondary literature consists of compilations and analysis of what Steiner said on this or that topic. I myself have also contributed to this body of work in the field of education. In recent years I have attempted to relate Steiner's approach to the discoveries of contemporary science.[5] I have tried to do so critically and not merely in an attempt to justify Steiner by highlighting the ways in which science has tended to confirm the views he expressed. This book is an elaboration of this process.

One of the difficulties we have to overcome when we take an anthroposophical perspective is to avoid the wrong kind of anthropomorphism. This is a great temptation when dealing with concepts such "man as symphony of the creative Logos" or the human being as prototype for the animal kingdom. When we live with the metaphor of the animal kingdom like a fan spread out, each species representing a different facet and the human being as the whole fan, how do we actually imagine this? Does this mean that the human being is the end or summit of biological evolution? When Steiner spoke of Atlanteans and Lemurians as earlier stages in human evolution, what did he imagine archaeologists and paleoanthropologists would find? Unfortunately it is too easy to merely assume Steiner must have (somehow) been right, and that poor old scientists simply don't get it! I have stumbled across this attitude frequently when giving lectures on the subject of this book. Even some anthroposophical publishers have made much the same point.

Sadly that is the kind of response that gives anthroposophy a bad name. I am also fairly certain, given Steiner's deep respect for the scientific approach, that he would have found such attitudes disappointing. He was, after all, a university trained scientist. We are called upon to apply both intuitive and rational, analytical faculties to understanding our place in nature, past and present. As Steiner himself put it,

> Spiritual science can only base itself on what the developed soul faculties can discover in the form of imaginations and inspirations. Spiritual science can only speak out of what is consciously experienced in the soul. In relation to what outer science can reveal of nature, spiritual science can more or less only examine the spiritual part of evolutionary development.[6]

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[5] I have essentially done this in a series of articles on language development, memory and the learning processes, mostly published in the journal *Paideia*.

[6] Steiner, R., lecture of May 22, 1921.

The distinction is important. For an understanding of the physical, material side of nature, Steiner was as dependent on his senses as anyone else, to say nothing of the scientific research of others. Steiner's own works show what an avid reader of current science he was.

The Challenge

This book attempts to interpret the story of human evolution as described by modern anthropology in the light of the insights provided by Steiner's anthroposophy, which he termed a modern science of the spirit. It seeks to add the factor of spiritual development to all the other factors that the study of human evolution already takes into account. In so doing I hope to make a contribution towards the integration of the spiritual dimension into the picture of the human being that currently informs the biological and anthropological sciences.

As a teacher I have a stubborn and urgent need to know where we stand. The motivation for writing this book has come down to just this: an attempt to clear my own mind in a way that might be helpful to others. I hope it provokes others far more competent than I am to say, "Hang on there, that's exactly where you go wrong and here are the reasons." To simply oversee, overhear, or ignore the argument for taking the spirit into account would be negligent. This may not be the best possible case for reconsidering, but it is a case that needs answering. Nothing would please me more than if a respected professional in the field took my thesis apart and, perhaps like a good teacher, pointed out just where I went wrong.

I do not expect professional anthropologists to learn much from this book in the way of new facts. I have sought to interpret the facts and hypotheses current in the paleoanthropological disciplines from the point of view of the spiritual development of humankind. I think I can assure the non-expert that the facts I present have, to the best of my knowledge, a sound basis. The many years of research that went into the background of this book have left me with the greatest respect for all the disciplines that contribute to the modern science of human evolution. I cannot claim to comprehend in detail the wealth of data from this multi-disciplinary field, let alone at how it is arrived. As a teacher, however, I continuously have to seek out the essence of the message each scientific branch and each author is presenting.

In my experience, however, one essential aspect is continuously overlooked, even systematically removed, from the agenda. There is one factor that up till now could not be taken into account. Which graduate student could have gone to his or her professor with a proposal for a doctoral thesis taking account of the human spirit in evolution? Well, perhaps at the University of Avalon in Glastonbury! It is hard to imagine Dr. Chris Stringer publishing a paper in *Nature* on "The gesture of the human spirit in hominid fossils: a survey," or Professor Tim White "Spiritual implications of Pliocene hominid postcranial remains from Awash, Ethiopia" in *Current Anthropology*! This would not be quite as bad as "Shelley from the Molecular Point of View" but, in the present academic scientific world, equally impossible. Is it a form of intellectual apartheid that prevents mainstream scientists from referring to such work as, for example, Professor Wolfgang Schad's (equally scientific and referenced paper) "Gestalt forms in Hominid Fossils" in Volume 4 of the journal *Goetheanistische Naturwissenschaft*? Nor is Schad alone. There is a whole group of researchers who pursue "contextual biology" and others who apply similar methods to psychology, medicine, pedagogy, cultural history and other fields of knowledge.

And yet the passion that characterizes much of the science of anthropology betrays the fact that many leading workers in this field are not unaware of the spiritual dimension implicit in their work. Their language often reveals it, not so much in their academic papers but when they come to presenting the broader picture in books written for a general readership. Nor is this, I believe, merely rhetoric and metaphor. The problem is, we lack the language and the precision of concepts to articulate such experiences. We fall back on metaphor rather than exact terminology. The results often sound awkward and even pretentious when authors try to refer to the imponderables of life. But science, in common with art and the quest for the spiritual, has its true roots in awe, wonder and reverence.

Wonder is an experience we have when we seek or recognize higher meaning. Here and there we catch glimpses from behind the scenes of the unfolding public drama that the scientific search for human origins has become, which reveal that some of these scientists acknowledge that the materialistic paradigm is not absolute. Richard Leakey and Roger Lewin admitted in their book *Origins Reconsidered* how deeply personal the search for human origins is. Perhaps more than other scientific disciplines paleoanthropology is, as they put it, "in a sense extra-scientific, more philosophical and metaphysical, and it addresses questions that arise from our need to understand the nature of humanity and our place in the world."[7] Nor is this confession from two influential scientists in the field unique.[8] Let me add the voice of Dr. Donald Johanson, discoverer of the famous hominid fossil "Lucy" and President of the Institute of Human Origins in Berkeley, California. In the epilogue of his book *Lucy's Child,* Johanson declares,

> Any effort to get the truth out about who we really are and where we fit into the rhythms of the earth seems to me passionately worthwhile. I would like to think that my vocation, the search for our origins, is a part of that truth-quest. Our shared curiosity about our beginnings is the emanation of a deeper urge, felt as wonder, to discover the true humanity that lies beneath and beyond the old deceptions, the outmoded beliefs.[9]

In fact this tone of reverence and respect for the nature of the human being and our ancestors can be perceived in many such books. I am not sure how all those respected scientists would explain it. My guess is that most of them would explain it away.

The central theme is to ask, Is there meaning in human development and human evolution? If so, what is it and how can this be established? All the other questions that the book addresses relate back to these.

I do not pretend that this book will lead to a paradigm shift but I do expect a serious refutal. I try to present in what follows the case for recognition of the spirit as a factor in evolution. The reader will have to judge for himself or herself whether I have in any part succeeded.

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[7] Leakey, R. and R. Lewin, 1992, XVI prologue.

[8] I quote several within the text. Their articles will be listed in the Bibliography. I would simply like to name Andreas Suchantke, Craig Holdrege, Dr. Ernst-Michael Kranich, Jochen Bockelmühl, Professor Brian Goodwin, Friedrich Kipp, Armin Husemann, M.D., and Jos Verhulst.

[9] Johanson, D. and J. Shreeve, 1989, p290.

Chapter 1

Self-Knowledge, Truth and Goodness

Discovering where we came from reveals much about who we are, and knowing ourselves helps us understand our origins. As creative beings we are always in a state of becoming, which is why evolution and individual development are aspects of a single dynamic process. The questions of human origins and the nature of the human being are inextricably woven together. How mankind came to be the dominant species on earth is a story that tells us what kind of beings we are. Conversely, understanding what kind of beings we are sheds light on how we have come to our unique position within the ecology of the earth.

Furthermore, the self-knowledge we gain through studying our origins is not merely of personal interest but also has a significance for the rest of world. The fact is, the destiny of life on earth is bound up with this human quest for self knowledge. The unique and wondrous abilities of human beings and how they arose are the subject of this book, and I will be exploring them in detail. But let it be said at the outset that we have a duty to attempt to understand these faculties in as comprehensive and honest a way we can because of the shadows they cast on the world that sustains us. We experience this darkness most drastically in the ecological consequences of modern technology which is, after all, the most potent expression of human intelligence. So significant are the consequences of this intelligence for the planet that they can hardly be exaggerated. Let it suffice to list a few of the most familiar (though far from fully understood) concerns: chemical and radioactive pollution, advanced destruction of the ozone layer, global warming, the loss of natural habitats with local and global impact, diminishing biodiversity, and human overpopulation. Furthermore, we must add to our ecological deficits a heavy balance of intra-personal, social, cultural, economic and political helplessness, of fear and uncertainty which comes to expression in all manner of social woes.

Whatever we hold to be the significance of the end of one millennium and the start of another, we have reason enough to reflect on what humanity has become and what it may become. The past century closed with a deep frown of concern on its brow. A century of incredible progress, the most rapid period of fundamental change in the whole of human history, leaves us dangling, disoriented, faced by paradox where- ever we turn. Let us be honest and admit to a primal uncertainty. Who really knows what it all means? I could fill this chapter with a frightening story of seemingly intractable problems and impossible challenges, interpreted by a Babel of competing theories and therapies. It is no wonder that we are so drawn to tales of the weird and mysterious on the one hand and prone to getting away from it all (self-gratification, endless entertainment, consuming, drugs, alcohol and anything else that seems to take the pain away) on the other. It is unnecessary to attempt a scholarly analysis of the symptoms of the times and the challenges they pose for us. One need only leaf through a Sunday newspaper (all ten sections plus travel supplement) to see not only the crises of the week but the tragedy of our times. Of course there are shafts of redemptive light piercing the gloom, but they only serve to reinforce the darkness and remind us that the search for meaning is, as it always has been, existential.

All these problems flow causally from human activity driven by the human will, motivated and conceived by the human mind. Presumably this has been the case for a very long time. I take the view that our history of ecologically harmful behavior goes back a long way. Just how long is a topic I will be discussing later. The difference, of course, is that we now possess the means to translate our thinking into deeds that are infinitely more powerful than ever before and therefore the stakes are that much higher. The fact is, modern, materialistic, reductionist thinking (some would add the epithets, predominantly white, male and Western to the damning list) has compounded the morally shallow, greedy, exploitative and destructive side of human behavior and that even our recently acquired ecological conscience has done little to change in terms of practical consequences.

The balance on the other side is noble; the best achievements of modern medicine, as well as the many technological advances that make life safer, more comfortable, that give us so much more mobility, access to information and so on, cannot be glossed over by doom-laden backward looking pessimism. I owe the life of one of my children to medical skills that were not available in my childhood. That there is (and has been) much good in the world is the point we need to dwell on because that good is not just there by chance or because in a random scatter of behaviors, some are bound from various perspectives to be perceived as good. No, they are good by intention, not by chance or self-interested calculation. Nor does the good arise as an accumulative aggregate of blind progress, along the principle that the process of trial and error will result in some good because good is what works. The fact that there is good in the world, that good things happen, that good things are discovered (and sometimes rediscovered), is crucial to our understanding of ourselves because goodness, its presence and absence, implies that there is meaning.

This assertion may strike the reader as hopelessly naïve or as well intentioned, if deluded piety. I hope I can show that it is neither. As I shall try to argue, a human being is capable of doing the good thing out of insight and free will. No one can deny that a human being can do evil, often inadvertently but also intentionally. It would be foolish to claim otherwise. Yet what makes the deeds of human beings either good or bad is not absolute but relative. But, relative does not mean random. Things or events of themselves do not have meaning in the abstract, but only in context. It is the same with goodness. Goodness is always in context. Evil, its antithesis, which comes in all shades, is always in some way out of context. One could also say out of balance. What makes the difference is meaning.

The search for meaning is intrinsic to the process of knowledge. But for knowledge to have meaning it must be as complete as possible, which is to say it must be contextual, it must be embedded in a context. The context gives the knowledge its meaning. The greater the context, the greater the knowledge and its meaning.

Ways of Knowing

There are different ways of knowing things. We can know about things. This preposition implies a circling at a certain distance from the point. This makes a spatial distinction between knower and known, what we call in grammatical terms, subject and object. The predicate describes what we do to the object. This kind of knowledge always means doing something to or with the object of our knowledge. We can also, however, know something in the sense "I know her," which is different from "I know about her." The difference is one of intimacy. The Biblical phrase, "Abraham knew Sarah," makes the intimacy clearer. This second knowing implies that we unite ourselves with the object, or at least intend to approach as closely as we can. Both kinds of knowing are stages in the act of knowing. If the things we know about remain things, we remain detached, our sense of responsibility is diminished, because the meaning of the thing we know about is insignificant in relation to the totality of its living context. When we know something more intimately, when we recognize the other as being, we enter into dialogue with it. It is a two-way process. In dialogue we give, perhaps even risk, something of ourselves; otherwise it is no true dialogue.

The problem arises when our method of knowing stops at the "knowing about" stage. This is especially so when our object is the human being, humanity in general, or simply ourselves, though the tendency is equally true of other objects. If our method of knowing about the human being filters out aspects of human nature, if we focus on the parts and ignore, or fail to recognize the other parts, we cannot know the whole, or even approach it. To be blunt, if we treat the human being only as a mechanism, however complex, as a gene machine, as a collective of biochemical systems, we overlook the human as being. This is the main problem with the materialistic reductionist approach. It is true whenever this method is exclusively applied to the living world as a whole. Firstly it denies the fundamental quality of being to living organisms or processes, since being makes no sense to a materialistic point of view, and secondly, its methods only allow us to know about things.

To some extent this is understandable. It is difficult to take the whole context into account, it is much easier to start with parts. In focusing on one point, in trying to pin it down, other points of reference recede and go out of focus. The object becomes dislocated or displaced from its context, from the ordered whole with which we started.

Each attempt to gain clarity sooner or later fails. Things lose their meaning when they lose their context. Faced with complexity (Is there anything in the living world that is not complex?) the scientist seeks to simplify, remove as many factors as possible, except what they consider to be the essential, and establish norms for comparison. With each attempt to establish norms, general structures or predictable patterns (which we hope will provide us with security), we permanently risk distorting or losing the very phenomena being studied. Why? Because each case on closer examination turns out to be different, to vary from the norm in ways which make generalization a largely fruitless and often semantic task. Thus the phenomenon may have to be altered so that we can deal with it. This is very obvious in the whole field of the sciences that try to understand the human being. The complexity we discover threatens to overwhelm the means we have of understanding it.

This is not in any way an anti-science position. We can form concepts and generalize or categorize on the basis of our observations if we follow a path of knowledge that goes from the whole to the parts and back to a whole imbued with meaning, or at least as much of the whole as we can encompass, as many of the parts as we can distinguish, and as much of the meaning as we can apprehend.

Knowledge and the Will to Help

One of our main motives in searching for knowledge is a pragmatic need to solve problems. Beneath this understandable intention lies, I believe, something far more fundamental to human nature, something deeper and more quintessentially human. It is at heart a desire to help, to redress perceived imbalances, to comfort, to heal, to make life easier for the other person, and yes, for ourselves, too. This motive lies at the heart of scientific inquiry, though it may be very well hidden by other, shallower motives. What is the quest for knowledge about in the first place, if not the improvement of life? The better we understand the world, the better we can apply what we know to meeting human needs, and more recently we have learned to extend this concern to the natural world around us.

This interpretation may seem farfetched. It is farfetched because it needs to be retrieved from far away. Buried beneath seemingly impenetrable layers of terminology and remoteness of methodology, science is at heart a genuine desire to help. Of course, as in all walks of life, self-interest, ambition, short-termism and tunnel vision will be found. But these manifestations are not fundamental to science or any quest for knowledge, though no one should underestimate or excuse the potential for destructiveness when power is exercised, and knowledge is proverbially a powerful thing. Human beings are only destructive, anti-social, selfish or brutish when their true nature and spiritual potential is prevented from coming to expression. The reasons why this potential may be hindered or suppressed are manifold but they include both biological and cultural influences. That our true nature only comes to full expression in exceptional individuals and in the rest of us only occasionally should not deter us from trying. In fact such examples pose the central question, What aspect of the human being is able to override biological or cultural determinants? This question has often been asked before, usually in the following formulation, What is the origin of our free will?

I follow the view of Rudolf Steiner and other thinkers who have asserted that a truly free human being can only do good. Free in this sense means free from inner or outer compulsion to act in any predetermined way, even if that imperative comes from external moral codes derived from religion, philosophy or anywhere else. Free means that individuals derive the motives for their actions from their own intuitive insight.[1] A free human being has access through his own thought processes to a realm of "universal ideas"[2] (Steiner) and can draw his or her ideals and motives from this objective source, one to which any thinking being has access. I shall return to this idea later. For the moment I ask the reader to take it as an unsupported assertion.

The Will to Find Meaning

Gordon Wells, whose work on children's learning, has opened up new ways of understanding the process of education, very aptly called his pioneering book *The Meaning Makers*,[3] a reference to the way children actively create their understanding of the world in interaction with it and through communication with those around them. I argue that we can extend this attribute to humankind as a whole and that the self-directed search for meaning has been a key evolutionary trend in the long journey we

[1] Free also means free to make and learn from mistakes.

[2] See Steiner, R., 1979, *A Philosophy of Freedom*.

[3] Wells, G. 1987, *The Meaning Maker*s, Heinemann. Wells follows Bruner and Vygotsky in stressing the social aspect of knowledge and learning.

have taken from our earliest beginnings. Meaning is about recognition. It arises in mutual recognition between beings and in heightened form between sentient beings, and only a self-conscious individual being can recognize another individual being.

To recognize that something has meaning is to recognize it as being. Human beings have what the psychologist Viktor E. Frankl called an "innate will to find meaning" and it is this meaning-based will that leads towards the good. Evil arises out of the absence or poverty of meaning. It is not merely a question of not knowing, it is a question of not recognizing meaning, for whatever reason. We deem the intentional ignoring of meaning morally worse than mere ignorance. To inflict suffering, to degrade or kill another human being intentionally is justly considered a crime worse than accidentally or negligently doing harm. We intuitively rate harm done to humans as worse than harm done to other creatures with culturally different degrees of culpability. Some consider hunting for sport reasonable; others consider the killing of an ant a sin. The reason for these moral distinctions lies in our perception of the being of the other creature. The more we recognize being in the other creature, the more meaning it has for us. This is why we do not consider animals capable of evil, unless we project anthropomorphic qualities onto their behavior. As far as we know animals are not capable of experiencing meaning in the sense I am using it here, although they are obviously capable of being aware of the significance of certain things. A hungry lion knows that a lame zebra "means" an easy meal. I shall use the term "higher meaning" to distinguish this from simply knowing about something.

Only a lack of a sense of higher meaning, a lack of an awareness of the being of the other, can lead us to behavior that harms others, to destructiveness or selfishness which takes no account of the consequences. As the child psychologist Henning Köhler puts it:

> "Evil" behavior is always an expression of a tragically mistaken attempt to fill the "vacuum of meaning" which arises when a person is under the impression that his or her existence has no meaning for other people.[4]

He then proceeds to argue that if the potential meaning of our existence is discovered and recognized by the other people, and then valued as something that can contribute to our collective tasks as social beings, then that individual is more likely to do good. The more objective an understanding we have of the fullness of situations and relationships, their short and long term consequences, the more we will choose to be people who can act out of this insight. Doing good is always a choice. Sometimes this arises out of long reflection, weighing up the situation. Often we simply have to act in the moment. Being able to do good without first having to consciously consider the options is a mark of high development in an individual. It means that an individual's whole being is permeated by spiritual rather than egotistical will. There is, as it were, a direct channel between the realm of objective knowledge and the simultaneous ability to act in accordance with it, to be totally in tune with the whole situation. Doing good means having the will to do the right thing at the right time. It also means actively accepting full responsibility for one's deeds. "Moral intuition,"[5] is something we can work to develop. It is undeniably a long path, but every step towards it can only help.

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[4] Köhler, H., *Vom Rätsel der Angst*, Verlag Freies Geistesleben (trans. MR), 1999.
[5] See Steiner above.

Recognizing the Other

We awaken to our own being through the recognition of other beings, and this is where the search for meaning begins. We learn to know ourselves in knowing the other, in knowing the being of the world around us. Our desire to understand the world is initially a need to experience our relationship to it. The relationships we discover confirm our experience of ourselves, or lack of it. We have an inherent disposition to seek meaning, as it is essential to our self-experience. If the culture we grow up in is devoid of higher meaning, or denies its existence, we have very little on which to base our own experience of self. If this innate will to meaning is thwarted and social convention or religion, which traditionally was the guardian of meaning, is fragmented, incoherent or simply hollow, then the developing human being will follow the path of least resistance, which may not lead towards the common or ecological good.

The only meaning or life-motive that remains in the absence of higher meaning is survival, which in our complex world can take all kinds of forms. Moral insight, upon which civilization is based, arises out of the collective and individual search for meaning. Love, social goodness and ecological consciousness all have a common source. They all depend on our mutual recognition of the being of the other. Our genes may be selfish but the higher states of mind, such as language, cognition, knowledge, and even self-consciousness, are all dependent on interaction with other beings. Actually, at the most basic level, even our genes have the same disposition, since biologically they cannot replicate on their own either. Competition is not the only motor of life; cooperation is equally necessary at all levels. At the level of human individuality, being comes to expression through interaction with other beings and remains incomplete without it.

The picture we have of ourselves, what we choose as our innermost ideals and motives for life, what we have set ourselves as tasks to achieve, works not only on our individual development but influences our relationship to others and indeed to the world around us. If we follow a life-motive that says we are not here for ourselves but for each other, and this motive is not imposed upon us by any outer education or moral code, nor any biological imperative (such as a gene for altruism) but out of personal insight, healthy social processes would have a better chance of being sustained than if each of us pursues a me-first principle. It may sound simplistic put this way, but there is nothing simple about the consequences. That we are here for each other and that social life depends on mutual recognition and reciprocity are facts that only true self-knowledge can confirm. We cannot prove them mathematically, statistically or theoretically, we can only experience them empirically and phenomenologically. Self-knowledge is a process of self-activity that can be raised to significant levels. It is about who we are because identity is in the end also a process of self-activity.

The Responsibility of Science

Why is this philosophizing necessary in a book about human evolution? Unfortunately we cannot avoid it, if we are do the theme justice. Knowledge about human beings and how we arrive at it are important because the shadow side of human behavior is so dark. The picture we construct of what it is to be human—and this includes how we have come to be human—has the profoundest consequences for us all, not least for those finding their way in the process of becoming self-conscious individualities. I mean as children, adolescents and even university students, not to mention partners and parents.

The biologists, anthropologists and psychologists and all the other disciplines that contribute to the complex picture we have of humanity and human evolution may or may not be aware of the educational implications of what they say and write. The trickle-down effect of scientific knowledge may have to pass through numerous strata of filtering. Unlike mineral water, which is both purified and enriched by the process of permeation, scientific knowledge is poorer through the process. It invariably emerges in oversimplified, inappropriately compiled form, as often as not seriously out of date. Textbooks, especially those designed to help students pass examinations (which make up about ninety percent of what is available), parcel knowledge into quickly digestible units that fit on single pages.

Actually, the metaphor "digest" already suggests far too much. I am talking about the acquisition of simple concepts designed as add-on building blocks suitable only to short-term memory retention, a kind of biodegradable conceptual Lego system. Unlike real Lego, which has a robust and dependable material nature, conceptual Lego is not designed to last very long. While the contents may fade, the implicit learning structure leaves its impression as do the inherent attitudes that accompany such information (much of it hardly deserving the name knowledge).

What is more, the journalistic version of scientific knowledge, which has to obey the marketing criteria of sub-editors, often reduces the content to downright misleading headlines. Examples may include oversimplifications along the lines of: Scientists have found a gay gene, or, We are all descended from an African Eve. Serious scientists know what is meant by these shorthand formulations, but serious citizens and children may not. Professor Steven Rose has drawn attention to the problems that such misleading headlines create in his book, *Lifelines*.[6] My concern is for the child and young person living in a world where the important distinctions that well-informed adults may be able to make are not available to them.

Children Imitate the Attitudes We Show Them

Do we have any idea how such ideas work formatively into the emergent inner life of developing human beings, especially when they are very young? As I shall be discussing later, the young child is profoundly imitative, and this process is far from simple. Everyone acknowledges that growing children are influenced by their environment, even hard-line genetic determinists (of whom more later). It is not merely a question of parental or school influence. Our cultural environment works deeply into the developing child at several levels. Nor is this process one of simple imprinting of impressions, like pressing into wax or putty, nor of the training of social and cognitive habits. Environmental influences work both extrinsically and intrinsically. Internalized they become part of the formative processes within the developing human being, rather than merely functioning as molds into which the child grows. Such influences are taken in, literally in the case of nutrition or through the senses, passing through many complex stages of assimilation before becoming part of the body of forces that the child draws on for her own growth and development.

At a deeply unconscious level the child perceives qualities that work formatively in the world around her. Even as adults we retain something of this ability lifelong. It is not restricted to the superficial level of what the child sees or hears but cannot understand. Language acquisition is a case in point. In learning our mother tongue (again

[6] Rose, S., 1997, *Lifelines, Biology, Freedom and Determinism*, Penguin.

a topic I shall be exploring later at some depth) we also assimilate attitudes, affective gestures, moods and thought patterns such as sympathies or disparagement towards certain concepts or people. Even hatred can be imitated and assimilated. This in turn influences the way we think and feel. Imitation operates in many sensory modalities, including the perception of movement, body language and gesture. Children adopt the attitudes of their parents and role models that these gestures imply.

At even deeper, more unconscious levels, the developing human being is so open and has such extensive fields of perception, that the intentions of others are perceived and have their influence. I am not speaking unscientifically of telepathy, but of what can be observed. A child learns to speak by grasping the intentions of an adult speaker long before he or she has much grasp or semantic of syntactical meaning. I have observed my daughter at the age of just under two, understanding her grandmother speaking a foreign language not spoken in our home. Mind you, for a toddler not yet speaking, all languages are foreign in a sense, though in another sense all are familiar!

Again I stress that I am not referring to any supersensible activity. The child "reads" the intentions from the actions of the other person and these in turn reflect thoughts, feelings and attitudes. We may not be conscious of this fact, but what we think is inextricably mirrored in many subtle bodily ways, including body temperature, tone of voice, gesture and posture, pulse, skin and muscle tone. This is why lie detectors are effective with all but the most convinced liars. Such signals are read face to face, as it were, and are the most potent form of human communication.

Everything humans make and do expresses some thought (or its absence). Whether I empty my car ashtray in a meadow full of wildflowers beside a highway service station, or not, is an action arising out of complex and effective attitudes rather than any rational thoughts (to say nothing of the smoking habit in the first place!). We could call it, charitably perhaps, an un-reflected, inconsiderate action. How could it have come about?

My sense of the appropriateness of this action was at some point established. We may not consider this "thoughtless" act evil, but it is done in the absence of an awareness of the wider consequences, let alone the whole context. We do not have to have thought through the entire context of every conceivable action in advance to have a sense for whether it is right or not. Even our vast brain capacity would be taxed by that requirement. Rather it is a question of establishing primary attitudes of respect towards the world. If I learn to see the world around me as a living being, if I learn to be responsible for the waste I produce, if I learn that everything has its proper place and time within life's rhythms, I am more likely to act responsibly and take my rubbish home, if not actually give up smoking. The task of education becomes moral when children learn these basic gestures of respect. This will best be done out of respect for the child's own being, for the different states of consciousness which unfold at different ages.

The young child learns by imitation. If the adults around the children act out of love and care for the world around them, the children will assimilate the inner attitude that informs their actions. If adults live their lives out of a sense of higher meaning, this will powerfully influence a child's later attitudes. At a later stage the children yearn to know about the world, to discover its many faces and moods. The task of education then, is to lead the children to experience as much of the world around them as possible and to help them digest these experiences in an imaginative and living way, not through dead concepts and formula, but anthropomorphically, in ways to which the child can directly relate.

Later still the young person will want to know what principles are at work in the phenomena of the world and human culture and will demand ways of knowing that reveal those. At each stage the adult responsible has to understand both the child's way of being and seeing, respect this and work with it, as the carpenter must work with the grain in the wood. At the same time the educator must himself or herself strive to have a higher sense of the meaning of the subjects he or she teaches. If educators do this, the children will intuitively be nourished by that knowledge when they themselves internalize it through their own self-activity in learning. The younger the child, the more powerful this intuition. The child's will to meaning is all the more powerful for being unconscious. In learning to form their own judgments, older children and adolescents will increasingly feel separated from this intuition of wholeness and meaning. Their need is to find it through their own inner activity. They need help and role models still, but at this stage they expect competence from us. They expect that we know what we are talking about. They want to know that it is possible to seek the truth. However, they don't necessarily want to hear the answers from us. The judgments concern meaning they increasingly need to make themselves. They also need to experience adults who are themselves striving on a path of knowledge. This brief discourse on pedagogical principles, perhaps to be expected from a teacher, should serve to emphasize the point that the thoughts we have as individuals and their cultural extensions work formatively in the world and especially on children. The idea behind the Buddhist teaching of right thinking is in this respect very practical. Thoughts are realities and realities have consequences. I do not wish to labor the point any further; I hope it is clear what I am getting at. Let me sum up the relevance of this for my theme of human evolution.

The thoughts we have and the image we form of the nature of the human being work formatively on developing children and adults. That includes our biological and anthropological ideas. No doubt scientists would say, well, yes we hope so, that's why we do it. But the way we arrive at our theories and explanations, the methods we use, the thought-forms we apply are important too, as is the moral gesture underlying them. Later in this chapter I will take this point further, but at the moment I simply wish to pose the questions: How do we observe the human being? What methods are appropriate if we wish to understand our full and true nature, let alone do so in such a way that the dignity and integrity of the human being is not only recognized but valued?

Understanding what it is to be human—even approaching such an understanding—is always therefore a question of self-knowledge and self-knowledge cannot avoid the search for meaning. The modern relevance of the ancient saying, "Know thyself," is, however, not an appeal for personal revelation and fulfillment but a call to serve the higher needs of the rest of the world. We gain self-knowledge through recognition of ourselves with and through the other being, be that in nature or in the other person. This mutual aspect of knowledge has its shadow side. If we ignore it or fail to recognize it, there is always a high risk that we impose on and exploit the world around us. Our freedom has made us dangerous, but the very powers that make us so are the same ones we can use to heal and serve.

Science or Non-Science

Understanding ourselves means recognizing the fullness of our true nature and this is where the problems start. There are so many ways to identify and define human nature and each way brings its own limits. The perspective depends on the standpoint of our worldview and each worldview claims to encompass the whole.

At the risk of oversimplifying, we can say that since the Renaissance there have been basically two options. We can adopt a scientific view, which essentially means seeing things from a materialistic standpoint that recognizes only the logic of mechanical causes and sees the possibility of order but not meaning in the universe. The alternatives to the scientific view are many and varied but most share a belief in some kind of supernatural intention that gives the whole its meaning.

The modern scientific approach builds on two basic principles: the validation of theory by the repeatability of experiment; the simplification or reduction to basic principles of the application of measurement and thus quantification to phenomena. For the scientific view the question of meaning is strictly confined to the rational relationship of scientific facts to each other. The non-scientific approach is traditionally based on personal intuition, faith and revelation. These two perspectives are essentially irreconcilable although I suspect that most people, including many scientists, would wish that they were not. We live therefore with the paradox in that it appears to be a human need to want to see meaning in the world while our rationalist thinking inclines us to take a scientific view, which says, "There isn't any!" At any rate, it informs us that science is not equipped to answer this question.

Science can be seen as producing a conception of the world that is at odds with the way we experience it and even sometimes seems to wish to displace human experience. Because the scientific approach has the upper hand in our culture, it is easy to dismiss the alternatives. Science in many ways seems to claim implicitly its preeminence by virtue of possessing the only real form of knowledge available to us. It is almost as if science were above the cultural concerns of the times and forgets that it too is a part of culture and thus contributes to our overall sense of meaning along with art, aesthetics, philosophy, religion, ethics and individual human experience. At the end of a book devoted to understanding the relationship between science, art and the human world, Professor Anthony O'Hear of the University of Bradford, highlighted this point:

> One of the most insidious features of the scientific spirit is its tendency to suggest not simply that its knowledge has a unique standing and that anything that is really knowledge must stem from science, but that all true knowledge must conform to its ideal methodology of presenting its findings in terms of explicit theories and their deductive consequences.
>
> But science itself is a human practice, one practice among others. Examination of its theories and methods does not support the view that scientific knowledge is specially privileged or free from unprovable and mythological elements.[7]

Many scientists would, of course, refute my implication that science is a worldview (or has an implicit worldview) let alone, a belief system. Yet it is a way of seeing the world that in practice is selective since it places limits on what can be known. Its methodology is perhaps the best one available to us at present and its achievements are undeniable, but it cannot claim to be the only source of objective truth, unless we pragmatically reduce truth to what we know that works at present. The worldview underpinning the modern scientific approach is mechanistic and materialistic and is therefore devoid of meaning. Its supporters would say, of course it is, because modern

[7] O'Hear, A., 1988, *The Element of Fire, Science, Art and the Human World*, Routledge.

science reveals such a universe. As Richard Dawkins puts it in his pithy, provocative way:

> In a universe of electrons and selfish genes, blind physical forces and genetic replication, some people are going to get hurt, others are going to get lucky, and you won't find any rhyme or reason in it, or any justice. The universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil, and no good, nothing but pitiless indifference.[8]

The reason we do not like to accept this, we are told, is that human beings desperately need myth and narrative and, above all, meaning, for reasons that evolutionary psychology will shortly explain, presumably because the psychological longing for meaning somehow conferred fitness and reproductive success on us at some point during the Stone Age. But can we dismiss the alternatives so lightly?

The extremes of both the scientific and the non-scientific approaches would claim exclusivity of access to truth (or its nearest equivalent), but extremes always tend to be incapable of adaptation. They are, in a way, like unfruitful specializations that become, as often as not, evolutionary dead ends. Those at one end of the spectrum simply deny any alternative to what the philosopher Daniel Dennett calls "greedy reductionism"[9] which reduces human behavior to biology, biology to chemistry and chemistry to physics. It reduces complex organisms to cells, cells to molecules, molecules to atoms, atoms to subatomic particles, in a cascade of reductionist argument. This approach ignores the fact that different principles operate at different levels of complex systems or, put another way, the same principles operate differently. Biology is inherently more complex than chemistry and chemistry more complex than physics. The human brain for example is reckoned to be probably the most complex system in the known universe. Greedy reductionism oversimplifies in the desire to bring everything down to a few basic principles. Dennett gives an absurdest example of this kind of thinking taken to extremes by suggesting a scientific paper entitled, "A Comparison of Keats and Shelley from the Molecular Point of View."

The non-scientific extremes simply ignore all scientific fact and rely on faith, handed-down traditions, the word of individuals and hunches. One end of the spectrum says in effect there is no meaning, the other replies, yes there is. Arguing along these lines is hardly constructive. What we need is an integrated, holistic, consilient[10] approach to knowledge that recognizes the reality of both the sense-perceptible world (including the extension of our senses through instruments) and the psychological reality of human experience.

No Skyhooks Please

Daniel Dennett uses a metaphor[11] that I would like to adapt as a criterion for defining whether a worldview or philosophy is valid or not. He describes two kinds of

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[8] Dawkins, R., "God's Utility Function," in *Scientific American*, November 1995, p67.

[9] Dennett, D., 1995, *Darwin's Dangerous Idea*, pp80–82.

[10] I refer to Edward O. Wilson's revival of the term "consilience" in his book of the same title (1998) published by Little Brown. Wilson argues for the need to search for the fundamental unity of knowledge through reduction to a small number of universal laws.

[11] Dennett, D., 1995, p74.

theories; one that supports itself hermeneutically and is, in other words, a self-contained system requiring no external support. He uses the image of a crane that, firmly standing on the ground of reality, lifts its building materials step by step towards the highest point using its own structural resources. One can also observe that cranes can be built into the structure of skyscrapers so we can extend the metaphor and describe cranes lifting both themselves and their materials, thus providing us with a metaphor for self-building systems. The other kind of theory requires what in theatrical terms is known as a *deus ex machina*, or what Dennett so vividly refers to as a skyhook to raise itself up. The image is compelling. It is clear that any approach that seeks to offer an alternative to the modern mechanistic, materialist worldview may use no skyhooks. That is the challenge as I see it.

Each individual, each people, each culture, each historical period finds answers or at least formulates questions that relate to the mysteries of life and human nature. Much of human cultural endeavour has been a searching to understand humankind's place within creation. Art, religion and science are also expressions of this quest for answers. Social and political structures reflect such worldviews. The self-identity of any society, however unconsciously expressed or deliberately articulated, requires implicit or explicit answers to the questions of origins and the nature of humanity. For most of history, this has taken the form of myth, ritual, the construction of shrines, temples and all manner of sacred sites, as well as religion and philosophy. It goes without saying that all such answers would have to be judged as provisional.

All attempts to articulate the mysteries of life center on the relationship of the human being to the rest of creation. This also means understanding the creative forces at work both within the world and within the human soul. The religions of earlier ages found meaning in this relationship and expressed this in the images we are familiar with from mythology. No doubt each culture also found much that was inexplicable, even unknowable. Yet even what was beyond human comprehension was assumed to have meaning. Until the dawning of the scientific age, the whole of creation was imbued with meaning for the basic reason that the idea of an immanent, purposeful creator was implicit in the concept of creation. Life and all its manifestations great and small were experienced as an integrated, meaningful whole because it was the creation of a higher being or beings.

This certainty has faded with the rise of scientific thought. It did not happen overnight or even in a generation, but over centuries. It is a process that is still going on. The scope of classical Greek philosophy shows that some individuals had their doubts long before the rest of humanity. Conversely many people still have faith in some form of higher meaning. Let us not forget the twenty-three percent of modern Americans who believe in a creationist origin of the world.[12] And there are many others who are not Southern Baptists or creationists, who also believe in some non- materialistic meaning in the world. However, I hazard a guess that the vast majority of intellectuals today, if pressed, would probably sign up to a materialistic conception of the universe in some form or other.

[12] The results of National Opinion Research Centre poll quoted in Wilson, E.O., 1998, p142. Dennett, 1995, p516, puts the figure at 48% and reports that 70% believe that creation science should be taught in school alongside evolution. Michael J. Behe, in *Darwin's Black Box*, 1998, p239, reports a survey that shows that 90% of Americans believe in God.

Changing Views of Change

How did this shift of consciousness come about? The twin questions of development and origins exercised many minds from the end of the eighteenth century onwards. The ideas of development and evolution were themes that ran through the heart of nineteenth century scientific, artistic and philosophical thinking, beginning well before Darwin. In the broadest terms, cultural history in Europe and the United States oscillated between rationalism and romanticism, between a worldview which favored the intellect and one which placed greater faith in the intuitions of the will, though many individuals were motivated by both streams. Both these tendencies were radical in that they wished to break away from the traditional and static pictures of humanity's place in the world that had reigned since ancient times.

The cyclical view of a world strictly ordered into hierarchies, in which change was minimal and bound within a law of eternal stability which had existed from time immemorial right up till the Renaissance, was replaced by a more dynamic view of historical change and progression. Change was either slow and uniform or, depending on your politics and temperament, rapid, dramatic, revolutionary and cataclysmic. Either way it was change. Scientists of the organic world observed change in the progression from simple original forms to higher more complex ones. Professor Steven Jay Gould comprehensively described the changing view of change, especially within the life sciences in the history of science literature, in his book *Ontogeny and Phylogeny* (1977).

Initially the questions concerning the nature of change or evolution were intertwined with concerns of meaning and the nature of God. Rationalist philosophy began to displace the idea of a purposeful creation through the acts of a Divine Creator but did not doubt, on the whole, that nature expressed some kind of order, plan or higher design. What was not clear was whether this order was in some way predetermined, as in the pre-formationist view of embryology which held that all the major structures are present in miniature form in the germ and simply need to be unfolded. The alternative was the epigenetic view that order and new structures arose in the course of development. The word evolution actually changed its meaning from the literal unfolding of what was there to its opposite which was eventually defined by Herbert Spencer, the English social thinker as "change from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity," in his book *First Principles* (1862). In either case, nature was the expression of an immanent purpose that gave evolution a goal. It was otherwise incomprehensible. Everywhere one looked in nature one could see complexity apparently arising out of simplicity so that some kind of intelligent design purpose had to be assumed. That is, until Darwin.

Since Darwin

Darwin's theory of descent by natural selection, despite his efforts to limit its application, very soon became universal in its implications. His theory provided a mechanism that could explain the complexity of living organisms without the need for design or purpose, divine or otherwise. If this was the case, it was not, therefore, necessary to have a God or divine creator at all. Life could have arisen without any spiritual activity at all. The ultimate origin was left open for a divine spark, but once the whole process had been set in motion, life could unfold without spirit. Darwin was clear about that. When his colleague and independent co-discoverer of the idea of evolution by natural selection, Alfred Russel Wallace, argued for strict selectionism for all natural phenomena except the human mind or spirit, Darwin had to politely, and probably regretfully, decline. "I differ grievously from you, and I am very sorry for it,"[13] Darwin wrote to Wallace after Wallace had written suggesting that higher spiritual powers guided human destiny and had provided man with a larger brain than he biologically needed. He knew that any exception to the rule of natural selection would invalidate the whole principle.

Before Darwin it had been justified to argue that the complexity we perceive in nature was the result of intelligent design and intention. This meant acknowledging some preexistent idea, some principle of mind that preceded matter. Since Darwin it is not necessary to accept mind-first explanations since all forms of living organisms and their behaviors can be accounted for by the process of natural selection acting on chance variation, including what are considered the higher faculties of thought, language, feelings, consciousness and sense of self. Indeed much current Darwinian literature is devoted to explaining just such phenomena, including self-consciousness and free will. (I will be discussing some of these theories in the course of the book.) If it has become possible to explain organic complexity and human abilities by the processes of natural selection, the question of higher meaning becomes irrelevant. In the course of the nineteenth century, scientific inquiry shifted from seeking the purpose of a given phenomenon in its relation to the Divine Scheme of Things and how it revealed something of God's mind to asking about its causal origin, a shift of focus from the future (revelation) to the past (explanation). The progressive realization of a perfect world became the increasing perfection of the realized world.

Darwin did not abolish God (though he did personally lose his relationship to God following the slow death of his beloved daughter Annie[14] and later the death in childbirth of Amy) or the spiritual world or a preexistent meaningful order in the universe. He, or rather his idea, just made it irrelevant to science and thus increasingly irrelevant to cultural and intellectual life as a whole. In fact Darwin's idea does not necessarily imply materialism. Rudolf Steiner argued strongly that "Darwin's discovery per se need not have tended to materialism"[15] but that materialism was imported into Darwinism. Materialism, as a worldview which says that there are only material causes in the universe, does not need to deny the spirit. It just has to deny it any effectiveness in the world and deprived of effectiveness, spirit soon loses significance and becomes detached from our practical life concerns. It is relegated to the subjective personal level and loses any certainty of meaning. One could argue that materialism is still a minority view, if only because very few people except philosophers, scientists or other academics understand it. That is probably true but its influence as I have argued above permeates all levels of human society.

Mind or Matter or Both?

In the course of the nineteenth century, philosophy moved from deriving nature from the spirit (F.W. Schelling) to deriving spirit from matter (Haeckel). Most, however, sided with people like pioneering anatomist DuBois-Reymond who said *ignorabimus*, "We cannot know," because there are limits to our knowledge and always will be. Positions

[13] Quoted in Desmond and Moore, 1991, p570.

[14] Ibid., " Annie's cruel death destroyed Darwin's tatters of belief in a moral, just universe. Later he would say that this period chimed the death-knell for his Christianity," p387.

[15] Steiner, R. "Haeckel and Theosophy," lecture of October 5, 1905, in *Two Essays on Haeckel*, Rudolf Steiner Publishing Co. 1935, p101.

in the twentieth century, despite the change in terminology have remained basically the same. But do we have to choose between these two options, which say either that mind arises as a function of matter in the course of a meaningless evolution, or that mind or spirit or divine will preceded matter and nature. Or do we simply accept that we probably will not ever know? It is surprising how many leading thinkers on the human mind come to this conclusion, arguing that the mind is a chance product of natural selection which, because it evolved to optimize our survival chances, simply does not have the capacity to grasp the ultimate questions of meaning, consciousness, sentience, and so forth.[16] The nature of how the brain works may limit our ultimate ability to know certain things. "Humanly thinkable thoughts are closed under the workings of our cognitive faculties, and may never embrace the solutions to the mysteries of philosophy," is how Steven Pinker summarized this view.[17]

Is there not an option of seeing mind and matter, spirit and nature, as an integrated whole, sharing a common origin and evolution? Spirit and nature are not necessarily mutually exclusive explanations for life on earth. We can also consider spirit and matter as two different modalities of life, mutually interpenetrating, mutually interdependent, mutually causal, each both cause and effect of the other in dynamic exchange. We could see spirit and nature as an integrated meaningful whole. Once this would have been obvious. Now it is anything but. We have no idea anymore what spirit is, which is why it is so easy to ignore it, remove it from the equation. Our explanations no longer require it so, therefore, it does not exist.

Thus with the loss of the sense that we are integrated within a meaningful whole, we have also largely lost our intuitive experience of the spirit. I will be talking a lot about the spirit in the chapters to come. For the time being allow me to simply define spirit as the quality in the living world which integrates and imbues the whole with meaning. Spirit is an active principle, a reality, which we can learn to recognize in our thinking and perceive in its manifestations. Step by historical step, science has stripped what we know of the world of its higher or spiritual meaning and replaced it with causal explanations which are devoid of objective meaning. What meaning remains is deemed personal, subjective and relative. The fall of a ripe lemon from a tree can be explained by a combination of causes involving gravity and the nature of plant substance. It has meaning to me only if I notice it, gather it up and make myself a lemon juice. The existence of a blue planet spinning through space is equally empty of meaning, at least in terms of reductionist scientific thinking.

[16] Among those expressing such views are E.O. Wilson, with long term hopes for solving most of the questions, Steven Pinker in *How the Mind Works*, Daniel Dennett in *Darwin's Dangerous Idea*, Richard Dawkins in *The Selfish Gene*, Matt Ridley in *The Origins of Virtue*.
[17] Pinker, 1997, p565.

Chapter 2

Contextual Thinking versus Reductionist Thinking

The Meaning of Meaning

I have spoken above of the will to find meaning and of our need to find a meaningful relationship to our understanding of ourselves. This short sentence itself needs seriously unraveling and the layers untangling so that we can find and follow the thread running through it. What do I mean by meaning anyway and why is it important? If the question has little meaning for science in any strict sense, it nevertheless is of central, existential importance for each individual. Why? Because the meaning I find in my life is the ultimate basis for my actions, for what I do, and this in the end is of far greater importance than what I think or even what I feel.

Our sense of meaning informs our actions, and reflecting on the consequences of our actions is a learning process that leads to greater knowledge and more meaningful actions. However, it is a phenomenon of modern life that what we think no longer stands in direct relation to what we do. "We" includes me! What I think does not necessarily inform what I actually do. This can mean that my actions may contradict what I actually hold to be sensible, reasonable or moral. The consequences of this for the world are of far greater significance than any theoretical underpinning my actions may have. The justifications that I construct either before or after the event may be interesting or even helpful to my subsequent understanding, but these considerations do not necessarily imbue my act with meaning. This is a modern moral dilemma.

Therapists, psychologists and those responsible for the criminal justice system find themselves increasingly confronted with motiveless behavior. The individual really cannot think of any important reason why he committed the crime or behaved in the socially destructive way he did. Such behavior has become increasingly spontaneous, driven by sudden impulses or the urge for intense experience. Crime is often the secondary consequence of such behavior, in the sense that initially meaningless acts or the desire for gratification create vicious cycles of situations in which the individual is trapped in a net of reactions. Violence leads to a progressive reduction of whatever inhibitions an individual may still possess. The fewer inhibitions, the more impulsive, perhaps compulsive, the behavior becomes. Drug habits, for example, can override all moral considerations or inhibitions and lead to doing almost anything to feed them.

Most of us fortunately do not turn to crime and self-destruction, but the distance between our thinking and our actions is equally marked and this expresses itself above all in the avoidance of responsibility and in living with moral contradictions that ought really to cause us sleepless nights. In the absence of higher meaning we satisfy our sense of purpose with material gain and consumption. Material success does not always lead to social stability and personal satisfaction.

Psychologists and therapists are familiar with a typical syndrome in which hitherto successful people come to a point where the pressures of maintaining material worldly success can no longer be withstood. Usually prompted by some relatively minor crisis, the whole meaningless structure either slowly deflates or dramatically collapses with major collateral damage to family and friends. There is no evidence that increased living standards lead to mental health, happiness or a sense of purpose. The social problems in our society are not in decline and most have at heart a loss of identity and meaning. A simple statistic may represent the unhappiness that lies at the heart of our society: A fifth of the children in Great Britain are believed to have mental problems, mostly stress related.

The Past Had More Meaning

Perhaps in the past things were different, but I certainly do not subscribe to the "good old days" perspective. My reading of history tells me that past societies were in many ways awful for kings and peasants alike. However, it is equally clear that there has been an evolution of consciousness and judgments like "better" or "worse" are inappropriate. There is no evidence that people a thousand years ago, or a hundred thousand for that matter, were less intelligent or less sensitive, but their relationship to questions of higher meaning was without doubt very different. One of the things that has certainly changed within the time span of mere centuries is the way in which an individual's actions used to be far more circumscribed by social convention and cultural restraint. In pre-industrial societies (and even well into the twentieth century in some societies), cultural norms and traditions which themselves reflected the dominant worldviews that were typical for particular times and places had a far greater influence on the individual's sense of meaning.

What we see in modern times can be described as a disintegration of social and cultural forms. This has many aspects. The one I wish to highlight because it relates so closely to my larger theme is the disintegration of the experience of the unity of nature, culture and life.[1] In the life of the individual this translates into the separation of thinking, feeling and willing from the unity within which they were once embedded and out of which they ontologically develop. In the past the external authorities that determined meaning, that sought to maintain and renew the bond between nature, culture and life, were explicit and by and large effective, be they church, state or broader structures such as tradition, custom and social convention. There have always been rebels, outlaws and madmen who rejected or were cast out of the unity but whose very existence both challenged and confirmed the rule. Such outlaws and martyrs had to show great individual strength and integrity to stand up to the forces of conformity. As Bob Dylan put it, "To live outside the law you must be honest." To think for one's self has always demanded both courage and honesty.

The difference is that this condition, that of the outlaw, has become the norm. We are all outsiders, strangers in a strange land. Many people no longer accept the traditional world view that each individual and each creature has his or her place in the scheme of things and each thing that befalls us is assumed to have meaning, if only that of divine retribution for our sins. Such external instances of authority have become

[1] This phrase echoes the title of Professor Peter Cornelius Mayer-Tasch's book *Ein Netz für Icarus, zur Wiedergewinnung der Einheit von Natur, Kultur und Leben*, 1987, Goldmann Verlag, translated as *A Net for Icarus, the Regaining of the Unity of Nature, Culture, and Life*.

weakened, fragmented and the worldviews that sustained them have become relativized with corresponding loss of influence. The alternatives today are more short-term, like fashions. It is possible to dabble in astrology and yet be a materialist. It is possible to go to the acupuncturist for one complaint and take cortisone for another. We use what works, regardless of the paradoxes, and still consider ourselves to be rational. The currently dominant view is that there is no worldview that can be relied upon. We live in a meaning vacuum in which every form of virtual reality is on offer for us to pick and mix.

Even science, which really ought to provide us with a reference point, is not trusted for answers to questions of meaning. It is only trusted insofar as it comes up with practical solutions to our practical problems. There is no substitute for science if one wants to build a machine that retains and reproduces more information than an entire nation of scribes, or if one needs to replace his damaged liver with a new one grown in a pig, or if one wants to send back color pictures from Jupiter. But ask what any of it means or how we may live in peace with one another and science has thus far not been much help. When science tries to help us find our identity or provide us with meaning, it can lead us into deep water. Let us not forget that science has served many masters, including eugenics programs in the United States and the *SS Ahnenerbe* in Nazi Germany, all in the name of objective science and the apparently sincere desire to create a better world.

As individuals we are increasingly forced to determine our own life-motives for the realization and fulfillment of our biography, a fact we can heartily celebrate. However, as long as we cannot reconcile what we feel with what we know and if we cannot find any coherence between either feeling or thinking and what we do, we lack freedom. The gap between what we know we ought to do and what we actually do is the measure of our inner freedom or lack of it. The limiting of freedom is also the increase in determinism and here the question is by what or by whom?

Meaning, in the sense I am using the word, is also an expression of the relationship between myself as subject, as focal point of my own experience, and the world and other people. Meaning defines my relationship to the world and to my inner self. It provides me with the means of understanding both. Above all it provides me with an empirical basis for my actions, for my actual interaction with the world.

How We Know What We Think We Know

Meaning is a process rather than an outcome. It is the quest for meaning that is important, not the attainment of absolute truth or certainty. It is a process that for all practical purposes has no absolute end result or conclusion and thus has no limits. Meaning is more than knowledge, and the search for knowledge itself should have no theoretical limits, though it can and does have practical limitations. Knowledge arises out of experience and experience is an active process involving doing, perceiving and thinking. When knowing and doing form an integral system, a feedback loop, the one flowing out and back into the other, then meaning arises.

Crucial to this process is our understanding of how we know what we know, in other words, the methods and forms of thinking we use to arrive at explanations and motives for our actions. It is realistic to assume, for example, that all explanations we arrive at are of a provisional nature, however probable they may seem. At any given point, the most we can achieve is the best possible explanation that makes sense, given what we presently know. Knowledge and the explanations we derive from it evolve and can change in dramatically unexpected ways—as the history of the scientific search for human origins amply demonstrates. This is not only due to the discovery of new facts but also to changing perspectives on fundamental issues such as how we see the nature of the human being, and this leads to new interpretations. This on-going change reflects cultural norms, shifting paradigms and even evolving consciousness. The *zeitgeist* or the spirit of the times influences the interpretations we make, in ways which are little understood or acknowledged by science, however much sociology and cultural anthropology point to the problem.

So if knowledge evolves and is essentially in a state of flux, what certainty can there be in the search for meaning? Well, we can start by recognizing that the way we approach the question, indeed any question, can narrow or expand the possibilities of approaching an understanding of reality. Any method we choose must be inclusive rather than exclusive. Our search for an inclusive method means we must take all known and relevant factors into account. What is relevant? If we think of the question geometrically, then whatever is even tangentially related to the subject of our research obviously has to be included.

What appear to be parallel phenomena, that is, those with no known direct point of contact but with a potential relationship, should be exposed to theoretical examination of that potential and even then, if nothing is found, we need to keep it at least peripherally in view.

If we start with the assumption that things in the real world do not occur in isolation from each other, we will always have to consider processes and reactions within a context. That context has physical and nonphysical dimensions.

One can see why when computer models of complex phenomena are constructed to predict outcomes, the programmers in practice set limits on the number of factors they include. It may sound impressive when they key in ten or even twenty. In reality each factor is itself probably an over-simplification of reality and anything that doesn't lend itself to simple quantification gets left out. Real life isn't reducible to discrete factors, nor is it predictable to any significant degree of probability, even though statistics can be produced to make it seem so.

Reducing Social Phenomena to Math

All this means our methodology must include not only the study of phenomena susceptible to quantifiable techniques, and which yield to the experimental process of reproducibility, so central to the scientific method, but must also take account of psychological phenomena or psychological aspects of phenomena, however personal, individual or subjective they appear. No categories of experience should be excluded. This factor has hamstrung the social sciences. In order to claim the status of serious science its practitioners have often applied the methods of mathematics, statistics and physics to complex social phenomena in often totally inappropriate ways. No one ever got a research grant unless their methodology could demonstrate results in the form of bar charts, equations or percentages. This, as everyone knows, is the Emperor's New Clothes paradox of the science. Questions are so formulated in surveys that the answers fit into predetermined schema. Even with good will this is necessary; otherwise one cannot translate people's thoughts and feelings into data that can be represented mathematically.

In our on-going quest for knowledge and explanations, theory and experience needs to be constantly matched and modified, if meaning is to be found, however provisionally. This is usually addressed by the principle of reproducibility. If a hypothesis is presented to account for a phenomenon, experiments are set up to prove if it really is so. In order that these can be repeated by other independent researchers and thereby gain scientific credibility, the experiments are designed not only to minimize the complicating factors but also to minimize the chances that others will come to different conclusions. Not only the methods of quantification but also the instruments themselves may influence the phenomenon being investigated. A typical case has been the interminable disputes surrounding the highly technical methods used to date archaeological material.

Dating is crucial to human evolutionary theory and its various methods involve some of the most sophisticated techniques used in science. That does not prevent the "facts" from being regularly and sometimes radically revised.

Meaning and Science

But we are faced with a more fundamental problem. Reductionist science has proven itself largely unsuited to dealing with much of human experience, particularly those aspects it deems to be beyond its sphere, that is to say, metaphysical. Anything psychological is in its primary form not sense perceptible, though its symptoms may be. The problem is, that it is at the metaphysical level that we derive most of our sense for meaning. Thus science leaves the metaphysical to philosophy and religion. But both of these disciplines have been left in the slipstream of science, riding along on its wake. In the English-speaking world at least, science has paid at most lip service to philosophy. In practice it appears to consider itself to operate in a purely empirical, philosophy-free zone.

Of course serious scientists think about the philosophical implications of their disciplines, especially the epistemological aspects, but for the cultural observer of the effects of science, which every thinking citizen has the right to be, metaphysics, ethics and other aspects of meaning come very low on the agenda. The impression one has, with noble exceptions, is not so much one of "philosophy-free" science but of a "responsibility-free" science driven by pragmatism. There is hand-wringing among scientific ethicists but not much hands-on application of philosophical debate of central issues. Ethics become important in science when its applications have legal and therefore financial consequences, as in the controversies surrounding genetically engineered food crops or pharmaceuticals. Not that there is anything intrinsically wrong with pragmatism; only it is rarely value-free. Despite protestations of the virtues of pure research and the disinterested search for knowledge, science has much to answer for morally over the past century. There is very little "pure" science. It nearly always has an agenda. The arguments that politicians and the military determine the uses to which pure science is put simply do not wash and never did. Science has been well and truly discredited in recent years as a supposedly disinterested search for knowledge, and the petty arguments that muddy the waters around the search for human origins make for one of the worst cases of this. This is a phenomenon that underlines the point I made about the separation of knowledge, experience and deeds and the corresponding loss of meaning. What is conscience if not the integration of thinking, feeling and deed?

Most scientists would probably agree with the idea that science belongs to the cultural sphere of life and therefore should be free of economic or political determinants. Its funding should offer genuine intellectual freedom, and it is the judgment of fellow scientists that can best determine where and for what money should be spent. As long as industry, wealthy foundations with social agendas, and the military dominate research funding, we can expect little really free science. In the case of anthropology, apart from careers being made from the discovery of a few bone fragments, the temptations to poor Third World nations where the fossils are found are profit from well-funded scientific research and the tourism that follows. The other side of the coin is that scientists should respond to the genuine need for knowledge as their motivation for research rather than seeing the work as steps up the career ladder. If pure science, just as art should also be, were recognized as an essential part of a healthy society, then scientists (and artists) would be properly funded, and this would reduce their dependence on the masters who pay them.

Another Way?

If the alternatives available to us consist only of the conventional scientific method or the apparent relativity of personal subjective experience, then pessimism would be in order. If each individual, scientist, politician or humble citizen, is thrown back either on his or her own subjective basis for meaning in his life or submissive acceptance of a reductionist world view of selfish genes and packets of energy devoid of meaning, what can be done?

My practical concern as a teacher is how to explain human evolution to the next generation in such a way that they have the possibility to, put frankly, do something about it! Out of the qualities they can develop in themselves through the struggle to understand human nature, I hope they can gain sufficient motivation to tackle the problems inherent in the current world view, the one that has of necessity lead to a separation of nature, culture and life. I freely admit that my conscious purpose is dialectical. I want to open eyes to human potential. I want to facilitate, in however modest a way, the emancipation of that potential.

My experience tells me that this human potential that is borne in the younger generation (and perhaps in the hearts of a few oldies too) bears within it much good for the world. That is the significance of this search for meaning. I want the rising generation to do better than we have done. I recently read a report in the local newspaper of a study which revealed that most young people aged sixteen to twenty have little faith in politicians or politics and are mostly concerned with their own satisfaction and having enough money. One could hardly describe them as a generation of revolutionaries and certainly no match for the '68ers! Yet well over sixty percent of those youngsters trust that Amnesty International and Greenpeace are doing the right thing.[2] That gives me hope. These young people may be self-preoccupied, that is understandable, but they also want good to occur. They still, however, need to realize that only they can do it. Leaving it to Greenpeace and Amnesty is at best a mild form of passive resistance. Life demands a rather more self-active, though still pacifist engagement.

My argument is that in order to have a basis for doing good, we must have a comprehensive understanding of the world and the nature of the human being. How we arrive at this understanding is a question of the appropriate methods of acquiring knowledge. My belief is that a path of knowledge that takes account not only of physical, material nature but also of the spiritual dimension is more likely to lead to a meaningful relationship to the world, one which may be able to reintegrate the two worlds that have become separated. But what does "doing good" mean?

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[2] Neue Westflische, July 22,1999, printed an Associated Press story of a report commissioned by the Hamburg newspaper *Die Woche*.

An Analogy about Health

I would say that doing good means acting in accordance with the true nature of what we are dealing with and that this will vary with the circumstances. In other words it is relative but not random. In order to know what is good in any given situation, we have to have the broadest possible view of the situation. Perhaps a useful way of exploring this idea is through analogy.

When we are confronted with a problem, say, that of a child who is experiencing difficulties at home or at school or is suffering ill health, we ask the question, how can we help the child to a better state of health? It is a similar situation if we try to address a social problem within an organization or community or even if we are faced with complex issues in the environment. The problem or illness appears to us as a lack of health. This question assumes not only that we know what an organism is but that we know what health is. Is health the normal state of the organism when everything is functioning harmoniously? Do we know what it means to be in a normal state of being in the first place? We need to know what a normal state of health is if we are seeking to restore an individual or organism to it. Better health implies a state nearer to some theoretical norm. In reality when confronted with such a problem we tend to see it not in terms of norms but in the qualitative sense of what is good for that individual. We are asking in effect, what is good for this individual or community or landscape? In other words, what is good for the patient is healthy. Hence the analogy between what is good and what is healthy.

Health from a medical point of view is very difficult to define and is often an intuitive judgment on the part of the doctor rather than a measurable complex of factors. In fact the more one looks into it, the more individual it becomes. Ill health is much easier to define, and medical textbooks devote far more space to describing symptoms, illnesses and syndromes than they do describing health. Health is defined only in the most generalized terms. There is, however, a very helpful way of looking at health. Professor Wolfgang Schad, of Witten-Herdecke University in Germany, has formulated it as follows:

> The basic concept of health states that there is a large prospective potential and that illness is a diminishing of that potential in relation to the present status achieved.

Prospective potential means what an organism can potentially do or be but has not yet done or become. Schad refers to a concept established by developmental physiology, which acknowledges that every organism possesses within its functioning present state not only its evolutionary past as genetic inheritance and the influence of its ontological development as partial determinants, but also the potential to do more than it presently does. An example is an organism's potential for regeneration. This potential includes the ability within certain limits to replace worn-out cells and restore damaged tissue, as well as growth, development and reproductive capacity. It is incredible to realize how little of our physical bodies will accompany us from birth to death; they are being replaced continuously and yet remain us. The factors that integrate the identity of an organism through all its transformations can be found at different levels but together constitute the self or identity of the individual. At its most basic this property distinguishes self from non-self, though not necessarily consciously. This is biologically true of all organisms. It assumes a higher significance for us when we apply the principle to the human being and not only as a biological being. The same principle applies to all psychological phenomena too.

Health and Goodness

This concept of health has two important aspects for our theme. Firstly, health is a measure of the realization of the prospective potential of an organism. Secondly, ill health is a measure of the diminishment of prospective potential, which we can also describe as a limit to development. Both of these aspects are relative to the present state of being. This concept of health, therefore, can never be absolute but is always to be seen in the context of the present situation, and since every organism is dependent to some extent on its environment, the present situation includes the whole context. In human beings, this whole context comprises both the inner and outer life experiences.

The analogy between health and goodness becomes clear if we define goodness as that potential for development in a given situation. In effect, the more I understand of a situation and the more I act in ways that enhance the developmental potential of the whole situation, the more likely I am to do good.

One could counter this argument by saying that what is good for me is not necessarily good for another or for my immediate environment. Egotistical behavior, however, by definition only takes one perspective into account and not what is good for the whole situation and is therefore more likely to create further imbalances or ill health at some level or other. The fact that this definition is not absolute is what makes it workable. Goodness is incremental and depends on the range of understanding that informs it. The degree of consciousness that precedes a deed and especially that accompanies good deeds brings with it responsibility, since responsibility is a recognition of one's connection to the consequences of one's deeds. Knowing that I am directly connected to every deed I do, every thought I have, is the basis for a sense of responsibility and accountability. Being wholly good implies individuals being so in tune with the past, present and future of a situation that their actions release unlimited powers of potential in all around them. This is only conceivable in individualities such as Jesus Christ or Gautama Buddha.

The healthy development of individuals, the healthy development of communities and society, even the healthy development of the biosphere is best fostered by creating the optimal conditions for growth and development to occur with maximum human responsibility. That means minimizing the restrictions on development, be it physical, psychological or moral. When human development remains open, undetermined and flexible, the potential latent within each individual has the best chance of being realized. This is a fruitful measure of health. This concept of future potential is of major significance to understanding the nature of the human being because it opens a door to understanding the nature of spirit. Spirit is always healthy in the sense that it is all future potential. If it had been realized, it would no longer be spirit. As Professor Schad puts it, "It is not being (*Sein*) but becoming (*Werden*) that permeates reality." A meaningful education is one that nurtures the individual potential of every child. That spiritual potential is more likely to act in socially and ecologically constructive ways, in ways that are healthy and therefore good.

Why is this important? Development always occurs in a dynamic of past inheritance and future potential. At any given moment the balance, or the lack of it, expresses itself as health or ill health. It is analogous to the process of homeodynamics in biology. This term describes the tendency of an organism in the course of its development or lifeline to constantly balance its chronobiological rhythms at all levels (from the activity of neurons in the brain to the macro-cycles of development) and adjust themselves actively to changing circumstances. "Organisms are active players in their own fate, not simply playthings of the gods, nature or the inevitable workings-out of replicator-driven natural selection."[3]

The ability to adjust to changing circumstances means that there is unrealized potential in each organism. For human beings this is true to a far greater extent. This capacity for potential adjustment and self-directed change is the signature of humankind's evolution. It is a quality that has progressively emerged in the course of human evolution. We are more familiar with its analogue in the development of the individual.

Narrowing the View

The world and its phenomena can be known, indeed must be known, through a diversity of methods. The inorganic and the biological worlds are fundamentally different, whatever common processes underlie both. The human psyche is different again. The challenge is to develop a pluralism of methods each appropriate to their realm but which can nevertheless be related to one another rather than be collapsed into each other in a reductionist's hierarchy.

Physics is considered to be the foundation upon which all the other sciences are built and its principles can be applied and measured with mathematical precision. Furthermore the phenomena it studies are highly predictive, at least in Newtonian terms. When it gets to quantum theory things are not quite so straightforward, yet leading thinkers such as Steven Hawkings are convinced that the Theory of Everything is near at hand. This unifying model would enable all phenomena to be reduced to a small number of primary principles that stand in a known relationship to each other. It is these qualities, simplicity of explanation, mathematical elegance of formulation, predictability, minimum of uncertainty that other sciences often seek to emulate. Who can blame them when life really is full of surprises! In the classical view of reduction, biochemistry collapses into chemistry that can be best formulated by the laws (and models) of physics which is governed by a limited number of universal principles. This is the methodology behind ultra-Darwinism, or its specialist versions, evolutionary medicine, evolutionary psychology, evolutionary ethology, and so forth, but also one favored by geneticists and microbiologists. (The central thesis of evolutionary psychology has been justifiably caricatured as defining a chicken as an egg's way of making more eggs.)

The school of sociobiological thinking has produced a more grandiose vision of the integration of philosophy (including religion and ethics), biology and the social sciences. The pioneer of sociobiology, Professor E.O. Wilson, called his recent book *Consilience*, a term he revives from the Age of Enlightenment and which refers to literally a "jumping together" of knowledge by linking the facts and fact-based theory across disciplines to create a common groundwork of explanation.[4] Wilson's dream is of a reverse reductionism. This essentially means reduce phenomena to the basic units and then reconstruct the model up through the levels of complexity.

> Let us suppose that early in the next century the hopes of the molecular and cellular biologists are fully realized. Suppose further that the researchers succeed

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[3] Rose, S., 1998, *Lifelines*, p17, Penguin.
[4] Wilson, E.O., 1998, p6.

> in breaking a human cell down into all its constituent parts, track the processes, and accurately model the whole system from the molecules up. And suppose finally that the developmental biologists, whose focus is on tissues and organs, enjoy similar success. The stage will then be set for the final assault on the still more complex systems of mind and behavior. They are, after all, the products of the selfsame kinds of molecules, tissues and organs.[5]

What is wrong with such thinking? The problem is not with the reductionist method itself. Reductionism per se is not bad or, as some might see it, evil. The problem is the application of its mechanical approach to re-integrating the world of phenomena that it has separated from its living matrix in the world and been dissected into its constituent parts. What is appropriate for the inanimate world of matter is not necessarily always the right conceptual tool for understanding the living world. The world of genetics and molecular biology, for all its brilliant success, has this very Achilles heel. As Steven Jay Gould, the Harvard evolutionist, put it some years ago in one of his journal essays, genetics suffers from some

> … bad habits of Western scientific thought from attitudes that we call atomism, reductionism and determinism. The idea that wholes should be understood by decomposition into "basic" units: that the properties of microscopic units can generate and explain the behavior of macroscopic results: that all events and objects have definite, predictable, determined causes. These ideas have been successful in our study of simple objects, made of few components, and uninfluenced by prior history. … But organisms are much more than amalgamations of genes. They have a history that matters; their parts interact in complex ways. Organisms are built by genes acting in concert, influenced by environments, translated into parts that selection sees and parts invisible to selection. … I may not be the master of my fate, but my intuition of wholeness, probably reflects a biological truth.[6]

Contextual Thinking

It is the kind of reductionism that sees only the parts and not the wholes which leaves us stuck with only mechanistic explanations. The challenge is to restore life to its context. This is an approach requiring a different kind of thinking, one which not only reintegrates that which we have taken apart to see what it is made of but which also recognizes the integrating principles themselves at work. This is essential where we have to deal with life. As the biologist Andreas Suchantke describes:

> If you study an organism with the analytical method … then you can gain detailed knowledge of the basic elementary processes, the "building blocks" and their inherent causal conditions. What you never find, however, are the directing forces that weave these innumerable and discrete part-processes into the complex whole of an organism, from which the basic elements derive their meaning and condition in the first place.[7]

[5] Wilson, E.O., 1998, p103.

[6] Gould, S.J., 1980, "Caring Groups and Selfish Genes" in *The Panda's Thumb*, pp75-77.

[7] Suchantke, A., 1993, *Partnerschaft Mit Der Natu*r, p36, trans. MR.

That such directing forces are not necessarily sense-perceptible does not make them unreal. The totality of a plant is never visible at any one moment in time or space since it not only continuously changes its form throughout its life cycle from germinating seed to fruiting but also continuously changes it substance, until little if anything of the original cells remain. Even a speeded up time-lapse film that shows the entire life cycle does not present the whole plant to us. What remains largely unobservable is the plant's ecological context, the habitat's potential to bring forth this plant under specific conditions. Vastly complex and subtle though these processes may be, we could, given time and appropriate methods of observation and measurement, "see" them at work. Even then we would not account for the whole nature of the plant in question. What we cannot ever literally see are the organizational forces that configure the whole out of the parts, which maintain the integrity of the whole through all the transformations and plasticity. We can only recognize these forces in thinking, a thinking that does not stop at each stage of causal reduction but weaves each point arrived at back into a living relationship to the whole.

This is where contextual, fluid thinking comes in. We flow from perception to concept and back into perception. "Thinking is able to draw threads from one element of observation to the another. It links definite concepts with those elements and thereby establishes a relationship between them."[8] On their own, perceptions remain fragmented part-experiences of the object being observed. In our thinking we are able to re-integrate them into a comprehensible whole, usually not all at once but gradually. And because thinking has access not merely to individual subjective opinion but to universal concepts whose validity is not limited by time and place, or indeed person, such ideas can inform our perceiving and lead to knowing and knowledge. This is also true of the observations, descriptions and data provided by others. We can observe these too, internalize them, make them our own. With our own thinking we can form judgments and relate what we learn to what we already know. Intuitive thinking can access truths that are not merely true for me, but which can be thought by others and therefore have a general, if not absolute, validity.

This method will appear familiar to any scientist who is not merely seeking monocausal explanations and whose methodology involves continuously relating the observed phenomena to the larger context. Professor E.O. Wilson, a self-confessed scientific materialist, states that, whilst reductionism is the primary activity of science, it is not all that scientists do; "also crucial are synthesis and integration. Even the most narrowly focused researchers … still think about complexity. To make any progress they must meditate on the networks of cause and effect across adjacent levels of organization—from subatomic particles to atoms, say, or organisms to species—they must think on the hidden design and forces of the networks of causation."[9]

Reductionist thinking sees only a punctuated chain of causes. It does not see the totality of the manifestation as a unity that is more than the sum of its parts. The contextual approach takes account not only of observable traits and mechanical processes that cause changes to occur, but recognizes the relationships between the phenomena and grants them a reality too.

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[8] Steiner, R., 1979, *The Philosophy of Freedom*, p44, Rudolf Steiner Press.

[9] Wilson E.O., 1998, p59.

I have to admit that reductionist thinking in the mind of a wise old scientist like E.O. Wilson, a man who can generously acknowledge just how far the various branches of science are from realizing their part of the consilient vision, is stimulating because it is in many respects subtle. Each point Wilson makes sets a benchmark for any counter or complementary arguments. On top of which, if I may be permitted a very non-scientific remark, Professor Wilson is clearly a man with enthusiasm verging on love for nature, its diversity and its complexity, as his autobiography reveals. He is clearly no mere theorist but someone with a lifetime's experience of observing nature.

On the other hand, in the words of theorists like Richard Dawkins and Daniel Dennett, to name two of the leading proponents of reductionist ultra-Darwinism, the idea is positively "dangerous"[10] and, I must add, in some ways daft. The danger, however, is greater.

One of the central assertions that goes with the ultra-Darwinist or biologically determinist view is that there is a one-to-one correlation between gene and unit of behavior, between several genes and certain behavioral tendencies, which is the milder form being increasingly used. This claim is not only misleading to the nonspecialist but lends itself to verbal and conceptual shorthand by specialists themselves. We are told that no biologist really thinks in terms of a one-to-one correlation of gene and behavior but scientific papers and articles, not to mention popular science books and television programs increasingly use this terminology.[11]

Furthermore, if you suggest that genes are not susceptible to any extrinsic forces, that is to say they are not and can not be influenced by any external factors such the environment, including the cell environment in which the genes are first able to become in any sense active, then the chain of cause and effect is a tight linear one that extends only in one direction. Given time and money for research, so the argument goes, all forms of life and behavior will be explainable and therefore predictable. This is the Holy Grail of sociobiology and reductionist microbiology. And if everything is predetermined genetically and therefore, once we have "decoded" the human genome, the total content of human DNA, the step to intervention and manipulation is a short one. It is already being taken.

Greedy and Generous Reductionism

Both Dawkins and especially Dennett disavow "greedy reductionism" or ultra- Darwinism. The problem is there can be no "generous" or "good" reductionism, especially if it constitutes the only approach. There is nothing generous about Dennett's description of Darwin's basic theory of natural selection as a "universal acid" eating its way inexorably through any levels of explanation, a universally applicable explanation that lies at the bottom of all fields of knowledge. Nevertheless Dennett ridicules "greedy reductionism." Dawkins too explains at length in his recent books[12] the need for a step-by-step reductionism and laments what he calls "precipice reductionism."

There is a problem with relativizing reductionism by saying that we do not need to go all the way or, we can stop at higher levels in the conventional hierarchy.

[10] I refer to Dennett's book *Darwin's Dangerous Idea*, p 199.

[11] See Rose, S., *Lifelines*, chapters 4, 9 and 10 for accounts of a number of recent examples, 1997. See also Wills, C., 1998, *Children of Prometheus: the Accelerating Pace of Human Evolution*, Chapter 11, for an account of how complex the relationship between genes and behaviour actually is, in for example Down's Syndrome or William's Syndrome.

[12] Dawkins, R., *River Out of Eden*, 1995.

The favored level for holding back is the biochemical, the realm of genetics. Steven Rose describes this paradox by using Dawkins' own metaphor to criticize Dennett's concept of "greedy reductionism;" he seems to believe that he can bungee-jump off the cliff edge, and that the elastic will pull him up short of the hungry, snapping physicist sharks waiting at the bottom.[13] There is no logical restraint on the freefall of reductionism, if one's view is that it all comes down to atoms in the end. The "ultras" cannot have it both ways.

As the biochemist Professor Michael Behe has impressively demonstrated in his book *Darwin's Black Box*,[14] the Darwinian explanation fails to account for the origins of complexity at the micro-organic level, at the level of the cell. He is not alone in concluding that the great achievements of molecular biology demonstrate that the underlying life is intelligent design. Indeed Sir Francis Crick, co-discoverer of the structure of DNA, faced with this problem, even felt compelled to create a theory of life being seeded from outer space[15] because he could see no other explanation. Behe speaks of an embarrassed silence surrounding the stark complexity of the cell. "When the subject comes up in public, feet start to shuffle, and breathing gets a little labored. In private people are a bit more relaxed; many explicitly admit the obvious but then stare at the ground, shake their heads, and let it go at that."

Why is the observation of design handled with intellectual gloves? The dilemma is that while one side of the elephant is labelled intelligent design, the other side might be labelled God.[16]

Oh dear! Science may only invoke natural causes to explain natural phenomena. The concept of intelligent design is therefore the absolute *bete noire* of biological explanations, as Richard Dawkins has demonstrated for years with books like *The Blind Watchmaker*. The problem is, what do we understand as natural?

Dawkins and Co. would call natural intelligent design unnatural or, worse, supernatural and therefore unreal, or at least outside of the accepted rules of science. But as Professor Behe concludes, "Science is not a game and scientists should follow physical evidence wherever it leads, with no artificial restraints."[17]

Darwin's Paradigm

The conceptual basis of the ultra-Darwinist approach can be simply, but I hope not over-simply, put as follows. Starting from Darwin's central thesis, it applies these principles beyond Darwin's original intentions. Darwin started, as it were, in the middle, assuming the origin of living organisms and focused on explaining how organisms change. One can read his famous *Origins* from cover to cover and not read much about the origin of original species. The origin of new species arising from existing ones is the main topic. His central explanation was that they arise through the mindless, mechanical process he called natural selection. The core of his argument can be quoted:

> If during the long course of ages and under varying conditions of life, organic beings vary at all in the various parts of their organization, and I think this cannot be disputed; if there be, owing to the geometric powers of increase of each

[13] Rose, S., 1997, p88.
[14] Behe, M.J., 1998, *Darwin's Black Box*.
[15] Crick, 1982, *Life Itself*, Futura.
[16] Behe, M.J., 1998, *Darwin's Black Box*, p233.
[17] Ibid., p243.

species, at some age, season or year, a severe struggle for life, and this certainly cannot be disputed; then, considering the infinite complexity of the relations of all organic beings to each other and to their conditions of existence, causing an infinite diversity in structure, constitution and habits, to be advantageous to them, I think it would be an extraordinary fact if no variation ever had occurred useful to each being's own welfare, in the same way as so many variations have occurred useful to man. But if variations useful to any organic being do occur, assuredly individuals thus characterized will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance they will tend to produce offspring similarly characterized. This principle, I have called, for the sake of brevity, Natural Selection.[18]

The deductive logic of the argument is, despite the length of the sentences, compelling. What ultra-Darwinism has done is to build on this concept of design by mindless algorithmic processes. Life needs only time, random variation and natural selection to impose the order out of which design is created. In other words, the design of anything from eukaryotic cells to human altruism can be explained by the universal process of natural selection. To quote Daniel Dennett's witty formula, "Good reductionists suppose that all Design can be explained without skyhooks, greedy reductionists suppose it can all be explained without a crane."[19] This algorithmic process is what constitutes Dennett's universal acid, the solvent that is "capable of cutting right to the heart of everything in sight.[20]

Everything apparently includes culture, psychology, religion, morality and ethics. Steven Rose has highlighted with many examples the fallacy of both the theoretical and practical applications of ultra-reductionism to the understanding of the living world. His arguments are instructive and need no further elaboration here. I shall return to relevant aspects within the text and in context.

Common sense (and Alfred Russell Wallace) argue against the exclusive application of reductionist thinking specifically to a full understanding of the human psyche. But then common sense is a much-neglected form of knowledge that rarely conforms to reductionist principles.

The most potent critique of the Darwinist account of the evolution of the form of organisms comes from developmental biology, the science that actually studies how organisms grow and acquire their form in the course of real time. These studies show unambiguously that

it is not enough to regard these forms and capacities [of organisms] as the mere expressions of designs or blueprints that have already been established by natural selection, and that they are imparted to every organism-to-be along with its complement of genes at the moment of conception. The characteristics of organisms, they argue, are not so much expressed as generated in the course of development, arising as emergent properties of the fields of relationships set up through their presence and activity within a given environment.[21]

[18] Darwin, C., *The Origin of Species*, Summary of Chapter IV, Thinker's Library edition, 1929, pp97–98.
[19] Dennett, D., 1995, *Darwin's Dangerous Idea*, p394.
[20] Ibid.
[21] Ingold, T., 2001, *The Perception of the Environment*, p4.

This developmental approach envisages an organism in its environment as a totality, a unified system and also as an active agent generating its own capacities. This is a fundamentally different idea to that underpinning orthodox biology. It is also closely related to the ideas of ecological psychology, which shares the view of the subject as integrated into its environment in an active and interactive way, as opposed to a self-contained individual confronting a world "out there." Developmental biology sees the organism as an emergent agent developing within a field of relationships which it creates and changes as it lives, as opposed to the unfolding of a pre-determined entity simply requiring the right external stimuli to trigger pre-programmed responses, like adding water and light to a sunflower seed (though even this turns out to be far from simple chain of causal events). Both of these approaches hold much potential for my argument about the spirit and I will return frequently to them.

Explanations of Human Evolution, a Case of Punctuated Equilibrium?

The long history of explanations of human origins is fascinating and mirrors the evolution of cultural consciousness. Such accounts range from mythological descriptions of divine potters (such as the Egyptian Ptah), turning human forms in clay on the cosmic wheel, to Aristotle's wonderful concept of the hierarchy of life progressing from the inanimate to the sentient, from the cold blooded to warm blooded. Up to the theories of the evolutionary psychologists of the present day, ideas have been born, have lasted with minor variations for varying lengths of time only to be overthrown and replaced by new ones.

Since Darwin, Huxley and Haeckel in the nineteenth century, evolutionary thinking has likewise seen a number of periods of stasis followed by new ideas. The process of extinction varies in length but is inexorable. Time and again we have seen the resilience of ideas in the face of physical evidence. Darwin's theory of the Descent of Man was based on practically no fossil evidence at all. He drew his conclusions from other sources and assumed the fossil record would confirm him. As such hard evidence for human evolution began to appear in the form of fossils and archaeological discoveries, their interpretation was often predetermined by the expectations of their discoverers, whose views in turn were as often as not based on current theory and speculation. Ideas obviously determine the interpretation of physical material. This is especially likely when such material is as fragmentary as hominid fossils often are.

Sometimes in the history of paleoanthropology the ideas have seemed so powerful that the eyes of otherwise rational scientists, men of undoubted integrity, fail not only to see the forest for the trees but sometimes fail to see that the wood is stone! It is only after a fossil or archaeological find has been around for some time that its interpretation begins to acquire some degree of objectivity and we can begin to rely on its designation. This usually involves the complete revision of the original interpretation. A fossil is what you want it to be. The recently discovered and relatively complete fossil of a child on the Atlantic coast in Portugal has been hailed as showing traits typical to both Neanderthal and Modern anatomies. This is of course highly controversial, for reasons we shall hear about later. Highly qualified experts make the claim with international reputations. This claim has been totally refuted by equally qualified authorities. It so happens that each side represents opposing views with regard to the disappearance of the Neanderthals. The interpretation of this fossil is very significant for the choice between the rival theories. (I shall give references later when I discuss the case).

The classic (because extreme but by no means unique) example of ideas blinding scientists to facts, or at least strongly influencing the interpretation, is that of the Piltdown forgery. This farcical sequence of events caused some of the leading (British) experts in the field to fail to see what to others (eminent American experts such as Arles Hrdlicka, Gerrit Miller and William King Gregory) was obvious that not only were the various pieces of bone and teeth ludicrously mismatched and faked but that the logic of the "fossil" was flawed from the start. But the eminent scientists involved believed in the idea that brain size led human evolution. The specimen, which included a human-like brain-case and ape-like jaw and teeth (and was in fact a modern medieval brain-case and orangutan teeth), conformed to the idea of brain-first human evolution and furthermore relocated the roots of human evolution to the West (in fact just down the road from Darwin's country house), thus denying the primacy to Java or Peking Man, or Africa![22]

There have been many lesser examples of ideas getting in the way of objective science in this field. Evidence seems to accumulate in an unobtrusive way without significantly changing the dominant view, until suddenly a new idea throws all the evidence into a new light and a new dominant theory asserts itself. Some of these new species have to breed quietly in remote regions before gradually replacing the old one by absorption or displacement, others appear fully adapted and superior to everything else and replacement is rapid.

The Neo-Darwinian Synthesis

With the rediscovery of Gregor Mendel's laws of genetic heredity, the so-called new Evolutionary Synthesis (or neo-Darwinian synthesis) became the dominant evolutionary theory, promoted and represented above all by the ornithologist Ernst Mayr and the geneticist Theodosius Dobzhansky. These two giants of twentieth century biological thinking had a profound influence on the interpretation of human evolution. In their view humans were a special case in evolution. Because of their possession of culture, humans are not as prone to the workings of natural selection as other organisms (a view they took from Darwin himself). In fact historically it is the case that while Darwin's idea of common descent through evolution was quickly and universally adopted, the idea of natural selection as the prime mechanism was not. It was not until the mathematical genetic models of scientists like J.B.S. Haldane, R. Fisher and Sewall Wright in the 1930s provided a statistical basis for the idea that natural selection was to become the philosopher's stone (or to use Dennett's phrase, universal acid) for the whole selfish gene, ultra-Darwinist tendency that dominate biological (and increasingly sociological) thinking today.

So under the influence of Mayr (still promoting his many brilliant ideas at the age of well over ninety years old) and Dobzhansky, the interpretation of human origins was dominated by two central dogmas. First, their culture makes humans a special case. Secondly, according to the ideas of the Synthesis, human evolution was linear, that is to say a series of species each ancestral to the other, stretching from modern humans back to the common ancestor of hominids and apes. To explain the multiplicity of fossil types, sometimes coexistent, this approach spoke of great morphological and size variation within the species. This view was recently summarized by Tattersall and Schwartz:

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[22] The story and significance of the Piltdown forgery have been described by Erik Trinkaus and Pat Shipman in *The Neanderthals, Changing the Image of Mankind*, 1993.

> If it was a general rule that species slowly evolved themselves out of existence by gradual change under natural selection, then the history of human evolution, too, must have boiled down to a long, gradual slog from primitiveness to perfection: a process of fine-tuning over eons. Even leaving aside the magisterial and unassailable authority of Mayr and Dobzhansky, this view of human evolution was highly congenial to a science already steeped in notions of the Great Chain of Being, and it came rapidly to dominate the paleo-anthropological mindset.[23]

Punctuated Equilibria

The problem was that the people who studied the fossils found little evidence for this gradualist view of evolution at all, let alone among the hominid fossils. This led in 1972 to the publication by two young paleontologists, Niles Eldredge and Steven Jay Gould, now both famous professors, of a paper proposing the theory of "punctuated equilibria." This theory posited "tremendous evolutionary conservatism," where little or no change tends to accumulate through time, and the concentration into branching events of what evolutionary transformation does occur, as Eldredge himself formulated it.[24] Long periods of stasis (well attested by the fossil record) are punctuated by rapid evolutionary changes. The main causes for such change are climatic (e.g., ice ages) or catastrophic (e.g., periods of extensive volcanic activity or earth's collision with large meteors which probably caused the extinction of the dinosaurs). Natural selection working on the existent variation relatively quickly selects individuals better adapted to the new circumstances.

Since the early work of Eldredge and Gould, it has become clear that there are genetic mechanisms that can hasten this relatively rapid emergence of new species in rapidly changing environments. Regulatory genes are known to influence major developmental patterns in the individual organism. Such structural changes can have major impact on an animal's morphology, size and developmental life history. For any new structure to be viable, as one would expect in an organism, it must reach a certain level of development or the mutant will be aborted. This explains why there are no partial gills, wings, eyes or semibipedal hominids (the famous "hopeful monsters" as the geneticist Goldscmidt termed partly evolved organs hypothesized by traditional Darwinist explanations of gradual evolution). Organisms do not survive to breed if they are burdened with partly-evolved major organs or structures. Because non-lethal mutations known as "recessives" can be masked by dominant genes, they can be carried forward from generation to generation within a population until a critical mass of them has accumulated. "Finally, at some point, and by a mechanism that remains unknown, the mutant recessive is converted to the dominant state,"[25] and a new form emerges. This could explain the apparently sudden emergence of new fossil forms, such as the appearance of anatomically modern Homo sapiens, without leaving fossil evidence of the stages of transformation from old to new.

This possibility leads to the fact that speciation was probably the norm in hominid evolution as indeed it has been for other mammals. Instead of evolution appearing as a tree trunk with branches and modern humans as the growing tip, as Darwin suggested and Haeckel loved to illustrate with images of Teutonic oak trees representing the

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[23] Tattersall, I. and J. Schwartz, 2000, *Extinct Humans*, p46.

[24] Eldredge, N., 1991. *Fossils: The Evolution and Extinction of Species*, p38.

[25] Tattersall and Schwartz, 2000, p49.

phylogenetic history of humankind, hominid history is better represented as a bush. The idea however of a special place in the Great Chain of Being has lingered on. The outcome has been the tendency to shoehorn all known fossils into as few species as possible, explaining the often major differences as morphological variation within species. Since many scientists have been convinced that human evolution was somehow different, family trees have been consistently drawn up showing a pretty solid line to the present, even when the fossil evidence barely justifies it.

The only really unique fact about human evolution is that there has always been a number of hominid species around at the same time, except the present. The remarkable thing is not the (to us strange) fact of numerous contemporaneous hominid species but the fact that there is only one hominid species left! This is a tantalizing fact for those who nevertheless feel that human beings are somehow special in creation. It may tempt us into feeling we may have won the race of progress. This interpretation is contradicted by everything we currently know about evolutionary processes. We shall have to find the nature of our uniqueness elsewhere.

Hominid evolution appears to resemble that of other well-studied mammal groups, namely a complex process with much evolutionary experimentation with many new species breaking off and establishing themselves in new and changing ecological contexts. The closer the species the more likely it was that they were in some form of competition. As Tattersall puts it, human evolution is a history of experimentation, of constant exploration of the very many ways there are to be a hominid.[26]

Exaptation, the Missing Concept

Steven Jay Gould and Elizabeth Vbra, have proposed a new perspective on evolution by coining the term exaptation.[27] This refers to new traits that arise in one functional context, perhaps with an entirely different function, but which under changed circumstances may serve the organism in a new way. The best example is the suggestion that feathers evolved from reptile scales with a thermo-regulatory function but became used for flight. It is hypothesized that proto-birds with a warm layer of feathers took to raising their forelimbs, perhaps as a means of cooling or drying, as cormorants do today at the margins of lakes or by the seashore. Thermal air currents may have lifted the creatures off the ground, since the feather-covered forelimbs would have resembled wings. For thousands, perhaps millions of years, feathers continued to function as warmth regulators before being co-opted for flight. Whether this scenario is true or not, the idea of exaptation has been accepted as a likely and probably common evolutionary mechanism.

Exaptation offers a further route for the emergence of traits within organisms that in a sense preempts the mechanism of natural selection. Structural or morphological features that evolved to serve one function may have provided the physical solution to new needs. Natural selection functions to fine-tune the characteristic once it is in place. There is good reason to think that several key human traits may have arisen through exaptation. As we shall see, several anatomical characteristics appear in the fossil record as if from nowhere, including uprightness itself and the more or less sudden appearance of anatomically modern humans.

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[26] Ibid., p51.

[27] Gould, S.L. and E. Vbra, 1982, "Exaptation: A Missing Term in Evolutionary Theory," in *Paleobiology*, Vol 8, No 1, pp4–15.

It is likely that changes in brain structure, which of course will never be preserved in the fossil record, made higher cognitive development and language possible, evidence for which is, as we shall see, indirect. The emergence of higher mental functions is probably linked with the ultimate integration of what were once discrete neural systems within the brain. The idea of a modular development of the brain goes back to Jerry Fodor, whose 1983 book *The Modularity of Mind*, established an idea that has since been extensively expanded, not least by the evolutionary psychologists who would have us see all kinds of separate functions such as recognizing faces, using tools, being sexually aroused, negotiating relationships, bringing up children and so on, as having been selected along selfish gene lines. Interestingly Fodor himself has no truck with the selfish gene sociobiologists. His original theory foresaw the mind and its neural apparatus differentiated into perceptual and conceptual systems, with each perceptual mode processed by discrete systems. Originally the various modules are not inter-linked but all operate on a perceive-respond basis. "Perception is fast, automatic and unintelligent; cognition is slow, often conscious, intelligent and reflective," as Marek Kohn summarized it.[28]

The progression from what is essentially an animal modular mind to what is essentially a human integrated mind involved the evolution of cross-modular systems, making responses more flexible and creating the basis for conceptual thinking and ultimately self-consciousness. Fodor and Noam Chomsky, the father of modern linguistics both have problems with the idea of mental modules evolving through natural selection. The idea of cross-modularity and higher integration being the result of brain expansion and bootstrapping (the principle that systems extend themselves through their own inherent potential) is essentially an exaptive explanation. A cross-modular integrated brain is an example of the kind of emergent quality that complex systems can create. What emerges can sometimes be more that could be predicted by the sum of the parts.

A combination of exapted new brain capacity plus a developmental potential in the individual seems to me to provide the basis for a working account of the evolution of higher faculties and language, the emergent properties of inborn modular structures in the mind/brain develop cross-modular connections through the individual's interaction with the environment including the "inner environment" of the individual's own intentions. This is something Steiner anticipated back in 1909, when he described how at birth the infant cannot yet link different perceptual modalities to form concepts that explain phenomena. As he put it,

> The child already perceives the outer world [shortly after birth] but its brain is not yet an instrument capable of connecting external impressions in a definite way. By means of connecting nerves running from one part of the brain to another the human being learns by degrees to link together in thought what he perceives in the external world.[29]

Steiner goes on describe how this process is followed by a maturation process of individualization of what I have described as "meaning making."

[28] Kohn, M., 1999, *As We Know It: Coming to Terms with an Evolved Mind*, p159.
[9] Steiner, R., 1981 (1909), lecture from June 17, 1909, in *The Being of Man and His Future Evolution* (GA107).

Mind Matters

The reader will have noticed that I slipped in the phrase mind/brain into the above paragraph. The phrase suggests an ambiguity. Yet any monistic explanation has to see mind and brain as integrated in some way. If this is the case, then intention and agency must have an impact on development.

No one, I think, could deny the influence of human intention in shaping an individual's development, though most would limit this to the psychological and behavioral realms. However, form and morphology cannot be separated from mind.

An extreme example should make this clear. If an individual chooses to train as an athlete, this decision (a mental act) will have physical consequences with a lasting impact on that person's anatomy. Changes will occur from the level of fine neural architecture (e.g., for mapping the perceptual/motor aspects of a specialized skill) to muscle and even bone development. But more subtle processes occur too. The acquisition of a specific language leads to both neural structures and motor development in the speech organs specific to the articulation of that particular language. The articulation of English sounds involves a different shaping of the speech organs from the pronunciation of Japanese. These changes have long-term effects. That is why it is rare for an adult with matured speech organs to be able to speak a foreign language so perfectly that a native speaker could not hear that the speaker was foreign. This is also true of any acquired skill from writing to riding a bicycle.

Furthermore we know that mental states, such as attitudes and emotions, or underlying moods, such as anxiety, stress or their opposite inner peace, will eventually find expression in a person's physiognomy, posture, facial expressions, hormone levels, blood pressure and probably immune system. One's inner state works right into the physical body. What we experience as beauty in a face is not only the sum of outer proportions and features but is also a matter of inner radiance too. As Jefferson Airplane put it, "You're only as pretty as you feel inside." Traditional Christian dualism as exemplified in the idea of "the spirit is willing but the body is weak" has reinforced the separation of mind and body. In fact this dichotomy is not even between mind and body but rather between the higher and lower selves.

In the course of maturation (and especially early childhood) each individual creates an integrated brain as an expression of an integrated mind. Thus mind and brain are integrated as a result of maturation. Brain is not the cause of mind, nor mind the cause of brain. Both are only to be understood, I think, in the wider context of the total environment. Certainly this is the case with the higher cognitive functions.

Consciousness as an emergent property exists in the environment. The physical substance of the brain emerges as a biological process which itself is only to be understood as the sum of emergent properties in matter permeated with life, which itself is an emergent property. As Professor Tim Ingold puts it, "We do not have to think of mind or consciousness as a layer of being over and above that of the life of organisms, in order to account for their creative involvement in the world. Rather, what we call mind is the cutting edge of the life process itself."[30]

Consciousness is the ability of spirit to perceive itself. The human or animal soul is a locus where life can become aware of itself. Only humans can become aware of this process and thus become aware of meaning and structure. They can also as we know

[30] Ingold, T., 2001, *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, p19.

become self-aware. The most remarkable thing about this, and the thing that baffles the reductionist view, is the degree of self-activity involved.

If consciousness is a property that emerges in the dynamic process of development within a context, mind (the field within which consciousness arises) nevertheless precedes the brain structures capable of giving expression to it. The higher brain functions do not emerge stage by stage according to a preprogrammed blueprint or set of genetic instructions. The fine-tuning and integrating of the neural systems to the level of human thought is preceded by the self-activity of the individual. This activity expresses itself in the form of the will, often itself expressed as interest. The old model of stimuli triggering instinctive responses simply does not tell the whole story. The child does not respond to every sense impression or stimulus with identical intensity.

Furthermore, the ability to respond at any level more complex than physical reflex, first needs to develop in context. Interest and focus of attention clearly precede the neural capacity to respond. The child wants to pick up the apple long before he can coordinate his hand and arm movements to grasp it and before he has words to describe what he is doing.

Through doing, the child learns not only skills and motor coordination; he also engages in an on-going relationship with the world, one that ultimately leads to understanding and knowledge. We learn through doing and that doing starts with an expression of will.

To summarize these last two sections, we can see that evolution and development cannot meaningfully be reduced to a mere combination of intrinsic genetic properties established in previous generations by natural selection and extrinsic environmental causes alone. The evolving or developing organism is not a passive object being build to a comprehensive design and then set out in a given world to survive and replicate itself. Two further significant factors need to be included into the account of its genesis; the dynamic nature of an organism's relationships to its context and to the emergent properties within that totality. In the case of human beings that includes the human spirit.

The Cause of Causes

The real question as to how we understand the world goes deeper than the issue of reductionism and its ultra-Darwinistic form, though this specific theme will crop up several times more. As I stated near the beginning of this section, there are conventionally two diametrically opposing ways of understanding the world. I spoke of the scientific and the non-scientific. I can be more precise.

We can explain why things are the way they are causally. Things as they are now are the effects of causes in the past. The question we ask is, how did this come to be? To answer it we investigate its history. Or we can interpret things as they are now, from the perspective of the future, what Aristotle called in his study of causality (*Metaphysics Book* 5, Chapter 1) *causa finalis*, "the purpose for which something happens." In other words we can ask, what is this for? In this case the cause is directed towards an aim or the fulfillment of some objective.

Both cause and effect and "finalistic" explanations make sense and can be confirmed by everyday experience, though the two kinds of explanations apply to differing perspectives and circumstances. Nobody would deny that causal explanations are universally applicable—everything has a cause and each cause has effects. Finalistic explanations, which are also known as teleological or teleonomic (a term introduced to biology by Ernst Mayr to describe goal-directed explanations), are generally only applied where some obvious intention is at work.

Since the Age of Enlightenment in the eighteenth century and especially since Darwin's *Origin of Species* published in 1859, cause and effect as a mechanical process has replaced finalistic explanations in all the sciences. Finalistic reasons imply a goal and forces directing the course of events towards that goal. Intention has no place in mechanistic explanations and therefore without intention the question of meaning becomes meaningless. Biology looks at how things have come to be and may seek to project this into the near future to predict possible outcomes, in ecology for example, but steers well clear of any possibility of intention. In fact teleological explanations are generally avoided at all costs by biologists. There are several reasons for this, which are relevant to my theme.

Teleology belonged to the world of myth and religion. A Divine Creator or Creators were thought to have created the world with some purpose or objective in Mind. How could it be otherwise? For a mythopoeic consciousness an entirely meaningless act of creation is inconceivable. Creation implies intention. So cosmic teleology reigned. Rationalism began to undermine this view. Nevertheless the ideas of an intelligent deity as the Grand Designer, of there being a Divine Plan that the study of nature could reveal, remained potent. There was a sense among natural historians (as early scientists were known) that natural laws such as those governing (itself a verb suggesting conscious and benevolent justice) gravity or motion were somehow the thoughts of a rational God. Darwin's theory of evolution by natural selection saw only mechanical causes and no law other than randomness at work. He knew the consequences of his theory even though he did his best to play them down.

Lamarckism

Apart from the suspicion of divine teleology, a further reason for biology's avoiding this kind of explanation is the need to distance oneself from the taint of Lamarckism. Chevalier de Lamarck (1744–1829) has suffered the fate of others whose names have acquired an ism. As a naturalist and philosopher, Lamarck made many significant contributions to the science of biology and has the distinction of providing one of the first scientifically argued theories of evolution. Like Darwin he did not use the word "evolution" but "transformation" and, as Lamarck put it, "the march of nature." He was not the first by any means but he was the first to devote a whole book to the idea, his *Philosophie Zoologique* (1809).

His theory has been much maligned and misrepresented as standing diametrically in opposition to Darwin's, which accounts for his reputation in the age of the Neo-Darwinist Synthesis (the combining of Darwin's theory with the laws of Mendelian genetics). Lamarck recognized that the transformation of species into distinct new ones was not linear but branched and led to extinctions (itself a bold idea in the age of strict Creationism). Above all Lamarck appreciated the role of adaptation, not least because he saw clearly that physical and climatic environments had clearly changed. His mistake was to choose the wrong mechanism for adaptation, though it was not as wrong as it is often portrayed. He did not say that environmental conditions affect heredity. He said, "The environment affects the shape and organization of animals but it does not work any direct modification whatever in their shape or organization."[31] When an environment

[31] Quoted in Taylor, G.R., 1983, *The Great Evolution Mystery*, Secker and Warburg, p39.

changes, this alters an animal's needs and thus its behavior. It is this that leads, according to Lamarck, to structural change. "It is the needs and uses of the parts which caused the development of the same parts, which have even given birth to them when they did not exist."

The example that is always given is that of the giraffe's neck; a proto giraffe with a short neck stretches its neck up to reach higher leaves; this stretching is then passed on to its progeny and hence the evolution of the giraffe's neck. Actually Lamarck did not, to my knowledge, discuss the giraffe's neck but its long legs. It was Darwin who raised the subject as part of his dismissal of Lamarckism.[32]

Lamarck's failure was to provide the kind of evidence Darwin did and, to date no one has broken through the so-called Central Dogma that the path from the genome (the totality of genetic information contained in a reproductive cell of an organism) to the phenotype (the physical appearance and behavior of an organism) is one way, namely from the DNA to the organism. This means that information, once it has passed from the DNA into the protein, cannot be altered. In layperson's terms this means the organism cannot influence its own genetic inheritance and cannot pass acquired traits genetically on to its offspring.

The possibility of inherited acquired traits was incidentally an idea that Darwin himself was drawn to and he collected data to support the idea, even publishing many examples in *Varieties of Animals and Plants under Domestication* in 1868. He withdrew the idea in later editions of *Origins* when he realized that if he allowed any blending of inherited characteristics his whole theory stood to collapse. He returned to external natural selection as the only mechanism of transformation, and modern genetics has rallied round this view with great vigor.

The basic idea, however, that intrinsic forces within an organism might have some influence on both how an organism develops in response to its needs and on how species evolve over time, does make a lot of sense theoretically. In fact it makes a lot more sense than the incredibly cumbersome and hugely long time spans needed for the selection of traits emerging by random mutation. This has always been the Achilles' heel of Darwin's argument. Mathematicians have calculated that biologists' faith in time and chance is exaggerated. It simply would take too long by random mutation for enough mutations to occur for anything useful to evolve. There must have been enormous selection pressure for any mechanism that could facilitate feedback between an organism and its environment and that could direct mutations to the relevant places in response to need. Of course to date no mechanism to facilitate this has been discovered.

Thus Lamarckism, and its implicit teleology, produces such extreme opposition. If such a mechanism were to be discovered that could be integrated with natural selection and genetic replication, most biologists would have to rethink their theories and rewrite their books.

But the real reason Lamarckism is so strongly opposed is that Neo-Darwinists believe that in the end the environment through blind selection and the laws of genetic replication determines the way organisms, including humans, live. Lamarck's view that organisms choose the environment that suits them taken to its ultimate leaves the course of evolution open to free will and individual choice. Organisms, not least humans, can actively participate in their own development and evolution in a collective and distinctly individual sense.

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[32] See Darwin, C., *The Origin of Species*, Chapter VII.

Stories

Despite the universal rejection of teleology in the life sciences, there nevertheless appears to be a deep-seated tendency to explain natural phenomena using implicitly teleological terminology. Perhaps because our minds are predisposed to communicating information in narrative form, intentional elements that are intrinsic to stories creep into those stories. Narrative structure is essentially anthropomorphic and therefore tends to assume sequences of events which have meaning.

Several studies[33] have shown how accounts of human evolution are often presented in story form with the hero (early man) setting out on a quest to become fully human. This tendency is inherent in historical accounts, since history is the story of how the present arose. In explaining how things turned out as they did, it is natural to see the seeds of the outcome in past developments.

In the early days of anthropology there was a distinct tendency to see evolution as a march of progress, leading upwards from primitive to advanced, from savage to civilization, as if there were some inevitable natural order at work, with modern (European) man as its ultimate goal. This was a kind of retrospective teleology, with the purpose of evolution being the present state of civilization. Such tendencies have rightly been edited out of current theories of human evolution. Yet confusion still remains.

When biologists speak of traits being "selected for," the question arises by whom or by what? The answer given is natural selection but even this phrase implies an intention on the part of nature to make choices towards some end, namely the better survival of organisms. Of course, no biologist thinks that nature has any such intention, indeed that is the whole point of Darwin's idea. Yet the terminology muddies the clarity of the idea. Steven Rose has highlighted this point in both his books, *Not in Our Genes* (1984) and more recently in *Lifelines* (1997). There is a distinct tendency to speak of genes being for this or that trait of genes or viruses having strategies and competing in the struggle for survival and replication. The ultimate example is Richard Dawkins' phrase "selfish gene" which has entered the global vocabulary. All these phrases suggest, against the intentions of their authors, intentions only appropriate to human beings. There is a clear paradox here. On the one hand biological explanations are phrased in anthropomorphisms, or "psychisms" as Wolfgang Schad terms them, whilst at the same time human nature is explained in biological terms.

What of Self-Determination?

This paradox highlights the central question of determinism, especially in regard to human nature and evolution. If we allow only biological causes of a strictly mechanistic nature, then there is no room for the self-activity of human beings, to say nothing of free will. However, if, as seems impossible to deny, human evolution reveals distinctly non-biological determinants, such as cultural transmission, then intention must be admitted. Cultural transmission includes individual human beings deliberately acting in ways which are not genetically pre-determined, in developing new ideas and applying them in ways which have a major effect on the course of humankind's development. In this sense human evolution has been to a great extent Lamarckian and has become progressively more so in the course of human history. Clearly where human beings are intentionally

[33] See Niles Eldredge and Ian Tattersall, 1982, *The Myths of Human Evolution*, Columbia University Press, and Misia Lindau, 1894, "Human Evolution as Narrative," in *American Scientis*t, Vol 72, pp262–268.

behaving in new ways and these new ways are replicated by being passed on by non-genetic means, teleological explanations are appropriate.

Human free will, however restrained by nature, by genetic inheritance, or by physical limitations, is goal driven by definition. The problem of recognizing intention as a factor in evolution and development has to do with the thought processes involved in acquiring knowledge. The search for explanations of living phenomena must start with primarily teleological questions such as, what did this trait evolve for? or, why did that species evolve that behavior? "What for" and "why" are teleological questions because they ask to what end or purpose. When a hypothesis has been formed, it must then be confirmed. At this stage causal thinking is necessary to explain how something came about. Thus we can see that both causal and finalistic thinking have to be involved in any process of knowledge about the living world. What unites these two paradoxical approaches is the activity of synthesis that occurs in human thinking. This activity of synthesis stands, as it were, outside of the linear time frame represented by historical perspective of cause and effect and the future or goal orientated perspective. When it becomes apparent that both causal and teleological thought processes and explanations are necessary, each within their appropriate realm, then it becomes possible to avoid the paradoxes that arise when only one or the other method is applied.

Temporal Integration

The issue here is that of the ability of temporal integration. Human beings can step outside of the linear confines of causal time frames by anticipating the future and adjusting their behavior accordingly. We can apply the lessons learned from our understanding of the past and apply them to determining at least some of our future. Most of our technological civilization is directed towards this end. Thus we can say that our prospective potential is a real factor in both our individual development and our evolution. Our prospective potential, that is what we are capable of but have not yet done, is a spiritual factor in our evolution. This is the factor that is systematically ignored in most current accounts of human nature or human evolution. It is this spiritual potential, as I have stressed above, which gives our search for knowledge its higher meaning. We naturally want to ask why and we cannot limit the answer to historical causal explanations that only relate the past to the present. We also want to know whither. We want to ask about the future, not only in a merely speculative way, but existentially, because of our deep urge to make things better, both in a narrow personal sense and also in a higher moral sense. This urge is born not out of our genetically predetermined instinct to survive and replicate, though we have that too. It is an expression of our higher nature, our spiritual potential, our unrealized selves. It calls us, as it were, from the future.

This spiritual potential meets us and "interferes" with our biological selves. That was how Steiner put it in an enigmatic biographical note he wrote in a private letter.[34] Describing his own spiritual development to the theosophist and dramatist Édouard Schuré, Steiner wrote, "I understood that there is a regressing evolution, the occult-astral, which interferes with the progressing one." By occult-astral Steiner meant spiritual. This idea of a double stream of time is a clue to understanding the nature of the relationship between the realized world and the world of spiritual potential. I can describe it as

[34] See Steiner, R., 1988, *Correspondence and Documents 1901–1925*, Rudolf Steiner Press, p9.

follows: the evolutionary stream from the past, which brings us to our present state of being, meets and brings to expression the spiritual stream from the future. Both are aspects of life. Spirit and matter in this sense are double aspects of life. The "interference" created in this encounter is the origin of new formation. Evolution preserves, refines, makes fit for survival; the spirit generates new form. Past and future are integrated in the potential-filled present. In the human being spirit comes to self-consciousness but is active throughout nature as the potential, or intention, in all organic life forms.

We are indebted to Wolfgang Schad for pointing to this mystery of temporal integration and what it teaches us about our relationship to the spirit. In a number of books and articles, which as far as I can see have had little impact on wider scientific circles, he has applied this principle to developing appropriate methods of studying living phenomena and has demonstrated, with examples from the evolution of plants, reptiles, mammals and human evolution, how the concept of temporal integration provides us with a vital new conceptual tool to understanding the process of evolution. Throughout this book I draw where relevant from his ideas and apply them to the themes of human evolution.

While much of his work is of a more strictly biological nature, I have felt able to extrapolate from his fundamental methodology an approach which has proved fruitful to my theme. Having had the privilege of studying under him I am also personally indebted to him for the impetus to write this book.

A Rediscovery of the Spirit

Our present phase of human culture, which has learned to see the world in causal scientific terms, has, of course, been vitally important in the evolution of human consciousness. It has also, from an historical perspective, been brief. Human consciousness has evolved from a participatory mode to what has been termed an onlooker mode. As Charles Davy put it, "That is the essential feature of the evolution of consciousness: a gain in clarity and precision and objectivity is accompanied by a loss of participation. We are able to study the processes of nature in fine analytical detail and thus gain control over them, but we are strangers in a universe which has lost human meaning."[35]

But consciousness goes on evolving and scientific thought is continuously maturing into something much richer. In future we may look back on the nineteenth and twentieth centuries not as the high point of the scientific revolution but as a brilliant, if perhaps naïve, phase of modern human development. Brilliant yes, but also highly dangerous. Not only did we lose sight of the spirit, but in our hubris we nearly destroyed the planet! The two are closely connected. The healing of the earth will go hand in hand with a new recognition of the spirit. This recognition will be a process of self-knowledge, a rediscovery of the human spirit in terms appropriate to our post-modern age. A re-awakening to the human spirit will go hand in hand with a new, modern scientific awareness of the spiritual dimension in nature and the phenomena of the world. It is a path that will lead us to a sense of meaning in evolution from which we can draw criteria for our deeds and from which we derive a true sense of responsibility for the world whose stewardship we have been given.

[35] Davy, C., 1961, *Towards a Third Culture*, p51.

In my experience, however, one essential aspect is continuously overlooked, indeed, is systematically removed from the agenda. There is one factor that up till now could not be taken into account. Which graduate student could have gone to his or her professor with a proposal for a doctoral thesis taking account of the human spirit in evolution? Well, perhaps at the University of Avalon in Glastonbury! It is hard to imagine Dr. Chris Stringer publishing a paper in Nature on "The gesture of the human spirit in hominid fossils: a survey" or Professor Tim White "Spiritual implications of Pliocene hominid post-cranial remains from Awash, Ethiopia" in Current Anthropology! This would not be quite as bad as "Shelley from the Molecular Point of View# but in the present academic scientific world, equally impossible. Is it a form of intellectual apartheid that prevents mainstream scientists from referring to such work as, for example, Professor Wolfgang Schad's (equally scientific and referenced paper), " Gestalt forms in Hominid Fossils" in Volume 4 of the journal *Goetheanistische Naturwissenschaft*? Nor is Schad alone. There are a whole group of researchers who pursue "contextual biology" and others who apply similar methods to psychology, medicine, pedagogy, cultural history and other fields of knowledge.

And yet the passion that characterizes much of the science of anthropology betrays the fact that many leading workers in this field are not unaware of the spiritual dimension implicit in their work. Their language often reveals it, not so much in their academic papers but when they come to presenting the broader picture in books written for a general readership. Nor is this, I believe, merely rhetoric and metaphor. The problem is, we lack the language and the precision of concepts to articulate such experiences. We fall back on metaphor rather than exact terminology. The results often sound awkward and even pretentious when I quote several within the text. Their articles will be listed in the Bibliography. I would simply like to name Andreas Suchantke, Craig Holdrege, Ernst-Michael Kranich, Jochen Bockelmühl, Brian Goodwin, Friedrich Kipp, and Armin Husemann. Authors try to refer to the imponderables of life. But science, in common with art and the quest for the spiritual, has its true roots in awe, wonder and reverence. Wonder is an experience we have when we seek or recognize higher meaning.

A Vocabulary for the Spirit

What we need is a science of the non-sense-perceptible realities, a language for intuition. In modern times only art and particularly poetry have provided such a language for intuition, and science has a very ambiguous attitude towards art and the humanities in general. When an artist like Paul Klee spoke of the task of art as "making the invisible visible," he was not talking about molecules and chemical bonds. What can a mechanistic, reductionist science do with such serious human endeavour? Modernist painting from a molecular perspective, perhaps? Obviously not, a view any half-culturally-aware scientist would no doubt agree with. But what then? So despite the best efforts of evolutionary psychology, science, art and religion remain irreconcilable.

When C.P. Snow spoke of the "Two Cultures and the Scientific Revolution" in his famous Rede Lecture at Cambridge in 1959, he deplored the loss of common language and lack of mutual understanding between the scientists and "literary intellectuals" as he called them. Interestingly, Snow later revealed that his actual intention had been to highlight the failure of education and the plight of the Third World. He obviously touched a far more sensitive nerve. What Snow regretted most were the lost opportunities for the furtherance of human knowledge. "At the heart of thought and creation we are letting some of our best chances go by default. The clashing point of … two disciplines, two cultures … ought to produce creative chances. … The chances are there now. But they are there, as it were, in a vacuum, because those in the two cultures can't talk to each other."[36]

The problem today, I would suggest, is not between scientists and literary intellectuals but between those who deny meaning and those who acknowledge the reality of the spiritual world. Literature and other forms of art belong to what the German language calls *Geisteswissenschaft*, literally "science of the spirit," as opposed to *Naturwissenschaft*, the science of nature. The dualism implicit in these two categories highlights the problem. How many practitioners of *Geisteswissenschaft* even take the spirit aspect seriously? What we need is one unified quest for knowledge that draws no artificial boundaries and accepts spiritual phenomena—the sort of things art at its best concerns itself with—as equally relevant. The task is to devise appropriate methods for investigating the different phenomena, be they sub-atomic, mineral, organic, astronomical or those belonging to the realms of human cognition, language or consciousness.

Thus far fundamental concerns such as sentience, consciousness, and free will lack an appropriate methodology. After some 564 pages of closely argued explanation of *How the Mind Works*, Professor Steven Pinker admits, "There is something peculiarly holistic and everywhere-at-once and nowhere-at-all and all-at-the-same-time about the problems of philosophy. Sentience is not a combination of brain events or computational states: how a red-sensitive neuron gives rise to the subjective feel of redness is not a whit less mysterious than how the whole brain gives rise to the entire stream of consciousness. The "I" is not a combination of body parts or brain states or bits of information, but a unity of selfness over time, a single locus that is nowhere in particular. Free will is not a causal chain of events and states, by definition. Although the combinatorial aspect of meaning has been worked out (how words or ideas combine into the meanings of sentences or propositions), the core of meaning—the simple act of referring to something—remains a puzzle. … Our thoroughgoing perplexity about enigmas of consciousness, self, will and knowledge may come from a mismatch between the very nature of these problems and the computational apparatus that natural selection has fitted us with."[37]

Pinker is not alone in expressing the view that the nature of our brains and the way our mind works may preclude us ever understanding the central questions of human nature. Coming from where he does, this ought not to be surprising. One of the most articulate and experienced researchers in the field of language and cognitive sciences, Pinker has taken up the cause of evolutionary psychology and almost qualifies as an ultra-Darwinist. Yet, I do find it surprising that scientists of his calibre have the experience, the overview and the scientific standing to risk considering, if only as a hypothesis, the possibility that the self, the "I" is a reality despite having no physical location. If they were to do so, they would be in a far better position to test the hypothesis, apply it to phenomena and see if it makes sense. It is as if there were a kind of taboo preventing anyone with a scientific standing from even considering the philosophical implications of recognizing the spirit as something intrinsic to life.

Once the idea of being is accepted, even as a working hypothesis, the reductionist restraints on explaining how human beings came to be are removed. If at the core of a human being there is an individuality that is not merely the sum of biological processes, then other intentions, other inner determining factors can be taken into account. Reducing all anatomy and behavior to the outcome of a blind process of natural selection with all

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[36] C.P. Snow quoted in Davy, C., 1978, *Towards a Third Culture*, pp12–13.

[37] Pinker, S., 1997, *How the Mind Works*, p564–565, Allen Lane, Penguin Press.

individuals driven by the universal compulsion to replicate its genes, leaves nothing left to explain really!

Evolutionary psychology can reduce everything it turns its attention towards to behavior that maximizes our efforts to reproduce as many of our genes as we can manage. This is not to deny that the evolutionary explanations of our various behavior traits are right. They are no doubt, in a limited way. Obviously we can all recognize aspects of our behavior that probably have a biological basis related to our reproductive success. Even if the original reason why a particular behavior evolved has lost its significance, it may still influence the way we act.

We need only think of forms of display, demonstrations of bodily health, acts of power or responses to powerful displays in others—no organization is complete without its alpha male and corresponding junior competitors. We are animal enough.

However, if human beings as individuals, as groups, perhaps even as species, have a spiritual dimension, then that spirit or being would not only have been concerned with the physical replication of its genes but with development. Development in the sense of inner being coming to ever more complete expression through a given bodily form in a given environmental context is a principle as equally universal as fitness and reproductive success. In the case of human beings, development has reached the highest level of self-directed emancipation and self-consciousness. The process has not ended by any means. Being or spirit by definition implies the striving to realize potential at all levels, not merely at the level of genetic replication. The imperative to develop, to fulfil our largely self-created destinies, to live through the consequences of our actions and come at last nearer to true emancipation from all "determinisms," to come to freedom, is at least as compelling as the drive to replicate our genes. The bottom line is, the human spirit has more on its mind than its selfish genes.

Who Knows What It Is to Be Human?

Okay, so what is it to be human? Paradoxically that is a question that a human being can answer only for him- or herself. I can say only for me what it is to be human. I cannot say with any certainty what it is for another to be human. That is part of the modern condition too. Earlier cultures, as far as we know, had collective answers provided by religion and the wider culture itself to the question of what it is to be human. In our times there is simply no communal consensus on the matter. There are many definitions; indeed each generation seems to generate its own. The point is, I cannot know for certain what one means when one says, "I am human."

What we do have, though, is a multitude of perspectives on the question. Each one of these explanations is based on assumptions, criteria, interpretations, probabilities that all more or less preclude anything resembling the truth of the matter, the full, comprehensive reality, from revealing itself. It depends on the starting point and to a great extent on where we want to go with our explanation.

Paleoanthropology has been particularly fertile ground for definitions of what it is to be human, for the basic reason that the science has the primary objective of explaining human origins and therefore defining what is human in relation to what is not. In this field most of the running has been made by biologically orientated scientists, anatomists, paleontologists, and so on. The crucial question has always been at what point did we stop being animals and become human. The terminology used reveals the attitude—"naked ape," "third chimpanzee," or the more detached and technical Homo sapiens sapiens. At heart this science still has to define the difference between human and animal, by stating what the one is, has, or can do, that the other is not, does not have or cannot do. Historically the question has been to decide whether it is a difference in kind or only one of degree.

Sadly, history has been continuously blighted by answers to the question, what is it to be human? that have excluded others from the category and therefore deprived them of the rights we feel go with being human. Without exception, these others' own self-experience was to think of themselves as human.

Deprivation of human rights is no mere academic technicality! It can mean social exclusion, disadvantage, degradation, ethnic cleansing or genocide. I am not only referring to the historical issue of "savages and civilization," of whether native Americans, Australians or Africans had souls that could be redeemed. Our century has seen millions of people institutionally and legally deprived of their rights, deemed non- or sub-human and worked to death or sent to the gas chambers. As the news bulletins from Iraq (read Kosovo, Ethiopia, Sierra Leone, Irian Jaya or wherever) remind us, this behavior is far from absent as the new millennium opens.

So what can be done? Do we resign ourselves to post-modernist pessimism by saying that since it is all relative, then anything goes. That would be an abrogation of responsibility. I would argue that the urgency to understand human nature is such that the detached view is not possible. Given that we can only define for ourselves what it is to be human and the only certainty is self-experience, we will have to make do with relative rather than absolute answers that each individual can test for him- or herself.

One way of approaching the question is to observe development—in ourselves, in others, in organisms and organizations. In particular we can make observations of developmental processes in children. Clearly this must be done with respect and even with love. That means we must slip out of ourselves, our pre-knowledge and certainly our prejudices and let the being of the other, or indeed any phenomenon, reveal itself within its own context. If we try to observe and characterize the underlying formative principle that comes to expression in an individual's life history, we can begin to form a picture of what it is to be human. It is important to stress that this is a picture, an image, a representation and not a definition. We can try to do the same with aspects of human behavior, human anatomy, human technology and other cultural artifacts. We can try to do the same with what we know of whole cultural groups and historical periods. Rather than only seeking to define causal relationships, we seek to articulate what comes to expression through these manifestations. For this reason the comparison between human development and human evolution, though by no means a simplistic parallel, is relevant and thus forms a key part of this book.

In the following sections I describe the path of human evolution, as it appears to us from the fossil and archaeological record. Applying what we know of the nature of the human being from the anthroposophical perspective, I try to interpret human evolution from the perspective of the developing human being.

Chapter 3

Anthroposophical Anthropology and the Developing Human Being: Spirit as a New Paradigm?

Thus far I have used the term "spirit" in a very general sense, as a formative principle. The word itself seems to have returned to common usage, though it is used in imprecise ways. The terms spirit, soul and mind are used almost synonymously and are rarely defined. Whilst spirit as a idea, however vague, has returned to the vocabulary of writers, journalists and even politicians, in scientific literature spirit is never used. To refer in writing to anything spiritual, even obliquely, would be the kiss of death for a scientific career. No one who wishes to be taken seriously would risk the marginalization that would follow. To an extent this is understandable, given the waves of New Ageism and X Files-type speculation on the mysterious and supernatural that flood the media and bookshops. Even those who study religions and New Age phenomena are careful to distance themselves. The gap, however, between personal experience and theory remains wide and deep. In private conversation, people with scientific backgrounds, psychologists, doctors and so on, will discuss the matter with candor.

Such intellectual apartheid hardly furthers our quest for knowledge. It is a symptom of our times, another expression of fear and uncertainty about our true nature that sits deep in the modern psyche. It would take courage to overcome it. It would in fact take more than courage to break the vicious cycle of denial. It would take clear thinking and appropriate methodologies. Once these are established, science could well make one of its most significant paradigm shifts and herald the next major scientific revolution.

Though many branches of science may in fact be near to such a breakthrough, it is not so much a scientific problem as a psychological and conceptual one. We simply lack the framework for such thinking. One could argue that Steiner has already articulated the breakthrough and mapped out the new territory to be explored. The problem with Steiner, though, is twofold. Perhaps he wrote and said too much! Nor is it just the volume of his work. Many themes weave through his published works, particularly his lecture cycles, were often addressed to specific groups at particular times and places, and are consequently scattered throughout dozens of books. Until recently there was no real index to the work. Anthroposophical scholars cut their teeth by venturing into the maze and coming back with some new discovery. It would be more than a lifetime's work to digest what Steiner actually offers, let alone be able to relate Steiner's work to other research. On the other hand, the problem has also lain with Steiner's followers, many of whom distanced themselves from what the rest of the world was doing and concentrated on an elaborate exegesis or exposition of his works.

This is a harsh judgment, and I would be the last to denigrate the influence Steiner has already had in so many fields, not least my own, education. But the trickle-down effect of his ideas remains largely unrecognized and in some cases actually opposed, distorted or suppressed. My own view is that both of these problems are being overcome. Many capable authors (and more importantly practical doers!) have translated what they have learned from Steiner into work which is accessible and this work is now increasingly influential. My guess is that the paradigm shift that will enable science to take the spirit seriously will not occur by the sudden recognition of the work of Rudolf Steiner. It will arise through a diversity of discoveries in many fields of knowledge, and new approaches will emerge in a truly pluralistic way. The spiritual dimension in life will gradually become apparent. More importantly, I believe that it will occur not theoretically but through practical application, as applied understanding, as indeed it already is by many people doing real work in education, medicine, agriculture, ecology and so on. And it is good that it should be so.

More than Biology

This book takes as a starting point the view that the human being is more than just biology and chemistry. It assumes that people are also spiritual beings. For a perspective on what this means, I draw on the insights of anthroposophy, the spiritual science of Rudolf Steiner. Based on Steiner's anthropology, a picture is given of the developing human being that serves as a comparative model for examining human evolution. Whether the comparison is metaphorical or analogous remains to be seen. Central to this view is the concept of the emancipation of the human being in biological-evolutionary terms and the subsequent emergence of self-consciousness in human development. With the evolution of consciousness, humanity has increasingly developed the faculties of cognition, reflection and, recently, onlooker-consciousness that enable modern scientific thinking. Through active self-development the human being can, according to Steiner, extend this form of consciousness, stage by stage beyond the limits of what we experience as normal waking consciousness.

Human evolution is seen as a process of progressive emancipation from biological determination and increasing self-determination in which mankind has changed from being an object to being the subject of its own evolution. Our evolution has become increasingly purposeful and self-directed, as a process of individualization in which the spiritual aspect of the human being has come to ever more individualized expression.

Individual development is the process whereby the spiritual core of individuality takes hold of, forms and lives in its bodily organism and individualizes it to the point where it can begin to internalize and organize its experience of the world. In doing so it begins to have the possibility of understanding itself and the world. All organisms strive to bring their nature to its fullest expressions, to develop their potential in interaction with the world. Humans strive to do so with consciousness. The individual spirit inherits a genetic blueprint. It is placed into a social and environmental context. It seeks to individualize both in order to bring its own intentions to fruition.

Both concepts, evolution and development, are used in the sense of coherent change from within, as opposed to mere adaptation to external circumstances, through whatever cause or mechanism. Both these processes involve an inner principle of being coming to ever more comprehensive expression through its emancipation from external determinants. This is not the same as design (by external or internal agency) since the outcome is unpredictable. To see how this occurs we need a differentiated description of the various modes of human activity and the various realms within which development takes place.

In what follows I attempt to explain the nature of the human being from an anthroposophical point of view. I draw on Steiner's basic works on the subject, which are listed in the bibliography. I have, however, and wherever it seemed appropriate, supplemented this with what I consider to be relevant insights drawn from contemporary psychology and especially from neuroscience. This summary is of necessity brief, though probably hard going for the reader unfamiliar with Steiner's basic ideas. As these ideas form the basis for much of what this book tries to explain I hope that what is not fully clear by the end of this section will be so by the end of the book.

The Physical and the Life Bodies

In Steiner's anthropology the human being consists of a number of discrete though interrelating "bodies" or members, each with its own distinct properties and functions within the whole. "Body" in this sense implies a unity of related properties or forces. The word "body," as its etymology suggests, also implies some kind of vessel. These bodies include what body, soul and spirit traditionally meant.

Despite all ethnic and individual differences and variations, human beings share essentially similar physical bodies. Though there are still areas of pioneering work to be done into the working of the brain, heart, immune system, cell reproduction, not to mention embryogenesis itself—the translation of the genetic code into body—the physical body is by far the best known part of the human being. Modern medicine is a tribute to this knowledge, if occasionally a reminder of our limitations.

The other "bodies" that Steiner describes are not perceptible to our senses. They may be inferred to account for phenomena that we can observe with our senses, such as the whole life cycle of an individual from conception to death. We cannot observe the whole as an integrated unity in space, but only in time, which is not sense perceptible. We cannot literally see the temporal *gestalt*[1] but we can form a mental picture of it as a process in our thinking. The same is true of the soul and spirit. We can group various categories of phenomena within these concepts that we deduce through their indirect manifestations or infer as a working hypothesis. Confirmation that such categories describe realities can only come through direct experience and self-observation.

This, however, was not where Steiner was prepared to let the matter rest. His view was that the human being can develop new inner organs of perception which can push back the frontiers of what it is possible to know:

> Spiritual science asserts that there are many worlds around human beings who can perceive them only if they develop the necessary organs. Just as a blind person who has undergone a successful operation looks out at a new world, so through the development of higher organs human beings can come to know new worlds—worlds totally different from what our ordinary senses allow us to perceive. The higher organs whereby one can penetrate into the higher worlds are present in the embryo of every human being. Anyone can develop these organs who has the patience, endurance, and energy to apply the methods described in [my book] *How to Know Higher Worlds: A Modern Path of Initiation*.[2]

[1] The word *gestalt* indicates a structure or form possessing qualities as a whole that cannot be described merely as the sum of its parts. (*Collins English Dictionary*).
[2] Steiner, R., 1996, *The Education of the Child*, Anthroposophic Press, p7.

I have no judgment as to what extent other researchers have been able to do this. For me, such higher organs remain a working hypothesis. However, to paraphrase the philosopher Karl Popper, it is not so much a question of whether an idea is true in any absolute sense that matters, it is whether an idea is fruitful or not that counts. In a Popperian sense I find the ideas of higher organs and what they can perceive very fruitful indeed. In my view the reality of these nonphysical bodies is a distinct probability, since their existence helps explain things that otherwise have to be reduced to implausible mechanical processes.

A Living Bauplan

The physical body is animated by a body of formative forces Steiner calls the life-body. These forces are active in all living organisms expressing themselves in the processes of metabolism, growth, regeneration, the movements of the body fluids and reproduction. Such forces are naturally not visible. They can be intuitively grasped through their activity, through the way they manifest in an organism's life forms. One of the most distinct experiences I have had of the body of life forces was when it was conspicuous through its absence, namely in a corpse. Many people have related the experience of simply knowing that someone was dead before being able to feel for a pulse or body warmth. In the hours following the death of an individual, one can distinctly observe the withdrawal of the life forces. Once these forces have ceased to maintain the integrity of the organism, the processes of physical decay take over, forces which are of course ever-present in life, but which are, as it were, held at bay by the body's vitality. As cells die and are replaced in the ongoing process of regeneration, the maintenance of the *Bauplan*, the blueprint of the body's architecture is retained.

Very few cells last for long, the exceptions being the neurons of the brain, the cells within the heart muscles and those of the lens of the eye. Most decay quickly and are replaced. Of course each cell bears within it the DNA which records the genetic code, the physical basis for cell replication. Yet within each living organism the maintenance of the integrity of the *Bauplan* is non-physical. It belongs to the properties of the life-body to maintain this dynamic of continuity. The physical body also retains its identity in that it learns and acquires habits and skills. Here too, as we shall see, is the life-body at work.

Plants and animals also have life-bodies of formative forces. In the plant these forces are part of a nexus which embraces an entire ecosystem. The individual plant, even the centuries-old oak, is embedded into a life context of symbiotic relationships to many other organisms, the sum total of which forms a distinct ecological context. The relationships within a given context are part of a larger pool of life forces that comprise the life-body of a given habitat. These are in turn part of the life-body of the whole earth as a living organism that is the reservoir from which individual organisms derive their life forces and to which they return on the death of the individual. Since each plant species possesses a specific form spectrum, a life cycle, certain nutritional requirements, and a reproductive cycle involving perhaps certain pollinating insects, the overall composition of a species' life body will be distinctive.

Animals, especially lower phyla with modest central nervous systems, resemble plants more in this respect. Animals with greater mobility, that possess greater flexibility in their behavioral patterns, become by degrees more independent of their ecological context. Their life bodies become therefore more distinct. Apart from the primary processes of ontogeny and morphology (the relationship of form principles to their embodiment and growth in physical structures), growth and life cycle, nutrition, reproduction and the pattern of the creatures lifeline, the life body of an animal also becomes the bearer of its instincts and behavioral patterns.

As such the life bodies are species- rather than individual-specific and presumably "appear" distinctive from other species. Life-body and living space An animal's body of life forces also reflects the character of its relationship to its environment. I imagine the life-body of an elephant reflects both its rich inner life, intelligence and social instincts as well as expressing its relationship to its extensive habitat. Memory is a property of the body of life forces, and it is known that elephants do indeed have extremely comprehensive and long-lasting memories, particularly of the location and seasonal occurrence of water and other key resources within a huge territory. Their highly complex social structures also reflect a rich memory, mostly in the form of scents, since their vision is quite poor. Elephants form elaborate mental maps not only of their environment but also of the social relationships within their own and other groups. Anyone who has observed elephants in their endemic homeland, say the savanna of Eastern Africa can sense how they inhabit this space in the way a human inhabits a home, that is their environment somehow seems an extension of themselves and that environment expresses their relationship to it.

This example is in a way extreme since we know how much elephants shape their environment through their foraging methods and the effects of their dung on the soil. The negative aspect of this is particularly noticeable when there is too high a population density of elephants in a confined area, in a national park for instance, where the impact of elephants can lead to serious degradation of the environment. But the same is true of all species to a greater or lesser extent. Not only are they adapted to their environment but they also shape that environment through their life habits.

The web of relationships between organisms is a reality. This web expresses itself in countless points of physical contact, which one can reduce down the cascade of causes. We can see this web of relationships in any section of earth dug out of the garden, in which many species of flora, fauna and bacteria co-exist in mutually enhancing ways. If we want to recognize the nature and structure of these relationships, reduction makes them disappear. If we want, however, to discover the directing forces that weave these innumerable part-processes into the complex whole of an ecological context, then we have to recognize the forces that make up the web through their activity. Furthermore, if we want to characterize and describe the whole, which arises out of the coherence of the parts, then the concept of the body of formative life forces can help. What goes for the integrity of an organism itself is equally true for the community of organisms that make up an ecological unit, and so on up to the whole biosphere of the earth.

If such an organization were created by the human mind, say in the construction and running of a car factory, with all its physical production requirements and the human relationships necessary to make the whole function, we would have no difficulty recognizing the organizational plan behind it. In nature we are reluctant to recognize the intelligence that exists in complex organization as a reality because we fear it would be the thin end of the wedge of accepting the idea of design. The Darwinist approach specifically rules out design, arguing that what appears as design or meta-organization is merely the engineering outcome of blind natural selection.

As mentioned in the previous chapter, the biochemist Behe demonstrated, using five detailed examples drawn from the realm of microbiology, that the Darwinian explanation cannot account for the reality of molecular-biological complexity. In the concluding section he writes:

> The impotence of Darwinian theory in accounting for the molecular basis of life is evident not only from the analyses in this book, but also from the complete absence in the professional scientific literature of any detailed models by which complex biochemical systems could have been produced. … In the face of the enormous complexity that modern biochemistry has uncovered in the cell, the scientific community is paralyzed.[3]

Life Is Intelligence

Behe's answer is that intelligent design is the only possible explanation; "some features of the cell appear to be the result of simple natural processes, others probably so. Still other features were almost certainly designed. And with some features, we can be as confident that they were designed as that anything was."[4]

Behe does not conclude that intelligence was a Divine Creator or beings from other planets sowing the seed of life on planet Earth! He simply concludes that irreducible complexity could not have arisen by blind forces but by intelligence. Perhaps that intelligence is life itself. The research into the question as to how matter became organized into life has not yet come to any conclusive answers, despite initial optimism. I wonder if any of those biochemists has considered the possibility that matter arose out of life, rather than that life arose out of matter; that life, or a living creative intelligence, preceded matter? At any rate the concept of a body of living formative forces is a useful model for understanding organisms.

To return to our characterization of the life body, there are other phenomena that suggest its reality. Animals that live in flocks and herds highlight another aspect of the life-body. The flock or herd is an expression of a strong collective group life body, in which the group appears to function as one organism. The great migrating species merge seasonally into one body that has its own rhythms. We also see this in the wheeling and swooping of a flock of starlings at twilight or in the famous wildebeest migrations across the Serengeti. This collective life body finds extreme expression in the colony insects, such as ants, termites and bees. Of course, the means by which the cohesion of the colony is maintained is through complex chemical signalling. What provides the overall organization, however, is of a higher order than the means through which it is organized. Again we are drawn to recognize the organizing principle as a reality.

This higher order is an expression of the unifying body of forces that constitute the life body. Now I admit that would be a challenging thought for someone like E.O. Wilson, an acknowledged authority on ants!

Natural Conservation and Selection

The concept of the life body does not refute natural selection as a mechanism for the origin and form of species; rather it complements it with a higher level of organization that gives expression to the real interrelationships between organisms, their life histories and rhythms. The forces of the life body make an organism more than the sum of its organs and a habitat more than the sum of its physical properties and the species that inhabit it. Natural selection fine tunes the fitness of organisms within a given ecological context and ensures their optimum survival and reproduction. Yet ever

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[3] Behe, M.J., 1998, *Darwin's Black Box*, p187.
[4] Ibid., p208.

since Lynn Margulis' pioneering work[5] on cell structure which showed that symbiosis and cooperation are also important factors in the origin of cells, the concept can be legitimately applied to organisms.

So alongside competition, nature also allows cooperation. Organisms do not exist in a vacuum, they are always part of wider ecological systems. Such systems are to a high degree symbiotic. Symbiotic relationships are by their nature expressions of cooperation. We do not have to see the process of natural selection as entirely competitive. The survival of organisms is enhanced by natural selection and that survival may be enhanced by cooperation as much as by competition. Indeed Darwin himself later preferred the term "natural conservation."

A clear example of this naturally unconscious process is simply the fact that many organisms produce vastly more progeny than will ever reach maturity and be able themselves to reproduce. This fecundity of nature is the basis of the food chain. This surplus provides the means by which the complex mutual relationships that evolve between predator and prey are sustained, as well as providing a context within which whole communities of organisms, from bacteria through plants and insects right up the chain to the higher animals, the birds and mammals, can evolve. The study of any ecology from rain forest, savannah grasslands, temperate forest to arctic tundra will reveal the mutuality of organisms depending upon each other. This abundance is an expression of vitality, of potential that outstrips physical means. The pool of life forces is as valuable as the gene pool in preserving complexity and the potential for adaptation as the environment itself changes This is surely the best argument for preserving the bio-diversity—so dear to E.O. Wilson's heart. The model for bio-diversity is not that of the Chain of Being, where one link broken, the whole chain is destroyed, potent though the metaphor is. Nor should loss of bio-diversity be seen only as the loss of potentially useful (and commercially valuable) resources (pharmaceutical or agricultural). That may be a good politically pragmatic argument. The concept of life bodies enables us to see habitats as living macro-organisms with the variety of organisms, organs within that greater organism. It is a qualitatively different way of thinking, one that I think matters.

The Human Life Body

In the human being all these aspects of the body of life forces are to some extent also present. Steiner uses a variety of terminology to describe these different aspects; he spoke of a body of formative forces (governing morphology and embryogenesis), a time body (maintaining the integrity of an organism's identity through the course of time from birth, youth, into old age and death), a rhythm body (maintaining and integrating all bio-chronological rhythms), an instinct body, and, in terms of human behavior (and presumably that of the higher animals), a habit body. Steiner summed all these up with the often-misunderstood term etheric body—a term which originally referred to the fifth element beyond earth, air, fire, and water. The English adjective etherial would be appropriate were it not for its poetic and perhaps misleading associations.

In the human being, these life processes also have higher functions, which once liberated from their primary organic roles become a medium for the retention of acquired traits, habits, inclinations, learned behavior and memory. Its formative properties become the activity underlying the ability to form mental pictures, bringing mobility into thinking, weaving in the pulsing rhythms of emotions. In their most primal character,

[5] Margulis, L., *Symbiosis in Cell Evolution*, 1981.

etheric forces, in contrast to the force of gravity which works from the center, work from the periphery as forces of levity. Living form is always a balance between the forces of gravity and levity, at any moment either gaining the upper hand. The forces of levity come more strongly to expression in the young green shoot, the forces of gravity in the heavy ripening fruit. Strangely we do not have difficulty accepting the force of gravity, even though it is equally intangible or "spiritual."

At key stages in the maturation of the human being, these formative forces are emancipated from the organic processes and become free to develop within the soul of the individual. The life-body then becomes the bearer of habitual behavior, temperamental disposition, and memory and the organizing principle in patterns of cognition. It is the life body that mediates between the physical organism and the soul.

There is of course also a relationship between the environment and the human life-body. We are just as embedded in the formative qualities of our environment as other animals, especially in the environment in which we spend our formative years in childhood. We can see this in the character and temperament of peoples from different environments. Obviously this merges with cultural influences, yet it is possible to distinguish the mood of those who grow up in the far north from those who live in a tropical climate, of a desert or steppe nomad from a city dweller (anywhere New York to Tokyo).

In more intimate ways we have a symbiotic relationship with our domestic environment. A tidy mind is often reflected in a tidy study. Some people prefer a wild, overgrown garden, others neatly manicured lawns and color-graded flower beds. It works both ways. The space works subconsciously on our sense of well being and we shape our environments to reflect how we feel about ourselves. In its higher form we are capable of shaping an environment that is uplifting, as in a church or temple, or supportive and calming, as in a kindergarten or birthing room. We can also ignore this factor and leave ourselves and others to the mercy of awful spaces!

Instincts

It is often said that apart from a group of primitive reflexes which most outgrow within a few months of being born, humans are characterized by having so few instincts compared with (other) animals. Modern evolutionary psychology has in fact revealed to us that we possess a large number of specifically human instincts, deep seated impulses that have evolved over millions of years.

Sentience

Only humans and animals can experience sensation. The realm of sentient experience is the soul. Within the soul, Steiner distinguishes the sentient body, which organizes bodily processes to the point where they become receptive to sensation, and the sentient soul which is the bearer of the experience of sensation as inner life. The primary experiences of pain and pleasure, color sensation, our drives, urges, cravings, passions, anger and so on, all derive directly or indirectly from bodily processes. The sentient body is dependent on the etheric body's connection to the physical processes.

What connection is there between this process and the functions of the central nervous system? I interpret this activity as focusing on that part of the nervous system connected to the brain stem and limbic system and which relate to the systems concerned with behavior linked to hunger, sexual drive, the satisfaction of other urges as well as aggressive and defensive responses. It is also closely linked to the bodily cycles of the main organ systems such as hormone regulation, the endocrine system, respiration, digestion, thermoregulatory processes, sleep and such reactions as blushing and sweating. What all these systems have in common is that they present the brain with a picture of the human world of the "interior." Such systems have a deep evolutionary history and can only be consciously influenced by long term training in self-control through meditation, yoga and the like. The connections between desires, passions and aversions and sensations arising through the sense organs is a hugely complex matter which Steiner went some way to explaining in his uncompleted book *Anthroposophy a Fragment*.[6]

Complementing the view from the "interior," a second complex within the nervous system, the cortical-thalamus system, provides us with the rapid and sophisticated motor coordination necessary for precision control of movement and speech as well as the categorization of experience and higher-order activities such as language and cognition. The thalamus plays a crucial role within the brain as a central point of connection, particularly between sensory signals and cortical processes. The limbic-brainstem system provides us with an in-built value system in the sense that it predisposes the mind to pursue behavior that satisfies the organism's needs. The cortical system interacts with this older, more primal system and provides the individual with the ability to adapt to present circumstances by acquiring knowledge, abilities and higher faculties. Thus we can see an obvious correlation between the sentient body processes and the limbic-brainstem system on the one hand, whilst on the other between the higher soul faculties and the functions of the cortex of the brain. Modern neuroscience appears to give some confirmation of Steiner's distinction between sentient body and sentient soul, a distinction crucial to the whole mind-matter debate.

Research into brain development also sheds light on further aspects of human nature. As Dr. James Dyson put it, this research allows "the thought that inherent within human physiology, a deeper form of unconscious wisdom may be at work, which in the course of its encounter with sense impressions, contributes to the way in which concepts, mental images, emotions and judgments are built up."[7]

Individual Brains

Given the epigenetic nature of the emergence of neural structures, each individual responds in different ways to similar sensory input. It is an astonishing fact that the finer brain structures are not genetically predetermined and no two brains are identical even if the individuals are genetically identical because such structures are brought about by the individual's actual experience. As the brain grows and develops the neural connections that form neural networks throughout the brain but especially in the cortex, are reinforced when they correspond to an activity that the individual recognizes as relevant, useful or appropriate. What selects these structures is an unconscious and innate value system that reflects the emergent interest and intention of the child. Such value systems are universal in nature but it is in their interaction with specific sense impressions at unique moments in the individual's life that makes them significant. So vast is the number of possible neural connections and combinations that the neural basis for infinite variation and of brain structures is given. The origin of these value systems

[6] Published in 1996 by Anthroposophic Press with an enlightening introduction by James Dyson, M.D.

[7] Dyson, J.A., 1996, *Introduction to Steiner's Anthroposophy (a Fragment)*, Anthroposophic Press, p28.

obviously has a deep evolutionary history. One could say their wisdom is inherent in the body itself.

The developmental psychologist Esther Thelen[8] has demonstrated this process by observing how babies learn to reach and take hold of toys or cups placed in front of them. The baby produces a repertoire of random movements that through trial and error result in the child learning which movements co-ordinate to achieve the desired result. From a neural perspective, each random movement is accompanied by the "firing" of bundles of neurons. From the vast number of potential firing patterns those which are useful to the child are reinforced by a chemical signal in response to a recognition that the pattern is useful.

Repetition strengthens the connections and those of related network patterns that respond to the emotional, cognitive and motor aspects of the activity. At a later stage conscious concepts will emerge and the child will understand and be able to describe in words the activity.

The significance of this is the implication that the brain and the individual first have to create their own categories before they can form their own perceptions, concepts or judgments. And, if we allow an element of individual intention, the possibility of overriding innate responses, which is the basis for free will. That means the human being must first create order in the world as it presents itself to us. In this sense we are actively taking part in the world and not merely being spectators or worse, being programmed by it. I feel this account, drawn from the contemporary neurosciences, sheds light on Steiner's account of the nature of the soul and spirit.

Sentience and Consciousness

Another major issue, namely that of the nature of sentience and consciousness in relation to the brain-mind problem now presents itself. This is what is known as the "hard problem"[9] in current philosophy and neuroscience; the "easy problem" is the comparably easier problem of exploring the actual mechanisms and processes within the brain. The "hard problem" concerns the nature of the mind itself.

As far as I can see there are essentially four scientific/philosophical positions and two others on this issue, some of which go back a long way historically and which keep reappearing in various new guises,[10]

1. There is no hard problem. Mind is a brain state, an illusion created by the biochemical processes within the brain tissue.

2. Consciousness is an outcome of mental "bootstrapping," that is the illusion of awareness at the top of a computational cascade of brain processes, an internal perception of the brain's monitoring of its own brain states.

3. Consciousness is some as yet undiscovered but ultimately physical property, quantum or mechanical.

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[8] This is described in the transcript of the Horizon television documentary "The Man Who Made up His Mind," shown on January 24, 1994, BBC Education Publications.

[9] As far as I know the term was introduced by David J. Chalmers in *The Conscious Mind*, 1996.

[10] See Daniel Dennett's *Consciousness Explained*, 1991, John Searle's *The Mystery of Consciousness*, 1997, and Antonio Damasio's *The Feeling of What Happens*, 1999, for a detailed summary of current philosophical and scientific theories.

4. We cannot know because our brain has evolved to perform certain functions that preclude ultimate knowledge of its own workings.

5. Consciousness, mind or soul are properties that lie outside the remit of the scientific method and can only be experienced through mystical methods achieving states that have been variously described as grace, enlightenment, Zen, Nirvana, clairvoyance, etc.

6. Consciousness is being. It is a property of everything in the universe and manifests in various states including unconsciousness and consciousness and countless graded stages in between. It is quite useful to distinguish various aspects of the "hard problem."

I discuss Gerald Edelman's distinction between primary and higher order consciousness below. Antonio Damasio[11] makes a different distinction, namely between core and extended consciousness, the former providing the individual with a sense of self in any given moment; the latter is far more complex and provides an elaborate sense of self that links past memory with future intentions.

Extended consciousness is a quality unique to humans, though perhaps present in simpler form in some higher animals. Damasio's most engaging insight is the discovery that consciousness begins with feeling, a feeling of knowing. Furthermore he uses the metaphor of consciousness as the light of insight. He concludes that the mystery of consciousness is not revealed by this insight but only begins to be more accessible.

My understanding of Steiner's account of the higher order realms of self-consciousness may be summarized as follows: at the higher levels, beginning with the consciousness soul and leading to what he termed Imagination, Inspiration and Intuition, self-conscious spirit unites itself with being in the world, or rather being manifests within the self-consciousness of the individual at a level that has freed itself from brain-bound processes and, therefore, beyond the dichotomy of brain-mind duality. That is essentially the state he termed freedom.

Steiner's approach is to address the phenomenon of subjectivity first. This begins with sentience as a kind of core consciousness. According to Steiner, it is in the realm of the sentient soul that both urges and sensations become inner experience and that these are distinct from the brain activity which accompanies them. The question of sentience remains a fundamental one for science. As neuroscientist Steven Pinker puts it, "Sentience is not a combination of brain events or computational states; how a red-sensitive neuron gives rise to the subjective feel of redness is not a whit less mysterious than how the whole brain gives rise to the entire stream of consciousness."[12]

Studying subjective mental states and all the phenomena that constitute consciousness poses very real scientific problems, which are marginally less bothersome for philosophy. As the Nobel Prize-winning neurobiologist Gerald Edelman formulates the problem, "We cannot construct a phenomenal psychology that can be shared in the same way as a physics can be shared."[13]

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[11] A. Damasio, 1999, *The Feeling of What Happens*, Chapter 11.
[12] Pinker, S., 1997, *How the Mind Works*, p564.
[13] Edelman, G., 1992, *Bright Air, Brilliant Fire*, p114.

This is the very heart of the problem with an essentially materialistic explanation of the human being. Sensations that give rise to a more or less conscious awareness of how things seem to us are known as qualia.[14] Only an individual can experience qualia, and instruments designed to monitor the physiological changes that accompany them may change them in unexpected ways. What is more, they are usually fleeting in nature and often consist of multiple layers of experience, the intensity of which will be highly individual. Thus they remain outside the realm of direct scientific observation.

We can, however, as Edelman does in his theory of consciousness, assume that other conscious beings experience qualia, what he calls the qualia assumption. This assumption enables Edelman to correlate what we know of primary and higher level consciousness, brain structures and functions, aspects which are more accessible to scientific study. Qualia can even be theoretically discriminated into different properties of modality, intensity, continuity, and temporal and spatial qualities.

Having established a model of primary and higher consciousness, Edelman, concludes that qualia "individual to all of us, are re-categorizations by higher order consciousness of value-laden perceptual relations in each sensory modality or their conceptual combinations with each other. We report them crudely to others; they are more directly reportable to ourselves. This set of relationships is usually but not always connected to value. Freedom from time allows the location in time of phenomenal states by a suffering or joyous self. And the presence of appropriate language improves the categorization of qualia enormously."[15]

Language provides the self with both the need and the means to name and order an inner world constructed out of perceptions of outside events, recalled and imagined events and states, and their complex interrelations. Thus we create an inner stage upon which the drama of human suffering and joy can unfold, within which time/space, human creativity and imagination can endlessly emerge. The reader is advised to turn to Edelman's work to follow the full extent of his explanations, to which I can hardly do justice in this brief reference.

Edelman summarizes his work on qualia with the admission that, "after a certain point, in its individual creations at least, the mind lies beyond scientific reach. Scientific study recognizes this limit without indulging in mystical exercises or illusions. The reason for this limit is straightforward: The forms of embodiment that lead to consciousness are unique in each individual, unique to his or her body and individual history."[16] I can only speculate that Steiner would have greeted this monistic (single integrated causal) account of a fundamental aspect of individuality with great interest. Edelman sets benchmarks for a contemporary anthroposophical thinking.

Human or Animal?

The question whether humans should be classified as animals or as a separate kingdom of nature is in many ways academic. Nevertheless, given the significance attributed to our human condition, it is necessary to provide an answer. The anthropo-

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[14] Ibid.

[15] Ibid., p136.

[16] Ibid. Nor is Edelman alone in arguing the epigenetic nature of individuality. Boris Cyrulink, the clinical neurologist, argues case in his book *The Dawn of Meaning*, 1993, as does Alain Prochiantz in his book *How the Brain Evolved*, 1989, both published in the McGraw-Hill Horizons of Science Series.

sophical answer would be, Yes, we share physical, life and sentient bodies with the animals, but the human being possesses an individual spirit that animals do not have. Animals have a spiritual dimension to their beings, of course, but this spirit is collective, rather than individual.

However, the knowledge we have today about the abilities of the higher mammals, such as dolphins, whales and primates, suggests high levels of individualism within such collective spirits. So where do we draw the line between human and animal? Most of the traits that were once considered uniquely human were linked with the concept of culture but have now proved to be present to some extent in primates and especially chimps and gorillas. These traits include tool use and even tool making (with local cultural traditions), complex social and emotional lives (e.g., empathy, altruism, rules of conduct, diplomacy, and social politics), complex communication skills including the ability to pass on acquired skilled through demonstration and emulation, the ability to anticipate future events, even the ability to deceive. Recent studies of chimps (and other primates such as colobus monkeys and macaques) even show them to be capable of using plants with specific medicinal properties both prophylactically and in response to illness or injury! An article in the German scientific magazine *Bild der Wissenschaft* (March 2002) describes these and many other astonishing traits as the beginnings of culture.

The article quotes one of the great researchers in this field, "The question whether animals have culture is a little like the question whether hens can fly. If we compare them with the albatross or falcon, then perhaps they can not. Nevertheless hens have wings, they can flap them and fly up into trees. It is similar with animals if we compare them with us from our high perspective of art or science."[17]

De Waal's point of view, and Darwin would have agreed, is that the difference is a matter of degree rather than of kind. It is a continuum, a spectrum which runs from chimps using probes to extract termites all the way to Leonardo da Vinci and Albert Einstein. Is culture uniquely human? It depends what we mean by culture, whether animals have it or not. The Japanese anthropologist Kinji Imanishi proposed a definition of culture that simply describes it as the non-genetic transmission of all forms of behavior. In that case the extensive learning abilities of many animals, such as local birdsongs and the songs of whales are forms of culture, and human culture is simply a complex version of this. One has to say, this is a very monistic point of view. There is only one evolution.

Therefore, we have to ask if humans possess anything more in kind than our animal cousins than simply more in degree. One key distinction is that whilst other mammals are capable of consciousness, only humans are capable of memory. This statement obviously has to be qualified. Mammals, and no doubt other animals, can certainly recall situations; after all rats could hardly be trained to run through mazes and trigger all manner of feeding devises. But learning from painful or pleasurable experience is not the same as memory in the full sense. To remember, one has to re-create a mental image of a certain experience. As far as we know only humans can do this. The reason for this, according to Steiner, is memory is an act of the "I" or Ego.[18]

Consciousness, and we could also say sentience, is an attribute of the sentient body and soul (astral body in Steiner's terms), whereas memory is an activity of the "I." Forming mental pictures at will is the prerequisite for a whole range of higher faculties, including abstraction, an awareness of time and sequence, the ability to understand

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[17] Frans de Waal in *Bild der Wissenschaft*, March 2002, p38.
[18] Steiner, R., 1979, *Occult Science, an Outline*, pp46-47.

complex phenomena and having a sense of self. We have a consciousness of our own identity and that of others precisely because we can remember.

The Self

Philosophy has struggled for centuries with the question of the self. Biology too has to reckon with a distinction between self and non-self as a defining basis for any organism. Broadly speaking the two lines of inquiry have kept the kind of safe distance from each other that characterizes parallel lines. Then comes the key questions of self-consciousness, "How do I know that I know?" and "Who or what is the 'I' is that knows itself?"

However, long before we get to the issue of self-consciousness, the fact that organisms need some kind of sense of self requires some explanation. Not only do organisms need to have some way of distinguishing themselves from other objects, they also have to maintain this throughout their lives. The immune system that any organism possesses is based on an assumption of self-substance and non-self-substance. One could say this was fundamental to life itself. The permanent activity of maintaining the integrity of the organism includes such well-known strategies as feeding, defending oneself, learning and adapting.

The continuous activity of balancing the processes within an organism to sustain health and regeneration is called homeostasis, what its discoverer the physiologist W.B. Cannon described as, "the coordinated physiological reactions which maintain most of the steady states of the body and which are so peculiar to the living organism."[19]

This coordinated, rhythmical activity of homeostasis is present within each cell, though it reaches a higher level of organization in the organism. The more complex the organism (and its environment), the more complex the process of homeostasis. The brain of a complex organism requires a sense of self (though by no means a conscious one) in order to manage the huge number of factors that have to be perceived and the changes and modifications that need to be made every second of life. The more complex and unpredictable an organism's life, the more complex the integrating process of homeostasis. Mobile creatures leading eventful lives have much to do to maintain their ongoing inner balance. This complexity increases during particularly difficult situations. Since the conditions of homeostasis themselves constantly change during an organism's life, Professor Steven Rose prefers the word homeodynamics.[20]

Thus one could say that whilst the human genome contains the identity of the species, the DNA of each individual represents the potential physical identity of the individual. The physical self is that part which actually grows and develops and becomes the physical body of the individual. The life or etheric self comes to expression in the process of homeodynamics and in the lifeline of each individual.

Within the mind of any sentient being, the sense of self goes beyond the mechanisms of homeodynamics. Simple organisms get relatively simple messages from their sense organs and bodily sensors. On the basis of instinctual reactions, the organism can respond within its pattern of typical behavior.

Sentient beings such as animals not only perceive what happens to them—they feel it too. Pain and presumably other felt-responses add dimensions to the self.

[19] Quoted in Damasio, 1999, p138.
[20] Rose, S., 1997, *Lifelines*, p17.

Something has to do the feeling. Something has to feel. As soon as the brain can generate representations of its internal and external experiences, it can generate a sense of self, that is to say, it can create some kind of coordinated image of what the sense organs convey of the world and the state of the organism itself, such as its general well-being, its movement and position in space at any given moment. Such a sentient organism must have a complex sense of self. A sentient being has a continuously changing representation of its own body in relation to its immediate surroundings. What brings order to this dynamic of change is the sense of self.

Furthermore, organisms with central nervous systems remember who they are, or at least they remember what has happened to them enough to learn. The simpler the sense range of an organism, the simpler the capacity for learning. Animals certainly learn to avoid repetition of painful experiences, as well as associating primary requirements with certain situations and individuals, such as the provision of food or comfort. We can see this most obviously in domesticated animals and their relationships to the humans who care for them. The individual basis of such memory reflexes could be said to be the distinguishing factor in the self of an animal. We can learn to recognize these character differences in animals.

The physical body and what it experiences provide a basis for the sense of self. The totality of sense impressions, which include perceptions of the body itself, its position and state, as well the body's relationship to its environment, provide a sense of self, indeed a feeling of self. Since the body is essentially stable in itself throughout life—the relationship of hand to eye, right to left foot, the visual field facing forwards most of the time—this self is relatively stable too. The changes within the body that occur tend to happen within limited and known ranges, at least relative to the unpredictability of what happens outside of us. This sense of self is conveyed to us through our extensive and highly differentiated sense apparatus, including the familiar five senses and the less familiar senses of movement (proprioceptive sense), warmth, equilibrium and so on. These convey signals, percepts the mind receives in the form of mental images.

Since our bodies also learn things, like riding a bicycle, playing the guitar, or simply tying shoelaces, our sense of self also has a life-body dimension. Habits, skills, learned responses and memories all contribute to the etheric or life-body self. None of this need be conscious. As I understand him, this is the basis for what the neurologist Professor Antonio Damasio calls the core self, of which we can have only core consciousness.[21] By this he means a transitory experience of the moment to moment totality of body states. Core consciousness in this sense is not exclusive to humans but is almost certainly shared by all sentient beings but most clearly by the higher animals.

Damasio goes on to describe several levels of self which are particularly helpful in relating the anthroposophical view of the nature of the human being. He distinguishes between what he calls a proto-self, core self, and autobiographical self. The proto-self is an integrated and temporary coherent collection of neural patterns which represent the state of the organism, moment by moment. We are unconscious of this self. This proto-self corresponds to the sense of self provided by the sentient body.

The core-self arises as core consciousness when the organism becomes aware of changes in its state caused by something that happens, either internally or externally. Any object of perception causes a response generated by a change in the state of some

[21] Damasio, A., 1999, *The Feeling of What Happens*, see Chapter 6.

part of the organism itself. This core-self is entirely transient but since things are continually happening and being represented in the nerve-sense system, it seems as if it is a continuity. This may be a sense impression of something we see, it may be a memory arising into consciousness. We know, yes, it is I who is seeing, yes, this is I remembering. The awareness of this rises from the realm of sentient-body to sentient soul and thus is a kind of sentient-self.

Beyond this is what Damasio calls the autobiographical self. All our past experiences, the sum of all our learned behaviors and habits, all the knowing we can recall from memory provides us with a complex sense of continuity. As Damasio puts it, this self is "an aggregate of dispositional records of who we have been physically and who we usually have been behaviorally, along with records of who we plan to be in future."[22] This self contains critical facts of our existence, our name, where we live, who we know, as well as what we like and dislike, what we long for and much detail besides. The autobiographical self is thus based on the autobiographical memory of our past experience. The developmental psychologist Jerome Kagan believes that children develop the basis of this autobiographical self by the age of 18 months.[23]

As we develop and grow we each construct an identity. This is woven around our autobiographical self along with a range of distinguishing characteristics influenced by our bodily constitution such as temperament, and by our social and cultural milieu, such as language, family traits, learned ethnic behavior, attitudes and body language, our kinship and network of friends and so on. The geographical, climatic environment within which we grow up influences this identity also. Obviously this is shaped by the actual course of events in our lives, by what happens to us, by the situations we experience. The dreams, hopes, aspirations and ideals that we have also color this identity.

This is as far as Antonio Damasio can go with his ultimately materialistic paradigm. The concept of a spiritual self integrated into yet ultimately distinct from these other selves would be a step too far. Before I come to characterizing the spiritual self, we first have to describe the realm of the soul or mind.

The Mind or Soul

Let me first summarize globally, as it were, what I mean by the terms mind and soul. In effect the mind arises out of and uses (I have chosen these five highly significant little words with care!) the complex structures of the brain to create pictures "in here" of what the individual experiences of the world "out there." Really a myriad of overlapping partial pictures comprising elements of all possible sensory modalities, all possible emotional colorings and associated will impulses—these pictures "in here" are in continuous interaction with "out there."

This interaction includes all the levels of monitoring and coordination of bodily functions, position or states. We are, of course, only conscious of a tiny fraction of this activity. Too much consciousness would lead to confusion, dysfunction and general overloading with pathological consequences for the individual. We really do need to keep our heads above all this vast swirling ocean of brain activity. The soul lives within the field of interaction and interrelationships between "in here" and "out there." The soul can also be described as the medium that translates the intentions of the "I" into the

[22] Ibid., p173.
[23] Kagan, J., 1995, *The Second Year*.

activities of thought, feeling and deed. Though there is some semantic ambiguity in the distinction between mind and soul, it might be helpful to think of the mind as the totality of mental activity (distinct from the material-chemical processes of the physical brain) and the soul as the inner life of the human being as expressed by thoughts, feelings and the intentions of the will.

The soul thus provides the human being with a realm of inner experience, from basic sentience to the experience of self. The soul is also the intermediary between the living body and the spirit. The spirit is the individual core of a human being, what we refer to when we say "I." What Steiner termed "the body of the I,"[24] the vehicle through which it most clearly expresses itself, consists of the higher soul faculties, which we would normally term our conscious mind.

Here Edelman's distinction between primary and higher consciousness is instructive. Primary consciousness requires perceptual categorization based on input from the sensory apparatus and is linked to behavioral responses, most of which are instinctive and in most cases innate. A frog responds to the perception of fly-shaped objects moving within a certain spatial distance from itself by shooting out its adhesive-coated tongue; it apparently does not respond if the fly or object remains static. Or as Ted Hughes so evocatively describes it:

> Terrifying are the intent sleek thrushes on the lawn,
> More coiled steel than living—a poised
> Dark deadly eye, those delicate legs
> Triggered to stirrings beyond sense—with a start, a bounce, a stab
> Overtake the instant and drag out some writhing thing.
> No indolent procrastinations and no yawning stares,
> No sighs or head-scratchings. Nothing but bounce and stab
> And a ravening second.

A thrush seeing a worm is an act of perceptual categorization. It recognizes the worm-like object in the wet earth and responds instinctively. Such an act of perception requires primary consciousness. A creature limited to primary consciousness is, however, bound eternally to the present.

Conceptual categorization, on the other hand (or brain hemisphere?), requires memory as well as perceptual categorization. Presumably thrushes have some form of memory and can, within limited parameters, learn from experience. The distinction between primary and higher level consciousness lies in the degree of control over memory and whether past experiences can be linked to present ones to predict future situations. This requires not only a mental imaging process but one which can interact with existing neuronal "maps." These maps are complexes of existing neural networks which relate to specific functions, such as linking light receptors in the retina to areas of the visual cortex, or to specific sensorimotor functions, or they may stimulate engrams or units of neural activity that re-stimulate parts of retained mental images, which we call memory.

Perceptual categorization works in effect like this: on receiving certain visual signals the "decision" to activate certain appropriate motor responses is reflected in the

[24] Steiner, R., 1996, *The Education of the Child*, p10.

interaction between groups of neural maps. Higher consciousness enables the process of mental picturing to occur at will and comes with the capacity to intentionally choose from a series of response options, including ignoring the stimulus. Learning enables us to enact intentions from a previously determined set of values. When playing cricket, the batsman has milliseconds to adjust the angle of the bat to strike the ball to the boundary. Registering the exact speed, trajectory and spin of the ball and reacting accordingly is an acquired skill (with possibly innate factors playing some role, such as acute eyesight and motor control), but a good batsman will improve with practice. The intentional choice to play this one down the on-side or let it pass is definitely a question of higher order consciousness, though the batsman may describe it as instinct.

Higher level consciousness requires an underpinning of primary consciousness, but in order to form connections between different perceptual categorizations to then form conceptual categorizations, a broader time frame is needed than present consciousness supplies. In order to extend the present into a consciousness of before and after there needs to be a higher point of reference.

Higher consciousness requires a self, a point of reference that can relate past experiences with future possibilities. Damasio uses a different distinction between core and extended consciousness. The former provides a transient, momentary awareness of states of mind (and body), a sense of transient self. Extended consciousness is able to call upon memory and anticipation of the future and provides the individual with a complex sense of identity as well the ability to know and recognize other beings. Core consciousness is essentially a biological phenomenon, experienced primarily in the realm of feeling. Extended consciousness permits language and conscious thought as well as creativity and invention. At the highest levels of extended consciousness, we are able to think and conceptualize.

As Terence Deacon has convincingly shown in his book *The Symbolic Species*,[25] the basis for higher order consciousness is symbolic thinking and memory. Symbolic thinking enables human beings to have a consciousness of self and non-self, what forms the basis for a subject-object and subject-predicate relationship to the world. In evolutionary terms the most developed form of symbolic thinking is language, which I shall discuss in detail later in the book. Let it suffice at this point to say that the path to language evolved first out of the human need to communicate and then through the emergence of representational cognitive activity. Communicating is a primary means of interacting with the outside world, it is a continuous process of perception and inner response. The evolution of syntax, which gives it structure and sequence, is closely related to the cognitive structures through which we order our view of the world.

But language, in its full sense, has yet another dimension. It reveals something of the inner nature of both the human being and the cosmos. As I shall discuss later, it is this spiritual aspect of language and its close connection to other higher order forms of consciousness that spans the threshold between soul and spirit.

Between Body and Spirit

Steiner describes the relationship of body, soul and spirit as follows; "The spirit is the central point of the human being, the body the instrument by which the spirit observes and learns to understand the physical world and through which it acts in it. But

[25] Deacon, T.W., 1997, *The Symbolic Species*, Allen Lane.

the soul is intermediary between the two. A thought which arises in the spirit is translated by the soul into the wish to realize it, and only through this can it become deed, with the help of the body as instrument."[26] The soul, then, is the mediator between the body and the intentions of the individual.

The human soul becomes not only the stage upon which his or her biography, thoughts, feelings and intentions unfold, but a stage upon which the drama of cosmic events are played out. The human being is not merely a spectator at this drama but, as Steiner put it, "human beings with their soul life are the stage upon which world events play. … The remainder of nature, which is at the same time a cosmic process, enters the human being. The human soul is a stage upon which not simply a human, but a cosmic process plays out."[27] As spiritual beings, we are linked to the spiritual world, just as we are linked to the natural world through our physicality, although since our ordinary consciousness arises out of the brain, our awareness of our spirituality is usually covered up, hidden or occult.

That historically this was not always the case suggests that the relationship between body, soul and spirit has been a changing one. What we understand of child development reveals the same trend in the emergent individual. Young children have far greater access to spiritual perceptions than adults, and only through the hard work of exercising the mind through meditation or through concentration can adults once more attain this kind of consciousness. The difference between child and adult, and presumably between pre-historic individual and modern person, is the degree of self-consciousness that accompanies spiritual awareness.

Thought enables the human being to transcend the imperatives of the sentient soul. We can choose not to act out this or that urge or desire. Thought gives us a degree of freedom from the compulsion of following our bodily nature. It also enables us to apply conceptual and combinatory thinking to solving problems through the use of technology. Thought also gives us access to an understanding of the laws that govern the world. It gives access to knowledge about the world and ourselves and this in turn leads to a search for the truth.

Just as the brain is the center of the bodily organization, the "I" is the center of the soul. Through the "I" we have access to the spiritual realities of life. When an individual's thoughts and deeds are motivated out of an experience of self-existent truth, that means being entirely free of any self-determined sympathies, the "I" becomes the inner soul of the soul. At this point the individual can begin to experience the truth directly. Spiritual insight leads to the need for inner development and arises out of it. The human drive to develop, something absent in animals, is an expression of the spiritual within the human being.

The spirit of the individual, the "I," works to refine and individualize the lower "bodies" of the developing individual. Throughout the development of the individual, the spirit works as a determining force from within. It is also the human spirit which has been at work throughout human evolution, working to refine the physical and life bodies as well as the sentient bodies or souls of our ancestors to make them more permeable to the self-experience of the spirit itself. As Steiner himself put it:

[26] Steiner, R., 1970, *Theosophy*, p80.
[27] Steiner, R., 1996, *The Foundations of Human Experience*, Anthroposophic Press, p77.

> When human beings are only beginning to rise above the animal, when their "I" is only just kindled, they are still like an animal insofar as the lower members of their being are concerned. The etheric or life-body is simply the vehicle of the formative forces of life, the forces of growth and reproduction. The sentient body gives expression only to those impulses, desires and passions, which are stimulated by external nature. As human beings work their way up from this stage of development through successive lives or incarnations to higher and higher evolution, the "I" works upon the other members and transforms them. In this way the sentient body becomes the vehicle for purified sensations of pain and pleasure, refined wants and desires. And the etheric or life-body also becomes transformed. It becomes the vehicle of habits, of human beings' more permanent intent or tendency in life, of the temperament and memory. One whose "I" has not yet worked upon the life-body has no memory of experiences in life. One just lives out of what has been implanted by nature. This is what the growth and development of civilization means for humanity. It is continual working of the "I" on the lower members of human nature; this work penetrates all the way into the physical body. Under the influence of the "I" the whole appearance and physiognomy, the gestures and movements of the physical body, are altered.[28]

Nature, Nurture, and the "I"

Here we touch on a central aspect of this book. There are three determining factors within the life of the human being. The first two are well-known: the genetic inheritance and the cultural-environmental influences, nature and nurture. The third is Steiner's great discovery, the self-activity of the individual, the activity of the "I." The "I" is not merely the result of the interaction between the genetic and environmental streams, though the body of the "I," as Steiner called it, is certainly shaped by the individual history of this interaction, be it at the neuronal or the sociological level. The "I" pre-exists the process of interaction though engages in it.

The body of the "I" is created by the on-going process of environmental events interacting with maturationally generated behaviors. It engages with and masters control of the physical body, individualizing it from the immune system up to being able to play a flute whilst walking on a tightrope. It adopts and adapts its social and intra-personal environment in individual ways. The individual may speak English like millions of others but is instantly recognizable to his or her friends on a mobile phone. Not only are the speech organs individualized to a personalized voice, but the character and personality of the individual shines through even the digitalizing of the sound frequencies. The individual asserts him- or herself to a greater or lesser extent within both the realms of genetic inheritance and social context. Life provides such a limitless range of hindrances and supports and circumstances that it is fairly obvious why no two individuals are quite the same in personality or biological history.

If the biological/bodily sense of self provides essentially the basis for our life of feeling and emotion and the soul or mind self can express itself in thought, the "I" can express itself in an unconscious realm behind either of these realms of soul, namely in the will. The "I" most clearly expresses itself in the will of an individual.

We can most fully recognize an individual by his or her deeds, which are the traces of will activity. Of course will is active in feeling and thinking, yet in its purest

[28] Steiner, R., 1996, *The Education of the Child*, Anthroposophic Press, p11.

tangible form it expresses itself in what a person does. This includes the whole range of human activity from standing up and directing our attention to healing the sick and raising the dead.

Yet this still does not cover all aspects of individuality. So far we have a very complex and subtle picture of the human being, far more helpful (and hopeful) than the crass forms of nativism or environmentalism typical not so long ago. Yet we still have further to go. It is not enough to stop at neural sectionalism to explain individuality and the potential of free will implicit in it. Steiner's concept of the "I" is that of a spiritual core of the individual, one that bears within it a spiritual inheritance and potential. Not only is the body of the "I" being formed in interaction with the physical and cultural/ environmental streams, it is also interacting with its own spiritual past and future too. Indeed it has selected its own physical and environmental context as one in which it can come to expression most effectively. The "I" has a pre-natal and a post-mortem existence. It is in effect eternal. The true concept of individuality, according to Steiner, only becomes clear if we accept the hypothesis of reincarnation and karma. The eternal spiritual core of the individual passes through a series of lives, each one influenced by previous existence and which in turn influences subsequent ones.

As we can see from the quotation above, the concept of the "I" for Steiner led inexorably to the idea of "reincarnation," of repeated earth lives for a single individuality. Parallel to the physical stream of inheritance, there is a spiritual stream borne by the individual "I" as spiritual core of the human being. What the individual experiences in life is reflected in the soul. It is retained in memory and is the basis for new abilities. The "I" of the individual is not untouched by these experiences but itself undergoes change. What the individual acquires in the way of new faculties through learning is taken up by the spirit, the "I." These form the basis for innate capacities that appear in an individual's next life, capacities that can not be accounted for by physical inheritance or upbringing.

When Steiner spoke of the fruits of capacities learned in one life being carried into the next, he was not, I think, speaking of playing the piano or riding a bike. Just as a series of perceptions can give rise to a remembered concept, which in effect preserves an essential aspect common to all the individual perceptions, so too does the spirit take up the distilled qualities of learned abilities, perhaps a sense for melody or balance. In a subsequent life we have no memory of our previous lives, what we bear within us are potential capacities which may under totally different circumstances, not to mention a new physical inheritance, come to quite different expression.

The "I" and Destiny

The incarnating spirit brings with it not only its individually acquired capacities, it also brings its destiny. This is likewise self-created and formed by the consequences of its own actions in past lives. However, humankind as a whole has lived through numerous incarnations at different points of evolution and a broad commonality of primal experience can be assumed. We can assume, for example, that all of us spent most of our lives (plural) as hunter gatherers, since that is what we were for ninety-nine percent of our evolutionary history. Steiner tells us that most individuals reincarnate about every thousand years. This gives us at least a broadly similar contextual heritage.

The outcome of each life spent on earth leaves a core of abilities and tendencies which live as potential with wthe spiritual "body" of the individual once the physical and life bodies, and with them the basis for memory and experience, have disintegrated, gone back to their origins. The "I" according to Steiner makes a journey through the spiritual world, during which the "new content" of the individual spiritual being is assimilated and integrated. At a certain stage in this process the individual reaches a point where further resolution is only possible through experiences only available in the sense world and the individual begins to turn, as it were, back to the world of the senses and physical incarnation.

There is a gradual gathering of forces once more around the archetypal model of the human being. The model has to find a physical basis for its existence and so the connections that link the individuals to this world become active. Each deed performed and each relationship lived in this life leaves us linked through countless strands to other human beings. These links draw individuals near to each other again. What lies unresolved between them, at a deeply unconscious level, brings them together again. That which is unresolved recurs.

Relationships are reestablished, though usually not in the same form as last time. Complex transitions have occurred as those relationships could not remain static since the previous earth life together but have undergone subsequent development within the realm of the spirit (just as memories mature in our unconscious and as learned skills become abilities). Steiner tells us that cognitive patterns, thought habits and attitudes metamorphose into movement, into activities and gestures of the limbs. Limb activity metamorphoses in mental activity between one life and the next. What is practised and learned in one realm becomes faculty (or its absence) in the next realm. What occurs in the development of the individual operates at a higher level in the transition from one life to the next, such as the fact that the development of fine motor skills forms the basis for mobility of thinking. Between one life and another this is mirrored at the spiritual, moral level. The gestures and movements imbued with moral intelligence in one life, developed through moral deeds or perhaps through artistic activity, will influence the nature of that individual's thought life in the succeeding earth incarnation.

When it comes to "re-entry" into this life, the individual spirit's choice of time, place, circumstance, culture, language, parents, and social situation will reflect aspects of personal destiny, wrapped up as it is with particular other individuals. It will also reflect aspects of a more general destiny typical of many, perhaps millions of, individuals who have experienced the world in a certain way, say as members of early farming communities at various places and at various times, with all the practical and cultural experiences that may have been involved.

If, despite the complexity of the process and the range of factors involved, this still smacks of a determinism, then we also need to take into account what Steiner wrote about self-determination. In his book *The Philosophy of Freedom* (retitled *The Philosophy of Spiritual Activity*), Steiner observes that "nature makes of man merely a natural being; society makes him a law abiding being; only he himself can make himself a free man. Nature releases man from her fetters at a definite stage in his development; society carries this development a stage further; he alone can give himself the final polish."[29] The free spirit is "only the last stage of man's evolution." The concept of free will developed by Steiner is therefore one of self-activity of the individual.

How then does this match with Steiner's avowed monism which accepts no purpose in evolution[30] and fully recognizes that the human being "makes his appearance

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[29] Steiner, R., 1979,*The Philosophy of Freedom*, Rudolf Steiner Press, p142.

[30] Ibid., p144, "Scientists, happily have thrown out the concept as a dead theory."

as a member of a naturally given totality (race, people, nation, family, gender) and also lives within a totality (state, church, and so on). He bears the general characteristics of a group to which he belongs, and he gives to his actions a content that is determined by the position he occupies among many others." To translate the question into modern terms what, if anything, is left unaccounted for by evolutionary psychology?

Steiner's answer was to point to the fact that thoughts and the ability to apply them in free deeds is something that individuals can develop only out of their own experience, whatever generic basis the activity has. "The individual can only get his concepts through his own intuition. … How the individual has to think cannot possibly be deduced from any kind of generic concept … just as little is it possible to determine from the general characteristics of man what concrete aims the individual may choose to set himself. … In this sense every single human being is a separate problem."[31]

For the most part the study of our generic and cultural past will tell us most of what we want to know about humanity in general. Individual freedom is only attained through self-activity. So in this view of human nature, to the best that science can offer us we must add the factor of human self-activity and its precursors in history, for this self-activity evolved through pre-stages. The appearance of these pre-stages of human emancipation form a central thread running through this book.

Steiner's Concept of Evolution

Steiner's concept of evolution was of a cosmic process in which both the realized physical world and the unrealized spiritual world are wholly and dynamically integrated, being mutually interdependent. In this relationship, spirit comes to manifestation in the natural world and to self-consciousness in the human being.

In order to understand the natural world, as well as to ask how it comes about, we also have to ask what it is that comes to expression in each natural phenomenon, in each living being. A full study of human evolution must deal with the qualitative as well as causal questions since it is our evaluation of qualities rather than causes that may lead us to meaning. We need to know both, of course. Conventional science looks at causes and has to leave questions of meaning out of the equation. Seeking meaning is, of course, not the same as seeking to identify purposes. Purpose is too linear a concept for complex phenomena. Meaning arises out of the totality of a situation and describes what comes to expression rather than merely telling us what causes what.

Late in his life, Steiner wrote a new foreword to a new edition of his first published work. He reflected on how he came to his own theory of knowledge. He described how drawn he was to the theory of evolution by descent, yet he had to wrestle with the paradox that he himself had direct experience of spiritual reality "in consciousness with the same clarity that characterizes mathematical knowledge." Faced with this experience Steiner felt it was impossible to accept the conventionally accepted limits to knowledge. He wrote:

> In reference to all this, I was somewhat inclined toward the theory of evolution then in its flower. In Haeckel this theory had assumed forms in which no consideration whatever could be given to the self-existent being and activity of the spiritual. The later and more perfect was supposed to arise in the course of time out of the earlier, the undeveloped. This was evident to me with regard to the

[31] Ibid., p206.

external reality of the senses, but I was too well aware of the self-existent spiritual, resting upon its own foundation, independent of the sense-perceptible, to yield the argument to the external world of the senses. But the problem was how to build a bridge from this world to the world of the spirit. … Thus my search was directed along the path from sense-observation to the spiritual, which was firmly established in my inner experiential knowledge. Behind the sense-perceptible phenomena, I sought, not for a non-spiritual world of atoms, but for the spiritual, which appears to reveal itself within man himself, but which in reality inheres in the objects and processes of the sense world itself.

Because of man's attitude in the act of knowing, it appears as if the thoughts of things were within man, whereas in reality they hold sway within the things themselves. It is necessary for man, in experiencing world or appearances, to separate thoughts from things; in a true experience of knowledge, he restores them again to things.

The evolution of the world is thus to be understood in such fashion that the antecedent non-spiritual, out of which the succeeding spirituality of man unfolds, possesses also a spiritual beside itself and outside itself. The later spirit-permeated sense-perceptible, amid which man appears, comes to pass by reason of the fact that the spiritual progenitor of man unites with imperfect, nonspiritual forms, and, having transformed these, then appears in sense-perceptible forms.[32]

I will attempt to explain from a contemporary perspective what this might mean. For the time being this concludes our brief explanation of the anthroposophical understanding of the nature of the human being. For the reader who is unfamiliar with these terms and concepts, I can assure you that I shall return to them in greater descriptive detail in the course of the book. What you have just read is as much as can be squeezed into an introduction. Bear with me, more will be revealed as we go along.

Steiner and Paleoanthropology

The science of paleoanthropology was only beginning to emancipate itself from the tradition of noble amateur when Steiner wrote about human evolution. He was clearly aware of discoveries in the field, whether it was Karl Gorjanovic-Kramberger's discovery of Neanderthal fossils at Krapina in Croatia, which Steiner referred to in a lecture in 1905 (although the monograph on the fossils only appeared a year later), or the discovery of the Ice Age cave paintings at Altamira, which Steiner acknowledged as pre-historic. One can only speculate on what his views would have been today, given the amount of data and fossils available. In subsequent chapters I will explore what an anthroposophical interpretation of this material might mean based on Steiner's approach to the knowledge available to him.

So what, in a nutshell, did Steiner believe his spiritual science could offer to the study of human origins? In 1905 he gave a lecture, later printed under the title *Haeckel and Theosophy*, in which he outlined the relationship between spiritual and natural science.[33] In those days he used the term "theosophy" for the spiritual science he later termed

[32] Steiner, R., Preface to the New Edition, 1923, *A Theory of Knowledge*, originally published in 1886, this edition 1967, Anthroposophic Press, pXVI.
[33] Steiner, R., 1935, "Two Essays on Haeckel," the lecture dated October 5, 1905, given in Berlin. All the following quotes come from this lecture, unless otherwise stated.

"anthroposophy," a step he took to distance himself from the Theosophical Society. It is indicative of Steiner's approach that he so stoutly defended Haeckel against a whole group of "dualist" detractors, whilst at the same time challenging Haeckel's materialistic thinking. It was Haeckel's monistic Darwinian approach to which Steiner allied himself. About Haeckel himself, Steiner had no illusions. He described Haeckel's biogenetic law, that ontogeny recapitulates phylogeny, as one of the most important ideas of the age but that Haeckel was its worst possible protagonist.[34] Given the fate of some of Haeckel's ideas, notably those leading the way to eugenics and the worst forms of social Darwinism, Steiner's concern was prescient.

Steiner's own version of monism sees physical and spiritual evolution as two confluent streams rather than as two parallel universes with only a one-way exchange from above to below, as is the case with most dualistic world views of the spiritual on the physical. The gods may rule or at least intervene on earth but mankind has no influence above, indeed generally seeking to escape below for eternal bliss above. Less religious forms of dualism simply shrug their shoulders and say, "There may be another level but humans are incapable of knowing anything of it except by divine inspiration." Most scientists today would refute even that and promote a materialistic monism. That is what makes Steiner's monism so challenging in that it is monist but not materialist.

Steiner described a "two-fold descent of man," the evolution of the physical organism and the birth of the soul-spirit. The task of spiritual science is "to delve into the past with regard to the soul and spirit." He makes it clear that the relationship between spiritual science and natural science is complementary:

> Now [anthroposophy] does not lead to any conclusions antagonistic or contradictory to the facts advanced by natural science; only with the materialistic interpretation of these facts it can have nothing to do.

With regard to human evolution, Steiner acknowledges the relationship of human beings with the higher mammals, with the anthropoid apes, but refutes the view that humanity had descended from the apes. Steiner's view is that both mankind and the apes are descended from a common ancestor: "What should be accepted is a primeval creature, a common physical ancestor, from the stock of which the ape has degenerated, while man has ascended."

We may find the terminology inappropriate for our times but the idea is important. The common ancestor already possessed the "soul of man," that is, mankind had not only a physical ancestry but a "soul-ancestor," too. This "soul-ancestor" still belonged to "higher worlds" and thus "lacked the mental activity and moral sense now evident. Such souls could conceive no way of fashioning instruments from the things in the outer world; they could create no political states."

The human soul-spirit in primeval times clearly did not express itself in cultural, technical or individual ways. Its activity "still consisted to a great extent in transforming the archetype of those ancestral bodies themselves. It labored at improving the incomplete brain, enabling it at a later period to become the seat of cognitive activities."

Clearly this formative period saw considerable biological variety. As Steiner put it, "Figuratively speaking, we may say that the soul 'selected' a certain number

[34] Letter from Steiner, September 1907, to Édouard Schurè, in *Correspondence and Documents* 1901–1925, Rudolf Steiner Press, 1988, p13.

of such ancestors as seemed best fitted for receiving the external corporeal expression distinguishing modern man." Clearly we are dealing with more than natural selection, we have to reckon with spiritual selection as well! The capacity for morphological transformation of the ancestral species, or "reconstruction" as Steiner put it, was an expression of a spiritual principle. "Thus man is physically descended from the 'archetype' while spiritually he is descended from the 'ancestral soul'." Not all of the branches of the genealogical tree quickened by the life-sap of the "soul-ancestor" were "capable of subjecting themselves to the soul's progress."

One of the branches not selected to bear the human fruit "deteriorated, and is now represented by the anthropoid apes." Indeed, in Steiner's view the whole of animal evolution has been influenced by spirit coming progressively to a more complete form of expression. As he put it:

> When our earth came into existence, man was a purely spiritual being; he began his career by building for himself the simplest of bodies. The whole ladder of living creatures represents the outgrown stages through which he has developed his bodily structure to its present degree of perfection.

This is a radically anthropomorphic picture of evolution and one for which Professor Stephen Jay Gould would no doubt save his most eloquent ridicule. But perhaps I do him an injustice—he might show scholarly, if patronizing, historical interest in so quaint a theory! The Harvard evolutionist would be justified in disposing of Steiner in a cloud of ink if Steiner's vision were of an egocentric anthropomorphism which saw in mankind the pinnacle and goal of creation. But that was not Steiner's position. Humanity's unique position in nature is solely by virtue of human beings' possessing an individualized spirit.

The whole of nature is imbued with spirit, but what even the animals lack, despite their sentience and states of consciousness, is individualized spirit. In animals, spirit comes to expression at the species or group level. One could say, therefore, that species rather than individuals evolve. Humans, as a species, have also evolved but only individual humans evolve as individuals, what we would normally call individual personal or moral development, in other words, development of new faculties through their own active endeavor. Within limits animals can learn from experience, we may also train them as juveniles to perform certain behaviors, but we cannot say that animals develop themselves with conscious intention. The story of human evolution is an account of human ancestors increasingly acquiring this ability, the ability to direct their own development.

Central to Steiner's account of evolution is the assumption of an inherent meaning in creation because he saw the world imbued with spirit. And that spirit comes to expression in life and in living beings at all levels of existence. It comes to individualized expression in human beings. Spirit too has evolved. The challenge of anthroposophy is to recognize the spirit at work in the living world and to do so with the very human faculties that have evolved in us. The challenge is to establish a science free of the limitations materialism imposes on human thought and to do so with the very means that uphold materialism itself—the human mind and its powers of perception, insight and thinking.

The unique position humans have in creation lies in the very fact that they possess spirit in individualized form within them and this gives them incredible power over the rest of creation. This power comes through our ability to think and manipulate the world. It has taken a long time to emerge but it has now well and truly arrived! Possession of such spiritual powers of thought is from where human freedom and responsibility come. To deny the existence of the spirit, or the individual human spirit, is to deny ultimate responsibility. From where does the materialist derive his or her sense of responsibility for nature? Merely from self-interest or rationality? That hardly suffices when it comes to tough choices.

The materialist can only choose egotistically. There is no true altruism for the materialist. There is no higher truth at all, only natural selection. In the somewhat dated terminology of 1905 Steiner concluded the lecture I have quoted from above, with the following thoughts: “Thus does the materialist mark the whirling atoms in stone, in plant, in animal and in man too, in every work of art, and claims for himself a knowledge of a monistic cosmogony that has overcome the ancient superstitions. Yet [anthroposophists] have a monistic cosmogony too, and we can say, in the same words that Haeckel uses, that we see God in the stone, in the plant, in the beast and in man; but what we see are no whirling atoms, but the living God, the spiritual God, whom we seek outside in Nature, because we can also seek Him within ourselves.”

The God within ourselves is the highest principle towards which we can aspire. The core of our being is an aspect of this spiritual principle and it is this core that works through evolution. It is this spiritual core that gives life its meaning, and its trend is to manifest itself ever more completely. We can only act out of the reality of this principle if we act out of freedom, that is, free from all determining factors, whether external or internal. This state of freedom is not easily attained. Yet for the sake of the earth, for world evolution—not for the meaningless egotistical motivation of self-preservation and the mere continuation of our genes—we must strive for this freedom. The human spirit is the very antithesis of egotism, and egotism is the curse of materialism. Nor is this kind of spirit much of an intellectual comfort, more an open-ended and expanding challenge of responsibility. The search for this truth is also a path that begins in wonder and leads into ever-deeper levels of reverence.

Chapter 4

First Steps

Over a period of at least five (and possibly seven) million years, humanity has acquired the traits that we associate with humanness. Upright bipedal walking is a trait already apparent in the very earliest fossils dated to at least 4.5 million years ago (abbreviated to mya). The earliest stone artifacts believed to be around 2.5 million years old demonstrate manual dexterity and tool use. Brain size had achieved significant volume by the time of Homo erectus who is known to have existed as long ago as 1.5 mya. The migration of hominid[1] species out of the presumed indigenous homeland of Africa into new environments is testified to by evidence over a million years old. The essential elements of human language are thought to have been established by around 100,000 years ago (100 kya). Anatomies more or less identical to our modern form appear in the fossil record at around the same time. By 40 kya human beings were leaving evidence from which we can deduce that a whole series of behaviors we would call culture, such as art, religion, complex technologies and life styles which could adapt to almost any habitable environment (including the harsh conditions of the last Ice Age), were well established. In the period from about 60 kya to 15 kya modern humans appear in Australasia, Siberia, Japan and the Americas.

That in brief, is an overview of our prehistoric achievements. What humanity achieved over millions of years, each child manages in a few years in learning to walk, talk and think. Of course the matter is vastly more complex than this postcard summary indicates. In succeeding chapters I will delve into some of these complexities, highlighting the unresolved issues, citing the main options in terms of interpretations and showing how views change.

Perhaps the most astonishing aspect about the study of human origins is the incredible fluctuations in the emergence of facts and theories explaining them. Few sciences can have so fundamentally changed their basic premises so often in such a short space of time. The foundation supporting the ground floor of this science, namely the time frame within which human evolution is thought to have occurred, has dropped at such rapid speed and in such a series of unexpected descents that anthropologists travelling in this lift must wonder when they will ever hit the bottom. What started out as a question of whether antediluvian prehistory even existed rapidly had to come to terms with archaeological evidence of human life thousands of years ago. Years became

[1] A glossary of terms is provided at the end of the book. I have done this to keep the text as uncluttered as possible. What is being referred to is usually clear in the text, but a more specific definition of terms is provided in the glossary.

hundreds of thousands and now get ticked off on time charts in millions, which are fundamentally incomprehensible time dimensions. The world was a very different place 5 million years ago (unabbreviated for emphasis!). Even from the perspective of geological time, 5 million years is minor but it still encompasses huge changes on the earth's surface, if not actually at continental levels. When on sees the depth of certain African archaeological floor levels scraped out in gorges and river valleys and imagines that these were once on the surface, it is possible to get some physical sense of geological deep time. The sheer depth of sediment above and the volume of debris already eroded are amazing.

The outcome is that humanity's origins get pushed further and further into deep time. It is rare that any archaeological find is ever revised to a more recent date. It does happen but the general trend is to ever-older dates. It is not impossible in such a rapidly changing field of research that we could pick up *Nature* next week and find that some team has just re-calibrated all current dating processes and it turns out that Homo erectus emerged at 9 AM on the October, 29, 4004 BC plus or minus a quarter of an hour! It just seems highly unlikely.

In the ten years or so that I have been researching this book, I have had to rewrite certain chapters with frustrating irregularity, not simply in the quest for stylistic perfection (another rapidly fluctuating phenomenon) but because major discoveries keep being reported, which change the whole picture or at least a key part of it, such as the hotly disputed issue of whether we are closely related to Neanderthals or not.

It is not, however, the purpose of this book to catalogue the accounts of human evolution and the supporting evidence. The reader can refer to the extensive literature listed in the bibliography. My purpose is to explore what is known from the perspective of human development that the opening section outlined, namely the spiritual dimension. I will examine the various aspects that form the main focus of contemporary anthropology from this perspective, bringing what detail seems necessary to make the points I feel are relevant. In so far as it is possible I will take a chronological approach, which means taking the evidence of the oldest known hominids and working towards the present. From time to time it will be appropriate to address the subject thematically rather than strictly chronologically. I will start with a diagrammatic overview of the genealogical tree, which represents the current view of the relationships between the various species related to the human line in time and space.

This already presents a difficulty since there are many different views on this, with parts of this diagram the subject of heated debate. New discoveries are being made all the time, with new fossils from the earliest period being identified in Eastern Africa and Ethiopia as I write. Another area of flux at present is nearer the top of the tree, or bush as it more closely resembles, with discoveries in Spain, Portugal, Croatia, France and Japan throwing open the debate once more. Regardless, I have taken the plunge and drawn up a diagram that is bound to be out of date, at least in detail, but gives a broadly agreed summary of current thinking.

Original Origins

One of the fundamental mysteries surrounding human origins is the question of the common ancestor of hominids and the anthropoid apes. Both the fossil records and the molecular evidence point to a split in the lineage of hominids to one branch and chimpanzees on another occurring between 8 and 5 mya. The split is assumed to have occurred in Africa.

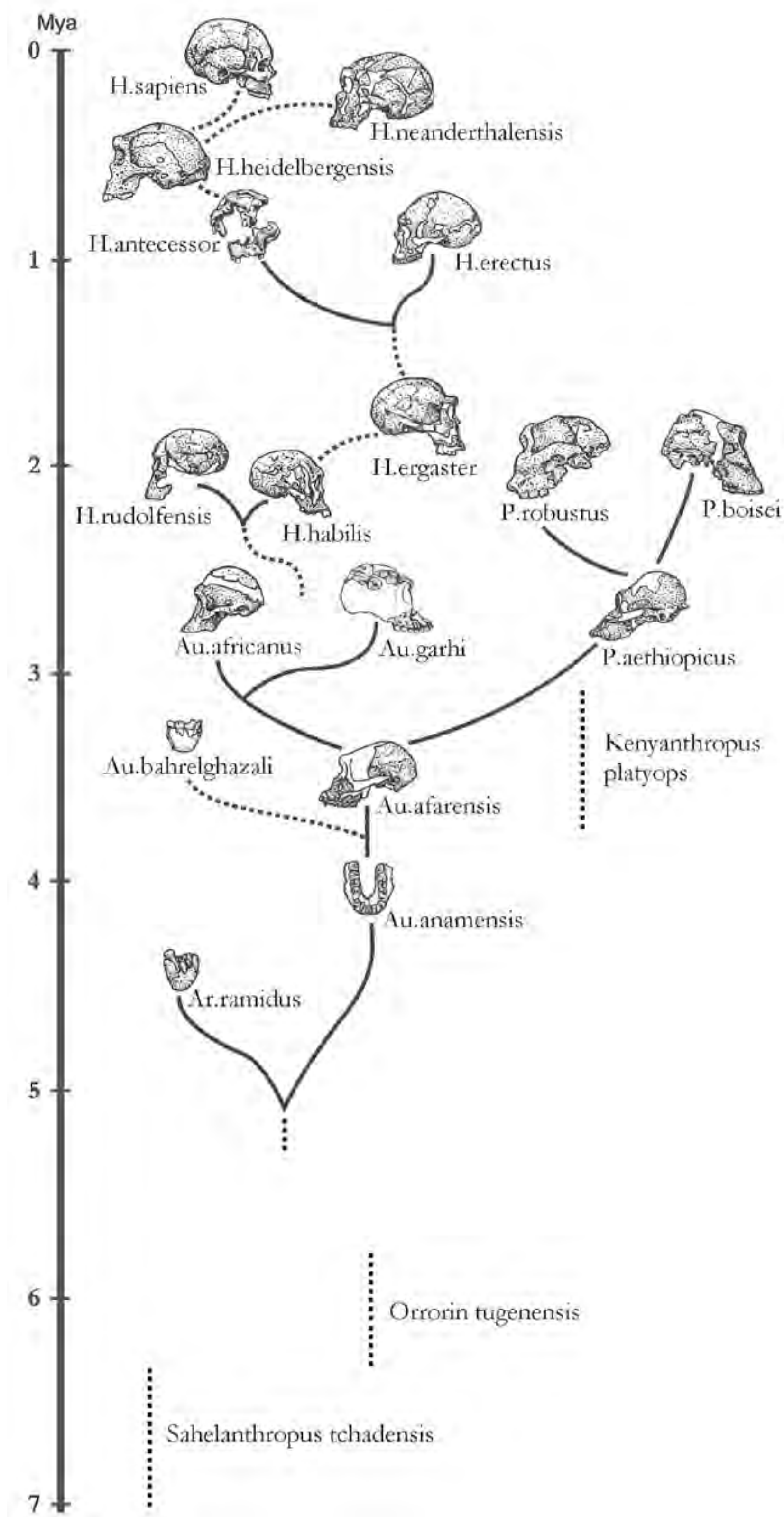

Fig 4.1 *Time chart showing the currently assumed relationships between the various known hominid species. Several new species have been included though their genealogical relationships have not yet been determined (after Tattersall and Schwartz, 2002, but updated following more recent discoveries).*

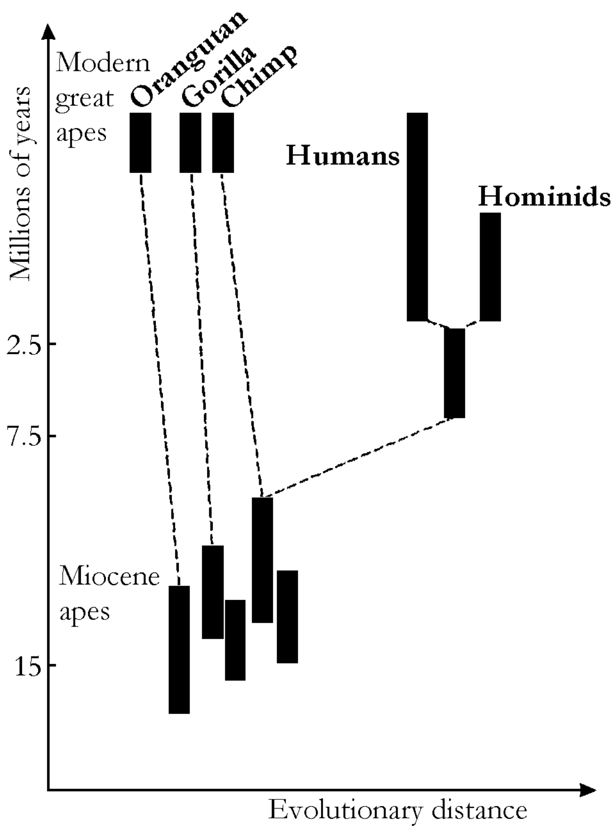

Fig 4.2 *Diagram showing the assumed ape-hominid split (after Lewin, 1998).*

One of the complicating facts for scientists working in this field is the almost total lack of fossil remains for ancestors of our present day African apes! and there is precious little material for their Asian counterparts, the gibbons and orangutans.

For the period between 12 and 4 mya there are some ape fossils but these are scarce indeed. The reasons given for this startling absence is that the environments typical to apes such as tropical forest are not conducive to the preservation of fossils, though recent studies suggest that some fossils may be preserved.[2] Fossil hunting in rain forest conditions is not easy. In fact it is only in areas of former forest, now preserved in sediments, that such fossils can hope to be found. It may also be the case that the ancestors of present-day chimpanzees and gorillas were simply not as plentiful as hominids.

Hominid fossils by comparison are relatively abundant, though I stress the "relatively." The basic reason for this is that hominids inhabited different environments than those of the ancestors of chimpanzees and gorillas, at least for the past 45 million years. The great apes in Africa were presumably confined to the rain forest areas west of the Great African Rift system, where they are still to be found. Hominid fossils are found essentially east and south and within this great continental divide. Only from later years are they found elsewhere on other continents.

[2] See *New Scientist*, February 26, 1994, p18.

Planet of the Apes

Ten million years ago there were upwards of 50 species of ape, from the gigantic cevapithecus, twice the size of a human being in the jungles of Southeast Asia, to the tiny limnopithecus, as small as a mouse. These highly intelligent animals were widespread and important within many of the world's environments. Then over a period of a few million years this great diversity of ape species dwindled to a mere handful. Among these few species must have been the anatomical ancestors of human beings.

While the geological period known as the Late Miocene stretching from approximately 105 mya suggests a decline in the number of ape species, it did see an increase in the number and variety of monkey species such as baboons, geladas and colobines in Africa and Eurasia. Just what made the monkeys so successful and the apes dwindle to a handful of species probably had to do with major ecological changes that reduced the natural habitats of apes. Why the monkeys should have proved more adaptable to changing conditions than the apes is less clear, though it is probably related to their life-history profiles.

Interestingly Dr. Jay Kelly of the University of Illinois notes that each of the apes which did survive into the present is "in its own way atypical when seen in the context of ape evolutionary history as a whole."[3] Kelly also notes that the living apes are all highly specialized in their behavior, a feature not typical, as far as can be told from fossils, of Miocene apes.

In fact it was not just the apes that disappeared, it was a whole group of species including certain monkeys, giraffes and rodents. What they all had in common was the fact that these particular species were all forest dwelling animals. They were replaced by species typical of more open environments. The clue to this remarkable change was found in geological evidence of major changes in plant types dominating wide areas of the earth's surface. Each plant type leaves its own signature. The analysis of radioactive isotopes of carbon dioxide in calcite nodules left by decaying plants reveals a transition from predominantly forest plants to grassland plants in the period between 8 and 6 mya, notably in Eastern Africa. The mass extinction of forest-dwelling species including the apes is obviously related to the loss of their habitat.[4] Change of habitat and mass extinction can often lead to vast adaptive radiation[5] among the surviving species who evolve new forms in response to the many opportunities and challenges created by new environments.

Of the present-day apes, the bonobo is perhaps closest to the common ape-human ancestor. While its close relative the common chimpanzee appears to have diverged from the chimpanzee lineage by adapting to more open, drier habitats, the bonobos seem to have retained the original pattern of life adapted to humid forests. Their anatomy is less specialized than the chimpanzee's, and their body proportions more closely resemble that of the early hominids, the Australopithecines. When they walk upright, bonobos have longer legs and smaller heads compared to chimpanzees; they look remarkably un-ape-like.

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[3] Steve Jones, et al.(eds.), 1992, *Cambridge Encyclopedia of Human Evolution* (CEHE), p230.

[4] Reported in the transcript of the BBC Horizon program, "The Ape That Took over the World," broadcast on October 4, 2001, quoting Jay Quade the geologist who made the discovery.

[5] Adaptive radiation means the diversification of an evolving group of closely related species into new habitats or ways of life.

The biggest puzzle of all, however, is how the ape species made the transition and adapted to become the ancestor of our ancestors. At least one species became the upright walking ancestor of the Australopithecines, the earliest hominid group. The background to this event needs to be described in more detail.

East African Origins

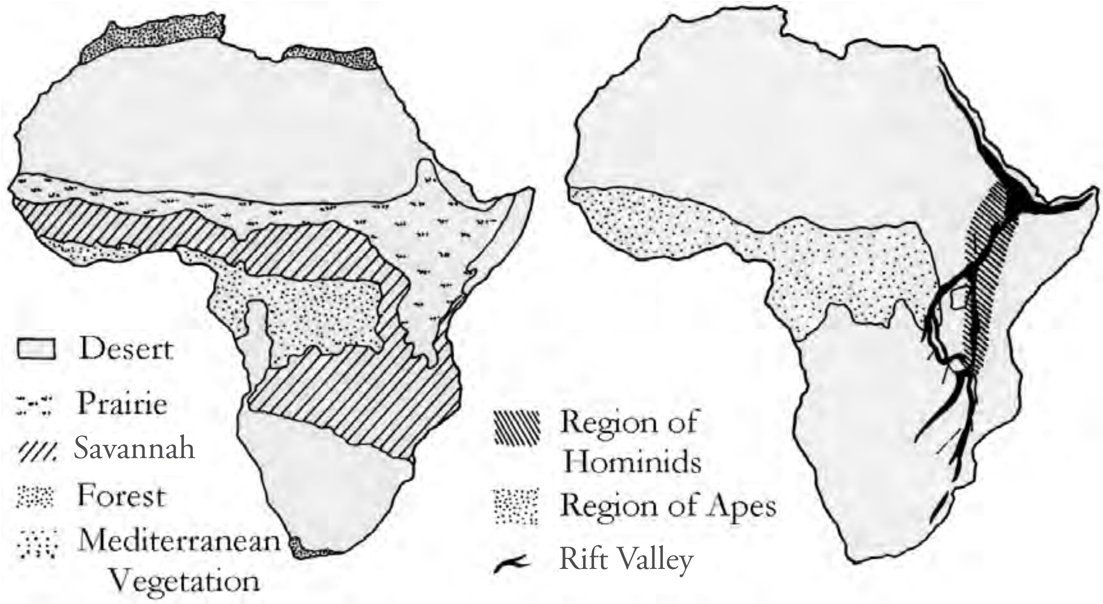

Fig 4.3 *Map of the East-African Rift system and the main types of habitat.*

Paleoclimatology and geology[6] have combined to give a picture of major tectonic upheavals in the late Miocene and early Pliocene period in East Africa (the period from about 101 mya). As the Great Rift Valley system was opening up, the Kenyan and Ethiopian Highlands were being simultaneously raised. This caused a fragmentation of the central African rain forests that once stretched in a continuous belt across equatorial Africa from the Atlantic to the Indian Ocean. The original home of the African apes therefore underwent a major reduction in expanse. This was largely due to the change in the circulation of the air masses altering the pattern of precipitation. East of the Rift became part of the monsoon system of the Indian Ocean and as such became distinctly seasonal. In the rain shadow regions within and to the West of the Rift Valley system a remarkable mosaic of localized environments arose, from the snow fields of Mt. Kilimanjaro to the oven-like temperatures of Lake Natron. Predominant, however, was the blend of open savannah and ribbon forest along the watercourses. Perhaps no region on earth has such variety of ecological pockets or such a range of flora and fauna.

As the Rift Valley literally divided the continent, so to major changes in the drainage patterns and the lake systems further fragmented the heart of Africa. The Nile, the Niger, the Zaire, the Zambesi and the Ruwezori rivers all changed their directions of flow, thus creating real geographical barriers between sister species among the Miocene

[6] Yves Coppens, 1994, "East Side Story, The Origin of Humankind," in *Scientific American*, Vol 270, No. 5, May 1994.

apes and thus ideal conditions for allopatric speciation (the evolving of new species in geographical isolation), which takes place among small, isolated populations, and for environmental impetus for change. It seems therefore likely that the ape-hominid split was geographically an east-west one. West of the Great Rift Valley apes adapted to an equatorial rain forest environment where their descendants, the gorillas, chimpanzees and bonobos, still survive in increasingly precarious sanctuaries. To the east, in a drier, more open and varied environment the other branch the hominids adapted in their own unique ways.

Controversial Discovery, Again

Thus far, with the exception of two glaring anomalies, all early hominid fossils have been found in or east of the East African Rift Valley system. The discovery of a fossilized piece of jaw assigned to a species called Australopithecus bahrelghazali and the very recently published sensational find of Sahelanthropus tchadensis, both found in Chad, 1500 miles west of the Rift Valley, has the potential to dump the East-Side Story, as the theory of hominid origins being exclusively east of the great divide of the Rift Valley.

Sahelanthropus, or Toumaï (a name given to children born in the dry season in Chad) as it has been nicknamed, is probably the most significant fossil found for decades. The full implications of the discovery were being revealed as this book was going to press. Essentially this well-preserved fossil skull is significant for the following reasons:

1. Its age. At 7 million years old this pushes the age of hominids and the assumed split from the ape lineage back considerably.

2. It walked. There is good evidence that Toumaï was an upright walker, thus pushing evidence of uprightness even further back in the fossil record. It demonstrates yet another variant of upright walking.

3. Its location. Chad straddles the Sahel region of the southern Sahara desert and is very far from the Rift Valley, long claimed to be the cradle of humankind. A million years ago the region was not desert but a mix of rain forest, and lakes.

4. Its appearance. The skull shows a mosaic of advanced and primitive traits. The brain case is ape-like, but the face is short, and the teeth, especially the canines, are small and far more human-like. The bony structures over the eye sockets are also a distinctive hominid feature.

5. Its place in the human ancestry. Toumaï appears to be closer to the much later Homo and this implies that all the australopithecines may be further remote from the human lineage that has been assumed. This will cause a major rethinking of all family trees!

6. There is no doubt that this discovery will be only the first of many in the region. If there is one well-preserved skull, there will be others. Each new find will change the picture.

Professor Bernard Wood of George Washington University assessed the significance of the find as follows: "My predication is that S. tchadensis is just the tip of an iceberg of taxonomic diversity during hominid evolution 5 to 7 million years ago. Its potentially close relationship with our own, hominid, twig of the tree of life is surely important. More notably, however, I think it will prove to be telling evidence of the adaptive radiation of fossil ape-like creatures that include the common ancestor of modern humans and chimpanzees. The fauna of the Burgess Shale in Canada, which samples a bewildering array of invertebrate groups some 500 million years ago, is a famous example of diversity at the base of an adaptive radiation. Does S.tchadensis belong to the African-ape equivalent of the Burgess Shale?"[7]

Toumaï is not the only recent discovery to cause great interest in the earliest stages of human evolution. In the year 2000 a French/Kenyan team announced the discovery of a fossil they called Orrorin tugenensis (usually referred to as Millennium Man) dated at around 6 million years old. Though Brigitte Senut of the Natural History Museum of France, the leader of the teams, claims Orrorin is the nearest to the common ape/human ancestor yet found, this is hotly disputed by leading authorities in the field. It has even been suggested (by Professor Bernard Wood), that Orrorin may be ancestor to neither ape nor hominid.[8] Its upright status is both claimed and disputed.

Previous Controversial Discovery

Next in age are the remains of some seventeen individuals found at Aramis in Ethiopia and dated to around 4.4 mya. Professor Tim White, who led the joint American-Ethiopian expedition, published the details in *Nature*[9] giving them the provisional name Australopithecus ramidus. They have now been re-designated to a new species which Professor White has called Ardipithecus ramidus, which means "ground ape," "ramidus" meaning "root" in the local Ethiopian language. Since that discovery Yohannes Haile-Selassie, one of Professor Tim White's Ethiopian graduate students, has found further fossils which suggest the existence of similar but subtly different related species. So now we have Ardipithecus ramidus kadabba ("ramid" means "root," "kadabba" means "basal family ancestor" in the Ethiopian language) assumed to have lived about 5.5 mya and its younger cousin Ardipithecus ramidus ramindus 10 dated at around 4.4 mya. From the little that has been published about ramidus, it seems that though basically upright, these creatures more resembled chimpanzees and lived in a heavily forested area. The known specimens would have stood about 120cm tall (about twenty percent taller than Lucy, described below).

Another recent expedition,[10] this time led by Maeve Leakey in the Turkana region discovered fossils belonging to yet another australopithecine species, named Australopithecus anamensis by Alan Walker, from the Turkana word "anam," meaning

[7] Quoted from *Nature* 418, 133–135 (2002) published in the website.

[8] Reported in *Time Magazine*, July 23, 2001, p61.

[9] White,T.D., Gen Suwa and Berhane Asfaw, "Australopithecus ramidus, a new species of early hominid from Aramis, Ethiopia," in *Nature* Vol 371, September 1994. See also Bernard Wood, "The Oldest Hominid Yet," in the same volume of *Nature*.

[10] A *National Geographic* report shows photographs of these finds, Vol 188, No 3, September 1995. See also Walker and Shipman, 1996, p122. Other references include: Rick Gore, 1997, "The First Steps," *National Geographic*, Vol 191, No 2, February 1997; Leakey, M. and A. Walker, "Early Hominid Fossils from Africa," in *Scientific American* Vol. 276, No. 6, June 1997, pp60–65.

"lake." It is highly likely that further discoveries in the region will be made adding perhaps yet more species to the already complex picture of early hominid evolution.

A Remarkable Yet Typical Case

Even as I write, the scientific press is reporting the discovery of a new hominid fossil in that most prolific region (for hominid fossils) of Kenya's Turkana Basin. A relatively complete skull has been found and pieced together, dated at between 3.2 and 3.5 million years old, showing an interestingly flat face, smallish lower jaw and small teeth. It is so different from other known fossils of the period to merit being allocated to a new species, Kenyanthropos platyos ("flat-faced human from Kenya").

We may assume from the designation that its finders, under the leadership of Maeve Leakey, think it belongs to the human lineage. This makes it a challenge to Australopithecus afarensis, described below and hitherto regarded as the earliest direct human ancestor. At a recent gathering of anthropologists, Leakey remained uncertain in pressing such claims, though Kenyanthropos is certainly less ape-like and therefore possibly closer to the line that led to Homo.[11]

The most significant thing about Kenyanthropos is that living at exactly the same time as Australopithecus afarensis (Lucy), it proves that afarensis was not the only bipedal ape. The two species show enough anatomical differences to rule out the possibility of the specimens representing variations within one species.

For many years the existence of a single species at or near the root of the human ancestral bush has been seen by many evolutionists as an anomaly. All other groups of evolving mammals at the same time show a pattern of adaptive radiation with several and often many species. With the discovery of Kenyanthropos, it makes it even more likely that the anatomical evolution of humans arose out the same processes by which other species evolved.

As Ian Tattersall and Jeffrey Schwartz conclude in their major survey of all known hominid fossils,[12] the history of hominid evolution is "astonishing in its diversity," and nowhere is this truer of the genealogical "bush" than among the australopithecines. These two scholars have tried to sort out the relationships amongst the present crop as shown in the cladogram below. This diagram shows the relationships between the species from a morphological point of view based on an analysis of primitive and derived states. Primitive states are assumed to belong to the ancestor, derived to a descendant.

From around 3.5 mya fossils of A. afarensis are relatively common (it remains to be seen how common Kenyanthropos was). By this time several critical hominid characteristics had evolved. These include dentition patterns, rotary chewing (as revealed by jaw and tooth shapes) and, most important of all, truncal erectness and bipedal locomotion. In other words, as far back as the fossil record goes, hominids walked upright. Even the earliest australopithecines were bipedal. Their anatomy shows that they were habitually capable of walking upright, in ways that no known apes did.

[11] Reported in *Scientific American*, June 2001, p18; see also *New Scientist*, March 24, 2001, p5 and *Nature* Vol 410, p433.

[12] Tattersall, I., and Schwartz, J., 2000, *Extinct Humans*, pp102–104.

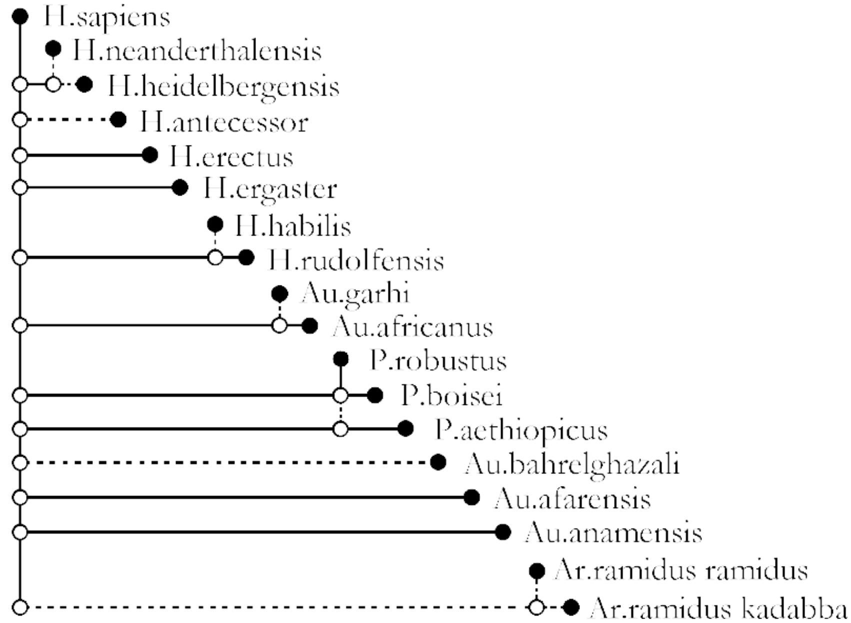

Fig 4.4 *A cladogram showing the assumed relationships between the various australopithecines and related groups. This does not include the latest discoveries of Orrorin tugenensis (6 myo), Kenyanthropus platyops (3.5 myo) or Sahelanthropus tchadensis (6–7myo), since their relationship to succeeding species is still a matter of dispute. The finders of Orrorin and Sahelanthropus have suggested that these two species are more closely related to later Homo than the australopithecines, which would relegate this group to a dead-end side-branch of the human bush. This is hotly disputed. The complications arise because these fossils all demonstrate a range of primitive and advanced features, such as flatter more upright faces or small teeth. What these new finds do demonstrate, however, is the fact that human evolution did not proceed in a linear way from primitive to advanced, but rather was hetereochronous. It also demonstrates, as Professor Bernard Wood of Washington State University put it, "Anyone who thinks this isn't going to get more complex isn't learning from history" (quoted in a report in* Nature, *July 11, 2002).*

A cladogram is a diagrammatic representation of a group of organisms that share primitive (in the sense of original) traits or states and are distinguishable by virtue of derived traits or states, i.e., those not present in the ancestor. A clade (from the Greek for "branch") is a group of closely related organisms. Organisms that share derived traits/states are deemed to be closely related (updated after Tattersall and Schwartz, 2002).

It seems then that uprightness, that quintessentially human characteristic, clearly belonged to the common ancestor of both humans and apes. The anatomist John Napier described this trend: "All primates can sit upright, many can stand upright without any support of their arms, and some can walk upright. In other words we must view the human upright posture not so much as a unique hominid possession but as an expression of an ancient primate evolutionary trend. The dominant motif of that trend has been an erect body."[13] Fossils of an ape over 20 millions years old have been found in Uganda, described as "the best candidate for an ancestral ape."[14] Its discoverer, Laura MacLatchy believes that Morotopithecus indicates that the upright posture typical of brachiating (swinging by their arms) apes evolved 10 million years earlier than has been previously thought, and in a relatively large ape, at that.

[13] Napier, J.R., quoted in Lewin, R., 1989, p65.
[14] Reported in *New Scientist*, April 26, 1997, p13.

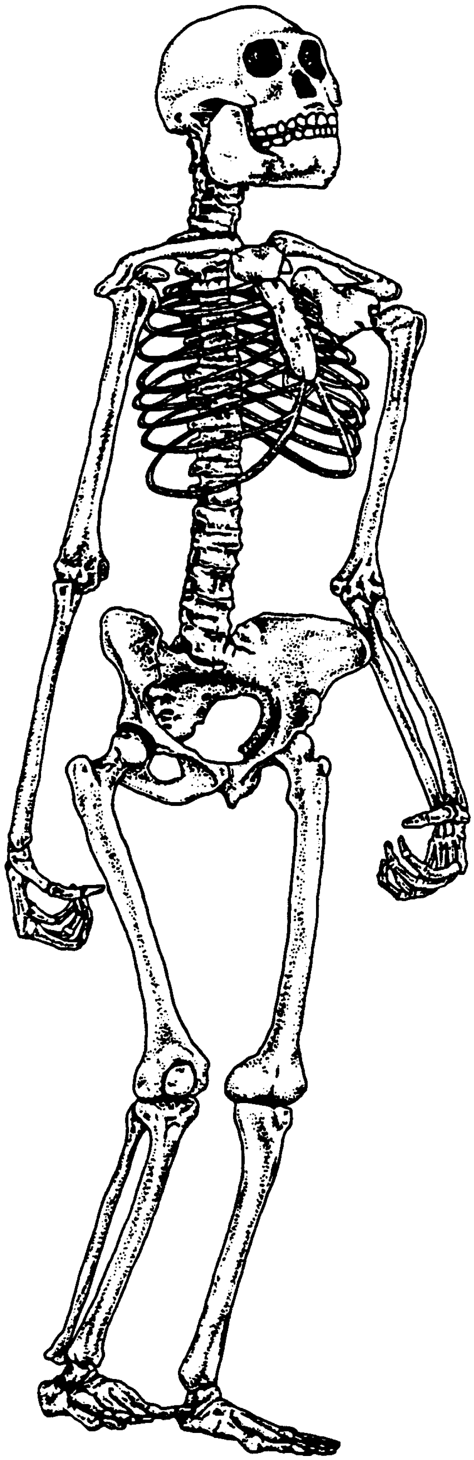

Fig 4.5 *Lucy: a reconstruction of the skeleton of Lucy (after Lovejoy). Lucy was the name given to a hominid fossil of the species Australopithecus afarensis discovered in the Afar Triangle in Ethiopia by Donald Johanson and Tim White in 1974. Lucy is remarkable in that around forty percent of the original skeleton was recovered, which allowing for mirroring of symmetrical bones enabled a very complete reconstruction to be made. Lucy (whose gender has recently been questioned) is thought to have been about 1.1 meters tall as an adult.*

Uprightness as a Problem

For many years scientists thought that the trait which first distinguished hominids was their brain size and thus intelligence, as suggested by our species name Homo sapiens, literally wise or intelligent man. This view had to be turned on its head once it became apparent that upright walking preceded significant increase in brain size by several million years. The great French anthropologist Andre Leroi-Gourhan expressed the shock that this discovery created when he wrote in his seminal book *La Geste et la Parole* (1964), ". . . that human evolution began not with the much vaunted head and brain but with the feet. … We were prepared for anything but this!"[15] Now we know that hominids have been capable of upright walking for as far back as the fossil record shows. Yet it remains to be seen how this unique form of locomotion evolved.

The actual way in which this most fundamental of human traits evolved is important to all theories of human evolution for many reasons. Most theories of human evolution try to account for the sequence of major developments as unfolding in a linear chain of cause and effect, along the lines of: 1) man descended from the trees and then learned to walk on the earth; uprightness freed the hands; thus man could make tools; thus he became a great hunter; thus he could nourish a large brain; thus civilization arose, or 2) man descended from the trees because he was an upright walker, thus he had his hands free to make tools and become a hunter; thus he developed a large brain which formed the basis for culture and civilization, or 3) man came down from the trees because the trees disappeared due to climate change, thus he formed social groups for survival purposes, developed tools to defend himself against terrestrial predators; selection pressure due to increased tool use led to uprightness and finally large brains evolved, perhaps through the need to develop language skills, or even 4) woman came down from the trees and had to carry helpless infants in her now naked arms, fur to which infants could cling having been replaced by bare skin and sweat glands to cope with overheating in exposed savannah environment—this leads to uprightness; woman becomes a forager, while upright men become hunters; social complexity leads to increased brain size; large brain leads to culture; or finally 5) man became an aquatic creature because of environmental pressures (climate change leads to aridity inland, coastal areas provide rich sources of food), uprightness acquired through wading, when the land became more congenial, man moved inland and took up hunting, leading to large brains, and so on.

The permutations are many and varied and I have mixed them up in these somewhat caricatured scenarios, none of which to my knowledge has been proposed in quite this form.[16] They all depend on uprightness being achieved. Many earlier theories follow uprightness with statements along the lines of "uprightness freed the hands to. …" The question, however, has to be asked, freed by whom or what? There used to be a distinctly implicit teleology in the concept of natural selection bringing about a major anatomical change "in order" that mankind would have hands free to become toolmakers. Even the more biologically acceptable explanation that ascribes the benefits of having free hands to an exaptation begs a question or two.

Neither adaptations nor exaptations are, of course, strictly speaking "for" anything. Anatomical or behavioral novelties are generated and maintained by a series of

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[15] Leroi-Gourhan, A., 1964, p43 in the Frankfurt edition.

[16] Roger Lewin has described many actual scientific theories that follow this kind of pattern in his books *Bones of Contention,* 1987, and *Human Evolution, an Illustrated Introduction*, 1989.

genetic processes. The organism may benefit in some way from such a chance innovation. To return to the question of uprightness, I am not refuting the reality of the concept of exaptation, but merely pointing out that even if upright walking did in effect "enable" the hands to be free, we still have to explain how uprightness came about in the first place. Early hominids did not become upright in order to facilitate the freeing of the hands, because that contradicts the basic principles of evolution as we know them.

To put the problem into perspective it is necessary to explain the full extent of anatomical changes from being quadruped to becoming bipedal. Not that anyone imagines that hominid's immediate ancestors were fully four-footed. Rather, like apes they were four-handed and, like present day apes, probably also knuckle-walkers. At any rate our pre-bipedal ancestors were probably also tree-climbers. The combination of anatomical adaptations that would have provided a basis for the transition from a four-legged to a two-legged animal is extensive. The list includes developing a platform foot with enlarged big toe parallel to the others, broader knee joints with increased vagus angle of the femur to the knee, altered pelvis shape with altered length and angle of the femoral head, major changes to the curvature of the spine and the position of the head, the shape of the face and jaws and many re-arrangements of the musculature.

The cost in terms of health as a direct result of uprightness is also significant. Elaine Morgan[17] quotes horrifying statistics on lower back pains (a problem from which Neolithic peoples also suffered, judging by recent studies on skeletons),[18] slipped discs, worn-out joints and osteoporosis, obesity, enlarged adenoids, varicose veins, gynecological and sexual malfunctions, inguinal hernias and hemorrhoids.[19] (I will be discussing gynecological problems later). How then did uprightness come about? The anatomist Owen Lovejoy of Kent State University, who has researched this question as much as anyone in recent years, summed up the problem. "For any quadruped to get up on its hind legs in order to run is an insane thing to do. It's plain ridiculous."[20]

Anyone who has observed a child learning to walk should be convinced that upright bipedalism, if it were to be any advantage to a proto-hominid, would have to be nearly perfect from the start. The huge list of anatomical changes involved could hardly have evolved incrementally. The stages of transition that a child goes through from crawling to full upright balance could not possibly have evolutionary equivalents. Tottering, shuffling and other forms of incomplete uprightness would be absurd. No creature could afford that amount of trial and error. Uprightness, to have been of any use, however exaptive, must have been fairly complete.

The problem becomes clearer when we look at the situation from a biomechanical point of view. An animal walking on all fours is very stable. Its internal organs are suspended from a shallow arch formed by the vertebral column supported by movable pillars. At the risk of oversimplifying we can describe this as being essentially based on the cantilever principle along the lines of a suspension bridge. In standing upright this arrangement becomes an extremely unstable tower with a narrow base and an unequal distribution of weight, made more unbalanced by placing the weight onto one foot in the

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[17] Morgan, E., 1990, *The Scars of Evolution*.

[18] Theya Molleson, 1994, "The Bones of Abu Hureya," in *Scientific American* Vol 270, No 2, August 1994.

[19] See also S.J. Olshansky, et al., "If Humans Were Built to Last," in *Scientific American*, March 2001.

[20] Lovejoy, C.O., quoted in Morgan, E., 1990, Chapter 3.

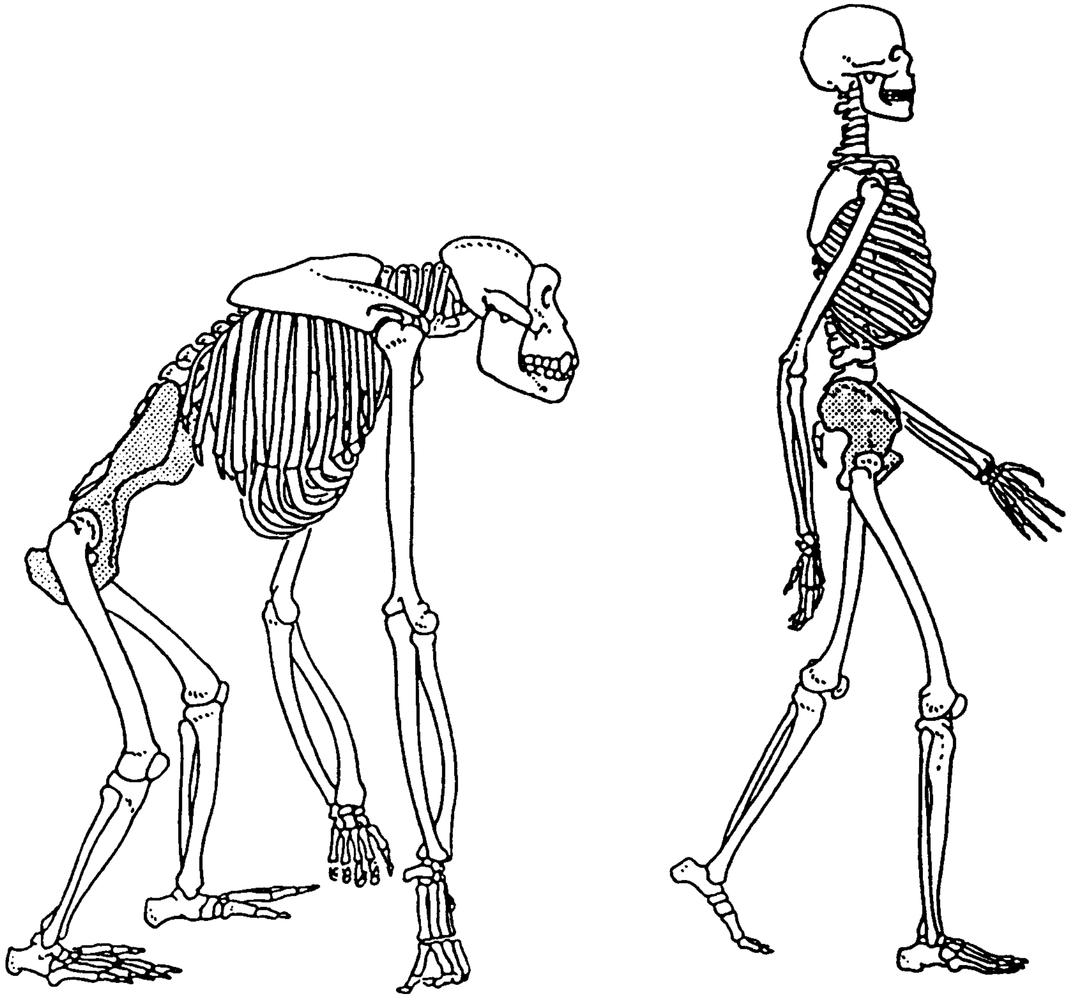

Fig 4.6 *The Anatomy of Uprightness: comparison of a chimpanzee and modern human skeleton. Apes usually walk leaning on their knuckles; their arms are longer than their legs, whereas a human's legs are longer than the arms. Human hands have opposable thumbs, which together with other features of the hands and wrists provide humans with a wide range of precision grips. Apes have larger shoulder blades and their arms are not only considerably stronger than humans but can rotate further in their sockets, in line with the demands of brachiation (movement through hanging by the arms in trees). The ape's shoulders blades are set much higher which facilitates climbing but restricts deep breathing and the swinging arms movements humans make when walking. Both of these aspects give humans a more rhythmical movement, the ability of sustained effort such as long distance running, and speech. Furthermore, greater lung capacity means increased oxygen intake, which would improve thermo-regulation and in particular cooling. The upright posture alone reduces the surface area of the body exposed to the hot savannah sun. The curves in the spine bring the center of gravity of the human being directly over the feet, thus providing a basis for uprightness and balance. The lumbar region of the spine is longer and broader in humans; the head is balanced on top of the spinal column with the spinal chord passing through the foramen magnum, a hole in the base of the skull; the cervical vertebrae (neck) are smaller in humans, since they do not have to provide grip for the powerful neck muscles an ape needs to hold its head up. The torso of a human is more slender and the rib cage barrel shaped rather than bell shaped. This is related to the human collar bones (clavicles) which hold the shoulders apart and present a broad chest at the front. The human pelvis is shorter and flatter, giving humans a tapered waist unlike apes . Humans have a smaller abdominal cavity and their stomachs and intestines are considerably smaller than an apes. However, humans have*

evolved rapid digestion of high protein foods such as meat. Smaller guts adapted to quick digestion use less energy, thus freeing up more to support energy- demanding organs such as large brains.

The human head houses a brain more than three times larger proportionally than an ape. The face is flatter and more vertical. The lower jaw is much smaller, with smaller teeth and no bony ridges along the crest to anchor powerful chewing muscles as apes do. Absent too are the large canine teeth found in apes.

The human thighbone angles in to the knee, whereas apes' legs are parallel and set wider apart. The human foot has an arched sole (ideal for striding) and all the toes are parallel to the axis of the foot, whereas the ape's foot is curved with an opposable toe ideal for tree climbing.

Despite the many adaptations to upright walking, humans retain many other abilities and with training can become expert swimmers, jumpers, climbers, dancers, yoga practitioners, and so on.

act of walking. An engineer designing such a construction would no doubt reorganize the distribution of internal organs symmetrically around the central supporting column of the spine. The ligaments that hold up this bag of soft organs slung in front of the body would be more effective were they suspended from the horizontal collarbone structure rather than being connected to the spine as they actually are. The consequences of this arrangement are plain to see in middle aged men and pregnant women—extreme curvature forwards of the lower back and sagging at the front!

Organisms, however, are not created by engineers. Evolution has to work in the main with what is already there. Alterations can only come about, if we follow neo-Darwinist theory, by natural selection working on chance variation, conferring increased fitness on the creature at each stage, which conventional wisdom holds to be minor and incremental.

Starting from scratch is unfortunately not an option. The proto-hominids must have had very good reasons for embarking on the path that led to upright bipedalism if the interim stages were of no advantage, indeed were more likely a disadvantage. If the process itself led to a weakening of the organism's health, as seems to be the case if the chronic conditions listed by Morgan are justified, then we have some explaining to do. This is why anthropology has repeatedly come up with models of the advantages of bipedalism that have tended to exaggerate their case and have subsequently been found inadequate.

There are theories that account for upright bipedalism that show that there are certain circumstances that would make uprightness viable. Peter Rodman and Henry McHenry of the University of California have developed a theory that goes a long way to explaining matters. Their theory involves taking a closer look at some assumptions about the relative bio-mechanical efficiency of human bipedalism as opposed to quadruped locomotion. Previous comparisons showed that, compared to fully four-footed animals such as dogs or horses, human bipedalism was far less efficient in energy terms, thus no immediate advantage would be gained by a quadruped becoming a biped. The upshot of their studies was, however, to show that human walking is energetically "rather more efficient than most forms of quadrupedalism at low speeds, and appreciably moreso than chimpanzee bipedalism or knuckle-walking, which suggests that bipedalism evolved in response to selection pressures for efficient low-speed terrestrial locomotion, perhaps in sparse environments,"[21] Rodman and McHenry concluded that a more dispersed

[21] Rodman, P. and H. McHenry, quoted in Bilsborough, 1992, pp91–96.

food resource would provide the selection pressure and cited the Late Miocene climate changes in East Africa. They suggest that uprightness gave early hominids an advantage in an environment in which resources were more sparse, as they are on the savannah. What their theory has going for it is a common sense analysis of the facts with none of the major "ifs" that characterize many such early hominid models. What it still does not explain, however, is the mechanism that brought about such radical morphological change, nor why other primates, such as geladas or baboons, made the adaptation to a savannah environment effectively without becoming upright walkers.

Maeve Leakey has suggested that the change to drier climate rewarded bipedalism not by making them walk longer distances between stands of trees, as other theories have it, but with the evolution of new plants, typical of grassland environments.[22] She argues that early hominids lived neither in dense forests nor on savannahs but in environments with some trees, dense bushes and shrubs and some grass. She suggests these plants provided many berries, fruits, insects and their larvae, birds' eggs, all of which primates are known to eat. Just as the gerenuk (a kind of antelope) during the same period evolved its long neck and stands on its hind legs to reach higher branches, uprightness would have been a distinct advantage to hominids when feeding off low bushes.

As Robert Foley of Cambridge University has pointed out,[23] apes brachiate, they swing beneath the branches when moving in trees. This upright position is supported by an anatomy that has an innate tendency to truncal uprightness. The transition for a species with essentially an ape anatomy to terrestrial locomotion would need less radical modifications than for a creature descended from monkeys, which climb on all fours along branches. The savannah baboons and geladas may not have become upright for this reason when their ancestors left the forests and became terrestrial. With hominids the anatomical reorganization would have been less extreme but nevertheless complex enough.

Hominid ancestors were presumably closer to chimpanzees in their anatomy and lifestyle, though the anatomical differences between knuckle-walking apes and bipedal humans are profound. There is also a total absence of any evidence from the existing fossil material for knuckle-walking among early hominids. As I have stressed above, the earliest hominid fossils are more human than ape-like in their locomotive anatomy, and the transition from brachiating ape to bipedal hominid remains unexplained.

Aquatic Ape Theory Resurfaces

There is one other theory that probably deserves further attention. This is Elaine Morgan's revival of an earlier theory called the Aquatic Ape, which she describes in her book *The Scars of Evolution* (1994). The only scientist to take this theory seriously is Desmond Morris who devoted part of a television documentary on human nature to examine it. Taking up an idea first proposed by the zoologist Sir Alister Hardy back in 1960, Morgan lists a series of anomalous anatomical traits in humans which could be interpreted as vestiges of an aquatic existence. These include our hairlessness, vestigial earflaps, eyebrows, subcutaneous fat, the diving reflex in babies, the loss of oestrus cycle, front to front sexual intercourse and the position and size of human genital organs. Like

[22] In interviews in *Time Magazine,* July 23, 2001, p59, and *Scientific American*, October 2001, p26.
[23] Foley, R., 1995, *Humans before Humanity*.

other mammals who were originally terrestrial and became wholly or partly aquatic, such as the whales and dolphins, the seals and sea elephants, or otters and beavers, human ancestors may have taken to the water and acquired these specialist traits. Unlike these other species, humans apparently came back out of the water and became terrestrial again, though remaining on the whole good swimmers.

Morgan believes that, like the proboscis monkeys of Southeast Asia who wade in an upright posture between mud banks carrying armfuls of food, humans may have become upright during an aquatic evolutionary interlude. She favors a now dried-out swamp area, the salt pans of the Afar triangle, as a likely location, conveniently downstream from known early hominid sites. The area now known as the Denaktil Alps, a series of tilted blocks on the edge of the Red Sea, may have been islands surrounded by shallow lagoons, and no doubt a rich environment of mangrove swamps and shallow seas teeming with marine life.

The only real argument I have ever come across that casts her theory in doubt, is that from Jonathan Kingdon, in his book *Self-Made Man and His Undoing* (1993), questioning how such aquatic apes would have had access to fresh water in such an environment. Otherwise, the anthropological community seems to have basically ignored Morgan's idea, because it is simply too radical for a group of scientists, predominantly men, who in one form or another all agree on the picture of early hominids as hunter-gatherer savannah dwellers. Some favor more hunting, others favor less, but swimming and wading around mangrove swamps definitely does not fit into anyone's picture. Whatever the reason, very little of the literature makes any reference to Elaine Morgan's work at all. What does seem to be clear is that many Afarensis-like fossils have been found in the context of water, either on lake margins or in swamps. From the foot bones associated with this kind of hominid, it appears that walking on dry land was not the primary activity to which these organs were anatomically adapted. Tree climbing seems the most favored explanation, though wading is also a possibility.

Upright in Different Ways

So how did hominids become upright? The answer to this most central question of human evolution remains open. It is likely that a whole range of factors played into it. Once bipedalism was established, the advantages were obvious.

Apart from the "freeing" of the hands for manipulation and carrying, there was also the advantage of reducing the surface area of the body exposed to the burning heat of the tropical sun. Experiments have shown that being upright and possessing a thick head of hair such as present day Africans have reduce the heat factor by sixty percent.[24] Having the upper part of the body above the ground exposed to cooling breezes would have also been helpful to a naked but upright hominid. There is some evidence that a vertical silhouette is less of a trigger to predators who instinctively react to horizontal silhouettes.

Accepting that hominid evolution began with the feet, it now appears that it did so several times! It seems accepted today that bipedalism has actually been a series of different morphologies, evolving in different places and at different times, rather than a unique evolutionary event. Initially we find an australopithecine form of bipedalism in which the four or more species each varied in their pattern of locomotion Afarenis and

[24] Reported in Stringer, C. and R. McKie, 1996, *African Exodus*, p18.

its South African cousins Africanus also appear to have been well-adapted to climbing.[25] Their knees did not lock as ours do, so that walking with slightly bent legs would have required considerable muscle strain and corresponding energy demands.

Furthermore, the early australopithecines or their predecessors, such as Ardipithecus, had heads that were not balanced on top of their spinal columns but hung forward on strong neck muscles, in a position somewhere between a chimpanzee and a human (according to the evidence of the location of the foramen magnum, the hole in the base of the skull, which shows the position of the head in relation to the neck).

Nevertheless, as the famous footprints from Laetoli (dated at around 317 mya) impressively show, some australopithecines, or perhaps the recently discovered Kenyanthropos (though almost certainly not Lucy-like hominids, despite Donald Johanson's protestations), could walk as well as we can, but their anatomy was by no means the same as ours. The recent rediscovery by Ron Clarke and Phillip Tobias of the University of the Witwatersrand in Johannesburg (rediscovery because the fossils had been misidentified and stored away, then later discovered and correctly identified) of a collection of foot bones has complicated the picture of Australopithecus bipedalism.[26] Tobias believes that the fossil known as "Little Foot" shows that the big toe was so articulated that it could swing to the side and be used to grip in ape-like manner as well as being oriented forwards as in the human foot. The interpretation is controversial but certainly opens the possibility that early hominids "experimented" with different forms of bipedalism. It appears that early hominids were adapted to bipedal locomotion yet retained primitive traits that enabled them to be effective tree climbers (though not as good as apes). They seem to have retained some of these features even after a more terrestrial lifestyle seems to have established itself.

Next we find a habiline (the adjective used to describe species related to Homo habilis) mode of walking which was more terrestrial though still possessing some climbing ability. But Homo habilis did not have the striding gait typical of Homo erectus. Erectus anatomy suggests a heavy body build and more barrel-shaped trunk and thus an emphasis on other parts of the body related to bipedalism.

According to the anatomist and hominid expert Professor Alan Walker, the Nariokotome Boy, the most complete erectus fossil skeleton ever found "was a more efficient walker and runner than any modern human."[27] Robust bones, narrow hips, long-necked femurs and muscles stronger than any Olympic sprinter made erectus a formidable mover.

Neanderthals also had different limb proportions and pelvic shape though there is no evidence that their bipedalism was any less efficient than that of modern humans with their, on the whole, more linear body-build and full-striding gait. Neanderthal limb proportions and their estimated bio-mechanics show that these people were more suited to short, powerful bursts of sprinting.[28]

We must also remember that each of the above named hominid grades overlaps and that the phylogenetic relationships within the various clades are often far from clear.

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[25] Henry M. McHenry and Lee Berger, 1988, "Body proportions in A. afarensis and A. africanus and the origin of the genus Homo," in *Journal of Human Evolution*, 35, pp1–22.

[26] Reported in *National Geographic* Vol. 191, No. 2, February 1997, Walker and Shipman, 1996, p177.

[27] Stringer and Gamble, 1993, p92–93.

[28] Foley, R., 1997, *Humans Before Humanity, an Evolutionary Perspective*, Blackwells Scientific publications.

Therefore the possibility of one form of locomotion directly evolving into the next can be discounted. What is more significant is the fact that bipedalism expressed itself in a variety of ways each appropriate to the whole organism.

A recent new field of research has thrown interesting light on bipedalism. The Dutch anatomist Fred Spoor has shown that the shape of the vestibular system of the inner ear, and in particular the bony labyrinth, is related to an animal's mode of locomotion.[29] The vestibular system includes not only the organs of hearing but also of balance. By applying his techniques of measurement to a range of fossil hominid skulls, Spoor has shown that each hominid species has its own characteristic shape of bony labyrinth in the inner ear, thus providing further indication that each hominid species had its own variant of upright bipedalism. It is hoped that this line of research will help clarify the origins of bipedalism.

The point is that each hominid grade expressed full uprightness in its locomotion but achieved this through anatomically different means, suggesting that other means of anatomical selection were at work. Hominids are characterized by a powerful tendency towards uprightness and this tendency needs to be explained.

Spiritual Selection?

There is another way of addressing the problem, one that complements all the biological factors. As well as seeking utilitarian reasons for this major evolutionary step, we can ask what comes to expression through such a development.

If we think of upright bipedal locomotion as a behavioral trait requiring a complex suite of anatomical adaptations, then we need to see what stimulates the behavior in the first place. The selective pressure to change an ape foot into a human foot must come because the creature increasingly runs around on them. The behavioral need must be compelling. In other words, an inner urge to become upright and to move about on two legs will drive anatomical change. In order for such selective pressures to bring about change quickly—which appears in the case of bipedalism to be necessary—there needs to be considerable morphological plasticity and a very broad genetic norm of reaction. The wide morphological range of living humans and the evidence of the fossil record suggest a very flexible and broad norm of genetic reaction. When we look at the anatomical changes that occur when a child learns to walk we also see considerable morphological plasticity.

At birth the child's anatomy is ill-equipped to walk. It seems obvious but it is also significant. The structures and musculature necessary must first develop and they do so through use; they do not do so if for some reason the child remains bedridden or is prevented from learning to walk. The salient point is that the child has to learn to walk and the primary forces involved are the child's inner will to do so supported by imitation of older people who can walk plus considerable encouragement, praise and reward for his efforts. No one who has watched a child master this feat (no pun intended) can underestimate the inner and outer activity involved—nor the tragic consequences where such encouragement and role modelling is not provided, as in the case of those poor infants abandoned in Rumanian orphanages. The frustrations and the bumps, the feeling of insecurity and instability that infants experience whilst learning to walk are considerable.

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[29] Spoor, F., reported in Walker and Shipman, 1996, pp203–204.

One can sometimes observe children putting off the effort and remaining at the crawling stage, which is a surprisingly efficient and far more secure form of locomotion, until the adults simply refuse to carry them around any longer. Once the self-directed activity has begun, anatomical changes have to occur. These include: a co-ordination and balancing function, changes in the shape of the foot (hence the need for first shoes to be soft-soled, as Clarke's the Shoemakers wisely advise), and the strengthening of the thigh, buttock, and abdominal muscles. Even at the stretching stage, when the child first raises his head from being face down on the floor and continues right into full uprightness, the neck muscles must develop. Above all the child acquires the characteristic double curvature of the spine which comes from being upright. This in itself involves a change of shape of the vertebrae known as lordosis.

An interesting footnote to this is the fact that the fossil record indicates an equivalent change in the number and shape of vertebrae among early hominids. Alan Walker recounts that "as posture and locomotion changed in the hominid lineage, the lower thoracic vertebra evolved into an additional lumbar vertebra; at the same time, the lumbar vertebrae began to develop the wedge shape that creates the lumbar curvature, which is called lordosis. Improving the humanlike degree of lordosis improved postural control of the torso in a habitually erect biped." The modern child does not grow another vertebra but it does have to achieve lordosis.

It is important to stress that this lordosis does not simply grow into shape in the child. It is formed through the act of becoming upright, through the pressures involved. From what I have described in Chapter 3, it is obvious that the motive force in the child in acquiring uprightness is an expression of its inner self-activity, in other words the "I." The dynamic maintaining of equilibrium is the quintessential activity of the "I." There also has to be sufficient plasticity in both the bone and the genetic blueprint underlying its growth, and has to be a response from the environment, in the case of the child, the social environment.

What we observe in child development holds true for human evolution in this respect. Development is interactive; genes interact with the environment in very subtle ways. Let us assume that one gene or a group of genes is responsible for the potential for upright walking. This will function in a given range of environmental contexts, their norm of reaction.[30] As we have seen, the norm of reaction in human genes appears to be very broad. Hominids living in different environments with different lifestyles will likely have different modes of locomotion. This reveals great plasticity in the human genome and also the powerful innate tendency to uprightness.

We have seen that this tendency clearly belongs to the hominid lineage as far back as we can trace it. We could say that it has exerted a selective pressure through all hominid species. Could it not be possible that this is the expression of the third factor in human development, that of the spiritual "I" at the core of human nature in interaction with the gene-environment context? Is not this selective pressure, which in the individual we have called the self-activity of the "I," also at work at the species level in human

[30] The genetic norm of reaction is also what accounts for the variation in form between dandelion leaves that grow in different situations, either long and smooth-edged in an open fertile meadow, or short and deeply pinnately-lobed (tooth-edged) growing in a crack in the pavement. The genetic code of the organism determines the characteristic shape and form of a species but this can come to variable expression depending on the conditions limiting development. The possible range is known as the norm of reaction.

evolution? Is not this not spiritual selection at work? In a sense the "I," working as it does from the periphery in the individual, is a part of the greater environment within which genes have to function.

The "I" is an environment within which the physical body develops. It is a selective pressure that is striving to individualize the inherited substance. Obviously such a selective pressure is most strongly at work during the developmental phases with most inherent plasticity and rapid growth, namely during the embryonic and childhood stages.

Let us assume for a moment that the not-yet individualized human spirit is a selective force working in human evolution, selecting forms and behaviors through which it can come to ever more coherent and ultimately individual expression. What forms would it select? Why could not the human spirit not come to expression in a four-footed mammal with a large brain, or even a large aquatic mammal without any feet? Why would the human spirit be unable to fully incarnate in a knuckle-walking primate? What is it about uprightness and the human form that is favored by the spirit? What is it that makes the human form a vessel within which spiritual faculties can develop?

It would be tempting to say, because humans have large brains, but that would be a chicken and egg explanation. And anyway, as we shall see later, large brains did not emerge until hominids were well down the road to being human. No, it clearly has to do with uprightness, that most primal of human qualities. As Richard Leakey put it: "The origin of bipedal locomotion is so significant an adaptation that we are justified in calling all species of bipedal ape 'human.' … My point is that the adoption of bipedalism was so loaded with evolutionary potential … that its importance should be recognised in our nomenclature. These [early] humans were not like us, but without the bipedal adaptation they couldn't have become like us."[31]

Uprightness as Experience

What is it about the experience uprightness that gives it an "I" quality? Perhaps it is too simplistic an answer but it is a fact that without the self-activity of the "I" uprightness cannot be sustained. Remove or weaken the "I" activity and uprightness is lost. Just standing upright is an effort of inner activity without which we would lose balance and topple over. The impulse to stand up and retain that balance comes from within. It is not supported by the biomechanics or our posture. Horses and cows can dose standing up because their body weight is balanced and their knees locked. The same goes for birds perched on branches; their claws hang on and the position of their centre of gravity gives them a stability even on two legs which humans lack, which is why we sleep lying down. Being upright even the earliest hominids must have had this "I" activity, however unconsciously, within them. Whilst any creature requires some degree of inner drive to remain on its feet, the act of balancing on two feet requires exponentially more inner activity.

Standing in equilibrium on two feet requires remarkably little energy (standing uses only seven percent more oxygen than lying down[32]), compared to that used by quadrupeds or apes because we can lock our knee joints and our center of gravity is normally located inside the pelvic girdle directly above our feet. Four-footed animals must continually strain their muscles because they are standing in effect on their toes

[31] Leakey, R., 1994, *The Origin of Humankind*, p13.
[32] McNiell, Alexander R., *The Human Machine,* 1992.

and never have straight legs and they must hold up their heads. This energy-efficiency in standing upright is in stark contrast to that of all other vertebrates and poses interesting questions for the process of evolutionary selection. However, its psychological consequence is what interests us here.

Standing still brings with it an inner calm that literally quiets down the physical activity, thus allowing forces to be freed for higher inner activity. In fact standing still turns out to be a neurological challenge of the highest order. Recent studies have shown that though little energy is needed, tremendously complex monitoring of fine movement is needed to maintain balance. In standing we continuously oscillate around our centre of gravity, requiring many fine adjustments of position. In standing we continuously make pendulum movements, left/right and forward and back. This pattern of swinging can even be affected by our breathing and pulse rate. Nevertheless these movements swing at most a few centimeters from the vertical and the center of gravity never leaves the region within the pelvis.[33]

The activity of being upright and facing the world creates a specific psychology. Unlike quadrupeds whose spines lay in the same axis as their direction of movement, humans experience the axis of their bodies at right angles to the direction that they face. Most vertebrates, with the exception of some bipedal dinosaurs and birds such as penguins, are oriented in their whole being along the lines of their bodies, their main sense organs being in the head which generally continues the horizontal orientation of the spine. This is particularly true when animals are in movement. In fact when looking, listening or scenting, many animals stand still for a moment and raise their heads above the horizontal. The mouth as the main organ of feeding, the nose, the eyes and ears all orient the animal's attention into a plane horizontal to the ground. Animals' instincts, their defensive and offensive gestures all express themselves in this plane and integrate the animal directly into its surroundings.

The upright posture of the human being, on the other hand, places us into a totally different relationship to our environment. Instead of being integrated into the surroundings by virtue of having peripheral vision (the eyes of most animals being lateral, thus providing for a much wider perspective), the human being stands back and confronts the world in a gesture of antipathy. The verticality of the body forces the human being to stand back from the world and in so doing we no longer simply fit into the flow of life. Bifocal color vision, which we share with other primates, emphasizes this by giving us a sense of depth and perspective to the distance between us and the world.

It is interesting that although even the australopithecines walked upright, their heads were ape-like, with muzzles and eye sockets set beneath prominent brows. It is first with the habilines and Homo erectus that we see an anatomy that reduces the prognathism of the face. A fully frontal face is first evident in anatomically modern humans who give us the first unambiguous cultural evidence for symbolic thinking and self-consciousness.

The cognitive faculties that have to do with knowledge and the recognition of concepts are made possible by this standing back from the world. It is this gesture that determines the inner experience of the human being. It is the prerequisite for the ability

33 For a full description of the anatomy of uprightness see Verhulst quoted above (at present only available in German but soon to be translated into English) and R. McNiell Alexander, *The Human Machine*, 1992.

to experience the separation of subject and object, as well as the perspective from which to name and categorize the things around us.

Having a position opposite to our field of perception and having the inner ability to watch the watcher within, give us the basis for the powerful sense of self that characterizes the human being. Having a focal point of self is a prerequisite for subject-object consciousness. This enables the human being to reach out and take hold of the world and ultimately to transform it.

Uprightness, a Hypothesis

I have not offered an alternative theory of how hominids became upright, rather I have focused on what uprightness means from the inside, as it were. The different perspective on the world that being upright brings with it may or may not have been an adaptive advantage to early hominids, but it certainly created a significantly new context for cognitive development. Even allowing for their apelike heads, upright hominids experienced the world in a way no other creature had ever done.

For what it is worth, my own guess is that uprightness developed quite quickly once hominids became terrestrial. The extreme plasticity of hominid morphology enabled the anatomical changes to occur in fairly large stages, starting with the platform foot. Regular walking led to selective pressures to change the pelvic girdle and the angle of the thighbones. Such changes would have been easier in small, light animals. One can imagine that the first hominids to walk upright were small, perhaps even smaller than Lucy at 1.1 meters tall.

As far as we know the first bipedal hominids (we know only bipedal hominids) inhabited an open woodland environment with fairly large solitary trees dispersed in savannah grassland. This kind of environment is widespread in southern and eastern Africa and includes grassy woodlands and bushland with denser stands of trees around the shores of lakes and along river courses. As Ian Tattersall points out, "This is a stable environment, not merely one of ecological transition between forest and open grassland; and it is a habitat in which early hominids would have been able to make the most of their varied locomotor abilities."[34] These varied abilities included bipedal walking and arboreal climbing.

Furthermore it is likely that upright bipedalism has always involved a strongly epigenetic factor. As in modern humans, upright walking is not a reflex but has to be learned through imitation and trial and error in the course of early childhood.

The anatomical structural changes required for walking have to be acquired through doing it, otherwise they remain latent and undeveloped. This factor has been largely ignored in discussions of the origins of bipedalism. Yet it is highly significant.

The drive to uprightness however was internal, as it is in the individual child. In early hominid evolution the "I" was not, however, acting individually but collectively. It was something of a "group spirit" that worked within a whole species or at least within many members of that species. If we can accept the activity of the spirit within the individual, it is not too great a step to think in terms of a collective inner drive to uprightness within a species.

Whether uprightness was an immediate advantage or not is not the main point. It may have been but it could equally have been that the first upright bipedal hominids were only occasionally upright, perhaps pausing momentarily to look and listen. It is

[34] Tattersall, I., 1998, *Becoming Human*, p117.

possible that uprightness may have been favored by sexual selection, that those hominids that demonstrated uprightness may have been selected by mates who intrinsically valued this gesture.[35] The point is that uprightness and the perspective that it gives would have been stimuli to new cognitive developments. Such developments would not necessarily require an increase in brain volume, indeed there is no evidence of this until much later, but it may have involved new organizational structures within the brain as the picture "in here" became more complex. An animal with a chimpanzee-sized brain is already a highly intelligent animal. We do not have to look for evidence of immediate brain size increase to reflect new cognitive patterns. We know these in fact came much later.

Natural selection would have ensured that early hominids with new brain structures and upright posture would be able to adequately survive and reproduce. For the incarnating human spirit this was an embryonic time during which it would have worked essentially from the periphery and would have been most active in shaping and influencing form during the literal embryonic stages of development. Only later when organs within the nervous system evolved that were capable of being used for the kind of thinking that makes tool use possible, would we expect to see any significant increase in brain size. And much later the higher-level functions such as language, conceptual thinking and self-consciousness emerged.

What kind of consciousness could these embryonic spiritual beings have had? It is impossible to know. We are continually amazed at the mental gifts of chimpanzees and other animals, so we should expect at least as much from early hominids. As spiritual beings, however undeveloped in individual capacities they were, they would have had a close affinity to spiritual qualities in their environment. Their consciousness would have been peripheral, spread out within their environment, a kind of clairvoyance, though their survival needs would have required an equally sharp and focused awareness. The emergence of self-consciousness, which occurred in the course of hominid evolution, would have been accompanied by a loss of this global consciousness and clairvoyance. This loss, however, enabled our ancestors to take hold of the earth in ways that no other being in creation has.

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[35] See Marek Kohn, 1999, *As We Know It; Coming to Terms with an Evolved Mind*, for a discussion of Amotz Zahavi's Handicap Theory, which suggests sexual selection may favor individuals who visibly demonstrate risk or investment in costly behaviour or anatomy such as the peacock's tail. See also Geoffrey Miller, 2000, *Courting Minds: How Sexual Choice Shaped Human Nature.*

Chapter 5

Lucy, Flatface and Friends

Being and Becoming

If we want to examine when and how human behavior evolved, and particularly those qualities that reflect humanity's spiritual nature, then it is important to try to form at least a tentative picture of what kind of beings these creatures were. They were not human, at least not in any way we would recognize, but neither were they apes, at least not like any apes with which we are familiar. But as the quote in the previous section from Richard Leakey suggests, in a way they were more human than anything else simply by virtue of their upright bipedal posture.

Having said that, I hasten to add that we have to guard against a conceptual trap into which it is all too easy to fall. In reality, in biological, zoological reality, there are no transitional species, whether half-ape/half-human or any other percentage bias. There are only species, complete, integral and viable in their own right. Species are not on their way to becoming anything. Natural selection sees to it that any species that survives is just what its label says, a fully evolved creature optimally adapted to its life circumstances. To be otherwise would be what has been termed a "hopeful monster"[1] a mutation on its way to being something else, like a creature with a ten percent wing, waiting for the other ninety percent to evolve so that it can do something useful with it. Such monsters do not become species.

When I say certain species were more human, I willingly grant that what I mean is actually something that goes beyond the normal way of describing species from a biological point of view. I am working with the hypothesis that the human spirit is a potential that selects opportunities among a group of highly evolved primates to come to expression. It is the reflection of a spiritual selection pressure. One could also say, perhaps less controversially, that being more human means simply that a certain species, judged from our perspective of hindsight, was further on the way to becoming human—which is also true, but only half the story. We are looking for signs that the emergent spirit was actually emerging. Uprightness, the case in point, is clearly a symptom and at the same time a precondition for the evolution of higher order organization within the primate line that specifically indicates humanness. Humanness is synonymous with the emergence of spirit into self-consciousness.

Foragers

Let us now turn to the early hominids themselves. It seems incredible that we can form a picture about the lives of creatures who lived between 2.5 and 5 million years

[1]This phrase was coined by Richard Goldschmidt, 1952, in an article entitled "Evolution, as Viewed by a Geneticist," in *American Scientist*, 1952, 40, pp84–135.

ago on the basis of fossil fragments that all together would probably fill a couple of suitcases. They left no tools, no remains of dwellings, and practically no direct evidence of their lives at all, only fossilized bones. However they did leave perhaps the most remarkable archaeological find ever. They left one short sequence of fossil footprints. Yet it is possible to construct at least something that tells us what kind of creatures they were. Most of what we know comes from anatomical studies, which, together with evidence of the kind of environments they lived in, provide a basis for comparison with the lives of other similar creatures. Comparisons are, of course, not easy and require quite a lot of assumptions. According to reconstructions, the earliest hominids known looked like upright apes. Whether they behaved like apes is the crucial question.

It is now certain that the earliest hominids were far from being the big game hunters that inhabited the imaginations of earlier anthropologists. Nowadays it is assumed that the early australopithecines (this term covers several species with the genus name Australopithecus) lived as foragers, moving in small groups along the edge of the savannah, by lakes and watercourses. Though bipedal, their anatomy suggests that they were skilled tree climbers and so they were probably at home in the gallery forests that lined the margins of the lakes, marshes and riverbeds. Analysis of wear on fossil teeth indicates that they lived mainly on a vegetable diet of fruits, nuts, tubers and roots. No doubt they supplemented this diet with grubs, insect larvae, grasshoppers, bird eggs and meat scavenged from carcasses abandoned by the larger predators, the leopards, sabre-toothed cats, hyenas and so on. In other words, they were generalists in their diet, not unlike present day chimpanzees.

There is some evidence from the fossils of sexual dimorphism, which means there is a significant size difference between males and females. This usually indicates social structures in which dominant males rule over a harem of females, having to assert themselves over other competing males. It could also be the case, however, that the larger individuals belonged to a different species. The main differences between these early hominids and apes were that early hominids lived in a radically different environment to that inhabited by the present African apes and that they were already upright.

Despite all the pressures in that troubled part of the world, the chimps, bonobos and gorillas that survive today in their pockets of equatorial forest do so partly because they are literally at home, that is to say, they are endemic to those regions. They inhabit their original environment, to which they are supremely well adapted. In their forest homes they have no major competitors other than humans and they are extremely adept at exploiting the resources available, new leaf growth in the case of gorillas and high protein fruit and nuts in the case of chimps.

Early hominids, forced as they probably were by periods of aridity and tectonic upheaval to seek other habitats as the vast areas of tropical forest contracted and fragmented, found themselves not the dominant species but rather marginal members of a crowded community of many larger animals, among them a whole range of powerful predators. The reconstructions seen in a television documentary made by anthropologist Donald Johanson make this aspect vividly apparent. A small, slender but quick-footed and alert Australopithecus, presumably played by a child in the film, can be seen nervously hiding in the bushes before scampering out onto the savannah to forage food. It is a telling image. What qualities and traits can we imagine their having which enabled them to move from the relative security of the forest to the high risks of the savannah?

Small, Clever, and Alert

If we assume that the common ancestor of the modern apes and hominids had some basic traits of both, then we can see that our small, vulnerable hominid ancestors did have a few useful adaptations on which to build. Being primates, they already had complex social structures based on sharing and co-operation and were highly mobile and alertly intelligent. Katherine Milton has shown that primates respond to the problem of nutrition in the forest either by morphological or by behavioral solutions.[2] Finding suitable food is by no means as straightforward as one might assume. The incredible plant variety means that food species are isolated and widely distributed within the forest. Good color vision, the ability to focus on different focal points, and an accurate sense of distance and perception certainly provide such primates with an advantage. But far more significant is close social bonding with elaborate communication. This enables groups to forage with individuals widely dispersed whilst a core group guard the young and "report" back on caches of good nourishment. This behavior is known of chimps and we can assume that early hominids were as adept.

Some primates respond by developing digestive systems able to cope with relatively available but nutritionally poor foods, such as leaves. Others, however, develop the social and cognitive skills to locate the much rarer but high quality food resources, such as fruit, nuts or even meat. Effective foraging strategies involving co-operation, memory, and the ability to map mentally large areas of forest have evolved in response to the latter. Christopher Boesch, who has studied chimps in the wild, has noted that chimpanzees "have a sense of Euclidean space that does not usually occur in a human child before the age of nine. They can make a mental comparison of the relative position of things they cannot see."[3] Our hominid ancestors were at least as intelligent as present day chimps.

Brain over Brawn

The tendency to use mental skills, which has characterized hominid evolution, has, as Katherine Milton put it, "amplified a tendency inherent in the primate order since its inception, that of using brain power, or behavior, to solve dietary problems."[4] The move onto the open savannah, or at least onto its fringes, called for an enhancement of at least two ancient primate trends, that of uprightness and that of using brain power. If we compare hominids with other primates we can be sure that the other basic quality they possessed which stood them in good stead was the complex and tight-knit social structures that characterize these animals. It is known from studies of chimps and other primates that these social structures are based on elaborate perceptions of the behavior of other members of the group and some form of (probably non-vocal) communication. This is true of all social animals but is evident to a very high degree in primates, who spend a huge amount of time in social interaction and close observation of continuously shifting alliances, hierarchies, family relationships and sexual relations. Human observers in the field have difficulty keeping track of such social complexities, which express themselves not only in overt behavior and rough and tumble but also in subtle, sly glances and barely perceptible body language.

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[2] Milton, K., 1993, "Diet and Primate Evolution," in *Scientific American,* Vol. 269, No. 2, August 1993, pp70-77.

[3] Boesch, C., 1992, "Apes and Humans" in *National Geographic,* Vol. 181, No. 3, March 1993.

[4] Milton, K., as above.

Whatever the meaning of such social complexity, it is clearly a faculty that would be extremely useful as a basis for co-operation. With fewer and more widely scattered food resources in a late Miocene savannah environment, early hominids were able to build on their inherent capability to develop into quick, alert foragers, able to find a wide range of food resources scattered not only spatially but also, because of the increased seasonality of the climate, distributed throughout the year. The instability of the climate called for species to be adaptable to changing environments. Adaptability as well as resourcefulness and resilience were surely also characteristics of early hominids.

A Place Touched by the Spirit

It seems no coincidence that of all the earth's environments, that of the savannah seems most suited to human evolution. Savannah is basically characterized by grassland scattered with individual or small stands of trees, interspersed with areas of forest and marshland on the margins of rivers and lakes. Andreas Suchantke has argued that not only has the savannah been the birthplace of all the main hominid species, but when humans migrated into other regions they sought out environments as similar to the savannah as possible and since Neolithic times, where this balanced landscape of grassland with individual trees did not occur naturally, mankind has created a cultural landscape such as is typical in the Near East, the fertile valleys of Nile, Tigris, Indus, Ganges, and Huang Ho rivers, and in the orchard-olive groves of Europe.[5] Wherever humans have created such a landscape, as for example the monastic forest clearances or land reclamation of medieval times, there has been a subsequent increase in faunal and floral species diversity, for that is a typical characteristic of the savannah landscape.

Eastern Africa possesses the archetypal savannah. No region on earth has such species diversity of the higher animals, in particular the large mammals and birds, among them fifty species of antelope, many other hoofed species, rhinos, hippos, giraffes, buffaloes and elephant. What is it about this high concentration of the higher animals that made eastern and southern Africa so conducive to human evolution? From a biological point of view, one could imagine that less competition would have favored such a unique group of species as the hominids. Professor Wolfgang Schad offered a fascinating perspective on this in an article some years ago. He described how the landscape as well as plant and animal world of the savannah express anthropomorphic qualities, as it were, spread out.

In particular the elephant expresses many qualities otherwise found only in the human being. Schad refers to the elephant's "highly sensitive, richly differentiated and astoundingly personally colored soul qualities! An excellent memory capable of spanning long periods of time, the lifelong ability to learn, close social bonding based on personal knowledge established especially in the course of a long childhood, the elephant has a psychological capacity that far supersedes that of the great apes."[6]

Schad also finds morphological parallels between humans and elephants in the five digits of the foot and the proportions of the leg bones, as well as in the unique locking knee that gives such a direct expression of uprightness. In the head organization, which bears, of course, no physical resemblance to the human head, no other animal better

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[5] Suchantke, A., 1993, p118.

[6] Schad, W., 1992, "Geburtsland der Menscheit. Lebensform einer menschengemässen Natur," in *Die Drei*, February 1992, trans. MR.

than in the elephant expresses the principle of verticality of the face typical of humans. Likewise, the elephant has freed its mouth from the task of direct feeding through the hand-like abilities of the trunk.

The elephant's trunk has no true equivalent in the animal kingdom. In its complexity it approaches human levels. Following a description of the giraffe, which in character contrasts in many ways the earthy elephant, with its elegant and distancing gesture of surveying the landscape from its high position with its large, dark, dreamy eyes, Schad summarizes the human qualities which these two animals express each in a singular way.[7]

> Elephant and giraffe, those two great animals which originated in the same land as mankind, show us a fullness of human life-motifs, and they do so in very different, even polarizing ways. Something shines through them in an artless, natural way that we can recognize as the two sides of, even the double nature of the human 'I' itself, which we can discover in ourselves. On the one hand we meet that ever-learning 'self' that unites itself strongly with earthly nature, and on the other hand we recognize a self that exists eternally in an otherworldly, transcendental region in what appears to be a finished complete form. Here in Africa, that which otherwise can only be recognized by the human 'I' through self-knowledge as our spiritual double-nature, expresses itself sense-perceptibly in nature. In Africa that which the human being normally finds within approaches us from the outside. Or is that duality again too European a way of seeing things?

There is obviously no close genetic relationship between elephants, giraffes and humans. The point is that qualities close to those we recognize in human beings can be found in many higher evolved animals.[8] All nature is imbued with spirit, and with effort the human mind can penetrate to the being character of plants, animals and landscapes. Perhaps in the African savannah the spiritual qualities that are essentially human are more expressive. The influence of such an environment on an impressionable creature like a hominid must have been considerable. Or put another way, if the spirit was nearing embodiment, no other environment on earth provided such a range of sentient beings to express the vast potential variation inherent in the archetypal, cosmic form of mankind. Africa has been "touched" by the incarnating spirit more than most other places, hence the unusually large number of "higher" or more developed animals. I have referred to this idea of Professor Schad's at length because it is in my experience unique. In the quest to understand the distinguishing characteristics of humans and their ancestors, anthropologists have naturally focused on our closest genetic relatives, the great apes, for comparison. This makes sense but limits the perspective by looking only for genetic or genetically determined behavioral links. Spiritual qualities, however, permeate nature at all levels. I have already discussed how we can see a particular habitat and all the organisms that inhabit it as etherically constituting a unity, a super-organism.

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[7] Ibid.

[8] The word "higher" in this sense implies relatively recently evolved species that show a high degree of internalization in their nervous systems, cognitive capacities and relative emancipation of behavior within their environment.

The sheer diversity and not least the presence of so many highly evolved animal species of the African savannah can be seen as a context to which the human spiritual archetype, what Steiner called the soul-ancestor of humanity, is particularly drawn. The African savannah was ripe and fecund for the human spirit. Different aspects of that spiritual being have come to one-sided expression in a whole range of different organisms. The more highly evolved, those with the greatest plasticity, have been the most receptive.

I confess that I find this image grandiose and compelling but I do not fully understand it. I feel it is telling me something of the nature of the spirit of humanity that is bigger, more comprehensive, more complex that I can at present imagine. I sat in a minibus once in the Masai Mara Game Reserve observing another busload of tourists aiming their cameras at a lioness with cubs, as everyone on my bus was doing. My first reaction was to try and distance myself, not literally—the lioness was very real! I did not want to be a part of all this, for reasons the reader can perhaps imagine. At the lodge that evening, chatting to those same tourists, I came to the conclusion that this is different than Disneyland or even the Grand Canyon. We are drawn here really because we have an image of the savannah that resounds deep within us. Every wildlife documentary we have ever seen has stirred the sleeping savannah dweller within us, not, I think, because we have ancestral stirrings but because we too instinctively recognize the qualities that live in that place.

Human-Apes

In a species-rich, diverse and changing environment such as eastern Africa was between the late Miocene (the period at the end of the earth age, the Pliocene) and the beginning of the period known as the Pleistocene, which began around 2 mya, it is little wonder that there was considerable diversity among early hominids. At present there is no general consensus as to the number of species of early hominid or to their evolutionary relationships. Essentially paleo-anthropologists recognize at least five main species, each one of which may have had several subspecies.

Of the earliest known hominids, Ardipithecus ramidus and Australopithecus anamensis, little is as yet understood, though there are strong indications for bipedal uprightness. As we saw in the last section, new discoveries have added Kenyanthropos platyops to the range of species living at the same time as Australopithecus afarensis, best known from the famous fossil "Lucy" found in Ethiopia. In what follows I describe what is known about the australopithecines. We know as yet too little about Kenyanthropos to distinguish them in their lifestyles from australopithecines, so I will assume they were broadly comparable to their better known cousins. So what follows describes the whole spectrum of early hominids.

Though the name Australopithecus, which means "southern ape," may be a misnomer, reflecting a certain caution on behalf of paleo-anthropologists, neither were these hominids truly human, despite their upright gait. They were simply near-humans, a name which has been subsequently given, Paranthropos, to some of the species that later differentiated in radiations of a regional nature. The name Kenyanthropos makes it clear that Maeve Leakey, Fred Spoor and Alan Walker, who described the specimen, are in doubt about "Flatface" belonging to the human line.

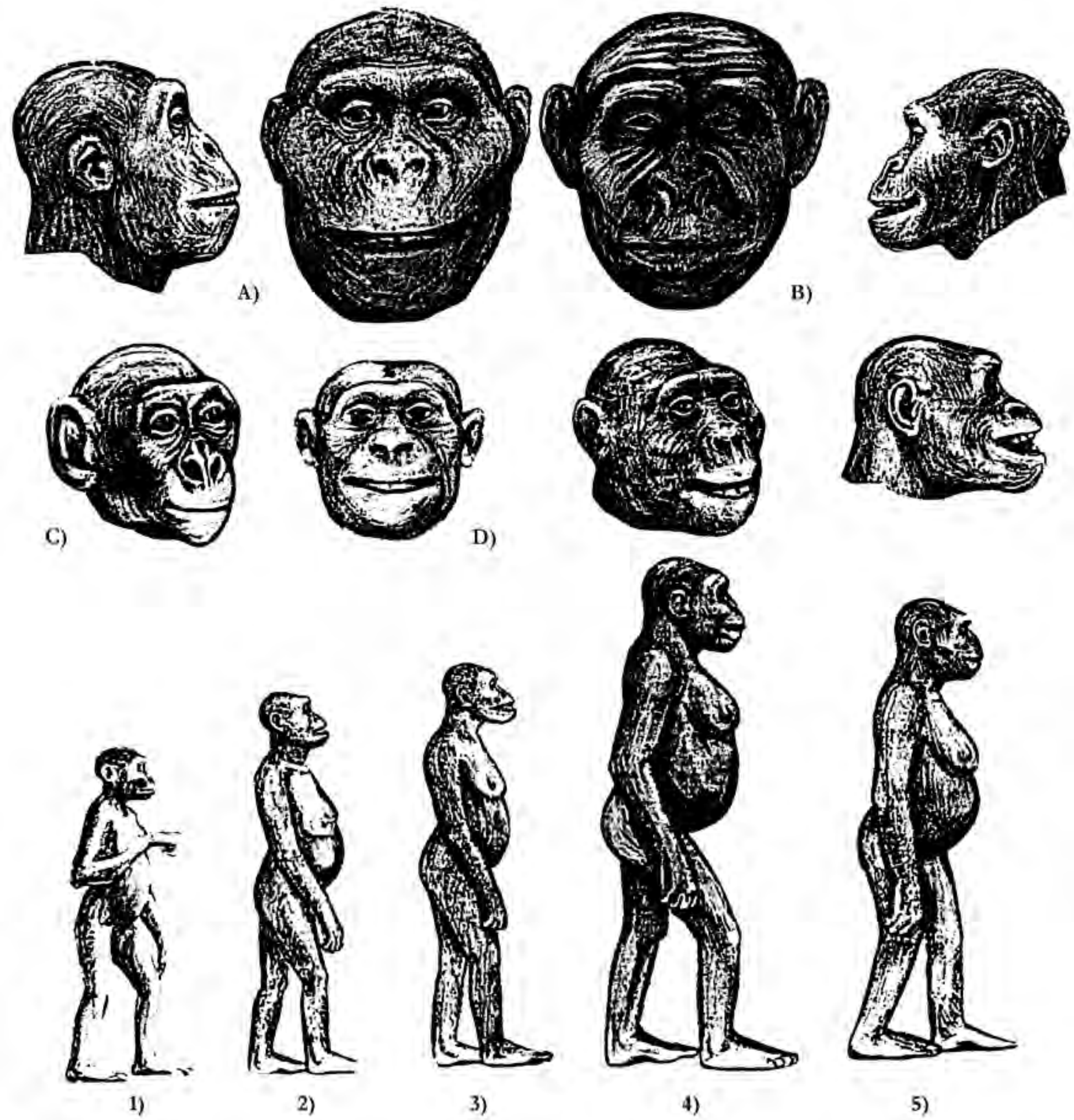

Fig 5.1 *Comparison of what several australopithecine species may have looked like, compared with savannah apes. The heads: a) Paranthropus robustus, profile and frontal b) Australopithecus africanus, frontal and profile c) Bonobo chimpanzee d) three views of Australopithecus afarensis (Lucy). Full (female) figures standing in profile from left to right: 1) a savannah ape, 2) Lucy, 3) africanus, 4) boisei and 5) robustus (after Kingdon 1993). There are many reconstructions of hominids in the literature. Born and raised in Tanzania, Jonathan Kingdon has published a seven volume* East African Mammals *illustrated by himself. His drawings of African peoples are always very expressive. For that reason I have chosen his sketched reconstructions.*

Among the various hominid species, and even within species, there was considerable difference in size. There were pygmy types no taller than 1.1 meters (3 feet 8 inches) such as Lucy herself, and massive cousins with enormous, powerful jaws with great round grinding molars.

Many of these differences were regional adaptations though some size difference was clearly due to sexual dimorphism, wherein one sex, usually the males, physical growth carries on much longer and members can reach twice the weight of their mates. It is thought the robust australopithecines such as A. boisei, A. robustus, A. crassidens, A. aethiopicus and so on, specialized in a plant diet of tough, fibrous, hard-skinned vegetable matter such as is found in drier areas, prone to bush fire and drought. Alan Walker has shown that tooth wear on P. boisei indicates that their diet may not have been so hard,[9] but that they did need large quantities to be more robust. A. boisei seems to have had a diet of fruit, hard seeds and fibrous pods. The more gracile (meaning lighter boned) hominids such as the smaller Homo habilis appear to have eaten more soft fruit.

This seems to reflect the results of Katherine Milton's research in primate nutrition quoted above. Some hominids specialized in adapting morphologically to their dietary needs by evolving powerful chewing apparatus and a powerful metabolism to deal with large quantities of relatively low-grade plant foods, much as gorillas do today. Alan Walker has compared australopithecine and Homo erectus anatomies and concluded that the former had a narrow chest and a thick-waisted torso like an ape with a protruding belly.[10] If the Nariokotome Boy (an almost complete juvenile erectus fossil I will discuss later) was typical, Erectus was, like modern humans, more barrel-chested and had a well-defined waist and narrow hips.

The difference in body shape between these two hominid groups was largely due to the fact that australopithecines had large gastrointestinal tracts which, being herbivores, they needed to break down the cellulose in their foodstuffs to release the nutrients. Erectus was already a predator with a fast digestion and therefore needed less gut which enabled him to have the slim figure typical of the indigenous peoples of the Turkana region even today.

But to speak of Erectus is to jump ahead of the story. Essentially we find two groups of australopithecine species, a smaller gracile group including afarensis and africanus and the robust group mentioned above. Afarensis succeeded and presumably evolved from the Ardipithecus ramindus lineage, retaining some its ancestor's presumed arborial traits, though both were upright walkers. Around 3 mya, A. africanus appeared on the scene in eastern and southern Africa. It is assumed that africanus was closely related to afarensis, though there are interesting anatomical differences which suggest that they were sister species sharing a common ancestor rather than africanus evolving from afarensis.

Afarensis possessed shorter arms and longer legs than africanus, which made africanus, who appears later in the fossil record than afarenisis (they may have overlapped), more resemble chimpanzees who likewise have long arms and short legs.[11] On the other hand africanus shared certain important features with Homo habilis, who as we shall see is considered to be very much in the human line. These included a larger brain than older australopithecines, a shorter, flatter muzzle or face and smaller canine teeth. This appears to be a case of mosaic evolution, in that the head becomes more human-like whilst the body returns to more ape-like morphologies. The plot thickens and will only become clearer with the discovery of more fossils, or then again it may simply get more complicated.

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[9] Quoted in Bilsborough, 1992, p108.

[10] Walker, A. and P. Shipman, 1996, p198.

[11] Reported in *National Geographic*, Vol. 194, No. 2, August 1989, p92.

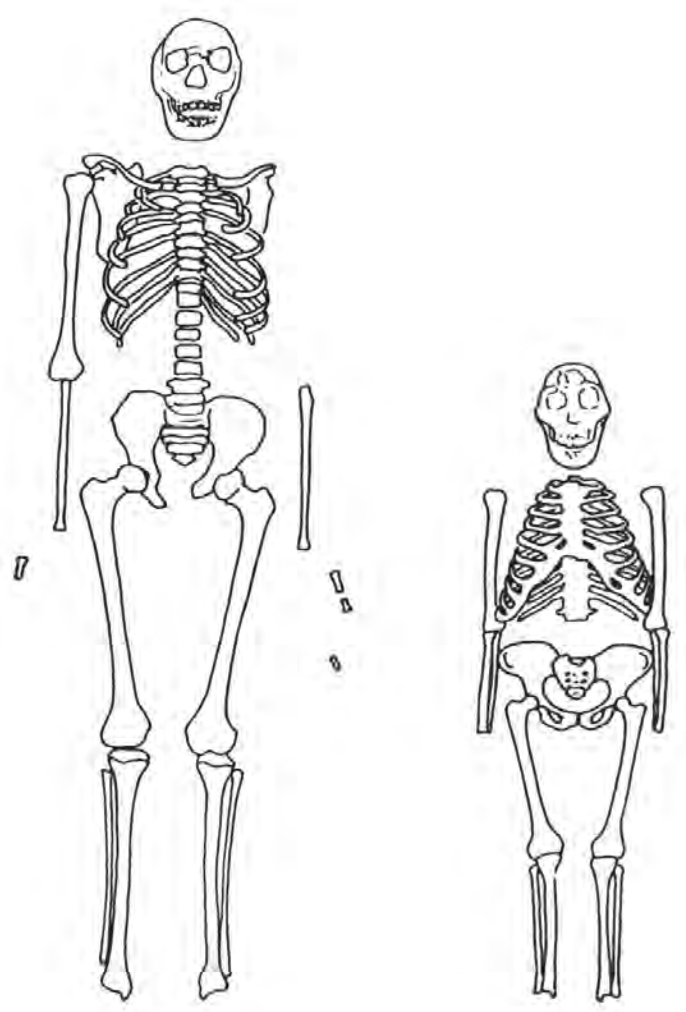

Fig 5.2 *Comparison of australopithecine and erectus anatomy, represented here by the two most complete fossil skeletons known, the Nariokotome Boy (an African erectus) and Lucy (Australopithecus afarensis). Lucy is not only significantly smaller but has a more ape-like, bell-shaped rib cage and was certainly potbellied, whereas the erectus people had long torsos, narrow hips and waists and much more closely resembled modern human beings in overall body proportions (after Lovejoy, quoted in Walker and Shipman, 1996).*

In evolutionary terms, the australopithecines were certainly successful, surviving in some habitats for well over 2 million years. It has been suggested by Elizabeth Vbra[12] that they became extinct due to climate pressures and competition from other herbivores. R.G. Klein[13] suggests that the demise of the robust australopithecines was due to climatic change around 0.9 mya. It is likely that a number of factors came together to place evolutionary pressure on a dwindling population, including competition from the successful Homo erectus groups.

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[12] Vbra, E., 1985.

[13] Klein, R.G., 1988, quoted in Bilsborough, 1992, p135.

Footprints in the Ashes of Time

It is impossible to leave the australopithecines without reference to that remarkable sequence of footprints found by geochemist Paul Abell, a member of a team led by Mary Leakey in Laetoli in Tanzania in 1978. Some 3.6 million years ago three hominids tentatively walked across freshly fallen volcanic ash from the nearby volcano Sadiman. At one point they paused and turned towards the direction of the volcano. It rained shortly afterwards and the ash turned hard like a thin layer of concrete. Subsequent falls of ash buried and preserved the footprints until their discovery in modern day. After studying the footprints, they were buried to protect them from the elements and the animals that graze the area.

Recently they were revealed again in order to repair damage caused by sprouting acacia seeds, and scientists were able once more to examine 29 of the 69 footprints. Most interpretations of the footprints describe three hominids, one large, presumed male about five feet tall. A smaller individual coming behind stepped in the footprints of the larger one. Alongside the first individual, a smaller hominid, about four feet tall, walked very closely to the larger individual, suggesting body contact. It is apparent from the length of stride that the smaller individual adjusted its stride to keep pace with its larger companion, that is, because of its shorter legs, it had to make unnaturally long strides to keep up. Some theories and reconstructions show a large male with its arm around the shoulders of a much smaller female, in order to account for the closeness. Others suggest the smaller was a child.[14]

This is human behavior. It is interesting to note the lengthening of the stride of the smallest of the three individuals. No juvenile animal trying to keep up with an adult would make unnaturally longer strides, it would simply trot faster to keep up, that

Fig 5.3 *The Laetoli Footprints*
(© John Reader, Science Photo Library)
Trail of hominid footprints fossilized in volcanic ash. This 70 meter trail was found by Mary Leakey's expedition at Laetoli, Tanzania, in 1978. It dates from 3.6 million years and shows that hominids had acquired the upright, bipedal, free-striding gait of modern man by this date. The trail probably belongs to Australopithecus afarensis and dates from 3.7 to 3.0 million years ago. The footprints show a well developed arch to the foot and no divergence of the big toe.

[14] The original report and photographs were in *National Geographic*, April 1979, "Footprints in the Ashes of Time" by Mary Leakey. A recent report on the restoration work was in *Scientific American*, September 1998, "Preserving the Laetoli Footprints" by Neville Agnew and Martha Demas.

is, the smaller animal would make more and shorter strides. This looks distinctly like imitation, that quintessential behavior of humans and especially human children. What image could be more evocative? These upright walking hominids, as yet unidentified, were already exhibiting behavior with which we can empathize, without indulging in anthropomorphism.

The Threshold

The first hominid fossils to be generally accepted as part of our lineage, Homo, were those found in Olduvai Gorge in Tanzania by Louis and Mary Leakey. In 1964 Leakey, et al., announced a new species, Homo habilis, which literally means handyman—a name suggested by that pioneer of African paleoanthropology, Raymond Dart, on the assumption that these hominids were the first to make tools. Since that announcement other fossils have been found, the most important sites being Koobi Fora, on the eastern shores of Lake Turkana in northern Kenya, and in South Africa in the Transvaal, as well as some fragments from Omo in Ethiopia.

Early Homo is characterized morphologically by having a relatively larger cranium, and therefore the brain, on the average is twenty to forty percent larger than the australopithecines' brain. The face is generally flatter and the teeth are set in an even dental arc, the molars are smaller than in Australopithecus, while the canines and incisors are large relative to the cheek teeth. All in all the lighter bones and less "dished" face indicate that the head was more balanced on the vertebral column.

We now know that such is the variation among the relatively few fossils of early Homo that an exact distinction between Australopithecus at one end of the spectrum and the ancestor of Homo erectus at the other, is difficult.[15] The more robust of the habilines, such as the famous KNM-ER 1470, have since been reclassified to a different species, Homo rudolfensis (Lake Turkana was formerly known as Lake Rudolf). The smaller Homo habilis has a brain size near Australopithecus but face, jaws and teeth are more human-like. Homo rudolfensis has a significantly larger brain but shows some parallel traits to Australopithecus in tooth and jaw proportions, as well as certain aspects of the face and the base of the cranium.

Hominid fossils are usually referred to by their catalogue number, often abbreviated, for example to 1470, and sometimes by personalized nicknames given to them affectionately by their discoverers such as Lucy, Nutcracker, the Nariokotome Boy, and so forth.

The evolutionary relationships of these specimens to the actual human lineage, however, remains unclear though Colin Groves, of the Australian National University has pointed out that Homo habilis is "more strongly neotonous than its sister group,[16] a point I will return to later. Professor Alan Walker, of Pennsylvania State University,

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[15] Homo habilis is characterised in terms the layman can understand by Alan Walker, 1996, pp88–109. Walker is one of the experts most sceptical about the status of habilis as a species at all. He believes the problem started with the description of the original type-specimen by Leakey, Napier and Tobias in 1964. He feels they artificially created habilis as the missing link between the australopithecines and Homo erectus to bridge a gap, and in doing so they created a category to "shoehorn" all manner of diverse fossils into. Tattersall and Schwarz, 2000, Chapter 4 gives a good survey of the various theories and literature about which specimens are considered habilis and which are doubtful.

[16] Groves, C.P., 1989, p312.

describes the gracile Homo habilis (from specimens such as KNM 1813, OH 13 and 24 and St.W 53) as a "strange ape-bodied hominid-headed species that probably went extinct without issue."[17] The larger habilines, like 1470 were large-bodied, large-brained and probably more closely related to Homo erectus. Both species appear to have been around at the same time, at least in the Turkana region. I will leave the classification problems to the experts, one of whom (Ian Tattersall) described the current classification of habilis/rudolphensis as a mess.[18] What is important is that the ancestors of later hominids are "presumably represented somewhere within the large and miscellaneous aggregation of fossils that have at one time or other been called H. habilis."[19]

What interests us more are the human qualities that come to expression through the habilines. The archaeological evidence that most clearly marks the threshold to the human lineage is the appearance of deliberately worked stones. Which species first made these artifacts is not yet known. The recent discovery in 1994 (but not reported until December 1996) of a Homo jaw dated at 2.33 mya in a site in Ethiopia in association with stone tools makes it more likely that Homo was the first tool maker. It is not, however, clear that the australopithecines did not use stones as tools! The threshold to tool use was no doubt crossed more than once in different places at different times, possibly even by different species in different ways.

Fig 5.4 *The famous large brained fossil KNM 1470, dated at 1.9myo (once thought to be Homo habilis, now regarded as Homo rudolfensis), frontal and profile views of a cast. Some more recent reconstructions of the fragments give the face a less vertical profile (author's photo from cast).*

[17] Walker and Shipman, 1996, p208.
[18] Tattersall, I. and J. Schwartz, 2000, *Extinct Humans*, p123.
[19] Ibid.

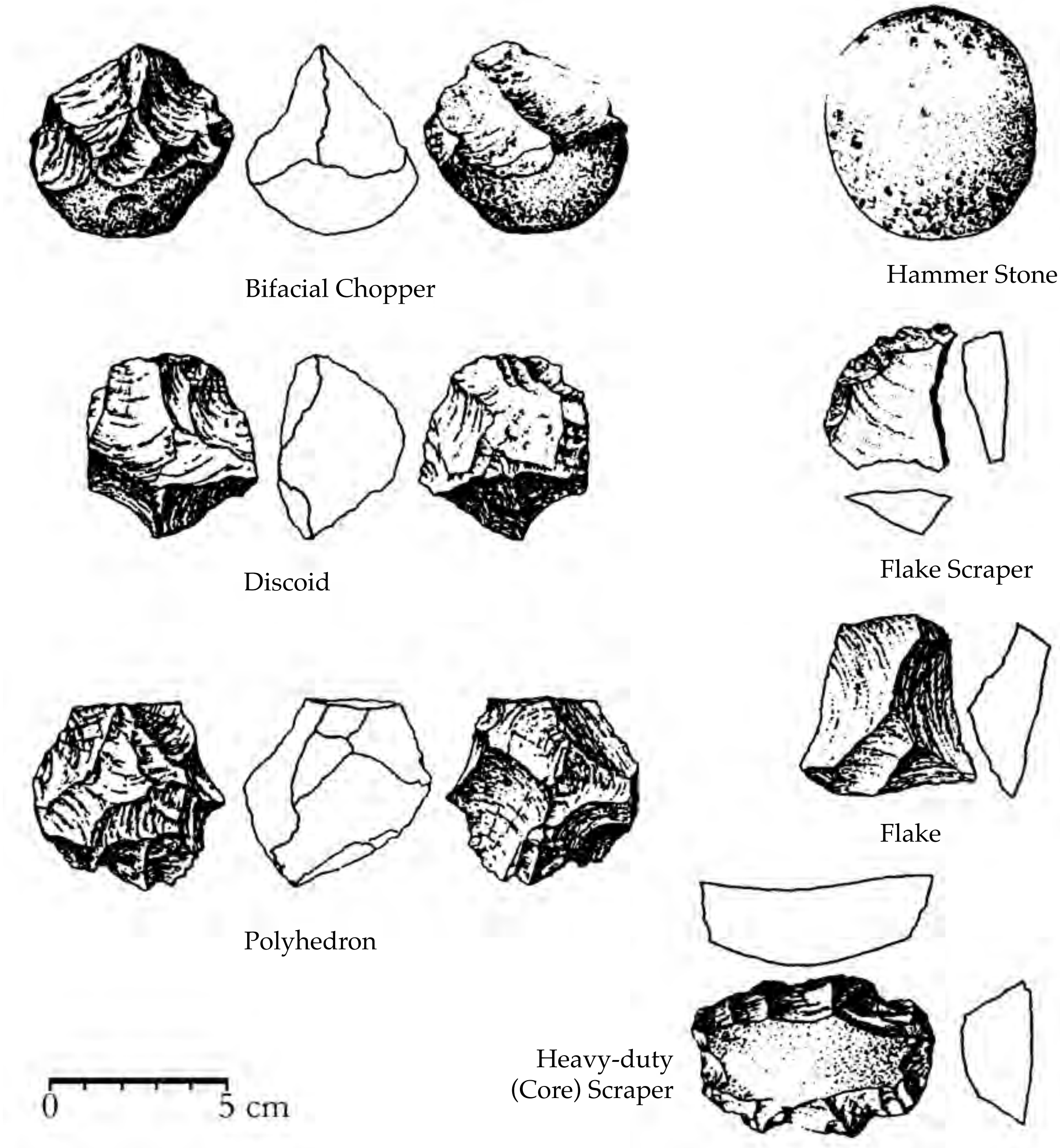

Fig 5.5 *Olduway stone artifacts from Koobi Fora, Lake Turkana, Kenya (after Schick and Toth, 1993).*

Artifacts

Thus far I have used the word “tools” as shorthand. Since we often do not know the exact function to which shaped stones were put, the term, “artifacts,” is probably a more appropriate word than “tools,” since that term implies a specific work function. It seems likely, however, that the first artifacts (from those that have been preserved) were in fact used as tools. The earliest stone artifacts come from Hadar in Ethiopia and date from around 217 mya. They consist of small flakes struck from pebbles.

These earliest assemblages of tools are categorized as Olduway (or Olduwan) Tools, following the convention of naming groups of artifacts of a similar type or method of manufacture after the site where they were first recognized. The earliest types of artifacts such as those from Hadar were usually shaped by one blow to a pebble and they rarely show signs of having been further re-worked, a procedure known as retouching. Interestingly, microscopic examinations of these flakes show very little sign of wear and this suggests that they were not used extensively before being abandoned. The cores from which these flakes were struck have also been found. Many were earlier classified as "choppers," though it is not clear that they were used as tools. It is possible in fact that only the flakes were used. The later sites at Olduway (sometimes written Olduvai) Gorge show a wider range of similar artifacts as well as larger stones that clearly were used as pounders and choppers.

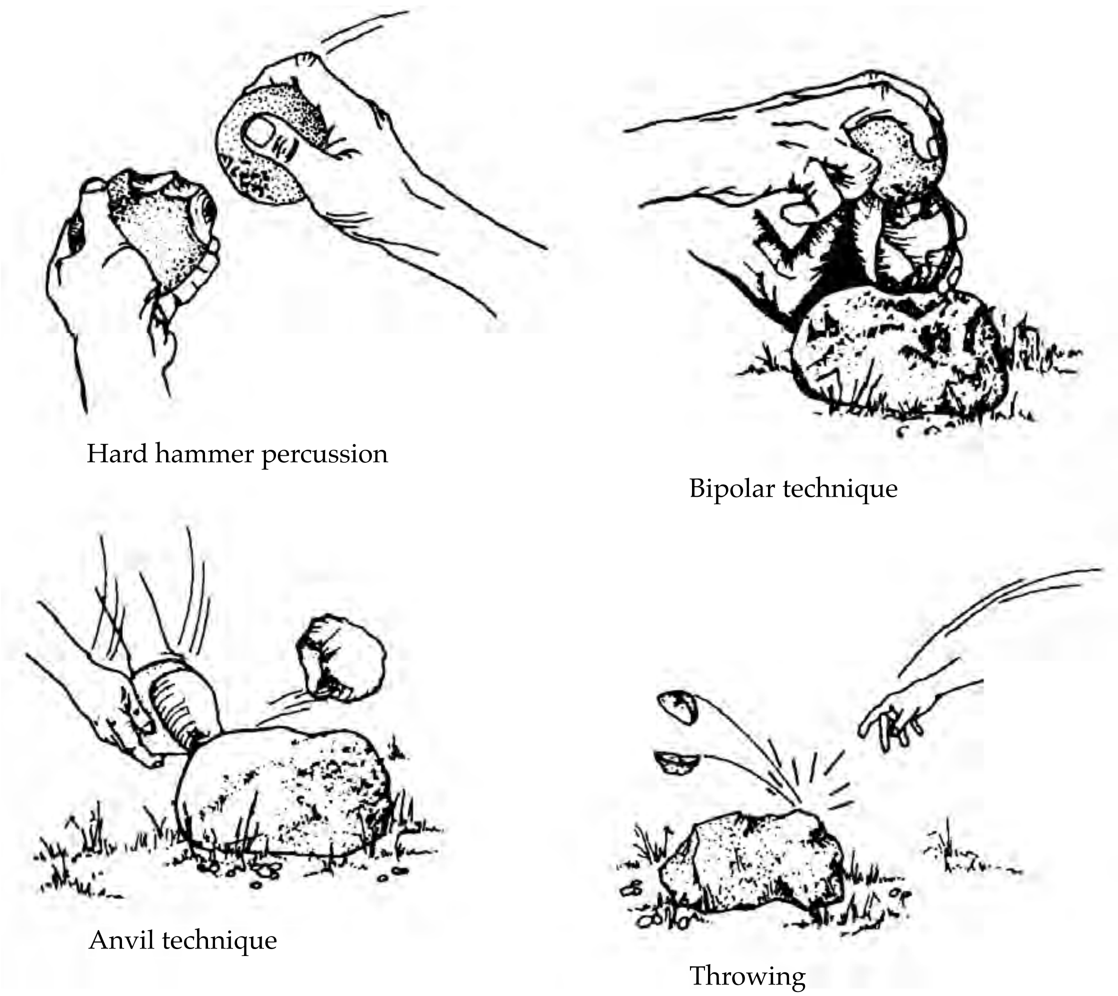

Fig 5.6a *Olduway pebble tools and various ways in which these tools were likely to have been made (after Schick and Toth, 1993).*

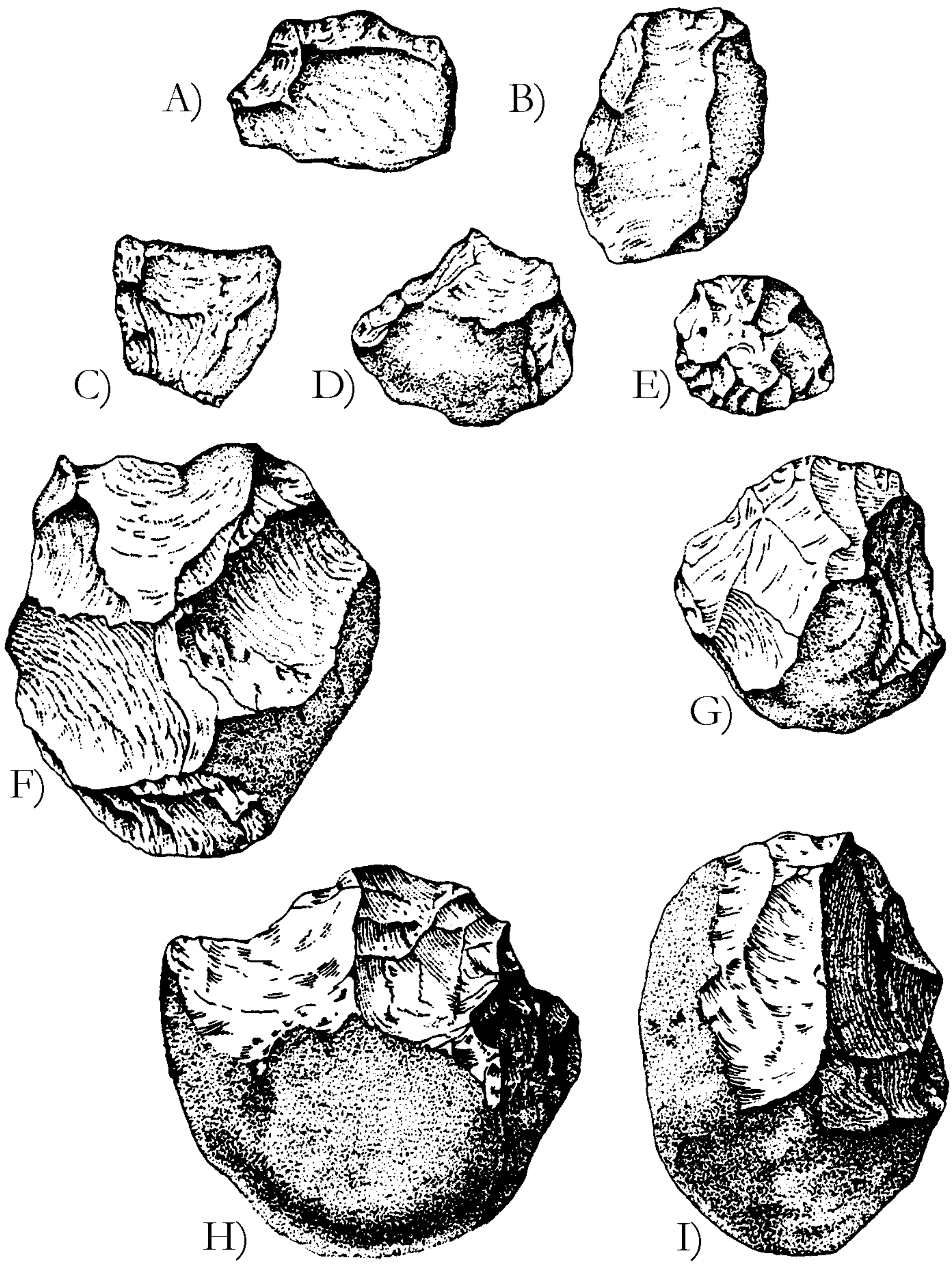

Fig 5.6b *Examples of pebble tools A-E scrapers and retouched flakes, F-I choppers and cores from Olduway Gorge Bed 1 (after Leakey, 1971). Recent work done at a site on the western shores of Lake Turkana dated to 2.23 mya has shown just how skilled early toolmakers were. Scientists have been able to refit some of the 3000 piece of worked stone back together, in one case 20 flakes from a single cobble. Such painstaking research shows that "flakes appear to have been struck in preferred directions in rapid succession, implying a degree of knowledge of the material, dexterity in handling, and possibly a distinct purpose … showing for the first time in the archaeological record evidence of minds at work" (quoted in* Nature, *Science Update, May 1999).*

Characteristic of the Olduway level of artifacts is the fact that there was clearly no standard shape for specific functions, as there was in much later assemblages. The shapes reflect rather the chance results of simply striking flakes from suitably shaped pebbles. Earlier systems of classifying the results into complex ranges of artifacts have now been simplified since the variety of shapes is now thought to reflect the vagaries of early stone knapping, rather than a range of specific tools. The shaped stones did serve numerous functions but these were predetermined in only a general way. Pebble tools are relatively easy to make and modern experiments have shown how effective they are for cutting tough animal hides and sinews, cracking bones open, or pounding tough plant fibres into digestible form.

By analyzing the site locations where stone artifacts are found and correlating this with the nearest natural source of the stone used, the method of manufacture and the microscopic examination of wear on the artifacts themselves, it is possible to deduce a surprising amount about hominid behavior. The phrase often used to describe this process is "silent stones reveal their secrets." They do not reveal all but they do give clues to the thought processes of early hominids, and some indication of processes linked in time and space can be read from them.

Some flakes and cores have been found together near the fossilized remains of the carcasses they were used to butcher. We know that only hard, crystalline stones that will flake, leaving razor sharp edges, were used to make flakes. If a source of suitable stone is nearby we can deduce that the tools were made opportunistically, as need arose from what was at hand, and they were simply left lying when they were no longer needed. Other sites have evidence only of the later stages of flake production, i.e., the matrix cores are missing, and the nearest source of such stone is some kilometers distance away. This is quite a different situation to opportunistic responses and implies a degree of planning. It means, in effect that a hominid at some point recognized good stone, stopped and collected some, perhaps even knapping a few flakes to take along—flakes are easier to carry than un-worked lumps—in case he or she later found a use for them. That means the hominid had a mental picture of something that might occur in the future and invested time and energy in a present moment on the basis of a future prediction. The alternative scenario is of a hominid finding a carcass, then having to rush off to find suitable stone, make the flakes and return before some other scavenger, hyenas, jackals, vultures and so on arrive. One might add that carrying a collection of useful flakes in anticipation of needing them also implies having something to carry them in. Having one's hands full of sharp flakes is not wise whilst traversing rough terrain thick with sharp thorn bushes.

To use stone tools to shape and form other materials such as wood, bone, or plant fibers to make other artifacts to perform other functions requires even more complex levels of memory and conceptualization, as well as anticipation of future needs. Professor Alan Gowlett has identified up to fifteen stages involving abstract thought processes and manual procedures between seeing a suitable outcrop of stone and finally using another manufactured artifact, possibly some considerable time later.[20]

In some cases the concentration of debris and the pattern it forms on the ground can reveal where and how a tool was formed. Where more complex stone knapping techniques have been applied, producing much "waste" material, it is sometimes possible to painstakingly "refit" the pieces like a three-dimensional jigsaw puzzle and see how the

[20] Gowlett, A., 1984, *Ascent to Civilisation*, Chapter 3.

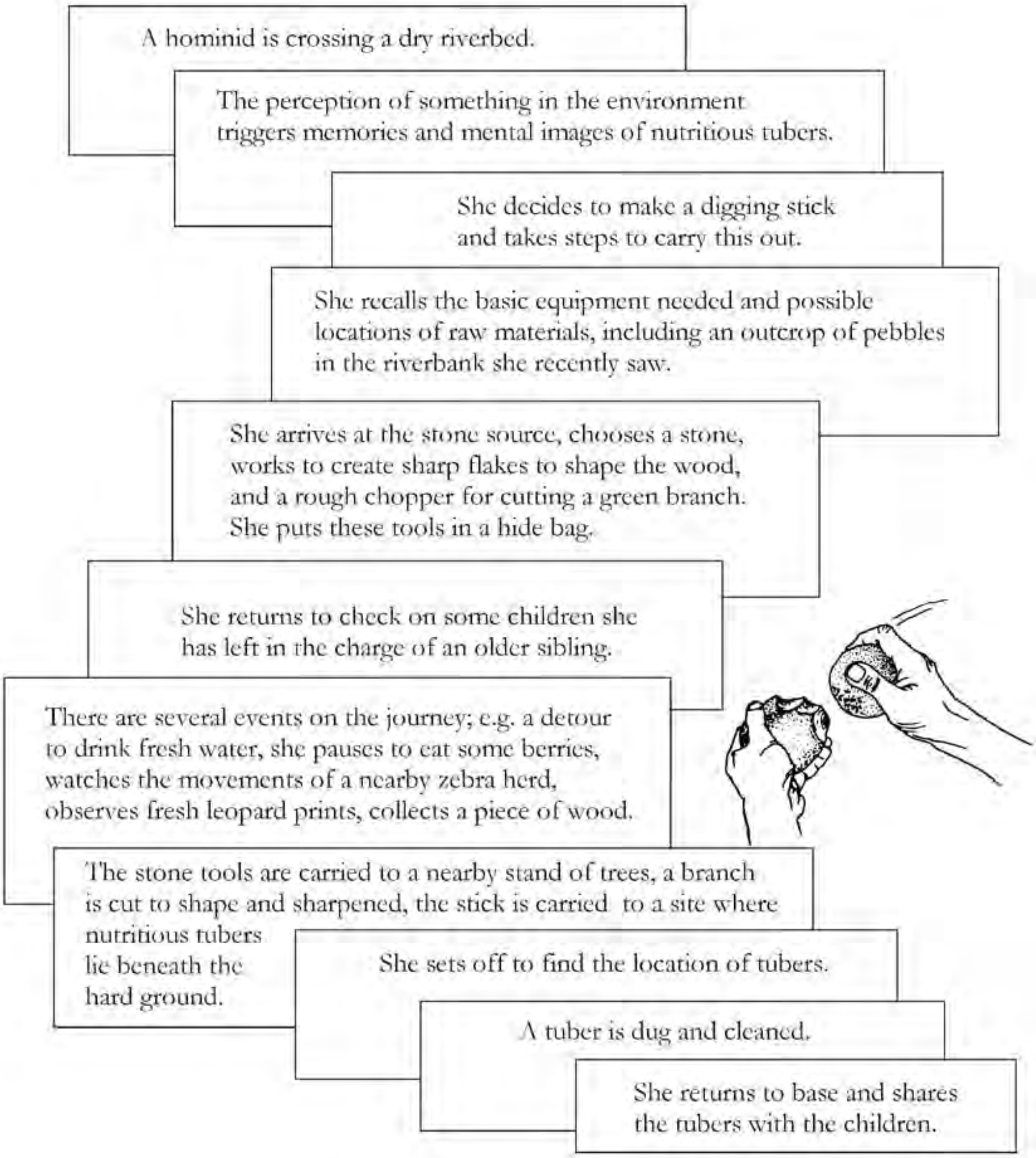

Fig 5.7 *Diagram showing an example of the conceptual and procedural stages of hominid tool production. A hypothetical situation is envisaged in which a hominid makes a stone tool to fashion a wooden digging stick. The sequence is divided up into complex stages to show the degree of planning, foresight, knowledge and awareness implicit in the use of tools (after Gowlett 1993).*

original core was worked. In this way, the science of studying stone artifacts has revealed many otherwise invisible aspects of early hominid behavior.

Analysis of Olduway tools tells us that early Homo had mental skills of some complexity. Transportation of materials reveals not only a detailed knowledge of resources within an environment but a fairly high degree of foresight. In order to appreciate this ability, we need to compare it with that of other tool-using animals. We have long since established that humans are not the only tool users, but they are probably the only toolmakers.

Stones or Bones?

Reading the literature on paleoanthropology, it is interesting to note the professional proclivities of the authors. Someone like the "stone-man" Nick Toth can be quite inspirational on the ingenuity of early hominid tool production.[21] Alan Walker, a "bone-man," confesses, on the other hand, to finding the famous Acheulean hand-axe uninteresting and indicative of a dull mind. The "stones or bones" preference shows the creative interface between the biological and the anthropological/archaelogical approaches and the corresponding weighting of natural against cultural processes.

Animal Tool Users

At the one level it is known that the Ammophilia wasp in Australia uses one grain of fine gravel to hammer a plug of sand into a hole it has made in the ground to house its egg. Some birds, such as Egyptian vultures and black-breasted buzzards, drop stones on large eggs to crack them open. Sea otters crack open clams with rocks.

But despite these and other similar examples, it is the chimpanzees and bonobos who are the most technologically advanced animals known to us. In the Tai Forest on the Ivory Coast, female chimps use stones as hammers and occasionally also as anvils to crack open the nutritious cola nuts. Furthermore, chimps have been observed to learn this skill from older animals, a clear example of "cultural" behavior being transferred from one generation to the next.[22] Most remarkable and well documented is the skill chimps have developed in choosing a suitable probe and "fishing" for termites in the narrow entrances to their mounds, a skill which it is surprisingly difficult for humans to imitate. Other observations of chimps record them using moss to soak up water like a sponge, using sticks to reach things floating or hanging out of reach and throwing stones in anger. In captivity young chimps can be taught to use all manner of gadgets.

The essential differences between chimps and humans in respect to tool use are not only in degree but also in the extent to which tool use changes behavior. Not only is the degree of planning and intentionality in human tool making many times greater but in the case of humans, and hominids, tool use has led exponentially to radically different life-styles. Some macaques have been observed learning to wash potatoes before eating them, and some chimps may become very skilled at fishing for termites, but neither of these behaviors has led to these primates changing their lives, moving to another place with different circumstances or increasing the amount of tool-based life strategies. Trained chimps in captivity revert more or less to type as soon as they become sexually mature, though after being raised in an American family, as Lucy the chimp was, they may have some difficulty adapting when introduced to the wild.

Jane Goodall movingly describes[23] how Lucy suffered two years of disorientation and rejection by her fellows before she managed to adjust to life in the forest. With early hominids I imagine something similar occurred in terms of tool use and production with regard to the australopithecines and early Homo. Just as the technological distance between chimps and humans is not just one of degree but one of an order of significance, so too is it between these grades of hominid.

Australopithecines may well have occasionally used stone or other tools, but this did not radically alter their way of life as it did, no doubt over countless generations, for

[21] Schick, K.D. and N. Toth, 1993, *Making Silent Stones Speak*.
[22] Reported in *Bild der Wissenschaft*, March 2002.
[23] Goodall, J., 1990, *Through a Window*.

early Homo. Australopithecines around 216 mya (the period of transition between the earth ages called the Pliocene and Pleistocene) were certainly equipped anatomically, in terms of manual dexterity, to make and use simple tools. If they did so, and comparisons with chimps suggest that they were at least as developed, they probably did so at the levels that chimps do today in the wild.

The point about tool use is that it is a behavioral adaptation, which means that it is a learnable skill, passed from individual to individual. Australopithecines had the anatomical wherewithal, opposable thumbs, manual dexterity, and certainly enough intelligence, to make simple tools by shaping stones. Since tool use seems from the fossil record, to precede the increase in brain size associated with Homo habilis and related species, it was not dependent on larger brains, rather the reverse, increased tools use and tool making behavior could have been a stimulus to larger brains. Once the skill was "discovered" by a particular group, it could have easily been copied by other observant hominids even from other species. It does not need any genetic link to be present. It could have just as easily been forgotten or lost as individuals and groups died out. Tool making and tool use are skills (or behaviors) based on information that can be communicated through imitation, teaching, showing, observation, and so on. Here we see a clear case of behavior driving evolution.

Software

Stone tools were certainly not the only artifacts that hominids made, though they are the only ones that have survived. Pebbles were a readily available material, particularly for hominids who frequented river courses as we know they did. So were many other materials. Everything we know about early hominids suggests an opportunistic and observant nature. We can therefore be sure that the useful properties of other less durable materials were noticed and used to meet a variety of needs. If chimps use not only stones as hammers but sticks as levers, moss as sponges, straws as probes to winkle insect larvae out of holes, so we can be sure that hominids were at the very least as adaptable. What we know of stone tool use and production suggests that we should imagine more than just momentary use of what was immediately at hand. It is highly likely that a range of materials including horn, bone, sinew, skin, wood, bark, plant fibres, liana, grasses, rushes and shells were modified and used to assist in life's daily round.

Early Homo and possibly even the later australopithecines had the manual dexterity and the cognitive skills to make effective use of natural materials. The most basic need for early foragers would have been the means to transport things around whilst leaving the hands free. Anyone who has tried carrying more than a few small things without pockets will appreciate how essential a carrier bag is. We know that hominids transported stone flakes and cores many kilometers before using them. Stones were not always easily available in swampy regions, where large prey or fowl could be found, or in wet forest areas.

A small, secure bag would be very useful. Scavenging was not without its dangers, and the speedy disarticulation and removal of pieces of carcass to a safer base was essential. Foraged foodstuffs such as fruits, nuts, tubers and so on, would likewise need to be transported, as indeed would useful materials themselves. The carrier bag, though invisible in the fossil record was probably one of the most significant technological developments in the emancipation of mankind!

In the absence of archaeological evidence (remember the old adage, absence of evidence does not mean evidence of absence), we must try to reconstruct a picture of such technology out of what we know about the entire ecological situation. Many animals weave nests out of grasses and plant fibres, not least of which the highly visible weaverbirds that hang their nests from the tips of thorn tree branches around the Rift Valley lakes. Even chimpanzees interlace branches to make sleeping platforms, so it is not unreasonable to imagine that hominids could do at least as much. Hominids were by their very nature observant. Not only their life-style as foragers demanded it of them but as we have already seen their upright posture forced them to stand back and look at the world around them and reflect upon it. However, humans are not only observant, they are above all imitative. It belongs to the childlike quality of the human being that we are deeply imitative and have the ability to translate observed activity into self-activity.

We are therefore justified in imagining that early Homo would have noticed and watched the activities of the animal life around them and through a process of transformed imitation have learned how to weave containers, carry mats and even shelters out of woven plant material. As efficient butchers they would have noticed the properties of animal sinews to bind, link and articulate. Perhaps the most obvious form of carrier bag, particularly for transporting the pieces of a carcass, would have been the animal's skin itself. Easily separated from the muscle tissue and bone with a sharp blade, a skin makes an ideal bag, for the simple reason that it is a kind of bag anyway. Materials requiring the least amount of modification were most likely the first to be used.

As a footnote to the virtues of a carrier bag it is interesting to reflect on the conceptual implications of being able to collect things into one bundle or category. Collecting, grouping and sorting out are very basic human cognitive activities. The use of such materials, as already hinted above, is also closely related to other factors such as having the appropriate tools to cut, shape or in some way make the raw material more useful. It is the dynamic of basic technology that it requires complementary technology to become relevant. This assumes the existence of certain factors and stimulates the creation of others.

Technological development is in this sense a synthesis of existing and future conditions. At any rate, invention is only relevant when many factors come together at the same time and place. The same was true of James Watt's steam engine! The idea was only practical because of existing technology, casting techniques to make pressure resistant cylinders, and because it met an existing need, the transport of coal and ores.

How Did These New Ideas Come About?

Let me try to reconstruct some of the interrelated circumstances that brought about a technical response in the early Pleistocene. The need to transport food only arises when it is necessary to compete with other scavengers or predators or if the social structure of the group has led to some kind of sharing of resources. Very few animals transport food except to feed their young or if they are nest-bound or incapable of feeding themselves. The leopard must have been very much in the consciousness of early hominids. An africanus skull was found in South Africa with two pierced holes at the base that exactly fitted the canine teeth of a leopard skull nearby—clear evidence of mutual familiarity.

Knowing the ways of the leopard would have taught them how to find his larder of half-eaten antelope (and no doubt the occasional hominid) carcasses hung from the branches of trees out of sight of the vultures. Keeping a sharp lookout, hominid groups could have raided the larder in the leopard's absence. They may even have taken the leopard's example of storing surplus food for later.

The kind of complex foraging and hunting carried out by hominids required a fairly advanced level of co-operation. That in itself would have required an effective form of communication. The more complex the foraging or hunting techniques became, the more time would have to be spent planning, preparing equipment, teaching the use and manufacture of tools. The very use of such techniques furthered the process of selection and preparation of materials. That in turn influenced the use and ultimately the choice of prey taken or material collected. The by-products of food assumed another significance. Animals were chosen for the quality of their hides or fur or quills, rather than primarily for their meat. Plants were harvested for their fibers and so on. The need for more materials and new techniques to prepare them created the need for secure bases where the work can be done. That in turn demanded specific social relationships.

As I have already pointed out, the models that saw early hominids creating a niche for themselves on the savannah as game hunters have given way to less heroic visions. The term "scavenger" does not have noble connotations, though "forager" is somewhat better. We need not feel ashamed, however, that our ancestors were not mighty hunters. In many ways the skills required by foragers are less specialized and more universal. They had to be quick-witted, alert, flexible and above all, adaptable. The competition in such an environment was tough and mostly had the advantage of not having to fend for helpless children for several years as hominids had to.

The whole ecology of interrelated factors and preconditions that made up hominid life styles was a highly complex matter. It is overly simplistic to account for such processes by postulating a series of adaptive evolutionary steps, which fits upright walking, use of the hands, brain expansion (known as encephalization), language and cognitive development in some sort of causal chain. The dynamics of evolution are subtler.

Brain Power

The significance of large brains in human evolution is somewhat ambiguous. Upright bipedalism was the decisive adaptation that put hominids on the road to being human (from the perspective of hindsight of course) but the brain is no doubt the most remarkable of human organs. Our understanding of the brain has increased dramatically over the past decade and yet those who study how it works admit that we are far from knowing all or even most of its secrets. From an evolutionary point of view it is clear that it was initially not our brains that distinguished us from other primates, yet the nearer we get to Homo sapiens, the more significant brain power became.

The most obvious aspect of brain development in human evolution has of course been its growth in size. This increment however is by no means straightforward to measure. From a macro-evolutionary point of view there has been a gradual increase in relative brain size though this does not mean that all species have increased in brain size or complexity. Since brain size of itself is to a large extent a factor of sheer body size, absolute brain size is not the decisive point. In order to say that one species has a larger brain than another, one has to take body size, or more usually mass, into account. There are various ways of calculating this but the most common is to use the measure of encephalization quotient, or EQ, devised by Harry Jerison of the University of California. EQ measures the coefficient of mean endocranial capacity for a species in relation to mean body mass. In comparing species EQ levels one also has to take into account the fact that brain size must increase by a factor of 0.75 for each unit of body size increase, just to maintain the same level of function.

At each major stage of evolution, for example, from amphibian and reptile to mammal there has been a dramatic relative increase in the size of the brain. Modern mammals, which evolved some 65 million years ago, have about five times more brain than their ancestors. Primates have on average twice as much brain as other modern mammals, and humans have about three times as much brain as the average monkey or ape (an achievement matched, incidentally, by dolphins).

The Powers of Representation

Two of the main functions of the brain are the integration of sensory information and the co-ordination of responses. An animal's experience of the world is dependent on what sensory information it receives and what system it has for integrating it. The brain and nervous system create a mental representation of the world, a framework within which the animal can live effectively. As Jerison puts it, the brain monitors the world "out there" and creates a model of it "in here."[24]

The cognitive capacity of an animal is reflected in the complexity of its mental world, what I described as sentient soul in Chapter 3. The inner world experienced by an ape is more complex than that experienced by the average mammal. The relationship of "out there" to "in here" must be correspondingly different, but not necessarily better in terms of survival effectiveness. Presumably a lizard's version of reality, its mental model, is perfectly adequate for the successful long-term survival of its species even though it may be much simpler than that of a mouse inhabiting much the same habitat (say the stone wall and garden of Graham's holiday find in Mallorca, of which I also have a mental picture and warm memories).

The difference has to do with the range of sensory "inputs" into the model of reality created by the brain. In amphibians the primary sense is vision; in reptiles olfaction (smell) is more important. In most mammals auditory faculties are added to olfaction and vision. In primates olfaction is less dominant but there is a dramatic increase in stereoscopic and color vision. Primates and other social mammals, and probably the large-brained cetaceans (whales and dolphins), have the faculty to create complex spatial "mental-maps" of their habitats as well as being able to keep track of the even more complex social behavior of their fellows.

Hand in hand with the increase in representational ability goes the increase in possible behavioral responses, since more information gives more options. Animals with greater representational powers have greater freedom of behavior—indeed these two faculties must develop in tandem through reciprocal feedback. This gives us a good example of directionality in evolution, a trend towards greater behavioral flexibility and at the same time a progressive distancing of the animal from a direct relationship to its environment, since more layers of cognitive processing separate the animal from immediate interaction with the external world. This is a clear trend towards emancipation. As the linguist Derek Bickerton put it,

[24] Jerison, H.J. and I. Jerison, 1988. See also Lewin, R., "The Great Brain Race," in *New Scientist*, December 5, 1992.

> Now it is true that, at the level of genetic change, processes are entirely random and unpredictable and that conditions imposed by the environment may seem equally random and unpredictable. … However, one great constancy prevails through it all. As long as there are creatures whose motor capacities and environmental conditions allow them to benefit from it, evolution will always favor an increment in representational power.[25]

Improved representation does not necessarily improve survival chances; it merely tips the scales in the direction of behavioral and especially cognitive flexibility, including the possibility of developing conceptual skills, higher order consciousness and all that goes along with it, including language and self-consciousness.

In humans the sensory range has to be vastly expanded by the perception of language and by the higher cognitive faculties such as our abilities to perceive and understand the thoughts of another person, the meaning of symbols, or the ability to observe ourselves doing these things. Steiner described the highest sense as that which can perceive the "I" of another person. With the corresponding increase in the complexity of the inner picture of the world at each stage of evolution, there has been an incremental separation from direct experience of the world and at the same time a progressive independence from the external world. The brain is also the organ of object consciousness and self-awareness. It is in the brain, as it were, that the human being is most detached from the environment. I quote Derek Bickerton again, " The paradox of consciousness is that the more consciousness one has, the more the layers of processing divide one from the world. … Progressive distancing from the external world is simply the price that is paid for knowing anything about the world at all."[26]

What Price Brains?

So hominids began to evolve larger brains. The cost of such an evolutionary step is great. Brains are expensive organs to sustain, demanding large amounts of energy and an intensification of the metabolic processes, not to mention a longer gestation period. In an adult human being, the brain is 2% of the body weight but consumes some 25% of the body's energy supply. The advantages to early hominids of a larger brain must have been fairly effective in terms of survival of the species to justify such an investment. Just why such an investment was worthwhile is not clear given the obstetric complications of a large brain. The immediate advantage in terms of slightly increased brain capacity is also dubious. Modern people range in brain capacity between 1,000–2,000 cubic centimeters without any obvious differences in ability. The kind of incremental growth envisaged as small increases due to natural selection hardly accounts for the phenomenon if such small increases in size led to no significant advantage.

As it is, humans apparently have more brain capacity than they actually need. The key question is how and when did this remarkable evolutionary juggling act come about? One of the great challenges of evolutionary biology is to provide an integrated theory which accounts for the fundamental anatomical traits that characterize the human being: upright bipedalism, encephalization, human dental patterns (including their assumed diets and digestive tracts) and vocal ability. Much research has sought to link these traits and their associated behaviors into some kind of causal nexus. Various linear

[25] Bickerton, D., 1990, p103.

[26] Ibid., p86.

causal links have been suggested, but most theories seem to go round in circles searching for the starting point. As yet no one theory accounts for all the facts.

As we have seen, factually it is certain that bipedalism came first. Hominid patterns of dentition are already distinguishable from typical ape forms in the earliest fossils, such as the fragment of jaw from Lothagam in the Turkana Basin, dated to around 5.6 mya and the Kanapoi specimen from the same region dated to 4.1 mya.[27] Full bipedalism does appear to have preceded human dentition but both trends are very old. With regard to encephalization, there are a number of problems in estimating this. First, establishing brain capacity from fragmentary skulls, often embedded in or even filled with mineral matrix, is by no means easy.[28] Secondly living body mass has to be estimated from what is often a handful of post-cranial bone fragments. Nevertheless various tables showing hominid EQ data have been plotted.

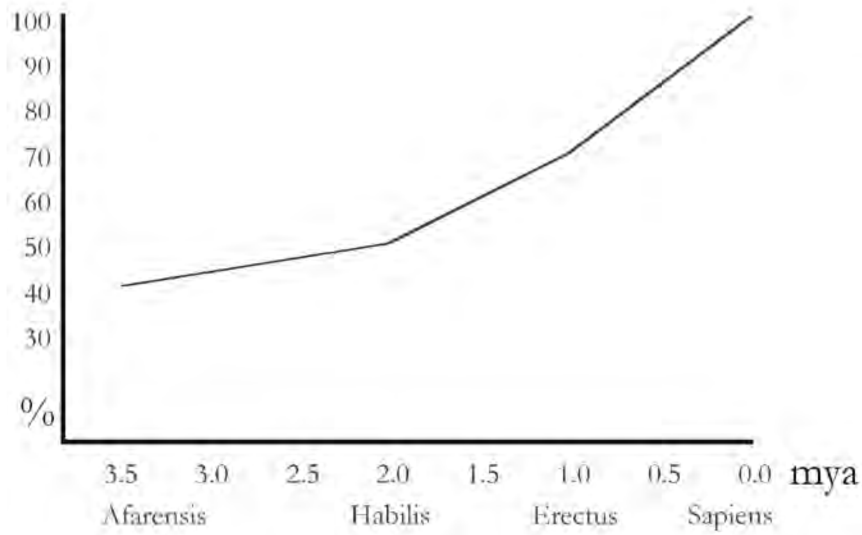

Fig 5.8 *Table showing the encephalization (EQ) quotient (the relationship between brain capacity and body size) increase in real time in hominids. The vertical axis indicates EQ as a percentage of modern humans, the horizontal axis indicates time in millions of years, 0.0 = the present (after Bickerton, 1990).*

Such tables reveal that in the period between A. afarensis and Homo habilis there appears to have been a 25% increase. This leaves many of the robust australopithecines out of the equation, with their large bodies and relatively small brains. One should also note that australopithecines such as afarensis and africanus already had brains 50% larger than recent apes.[29] With erectus there is a clear acceleration of growth and the overall increase from erectus to H. sapiens was a large 91%.

[27] Maeve Leakey, "The Farthest Horizon," in *National Geographic* Vol. 188, No. 3, September 1995.
[28] Alan Walker, 1996, describes how he had to split open a precious fossil with numerous blows with a hammer and chisel, a remarkable technique for a science more used to working with delicate instruments to prepare fragile fossils!
[29] Martin, R., 1995, "Hirngrässe und Menschliche Evolution," in *Spektrum der Wissenschaft* September 1995, p48–55.

How did this increase come about? Whatever its cause, it is unlikely to have been tool use alone, as has often been suggested. Brain size had been increasing long before the oldest known tools were made. At any rate there is no obvious correlation between new technologies and increase in brain size that could be called direct cause and effect. What is more likely is that tool use has a closer relationship to brain organization. If, as seems likely, the human brain has evolved less as one total entity than as a series of interrelated functional modules, then the co-ordination of manual skills, long practice and the conceptualization process that ultimately must accompany complex behavior, such as making and using tools, may have resulted in a re-organization of the brain. This may have preceded any global increase in size.

Further demands on hominid brains include being sociable. Hominids have almost certainly always been social animals and if other primate groups are anything to go by, such social life can be complex. The ability to map such comings and goings of group dynamics would certainly have had its advantages. It may be that the increased complexity of social behavior and group dynamics would have selected for larger brains. Added to this the increased feeding range of omnivorous foragers in a savannah environment would also have greatly benefited from increased cognitive capacity. However, comparative studies on living primates and other animals with large brains relative to body size show no significant correlation with the factors discussed above.[30] Indeed some of the largest brains are found among solitary species where social dynamics are at a minimum. Anyway increased cognitive capacity does not necessarily require larger brain volume. It might very well be achieved by more efficient structuring of what is already there. Such a higher level of structuring would, for example, be required by language.

Feeding a Brain

As Robert Martin of Zürich University has recently shown the decisive factor in brain size is the amount of high-energy nutrition available in the embryonic and post-natal growth phase.[31] The size of a primate's brain depends on the amount of surplus energy generated by the mother and passed onto the child in the form of nutrients and, in particular, milk. The ability of hominids therefore to harness and digest nutritionally higher energy sources has been one of the most significant factors in human evolution.

The mobility provided by bipedalism and the associated freeing of the hands must have enabled early hominids to exploit new high-energy food sources in the recently emerged savannah and riparian environments. Having, as humans do now, a stomach and intestinal tract adapted to the rapid digestion of high-energy foods would also have been necessary. As noted above, Alan Walker believes that tooth wear and the anatomical proportions of fossil hominids indicate that Homo erectus had greater mobility, a smaller gut, probably adapted to rapid digestion of high-protein foodstuffs, than earlier species. This means that erectus had more metabolic energy available to support larger brains. Smaller hips, which enable greater mobility, however, also mean smaller brains at birth and these necessitate a prolongation of fetal brain growth not in the womb but post-natally. If you want an erectus-sized brain, or yet a modern sized one, you need an orderly family life, with extensive child-care, sharing of resources and strong bonding. We modern humans have traded some of our mobility, in comparison

[30] Jones, S., et al. (eds.), *CEHE*, p115.
[31] Martin, R., 1995, as above.

with erectus, to have even larger brains. Our hips are wider and therefore we are not as efficient movers as erectus people were. What is clear, is that a long nursing period would have been essential to provide the growing infant with sufficient energy-rich nutrient to support rapid brain growth.

At birth a human baby's brain consumes 60% of the available energy. At 7 years old this is still 40%. This high demand must have put hominid mothers under considerable strain, even allowing for smaller brains. The Taung Child, an A. africanus fossil thought to have been around 3 years old, based on the presence of milk teeth, had a brain estimated to be 92% of its eventual adult size. This means the africanus mother must have provided the child with a high level of nutrition, presumably by nursing it, before it met a premature death in the claws of a large bird of prey, as a recent theory has it.

Keeping a Cool Head

Another aspect of brain evolution is beginning to become clearer. The brain is very sensitive to changes in temperature and it cannot take too much heat. A rise of only twelve degrees Celsius can disturb brain functions and a rise of four degrees can cause dangerous sunstroke. The brain, therefore, needs an exact temperature control mechanism and, especially in hot climates, an effective cooling system.

Animals, such as large carnivores, dogs and big cats, that exert themselves in hot places cool themselves by panting. An arterial network known as the "rete mirable" extends through the snout, and the blood flow network is cooled by the evaporation of fluid from the mucal lining of the nasal cavity (much the same heat exchange system as a refrigerator). This cooler blood then flows to the brain, lowering the temperature.[32]

Being upright, of course, reduces the body area presented to the direct rays of the sun; in fact at noon, 60% less heat is absorbed by an upright man than by a quadruped of equivalent size. Working in the opposite direction is the fact that being upright increases the gravitational pull on arterial blood passing from the heart up into the head. On top of this (literally) we present our head with its heat-sensitive brain to the full effect of the sun, though we can assume that hominids at least had the benefit of dense, tightly curled hair typical of many tropical peoples today.

As a thermo-regulatory adaptation, hominids have evolved a network of emissary veins fed by the vertical plexus that lead in and out of the brain, out through the cranial bones and under the surface of skin on the top of the head. The brain transfers heat to the blood, which then flows out onto the surface of the skull where it cools. When the brain overheats through exercise-related stress, the blood flow reverses and flows back into the cranium, thus cooling the brain. This adaptation was essential once hominids developed the ability to run over long distances, or at great speed over short ones in a hot climate.

It seems that this system was absent in australopithecines. It first becomes apparent in habilis and erectus, as revealed by the telltale impressions of blood veins on the inside of the fossil crania and the small holes in the bone through which the veins pass to the outer surface. Since this adaptation came some time after uprightness had been established, this thermo-regulatory system must have both enabled hominids to protect their delicate brains from heat stress and also removed a serious limit on the

[32] Fialkowski, K., 1987, *A Mechanism for the Origin of the Human Brain, in Current Anthropology*, pp288–290.

expansion of brain size, especially the cortex. How this extremely valuable adaptation in the blood supply to the brain evolved is unclear. But if the impulse to go beyond normal physical limits created this selectionary pressure, then presumably early hominids were regularly dropping like flies from heat stroke. Those with the fortuitous mutation that reversed blood flow out of the brain by way of a new network of veins had an immediate advantage. This adaptation belongs to a suite of thermoregulatory adaptations that Homo erectus possessed, including the "human" nose that cools inhaled breath whilst retaining precious moisture; tall, slim stature which increases surface area over against body volume (peoples in cold climates tend to be short and stocky to conserve body warmth); and probably sweating from a mostly hairless body. Of course, naked skin in a tropical climate would of necessity have been darkly pigmented.

Brain-Size Peaked Already?

The human brain has not actually continued getting progressively larger. It would be more accurate to say that brains increased in size until recently. Curiously over the past 20–30,000 years brains have actually been getting smaller. According to Robert Martin, from an average of 1569 cc for male Cro-Magnons (early European Moderns), brain volume has fallen to an average of 1436 cubic centimeters.[33] This has certainly not been due to a decrease in social complexity, technical demands or loss of cognitive abilities, or poorer nutrition.

Martin suggests that the reason may be that Neanderthals and Cro-Magnons weaned their offspring at a later age, thus leading to larger brains. Perhaps having reached an optimum size for the effort involved, mankind, or at least womankind, took a small step to emancipating itself from its demanding offspring. As we know, there is no correlation between brain size and intelligence among present human races or individuals, despite racist attempts to prove them. The London Underground recently did its bit to counter this prejudice with a cartoon poster showing a series of identical brains labelled Negro, Asian, and Caucasian. The last brain was half the size and was labelled Racist.

Feet before heads in a general evolutionary sense, increased brain size has gone hand in hand with a progressive increase in the elaboration of the central nervous system. The more sensory information that was being processed and the greater the complexity of representational systems, the greater became brain size by volume. Bifocal vision in primates and in particular in hominids would, for example have vastly increased the amount of sensory data being simultaneously processed. While it is true that other animals have far more sensitive sense organs (one need only think of the dog's sense of smell and so on), and that apes and humans have lost much of their senses of smell and taste, bifocal color vision, with the capacity to resolve focus of great clarity and depth, delivers probably more sense data simultaneously than any other sense organ in all of nature.

This kind of vision requires considerable processing capacity in the brain and thus high levels of representational ability. Added to this the manipulation of prehensile hands co-ordinating with visual perspective also requires large networks of neural connections.

If we correlate all this with the factors discussed above we have an extraordinarily complex development resulting in larger brains and more importantly, since brain size within very broad parameters is no measure of cognitive capacity, brain organization

[33] Martin, R., 1995, p54.

and brain structure. Throughout hominid evolution, as far as one can tell from the fossil indications, different parts of the brain have developed at different rates. Broadly speaking those areas of the brain associated with motor systems evolved first, followed by sensory processing areas and finally the areas involved in cognitive integration. The frontal lobes of the cortex appear to be the most recent development and these are very much linked to aspects of personality and faculties of judgment. Thus the brain has followed the rest of human morphology in evolving progressive features of the motor and sensory systems in advance of cognitive integration.

Culture, an Evolutionary Force

In sum we can see a complex correlation of factors at work in the evolution of the most complex organ known to us, the brain. Uprightness and increased manual dexterity were related to new life styles and feeding habits which enabled hominids to maintain a high-protein diet. Prolonged post-natal care and nursing enabled large brains to develop. New behavior, including extensive foraging, social co-operation, tool use and general problem-solving led to more complex cognitive abilities. Increased neural networking enabled greater internal representational mapping, mental picturing and the development of language.

In all this the brain was becoming an instrument for the human spirit and that meant that a new factor was added to the equation, one that does not have its roots in biology but in the spirit, namely, culture. If we use the definition of culture referred to in chapter 3, namely the non-genetic transmission of behavior from one generation to the next, we can see the potency of this force in evolutionary terms. Jean Piaget, better known to us for his studies of child development, saw the evolutionary implication of behavior and described this in his book, *Behavior and Evolution*:

> In contrast to the conservative tendencies characterizing the internal organization of living things, behavior must be deemed the principle factor in evolution. To the extent that evolutionary "progress" depends at once on the growth of the power of organisms over their environment and on the relative independence they acquire as a result of their actions an independence which is largely due to an increased mobility—behavior must be considered the motor of transformations. And no matter how neurological, physiological, or even biochemical the preconditions of behavior may be, the fact remains that behavior itself creates those higher unitary activities without which macroevolution would be incomprehensible.[34]

Behavior and culture, which is non-genetically acquired behavior, are the real motor of evolution, to quote the late Steven Jay Gould,

> In short, the biological basis of human uniqueness leads us to reject biological determination. Our large brain is the biological foundation of intelligence; intelligence is the ground of culture; and cultural transmission builds a new mode of evolution more effective than Darwinian processes in its limited realm- the "inheritance" and modification of learned behavior. As the philosopher Steven Toulmin stated: "Culture has the power to impose itself on nature from within."[35]

[34] Piaget, J., 1976, *Behavior and Evolution*, p145.
[35] Gould, S.J., 1981, p325.

That is exactly what the spirit does; it works on nature from within! Culture did not arise spontaneously at a point of critical mass in biological evolution; it was not just the product of higher levels in the hierarchy of neural representation systems. The brain is not its cause but its instrument. Culture, like individuality, is a human quality and has a spiritual origin. It could, of course only come to expression where a surplus capacity had been created, where opportunities presented themselves. The brain evolved to the point where it became accessible to a higher order of organization and this meta-organization, I would suggest was the human "I."

It seems that at each stage of evolution exaptations occurred which anticipated future needs, or if that is too teleological, which at least bore potential for future emancipatory steps. At any rate this motif repeats itself with the development of each individual, in that the brain cortex has a vast number of neural glia (neural nerves) uncommitted to any specific function, and thereby an enormous potential for diversity, flexibility and plasticity in the forms of mind that can arise to use the instrument. Rudolf Steiner often pointed out that it is the "I" which, of the higher members of the whole human being, is least developed but which bears within it the greatest scope for evolution. Again we encounter this signature of the "I," in an organ that has throughout human evolution borne a curious paradox within it.

As quintessential organ of the nervous system the brain is the first to form in the embryo, and in the course of evolution it evolved before it was fully needed and in that sense is a product of the past and yet within itself bears unfathomable potential for future development. Linking these qualities of past and future, the brain is above all the organ of consciousness that by definition only exists in the on-going, eternal present!

Emancipation

I have used the term emancipation above in passing. This is an important aspect of approaching human evolution from a qualitative and spiritual perspective and it needs a bit of explaining.

One of the significant trends in animal evolution has been the increasing degree of emancipation of certain animals from their immediate dependence on their environment. In its most elementary form this provides greater mobility. Another significant aspect is the increase in organizational complexity that goes hand in hand with an internalization of life processes. Fish are supported by the water, while the amphibian can support its own body weight on land. Neither can regulate its own body warmth through metabolic activity. Mammals however can do this to a far greater extent. This trend of internalization and emancipation can also be seen in reproduction. From an evolutionary point of view there has been an increasing tendency among vertebrates towards internalizing of the embryonic phase of development. This ranges from fish eggs being fertilized externally in the water, amphibians having thicker embryonic membranes, reptiles laying eggs requiring the environmental warmth to develop, birds building nests and brooding on their eggs, through many subtle variations on up to placental mammals. At each stage the egg and developing embryo are increasingly removed from direct contact with the environment. This trend is accompanied by longer gestation and prolonged parental care.

Nevertheless nature favors the fertile over the careful. The vast majority of offspring supply the food chain! The trend towards emancipation involves only an increasingly smaller range of species.

Different Ways of Dealing with Babies

Mammals, and humans in particular, have achieved a high degree of emancipation by sheltering their offspring within the mother's own body during the embryonic and fetal stages. There are a series of constraints, however, on the placental arrangement. Given the shortage of space within the maternal body, the number of young a placental mammal can bear is limited. Likewise the mechanism of birth itself means that the size of individuals is also limited. The limitations are such that mammals must continue to nourish their offspring with their own substance even after birth, namely with milk.

Among the range of mammals there are essentially two ways of dealing with these limitations. Some mammals give birth to large litters of sucklings that are still at a very early stage of their ontological development. They are typically naked and unable to maintain their own body warmth, and their sense organs are often poorly developed. Their limbs are still short and unsuited to bearing their own body weight. They are functionally immature and they require a continued substitute for the placental environment, which is provided in the form of warm, secure nests or burrows. Such offspring are known as altricial.

At the other end of the mammalian spectrum are animals which give birth to a single offspring (occasionally twins) which is at a much more advanced stage of development. Shortly after birth it is able to stand and, while it may need some protection, it is physiologically more or less a small version of its adult form. This is characteristic of many ungulates (hoofed animals) such as the wildebeest which can run with the herd within five minutes of birth, five very dangerous minutes in which it stands a high chance of falling prey to some waiting predator. Such offspring are referred to as precocial.

One group of mammals takes up a position somewhere between these two extremes. It includes the social carnivores, dogs, cats, seals and so on, that tend to give birth to medium- to small-sized litters of whelps or kittens, that though often blind, are protected by warm fur and are not hidden away underground as most rodents are, but are kept more or less in the open. This is also true of those who have less to fear because of their size and power, such as lions, elephants, rhino and other large mammals,[36] or because they belong to large packs. The young, whilst being suckled by their mothers are also often protected and played with by other adults. There is often intense tactile contact between the pups and adults through being handled, groomed and played with and this clearly helps with bonding. Animals born with their eyes open often bond through visual contact, whereas those born blind bond through scent and touch.

In summary, we can say that the degree of emancipation from outer environmental influences goes hand in hand with a prolonging of the formative stage of infancy. The earlier an animal becomes exposed to the environment, the sooner it reaches maturity. If we equate "higher" development with emancipation, then animals may be said to be "higher" by virtue of their longer developmental phase relative to other species. Wolfgang Schad recognized this principle and took its consequences a stage further in terms of evolution. He formulated the following biological principle:

> The higher evolved a creature is, the longer and more profoundly it is removed from the direct influence of the environment. The earlier an animal is exposed

[36] Animal childhood is never really safe and even lion cubs have surprisingly high mortality rates.

to such environmental pressures, the earlier it will become functionally effective and therefore the lower it will remain in evolutionary terms.[37]

The Human Child, a Paradox

Where then does the human child fit into this spectrum? At first glance, human infants (born singly, twins are relatively rare) appear to come naked and helpless into the world, at an early ontological stage of development. Yet closer examination reveals that the matter is not quite that simple. Indeed, the human being has something in common with the social predators such as the big cats or wolves in that he has relatively good control over his body warmth and is well padded with subcutaneous fat for insulation. Human infants retain the fine body hair called lanugo, which is an embryonic trait. (The fact that we have to wrap our babies up indicates that originally our natural habitat was tropical where the amount of body fat corresponds to the requirements of mean atmospheric temperatures.) Like the developed ungulate calves, foals and kids, humans are born with their sense organs functionally highly developed, indeed, the ears and eyes are already sensitive in the womb. Thus our situation is paradoxical. We seem to combine traits from the whole spectrum of mammal neonates. We are at the same time both precocial and altricial.

This paradox begins to reveal its inner order when we examine the phenomena in relation to Steiner's threefold differentiation of the human organism into a nerve-sense pole, a metabolic-limb pole and a mediating breath-blood circulation system.[38] Looked at from this point of view, the human infant is functionally least developed in its whole metabolic and limb system. With the exception of the primitive reflexes such as the sucking instinct and the powerful gripping reflex of the hand, the baby's entire movement system is undeveloped and remains so for some time. The nerve-sense system is by contrast well developed in the womb and undergoes rapid growth in the first postnatal year. Brain volume increases and in particular the cerebral cortex grows rapidly in the first year. The main neural connections are not complete until 9 months and continue to form their myelin sheathes throughout childhood. The synapses linking neurons reach a maximum in number between 9 months and 2 years and total 50% more than adults possess. Metabolic activity in the brain reaches adult levels between 9 and 10 months and goes beyond at around 4 years before declining to adult norms at puberty. The total number of synapses also declines with puberty.[39]

Though fully functional, the nerve-sense system undergoes a long process of differentiation. At first, sensory input appears to be global (Steiner frequently described the young child as "wholly sense organ"), and only progressively do the separate sense impressions crystallize out and the complex neural networks in the cortex receive their structure.

The rhythmic breath-blood circulation system becomes fully functional actually at the moment of birth when the first inspiration inflates the lungs and the closing of

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[37] Schad, W., 1982, p77, trans. MR.

[38] Steiner first described the threefold nature of the human organism in an appendix to his book *Riddles of the Soul*, which appeared in 1917. He developed the concept in *Foundations of Human Experience*, AP 1996. For a detailed bibliography of Steiner's concept of the three-fold nature of the human being see Blunt, R., 1995, Section 3.3.

[39] These details on brain maturation come from Martin, R.D., 1990, and 1992, Jones, S., et al. (eds.), *CEHE*, sections 2.13 and 3.2. as well as Jerison, H.J. and I. Jerison (eds.), 1988.

the heart-valve with the first rush of arterial blood effectively separates the two streams of arterial and venous blood. Though both breathing and circulatory systems remain unstable for some time, both systems are functional within seconds after birth.

The developmental stage human beings achieve by birth has had major consequences for our evolution and specifically for our anatomy, brain size and ability to learn.

Obstetrics

Whatever else we are, humans are primates, and it is necessary to compare human gestation and birth with other primates in order to gain some insight into the evolutionary problems that becoming human entailed. One of the chief characteristics of primates is their proportionally large brains. They therefore hold a unique position among mammals with regard to reproduction because of the special factors involved in producing such large brains. Newborn primates have larger brains in relation to body size than most other mammals, except aquatic mammals such as whales and dolphins who anyway have quite different anatomical constraints, or lack of them.

As a whole, primates give birth to small litters of well-developed offspring who are suckled for relatively long periods. These offspring tend to attain maturity late and have long life spans. Even among primates, humans hold an anomalous position in that, as observed above, infants are not wholly altricial since the brain and nervous system is immature at birth and develops in fetal fashion for about 12 months postnatally.

Having the largest brains relative to body size of all mammals, humans have had to evolve unique solutions to unique problems. Two of the most characteristic of human features, namely upright bipedalism and large brains, have been anatomically at odds with each other throughout human evolution. The structural constraints on the shape and size of the female pelvic ring, through which the child must pass at birth, brought about by the biomechanics of bipedalism, appear to have been countering the evolutionary trend to larger brains. Upright bipedalism puts constraints on the size and shape of the female pelvic ring.

There is a limit to how wide the diameter can be without putting excessive strain on the angle at which the femur necks at either side can tilt into the pelvis. This therefore limits the size of a baby's head at birth. Evolution has had to find a balance between two conflicting trends, that of upright bipedalism and larger brains. Since bipedalism came first one option was to return to some form of quadrupedalism. For quadrupeds like horses or cattle that give birth to large offspring, there is no problem since the pelvis is very wide and the uterus and vagina are parallel to the spine providing a relatively straightforward passage, which emerges just below the tail. However mankind did not follow that route, but upped the evolutionary stakes by going for the complex option of retaining both quintessential human traits.

A third significant factor in human reproduction has been a slowing down of human metabolic rates leading to a prolonging of the major life stages. I will examine this aspect below in the section below on life histories. Though some small monkeys, such as the squirrel monkey, experience, like humans, a difficult and strenuous birth, the reasons for this have to do with the relative smallness of their bodies. In all mammals brain size does not increase in exact proportion to body size, but only by 75% on average. The larger monkeys and apes do not therefore have this problem. Proportionally the squirrel monkeys' brains are larger in relation to their bodies, hence the difficulties at birth, given that primates are by nature large-brained.

Apes have the least birthing problems of all primates since the infant head has ample space passing through the pelvis. This is certainly the case for apes observed in the wild. In captivity birthing problems do arise, but these are not thought to be due to anatomical difficulties as much as to psychological problems for inexperienced mothers who have not learned from other females in the group how to cope with the problems of childbirth.

Human females are of equivalent body size to female apes and the gestation periods are also broadly similar; humans requiring 266 days, orangutans much the same, chimps 230 days and gorillas 260. Yet humans, as we know, often experience considerable obstetric difficulties. The problem is not, as one might expect, due to abnormally large brains. Human neonates have a cranial capacity relative to body size of 9.9% compared with a chimp's 9.7% Some macaques have relatively larger brains than humans at birth. The problem is that the newborn human is nearly twice as large as the ape at birth.[40] As Elaine Morgan puts it, "Compared to a chimpanzee, she (the human mother) spends 16.7% extra time producing a baby which is 92.2% larger. Somewhere along the line of evolution, human females have opted, or been compelled, or been enabled, to invest a vastly increased proportion of their physical resources in the production of each child before it is born." It is this fact, as much as bipedalism which is not unrelated, that has made humans unique.

In 1956 the zoologist Adolf Portmann wrote of humans having a "physiologically premature birth." Portmann observed that "after one year the human being reaches a developmental stage that a species of mammal of this kind should have realized at birth. If this condition was really reached according to mammalian principles, the pregnancy should last about a year longer than it actually does; it should last some 21 months."[41]

The significance of Portmann's observations were generally not recognized until Stephen Jay Gould took up the theme of heterochrony, or variable developmental rates, in his important book *Ontogeny and Phylogeny* in 1977. Portmann himself was clear that the first post-natal year was highly significant for the development of specific human qualities such as language, cognition, insight and knowledge.

Heterochrony

The term heterochrony describes developmental processes within an organism, which proceed at differential rates, some speeded up, others held back. Where a combination of precocial and altricial traits can be seen simultaneously, one speaks of heterochronous development. One particular aspect of heterochrony is the retention of immature traits well into adulthood. Humans show a number of heterochronous characteristics both in their anatomy and in their development.

We retain many childlike, even embryonic, features in our anatomy and there is a marked delaying of both sexual maturity and psychological maturation. Physical growth is slowed down and prolonged even after sexual maturity. This process is known as neoteny and is a form of the general process of paedomorphosis in which certain embryonic or juvenile traits are retained into adulthood and sexual maturity.

The mechanisms of heterochrony can have wide ranging consequences for the evolution of organisms for the basic reason that a relatively simple change at the genetic

[40] I am indebted to Elaine Morgan's recent book *The Descent of the Child*, 1994, for a summary of the facts cited here.
[41] Portmann, A., 1956, p49.

level can have major consequences if the developmental rates are altered. An important example is the exaptive consequence of a prolonging of the fetal stage. The fastest growing organ, the brain, would have more time to reach significantly larger proportions with corresponding potential increase in functional capacity.

Neoteny

The Australian anthropologist Dr. Colin Groves has examined the process of neoteny in some detail and has reviewed the evolutionary implications.[42] He has described the full range of neotenous traits in human beings. These include:

- Characteristics of the skull, such as the thin-walled brain case, small, flat face below the frontal lobes, and the centrally directed foramen magnum. The foramen magnum is the hole at the base of the skull through which the spinal chord passes. The skull articulates to the vertebral column at this point. In the embryology of all mammals, the foramen magnum begins under the skull but migrates back to a position behind the skull at birth. In humans it only does so slightly. Adult apes have a medium position between other mammals and humans in this respect. The position of the hole is functionally necessary to the position of the head. The central position in humans enables the head to balance freely on the vertebral column (and is therefore a key indicator for upright bipedalism in hominid fossils).

- Such external characteristics as the forward position of the vagina and retention of the labia majora, retention of the downy hair covering called lanugo, rather than fur, and in some human ethnic groups the loss of skin pigment, in others the retention of thick "suckling" lips and the epicanthic fold of the eye (the typical "Mongolian" eye shape).

- Prolonged growth, delayed closure of the fontanel and delayed tooth eruption, prolonged infant dependency and growth phase, and longevity.

- Large body and lengthened generation time.

Dr. Groves also includes secondary consequences of these features such as the development of the unique human chin and the shape of the nose, both due to the small size of the facial bones and jaws. In summary one could conclude, that far from being the crown of creation, compared to other mammals, humans are rather undeveloped and primitive. When we consider the various human organs, the hand, the foot, the mouth, it is obvious that humans have retained a much more primitive state (in the sense of original) if we compare them with the advanced and specialized claws, hooves, canine teeth of the other mammals.

Nevertheless, this unspecialized, original state of human morphology has been an important aspect of human evolution. Being neotenous also means being less specialized, retaining a maximum of potential, being closer to the spiritual archetype and therefore more capable of development.

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[42] Groves, C., 1989.

Space does not permit fuller discussion of Groves' reworking of the Russian evolutionist Lev Berg's theory of evolution. Berg wrote in the 1920s without the benefit of much knowledge of Mendelian genetics but came up with a critique of emerging Neo-Darwinism that is fascinating. Suffice it to say that Groves' reworking of Berg's theory provides a serious challenge to the dominant one-sidedness of current theory. Following Berg, Groves sees evolution by inner law.

> Endogenous (growing from within) genetic factors must play an enormous, until lately quite unrecognized, role in human evolution; natural selection has an obvious role to play, but I believe more and more that the evidence allows it mainly a "fine-tuning role," and that the course of evolution is determined far more by nomogenesis (evolution by law) than traditional adaptive mechanisms.[43]

As Groves demonstrates in chapters of closely analyzed examples, most of the chief characteristics of human evolution, both anatomical and behavioral, have little to do with the usual process of natural selection. Neoteny in particular and heterochronous developmental rates provided early hominids with a whole range of new evolutionary potential. I would suggest that the spiritual selection, which I have referred to, made use of those windows of opportunity. It is even conceivable that the "I" as formative principle comes to expression in the very nature of the retention of embryonic or juvenile traits. Interestingly, Groves concludes his summary of the neoteny/brain size relationship by acknowledging that the correlation works sometimes but not always. His final question is surprisingly honest about the scope of what science can not yet answer.

> This does not of course resolve the question why? There is a correlation between brain size and longevity; brain size is related to neoteny; neoteny is correlated by Gould (1977) with K-selection (small litter, intensive parental care), and this in turn is part of a package, which involves longevity and prolonged growth stages. What, then, is causing what? I think we have a glimmer of some answers, but we are far from knowing the questions to which they may respond! I wonder whether, in our present state of understanding at least, the questions and the answers may not be in some sense mutually exclusive.[44]

Other Organizational Principles?

To the question as to what is causing what, I feel we need to add the complementary question: What comes to expression through these evolutionary changes? In the web of interrelated causes and "directing forces" another dimension needs to be added posing the question: What forces of evolution are coming to meet and "interfere" with the biological changes listed above by Groves? In the dynamic simultaneity of past inheritance and future potential, what possibilities arise for new development in Steiner's sense of an inner principle of being, working to come more distinctly into expression?

Neoteny is clearly not the key to human evolution. That much is clear when one considers that none of the features associated with upright bipedalism can be directly linked to neoteny. It is part of the wider phenomenon of heterochrony, which expresses

43 Ibid., p314.
44 Ibid., p280.

itself in shifts in the pattern and timing of developmental stages, which certainly has been a feature of evolution. Neoteny is but one expression of the organizational principles that have guided human and animal morphological development.

Clearly in the trend of limbs before brains, Wolfgang Schad has shown that all the major transformations in human evolution have taken place in a heterochronous mosaic form in such a way that anatomical innovations within the locomotive system (the ability to walk upright) have always preceded those of the higher integrating central organs (the brain and nervous system).[45] That is to say, progressive developments in an emancipatory direction have always begun with the lower limbs. Mankind began its steps towards freedom literally with its feet and later its hands. The brain and central nervous system followed in these footsteps. We may be neotenous in our developmental patterns and in the shape of our heads, but we are precocious in an evolutionary sense in our limbs, and in particular our feet and legs. In evolutionary terms, we are ahead of ourselves in the limbs and held back in the development of the head. Though the opposite appears to be true in the development of the individual child, in that the limbs are still at an undeveloped stage at birth, whilst the head and senses are well developed, it is largely through the activity of the limbs that the brain is structured and experience differentiated. Conceptualizing is always preceded by limb movement; we grasp with our hands before we grasp with our minds; we relate in space before we relate conceptually.

The will nature of the human being is, according to Steiner, bound up with the metabolic and limb systems. The "I" expresses itself most strongly through the will. The essential dynamic in the metabolic and limb systems are the muscles and the blood. "What does this mean," asks Steiner in lecture 10 of the *Foundations of Human Experience* (*Study of Man*).

> Muscles and blood are the organic instruments of the will. … Hence it is arms and legs, hands and feet that are principally developed for the will. … If you want to study how the will reveals itself in the outer bodily forms in the world, you must study the arms and legs, hands and feet. If you want to study how the intelligence of the world is revealed, then you must study the head, or rather the skull, as skeleton.[46]

In another education lecture Steiner speaks graphically of the "I" having "its ground in the legs and feet."[47] Thinking and judgment originate in the unconscious will active within the limbs and then rise to conscious conceptual form in the head. It is, however, the will which "directs the course of the individual,"[48] the concept is only a reflection of the will activity. What Steiner here describes of the individual is equally true of human evolution. The spiritualized will manifested itself first in the limb system and only later through the brain and central nervous system.

[45] Schad, W., 1992, p106.
[46] Steiner, R., 1996, *Foundations of Human Experience*, p139.
[47] Steiner, R., 1996, *Waldorf Education in Adolescence*, p21.
[48] Ibid., p22.

Eternal Embryo

It was that widely read and perceptive evolutionist Steven Jay Gould who spotted the significance of a passage in T.H. White's novel *The Once and Future King*.[49] God created all the animals as embryos and called them to him and offered them whichever anatomy they desired. Each opted for a specialism, the lion for claws and sharp teeth, the deer for antlers and hoofs. The human embryo stepped up last and wished to stay as he was, offering to do his best to fashion a few humble instruments to defend himself. God congratulated him, saying, "You will look like an embryo till they bury you, but all the others will be embryos in your might. Eternally undeveloped, you will always remain potential in Our image, able to see some of Our sorrows and to feel some of Our joys. We are partly sorry for you, Man, but partly hopeful. Run along then and do your best." The story is worth retelling since neither book, Gould's nor White's, will be read too often.

Juvenilization

I have already pointed to the basic gesture of uprightness as being that of the human spirit, the "I" -gesture. The other expression of the "I" is the paedomorphic one discussed above. Another characteristic of hominid evolution has been that new species have appeared to be morphologically younger. That is to say the skeletons, in particular the skulls, have progressively had shapes typical of ontologically (the development of the individual) earlier stages of development.

Most significant of the features that point to this progressive juvenilization are the reduction in tooth size and shape and their loss of deep roots, the reduction in size of the main chewing muscles and their anchoring points on the cranium, the ballooning forehead and general roundness of the cranium, and the loss of the projecting eyebrow ridges. Furthermore, the bones of the cranium and post-cranial (below the neck) skeleton have become, in general, significantly thinner and lighter. Zoologist Jonathan Kingdon has summarized this tendency as follows,

> This lack of massive bone resembles "arrested development"; it is as though we retain a juvenile lightweight skull and skeleton. Compared to skulls of large apes or extinct types of men, our heads are decidedly childlike and this is not simply a matter of face proportions. Maturation in a Modern human transforms the adult face less completely than in an ape or extinct man, because we fail to thicken up our bones with massive ridges and buttresses of a truly robust animal.[50]

Ethnic Diversity Less in Early Childhood

Another paedomorphic aspect of human development has often been observed, namely that among present day populations humans are far less racially differentiated in early childhood than they are as adults. The similarities in size and shape are far greater before puberty than after. In the course of ontological development, the human being sexually, racially and constitutionally becomes increasingly more specialized. One can only speculate whether this has also been the case in the course of human evolution. Certainly, as we shall see later, humanity has become culturally increasingly differentiated and specialized from geographical region to region.

[49] Quoted in Gould, S.J., 1981, *The Mismeasure of Ma*n, p333.
[50] Kingdon, J., 1993, p46.

Fig 5.9 *Changing shape of Neanderthal skulls in the course of ontogeny. Top row: 18 months old with fontanel still open, from Staroselje, Crimea; 6 to 8 year old Child of La Quina, still undergoing change of teeth, from Charente, France. Middle row: 9 year old child from Teschik-Tasch, Uzbekistan; 14 to 15 year old from Le Moustier, Dordogne, France. Bottom row: adult from La Quina, France, and the Old Man of Chapelle-aux-Saints, France. This skull is from a man about 40 years old.*

Early Hominid Infants More Human in Form Than Adults

As far as is known from the fossil record, the trend in ontological development has always been from a more generalized human-like form in childhood to a more specialized and more robust form in adulthood, a trend that is particularly noticeable in present day chimps, orangutans, and gorillas where the infant skeletons are far more human-like in their general uprightness and shape than the adult ones. There are unfortunately too few specimens of each hominid species to tell whether this was always as apparent, with one exception. There have been enough Neanderthal finds of all ages to see the trend clearly.

In the group of fossils shown in Figure 5.9, the infants are clearly very Homo sapiens-like with their rounded craniums, high forehead and un-thickened brows. The progression towards the typical Neanderthal form is very marked. The adult Neanderthal is strongly prognathous (with prominent lower jaw), with massive eyebrow bones.

Though infant fossils from earlier hominid grades are very rare (and even more rarely printed in the literature), there are some indications available. The child's skull from Modjokerto in Java is an infantile Homo erectus. It, too, has a sapiens-like forehead and domed cranium. Among the habilines, the two known juvenile forms (OH 7 and OH 13) are especially sapiens-like. Likewise the Taung Child, probably a young Australopithecus africanus, shows a more vertical face and well-rounded cranium untypical of the adult forms. From the large number of fossils of the A. afarensis hominids found in the Hadar in Ethiopia, there are juvenile remains that also prove to be more sapiens-like than the adult forms.

German paleontologist O.H. Schindewolf (1972) discovered the morphic resemblance between the juvenile form of hominid species and the adult form of the succeeding grade.[51] The ontologically earlier form anticipates in general shape, rather than in detail, the phylogenetically following form: the Taung Child anticipates an erectus adult, the Modjokerto Child a Neanderthal adult, and so on. Subsequent fossil finds suggest that one could interpose a further similarity between the Taung child and the Homo habilis grade, particularly of the KNM GR 1805 type, and between the juvenile H. habilis type OH 7 and erectus.

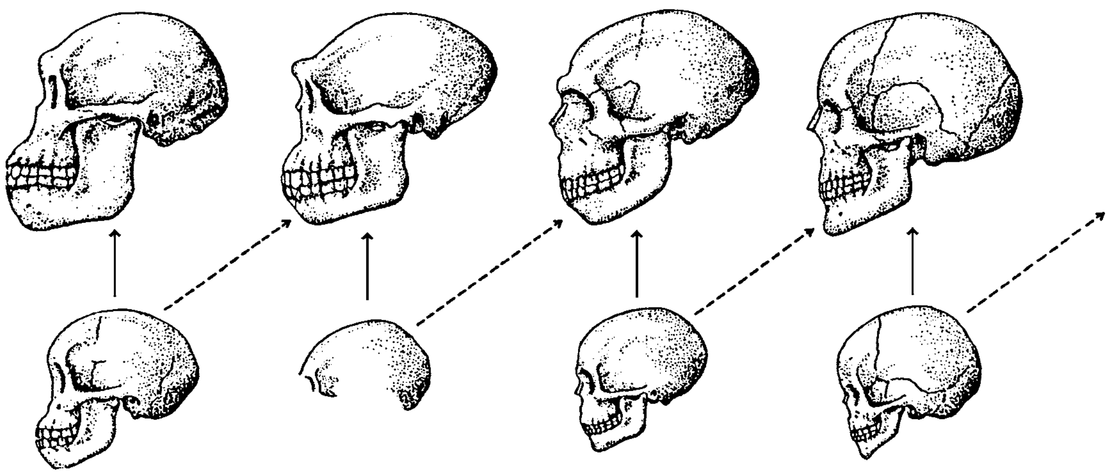

Fig 5.10 *The morphic resemblance between juvenile forms of one grade and the adult forms of subsequent hominid grades. The upper row portrays typical adult forms, the lower shows the juvenile forms of the same grades. From left to right: Australopithecus types such as africanus, erectus types, Neanderthals and Moderns (after Schindewolf quoted in Schad 1985).*

Two Contradictory Trends in Morphology

Thus we discover two trends in the morphology of the human skull. The first is within the ontogeny of the individual that changes from primitive or progressive to regressive forms, in other words, from juvenile to old; the bones themselves change their shape in the course of a lifetime. The other trend proceeds from one typological state to another, from the earliest Australopithecus to anatomically modern forms. This trend is the opposite; it progresses towards ever more juvenile forms. This trend clearly expresses

[51] See Schad, W., 1985, p124.

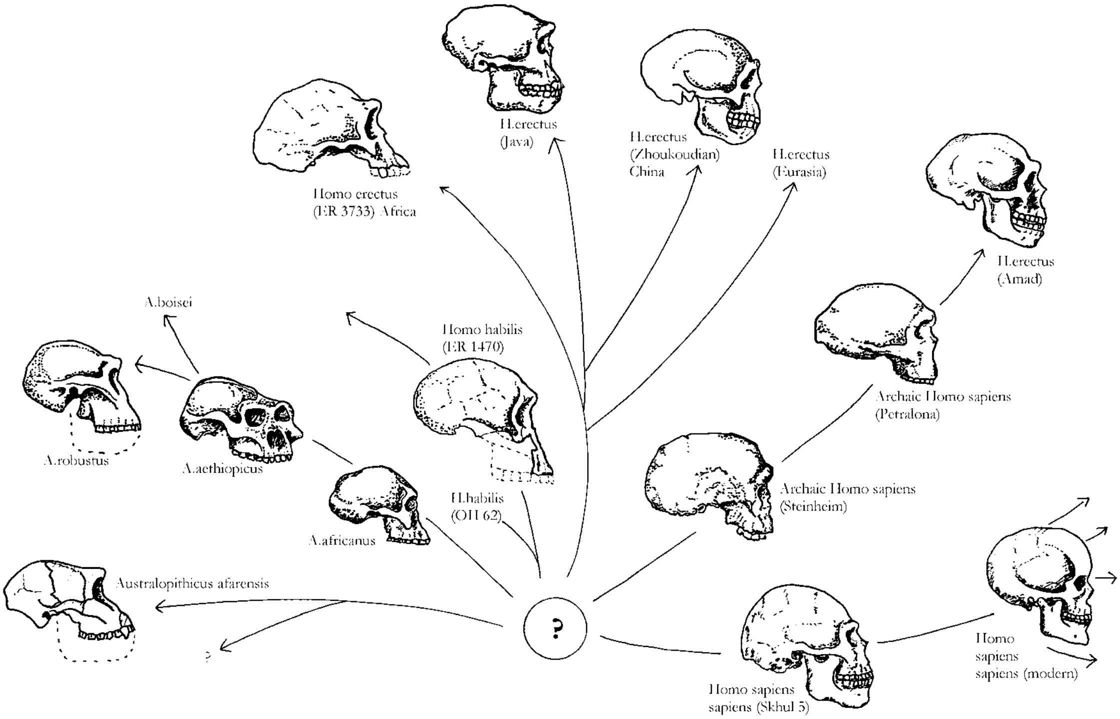

Fig. 5.11 *The motif of uprightness in hominid skulls. A range of hominid skulls from australopithecine to modern Homo, showing the increasing verticality of the skull and retention of juvenile traits. Each grade shows types which are closer to the modern human profile and others that are more robust band significantly further removed from this juvenile archetype (diagram adapted and updated from Schad, 1985).*

a change from more apelike to more human forms. Between the typological stages there is no obvious direct genetic continuity. This second discontinuous rhythm of evolution could be said to flow in the opposite direction of the first. The second trend works, as it were, out of the future and creates morphologically ever-younger forms. The first trend, that which has to do with the maturation process, clearly works out of the past and has a direct causal nature. Taking the juvenile Homo sapiens-like form as a measure, Schad transformed Schindewolf's diagram (Fig. 5.10) to show the nature of these two streams more clearly (Fig. 5.11).

As we now know, the lineage of modern humans, once thought to be at the top of the trunk of the tree of life, actually resembles a complex bush. Since all the known grades overlap with each other, the actual genetic lineage remains largely unclear. It is likely to have proceeded amongst those hominids nearest the branching points and the mechanism by which the mutations that led to new speciation occurred was most likely in that archetypal phase of ontological development, namely in the embryo. Heterochronous events in the embryonic development, probably caused at the genetic level by the retardation or acceleration of aspects of growth, led to the morphological changes. At the cultural/behavioral level, similar variation, in particular prolonging of developmental stages, enabled hominids to become human by extending the period of protection from selectionary pressure long enough for the formative forces to free themselves for higher development.

The degree of juvenilization seems to increase with the Homo erectus and the sapiens lineage, though some traits are to be found among the habilines and even paranthropines. It is however, difficult to distinguish juvenilization from sexual dimorphism, in which females tend to be smaller than males. Being smaller their anatomies are bound to be more gracile. The fact is, smaller, lighter bones, rounder skulls, and so on, are less specialized and nearer to the archetypal juvenile form, regardless of what meaning we give to this fact. Modern humans also reveal this trend even among 2-meter-plus-tall basketball players, so all neotenous features cannot merely be put down to allometric (relative growth relationships) scaling.

Taking Time

The importance of post-natal brain development in humans is vital to our ability to learn. At birth a human baby's brain is 20% of its ultimate adult weight, compared to 40% in chimpanzees. The total number of neurons in the brain, however, is reached a few weeks after birth. The increase in volume is due to the development of axons and dendrites, the forming of the synapses and the growth of myelin sheaths around the axons. At birth only the deep spinal and brainstem connections within the brain, such as motor nerves, tactile sense nerves, optical and auditory nerves, are mature. In evolutionary terms, these are assumed to be the oldest parts of the brain.

The bulk of the brain's networks, and in particular those of the cortex, develop through the child's interaction with the world. The activation and stimulation of the senses plays an important role, as does the learned motor control of the body, in particular the hands and the development of the organs of speech. The richer the fine-tuning of the neural networks through individual experience during the early stages of development, the more cognitive skills and motor abilities can develop. The more the individual can learn and relate to what he or she learns, the more that individual becomes autonomous from his or her innate preprogramming.

The physiologically premature birth and lengthy infant dependency extends the learning curve in humans decisively, a highly significant step of emancipation. The ability to go on learning and creating new neural pathways slows down but does not entirely cease throughout the whole of life. The limits on this future-orientated development have thankfully yet to be achieved.

The human solution to the large brain-bipedalism conundrum was found. Aided by one or two other anatomical peculiarities, such as the modest degree of elasticity during birth in the joint where the two pelvic bones meet at the front and the unfused cranial bones of the infant which allow, especially at the open anterior fontanel, manipulation of the baby's head during the passage of birth , the large-brained baby manages to get born. Human mothers "liberate" their babies at an early stage of maturation into a nurturing environment of human social care. This in itself produces quite new demands on mankind, which I shall address shortly.

To sum up then, we have seen that in some respects the human being is conservative in retaining many features typical of the mammal prototype and remains unspecialized. At birth the child is partly altricial and physically quite well developed. On the other hand the child is extremely unformed and therefore extremely able to learn. In fact most of its behavior and psychological abilities remain to be acquired.

The human being has, therefore, a unique combination of undeveloped and premature traits and traits that in effect become mature at birth. This heterochronous development is characteristic of the human being and is an aspect of the universality of the child. As the child grows up, the heterochronous quality of the biological development is reflected at the psychological level in a transformed way. Human consciousness is able to bring together the elements of established experience and knowledge through memory with an anticipation of the future in the form of forward planning. This ability to combine in the present the gains of the past with the potential of the future is the faculty that enables humans to not only learn but preserve what has been learned in a more permanent form than individual memory, namely through cultural tradition.

Parallel to what the genetic code transmits from generation to generation, in terms of the basic pattern of developmental phases in the unfolding of the human organism, runs the thread of human culture, borne by the individuals who recreate that knowledge each time anew in their lives.

The Real Significance of Heterochrony

Of the various aspects of heterochrony that are important to human evolution, the most important is probably that of retardation, the holding back of morphological development. In this gesture we see one of the key facets of human nature. In the retardation of various morphological features, something of our animal nature has been held back, allowing perhaps something of our humanness to emerge. This is a key feature of our uniqueness. Belgian researcher and Waldorf teacher Jos Verhulst has recently published a remarkably full account of the phenomena related to fetalization and retardation in human development in comparison with the higher animals and in particular the primates.[52] We can be deeply grateful for this marathon undertaking from someone who is neither a full-time academic nor a specialist in the field. It remains to be seen whether this book will generate more response in scientific circles than other similar works based on the Goethean approach.

Verhulst sees retardation as the basis for the greatest difference between animals and humans. He sees the retardation process as one latent in the whole and especially mammal evolution. As he sees it, the fetal form of any species is closer to the living archetype. In the human being this retention of various foetal forms (and other heterochronous traits) into adulthood, shows itself not as a random collection of vestiges but rather as the reflection of an overall principle of composition in which the various parts are integrally related to each other in mutually interrelating ways, rather than simply being the viable but random agglomeration of independently selected traits. The human form reveals the original, unspecialized, primitive form of what in the higher animals appears in specialized, one-sided forms. The architect of the human form, he suggests, is that principle of composition that creates a whole with greater potential than the sum of the parts, a principle that "reveals itself the bearer of unusual potential, such as ability of uprightness bipedalism, language and civilization, and so forth."[53]

The following diagram illustrates some of the interrelationships of human traits linked through retardation.

[52] Verhulst, J., 2003, *Developmental Dynamics in Humans and Other Primates: Discovering Evolutionary Principles through Comparative Morphology.*
[53] Ibid., Verhulst, p373.

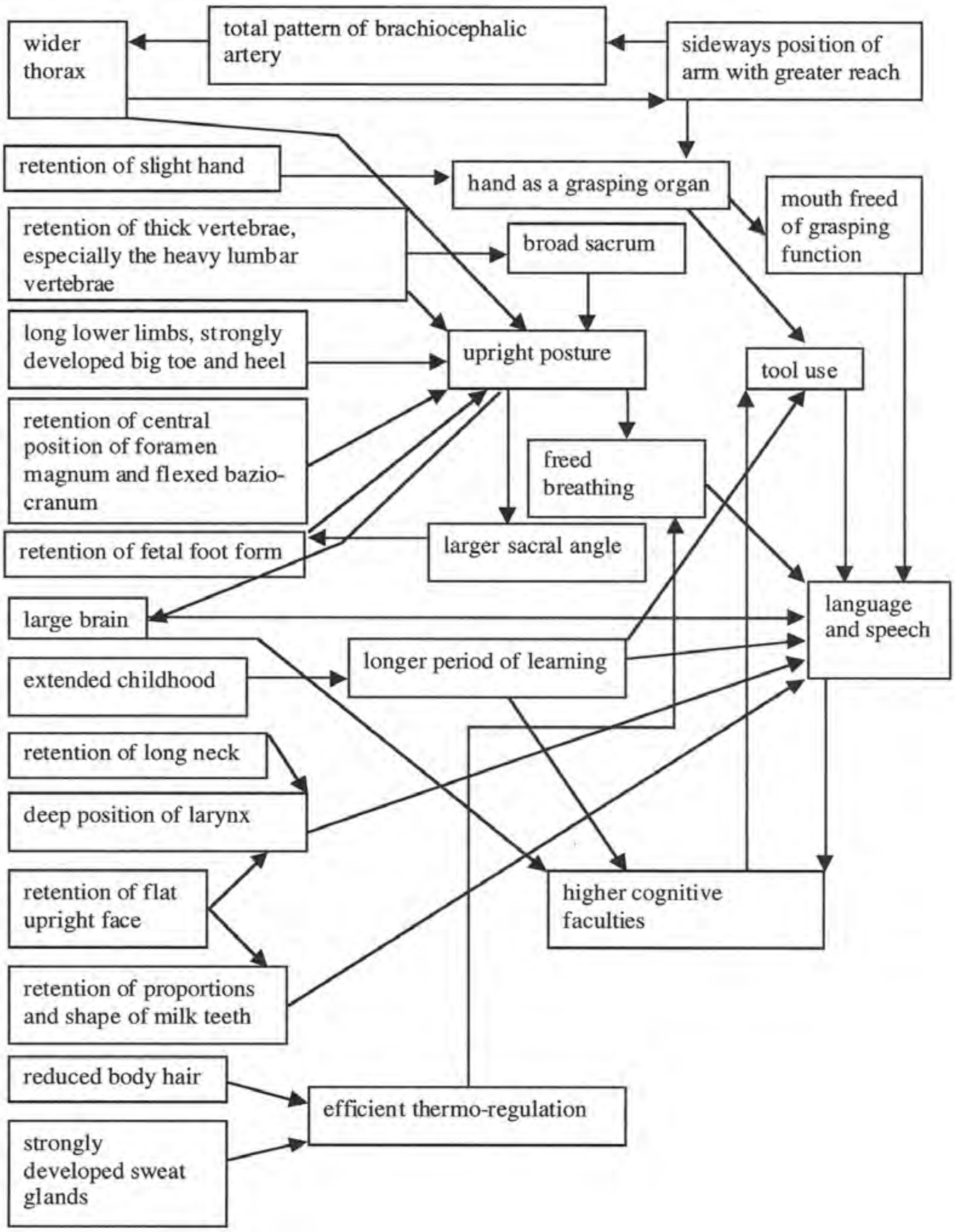

Fig 5.12 *A schematic representation of the web of effects caused by retardation in anatomical development. The concept of retardation, first formulated by the Dutch anatomist Louis Bolk, was originally conceived as involving the retention of foetal traits into adult development. Expanded the concept includes the retention of more primitive, more generalized, less specialized traits. Any organism is however, a total and complete composition. The various organs may be more or less retarded in their development, yet any organism forms a harmonious whole. Retardation of certain organs as exaptations provides opportunity for other functions to develop—a real case of the parts adding up to more than the whole. Organs with one function may acquire quite different functions. The net result for human development is considerable. This diagram demonstrates in simplified form the web of causes and effects of a range of organs retaining earlier forms. The outcome has enabled higher development, such as language and higher forms of cognition (adapted from Verhulst, 2002).*

The various retardation effects together create the possibility for what we consider the key human traits of uprightness, language, and tool use. Furthermore, this retardation tendency has a long history among the primates. We can assume it was a trait typical of the common ancestor of hominids and apes. This phenomenon has also been described by several researchers, notably Steven Jay Gould, who ascribed the causes to natural selection.[54] Verhulst concludes his book with following statement:

> The large brain and overall retarded character of the first primates can certainly not be explained by the selection process suggested by Gould (encouragement of the learning ability through extended and slower development and longer life histories than other mammals). If this were so we would expect to find the same mechanism appearing even more effectively among almost all present mammals that have much larger brains than the earlier and now extinct primates. And the extreme retardation in human beings forms only the final building block in the expression of an evolutionary principle of retardation that has progressively and forcefully prevailed in the course of evolution. Basically we can pursue the theme of retardation back before the appearance of the primates. The oldest trait of retardation among vertebrates is the form of the head and skull.
>
> The phenomenon of composition points compellingly to Bolk's (the Dutch anatomist who first fully described the principle of retardation) concept of the teleological effectiveness of "inner developmental factors" that can be seen at work in the evolution of animals. The goal of the principle of retardation that can be seen throughout primate evolution becomes visible when its reaches its end when humans appeared. Thus human speech assumes a central point around which the whole spectrum of retardation effects group themselves as a planned whole. The appearance of language in the physical realm was the goal towards which this evolutionary process strived. Through the human being the Word appeared for the first time directly in matter.[55]

I am sure this courageous conclusion will not win Verhulst any friends in the scientific community, though any who have followed the argument through nearly 400 pages will better be able to see how he arrived at it. Here we have a higher principle of potential working as a selective force through and within all the other evolutionary processes. The least one can say of Verhulst's theory is that it seeks to integrate the many anomalous features of human anatomy into an integrated account, something conventional evolutionary cannot do, except through the hold-all, catch-all explanation of natural selection.

Life Histories

Much work has been done in recent years on the comparative life histories of mammals, by which is meant the rhythms of the onset and conclusion of key developmental phases such as gestation, birth, weaning, dentition, sexual maturity and life expectancy.

Life proceeds not in measured steps, not in random bursts of activity, but rhythmically. Furthermore, it becomes apparent when comparing animal life histories

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[54] Gould, S.J., 1980, *Ever Since Darwin*, pp67–68.

[55] Verhulst, J., 1999, p379.

that animals pass through the equivalent developmental phases in differing time scales measured in conventional calendar terms. The impression one has is that "roughly speaking, large species live slowly, small species live fast lives," as Leakey and Lewin put it.[56]

To demonstrate this effect one can compare the life histories of the largest and smallest primates, the mountain gorilla and the mouse lemur, a tiny creature weighing only about 80 gms fully grown. The gorilla becomes sexually mature at about the age of 10 and lives to about the age of 40. Female mouse lemurs produce their first offspring at 9½ months and may live to become 15 years old (ancient relative to the life of mice!). The mouse lemur lives and dies and leaves offspring and their descendants, up to l0 million individuals, in the time it takes for a gorilla to mature and bear one child. Yet the hearts of both animals, gorilla and mouse lemur, would have pulsed to approximately the same number of beats in a lifetime. The little animal just lives faster. The number of offspring an animal produces is also a question of life speed. Apes and humans have slow life speeds (though it does not always seem so) and raise few offspring, but they usually do so carefully and thoroughly and the survival rate of those offspring is infinitely higher than that of baby mouse lemurs.

Life Histories of Some Primates

	Prosimian Lemur	Old World Monkey (Macaque)	Great Ape Chimpanzee	Human
Gestation (days)	144	ca. 173	ca. 235	280
Eruption of first tooth (months)	Around time of birth	Shortly after birth	3-4	6-9
Begin change of teeth (years)		1	3	6-7
Begin sexual maturity (years)	2	2 3 (male)	8-9	11-14 14-16 (male)
End of body growth (years)	3	7	11	18-21
Life expectancy (years)	14	24	30-35	70+

Fig 5.13 *Comparison of primate life histories. As can be seen, humans have considerable development even after sexual maturity. (adapted from Kipp, 1991) Recent research suggests that Homo erectus was fully grown by the age of 14 to 16. Barry Bogin of the University of Michigan explains the shorter length of erectus maturation by suggesting that they had a shorter adolescence. He suggests that extended adolescence evolved later in Homo sapiens to enable youngsters to learn the skills of parenthood and dealing with greater social complexity. Christopher Dean of University College London, studying the growth of enamel on hominid teeth, says, however, that the evidence shows that all growth phases were truncated. Erectus gained their first molars at around 4 to 4.5 years old, whereas modern humans gain them at around 6. At any rate all agree that the prolonged childhood of hominids enabled greater brain growth and learning (reported in* Nature Science Update, *December 6, 2001).*

In humans, as opposed to apes, the full extent of adult growth is held back, thus extending the phase in which most learning is done. Puberty in apes marks the arrival of adult behavior and, as has been demonstrated in captivity, a major narrowing of learning ability. In humans we see significant physiological and psychological changes continuing well after puberty up until the twenty-first year (ossification continues in the collar bones, the clavicles, well into the twenties).

[56] Leakey, R., and R. Lewin, 1992, p147.

Comparing Primate Life Histories

If we compare the life histories of various primates, we see that the phases in humans are consistently longer. We note that apes, too, have a prolonged childhood. The gesture of human development though is not only more drawn out than even the great apes, but it is characterized by a series of longish pauses in which little occurs somatically. The most distinguishing feature is the growth spurt that occurs in humans beginning at puberty.

Distinctly Human Life Phases

This bodily and behavioral plasticity of humans, stretching as it does over nearly two decades, has a great significance for the development of human faculties. A long infancy can be seen as an extension of the embryonic phase, a period in which the nervous system and brain have their most extensive growth and differentiation, without which the basis for language and cognitive skills would be inadequate. The subsequent period of childhood encompasses modest physiological growth but immense behavioral learning.

One need only think of the agility of 9½ year-old children, the enormous linguistic and conceptual achievements, the sheer range and complexity of things that children of whatever cultural background can and do learn. With puberty begins the complex process of coming to terms with an awakening inner life of thoughts and feelings and the self-awareness of moral responsibility and values, of relationships to other people and to one's own destiny, not to mention the practical and intellectual demands on young adults.

This third vital phase of development is accompanied by one of the most difficult stages in the individuation process of the human spirit. In order to enable the possibility of further development, a retardation of physiological completion is necessary. For this reason, traditional societies reserve some of their most intensive and intimate initiation rites for the time following puberty. What makes humans human is, above all, the fact that individual spiritual development and the ability to learn do not stop on reaching sexual maturity, but can continue throughout life. By and large, even the higher animals stop learning and developing with sexual maturity. This is certainly true of chimps, even those reared in captivity by scientists who have trained them to adapt to human life styles. After puberty, they are no longer able to adapt and revert to their natural and sometimes dangerous state. Elephants are among the only animals to retain the ability to learn throughout their lives, a fact perhaps curiously correlated to their continuous tooth growth. Elephants go on producing "wisdom teeth." After some six replacements, no more are produced and, unable to process food effectively, the elephant eventually starves and dies.

Life-Long Learning

In most mammals, there is a relationship between body size and life expectancy. The larger terrestrial mammals, such as deer, horse or cow, can expect to live up to 30 years. On the basis of body size, humans could expect to live up to 30–35 years. The average in western industrial societies is now over twice that. Here lies one aspect of human freedom. As Bob Dylan put it, "He not busy being born is busy dying."

In summary we can say that what characterizes the human life history is: a prolonged embryonic phase, an extended period of childhood and youth, the retention of youthful plasticity, and individual learning ability throughout a long life.[57]

[57] See Kipp, F.A., 1991.

What we know of human life histories (which of course only expresses part of what we understand by human biography) poses a number of questions regarding human evolution. If we assume that the typical life history itself has evolved, can we project those same developmental stages, and in particular their timing, onto early hominids? If the prolonging of childhood has been a key factor in human evolution, what can the analogy of modern child development tell us about the evolution of consciousness, memory and the nature of learning itself? I will address the latter aspects first, which focus on the nature of childhood itself.

Teaching Our Organs

It was Goethe who pointed out that animals are taught by their organs.[58] He extended his premise to include that humans have the further advantage of being able to teach their organs. The observation is a simple but profound one. An albatross can only fly in a certain way because that is how its wings are formed; a lion can only hunt like a lion; a beaver can only build dams, it cannot apply its engineering skills to other activities. These animals are superbly efficient at what they do, but they are clearly limited by the construction of their bodily organs to specific behavioral patterns.

Human organs are firstly, from a morphological point of view, far more primitive in their development. Compared with the fangs of carnivores or the grinding molars of ungulates, our teeth are quite undifferentiated, almost infantile. The same can be said for the human hand or foot. Many of the internal organs, such as liver, lungs, stomach and kidneys, have very simple forms at birth and only mature in the course of early childhood. Stephen Jay Gould noted the significance of this aspect for the later development of higher faculties. He wrote, "Only the morphologically unspecified among animals have not made inflexible commitments to particular modes of life that preclude this prerequisite for intelligence."[59]

The point is that, in comparison with the higher animals, humans have to go through a much longer period of training before they can become self-reliant. Most animals achieve self-reliance with a minimum of training. The young albatross has only one chance to succeed in mastering its wings. If it fails on its first flight attempt, it falls into the hungry jaws of the sharks who have gathered for the occasion. It is true that the higher animals, the big cats and apes, have to fine tune their hunting or climbing skills through play and practice, but the basic behavior pattern is predetermined.

Were human behavior to be exclusively determined by bodily functions and the restrictions of the specialization of our organs, life would be very different. Some behavior is, of course, strongly influenced by bodily needs, urges or desires. We respond to hunger, sexual attraction; we can be aggressive or defensive; hormonal changes can cause mood swings and even, in extreme cases, mental instability and personality change. Whenever our bodily functions determine our behavior, however, we become less free and, in a sense, less human. Where human behavior is dominated by un-reflective habit, instinct or bodily urges, it often takes on an anti-social, perhaps even inhuman form. In an animal such tendencies are natural and appropriate; in a human being they are only degrading. Indeed, recent research into primate behavior has given insight not so much into normal, healthy human behavior as into its more pathological and extreme forms.

[58] In a letter to W. von Humboldt, March 17, 1832.

[59] Gould, S.J., 1985, p15.

Chimps after the Fall

It is fundamental to our comprehension of ourselves to see the behavior of chimpanzees not as a model of where we have come from but of what we would become if we were to lose our humanity. I stress that what is natural and therefore free of value judgment in a chimpanzee is unnatural and regressive in a human being. The extreme promiscuity of bonobos clearly serves an important social function within their groups. Such behavior is not unknown in humans, though most societies would judge this to be abnormal in the long run, or at least uncivilized. The geographical magazine *Geo* recently published photographs of bonobo sexual behavior. That many readers found these obscene, even pornographic, does not show a high degree of prudery among *Geo* readers, but rather reveals the unease we experience at seeing behavior closely related to a lower side of ourselves. I doubt there would have been any concern over pictures of parrots mating.

Neither chimps nor any other animal possesses the "transparency" to allow the light of the spirit to shine through. The "I" is the spiritual core of being from which self-control, altruism, and conscience arise. The presence of the "I" in young children comes to the fore only gradually. For this reason children under a certain age cannot really be held responsible for their deeds. A natural sense of shame and modesty comes with self-consciousness and should not be confused with puritanical self-denial.

Transforming Imitation

We have seen how postural uprightness creates the physiological gesture of standing back, facing the world. At the psychological level this gesture expresses itself in a subject-object consciousness that is the basis for a sense of self distinct from the experience of the non-self comprising the rest of the world.

Each individual child, in mastering the physical body and in raising itself up, creates a center of self that gradually comes to self-consciousness. Naturally, this process is one of countless and overlapping transitional stages with varying degrees of consciousness. At one extreme, the experience of "self" is entirely peripheral. That means the child's consciousness is almost totally in its environment, including, no doubt, the "environment" of its own bodily processes.

At the other extreme, actually only imaginable in the adult, is one of total concentration on self. Most of our experiences consist of a rhythmical flow of focus between the inner experience, say, of our own thoughts and what is going on in the environment. We actually only momentarily "lose" ourselves in something outside of us, be it another person, a work of art, a sunset and so on. We rarely fully identify ourselves with something in our environment. The other moment in our daily lives when our consciousness "goes out" to the point where all sense of self dissolves is when we sleep.

Before the dawning of self-consciousness, the "I" is not yet bound to the brain but is active, though unconscious, in the environment. Its relationship in merging with its surroundings is basically one of unreflected openness. This openness means that the environment works deeply into the young child's organism. This includes not only the colors, sounds, shapes, and so forth, of the physical world experienced by the child, and not only the words, gestures and language of the parents, siblings and so on, but the moods and moral qualities of those people around the child. In sum, the child absorbs everything. The qualities a child takes in from his surroundings have an immediate effect, unfiltered as it were by rational thought. Its response to what it experiences acts directly on the will. Thus the fundamental relationship of the young child to the world is imitative.

The Nature of Imitation

The actual nature of this kind of imitation is no simple mirroring, but a complex process perhaps best characterized by a specific example. Let us observe a young child whilst visiting Grandma, looking out of the window. A grey squirrel is coming down from the garden fence and taking and burying hazelnuts that have been put out in a small plastic cup. The child has already learned that we have to be quite still so as not to distract the squirrel. After a while, she is absorbed in the activity going on outside on the garden patio and is not at all aware of her own position balanced on Grandma's knees. We can observe that the child's consciousness appears to be wholly with the squirrel, and even the animal's mood of nervous alertness is being experienced quite strongly over the child's whole muscle system. Even the breathing becomes irregular. Initially the child may unconsciously imitate the twitching movements of the animal, the lips may move as the squirrel sits up and nibbles at a nut, but the real process of imitation comes later when the child plays at being a squirrel and hops about the living room burying nuts under the cushions. Such is the transformative power of the imagination, that the squirrel activity is turned into human activity. That which has been observed has been turned into creative play.

Let us examine what has happened. Several vital things have occurred. The child has observed something in its environment. (She was actually led to do so in the first place by imitating the attentiveness and quiet mood of the loved adult.) In a completely non-analytical way, the child has taken in something of the essence of "squirrel-ness." Furthermore, the movements and alert concentration of the animal have been assimilated through both the sense of sight and also through the imitative response of the child's own micro-muscular movements, particularly of the larynx and chest. Thirdly, the child has transformed these experiences into her own behavior in play, behavior which does not literally copy the squirrel but which enhances or at least changes these experiences though imagination. What the child has learned from this experience is something of the essence of "squirrel-ness" or squirrel-like activity. The child has become, in some small part, squirrel or has made this new experience a part of herself. Furthermore, the experience has generated or freed creative energy in the form of play. So plastic is the human child that such impressions have the power to be transformed into both faculty and creative activity.

We can see from this example what an active two-way process perception really is in the child. The child's attention and focus of consciousness are outside herself, in the garden with the squirrel, and yet the animal's activity, its shape, its whole character, is reflected and experienced throughout the child's whole body, and not merely in the brain. Transformed, this imitative perception is translated into creative activity and remains a familiar, though unconscious, part of the fabric of memory. When the child again encounters a squirrel, it is something of a joyous reunion. At another level, the child will meet other situations, perhaps human behavior reminiscent of the mood and quality associated with "squirrelness."

Play and Wonder

From the earliest months of infancy the child reaches out to grasp the world. This phase of childhood up to the start of school is characterized by an intensity of curiosity and play and with it a metamorphosis in the quality of imitation.

Most young mammals also go through a similar phase of play and curiosity about the world around them. Among the higher mammals, this phase can last several years.

None of them, however, retains these qualities to any extent into adulthood. Humans have by far the longest period of childlike play and our curiosity in the world need never diminish, though sadly it often does. Creative play changes into experimentation and the desire for knowledge has curiosity as its basis. Both experiences give expression to the human urge to grasp and transform the world. As Stephen Jay Gould put it, "I believe that the analogy between childhood wonder and adult creativity is good biology, not metaphor."[60]

Childhood wonder is that ability of the human soul, as yet unbound by the concepts by which the adult, scientific world defines and classifies, to open itself to the world. The metamorphosis of wonder is not only the basis for adult creativity, it is the basis for respect and responsibility. The nature of wonder has been beautifully described by Edward O. Wilson. In his autobiography *Naturalist* he describes some of the childhood experiences that led him to study biology. Interestingly, he makes the link between the development of the human being and the course of human evolution.[61]

> Why do I tell you this little boy's story of Medusas, rays, and imagined sea monsters, sixty years after the fact? Because it illustrates, I think, how a naturalist is created. A child comes to the edge of deep water with a mind prepared for wonder. He is like a primitive adult long ago, an acquisitive early Homo arriving at the shore of Lake Malawi, say, or the Mozambique Channel. The experience must have been repeated countless times over thousands of generations, and it was richly rewarded. The sea, the lakes, and the broad rivers served as sources of food and barriers against enemies. They were impervious; it seemed, to change of any kind. The water land was always there, timeless, invulnerable, mostly beyond reach, and inexhaustible. The child is ready to grasp this archetype, to experience and learn, but he has few words to describe his guiding emotions. Instead he is given a compelling image that will serve in later life as a talisman, transmitting a powerful energy that directs the growth of experience and knowledge. He will add complicated details and context from his culture, as he grows older. But the core image stays intact.

As David Brierley so aptly put it, "wonder is expectancy of fulfilment."[62] Wonder assumes that there is meaning in the world. It is the human spirit, the "I," which metamorphoses the impulse to have into the need to know, both to apprehend and to comprehend. Imitation that transforms into learning is the means to knowledge and it is in the transformed power of imitation that human creativity lies. Imitation is a quintessential human characteristic. It underpins our evolution as much as uprightness and large brains. The inner response to the world, we call wonder, has been equally important as a basis for curiosity and exploration. Wonder is an expression of the human "I," recognizing being in the other.

[60] Gould, S.J., 1985, p65.

[61] Wilson, E.O., 1995, "Naturalist," here quoted from an extract printed in the *Independent*, August 26, 1995.

[62] Brierley, D., 1999, *In the Sea of Life Enisled*, p61.

Chapter 6

Working Man

Making fossil discoveries is without doubt the most high profile aspect of paleoanthropology. Being in the right place at the right time certainly helps, but recognizing the signs is even more important. This has happened at several highly significant moments in the search for human origins. On one occasion, a young professor of anatomy at the brand new University of Witwatersrand in Johannesburg, Raymond Dart, newly arrived to take up his post, discovered that his department had practically no skeletal remains, the bricks and mortar of his trade, as it were. He instituted a competition among his students to bring in the most unusual finds. One of those students, the only woman as it happens, recalled seeing a curious fossil on the mantel shelf in the manager's office at the nearby limestone quarry at Taung. Dart requested that he be sent any interesting looking fossils from the quarry.

When the first crate arrived, Dart opened it to find one of the most remarkable fossil skulls ever found, that of an A. africanus child with part of the fossilized brain still intact. More significant was the fact that Dart had trained with Grafton Elliot Smith, one of the pioneers in the field of human evolution, and was thus able to recognize the significance and humanness of his fossil, noticing the differently shaped teeth, brain and, above all, indications of uprightness.

The Taung Child, as the fossil is known, is one of the most evocative of our hominid relics, not least because of the partially preserved brain but also because of the small child's face with its second teeth just coming through. It is now thought that marks on the brain are the wounds left by the talons of a large bird of prey that may have snatched the child to its death. It took many years for the establishment to accept his find, but Dart was eventually vindicated.

Java Man

A generation or so before Dart identified the Tuang Child, another important discovery was found, just as fortuitously. As a young and ambitious anatomist, Eugene Dubois sailed off to the Dutch East Indies in 1889 in search of fossil evidence for human origins. Like his scientific hero Ernst Haeckel, he believed that the gibbon was the closest of the great apes to humans. He recognized, as had Darwin's great contemporary, the evolutionist Alfred Russell Wallace, before him, that the stable nature of the tropical environment would be a suitable place to look for the remains of an ape who had lost its fur. He went first to the island of Sumatra but shortly afterwards moved to Java. He instructed Dutch mining engineers working in the Trinil district to send him any likely-looking fossils. Remarkably, this search for a needle in a gigantic haystack paid off. A newspaper headline along the lines of "Man travels to Java to find missing link, succeeds" would have been apt. Fossil hunters today with vastly more knowledge and technical abilities can search for years and find nothing significant.

In 1891–1892 workmen uncovered two important fossils in sand deposited on the bank of the Solo river at Trinil in Java. The first was a skullcap, which appeared to somewhat resemble a human cranium in length and width, whilst being reminiscent of an ape with a flat forehead and thick bars over the eye sockets. A year later a thighbone (femur) was found some 400 meters from the original site. (Some teeth were also found but these have subsequently been identified as belonging to an orangutan) Apart from having a pathological growth on the upper part of the shaft, which Dubois correctly recognized as having been caused by injury, the femur was remarkable. It was nothing like an ape's. Dubois wrote,

> This being was in no way equipped to climb trees. On the contrary, it was obvious from the entire construction of the femur that this bone fulfilled the same mechanical role as in the human body. One can say with absolute certainty that Anthropithecus of Java stood upright and moved like a human.[1]

Dubois originally named the fossil species Anthropithecus erectus (upright man-ape) because of this determining characteristic. Haeckel posited a theoretical missing link between apes and humans and named it Pithecanthropus alalus (a somewhat contrived term implying ape-man with inarticulate speech). Dubois was convinced that his fossils belonged to a being more human than ape, not only on the basis of the femur but on his calculations of the brain volume. He estimated that the cranial capacity of the skull cap (Trinil 2) at around 1000 cc. Chimps have an average of 410 cc, and modern humans average between 1300 and 1000 cc. What puzzled him was the combination of traits. The skull was ape like, the brain capacity approached human size and the fact of bipedalism seemed fully human. He later revised his opinion and went for the compromise name of Pithecanthropus erectus (upright ape-man), probably in deference to the influential Haeckel. Ironically we now know that the femur could not have belonged to the same individual as the skull cap, being actually several thousand years younger, but Dubois came to the right conclusions that they belonged typologically together, even on the basis of wrong information.

Dubois' perceptive interpretation was not to be accepted by paleontologists for many decades. No one accepted bipedalism in such primitive forms for a very long time to come. The species Dubois identified is now included in the form spectrum of Homo erectus.[2]

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[1] Quoted in Trinkaus, E. and P. Shipman, 1993, p139.

[2] The history of changing attitudes to pre-history and human origins as well as accounts of the famous discoveries can be found in Erik Trinkaus and Pat Shipman, 1993, *The Neanderthals*; John Reader, 1988, *Missing Links;* and Roger Lewin, 1987, *Bones of Contention*.

Fig 6.1 *The Trinil thighbone (right) compared with a modern femur. Note the similarity of shape and angle, indicating that the species walked with an upright posture much as modern human do. The femur shows a pathological growth, probably due to an injury in life (photo by the author from casts).*

Homo Erectus

Erectus people were generally very similar in body proportions to modern humans and they were significantly larger than habilis, though the ratio of brain size to body size remains similar. There was considerable form variation among erectus, both in time and in space. The early stages are the subject of some dispute as to whether there was more than one species. Some specimens found around Lake Turkana such as KNM ER 3733 and 3883[3] appear to belong to a separate but equivalent grade known as Homo ergaster, "action or working man."[4] The name was coined by Colin Groves, whose work on heterochrony we have already discussed.

Some researchers see these earlier African specimens as belonging to H. ergaster and the Asian fossils as belonging to a different species H. erectus.[5] Later African specimens, which more closely resemble the Asian erectus, may in fact be descendants that migrated back into Africa. It is probably most helpful to think of H. ergaster as the precursor of H. erectus. For the sake of clarity I refer to all fossils in the traditional erectus spectrum simply as erectus and leave the complexities of taxonomy to the experts.

By far the most complete fossil found of early erectus is the Nariokotome boy (KNM WT 15000) found at West Turkana in Kenya, in hundreds of fragments amongst the roots of a thorn tree. The tree had seeded in the skull and ultimately grown out

[3] These numbers are museum catalogues, e.g., Kenya National Museum, East Rudolf fossil number 3733.

[4] Tattersall, I., 1997, "Out of Africa Again … and Again?," in *Scientific American*, Vol. 276, No. 4, April 1997, p46. See also, Bilsborough, 1992, pp125–133.

[5] Tattersall, I. and J. Schwartz, 2000, *Extinct Humans*, Chapter 6.

and through its human plant pot, shattering the fossil into many small fragments. After painstaking reconstruction by Alan Walker and Maeve Leakey, the skeleton gives a remarkable image of an erectus boy who died between the ages of 11 and 12.

Typically, erectus had a fairly flat brow and forehead with large bony ridges about the eye-sockets. The upper back of the skull was generally rounder than in Homo habilis, through the lower back of the skull was often formed by an abrupt angle inwards giving the skull a pointed shape in profile. Distinctive of the face shape was a prognathous lower jaw with a chin sloping sharply back towards the throat.

Erectus brain size varied (based on endocasts and calculations from known fossils) from 870 ccs (Sangiran, Java) to 1400 ccs (Verteszællos, Hungary). Only in the sequence of fossils from Zhou-Kou-Tien (Peking Man) is there any evidence of an actual increase in brain size over time, and that is slight. Brain shape, which is more relevant than size to cognitive faculties, does show significant changes.

The recent discovery of an erectus fossil about 1 million years old in Ethiopia has been claimed as evidence that there is in fact only one erectus species (reported in *Nature Science Update*, March 20, 2002). The specimen, an almost complete skull minus the lower part of the face, shares characteristics of both African and Asian forms. It opens the possibility that skull shape within a species may vary according to factors other than geographical location. Once more a fossil discovery comes along and complicates the existing carefully constructed theories. Whether one or two species within the erectus spectrum, the picture can only get more complex.

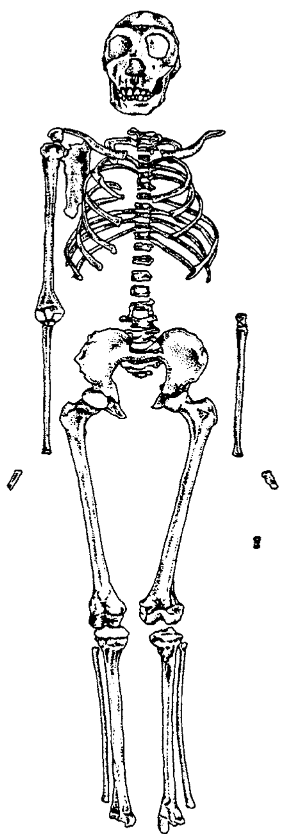

Fig 6.2 *The Nariokotome Boy, KNM-WT. 15000. This partial skeleton, reconstructed from hundreds of fragments, is the remains of an immature African erectus, who probably died before he reached his full adult height (from Shipman and Walker, 1996). The Nariokotome Boy was estimated to have been about 164cm tall and weighed about 55kg.*[6] *He was not fully grown and although estimates vary on how much more he would have grown (it is not totally clear if erectus had the same developmental pattern as modern humans), as a grown man he would probably have stood 6′ 1″ tall and been powerfully built. His physique is in fact not dissimilar to that of people living in the area today. Close examination of the skeleton reveals some minor but interesting differences from modern human anatomy, such as the more bell-shaped rib cage, as opposed to the typically barrel shape of modern chests. This observation reinforces the view that we became progressively human from the lower limbs upwards. The proportions of both arms and legs are more or less identical to our own. It also suggests that the breathing apparatus was perhaps not yet fully opened to allow the breath control necessary for full human speech.*

[6] Walker, A. and R.E. Leakey, *The Nariokotome Homo Erectus Skeleton*, 1993.

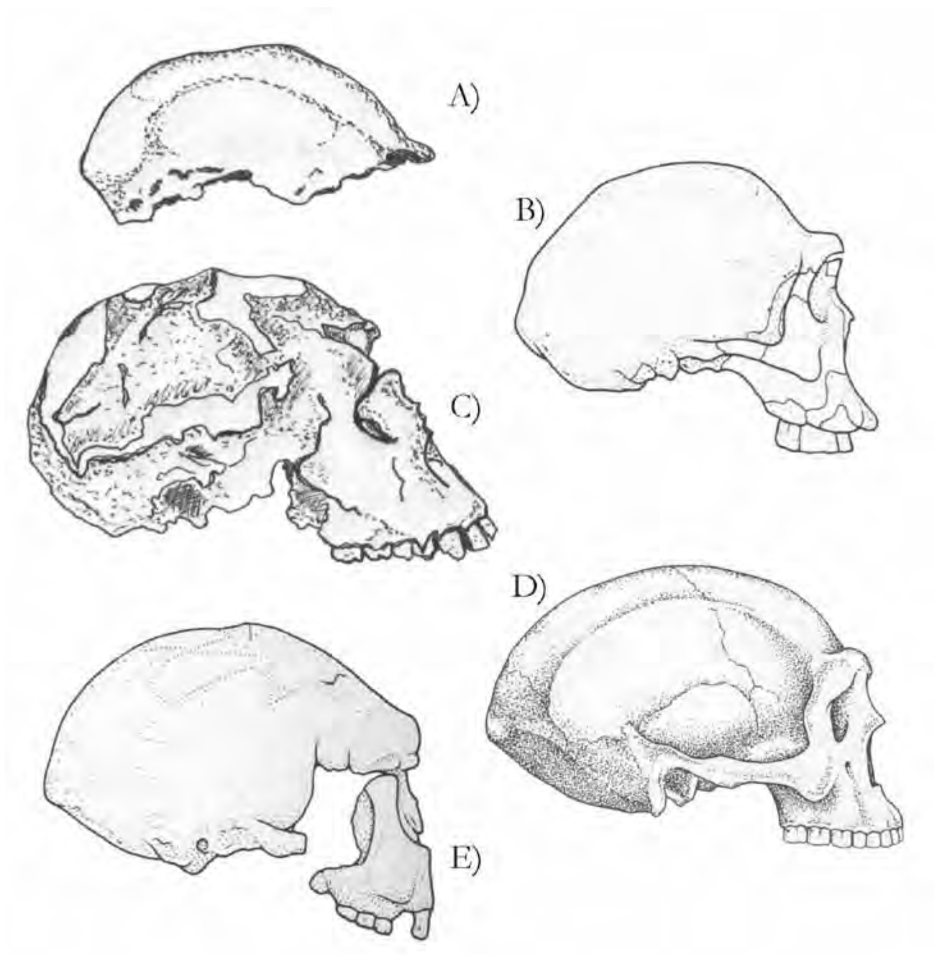

Fig 6.3 *These fossils skulls have all been identified as Homo erectus at some point. A) shows the type specimen, the original skull cap found by Dubois' workmen B) KNM-ER 3733 from the Turkana region of Kenya C) the Nariokotome Boy D) Choukoutieu (earlier known as Peking Man), from a cast of a now lost specimen E) Sangiran 17, from Java in Indonesia. The African erectus specimens have now generally been assigned to a new species Homo ergaster, whilst only the Eurasian specimens are considered to be H. erectus. H. erectus looks increasingly like a species descended of an original H. ergaster population that emigrated out of Africa around 2 myo.*

The recent discovery of an erectus fossil about 1 million years old in Ethiopia has been claimed as evidence that there is in fact only one erectus species (reported in Nature Science Update*, March 20, 2002). The specimen, an almost complete skull, minus the lower part of the face, shares characteristics of both African and Asian forms. It opens the possibility that skull shape within a species may vary according to factors other than geographical location. Once more a fossil discovery comes along and complicates the existing carefully constructed theories. Whether one or two species within the erectus spectrum, the picture can only get more complex.*

Conquering the Old World

Homo erectus was certainly highly successful as a species. They retained their characteristic life-style for well over one and a half million years and they peopled large areas of Africa, Eurasia, India, Southeast Asia and China, albeit never in large numbers. Only the far north and the higher mountain ranges were not, as far as we know, inhabited by them.

Until recently it had been assumed that erectus had evolved in the African Rift system and sometime after that migrated out of Africa into the Near East and from there into Southeast Asia, later moving on into China and Europe around half a million years ago. Several new discoveries and new dates for older fossils have radically questioned these assumptions.

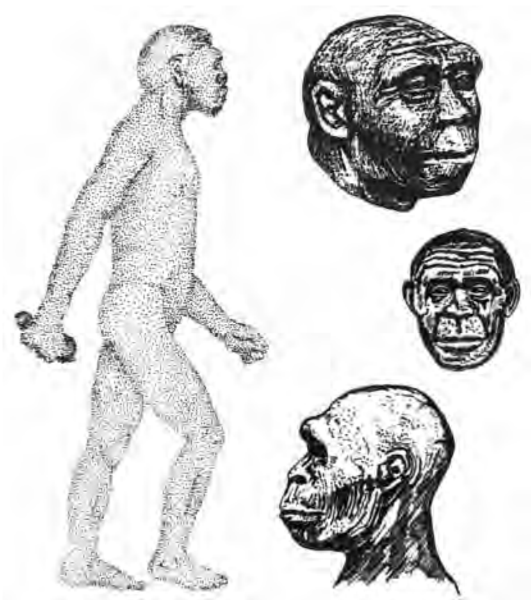

Fig 6.4 *Some reconstructions showing how erectus/ergaster people may have looked (after Kingdon 1993).*

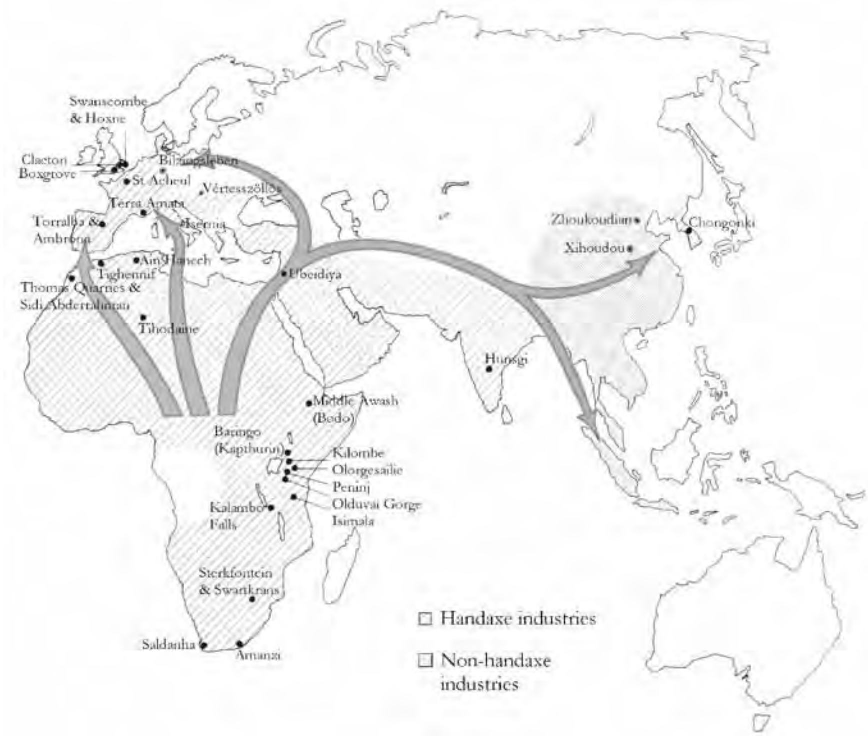

Fig 6.5 *Map showing the distribution of known erectus/ergaster sites, with arrows showing the possible routes taken by migrations of African erectus grade peoples.*

New Dates for Out of Africa

In 1989 a mandible (jawbone) thought to be of erectus-type was found with pre-Acheulean tools (Acheulean being the type usually associated with erectus) at Dmanisi in Georgia in the Caucasus.[7] This has now been dated at between 117mya and 118 mya. This find has been followed up with the publication of the discovery of two skulls at the same site, dated at 1.7 mya.[8] Recently,[9] new dates have been calibrated for two of the erectus skulls from Java, the Mojokerto child's cranium at 1.8 my. and the Sangiran cranium at 114 my. These dates are for the material in which the fossils were originally found. Though the possibility of later intrusion into older geological strata cannot be ruled out, this new data cannot be ignored, especially since Carl Swisher, who made the tests is one of the most respected geochronologists in the world.

Adding to the balance of evidence supporting such early dates are lithic assemblages of a type associated with erectus in other areas. British scientists Robin Dennell and Helen Rendell gave dates of up to 2 mya for hand axes found in Pakistan.[10] Dates of 114–116 mya have been given for tools found at Ubeidiya in the Jordan Valley (Doron Braun of the Geological Survey of Israel has even suggested 2 mya[11]). A firm date of 114 mya has been given for Acheulean artifacts at Konso-Gardula[12] in the southern Main Ethiopian Rift. All this evidence suggests an initial "Out of Africa" migration by Homo erectus well before 115 mya. This poses several fundamental questions for paleoanthropology. Did some erectus migrate out of Africa before the development of the hand-axe Acheulean culture? This might account for the absence of such tools associated with erectus fossils in South-East Asia.

However, several workers have explained this as being due to a lack of suitable stone in a rain forest environment, and argue that early humans developed tools using local bamboo, which can be just as sharp as flint if cut properly, but biodegrades and does not fossilize.[13] However, as stated above, the stone tools found associated with the Dmanisi site in Georgia are pre-Acheulean and are similar to those known as Olduwan. This makes it seem that some erectus (in this case probably H. ergaster) migrated out of Africa before the Acheulean culture evolved.

As it happens the Dmanisi fossils show that erectus at this stage was large bodied (in relation to earlier hominids) but with relatively small brains for their size. They were twice as tall and three times as heavy as any known australopithecines and had much longer legs. This suggests that it was anatomy rather the development of any new technology that permitted the exodus of Homo from Africa into Levant and Eurasia. Having such larger bodies, the Dmanisi hominids and their kin required a higher protein diet than the australopithecines. This probably meant greater consumption of meat. With such long legs, these hominids were well equipped to range far and wide in search of it.[14]

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[7] Dzapaidze, V., 1989, *Jahrbuch Rüm*, German Museum Mainz, pp67–116.

[8] Reported in *Science* Vol. 288, May 2000, p948 and p1019.

[9] Lewin, R., "Damburst of Humans Flooded from Africa," in *New Scientist*, March 5, 1994.

[10] Report in the *London Times,* May 17, 1994 by Norman Hammond.

[11] Ibid.

[12] Berhane, Asfaw, et al., 1992, "The Earliest Acheulean from Konso Gardula," in *Nature* Vol. 360 24/31 December 1992.

[13] Fagan, B.M., 1991, Chapter 9.

[14] See report, "Global Positioning" by Kate Wong, *Scientific American*, August 2000, p14.

On the other hand, a number of scientists, notably from Australia, Japan and China, have long argued for a separate origin of the Asian erectus peoples.[15] These theories have not found much support and must be, for the present, considered unlikely. Until clearly proven otherwise, it would seem that, like all other hominid species, Homo erectus evolved in Africa.

A spate of recent discoveries[16] in England, Spain and Italy of erectus-related fossils has opened yet another chapter in the saga of early hominid expansion. A hominid tibia (shinbone) and teeth at Boxgrove in southern England with associated stone artifacts dated to around 0.5 mya, slightly older than the famous mandible from Mauer near Heidelberg, Germany, was briefly claimed to be the oldest known hominid in Europe. This claim was soon superseded by new discoveries in northern Spain in the Sierra de Atapuerca where hominid fossils have been dated at around 0.8 mya. Two years earlier in 1994 a hominid skullcap had been found at Ceprano, south of Rome, which dated to 0.9 mya. There are even new claims from the south of Spain for stone tools dating to 1.2 mya. The colonization of Europe has thus been pushed back way beyond the 500,000 year mark that until recently was regarded as the earliest date for their arrival.

Why Did It Take So Long to Find Europe?

It has long been puzzled why Western Europe took so long to be colonized when Homo erectus was in the Near East 2 mya, and 117 mya in Georgia. What kept erectus out of Europe for so long? The colder climate was perhaps one reason, given that erectus originated in the Tropics. The fact, however, that the cycles of major ice ages began around 0.9 mya in Europe, which approximates the dates of known erectus presence, rather nullifies the climate as a limiting factor. It may have been that competition from large powerful carnivores such as sabre-tooth cats, hyenas and dogs kept hominid populations fairly marginal until organization, weaponry and control of fire tipped the scales in favor of early humans.

A further complicating factor in establishing the lineage of early Europeans is that the fossil material suggests that there were several species of hominids in Europe. As we shall discuss later, our recent evolutionary history saw two species in Europe, the Neanderthals and anatomically modern people. The ancestry of these species is being hotly debated. At any rate, the Ceprano fossil appears to have a closer resemblance to contemporary Homo erectus forms in North Africa, than to the later fossils such as Mauer, Arago or Steinheim, which are usually grouped together as archaic Homo sapiens or Homo heidelbergensis. I shall discuss the intricacies of these arguments below. For the moment it is useful to view the early colonizers of Europe as belonging to the erectus spectrum even if it turns out that the European version is not in the end actually classified as erectus. This does not explain how erectus populated such regions as Western Europe. Did they move up from the Middle East or cross the Mediterranean at the Straits of Gibraltar or island hopp from Tunisia via Malta, Sicily to Italy? This is not at present known, though either or all three options are possible.

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15 Wolpoff, M.H., Wu Xinzhi and A. Thorne, 1984; and Thorne, A. and M.H. Wolpoff, "The Multiregional Evolution of Humans," in *Scientific American*, May 1992.

16 Roberts, M.B., 1994, "A Hominid Tibia from Middle Pleistocene Sediments at Boxgrove," in *Nature* Vol. 369, May 26, 1994. See also *National Geographic* Vol. 192, No. 1, July 1997 for an overview of current research.

Whatever the dates or the route, the fact remains that early humans were clearly equipped with the faculties to enable them to adapt to such varied environments. They were physically big and powerful compared to earlier hominids (or indeed many moderns). We can put together what we know of their habits and way of life and correlate this with what we know of conditions during the Lower and Middle Pleistocene (circa 1.5–0.2 mya) to form a rough picture of erectus' conquest of large parts of the Old World.

Inadvertent Migration?

We need not imagine any dramatic journeys into the unknown, heroic treks into the interior or indeed any intentional wanderings to account for such migrations. A population moving on average one mile a year would make the journey from Ethiopia to Java in "only" 8,000 years! Given that erectus was around for 115 million years, an imperceptible rate of progress of even one mile per generation would have time to get there and back several times. Within such time scale both local and macro-climatic or tectonic events could have occurred, such as major changes in sea level and mean average temperatures, though even 115 million years makes little difference in terms of continental drift.

Early humans, judging by their anatomy, were capable of walking and probably running long distances. Their powerful legs and big lungs (or at least rib cages) testify to that. We may imagine a mobile people, hunting small animals, foraging for fruit and edible plant matter and scavenging meat opportunistically. Daily wanderings within their range were probably quite extensive. They may have used temporary camps at locations of plentiful food but they were essentially on the move, following a fluctuating range of food resources in a wide and mostly open environment. The changing seasons and the ebb and flow of natural resources, the cycle of harvests, both plant and animal, dispersed them both in terms of time and space.

Keen Observers

We can be sure that early humans had alert powers of observation; their lives depended on it. Though they were certainly bigger and stronger than the habilines or Australopithecines before them, and therefore more in a position to assert themselves offensively and protect themselves defensively, the savannah was still a dangerous place. Keeping out of the way of big cats and other large animals was one reason to be alert, but finding food was probably more important. Having larger bodies, larger brains, and children helpless for many years, all made heavy demands on a rich and varied food supply. Whilst plant foods continue to be an important part of the diet, early humans also needed protein-rich meat. Some was hunted, but much of was probably craftily scavenged if not actually stolen from big cats and other predators.

Observing the habits of animals was vital. The big cats often abandon kills when they are gorged, with considerable meat and, in particular, energy-rich bone marrow still to be scavenged. If humans could find these carcasses quickly and before other scavengers, a good meal was to be had. Whilst a group of stick-wielding humans could probably chase off jackals or wild dogs, hyenas were a more serious risk. Getting there first and getting at the most nutritious parts quickly and efficiently was vital. That meant watching out at dawn for the flights of the vultures, who can spot a carcass at 50 km. It meant listening for the sounds of hunting lions or the frightened cries of a wildebeest isolated from the herd and then being ready to move in as soon as it was safe.

Good Tools

Having sharp tools capable of dissecting the carcass in seconds, dividing it up into portable portions was a major advantage. Hacking through even thick tendons and sinews was possible using the tools we know erectus used. Later the brain cases and limb bones could be cracked and the fresh, rich, marrow and brain extracted. Such activities required not only good observation but also foresight, co-ordination within the group, good effective communication and an ability to learn from experience. These are all human traits. The later erectus people, or their close relatives such as those at Boxgrove, were demonstrating far more than mere animal scavenging skills.

Real Hunters

Fossil evidence shows that early humans were tackling large, healthy, highly dangerous animals, such as rhinoceroses, large deer, horses, and hippopotamuses. It is clear that these were not merely opportunistic discoveries of carcasses left by other predators or died of natural causes. These animals were hunted and killed at close quarters. The cut marks left on the bones by the butchering are overlaid with the gnaw marks of scavengers' teeth, which means the humans were there first to get the best meat. What is more these butchery sites were the scenes of complex tool-making and sharpening, of precise butchery (it is possible at Boxgrove to reconstruct the careful slicing of prime rump steak from the cut marks on the spine). This speaks of a confident group able to take their time without fear of other predators, as early hominids must have been, anxiously looking over their shoulders, grabbing what they could and getting out of the danger zone that a large carcass always becomes. All this means complex group communication, efficient division of labor as well as courage and strength, clear evidence of both brain and brawn.

Being familiar with the terrain and knowing quite large geographical areas and the plant, animal, material and fresh water resources within range would also have been necessary. Remembering where particular stands of fruit trees could be found and when they were ripe, or where succulent tubers could be found, belonged also to their skills.

The Saharan Pump Theory

If we imagine groups of Homo erectus ranging out into the savannah, always looking for new resources, we can see the basic gesture of expansion. If these roamings were "directed" by climatic or tectonic changes, shifting balances in the ecosystem, the end result could seem like migrations. One model has been created based on paleoclimatic studies on the changing nature of the Sahara. It is known that the Sahara region has been periodically temperate and well-watered, providing an environment for a wide range of plants and animals. At other times it has been more like its present state, hot and arid. During cooler, moister periods there would have been a northward expansion of animals typical of Eastern Africa, particularly up the Rift Valley.

It is likely that Homo erectus, as part of the ecological unity of herbivores, carnivores and scavengers, would have moved with them. When drier conditions returned, the fauna and flora would have retreated steadily back to the periphery, radially in all suitable directions. In this way the Sahara would have functioned over millennia like a gigantic organic pump drawing in groups of animals from the surrounding regions, bringing about intensive interaction. These can be identified as periods of active speciation as species rapidly adapted to new environments and "jostled" for niches. Then later in drier cycles, groups would have been driven out again, and in particular northwards towards the North African regions, into the Iberian Peninsula, into Europe and along the corridor of the Nile into the Middle East.

Climate Change

Over the last decade many attempts have been made to correlate climate change with new speciations or migrations.[17] It has become clear that around 216 mya the world climate became cyclical, with ice ages interspersed with interglacials. Such changes were often accompanied by significant speciation events. Though the correlation between cause and effect is far from straightforward, some key periods have been identified.

The cooling which began around 216 mya did see, among many other mammal speciations, the arrival of several new hominid species including Homo (Homo rudolfensis and later Homo habilis). Another significant change occurred around 116 mya, this time with evidence of major geological upheaval in the African Rift system.[18] Geologists have recently discovered evidence of major faulting and major volcanic activity in the Kenyan Rift. This may have led to environmental and climate changes, animal migrations and new speciations, including the migrations of Homo erectus.

It is known that during the subsequent millennia many new species of the larger herbivores appeared including gazelles, antelope and bovines. Many such animals had wandered into Europe by about 110 mya including hippos, forest elephants, lions and hyenas. Whilst it will be difficult to prove the causal relationship, the close link between environmental conditions and the evolution of animals including hominids seems certain. Rather than seeking simplistic correlations we can see these periods of dramatic upheaval (remembering, of course, that we are using the concept in the relative terms of geological time scales) as providing the opportunity for human tendencies to take advantage of new situations.

Countless local and individual factors would have influenced the trend to moving on. Viewed from our distant perspective, the result appears purposeful. Having the skills to adapt was important, but equally important was the urge to respond to human curiosity. Animals tend to cling to their niches. Homo erectus people, judged by our standards, were amazingly conservative and stable in the life strategies, and yet they had the will to respond to a challenge and were curious enough to take the risk of seeing "what is over there." The horizon has always beckoned and as Bruce Chatwin so passionately believed, it is human to wander, to roam, to follow visible and sometimes invisible paths.

This human tendency is indisputably a part of us. In a very real sense we all lived as Homo erectus and in the depths of our being, their world provided some of the substrata of our collective psyche. Just as the early stages of childhood leave an indelible impression on our lives, though we can recall little of it, so the erectus stage of mankind provided a substantial part of the warp on which our humanity is woven. Based on this tentative insight we have into this realm of our soul, we may begin to form some picture of how Homo erectus related to their world, what their soul faculties were and what kind of consciousness they enjoyed, and, no doubt, also suffered.

[17] See Roberts, N., 1992, "Climate Change in the Past," in *CEHE*, section 5.2.
[18] Maslin, M., "Rift Where Humans Began," in *New Scientist* Vol. 142, June 4, 1994.

The Arrival of the Midwife

From the anatomy of known Homo erectus specimens, the most complete of which is the Nariokotome Boy, it is clear that they were tall, long-limbed and narrow-hipped. One of the major limitations imposed by the mechanics of upright bipedal walking is the maximum width of the pelvis and in particular the sacrum. Being upright restricts the width of the birth canal.[19]

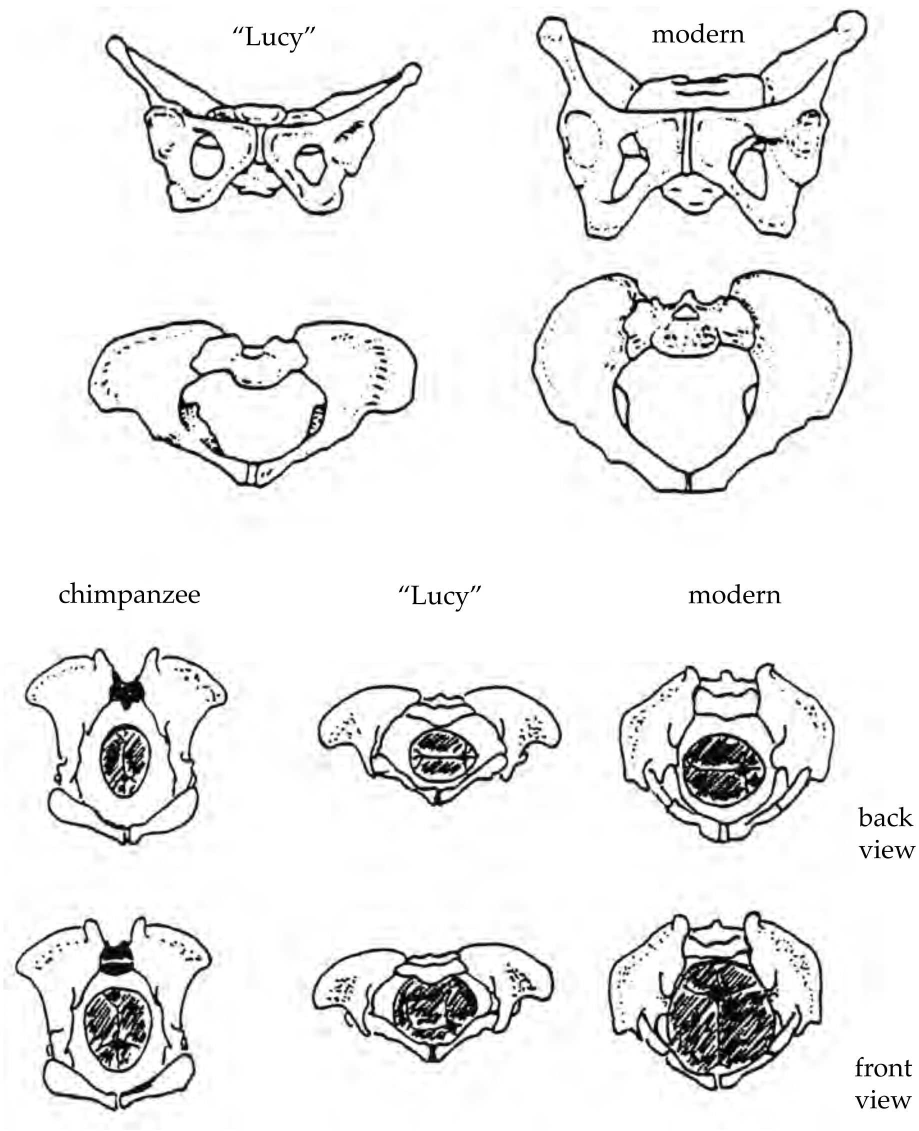

Fig 6.6 *A comparison of pelvis shapes: chimpanzee, australopithecine (in this case, the fossil known as Lucy), erectus and modern pelvis. As can be seen, obstetric difficulties are far more likely from erectus onwards. Recent research by Karen Rosenberg and Wenda Trevathan (published in* Scientific American, *November 2001) suggests that australopithecine infants had a 50-50 chance of being born without some assistance. Homo erectus infants would have experienced similar difficulties. Evidence from fossilized pelvises over the last 300,000 years indicates that the size of the infant's skull and shape of the mother's pelvis approximated that of modern humans. These babies would have to rotate their head and shoulders within the birth canal and thus emerge facing away from the mother. It has been suggested that help was always necessary, not only for physical assistance, but also for the emotional support that the midwife provides. The desire for emotional support during birth appears to have a long evolutionary history.*

[19] See Dixon, A.F., 1992, "Posture and Childbirth," *CEHE*, section 2.10.

As mentioned above, in apes birthing produces no physiological problems, and chimp and gorilla babies pass through the birth canal with room to spare. Lucy's well-preserved pelvis provides us with a picture of australopithecine birthing arrangements. As is the case with humans, Lucy's babies would have had to turn their heads sideways to pass through because the opening is oval. Modern babies, however, have a much tighter squeeze because the anterior (front) of the birth canal is rounder in shape. The bones of the baby's cranium are still soft and not yet knit together which allows for some squashing of the head without damage, but the whole operation is distinctly risky, requiring midwifery assistance more often than not to turn the baby's head. After birth the baby's cranial bones remain soft and malleable. The ballooning brain is able, therefore, to expand the cranium while still in a plastic state into its characteristic domed shape.

The evidence suggests that erectus mothers were also narrow-hipped and erectus children would have had to be born at a very early ontological stage, as modern infants are, and would have necessitated intensive parental care, the mothers requiring a highly nutritious diet in order to sustain the milk flow demanded by their helpless but rapidly growing babies. The assumption has to be that the mothers were not left to fend and forage for themselves but were supported by co-operative social groups, if not actually within tight-knit family units. Having even two small human children is a handful in a modern society; living on the savannah definitely called for support, starting with skilled midwives!

I have already discussed the significance for the development of human faculties of a prolonged period of gestation and rapid brain growth in the first year of life. The extension of childhood has profound implications for imitation, learning and the incarnation of the soul-spirit element into the human being. It also makes significant practical demands on the parents, the social group and their way of life. Even if erectus life-histories, the key phases of ontological development, were not identical to those of modern humans, they must have been far closer to ours than to those of the australopithecine or even Homo habilis. Nevertheless a recent survey of the evidence by Karen Rosenberg and Wenda Trevathan suggests that assisted birth has probably been necessary since uprightness evolved.[20]

The Teachers of Humanity

Though many of the regions into which Homo erectus migrated resembled the open savannahs of the African Rift, some were significantly different. The temperate climate of the Cape or the Mediterranean and Near East, and the cool uplands and more arid parts of North Africa and Asia would have provided new challenges. Perhaps most radically different were the tropical forests of the Indonesian Archipelago. How did the erectus people deal with these challenges?

First, one has to emphasize the ability to imitate and learn. The fossil record is mostly silent apart from the stone flakes and hand-axes, and the occasional suggestion of a pile of stones that may have been the base of a wind break or hut-like structure. Here and there are hints of hearths. Otherwise we must try to form a picture of the way erectus people may have responded to the situation, using what comparisons we can. With caution, though without being too literal and parsimonious, I feel it is possible to go beyond the limits of the material

[20] See Karen Rosenberg and Wenda Trevathan, "The Evolution of Human Birth," in *Scientific American*, November 2001.

evidence and not succumb to projections of the "once upon a time" kind of archeology, somewhere between Lewis Binford and *Clan of the Cave Bear*.[21]

Finding Food

Close observation of animal behavior by erectus people led not only to a share of the leftovers but was no doubt a source of much valuable information. Most animals do not "know" instinctively which plants are safe and nutritious and which are poisonous. They learn by imitating their parents and through a surprising amount of trial and error. Humans new to an area could learn quite a lot about local plants by observing who eats what, when. No doubt curiosity and tentative experimentation would have also been applied. Necessity and hunger force risks upon us too. But the "local" animals are the best guides to fresh water sources, fruit trees, wild honey and hidden tubers. Following larger, more powerful animals such as elephants, rhinos, and warthogs and watching them root up shrubs and expose tasty but otherwise inaccessible food sources was a good way to learn. Palm pith and hard-cased fruits or nuts which heavily tusked animals can split open and reveal with ease can also be got at with sharp hand-axes and flakes. Other primates are expert at locating nutritious fruits in the forest canopy. A watchful human need only follow and discover not only fruit but fresh bamboo shoots and avocados.

Traps

Following animal tracks, which was often the only way to get around, would also lead to discovering where animals congregated, water holes being the best and most predictable places to encounter prey of all kind. Erectus people would surely have noticed the natural traps that occur. Animals get their horns tangled in vines or thickets and can thus be easily caught. The spider's web may have also provided a useful model. Indeed the use of cordage, whether made of vines, creepers, plant fibres, plant fronds or grasses or animal sinews must have been an early discovery. Earlier I discussed the carrier bag and simple basket. I can also imagine nets and simple traps for birds, small game and fish. Many spherical worked stones, found at erectus sites may well have been used in similar fashion to the South American bola, that is two or three round stones linked with strong thongs, whirled round the head and thrown at the feet of running prey to bring them down. Spears came much later, certainly the ones with hafted points, but sharpened, fire-hardened short stabbing spears were probably used at close range to dispatch trapped or incapacitated prey.

Seasonal Scarcity and Plenty

Recent studies of the ecologies of regions not yet, or only partly, altered by modern human behavior reveal that each geographical area has its own cycle of periods of surplus and plenty followed by periods of scarcity.[22] These are often seasonal, with alternating wet or dry or cold and hot periods, or they have to do with the migrations of animals and insects that pass through. The transitions between such periods often provide opportunities for marginal hunter-scavengers.

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[21] Lewis Binford represents the extreme parsimonious interpretation of archaeological evidence for human behavior, no doubt an important corrective to enthusiastic speculation. *The Clan of the Cave Bear* (1980) is a feminist novel by Jean Auel that portrays Neanderthal males in their brutal and popular form.

[22] Kingdon, J., 1993, Chapter 5.

With the onset of the wet season, dry areas can turn quickly into marsh and bog, thus creating natural traps in which unwary rhinos or elephants can get bogged down. The sharp stone flakes found at archaeological sites were quite adequate to cut rapidly through the tough hides of such animals once they had died of exhaustion. Rivers and lakes drying up can often provide a bonanza of fish floundering in the shallow pools or caught in the sedges or reeds in inland waters or tangled mangrove roots by the sea, as the waters receded, surely the archetype of the fishing net. The breeding seasons and the migrations of birds, turtles, herbivores, and locusts provided periods of superfluity and plenty in quantities we can hardly imagine today. The vast herds of wildebeest on the Serengeti are but a suggestion of what the fecundity of nature meant in times before the domination of mankind within the world's ecosystems.

Early humans were not alone in gorging themselves at nature's feast, but they clearly began to be among the more successful. Many species of large cats, hyenas, jackals, bears, marsupial carrion eaters, giant lizards and carrion birds have since become extinct. Likewise several species of hominid disappeared leaving, as far as we know, only Homo erectus. Periods of plenty are always followed by periods of scarcity in nature. From time to time, the monsoon is weaker or non-existent, the dry season gets longer.

Over thousands of years, sometimes the temperature drops significantly and the climate becomes cooler. Not all species could cope and therefore dwindled, sometimes to the point of extinction. No doubt many groups of Homo erectus succumbed. But not all. They survived because they adapted themselves quickly and effectively to new conditions or they moved somewhere else.

Fire

Of all the skills that Homo erectus possessed, the use of fire was clearly the most significant. Natural fires are most common in areas of volcanic activity. We know that a whole string of volcanoes was active in the Kenyan Rift around 116 mya.[23] Fires are also started naturally by lightning or by sunlight focused through dew drops on dry tinder, igniting methane gases or seepages of oil, shale or bitumen. The areas where this commonly happens are also populated by plants that can regenerate themselves after burning.

These include the Cape region of South Africa, parts of Central Africa, Australia and southern India. The right wind conditions are usually necessary to cause forest fires. Fires can often smoulder underground in peat, forest leaf-mold or dead roots for a long time until the wind fans the embers into flames. As Jonathan Kingdon suggests in his discussion of the origin of the use of fire,[24] such situations favored close observation of the behavior of fire. In regions where lightning fires are common there are often rich pickings for the scavengers when the flames have passed. The old, the young, the weak, the slow and the small are often trapped and roasted alive. Tortoises, snakes, lizards and larger animals too can be found among the embers.

Long before fire was harnessed, hominids would have joined in the chance of free meals in the wake of fires. The frightening power of fire would not have escaped Homo erectus and, once they used the ability to stand back and observe how fire worked, mankind could overcome his instinctive fear to take advantage of the situation. It is probable that people "flirted" with fire for thousands of years before a smoldering log

[23] As reported in the *New Scientist*, June 4, 1994.
[24] Kingdon, J., 1993, pp55–57.

was taken along and kindled to make a campfire. Using fire and making fire are two very different things; the latter was surely a much later discovery.

Once the potential of fire was realized, it must have transformed life in many ways. The light and warmth it provided at night under a clear sky, opened up another world. There is no doubt that the earliest consciousness of the luminous quality of light was enhanced by fire. Its magical, transformative qualities and its power to bite painfully must have awakened the sense of spiritual otherness. Whoever has stepped out of the sphere of glowing light around a campfire into the darkness beyond can experience the sense of otherness, an environment full of unseen dangers. We have lost our sense of the mystery of fire, yet only a few generations ago its luminous quality was implicit to anyone. The creative spark that kindled the tinder was a metaphor with a very real image.

The social aspect of fire is also important. Fire becomes a hearth, a focus for community, especially at night. Its radiating heat and light provide a sense of companionship, social cohesion and solidarity. The group has a much more powerful experience of togetherness at night by the fire than scattered and merging into the landscape by day. Before the development of housing, the campfire gave groups of humans a parameter of group consciousness.

Indeed the first forms of housing merely put a windbreak, walls and later a roof around and over the circle of light and warmth created by a fire. Since Homo erectus needed larger quantities of food to satisfy his (and her) increased metabolic rate, the hunting and foraging ranges expanded, stretching out beyond the shelter of the protective tree-cover, out onto the open plains, along the exposed coastlines and up into the hills. Fire extended the possibilities in practical and in psychological ways. There is some controversy as to when controlled use of fire can be proven. Dates for Africa as early as 1.5 mya (Swartkrans in South Africa, Chesowanja and Koobi Fora in Kenya) are generally considered very questionable, though the recent evidence from sites such as Koobi Fora near Lake Turkana, is far more convincing.[25] The earliest well-dated evidence comes in fact from Europe. At a site called Menez-Dregan near Plouhinac in Brittany a hearth with associated tools has been found dating to around 450,000 BP (before the present.)[26] This correlates with other sites such as Terra Amata near Nice, Vertesszollos in Hungary and Zhou-Kou-dien in China which belong to a similar period. It is likely, however, that Home erectus took this step earlier in Africa.

The whole issue of fire use is highly controversial, as are so many other issues in anthropology. Not only is the evidence ambiguous, but the implications are major for current theories about the nature of our human ancestry. If erectus was making fires as early as 1.6 million years ago, as some researchers claim, such as Jack Harris of Rutgers University who has investigated fire sites at Koobi Fora using the most sophisticated of techniques, then the "big bang" theory of human evolution suffers serious deflation. This theory prefers to see most major technical and cultural traits that contribute to what we think of as humanness emerging very late in our history, usually associated with the emergence of full grammatical language. This is believed to have occurred around 40,000 years ago. Making fire 1.6 million years ago does not fit into this scenario.

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[25] See John McCrone, "Fired Up," in *New Scientist*, May 20, 2000.

[26] As reported in the *New Scientis*t, June 17, 1995.

Making or Just Using Fire?

A "middle way" theory sees fire use as possibly that early, but only as a casual, occasional activity, not one that transformed human cultural or technical life. Clive Gamble places this level of activity within his concept of a "fifteen minute culture."[27] It was purely a practical skill that had no symbolic significance. This theory allows erectus considerable technical skills but no human culture as such. The argument is that the fire sites in Kenya are the remains of campfires, not hearths. A hearth implies greater permanence of use, more preconceptions, greater levels of organization and all that implies advanced communication skills and thus symbolic behavior. It is argued that there is no evidence for fire making flints, though any flint knapper of even the most primitive pebble tools would have been familiar with the sparks that fly. Since the discovery of the Schœningen spears, the possibility that erectus knew how to make fire with a wooden fire drill has to be considered. My own view is that technical knowledge only leads to cultural transformation when it correlates with a whole group of factors that makes the context right for the expansion of cognitive awareness. The most obvious example is to observe children becoming aware of the wider significance of things they have been able to do for some time. Something of the character of creative play is always the prerequisite of inner development. Through consciousness higher meaning becomes visible or tangible in acts of a purely functional origin. The transition from the functional to the symbolic is made often, if not always, through play.

The most remarkable, and again controversial, erectus skill was making handaxes. Were they accidental products of handling stone, artifacts of great intelligence, boring or fascinating? Opinions are once again divided!

A Universal Tool

The stone tool assemblages usually associated with Homo erectus are known as Acheulean, named after the French site of St. Acheul in northern France. These consist of a wide range of carefully struck flake tools, spheroids (hammers or bolas), scrapers and, from around 115 mya, that most distinctive of all stone artifacts, the almond-shaped bifacial hand-axe. All these tools are struck from carefully selected, fine grained stones such as basalt, ignimbrite, chert, quartz or obsidian, sometimes found more than 100 kilometers from the nearest geological source. Most of the tools have retouched surfaces and edges, making them effective and often razor sharp.

All our ideas arise in the end through our experiences with and in the world. We learn by doing, taking hold of, experiencing and transforming materials. This is an ongoing cycle of inner and outer experience providing a cycle of feedback. We express how we feel and how we think in what we do and through our interaction with the world. This in turn helps make us the beings we are. The australopithecines and habilines may have begun to shape tools, but no species prior to erectus made such a significant impact on environment or indeed transformed his own lifestyles through cultural innovation. Indeed, as far as we know, erectus was the first hominid species to adapt itself to radically different environments, and did so essentially through cultural rather than biological adaptation.

The earliest stone artifacts, tangible evidence of this process, arose out of a combination of motor skills in the human hand, the nature of the material, hard stone, and the cerebral processes.

[27] *New Scientist*, May 20, 2000, p34.

Fig 6.7 *Acheulean and developed Olduwan artifacts (after Bils-borough). The Acheulean tradition proved remarkably consistent. Similar artifacts have been found from England to China, from Pakistan to South Africa.*

An Analogy with Children's Archetypal Drawings

At this early stage in the development of human consciousness it is not surprising that cultural expressions are so consistent. In the development of the child we have an analogous situation. All young children the world over and regardless of cultural environment make the same sequence of drawings. Only later do children begin to draw what they actually see around them and then they do so very individually. The phenomenon is well known. Such drawings are not the expression of artistic intention on the part of the child but rather represent the unfolding of developmental processes that reflect a close symbiosis between physical and cognitive development. In the young child the forces at work in the formation and maturation of the physical organism are the same forces that later form the basis for memory and the ability to learn and form concepts, namely the etheric forces. This emancipation of etheric forces from the organic realm into the soul realm is marked by a transition around the age of six or seven. During the period of maximum physical development in these first years, these etheric forces reveal themselves in the soul life of the child, in archetypal forms. These are reflected in the drawings and movements that young children make. These drawings, particularly the earliest which portray no obvious correlation to specific mental pictures, reflect the inner dynamic of the forces at work within the organism. It is this aspect which makes them a useful diagnostic tool for the doctor to identify weaknesses or blockages in one or another area of the child's organism.

At an equally early stage in the development of mankind, I can imagine a similar broadly common level of cognitive development. In erectus people, the etheric forces had not yet been penetrated by the "I" sufficiently for them to be emancipated into the soul realm. Erectus people were not yet consciously or intentionally able to form independent mental pictures and all the conceptual capacities that go with that ability. Their memory was not as personalized as ours. Their consciousness was far more peripheral and group-oriented. They had yet to develop a contoured and differentiated inner life. Had they been able to, we would expect far more originality and diversity in their cultural and technological creations. Given the same material and similar circumstances, the same universal forms would arise. The etheric forces of erectus people would have remained very much bound up with the organism and its rhythms. Therefore, we should expect a kind of universality of culture and form throughout the species.

That is, above all, the case with that most typical and universal Acheulean artifact, the bifacial hand-axe. Found practically wherever early man lived and made for over 115 million years, the bifacial was more than just a useful tool, it signifies an entire stage of humanity.

Handaxe Symmetry and Aesthetics

What is so special about a bifacial hand-axe? Firstly it has a central axis and the whole form is symmetrical to this axis. Then it has two convex sides or faces (hence bifacial), shaped like an almond. Both edges are sharp, often from top to bottom. One end is pointed, the other rounded.

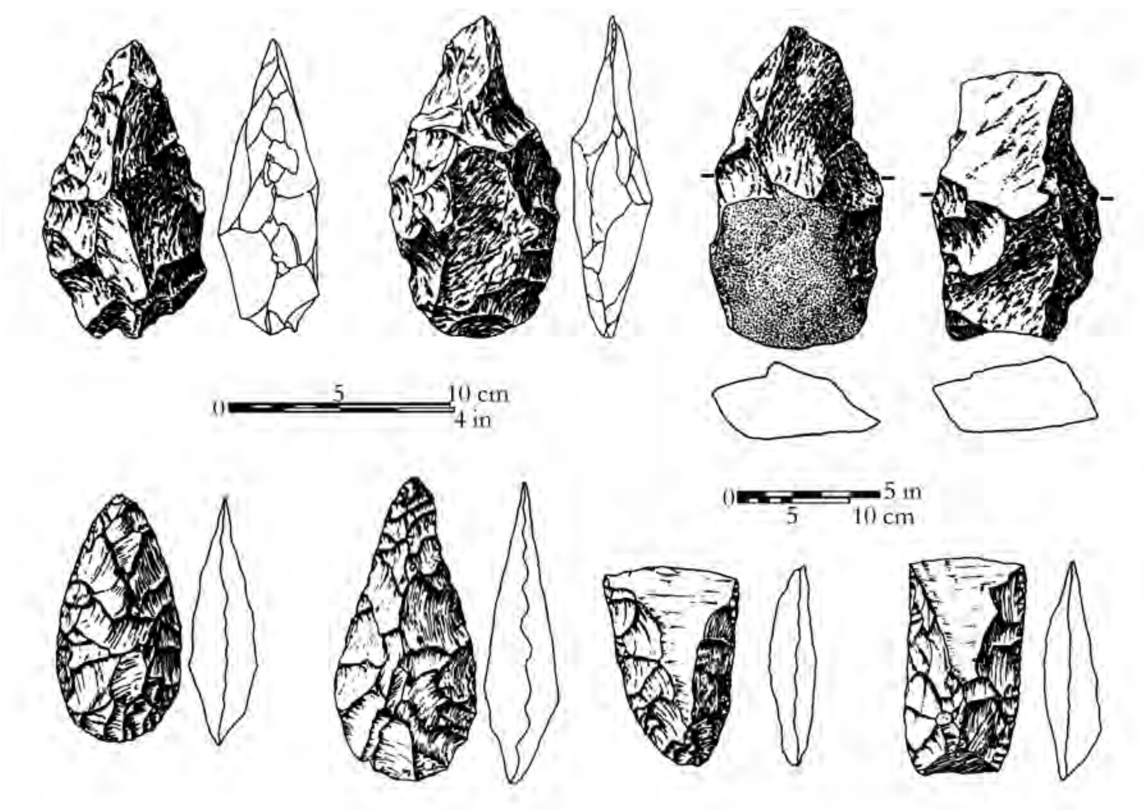

Fig 6.8 *A range of typical bifaces forms (after Schick, Toth and Gowlett).*

As John Gowlett put it in an essay on bifaces, “the hand-axe represents an important cultural achievement because in spite of its apparent simplicity, it combines quite a few different ideas in itself.”[28] The technique required to produce a bifacial hand-axe needs considerable skill and control but depends above all on finding the right angle to strike off the flakes around the edges and in striking alternate faces. A good grip and a steady rhythm are important.

The aesthetic qualities of the hand-axe have long been noticed and it is certainly the case that they are far better worked than was strictly necessary for practical purposes. Some hand-axes were made out of material unsuited by virtue of their brittleness to be used as tools such as quartz crystals and certain volcanic glasses. These stones have, however other more aesthetic qualities. Later peoples such as the Neanderthals and early Moderns continued to make bifaces for cult and ceremonial purposes. Many have been laid in graves along with other grave goods. Long after more efficient tools were being made, the bifacial clearly had a symbolic meaning beyond any practical use.

Studies on bifaces found in great number at Kilombe and Olorgesaile, both Rift Valley sites in Kenya, have shown that bifaces, though ranging in size from 5 to 15 cms in length, all have the same proportions.[29]

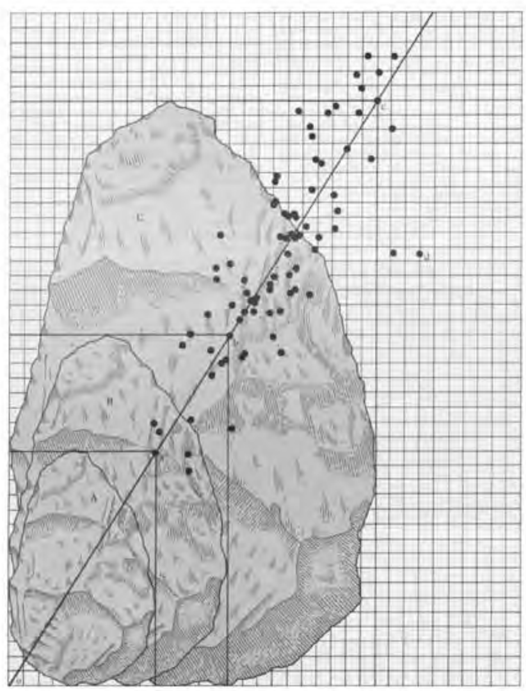

Fig 6.9 *A diagram showing bifaces of different sizes showing the same proportion between width and length (after Gowlett).*

[28] Gowlett, J.A.J., 1982, “Procedure and Form in a Lower Paleolithic Industry: Stone Working at Kilombe, Kenya,” in *Studia Praehistorica Belgia,* Vol. 2, pp101–109.
[29] Gowlett, J.A.J., 1984, Chapter 4.

The studies show an almost perfect correlation between length and width. In other words the small bifaces had the same proportions as the large ones, as length increases, the width increases by the same ratio. That means that the Homo erectus stone workers had cognitive faculties capable of performing mathematical transformations of a complex nature. As John Gowlett described it:

> Making hand-axes of the same proportions in different sizes means the oldest practical tradition of principles that hundreds of thousands of years later were dealt with by Euclid in his Elements of Geometry.[30]

One could call it a kind of innate hand-intelligence since it was almost certainly not intellectually conscious. Such an instinctive sense of form that expresses itself through the formative activity of the hands, and that remains universally the same for a million and more years, is a powerful expression of something in the nature of the human being. This must have been a quality that could be borne through the generations, independent of any genetic factors, handed on as a largely unconscious cultural activity. The archetype of the bifacial hand-axe appears to me to have been a form principle of essentially etheric forces. Form arises when the stream of formative forces encounters a form-giving principle, as in the vortices produced in flowing water by the rocks on the river bed. In this case the stream of activity reflects a conceptual form principle and the ultimate shape is determined by the interaction between concept, activity and substance, the nature of the stone itself. What then are the principles of form that come to expression in a biface?

A Feeling for Form

Looking at a biface purely in terms of form, and having for many years taught clay modelling to pupils at school, I can recognize the basic elements with confidence. Volume can best be felt if one gets the opportunity to hold an Acheulean hand-axe in the palm of one's hand. (There are right and left handed hand-axes, which ought not be surprising but never ceases to give me a strong feeling of affinity to early humans.) The element of surface, in particular the rippled, curving kind of surface which is alive, is twofold. Line as a quality is created by the all-round cutting edges which lead to the point, by a path which is not geometrically straight but made up of alternating scalloped curves, like a sketched line rather than one drawn with a ruler. Finally the whole culminates in a point. A sculptor would be hard pressed to find a more elegant or economical solution to the task of harmoniously combining these four primary elements into one form: point, line, surface and volume. Within its basic canon, the biface is endlessly variable.

A Long Schooling of Cognitive Skills

Whatever practical purposes the biface may have served, their production must have been a schooling of cognitive faculties. The spatial elements of symmetry, front and back, top and bottom, point and circumference, are expressed beautifully. I cannot help but think that the fine differentiation of the cerebral cortex, which must have occurred throughout the erectus stage of human evolution, found a wonderful archetype in the manual dexterity, symmetry and dynamic that the biface expresses. No doubt many other activities had similar effect, though none perhaps with quite the

[30] Ibid.

completeness of a biface. Just as the basic tool elements of point, cutting edge, lever and hammer, whilst being represented by individual specialized stone flake-tools, are all combined in the hand-axe, the truly universal tool, so too a cognitive archetype of spatial orientation evolved of which the biface itself is the fullest expression.

It has often been observed that large numbers of bifaces litter the sites where they are found. It seems that they were produced in large numbers and discarded before they were "worn out." A recent report on the Boxgrove site in Sussex describes exactly this situation: "They did not bother to use previously discarded tools, all of which were perfectly sharp. Instead, they seem to have preferred making fresh ones. When they had finished butchering, they appear to have thrown them away. The rationale behind this wasteful behavior is a mystery. The raw material for manufacturing cutting equipment, flint, was plentiful and it could well be that the act of making cutting tools was regarded as such an integral part of the eating ritual that tool manufacture occurred irrespective of whether it was strictly necessary or not the handaxes were discarded at a rate of one or more per square meter."[31] The hominids who made these tools were not Homo erectus but probably Homo heidelbergensis, but the point about the repetition of activity is valid. Whether it had anything to do with eating rituals is beside the point. What comes to expression through this apparently unnecessary activity relates to a more profound inner need.

We know from modern studies of neural development in children, that such a process of orientation corresponds to a mental framework which is based on a neural substrat, a network of neural connections fixed and reinforced through the myelinization process in which the connections between related neurons are strengthened through the growth of a fatty sheath along the axons linking the neurons. Children create and perfect this mental framework through regular repetition and practice of specific movements, by endlessly moving around, stooping, standing up, repeating manual skills , building towers of play-blocks, letting them fall and starting again. The spatial relationships are explored and practiced with a devotion and repetition rare at any other age. The spatial-exploring, orientation phase of childhood corresponds well with the Homo erectus stage of humankind, which is not of course to imagine erectus people as three-year-old toddlers , they would not have lasted long on the savannah. At an imaginative, qualitative level there is an element of recapitulation , though in the modern child at a higher metamorphosed level. The similarity lies at the level of will activity. Here we can experience the formative, creative forces working to shape and structure the cerebral instrument that later, with the emergence of the individualized soul faculties, will give expression to thoughts and ideas. As such the biface is something quintessentially human, an archetypal form expressing, perhaps, the as yet undifferentiated, three-dimensional unity of the human soul.

A New Technique Appears on the Scene

The curious thing is that around 250,000 years ago the descendants of erectus, Homo heidelbergensis or Neanderthals, began to make bifaces with much the same form but with a radically different method. Instead of choosing a suitably sized blank and knocking off the flakes around the edges until the desired shape was arrived at, the flakes themselves, instead of being seen as waste, became the basis for the tools themselves

[31] See report in *Independent,* August 27, 1995.

rather than the core which was discarded. Naturally sharp flakes had long been used before but now the cores could be so prepared that the desired tool, in the shape of a biface, could be detached from the core with one blow.

Thus the preconceived form was consciously planned and "seen" within the core. It could then be systematically released in a deliberate series of stages. Such a process reveals a far more focused and analytical form of thinking involving a fairly clear picture of the end product. The end result may be the same but the paths leading to it come from radically different parts of the soul. The old method clearly came from the will, the unconscious dynamic of habitual activity. The new method was cerebral, starting with a mental picture and requiring a whole series of deliberate pre-planned steps. The transition was clearly symptomatic of a major shift in human evolution.

The Biface, a Case of Gene-Culture Coevolution

The question of the influence of etheric forces on stone tool production sheds a light on the problematic relationship of gene-culture coevolution. One of the central problems with purely materialistic explanations of evolution is the significant fact of human transmission of key traits by cultural rather than genetic means. Richard Dawkins recognized this problem and coined the term memes[32] to refer to units of cultural replication. Thus created, the meme began to have a life of its own (as it should as a good meme) in that it encouraged evolutionists to think of memes as being like a special form of gene. The problem with memes is their interaction with genes.

As Edward Wilson has described,[33] the search for mechanisms which explain gene-culture coevolution has become a vital goal to reach in the task of slotting the pieces of a holistic, yet still materialistic, view of nature together into one seamless whole. He concedes that the greatest challenge is to account for the exponential growth of human culture as opposed to the very slow pedestrian steps of human biological evolution. Wilson summarizes the story of gene-culture coevolution so far.

> Genes prescribe epigenetic rules, which describe the general regularities of sensory perception and cognitive development which determines the way an individual mind forms itself (the specifics, as we know are individual) and these regularities channel the acquisition of culture. Culture helps determine which of the prescribing genes survive and multiply from one generation to the next.

Successful new genes alter the epigenetic rules of populations.

> The altered epigenetic rules change direction and effectiveness of the channels of cultural acquisition.

How Elastic Can Rules Be?

The problem with this account is that the forms of culture that have arisen through this process are so varied that the definition of the epigenetic rules that govern the development of the individual mind is so elastic that it hardly justifies their validity as rules. The norm of reaction of a particular gene or group of genes which provides the

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[32] See Dawkins, R., 1989, *The Selfish Gene*, a new edition, Chapter 11, "Memes: the new replicators," p189.
[33] See Wilson, E.O., 1998, Chapter 7, p137.

bias towards a particular kind of behavior must be extraordinarily broad to accommodate the range of known cultural forms.

At the level of erectus bifaces, the problem does not look so critical. Let us imagine that the gene, which biases the behavior of shaping stones, is endlessly reinforced by natural selection of those who make bifaces by their mates. We do not even have to imagine that making good bifaces made one fitter in a selectionist sense. This trait may be an inessential by-product of a more fundamental genetic bias towards manual dexterity. Survival fitness includes not only the physical environment but the cultural one too. As E.O. Wilson puts it:

> Some individuals inherit epigenetic rules enabling them to survive and reproduce better in the surrounding environment and culture than individuals who lack those rules if we look closer, or at least possess them in weaker valence. By this means, over many generations, the more successful epigenetic rules have spread through the population along with the genes that prescribe the rules. As a consequence the human species has evolved genetically by natural selection in behavior, just as it has in the anatomy and physiology of the brain.[34]

A Case for Sexual Selection?

What seems more likely than natural selection is sexual selection. This indeed is what Marek Kohn suggests in his book *As We Know It* (1999). Kohn applies the so-called Handicap Principle first put forward by Amotz and Avishag Zahavi, to explain why bifacial hand-axes were made by erectus people above and beyond the demands of necessity. The Handicap Principle explains behavior and anatomy among species that appear to be more of a burden than a selective advantage or fitness, such as having signal cries that would attract predators or the famous peacock's tail. These risky or simply expensive traits are a runaway trend demonstrating not only bravado but health and vigor, and thus attractive to potential mates. It is suggested that the time, effort, and above all skill shown in producing a biface hand-axe, show a degree of fitness to hominid mates that was well worth the risks involved. Being such subtle observers of their fellow hominid behavior, erectus people would have been able to appreciate the energy and skill and above all the high degree of symmetry which signalled intelligence.

Like many other ideas coming out of evolutionary psychology, the theory is compelling but basically unprovable, though no doubt someone could work out neat mathematical models showing the measure of symmetry against the odds of survival. What the Handicap Principle explains is why sexual selection might favor good biface makers; it does not explain what makes a good biface in the first place. It does not account for the subtle feedback loop between eye and hand, knowledge of the nature of the material and a sense for form and symmetry. It only explains why such skills become attractive even beyond their practical application.

An Etheric Account

A radically alternative view is to see the activity of the emergent "I" working in the etheric bodies of erectus people as a bearer of collective and therefore not individualized memory. The etheric stimulus to the physical activity of shaping stones to express archetypal forms naturally has an effect on the neural development of the

[34] Ibid., pp139–140.

individuals who made them, or rather on the use those individuals made of their neural structures. It may well have been that a greater plasticity of form was retained for longer in adult erectus people than is the case among adults today. Thus the norm of reaction of the genes involved may well have been broad but the endless repetition, generation after generation would have had a selective impact on the epigenetic rules that determined the neural developments that structured those brains. Biface-making may have become hard-wired in erectus brains but it was "engraved" in the collective etheric bodies of erectus people first, as an archetypal form arising through innate hand intelligence giving expression to a universal synthesis of form dynamic.

A key thought in this context is Rudolf Steiner's assertion that "it is of the greatest importance to know that the human being's ordinary powers of thought are refined powers of configuration and regeneration."[35] The fact that the body of formative forces corresponds to the same forces behind cognitive development makes sense of the link between repetitive formative activity, such as the knapping of bifaces and long term shaping of brain functions and ultimately neural changes. The role of the etheric memory in retaining such learned behavior and its feedback influence on cognitive processes appears to leap the barrier of the central dogma that experiences cannot change or influence the genetic material and thus cannot influence selective processes. This remains true at the physical level, but at the etheric level the selection process is one of reinforcement of patterns. Does this alter the situation with regard to behavior driving anatomical change? I am not qualified to answer the question. But I do feel it is justified to ask it.

This poses yet further questions about the etheric nature of epigenetic rules, also which I cannot answer other than to remind the reader that Steiner frequently referred to the body of etheric forces as the architect of the physical body. These supersensible forces, we recall, are the same forces, which underlie behavioral patterns and learned sequences of activity, as well as forming the medium for memory.

Place and Memory

Many authors have described how recent hunter-gatherers have a deeply personal relationship to their environment. Early man learned by imitating the world around him. I have suggested that this imitation was far more intense than anything modern people can imagine. Only the human infant, in being a "wholly sense organ" (Steiner) comes close.

The myths and legends of recent hunter-gatherer peoples show how the memory of an individual and his or her group were intimately bound up with their territory. The Aborigine songlines are wonderful examples of this. Theodore Strehlow, who collected and wrote down Aborigine songs, recalled how the people saw "recorded in the surrounding landscape the ancient story of the beings that for a brief space may take on human shape once more; beings, many of whom he had known in his own experience as his fathers and grandfathers and brothers and as his mothers and sisters. The whole countryside is his living, age-old family tree."[36]

Bruce Chatwin described how the Aborigine song described the nature of the land over which the song passed.[37] So, if Lizard Man were dragging his heels across the

[35] Steiner, R. and I. Wegman, *The Fundamentals of Therapy*, 1996.

[36] Quoted in Kingdon, J., 1993, p161.

[37] Bruce Chatwin, 1987, *Songlines*, p120.

salt-pans of Lake Eyre, you would expect the melodic contour of the song to express a succession of long flats, like Chopin's "Funeral March." In other words the songs were "maps" of the spiritual geography of the journey which was also the history of the ancestors and thus also the biography of the self. Each landmark, tree, outcrop of rock, spring, creek or hollow not only had its story but the story was his-story too, history and geography being in this sense one. I am conscious of the risks of drawing parallels between recent cultures and prehistoric mankind. The analogy of Aborigine songlines only helps us imagine an earlier kind of consciousness. It is hard enough for the modern mind to grasp the mythic consciousness, let alone project ourselves back to the times of Homo erectus. The analogy merely helps bridge the gap.

A Memory Culture

This memory culture, based on images long-remembered and on activities eternally repeated surely describes the biface culture of Homo erectus. A memory based on place and situation was one that re-membered, that is re-integrated the parts into the whole. Thus going to a specific place awakened specific associations which were re-lived and re-united. Repeated activities such as shaping a biface no doubt re-formed the experience of wholeness too. Whether erectus people articulated such identification processes in the form of something similar to the songlines is hard to say. My feeling is that they didn't in any linguistic way. Such experiences were possibly so deep-seated in the unconscious they did not require articulation in such consciously structured forms. Their consciousness was perhaps so dreamlike, their awareness so integrated in their surroundings and so lacking in subject-object differentiation, that the experiences could hardly have been more conscious than powerful feelings.

Locational Memory

We know that in the young child the earliest forms of memory are situation- and place-related and that this primitive form of memory occurs before ego consciousness.[38] Children remember a situation, or even certain feelings, on returning to a location where particular events were experienced. Remnants of this kind of locational memory are retained by all cultures who set up stones, triumphal arches or whatever to mark significant occasions at particular places. In our own souls this form of memory clearly belongs to deep and subtle levels of our unconsciousness. Returning after thirty-five years to a garden where I had played as a child brought powerful and not easily described memories of qualities of which I am usually quite unaware. It is a form of memory that seems to be most closely related to what was done at a particular place and seems strongly connected to our urges and drives, and to subtle sense impressions of smell and atmosphere. It is definitely less connected to intellectual thought experiences. As memory frees itself from outer associations it becomes rhythmical and cyclical and often musical. It is the realm of nursery rhymes, counting verses and repetitive activity. Out of this form of memory the oral traditions of epic mythology arose, though these belong to a much later date than Homo erectus. Herein lie the origins of cult and ritual, which focus around repeating significant events. Full memory comes with ego-consciousness.

[38] Lievegoed, B.C.S., 1982, *Entwicklungsphasen des Kindes*, pp113–115.

Language: a Formative Principle

The origin of language is probably the least understood aspect of human evolution. Its significance however is not in doubt. Current theory sees the acquisition of complex language as probably the defining factor in the emergence of modern Homo sapiens. Since the question of language goes right to the heart of the mind-matter conundrum, it is not surprising that practically all modern theories as to its origin and evolution dwell on the matter side of the equation, usually focusing on the neurological aspects.

From the anthropological point of view, various models accounting for the origin of language have been put forward suggesting a causal link with uprightness and manual dexterity, tool making, social structures, increase in brain size and so on, in short all the essential human traits as promoters of language development. But all these explanations have a certain chicken and egg character. They no doubt all played a role but it is equally possible to see language as the cause of at least some of these traits, increased brain size, for example.

The Lessons of Language Acquisition

Once again the analogy of the development of the child can provide us with insight into the origin of the human faculty of language. It is not possible here to describe in detail how the young child acquires language; I have done this elsewhere.[39] It is instructive, however, to reflect on what language development does for the child's whole development.

For the young child language has more function than simple communication; language also has the function of differentiating the entire emerging inner life of the soul. Language provides a means of generalizing and categorizing experience and as Susan Engel has shown, narrative structure in language provides the child with a means of ordering and understanding the world and crucially in developing a consciousness of self.[40]

Just as the senses differentiate out of a global state of perception (the child as "wholly sense organ"—Steiner) into the different realms of conscious and unconscious experience, so too language differentiates out of a global experience and the individual sounds, syllables, words and phrases receive their contours. Through the development of language, the child learns to order and structure his or her inner life and thereby creates a sense of identity, a perspective of self and the other, a sense of self in relation to the world.

Two Sides to Language: Lexis and Logos

Language has a double aspect. On the one side there is its grammatical and syntactical nature, what linguists call universal or generative grammar. This is the archetypal, spiritual nature of language and its function is to order, form, structure, symbolize and harmonize. The other side of language expresses feeling, passion and the will of the individual. This side of language arises out of the organism and its ensouled nature, out of sensation, pain, pleasure, desire, interest. This side of language is fundamentally communicative. The other side, the universal, structural side enables us to form representations, to conceptualize and form ideas and ideals. It provides us with

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[39] Rawson, M., 1997, "Language: Logos and Linguistics," *Paideia* No. 14, February 1997.

[40] Engel, S., 1996, *The Stories Children Tell*, Chapter 7.

a source of meaning and a basis for moral thoughts. I would argue that this aspect of language is essentially non-material, a property of the spirit.

Language the Civilizer

In this sense language provides humans with individual access to the spirit. Language is what makes us human and is clearly a primary civilizing and emancipating force. Naturally language in the mouths and minds of men and women can hurt and hate too, but that comes with the freedom that language gives us. Language is nevertheless the civilizer because it grants access to higher meaning. Language has given us the means to master the world and also perhaps to understand how and why.

Derek Bickerton, the linguist, formulated this thought beautifully in the epilogue of his challenging book, *Language and Species*,

> Language bestowed on its possessor powers that yielded far more than mere survival, powers that effectively conferred on our species the stewardship of earth. Yet, formidable as those powers were, they carried within them the seeds of destruction. Language had given us, not enough, but too much: not just the stewardship of earth, but the capacity to destroy species weaker than ourselves, and even features of the environment on which our own survival might depend.
>
> Yet language is at the same time the nurturer and facilitator of all that is best in us, all that seeks to avoid such a fate and bring us back into unity with the rest of creation. It is language, and language alone, that makes it possible for us to dream of a world of peace, freedom and justice where we might live in harmony with that nature of which, after all, we form only a dependent part.[41]

The child has the language of its parents to form its language and speech organs. But what of humanity? Who or what did mankind learn from? In an earlier stage of undifferentiated consciousness analogous to that of the young child, mankind formed its language faculty out of the world-word, the Logos, the universal language that spoke to the minds of early humans from the rhythms and gestures of the natural world. "In the beginning was the Word" or conception, idea, archetype, principle or system-forming model if you prefer. Steven Pinker may shake his long grey locks and roll his eyes to the ceiling at this conclusion, but I do not think this is mystical nonsense.

Language Evolution: Continuity or New Formation?

I will now turn to the question of how language may have arisen in human evolution. There are essentially two ways of addressing the problem. The first explanation would see a long continuity from lower forms of language or at least communication among animals, which ultimately, stage by stage arrived at what we now have as human language ability. This approach has led to the study of animal communication systems and particularly those of primates such as vervet monkeys and apes in the hope that pre-linguistic forms can be identified. The other view is that complex language appeared like Athene fully armed from the brow of her father Zeus. Of course very few people, except out-and-out creationists, would see the matter quite as simple as that. There are those, however, who see complex language as a new formation exclusive to human beings.

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[41] Bickerton, D., 1990, p256.

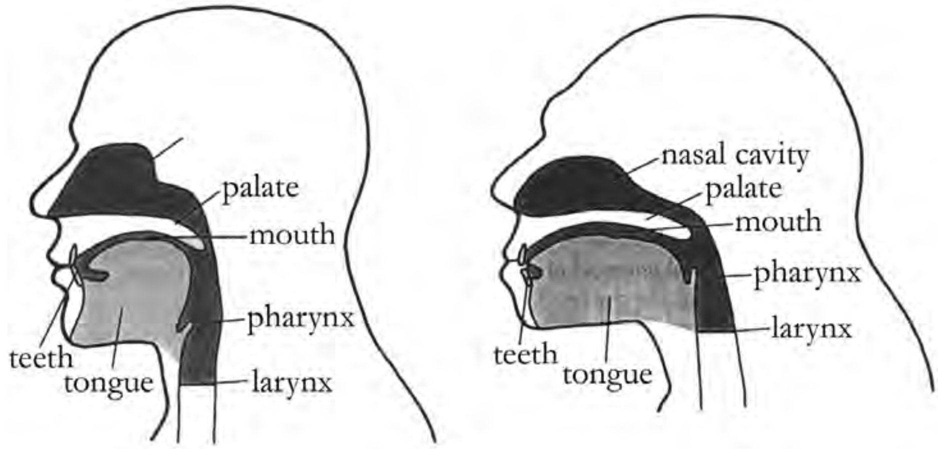

Fig 6.10 *A drawing showing a comparison of human speech and chimpanzee vocal organs.*

One thing can be clarified at the outset: vocal speech is a uniquely human adaptation. All attempts to teach chimpanzees to speak have failed for the simple reason that chimps lack the vocal apparatus to articulate the sounds that make human speech, as indeed do all other animals. A whole suite of physiological characteristics—from the breast cavity and control of breathing to the organs of the neck, mouth, nasal cavity, not to mention the neural apparatus to process, control and comprehend speech—are involved, all of which are more or less unique to humans in their formation and function.

The functioning of the human speech apparatus has been expertly described elsewhere,[42] so I will limit myself to a few aspects relevant to my general theme.

What Makes Vocal Speech Unique

One of the reasons why human speech is so unique, and indeed makes complex language technically possible in the first place, is the astonishing speed with which sounds can be formed, heard and understood. The high transmission rate of speech is an integral part of linguistic ability as it allows complex thoughts to be transmitted within the constraints of our ability to perceive them.

Speech is made up of phonetic "segments" known as phonemes, which roughly coincide with the sounds represented by the letters and diphthongs of the alphabet. Taking all the known languages of the world into account, there are thousands if we include all the sounds produced by the various speech modulating organs, larynx, soft palate, tongue body, tongue tip, tongue root and lips, singly or more often in combination. English uses about 40 phonemes, Khoisan 141. As Steven Pinker tells us, English is above average.[43] We can produce an astonishing 10–15 phonemes a second and up to 30 and still be understood. The really remarkable thing is not so much the production but the perception of rapidly-spoken phonemes. Interestingly our ability to perceive non-speech units is a much lower 7–9 sound segments per second. This high rate of phoneme perception, however, only works if the sounds are linked to make meaningful language. Syntax enables us to comprehend rapidly spoken strings of sounds linked as discrete words in sentences.

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[42] See Lieberman, P., 1992, "Human Speech and Language," in *CEHE*, section 3.5.

[43] Pinker, S., 1994, pp171–172; see also Zimmer, D.E., 1986, pp28–30.

Language Perception

The limit on our ability to perceive is due to the fact that our short-term memory can only retain up to 25 words in ten seconds—assuming that they are structured in a meaningful way. Beyond that we tend to forget what the beginning of the sentence was and our understanding of what is being said starts to get confused. Anyone learning German will have noticed this phenomenon since one often has to wait until the end of a sentence to hear what the main verb phrase is and whether it is negated or not. Long sentences have to be carefully structured with markers to relate the various clauses over the whole span of the sentence. Modern linguistics has done wonders analyzing how sentence structure works. Fortunately universal grammar, together with our senses of word and thought help us to do this automatically.

Being able to distinguish between sounds produced at this rate depends not only on our perceptual apparatus but on the quality of articulation in the first place, hence the age-old parental nagging, "Please don't talk with your mouth full." This, as I have often pointed out, is not some artificial distaste at seeing half-masticated food, but merely a technical point about language production—though teenagers often remain unconvinced. At any rate, our ability to articulate with such precision is dependent on the construction and co-ordination of our vocal organs, as well as suppressing the other functions of our mouth.

In speaking we continuously change the shape and length of the supra-laryngeal airway, thereby generating a changing frequency pattern in the vibrations of air, thus altering the amount of acoustic energy filtered through the airway in different positions. The larynx is the source of this acoustic energy, puffs of air being released rhythmically into the supra-laryngeal tract by opening and closing the vocal folds. The other organs of the mouth help shape the sound and alter the form of the frequency pattern. The pitch of a speaker's voice is also an aspect of linguistic information. In languages such as Chinese the same sound at different pitched intervals changes the meaning.

Listening involves interpreting the formant frequencies of speech. This is one of the most remarkable aspects of speech perception involving highly complex "calculations" of the frequencies of spoken sounds. This includes recognizing specific speech sounds despite the enormous variation in individual speech production and even in circumstances where very little of the whole frequency range comes through, as on digital telephones. People's voices are highly individual which means an enormous range of variation in formant frequency. This is why it is so difficult to build machines that can recognize human speech. The human sense of language and the related neural processing can deal effortlessly with the immensely complex input of information just to decode what someone is telling us, quite apart from interpreting what they mean by it. The so-called Speech Act theory[44] distinguishes between three basic modes: what is actually said, what the speaker intended, and the actual effect of what is said on the listener … and that is just for starters!

Furthermore, in imitating speech young children have the ability to "translate" and adapt the speech frequencies of adults whose vocal tracts are quite a different size from their own. This is not merely a question of scaling up or down the frequency. The child's vocal tract may be 55% the size of the mother's, thus the child cannot literally imitate the frequency needed to produce a given sound since a different frequency pattern

[44] Grice, H.P., 1975, *Logic and Conversation*, in Cole & Morgan, Syntax and Semantics 3: Speech Acts.

will be needed to produce the same sound. (The analogy of organ pipes may help to follow this.)

The child therefore produces a sound whose formant frequencies are proportionate to the ratio between the length of her vocal tract and her mother's.[45] This has to be acquired by trial and error during the many hours of mother-child vocal exchange. Once more we see the interaction between innate ability and learning.

This discourse into the complex mechanics of speech formation and perception is relevant to the question as to how such abilities evolved. In the ontogeny of the individual, the actual fine-structuring of the vocal organs and perceptual organs occurs through their use. In other words language helps to produce its own organs. Whether this was also the case in the phylogenesis of language ability in human evolution remains to be seen.

I have described human speech as unique in nature, but it must have come from somewhere. The physiology of speech certainly had its evolutionary antecedents. The study of hominid fossil remains provides some indications of speech ability and its evolution, though larynxes and neural structures do not fossilize. I shall review the evidence in the next section. Next I wish to look at language ability in animals since that should provide a measure for assessing the relevance of the fossil material.

Animal Language

Animals have a wide range of communicative possibilities. At one level they can signal information by scent such as territorial marking or advertising sexual readiness; by colorful plumage and body color, by non-vocal sound like crickets rubbing their back legs or other insects rattling their wing-cases. The list of weird and wonderful behaviors involving all the senses is long and much of it is familiar to us from nature documentaries, colorful books and wildlife magazines. What all these signals have in common is that they express a whole situation and give an unambiguous—at least to those to whom the signal is directed—single message along the lines of: Stay clear, I'm bigger than you, I am poisonous, I am ready and willing to mate, or this is my territory. These communications are complete, invariable and not possible to combine to form other meanings. Clearly they are genetically determined and the animal has apparently no choice about displaying them. They also usually elicit an equally invariable response.

There is considerable discussion among ethologists about the degree of consciousness in animal communication and cognitive abilities. There are those who posit elementary states of mind and those who put it all down to information-processing mechanisms of a more or less automatic, unreflected nature.[46] Given the nature of representational systems, the question of consciousness is initially one of hierarchies of mental mapping. A sense of self is inevitable even at a simple level, though this does not explain what we experience as consciousness. I will return to the question of human consciousness in the following chapter.

The highest level of this kind of signalling is the communication of information by bees and other insects such as ants and termites that live in complex colonies. As Karl von Frisch showed back in the 1940s, the dance of the worker bees returning to

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[45] Lieberman, P., 1989,*The Origins of Some Aspects of Human Language*, in *The Human Revolution*, Mellars and Stringer (eds.).

[46] A discussion of these issues can be found in Griffin, D., 1994, *Animal Minds*, Kennedy, J.S., 1994, *The New Anthropomorphism*, Dawkins, M.S., 1994, *Through Our Eyes Only?*

the hive gives detailed information including apparently directional instructions to the other bees. Experiments have shown that bees can learn new information quickly and correspondingly change the signals they give.

Further up the scale of animal communication it is obvious that many animals can give expression to their feelings. Sounds expressing distress, pain, pleasure and even tiredness—a yawning camel is a sight and sound to behold. Though these sounds are usually species specific and basically instinctive, they are not necessarily compulsive or automatic and may even be quite individual. Other animals do not have to respond, they can ignore them. A bitch may ignore the high pitched yelping of her pups as they play but would look up if she judged it to be serious or even sufficiently annoying—the same tolerance level can be witnessed in domestic dogs being pestered by intrusive human children. An indication of the flexibility this level of communication permits, is the fact that it reveals levels of experience.

Responding to the escalating threats of a rival in the form of behavior, gesture and sounds, requires fine judgment if serious bloodshed is to be avoided, which is what most animals seem to prefer. This kind of judgment improves with experience. It is therefore usually immature adults that get hurt because they haven't yet learned to read the signals.

The next level of communication is more than just an expression of emotion, there is a definite intention to send some specific message including perhaps a deliberately misleading one. At one end of this particular spectrum is the system of calls used by troupes of vervet monkeys to warn other members of potential danger. There are different alarm calls for various predators, eagle, leopard, snake or, to be specific, python. On hearing these calls—even tape-recorded versions—the other monkeys take appropriate evasive action. In a sense the vervet's leopard call is a kind of reference to the general concept "leopard," in other words the alarm call has a similar function to a noun which is a symbolic referent representing some concept. The difference however lies in the fact that the alarm call is invariably related to the actual perceived presence of the predator. The call can only mean; there is a leopard nearby, run up the nearest tree! Words on the other hand can be used in various ways, such as to question: Is there a leopard? Is that a leopard I see before me? There are many possibilities including, saying "leopard" when there is no leopard. The vervet alarm call lacks this flexibility. It is the equivalent to pointing, which is meaningless in the absence of the referenced object.

This level of language has an innate component. Vervets are born able to make the range of calls, but immature monkeys have to learn how and, critically, when to make such calls. Adult vervets can usually tell when youngsters have got it wrong, which is just as well, otherwise the learning process would be fairly tedious for the troupe or indeed dangerous—along the principles of the story of the boy who cried "wolf." The fact that some adult vervets have been observed making alarm calls when no predator was around with the obvious (to the watching scientists sweating in the nearby hide) intention of getting other vervets to run away. The fact that this works shows just how compulsive the response is. An escalation of this behavior would have disastrous consequences for a vervet troupe and would in the long run invalidate the purpose of the alarm call in the first place. Presumably such deceptive behavior is kept to a minimum.

More Complex Animal Communications

Further up the scale of complex communication systems are animals such as the humpback whale whose long evocative songs lasting up to twenty minutes appear to use other dimensions of language including mimicry, the ability to combine and recombine discrete units of sound and some use of combination akin to syntax. Full, complex language, such as is unique to humans, possesses three essential characteristics; basic sound units (phonemes) without intrinsic meaning which can be combined to make larger units like words; syntax, which provides the rules for combining the units into meaningful sentences, stories and so on; and finally and fundamentally, language is symbolic.

The songs of the male humpback whale are learned, imitated and varied from season to season. Since there are no apparent rules which govern the changes which involve gradual tonal modifications with combinations of phrases, it is assumed that there is no syntax. Nor does there seem to be any system of symbolic representation except in the sense of the whole song conveying a message. It is thought that females respond to individual qualities in the songs of the males that relate more to the overall quality of the song rather than to any particular content. The quality of the song somehow communicates an essence of the male's being, its strength, age, size, vigor and so on. Thus, as far as we know, whales probably lack the elements that make true language.

Chimpanzees

Chimpanzees show the most promise in their linguistic abilities and the literature covering studies of the abilities is pretty extensive.47 Despite initial optimism among researchers that apes are capable of high levels of language skills, there have been great doubts among linguists. The training of chimps and gorillas to use sign language or more recently to operate electronic keyboards with symbols on the keys, is a recognition that apes lack the physiological wherewithal to articulate speech. The results of such experiments, despite their widespread reporting in journals such as National Geographic, are highly controversial. Much of the work on ape language learning has been described as wishful thinking. Indeed some researchers working with sea-lions and even African grey-parrots have attained similar levels of ability to that claimed for apes.[48]

In the wild or indeed in captivity chimps are highly communicative, with a wide range of behaviors, though their actual vocalizing is relatively limited. Such is the complexity of their social interactions that they need equally complex communicative systems. The level of such interactions appears to far exceed that of other so-called intelligent animals. The many studies and experiments with chimps reveal an actual linguistic level that falls short of full language. Chimps do not use syntax to structure sentences, but remain at the level of stringing phrases together. Furthermore their utterances are almost exclusively related to present situations. Perhaps most indicative is the simple fact that apes have to be trained to pick up human-like language skills, they do not do so out of curiosity or instinct. That is until the bonobo chimpanzee Kanzi appeared on the scene.

[47] See Savage-Rumbaugh, E.S., 1986 and 1992. Wallman, J., 1991, gives a review of the literature.
[48] Derek Bickerton, 1990, gives a full account of the differences between animal and human language and Steven Pinker, 1994, gives a damning judgment on ape experiments, as did the Channel 4 documentary "Sex and the Scientist" shown on August 12, 1996.

Bonobos are a very rare species of chimpanzee on the verge of extinction, which is why they are not normally used in language testing. Kanzi is the son of a bonobo trained in captivity and has astonished his keepers by breaking through many of the limits that appeared to restrict ape language ability. He spontaneously learned symbols by observing his mother being taught and learned to recognize and understand much of what the humans around him spoke. He could refer to things not present, including things that had happened elsewhere some time ago. Like many trained chimpanzees he is very good at using a joystick and playing video games—which probably tells us about the levels of mind engaged in such activities. Kanzi and his cousins in the wild, from what is known of them, appear to approach nearer to human levels of communicative skills than have the common chimpanzees and yet the gulf between animal language, even at its most subtle, and full human language appears to be not just one of degree but of order. One would have to say that if Kanzi turns out to be typical of his species and not some kind of ape genius, we would have to review our opinions, but the chances seem slight.

Communication or Language?

This is why researchers like Derek Bickerton see little sign of continuity from animal into human language. This is not to say that there is no connection. Indeed all the levels of animal communication described above find some parallel in human behavior. As Desmond Morris has shown in his *Naked Ape* and subsequent publications, much of human communicative behavior is akin to that of the animals, such as display, signalling, expressing our emotions in non-verbal ways—humans have quite a range of grunts, yelps, cries, not to mention the steamy range of pleasure-induced sounds.

Bickerton argues that human language does not have its antecedents in animal forms of communication but rather in earlier forms of mental representation. Communication makes use of language, among other things, but language is of a different order of phenomena. This view assumes that language is primarily an advanced system of representation. What does representation mean in this sense? According to Bickerton's theory everything that any sentient creature perceives is a representation and not reality itself. We perceive the world through our sense organs and the information that they pass onto the central integrating organ of the brain is in the form of electro-chemical activity. The sensory mechanisms in the brain consist of vast collections of neurons that respond or "fire" in certain ways. The sensory information is synthesized and categorized as relevant or not-relevant for the creature. On the basis of this activity we can then respond in some way. Whilst this is obviously a gross oversimplification, it nevertheless makes the point that no sentient creature directly perceives its surroundings in their totality. There is always a selective representation, determined by the nature of the organ perceiving—for example, the eye does not perceive many traits belonging to the object, such as its smell.

Furthermore, different animals perceive different things because their conceptual apparatus is limited to what is species-specific, in other words relevant to that animal's needs. Frogs "notice" things relevant to frogs but are oblivious to things that do not fit their program, including tasty insects if they remain motionless, since they only respond to moving insect-shaped objects. As I discussed earlier in the section on brain power, the brain creates a map "in here" of what is "out there." The categories an animal's nervous system is capable of representing form the framework for the map "in here." Evolution has provided each species with its own map of what for them constitutes out there, some extremely simple, others highly complex. The degree of complexity I have correlated with the degree of autonomy or emancipation, since the more complex the mental map, the more removed the animal is from its environment. And the more distance an animal has, and the less automatic its responses, the more options it has in its behavior. This makes it possible to make decisions and assess possible outcomes based on an evaluation of the information from the present compared with information contained within the system, categorized and stored in the memory.

Bickerton sees language as a higher representational system since it enables us to not only represent things that are of direct evolutionary significance, as do the mental maps of other species, but also to represent anything at all. Language is a system that makes it possible to go from perceptions to concepts, but not only concepts strictly related to our survival needs, such as the vervet's concept of leopard. We can have concepts of things for which we have no direct sensory data, such as angels. The linguistic referents that represent concepts such as "leopard" can be used to denote things quite different to the animal in the mind of the vervet. A concept, once linguistically formulated can stimulate new perceptions. Once we know of something we are more likely to see it. Equally a linguistic expression can evoke a new concept, a fact which poetry demonstrates.

A study of modern linguistics shows that whatever else language may be, it is clear that both the words, the lexicon of language, and the inherent syntactical structures constitute a representational system. It is also plausible that this system has its roots in the simpler representational systems that evolved in animals' neural apparatus. Language when it arrived was able to make use of the cognitive systems already in existence. The representational systems of the higher animals such as primates already have much of the infrastructure required by language. However, apes lack the grammatical and conceptual faculties to develop full language, as Sue Savage-Rumbaugh has shown with Kanzi, the bonobo trained to develop linguistic abilities. They can use and combine symbols and even form chains of "words" but stop well short of the complex language structures typical of human language.

The reason for this, Bickerton argues, is that only humans have transformed their cognitive representational system—not to mention the anatomical hardware of the vocal organs—to develop complex thinking and full language. Hand in hand with this development emerged what we experience as consciousness and a sense of self. Apes and other animals appear to have at best a rudimentary sense of self and limited states of consciousness.

Language and consciousness are related. As Bickerton put it,

> If language were no more than communication, it would be a process; consciousness is a state. But if language is a representational system, it too is a state. Moreover, if consciousness too is a way of representing to ourselves and the world around us, then it may be that the origins of the two are closely linked, and that by uncovering the one we may also uncover the other.[49]

What, then, brought about the quantum leap from advanced representational systems such as higher animals possess to full human language, complex thought and self-consciousness?

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[49] Bickerton, 1990, p24.

Language, the Breakthrough

Taking into account what we have established about the nature of language and animal communication, we can now examine what the evidence tells us about how and when humans developed full language abilities. If we assume that language did not merely evolve as a more complex form of animal communication, but leap-frogged onto the back of cognitive systems that had evolved to a high level in primates and other mammals, then we have a partial answer to the nature of the quantum leap that seems to have occurred.

There are several lines of approach to this problem. Firstly we would have to look at how representational systems were adopted for language and see if language acquisition in children gives any pointers to this process. Secondly the nature of language development may indicate how complex syntactical systems emerge from simpler linguistic forms. Then we would have to examine what is known of hominid evolution to detect when this transition may have occurred, and finally we need to look at what the fossils have in the way of indications of vocal ability. As a thread running through these various aspects, there is the question of the incarnating human spirit.

The concept of a primitive type of language, a proto-language, is extremely helpful in defining both sides of the gap that separates full language from other simpler modes, such as used in animal communication. It does not, though, actually build the bridge spanning the gap. One would have to see if there are known examples of such a proto-language and compare those with what we know of full language.

Proto-language as defined by Derek Bickerton describes a primitive form of language used by primates with advanced communicative behavior and particularly those that have been trained.[50] It is also spoken by speakers of pidgin languages that have developed among populations of people thrown together without a common language except that of a colonial power. Most pidgin languages have arisen as a result of conditions of plantation slavery or similar forced cultural dislocation, when assimilating the dominant language as normal immigrants do was not possible because of the rigid separation of slave workers from normal society. Pidgin languages often evolve over a generation or so into full languages known as Creoles, for the basic reason that children learning them as a mother tongue imbue them with the principles of universal grammar, which their parents were unable to do.

Proto-language is also spoken by individuals such as Genie, the 13-year-old girl discovered in California who had been imprisoned by her father and deprived of normal exposure to language, among other terrible deprivations.[51] Furthermore proto-language is spoken by all very young children before they acquire full language. What all these individuals and some advanced primates, such as Kanzi the bonobo, have linguistically in common is the ability to communicate vocally or by using signs and symbols but without any of the formal properties of language proper.

The Limits of Proto-Language

Proto-language lacks the formal structures of full language; for instance, word order that follows definite principles that determine meaning—in proto-language word order follows the speaker's subjective priorities. Typically proto-language is delivered in strings of words or phrases, rather than sentences. Ideas may be inferred though not

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[50] Ibid., p118.

[51] Curtiss, S., 1977.

overtly stated in full language, for example through the use of words such as it, you, him, those, or the use of passive constructions in which the "doer" is implied but not named or referred to directly. The principles of syntax make it clear what is being referred to and the linguistic role being played by any word in any given context. In proto-language this is not the case. In full language words, phrases and clauses may be expanded by all manner of attributes and linked into complex sentences by prepositions, conjunctions and so on. Proto-language consists in the main of referents with very few attributes and verbal phrases without formal structuring elements. Finally proto-language lacks all grammatical elements such as inflections, articles, question words, numerical referents such as some, many, and much more besides. Proto-language can certainly be used to communicate real situations but without the means to make syntactically clear who did what to whom and why; it is bound to be fraught with ambiguities which limit its usefulness to express complex thoughts.

As Wilhelm von Humboldt put it, language "makes infinite use of finite media." A finite number of linguistic elements can be combined to create any number of meanings independent of the narrow meanings of the original elements. Language is a discrete combinatorial system whose building blocks may be combined in countless ways and yet retain their basic identity. Proto-language lacks the system necessary to combine in this way. The building blocks retain their overt representational meaning and the intentions of the speaker have to be inferred by the listener—and watcher—from the speaker's gestures, attitude, general behavior and a foreknowledge of the situation. A child saying, "Pussy cuddle" or "Mary, too," has to be interpreted out of the situation.

Whatever its inadequacy, proto-language is still extremely useful as a means of communication. Furthermore, it bears within it a number of features that enable full language to be constructed onto it. It has the primary property of using referents for things, states and activities. It has, or one can imagine it developing, some elements of proto-grammar, that is, words that do not strictly refer to anything but give meaning to other lexical items, such as forms of negation, question words, some time- and place-related words such as the concrete prepositions: in, on, under, as well as, soon, before, and so on. Simple quantifiers such as many and few, may be part of proto-language.

Proto-language is assumed by Bickerton to be biologically innate and based on different neural networks than those on which full language is based. From an evolutionary point of view it is older and therefore more resilient since it lies "deeper" in our brains. The child under two years old uses it while acquiring full language. Individuals like Genie still have access to it despite the terrible traumas suffered and despite missing the developmental windows of opportunity true language needs to emerge. Patients suffering various forms of brain damage and who lose their full language ability may still be able to call on some elements of proto-language, as indeed any of us can when we lose possession of our higher faculties, in fever, in extreme pain, under the influence of alcohol or other drugs or even deep fatigue. These are all states where self-control is weakened, when consciousness weakens, where the ego is not active in language, and our speech patterns fall back onto earlier more instinctive habits.

The Origins of Hominid Proto-Language

If proto-language is innate and used by the child up to two years old—the stage of two-word sentences—then it seems likely that hominids had acquired this level of language too. Full language emerges in children, replaces proto-language, and then develops in the way I have described in the previous chapter. It is likely that in the phylogeny of our species language development broadly followed the ontogenous patterns we know from the study of children.

If proto-language evolved in hominids as a means of communication, it was probably vocal, with body language and gesturing as support as it is in young children. What then, in the course of evolution, brought about the transition from proto- to full language?

Language consists of a lexical element which is structured in hierarchies of categories—such as those that link the concept "tree." These range from this tree outside my window through birch trees, oak trees and so on, to trees in general as in such phrases as, trees provide shade or trees are different from bushes. The category "tree" itself is subsidiary to the category "plant" which comes under the heading "living organisms," and so on. There is a clear correspondence between this hierarchical structuring of words and concepts and the kind of representational mental mapping that evolved in the nervous systems of animals to process their sensory data and corresponding responses. As discussed above animals need to similarly categorize their experiences—frogs responding to moving fly-shaped objects but not stationary ones, or vervets making a leopard alarm cry on the appearance or assumed appearance of a leopard. It is therefore conceivable that lexical elements of language could have built on existing representational neural structures.

But language also has its syntactical side. Syntax orders and sequences lexical units in meaningful ways. Even simple cognitive processes must link categories in systematic ways. The co-ordination of movement, of hand and eye in manipulation, of hearing and locating the source of the sound, in balance and so on, all require a mapping process. Having a map is only part of the solution, knowing how to get from A to B, how to connect C, D, and E and so forth, is the other faculty required. Could it be that this element of representational systems provided a foundation structure that could adapt to the demands of syntax? Perhaps this explains the close link between the centers of movement control and certain language centers? It appears that Broca's area of the brain, long associated with language and now thought to relate to grammatical processing, is adjacent to a large area of motor control.

In fact recent experiments by Marcus Raichle of Washington University have shown that Broca's area and related parts of the brain at a deeper level, are associated with co-ordinating complex actions involving both the hand and vocal organs.[52]

This does not explain the origin of syntax, it merely suggests that when syntax evolved, it could utilize existing neural structures with comparable functions. This enables us to envisage that the emergence of full language did not necessitate wholesale new structures in the brain. To recall what I said in the previous section, language has a twofold origin; it arises on the one hand out of the bodily organization and on the other it is a property of a higher order of being, namely out of the human spirit which is a vehicle for the Logos, the cosmic Word.

Who Spoke First?

Looking over what we know of hominid evolution it seems likely that hominids possessed some form of proto-language from early on. Tool making procedures share many features in common with proto-language. Making tools involves, as I have discussed, sequences of activities and simple mental templates for processes and forms.

[52] Quoted in Walker, A., 1996, p216.

Most of these processes involve repetition and chains of activities, finding suitable stone or other materials, preparing it, shaping it, retouching or modifying and so on. However, even admirers of hominid tools would be forced to admit that there is little development of the basic tool kit over long periods and most of them are fairly monotonous in form. If the kind of accumulative feedback that characterizes language acquisition were true of hominid tool production, we would expect more innovation and development. It would be fair to say that artifact production, from its earliest appearance in Homo habilis to the appearance of Mousterian tools with the Neanderthals, shows a few significant innovations followed by vast periods of stasis. One need only think of the Acheulean biface or hand-axe staying in fashion essentially unchanged for a million years or more. In other words if cognitive skills matched language skills then most early hominids remained at the level of proto-language.

This does not mean that such a proto-language would not evolve. It probably acquired a progressively larger vocabulary and increased flexibility in its usage over the course of many generations. There were, however, finite limits on its development, limits inherent in proto-language itself.

Tool Use as an Indicator of Language

In terms of other behavior, it would seem that, other than the simple tool production that clearly marked the habilines, the really significant changes in human behavior patterns came with Homo erectus. With a much greater range of habitats, more sophisticated hunting and foraging life styles, extended infant dependency and all the other features of erectus life that I have described above, it would be reasonable to expect language innovation with erectus. The significant increase in relative brain size of erectus probably indicates greater cognitive capacity. Perhaps the evolution of language abilities was a contributing factor in erectus brains becoming larger.

Language is a formative force in itself and together with all the other factors related to brain size that have been discussed, it could be that language played a decisive role. Indeed the achievements of erectus without some language ability seem implausible. It is possible to imagine australopithecine and even habilis life without proto-language if we assume cognitive skills and communication patterns at least as complex as those known to be possessed by recent primates and other mammals. After all, even these hominid species had relatively larger brain capacity than any other known species. It is therefore reasonably safe to assume that language formed the adaptive gulf between erectus and its predecessors.

Erectus Language Ability

The question is not whether erectus had language but how much and of what kind. The evidence I have referred to above seems to point to a level of proto-language for Homo erectus. Their relative brain size was still well short of modern levels, the degree of technical innovation during the one and a half million years of erectus' span was modest and conservative. Their greatest achievement seems to have been the use of fire, a step well within the proto-language range of conceptual thinking. But there are still no signs of cultural development of the order we associate with full language.

One interesting physical indication of erectus language ability comes from the detailed study of the Nariokotome Boy.[53] Alan Walker, who was responsible for the

[53] Ibid., p211–214.

anatomical description of the fossil, noticed that the holes in the vertebrae, the vertebral foramen, through which the spinal chord passes, were small in comparison to modern anatomies. Given that erectus were of comparable body size to modern humans and probably even more mobile, the small size of the spinal chord was puzzling. This would imply that either the boy had less motor control, which seemed unlikely, or that there was less sensory information passing to the brain from the lower limbs and upper body, which also seemed unlikely. The conclusion Walker and his team came to was that the boy, and by implication erectus generally, lacked fine control of the intercostal muscles that move the ribs and thus control breathing.

Without this fine control of the breath, full articulated speech is not possible. From a physiological point of view, erectus possessed the capacity to vocalize at a level necessary for proto-language but probably insufficient for full vocal language.

Homo Sapiens Spoke

From a cultural-technical point of view, the first indications of conceptual breakthroughs belong to the erectus-sapiens threshold, with archaic Homo sapiens (or Homo heidelbergensis—I shall discuss this terminology in the next section). From the point of view of social, behavioral development, this transition also seems a fruitful place to start seeing the origins of full language. However, it is only with the arrival of anatomically-modern Homo sapiens that full language may be assumed and only since about 40,000 years ago that we have any real evidence for complex culture, use of abstract symbols (Ice Age art), major technical innovation—of which much later in the final chapters of the book.

The Fossil Evidence

What about the hard evidence, the fossils? In studying the fossil evidence for anatomical indications of speech ability, the structure of the base of the skull is important, as this reveals the shape of the palate. Where the soft body parts do not fossilize, the points at which muscles attach to bones do give some indication of their size and position. The physical preconditions for producing human speech give some indication as to how bone shape can be "read" to deduce vocal ability.

The flatter the base of the skull along its middle axis, i.e. the roof of the mouth, the flatter therefore the tongue lies in the mouth. The flatter the tongue lies in the mouth, the more of it fills the mouth. The more the tongue lies in the mouth, the higher the larynx is in the throat. In humans the larynx lies deep in the throat and the tongue falls back in the throat and is thus rounded. The roof of the mouth, the hard palate, is particularly arched to accommodate the rounded shape of the tongue. The extent of the arching is therefore a measure of the shape of the supra-laryngeal airway and, therefore, an indicator of language ability (see Fig 6.9).

Given the known shape of the cranial base of numerous skulls, and in some cases the mandible (lower jaw), it is possible to reconstruct hominid airways with the help of computer modelling. The first thing to note is that uprightness and the degree of verticality of the head have a definite effect in altering the shape of the throat and the angle between the throat and mouth. Being upright causes the larynx to slip down the throat and makes a ninety degree bend in the supra-laryngeal tract into the mouth. So, in a very real sense, language is related to uprightness.

Charles Darwin was the first to point out the evolutionary price we pay for the ability to speak.[54] In mammals and human babies the position of the larynx high in the throat prevents food and drink from falling into the windpipe or trachea. In humans,older than about four months, the larynx is lower, and we continuously run the risk of choking on our food. Choking is statistically the sixth most common cause of death, a fact which gives some indication of the evolutionary nature of adaptation—namely that there is often a trade-off in function and this trade-off is not necessarily adaptive in the positive sense.

There are other complications for our anatomy in having this arrangement. The palate, in being arched, is considerably shortened, thus leaving less room for the teeth. This general shortening of the mouth leads to the increased risk of tooth impaction leading to abscesses and infection, not to mention overlapping of the teeth. Modern dentistry and orthopedics have reduced the risks, but many children pay the price (not least the parents who pay the financial price) of wearing braces to correct the damage.

From the study of fossil skulls it is apparent that the necessary flexion of the base of the cranium to meet the preconditions of fully articulated speech is first noticeable in Homo sapiens. Some early archaic sapiens specimens, such as the Steinheim and Petralona skulls[55] and some Neanderthals, too, show indications of the necessary degree of flexion . However the full degree of flexion is first established in the earliest Modern skulls such as those from Qafzeh in the Middle East. It would seem, therefore, that hominids up to early members of our own species lacked full language ability, that Homo erectus, archaic Homo sapiens and Neanderthals were capable of varying degrees of proto-language, but that full language appeared (or could be heard) with Modern Homo sapiens.

Stand Up and Speak

We should not of course forget in this account of the evolution of language, the fundamental factor of uprightness in language acquisition. I have already mentioned the anatomical and psychological implications of uprightness in human evolution in previous chapters. Let me stress the specific consequences for language development.

Bodily position and uprightness in particular influence, if not actually determine, our relationship to the world around us. Being upright and facing the world with bifocal frontal vision give us the perspective from which to categorize and name the things in the world. Pathological conditions which affect and destabilize body-posture are known to have a retarding effect on language development and general psychological development.[56]

Uprightness, as we know, had the consequence of freeing the hands. This had, in the course of evolution, the further consequence that the mouth was no longer needed to function as a manipulative tool in feeding or in holding, as is the case with other primates. Even Neanderthal people appear to have used their teeth as vices in the working of animal hides, as evidenced by extreme tooth wear at the front and powerful jaw muscles. Freed of these functions, the muscles reduced considerably, and in some cases reduced to practically nothing. Modern humans have much weaker jaw muscles than in all earlier

[54] Darwin, C., *Origin of Species*, p191.

[55] Stringer and Gamble, 1993, p90.

[56] See König, K., 1984, *The First Three Years of the Child*, p172, and 1997, *A Living Physiology*, chapters on the sense of balance and movement.

hominid species. This loss of specialization enables the muscles and other organs of the mouth to have enormous flexibility in the embryonic and infant stages, due to their very unformed nature.

As we have seen, the process of acquiring language in the young child actually helps form and structure the unformed organs. This would not be possible to the same extent if the muscles had largely predetermined functions. In the course of the ontogenetic development of the child, the organs of the mouth transform themselves from their primary functions of sucking, eating, drinking and so on. Such a transformation is only possible where there is great plasticity and flexibility of function. This fact of human evolution has long been known. It was most clearly expressed as long ago as the fourth century when Gregory of Nyssa wrote in his *Sermones de Creatione Homini*:

> Thus the Spirit created this arrangement like a musician in us. Without a doubt we would never have benefited from this advantage if our lips had retained the heavy burden of meeting the nutritional needs of the body. Yet the hands have taken on this burden and freed the mouth in order that it could serve the needs of speech.[57]

The Hand Frees the Mouth

It was Andrè Leroi-Gourhan who first fully examined this phenomenon in terms of modern anthropology in his seminal work *La geste et la parole* (*Hand and Word: The Evolution of Technology, Language and Art*) in 1964. Leroi-Gourhan saw this as a fundamental evolutionary trend in vertebrates.[58] He demonstrated a complex correlation in the evolution of the major organs, the mechanical organization of the spine and the limbs, the way the skull is attached to the spinal column, the teeth and mouth, the hand and finally the brain. He describes an evolutionary trend towards the integration of the two complementary "forward relationary fields," that is to say the facial and manual poles. He saw one trend towards an integration of these two fields, the face and hands, leading to a freeing of both organs for higher functions. The other trend was the development of the anterior limb extremities, the front feet or hands as advanced organs of locomotion, as in the wings of birds or bats.

Animals belong more or less to one tendency or other. Cats, for example, use their front paws not only for running but also for catching prey, whereas dogs have more powerful jaws but cannot manipulate their front paws to the same extent.

Furthermore Leroi-Gourhan showed that it was the initial impetus of uprightness that determined most of the characteristic features of human anatomy, including manual dexterity, large brains and small mouths, the essential prerequisites of language. Wolfgang Schad has subsequently shown that developments in the motor system always preempt those in the central nervous system in evolution.[59] The trend then towards encephalization, or relatively larger brains, was stimulated by developments in the limbs, first the feet, then the hands and fingers. This trend was accompanied by a loss of "limb" function of the head and in particular the mouth and lower jaw. As ever, we note that the characteristics of one organ within an organism cannot change without a corresponding adjustment throughout the entire organism.

[57] Quoted in Leroi-Gourhan, A., 1964, p 42.
[58] Ibid., Chapter 2.
[59] Schad, W., 1992.

Language and Culture

As we have seen, language is a matternot only of hardware but even more crucially of software. The leap from proto-language to full language was of such an order that no gradualist account can do it justice. It could not have just gradually become more effective, otherwise other primates would have made the transition too and there is no evidence of their having done so or doing so. Whichever way one looks at the problem, it involved the kind of evolutionary change that could only be brought about by cultural, that is to say, spiritual factors. The alternative is to believe in some crucial mutations of such complexity that no one has yet been able to provide a reasonable explanation of them. Biological adaptation provided the means of expressing this new formation, but the impulse to evolve full language and its conceptual corollaries could only have evolved through inner forces of the kind that express themselves in culture. Language evolved when mankind needed it to express our elaborate needs and only when we were ready to do so. Language evolved in tandem with society and at the pace that human faculties permitted. It also shaped both society and human faculties.

William Noble and Iain Davidson argue that "there can be no such thing as culture without language and the socially determined sharing of meaning and value."[60] This begs the question as to what culture is. They see no meaningful culture before fully modern humans. In terms of outer culture, as identified by archaeologists, they are probably right. Culture as an expression of spirituality may predate Upper Palaeolithic art and artifacts, but it will not, in geological time, be that much before it. As soon as humanity began to take hold of materials, transform them and create not only practical tools out of them, but representations or symbols, as soon as people began to consciously set out to live in other places and solve complex problems such as boat building and using unfamiliar food resources, and as soon as it became necessary to communicate inner questions, discuss things not immediately present, then full language emerged.

The Logos was there waiting, as it were, for humanity to have the means to express it, as Jos Verhulst put it (in Chapter 5). And yet even that metaphor is too passive. As a spiritual formative force, the Logos helped form and shape and structure the organs and processes that make language possible. The capacity to express the Logos came with the incarnation of the "I," which is another way of saying when the human being had emancipated him- or herself sufficiently from biological determinants to give expression to the spirit.

Language gave mankind the freedom to escape from the tyranny of the present. It gave humankind a means to conceive and to articulate the past in the form of conscious memory and mental pictures. It opened up the future by giving humankind a means to express wishes, intentions and hopes. Language gave us the means to construct complex systems through combining categories. It also vastly speeded up the process of learning and cultural transmission. It gave the mind a space to expand into, a space that reached back into the past and some way into the future.

[60] Noble and Davidson, 1989, p137.

Chapter 7

The Ancients: an Overview

In this chapter I shall briefly summarize the essential facts of the fossil record of hominid evolution. The reader is strongly recommended to refer to the works listed in the bibliography, which provide excellent accounts of more recent human evolution. I focus mainly on those areas of interpretation where the anthroposophical approach has a contribution to make. To start with I offer a brief overview of the story so far. Broadly speaking human evolution falls into the following phases:

Earliest Phase: Between 8 and 5 million years ago a common ancestor to the hominids and the living African apes emerged as an upright ape-like form inhabiting the fringes of the savannah zones of the East African Rift system. Ape species were in decline, while monkey species were radiating.

Hominids:
7.0 mya appearance (in the fossil record) of *Sahelanthropus tchadensis*
6.0 mya appearance of *Orrorin tugensis*
5.8 mya appearance of *Ardipithecus ramidus kadabba*
4.4 mya appearance of *Ardipithecus ramidus ramidus*
4.2 mya *Australopithecus* diverge into a range of omnivorous and herbivorous species
(including *A. aethiopicus, A. robustus, A. boisei, Paranthropus*, etc.)
4.1 mya appearance of *Australopithecus anamensis*
3.8 mya appearance of *A. afarensis* and *A. bahrelghazalia*
3.5 mya appearance of *Kenyanthropus platyops*
3.5 mya appearance of *A. africanus*
3.2 to 3.5 mya appearance of *Kenyanthropos platyops*

Second Phase: 2.4 to 1.5 mya A new genus, *Homo,* emerges in Africa and diversifies into a complex of different forms including *Homo habilis*, *Homo rudolfensis*.

Third Phase: 1.9 to 0.5 mya *Homo ergaster* evolves in Africa and spreads to Eurasia, forming distinct regional types, including *Homo erectus* (typically in Eurasia but possibly migrating back into Africa) and somewhat later *Homo antecessor* in Europe. These are the phases already described in previous chapters. There follow two subsequent phases, yet to be described.

Fourth Phase: 0.6–0.2 (0.1?) mya *Homo heidelbergensis* (also referred to as *archaic Homo sapiens* and even *Homo presapiens*) emerges, probably in Africa but possibly in Eurasia. They spread throughout Africa, Europe, Asia and the Far East forming at least three regional populations referred to as the Neanderthals (*Homo neanderthalensis*) in Eurasia, the Mabas in East Asia and early Moderns in Africa (with a probable fourth group in India known only at present by their stone artefacts).

FifthPhase: 0.15 mya to the present. Modern humans emerge in Africa and spread around the world, replacing and (possibly) absorbing existing earlier populations.

Fig 7.1 *Table showing the main phases of human evolution (after Tattersall and Schwartz 2002).*

The above chart summarizes an overview of current thinking and includes some simplifications. The variations in terminology reflect current uncertainties in classification, particularly during the Fourth Phase. The various regional populations represented by fossils in this group are all generally regarded as Homo sapiens though only the African group is considered by most anthropologists to be the direct ancestors of modern humans. Some authors prefer the term Homo heidelbergensis (named after the famous mandible from Mauer near Heidelberg in Germany) to describe the Homo group that preceded both the Neanderthals (and the Mabas, their Asia equivalents) and the Moderns.

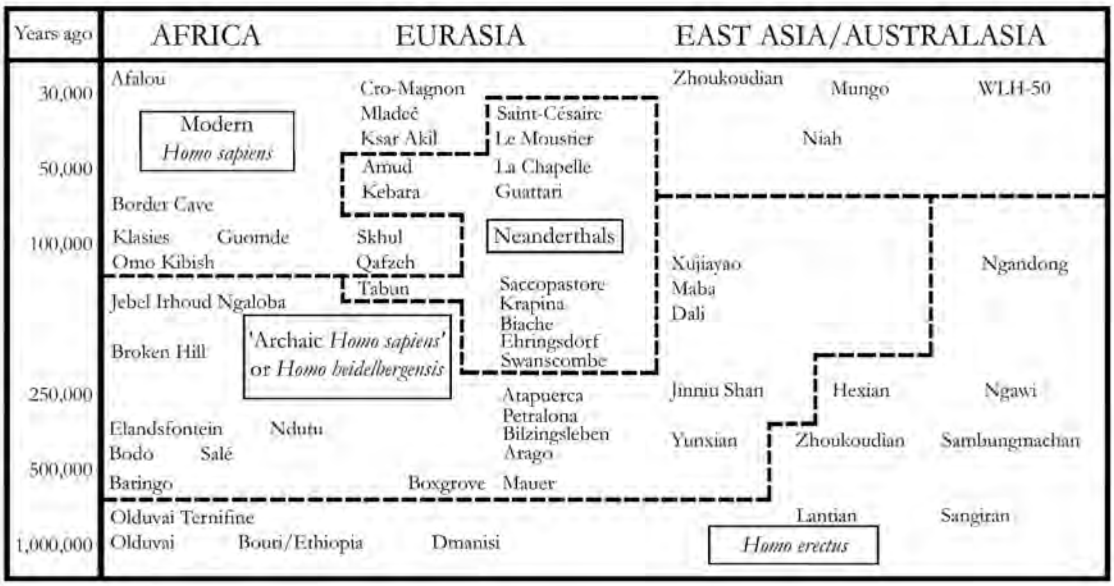

Fig 7.2 *Chart showing the main fossils in the Fourth and Fifth Phases in Africa, Eurasia and the Far East and Australasia. The names record the best known fossils in each hominid group (after Stringer and Gamble, Stringer, and McKie).*

Changing Views about When Europe Was Colonized and by Whom

Some ten years ago the picture of the phase following the spread of erectus around the Old World was relatively simple, if somewhat sparse. A handful of key fossils seemed to indicate the modification of erectus into Neanderthals and then Moderns within the past 200,000 years or so. This picture has become considerably more complex with the remarkable discoveries that have been made, largely in Europe but also in Asia, Africa and Australia. Not only are there complex issues of physical evolution and taxonomy and questions about which species were most closely related to each other (and whether interbreeding occurred), but there has also been a significant revision of our understanding of the technical and cultural capabilities of the peoples who lived during this period.

As things stand at the moment most of the major discoveries have been made in Europe once again, after the bright lights of public attention had been drawn to Africa and Australia. The remarkable discoveries in the Pit of the Bones (La Sima de los Huesos) at Atapuerca in northern Spain have challenged anthropology with a wealth of data.

Not only have the remains of some 30 individuals, mostly adolescents, been discovered within a remote cavern system, but many more are likely to be found. The news from the Pit of Bones has emerged painfully slowly because of the incredible inaccessibility of the site. Tons of debris have had to be removed by rucksack up a 30-meter shaft by wire ladder and transported by hand to the surface; the archaeologists have had to work in a tiny space with oxygen pumped in to sustain them. Yet the fossils coming to the surface provide a huge amount of new anatomical evidence for the anthropological community to digest.

As well as the Pit of Bones, highly significant finds have been made all over Europe, some human fossils, some working and living sites of early Europeans and some exquisite artifacts.[1] The most noteworthy finds include the Boxgrove site in Sussex, England, which has revealed few hominid fossils but extremely well preserved butchery sites with many tools, especially high quality hand-axes, dated to about half a million years ago. At Schöningen in Germany several finely crafted wooden spears and living sites have been found in a brown coal mine, dating to around 400,000 years ago, a find that has radically altered our view of early hominid technical capabilities and social and cultural levels. At Altamura in southern Italy, an almost complete Neanderthal skeleton has been found in a sink hole, so encrusted with crystals that it has so far proved impossible to extract it from the rock. In Ceprano, south of Rome, a skull was found with several assemblages of tools that date back before 780,000 years ago. And Gran Dolina, near Burgos in northern Spain has revealed hominid bones and tools all older than 800,000 years. Finally the very recent discovery of a Neanderthal child on the Atlantic coast of Portugal has thrown open once again the question as to the fate of the Neanderthals.[2]

One Very Diverse Group of Early Homo Sapiens

All these discoveries have pushed back the dates of European colonization to around a million years ago. The Pit of Bones fossils in particular pose the greatest questions of anatomical relationships as they seem to show traits distinctly like those typical of the Neanderthals. These fossils seem to confirm the view that all the European fossils prior to modern Homo sapiens in fact belong to one quite varied group including the early and late Neanderthals and the Mauer fossil, which gave its name to the Heidelbergs, though some researchers feel the earliest fossils are in fact Homo erectus.

Recently there was a report of the new discoveries at Gran Dolina in northern central Spain. The Spanish researchers claim that the evidence shows humans in Europe earlier than 780,000 years ago. What is more, the identity of these fossils is uncertain. The leader of the Spanish team is quoted as saying, "The Gran Dolina hominid fossils cannot comfortably be accommodated in any of the defined Homo species."[3] This uncertainty highlights the difficulties of making any clear statements about the history of human colonization in Europe at all! As the Pit of Bones evidence shows, the morphological variation at one site is so great that the upshot of all the classification debates seems to be that wide variation is simply a characteristic of early Homo sapiens and perhaps

[1] A well-illustrated summary of these recent finds can be found in the *National Geographic* series "Dawn of Humans," in Vol. 189, No. 1, January 1996 and Vol. 192, No. 1, July 1997.

[2] See Robin McKie, 2000, *Ape Man*, p186.

[3] Quoted in an article by Rick Gore in *National Geographic*, July 1997, Vol. 192, No. 1.

of humanity itself. The general consensus is that the Neanderthals evolved from representatives of descendants of H. heidelbergensis (also known as archaic Homo sapiens).

Modern humans, as we shall see, arrived from outside at a very late date and do not seem to have been a continuation of a European evolutionary stream. As we have seen, the earliest hominid fossils in Europe such as the Ceprano skullcap or the Gran Dolina remains, however, appear to be distinct from the Heidelbergs whose earliest representative is the Mauer specimen. Just what the relationship was between these early Europeans and African Homo erectus must at present remain an open question as must the evolutionary relationship between the Early Europeans and the Heidelbergs. Whatever the case the Heidelbergs marked a new phase in human development.

Furthermore these new discoveries have both challenged our understanding of the genetic relationships between the different fossils and provided ever earlier evidence of human-like behavior, long thought to have been impossible before the appearance of Cro-Magnon people in Europe around 35,000 to 40,000 years ago. I shall discuss this aspect below.

The Heidelbergs

The humans of the Fourth Phase (Homo heidelbergensis, or simply Heidelbergs) primarily distinguished themselves anatomically from Homo erectus by a significant increase in brain size and a changed skull shape including a reduction in tooth size. Chris Stringer characterized the differences as follows.

> Brain size [is] larger than typical erectus, housed in a flat, long but more elevated brain case, expanded higher up in the parietal region. In rear view they resemble the outline of a conventional house as opposed to the rather sagging tent shape of H. erectus, the slightly squashed sphere of Neanderthals, and the distinctive modern form of a house wider across the roof than the ground floor.

In terms of behavior, the Heidelbergs seem to have continued the successful foraging strategies practiced by erectus for well over a million years but show a marked increase in hunting skills and use of materials. The first significant changes appear, as ever, in the evidence of stone artifacts.

Cores and Flakes

On the basis of categorizing stone tools, archaeology has long divided human prehistory into three main periods, the Lower, Middle and Upper Paleolithic. In African archaeology the equivalent stages are known as Early, Middle and Late Stone Age. The Lower Paleolithic extends backwards to about 1.5 million years ago in Africa. The pebble tools before that date are referred to as Olduwan. They date back to 2.5 million years ago, as we have seen above.

The typical artifacts of the Lower Paleolithic (known as Acheulian after the French site of St. Acheul) are the biface or hand-axe and the chopper as well as pebble tools and flakes (shown in Fig 29). Around 250,000 years ago the transition to the Middle Paleolithic was marked by a decline in the size and dominance of the hand-axe and the gradual emergence of more knife-like tools typical of what is known as the Mousterian culture, though isolated examples also appear much earlier.

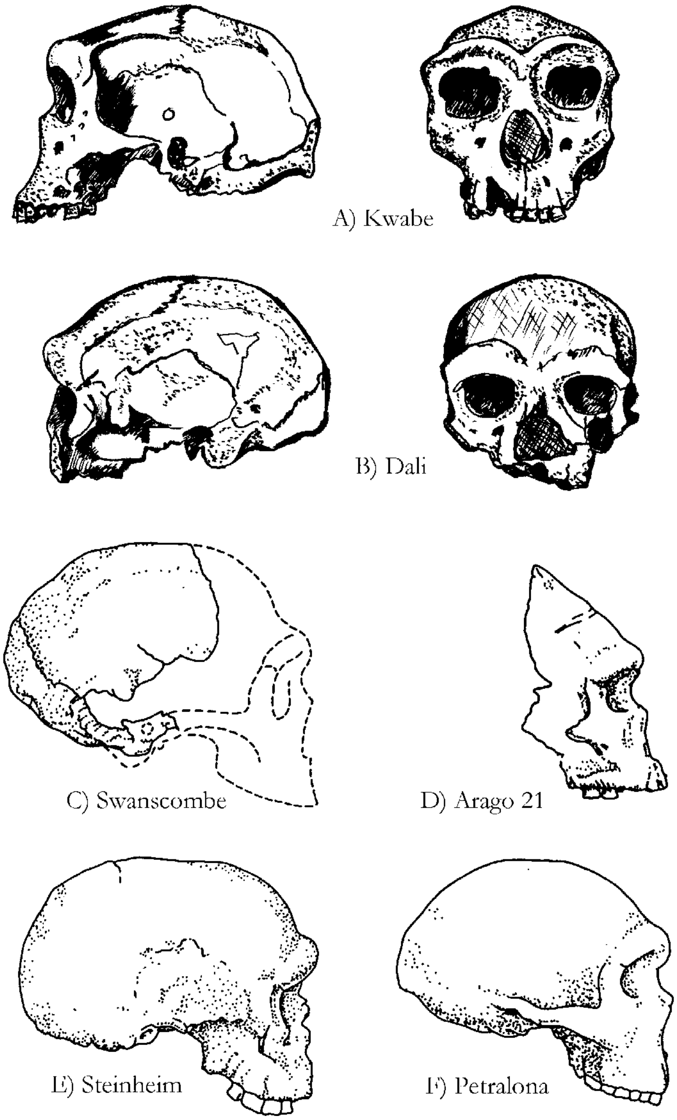

Fig 7.3 *A range of fossil skulls in Phase Four, usually identified these days as Homo heidelbergensis: A) skull from Kwabe in Zambia (formerly known as "Rhodesia Man"). It is of very uncertain date (photo of cast by author). B) the Dali skull from China, a late example of H. heidelbergensis. C) Swanscombe, United Kingdom. D) Arago 21, France. E) Steinheim from Germany. F) Petralona from Greece.*

Changes in the stone-working traditions were rare through the vast stretch of time that we call the Paleolithic. Once archaeology freed itself from the nineteenth century concept of technical progress, it became apparent that changes in production methods are not always or only the result of attempts to make the process and the end product more efficient. The way people make things reflects as much their state of consciousness, their relationship to the material, their sense of form and many other non-rational experiences. The sharp flakes of stone produced in a few seconds by striking two pebbles together are just as efficient at slicing through animal sinews or hides as the blades made by recent hunter-gatherer peoples requiring a level of skill learned only through long practice. A few experiments on the beach with pebbles make this very clear.

Fig 7.4 *Typical Mousterian tools (after Bilsborough p192 and Lewin p117)*

Then what do such changes as those which characterize the Middle Paleolithic tell us about the consciousness of the Heidelbergs or archaic Homo sapiens? Generally there are two fundamentally different methods for the in the production of stone tools. The first makes use of a suitably sized and shaped, naturally occurring pebble or lump of rock. Basically, pieces are removed by striking or pressure until the desired shape is accomplished. The simplest types of pebble tools need only a few fragments to be struck off to create a cutting edge, a fairly minimal alteration to the original natural shape of the stone. The classical Acheulean hand-axe is made by the same principle, only many more chips or flakes were removed and the edges sharpened by precise retouching. The opposite method makes use not of the core stone but the flakes themselves. The core is reduced to produce one or more smaller flakes and is then discarded as waste. The modern science of refitting has produced many painstaking reconstructions of worked stones found at a particular site—much like a three- dimensional jigsaw—to reveal exactly how all the various working stages proceeded.

Both techniques, shaping the core and working the flake, have been used since the earliest times in practically all stone artefact assemblages. Nevertheless a general trend towards the dominance of the flake-tool is marked. From the end of the Acheulean onwards the proportion of flake tools within the whole range and the variation of designs have increased. By the Upper Paleolithic, from around 40,000 years ago (and earlier in Africa), flake tools are almost exclusively in evidence.

These two archetypal methods of working imply quite different attitudes to the task at hand. Producing a core tool is a kind of clarification of an existing condition of unity. The maker experiences the wholeness of the form and need only remove the imperfections that disturb the whole. The process is more focused on the matter in hand, literally, and ignores the scatter of waste material (except for ensuring that the flying splinters do not hit one in the face). The toolmaker can identify him- or herself with the unity of both form and activity.

The Levallois Technique

A quite different consciousness is called upon with a flake tool. The reduction of the whole to parts, which are the focus of attention, is basically an analytical process. The whole becomes subsidiary to the parts, indeed the whole becomes only the means to utilizing the parts. In the Middle Paleolithic technique known as Levallois (named after a Paris suburb where these forms were first identified), the desired flake tool was carefully prepared on the core and then separated by one accurate blow into an almost finished state. The remaining tortoise-shell shaped core was then discarded.

In order to produce a Levallois point, for example, the design must have already existed to a high degree of completeness in the maker's mind as a pattern or model and a series of rational and skillful steps followed in the production. The skill required in making a Levallois point seems to exceed strictly functional requirements. Arguably the same level of technical effectiveness could be achieved using less demanding means.

With the Mousterian (again named after a French location), the quintessential Middle Paleolithic technology, an increasing degree of specification was applied to the range of artifacts. Flake tools had been produced from the earliest times and they were no doubt effective. However no specific form patterns emerged and a fairly wide range of seemingly random shapes were used for cutting, scraping and other less easily defined functions. With the Mousterian it is possible to classify groups of similar artifacts into categories such as transverse scraper, bifacial scraper, point, backed knife, saw-edged flake and so on. These tools conformed not only (on the whole) to clear functions but they were tailor-made to fit the hand and even take account of left-right handedness. The great French lithic expert Francois Bordes classified sixty-three types of flake tools and twenty-one types of hand-axes for the Middle Paleolithic.

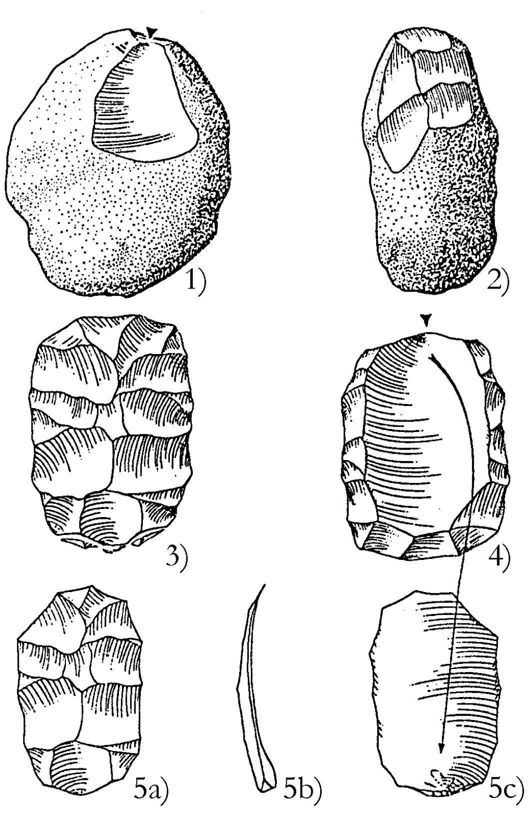

Fig 7.5 *This drawing shows the Levallois technique of making flake tools.*

Too Many Types

Recent work has changed this somewhat artificial and static view of types by identifying a more dynamic aspect of technology. Harold Dibble has shown that flakes were continuously retouched to renew their working edge to the point where the original form was quite lost.[4] The various stages of this process account in some cases for up to three of Bordes' separate categories. Nevertheless this does not change the point that "tools for the trade" was characteristic of Middle Paleolithic attitudes, indeed it stressed the element of deliberation and careful economic use of valuable material. On the other hand much of the material Bordes and his generation considered waste has proved under microscopic examination to have been used for cutting wood, shredding plant fibre and so on.

From Universal Tool to Tool Kit

The trend from the Lower to Middle Paleolithic is characterized by the loss of the unity of form and the emergence of a more asymmetrical and varied range of forms. Core tools were replaced by flake tools. Furthermore the trend in flake tools was away from chance shapes towards a more planned, functional and utilitarian approach. The decline of the classic hand-axe, both in shape and in frequency of occurrence was symptomatic of the transition. Wolfgang Schad has offered an analysis of this process with regard to the sense of form.

> With regard to the question of form, we see the individual elements of the hand-axe being taken apart: the scrapers emphasize the element of the surface or plane, the blades demonstrate a striving to attain the most linear edges possible; the points and burins achieve the element of point even more effectively than the old hand-axe. What characterizes this development is not the unifying of all spatial qualities in one form, which the hand-axe typified, but the opposite, their separation from each other. It is not the synthesis that is strengthened but the analysis. These tools taken together are a dismantled hand-axe![5]

Steps on the Way to a Differentiation of Cognitive Abilities

It would be premature to assume that analytic thinking emerged in the Middle Paleolithic or even Upper Paleolithic in the sense we experience it today. And yet the initial trend is clear. The analogy with the developing human being shows us that the emergence of thinking even within the life of one person is a subtle and variable process. The value of the analogy lies not in a simplistic comparison between prehistoric people and modern children. Even applying this comparison to the ethnology of recent hunter-gatherers is fraught with dangers.

The anthropology of the human being as a threefold interaction of body, soul and spiritual being shows that consciousness relates to all three realms in a dynamic way. For this reason one can speak of an unconscious intelligence expressing itself through limb activity, without which we could hardly walk upstairs. In the activity of walking, once learned, our limbs are engaged in an almost fully unconscious integration with the

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[4] Dibble, H.L.,1989, quoted in Stringer and Mellars (eds.), p332.

[5] Schad,W., 1988, in *Mitte der Erde; Israel im Brennpunkt der Natur und Kulturgeschichtlicher Entwickelung*, edited by A. Suchantke, Stuttgart, p354.

immediate environment. We experience the complex co-ordination of muscles as almost automatic in response to sense perceptions of which we are hardly aware. This is true of most habitual movements and actions. I can think about the content of this sentence without having to focus too much on the muscles involved in moving my fingers as I write. That I can more or less spell correctly and even fill the page with parallel lines of writing of similar size and shape (even on blank paper!) calls other sense and motor processes into activity. Because I am an individual endowed with a unique biography my handwriting has its own characteristics. At the level of style and thought content, still other parts of my being are engaged, emotional and cognitive.

I labor the point (perhaps another characteristic …) in order to establish that a polarity exists within myself between a willed activity where little consciousness is called for and a cognitive activity highly dependent on consciousness. Between them mediates a middle way, a point of reference and orientation. At one pole, in my limb activity, I am, relatively speaking in a synthesizing relationship with the world outside me. I'm engaging in it. At the other pole I have to withdraw and analyze. The one gesture is sympathetic, more or less at one with the material of the world (paper, pen, desk, etc.); the other is antipathetic.

To return to the polarity of core and flake tools one can see a parallel with the two poles of human consciousness. In the development of the human being the state of early childhood is one in which the child lives strongly in its bodily relationship to the environment. It feels its own body as world and the distinction between self and world as one without barriers most of the time. The child is not only a "wholly sense organ" it lives strongly in its unconscious will forces. The adult on the other hand has developed the mediating focus of "I"-consciousness and has developed a comprehensive cognitive and reflective faculty. In the shift from core to flake technologies we see one symptom of a emerging "I"-consciousness, directing as it were a more cognitive and analytical quality into the will activity of the hands in the making of stone tools and no doubt much besides.

Seen in this light, the activity of working in stone is at the same time an expression of the inner state of consciousness and the schooling of those inner faculties. The major revolution that occurred with the Upper Paleolithic, both in stone technology and in many other respects, marked a profound awakening to the world and presumably a profound loss of the radiance of the spiritual world. It really was like being cast out of paradise, a loss of innocence. Not that living in the Middle Paleolithic was, in our terms, like living in Paradise! Far from it. But in terms of awakening human consciousness, the shock to the soul of early people must have been dramatic.

There is nothing really in our experience to compare the state of mind of a Heidelberg human. Comparisons with animals are clearly not appropriate. These humans were just that, namely human. The Heidelbergs may not have possessed much in the way of self-consciousness but they were not animals. They possessed even then a spiritual core which linked them to a spiritual world.

Consciousness without Full Language

This is an issue in which anthropology shows its limitations. It has certainly recognized the humanness of Heidelberg behavior but cannot quite form a picture of what kind of beings these people were, essentially because it has a very limited basis for understanding what it is to be human in the first place. The brain capacity of Heidelberg people was certainly great enough for the human mind to have evolved as an instrument of the spirit. But how did that spirit express itself? Obviously it is difficult to imagine what kind of consciousness people may have had several hundred thousand years ago. It is especially hard for us because we have difficulty imagining what it is like to be without full language abilities. What kind of consciousness is possible at the proto-language stage I discussed above without fully developed language?

In imagining how such people were, we have also to place them into a real life context in which life and survival were hard. Having said that these people may have had the kind of intuitive consciousness we can only observe in pre-linguistic children, though the analogy, I stress once again, must be imaginatively applied and with the greatest respect for both the abilities of pre-linguistic children and our hominid ancestors. In saying this I realize I go way beyond the discipline of anthropology. The step I believe is justified as an imaginative leap in the dark but one which is firmly based on a careful weighing up of fact and experience. The reader will judge for him- or herself.

Using Our Intuition

How can we imagine what this consciousness might have been like? The only answer we can offer is intuitively. The only method available to us is to allow the phenomena to speak to our intuitive insight. In the same way that we study a living individual before us, we have to assume that what the senses present to us is only an outer picture and that what comes to expression lies behind or within this appearance. We have to read its iconic nature by allowing what comes to expression through our sense impressions to live within us. We have to meditate on these images. That means not only thinking about our impressions but also being within them. In our thinking, if we are patient enough to resist jumping to quick conclusions, our intuition can begin to grasp what comes to expression. Such a method can lead to intuitive knowledge, the value of which has to be constantly correlated with data we receive from other sources. It is a method that can lead to insight into the nature of living individuals, or other natural phenomena for that matter.

In this case we have a distinct advantage. The Heidelberg experience is one we have had in the sense that as humans their way of experiencing the world must be a part of our deep consciousness. It may be remote, but then so is the consciousness of a child to an adult.

An Experimental Archaeology of Consciousness

I do not pretend for a moment that such insight as we can gain will automatically have any great depth or detail. It takes great patience and cannot be forced. The most we can hope for may still be enough to awaken our respect and wonder. What I am suggesting is in fact no more than any good archaeologist constantly does as he or she handles the excavated artifacts over and over again with those deep and quiet questions: What did it feel like to hold this? What did they do with it? How did they make it? What did it mean to them? Experimental archaeology is also a version of what I am talking about. Until one has spent many hours learning how to knap stone or trying to slice meat from bone with a sharp flint, it is difficult to merely theorize about the level of consciousness involved. Out of such pondering scientific hypotheses can arise, which can be tested in the standard way. One can at least ask, does this fit the rest of the evidence we have?

As long as such thoughts are not colored by preconceptions or models that force the phenomena into preexistent categories of explanations, such as the pre-sumptions of

Darwinian psychology or socio-biology. Obviously no such thoughts are entirely free of preconceptions and one could argue that my assertion that there is a spiritual dimension to the human being, and has been all along in human evolution, could be deemed as such. My reply is to reiterate that the spiritual can be experienced and is therefore self-evident.

Since we do not have a living specimen before us, we must do with the fragments available to us from archaeology. Can we create enough of a picture of Heidelberg life for us to gain a few hints about their consciousness? Some of the glimpses archaeology provides for us are helpful. Clive Gamble of Southampton University who has spent many years excavating Boxgrove found a piece of antler from a now extinct giant deer species skillfully fashioned into a specialized mallet, probably used in the production of stone tools. The tool fits perfectly into the hand and was clearly used over a long period of time (minute fragments of flint were embedded into it). As Gamble put it, this tool was valued by its owner, was carried around (in a pocket or bag?) until it was finally lost. He calls it the first known human possession![6] This implies a high level of foresight and continuity of consciousness. These are significant qualities.

Adding Detail to the Picture

If we add to this image the Schöningen wooden spears, made some 100,000 years after Boxgrove, but still 400,000 years ago, other aspects of Heidelberg consciousness arise. Firstly these spears show a technical knowledge of astounding maturity; they are perfectly weighted like modern Olympic javelins and have been cut from branches of slow growing and therefore very strong trees. The spear ends have been expertly split to take stone spear points. They were clearly made to be thrown from a distance. Apart from the technical skill involved, which itself speaks of foresight, learning and practice, the consciousness that enables the thought of using a spear is a particular one. To stand back, no doubt having stalked or driven prey into a convenient position, then let loose an aimed throw this shows a powerful distancing of self and world yet also a strong focus on the target. Anyone who has thrown javelins at targets will be able to experience just this balance of inner and outer focus. Hartmut Thieme, discoverer of the spears, spoke of "a lovely lake with herds of horses drinking at the shoreline. Humans hiding in the bushes. At the right moment they leaped out, throwing spears. Since the horses wouldn't run into the water, it was easy to catch them."[7] To begin to understand what this means in terms of consciousness one must live into such a picture, again and again.

Preparation and Gathering of Material

At some sites, such as Boxgrove, where large areas have been investigated, it is possible to reconstruct sequences in the activities of Heidelberg people. Firstly flint nodules were dug from the bottom of a cliff and some rough trimming done on the spot. The stones were then taken some 500 meters to another place where they were worked further. Flakes were knapped, used and then discarded. Usually local materials were used, but there is evidence that some were brought from distances of up to 10 or 15 kms (in rare cases even further). Some tools were probably part of the basic equipment, such as the multipurpose wooden point or spear made out of yew and found at Clacton, or those beautifully made spears from Schöningen in Germany. The picture we have is of a people on the move, taking only what was absolutely essential with them, living in

[6] Quoted in McKie, 2000, *Ape Man*, p126.
[7] Quoted in *National Geographic* Vol. 192, No. 1, July 1997, p109.

camps of very brief duration, leaving little trace of their activities and making practically no lasting impact on their environment.

A Cultural Space

Other recent archaeological clues point to another aspect of consciousness. Dietrich Mania, the leader of the excavations of another Heidelberg site at Bilzingleben, some 50 kilometers from Schöningen, believes he has evidence of semi-permanent campsites with shelters similar to those made by contemporary Bushmen.[8] Similar claims have been made for sites at Terra Amata in France and even for Chichibu in Japan around 0.2 mya to 0.4 mya and 0.5 mya respectively.[9] This implies, as the anthropologist John Rick put it, that "they had the idea of actually making a structure, making a cultural space; a place where you might sleep. It represents a conceptual division between inside and outside."[10] This is different from birds building nests or rabbits digging burrows. Humans are not instinctively predetermined to build shelters. Such evidence shows an awareness of inner and outer space, a clear sign of some kind of inner life of soul. Not surprisingly, conventional anthropology has resisted such interpretations of archaeological sites because humans such as the Heidelbergs were not supposed to have been so human!

A Nascent Inner Life

Such reflections, including those in the previous section on stone technology, bring us once again to the conclusion that such behavior without subtle forms of communication is unthinkable. Beyond that we are faced with a fascinating option. Either Heidelberg people were pretty much like any recent hunter-gatherer people, or they were fully human but in a very distinctly different way, at least in terms of their mental or soul-spiritual life. The weight of evidence suggests that comparisons with recent hunter-gatherers are inappropriate, if only because their impact on their environment was not yet comparable. The latter view seems to be the case. We are forced to conclude that these people had a soul-spiritual constitution, an inner life that was as little self-conscious as that of a young child, yet possessed an intuitive connection to their environment that were someone to have it today, we could only describe as atavistic or shamanistic. In other words their "I" activity was primarily focused in the spiritual environment, and not within the particular soul-life of the individual. I will return to this question when addressing the nature of the Neanderthal people who succeeded the Heidelbergs in Europe and Western Asia.

The World the Ancients Inhabited

This section will look at shifting climatic patterns, particularly those that spanned the period in which modern humanity arose. But first a word about terminology. As indicated in the previous sections, there is considerable debate going on about the classification of hominid fossils in the period prior to the emergence of the Moderns. For simplicity's sake I follow the generalized terms coined by Clive Gamble as outlined in several recent books:

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[8] Ibid., p110.

[9] Reported in *New Scientist*, March 4, 2000, p4.

[10] Ibid.

The Archaics: refers to hominids in the period between 700,000 and 200,000 years before present (BP), thus including late erectus, Heidelbergs and early Neanderthals (or regional equivalent).
The Ancients: refers to the pre-modern humans in the period between 200,000 and 60,000 years BP, including Neanderthals or equivalents.
The Pioneers: refers to the critical period of European prehistory from 60,000 to 40,000 years BP and includes early Moderns, early Cro-Magnons and transitional species.
The Moderns: refers to humans who physically resemble us and who are taxonomically labelled Homo sapiens sapiens.

For the African and Asian contexts, these terms also apply though the periods they span may differ. I refer to these in the texts. Australia and the Americas are believed to have been populated only by Moderns.

The Ice Age(s)

The period all these types of humans and pre-humans lived in falls within the wider context of what is termed the Pleistocene or Ice Ages. We now know that this climatic epoch stretched from around 116 mya to about 10,000 years ago, though this latter date only marks the end of the last major Ice Age or glacial. There have been numerous global climate changes of a more minor kind since then, and scientists are in some debate as to the significance of the present phase of global warming.

The sequence of the Ice Ages and their alternating interglacials have been much revised since the early pioneers of geology such as Agassiz, Lyell, Penck and Brückner first established the concept that much of the world's topography had been shaped by glaciers and ice sheets. Based originally on features such as river terraces, moraines and actual glaciers in the European Alpine Regions and their fore-lands, the concept of Ice Ages has become global, the phenomena manifold, and the focus of study has shifted from land features to deep sea and polar ice sheet cores.

It has long been realized that the effects of Ice Ages reach far beyond the direct effects of ice sheets and are better seen as global cycles of climate change involving, essentially, a rhythm of cool, arid phases with expanded polar ice caps alternating with warmer, wetter periods with reduced ice caps. During glaciation vast quantities of sea water and atmospheric moisture are locked up in ice, causing sea levels to drop up to 150 and more meters below present day levels. The reduction of the ice sheets releases more water into the atmosphere and oceans, causing not only sea-levels to rise but also, more slowly, continental land masses, once the weight of ice-sheets up to several miles thick has been removed. Furthermore, the movement of major ocean currents and predominant wind patterns are profoundly affected by these changes.

In biological terms these cycles of climatic change, lasting between 40,000 and 100,000 years with many minor changes of shorter duration, brought about considerable pressures on environments, not least the rapidity with which some of these fluctuations occurred. The regions nearer the poles, particularly in the Northern Hemisphere, naturally experienced the greatest changes, but significant effects would also have been noticed in tropical and subtropical zones. Forests and woodlands expanded or contracted, grasslands appeared and disappeared, river and lake systems were radically altered, coastal regions were periodically inundated, offshore islands became joined to continental land masses, and even continents, now separated, were at various times linked by land-bridges. The effects of all these fluctuations naturally brought great pressures on animal life, causing major migrations and at times extinctions. Only in very recent times have humans had the means to adapt to and master such changes in environment. In such a changing world adaptability was at a premium.

In 1955 Cesare Emiliani published a paper which radically revised the interpretation and dating of the cycles of the Ice Ages. Using measurements of two isotopes of oxygen present in the fossils of oceanic microorganisms collectively known as Foraminifera, it is possible to identify the size of the oceans and thus the extent of the ice caps. These fossils, extracted from the layers of sediments on the ocean floor, give a picture of the relevant level of the isotopes. When alive, these microorganisms absorbed the isotopes of oxygen from the water.

During periods of glaciation the lighter isotope is drawn off, leaving the ocean water with a higher concentration of the "heavier" isotope. Emiliani believed that this phenomenon reflected ocean temperatures; nowadays it is felt that the isotope level reflects the relative size of the ocean. Either way there is a link with glaciations. Emiliani's model has been much revised, and data from ice cores from Greenland, as well as pollen measurements from sediments in lakes, notably in central France, have added new correlations.

It has now become apparent that many of the glacial periods were not continuous ice ages, nor were the intervening inter-glacials static periods of temperate climates. Typical for the whole period, however, were the relatively rapid fluctuations in climate.

Cultural Diversity

With such dynamic changes going on, it is clear that climate must have had considerable influence on the biological and behavioral development of early humans. What is characteristic of the whole period spanning the transition from Ancients to Moderns is the gradual divergence of anatomical and cultural adaptation and innovation. The general pattern, as I have shown, from the earliest hominids onwards has been one of anatomical advance preceding behavioral; uprightness, bipedal walking, brain size and extended childhood are all examples. The shift to behavior preempting (and likely prompting) anatomical change was not, however, consistent. Some Ancients clearly anticipated behavior usually associated with Moderns, or at least late Ancients and earlier we find some Archaics showing behavior typical of Ancients! Such is the disparity that the closer we get to modern humanity the less correlation there is at all between anatomy and behavior. This is a trend one would expect if the mental or soul development through the human "I" were progressively emancipating itself from the physical evolution.

Anomalous Artifacts

An interesting example of this is the appearance of flake-tool technologies in a period generally characterized by core-tool technologies. As I discussed in the previous section, the polarity between flake- and core-tool production is symptomatic of changes in conceptual faculties.

A number of well-researched sites in Europe and Africa[11] have turned up anomalies in the traditional view of the transition from Lower through Middle to Upper

[11] Stringer and Gamble, 1993, pp146–154.

Paleolithic cultures. At High Lodge in East Anglia, England, now reliably dated to around 500,000 BP, stone artifacts have been found which stylistically belong to Middle Paleolithic types. Most unusually, there is an absence of that archetypal Lower Paleolithic artefact, the Acheulian hand-axe. At Boxgrove in Sussex, which has been dated to around 0.5 mya, hand-axes were found, confirming its status as a Lower Paleolithic site, but the axes are of such quality that without the reliable dating of the site they would have been considered as belonging to a much later date.[12]

On the other hand, crude tools including simple hand-axes, core and flake tools have been found at Pontnewydd in Wales, dated at around 200,000 BP. Their appearance would otherwise suggest a much earlier date. This paradox of early "advanced" forms and late "crude" forms occurs at one site, Swanscombe, in the Thames Valley. A lower level dated to between 420,000 and 360,000 BP contained no hand-axes, but a comprehensive collection of Clactonian flake tools. Above these at a subsequent level is an almost classical assemblage of beautifully made Acheulian hand-axes and other typically Lower Paleolithic artifacts. Both levels are older than Pontnewydd.

To compound matters, the cliff-foot site at La Cotte on Jersey, dated to around 238,000 BP, revealed a dominance of flake tools, notably showing the Levallois technique, usually associated with the Middle and Upper Paleolithic. The site at Ehringsdorf in Eastern Germany also shows an absence of hand-axes and a predominance of refined flake tools, long thought to be late-Neanderthal, but now dated much earlier to 225,000 BP. Vértesszöllös in Hungary is another "early" culture with a surprisingly "late" date. Here pebble tools of the early Lower Paleolithic style, crude in comparison to Acheulian hand-axes and Levallois technique, turn out to belong to a period between 210,000 and 160,000 BP! These examples, and similar ones cited below in the context of the appearance of Upper Paleolithic industries at "early" dates, highlight the following points.

Firstly, they highlight the limitations of assuming a linear ascent of technological progress proceeding from simple to complex, from primitive to advanced. Secondly, they introduce the concept of localized developments appearing and then apparently disappearing, developments which did not necessarily pass on their achievements to the "cultural gene pool" of mankind in any material way.

At any rate, these and other aspects of archeology discussed below, certainly identify a divergence between anatomical and cultural developments and may be seen as a further symptomatic expression of the heterochromous nature of evolution which is itself a signature of the process of emancipation.

More Climate Change

To return to the question of climatic fluctuation, I will focus on the major changes that affected the period beginning around 250,000 BP and which saw a progressive cooling of global temperatures. This period was mainly temperate or cool with some brief glacial phases. It saw the emergence of the Neanderthals in Eurasia and other regional groups of Ancients in Africa and China. This was followed by a full glacial (with milder intervals) which lasted from around 180,000 to 130,000 BP. In Africa this period saw the probable emergence of early Moderns, whilst Neanderthals consolidated themselves in Eurasia, Mabas (Ancients) likewise in China, and late erectus continued in Indonesia. From 130,000 to 115,000 BP warmer interglacial conditions were widespread.

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[12] The details cited in what follows are drawn from a variety of sources including Stringer and Gamble, 1993, Trinkaus and Shipman, 1993, and Gamble, 1993 and 1994.

Towards the end of this phase it is probable that Neanderthals and African Moderns lived side by side (or alternately) in the Middle East. The following period from around 115,000 BP became cooler with glacial conditions returning around 75,000 BP and lasting, with milder intervals, up to around 10,000 BP ago. From the coldest glacial conditions around 20,000 BP but with regional variations, a general upturn in climate led to the re-colonization of many depopulated areas. The end of the last Ice Age led to rapid, dramatic and complex environmental changes of different kinds in different places. In the next section I shall look at the Neanderthals, as the best known example of an Ancient population, before looking in more detail at the emergence of the Moderns.

The Neanderthals

From the discovery of the famous Neanderthal fossil in 1856 in the Feldhofer Cave in the Neander Valley near Düsseldorf, Germany, to the present day, these Ancient humans have made a profound, though often false, impression on the popular imagination. They have played a similar role in the annals of folk (and scientific) lore to the Satyrs of classical mythology, the Wild Man and Blemmyae (figures with one eye, no heads, a single foot, and so forth, portrayed on medieval Mappa Mundi such as that in Hereford Cathedral) of medieval traditions, or indeed the Yeti of more recent legend. Their name has become synonymous with everything that civilized mankind feels it has to overcome. Only recently the Minister for Education referred to the behavior of striking school teachers as "Neanderthal," though what he meant was probably only clear to himself. At any rate, the spirit of the times has moved on, and the old image of the Neanderthals has been replaced (as has the Minster of Education) by something more appropriate.

The original controversy surrounding the discovery of the Neanderthals and the subsequent evolution of our understanding of these Ancients are symptomatic of our changing perception of our origins. This has been well documented and forms an important chapter in the cultural history of modern science. I will attempt in what follows to give a summary of what is known about these prehistoric people, focusing in particular on what their story tells us about the gradual emancipation of modern "I"-consciousness.

Neanderthal Bodies

Though by no means plentiful, Neanderthal fossils are fairly well known relative to earlier hominid forms. About a dozen reasonably complete skeletons have been found and several hundred other fragments. Thus we can reconstruct quite a good picture of what they looked like physically.

Starting with the head, it is quite easy to identify a typical Neanderthal of almost any age and sex, except for young children. The cranium is long and low, rounded off at the back by the characteristic bulge known as the occipital bun. The face is dominated by a prominent nasal region and large rounded brow ridges, but has a receding lower jaw with no chin. The teeth were large and powerful. Unlike their Archaic predecessors who possessed a thick bar of bone across the top of the eye-sockets, the Neanderthal brows formed two arches of bone filled with large air cavities called the frontal sinuses. Some early (Heidelberg) Ancients, such as the Broken Hill skull from Zambia and the Petralona skull from Greece, already show this trait which distinguishes them from the solid bone brows of erectus. The typical cheek bones of the Neanderthal were, as Chris Stringer put it, "swept back, giving a streamlined appearance to the middle of the face, and the cheeks were inflated rather than hollowed."[13]

Some of these features became more pronounced in later Neanderthals and have been explained as adaptations to living in cold, sub-Arctic conditions. The typical Neanderthal nose was not only prominent in length but also in width. It has been thought that large noses and sinus cavities helped warm incoming cold air, thus protecting the delicate brain tissues from extremes of temperature.

Modern Arctic dwellers do tend to have long noses, though broad noses are more common among tropical peoples. The Neanderthal combination of these features suggests a unique adaptation that responds both to cold atmospheres and the need for rapid heat dispersion after strenuous activity whilst wearing warm fur clothing, the face being the most exposed part of the body. As experience shows, overheating and sweating due to exertion followed by rapid cooling in icy conditions can be harmful.

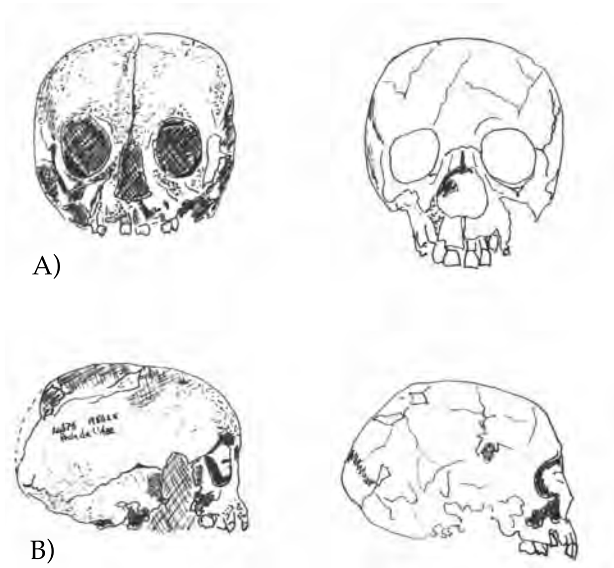

Fig 7.6 *Two Neanderthal children: A) a 3-year-old from Pech de l'Az, France, and B) a 9- to 11-year-old from Teshik-Tash in Uzbekistan (drawings after Tattersall and Schwartz 2002).*

Fig. 7.7 *The Old Man of La Chapelle-aux-Saints, France (photo of cast by author).*

[13] Ibid., p124.

A Powerful Rhythmic System

Perhaps one should see this typical Neanderthal feature as expressive of a powerful rhythmic system. The broad, barrel-shaped chest and wide shoulders are also indications of a powerful respiratory system. The human head reflects the threefold dynamic of the whole body, comprising the nerve-sense organs, rhythmic breath-circulatory system and the metabolic-limb system. In the head these three elements are combined in the domed cranium and main sense organs, the mid-face respiratory organs and the lower jaw, the most limb-like part of the head. Perhaps the dominance of the Neanderthal's rhythmic system is reflected in the prominence of the mid-face. In modern human anatomy this threefold dynamic has a more balanced proportion, with the prominent and high forehead balanced by the chin, a feature unique to modern humans (though present in reduced form in some Neanderthal specimens).

The architecture of the face reflects structural forces, such as the anchoring of the face bones and the tooth arches, tooth root size and the thickness of the bone itself. It also reflects the constitution of the whole organism, as indeed any part reflects to some extent the morphology of the whole. Were this not the case, it would be impossible to reconstruct skulls or whole skeletons on the basis of fragments.

Neanderthal Brains

Perhaps the most enigmatic feature of Neanderthal skulls is what was inside them. Brains were well within the range of modern brains and in a number of cases actually larger in terms of estimated volume. Modern brains average between 1,2001,500 ml in volume. Neanderthal females average 1,300 ml and males 1,600 ml, the Amud man possessing 1,740 ml. Interestingly, early European and Asian Moderns also had larger brains than "modern" Moderns. From the point of view of cerebral dominance, Neanderthals show the same proportional hemispheric dominance as modern people, which suggests a similar preponderance of right-handed people. It is assumed that this large brain capacity had more to do with their generally large body-mass, and may also be seen as a further cold-climate adaptation. However, it is not possible to infer anything about intelligence from brain size at this level, except that, simply by virtue of possessing such a large brain, we can only conclude that Neanderthals had as much neural potential as we have. How they applied it can only be deduced from what archeology tells us of their life-styles. Even then we should be cautious about equating technical skills with the range of faculties a brain can provide. In the end we simply do not know what went on in those brains.

Stature

Neanderthals were powerfully built, though relatively short and stocky. Men were on average about 5′ 6″ (169 cm), women about 5′ 3″ (160 cm), the tallest known being about 5′ 10″ (179 cm). Relative to modern humans of the same height they were probably heavier, excluding overweight Europeans and Americans! Their limbs were also on the whole shorter. This anatomy seems well adapted to cold conditions in that it minimizes surface area. In an abstract sense the Neanderthal gestalt tended to the spherical, while the Moderns tend towards a more vertically stretched out gestalt.

By modern standards they were clearly extremely strong. Their joints were thick and their bones generally far more robust than our more delicate skeleton. Their hands were particularly strong, the last finger bones very broad. Though having a very strong grip, their fingers were also capable of fine precision work. In short, they were built for hard work, rigorous movements and were probably better at short bursts of speed than at long distance running.

They Led Hard Lives

From the evidence of their skeletons, it is clear that they led hard lives and suffered considerable bodily stress. Indeed, the catalogue of injuries and diseases associated with physical stress reads like a casualty ward report. Practically all Neanderthal bones show some signs of injury or degenerative disease; healed fractures, deformed joints, tooth loss and abscesses are common. Many clearly survived major injury, a fact that attests for their social support system. Chris Stringer lists the range of disabilities identified in the famous Old Man of La Chapelle-aux-Saints, one of the early fossils to be interpreted as evidence that Neanderthals were subhuman. Modern pathology has identified "degenerate joint disease in the skull, jaw, spinal column, hip and feet, as well as a rib fracture and extensive tooth loss accompanied by abscesses. All this and not yet 40!"[14]

Neanderthal Lifestyles

How did these Ancients live? Up until fairly late times they seem to have repeated the patterns of the Archaics. Despite many claims for campsites, huts, cultural artifacts (other than stone tools) and indications of religious ritual, most interpretations of the evidence tend to play down all these features of life for most of the Ancients. A number of archaeological sites belonging to the period of the Archaics and Ancients have been very thoroughly investigated in recent years using all the means at the disposal of modern archeology. Boxgrove in Sussex, Biache-St. Vaast in northeast France, and Maastricht-Belvédère in Belgium are far better preserved than later sites from the Bronze or Iron Ages. The artifacts and bones have, as Clive Gamble put it, been exceptionally well preserved. "The fine grained sediments have not moved the material more than a few millimeters at most."[15]

Extensive evidence of any form of settlement is conspicuously missing. Here and there we find some, often disputed, indications of shelters. Deliberate structures, such as stone-lined hearths (e.g., at Vilas Ruivas in Portugal) and circles of large bones and stones thought to be windbreaks or the bases of shelters in Molodova on the banks of the Dnestr in Russia, have been found. But none of these suggests permanent dwellings. If more permanent structures were built, no conclusive evidence remains. Even in cave sites and rock shelters, which by their very nature are more spatially defined, the evidence is of repeated but again unstructured use. Such caves or cliff overhangs were not homes in any modern sense, but, rather, convenient places where people could retreat in relative safety and warmth to eat, rest up, recover from the frequent wounds apparently suffered and perhaps bury dead friends.

The picture we get is of a transient, opportunistic life-style. Animals were hunted or scavenged, cut up, disarticulated and the bones broken open. Stone tools were made. Fire was used but elaborate hearths were not built. It is likely that, as among the Archaics, for the early Ancients, hunting continued to play a subsidiary role to foraging, including the scavenging of carcasses. It was probably a winter activity, especially in regions where winter meant long months of snow and freezing temperatures. The large herds

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[14] Ibid., p88.

[15] Quoted from Gamble's chapter in *The Oxford Illustrated Prehistory of Europe*, ed. Barry Cunliffe, 1994, p24.

of herbivores, horse, bison, mammoth, reindeer and so on probably undertook seasonal migrations, covering great distances, too great to follow. When game was more abundant in the summer months, more organized hunting involving groups of Ancients coming together providing not only welcome gluts of nourishment but also opportunities for more extensive social interaction. Such organized hunting was already evident among Heidelberg Archaics, as testified by fossil evidence of slaughtered horses at Boxgrove and Schöningen. The site at La Cotte in Jersey is at the foot of high cliffs, and the heaps of mammoth and mostly woolly rhino bones found there are presumed to be the remains of herds driven over the cliff above. La Cotte, as noted above, is in many ways an untypical site, however, since it shows great precision in flake-tool technology as well as apparently carefully sorted piles of bones.

In general then, the Archaics, and to a great extent the Ancients, were relatively transient members of the ecology of their environments. Their presence, particularly in more peripheral regions, ebbed and flowed with the fluctuations of the climate. Towards the end of the Middle Paleolithic in Europe around 60,000 BP, and earlier in the Middle East and Africa, this pattern of unstructured sites begins to change.

All the evidence from Middle Paleolithic sites indicates that mobility was the key feature of life. The nature of the climate and terrain determined how often and how far the Ancients needed to move. Only with the Upper Paleolithic is there any evidence for structured base camps (i.e., villages) or storage places which were regularly used.

Taken as a whole, the evidence for organized forms of communal existence both among Archaics and Ancients, including Neanderthals, seems meager with one or two early exceptions such as Bilzingsleben in the Thuringia Valley of Germany, and yet it is important not to see this as a sign of less-than-human behavior. The very ability of peoples such as the Neanderthals to survive in marginal environments or harsh climates is a tribute to their skill. The very fact that they were able to adapt to a wide range of geographical locations, major seasonal changes and, in the wider perspective, rapid fluctuations in climate shows their qualities. They were skillful at what they did, and they made good use of both their resources and those of their environment.

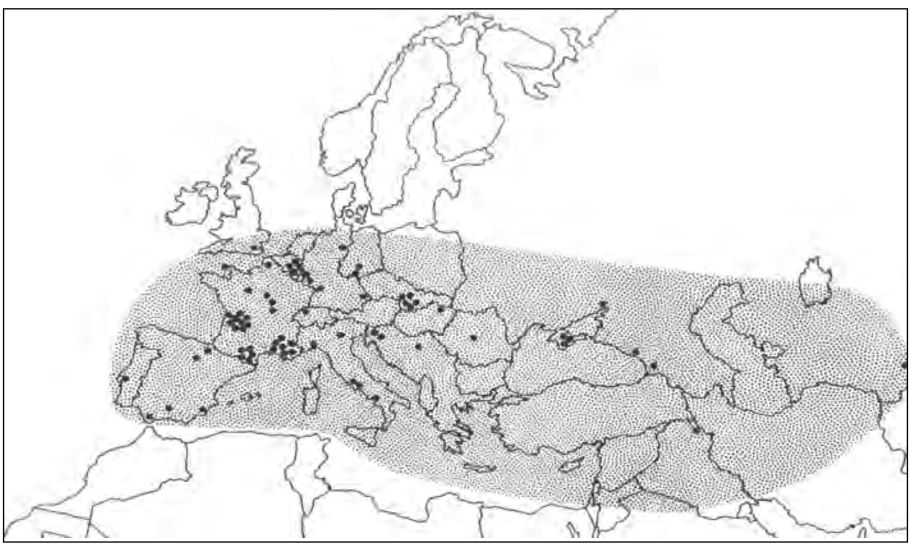

Fig 7.8 *Map showing the distribution of Neanderthal sites*

The Impact of the Ancients on Their Environment

In some regions, such as the endemic homelands of East Africa, the Ancients' impact on their environment began to be more than marginal. Even without advanced hunting techniques and ballistic weapons, the kind of close-up killing methods probably used were effective. This was particularly the case when people systematically selected the young of slow-breeding animals. Animals tied to a particular location and diet are far more prone to capture than large migratory herds. It is quite likely that over long periods such large animals would have been put under pressure by even modest hunting methods. The regular use of bush-fires in a landscape, either man-made or man-assisted, would have led to the dominance of fire-hardy vegetation, encouraging the development of savannahs with grasses and fire-tolerant trees such as acacia, leadwood and wild laurel. As Jonathan Kingdon, an expert on African fauna and landscapes, put it, "The prolonged interaction between humans and African Savannah communities must have established cultural and technical traditions that were so closely tied in with behavior and psychology that they were not quickly abandoned even in non-African habitats. African ecosystems evolved in tandem with Homo."[16]

The Neanderthals were not in a position to influence their environment to anywhere near the degree as their African relatives, if only for the reason that fire is much less effective in cooler, even sub-Arctic, climates! Fire is largely restricted to the hearth as a source of heat and light. They were to a great extent dependent on meat, plant foods being scarce, but there is no evidence of their impact on the environment. They were clearly effective foragers in the frozen wastes of winter and probably had the edge on other carnivores such as bears, hyenas or wolves. This edge consisted of control of fire and social bonding focused around the needs of their children, who needed such prolonged baby-sitting!

Evidence for an Inner Life of Soul

Of their personal lives we know very little, other than the evidence that life was hard. Many claims of cultural attributes are looked at skeptically by leading anthropologists. This is especially the case of many claims that the Neanderthals were the first humans to bury their dead. This is a very hotly debated subject at present, because the idea of deliberate burial is such a significant indication of uniquely human behavior. Understandable though this skepticism is, mourning the dead, however briefly, has been observed, and even filmed, among a range of mammals such as lions, elephants, whales and the great apes who show quite distinct, if brief, signs of distress at the death of a relative. To actually protect the remains of the deceased in a grave or by other means implies a quantum leap of consciousness.

The fact that a number of almost intact Neanderthal skeletons have been found indicates some form of burial. Bodies left abandoned on the surface or in lakeside sediments are quickly disarticulated by scavengers, trodden into dust or swept away by the action of wind and weather. Most hominid fossils have only survived in fragments and even then have been preserved only by chance. A number of Neanderthal skeletons were preserved only because they were buried, almost exclusively in the protected environment of caves. The questions are, were they buried by natural means, such as cave collapses, or were they put there by human hand, and if so, was it an act of ritual significance, or was it simply a means of disposing of the corpse? In order to determine

[16] Kingdon, J., 1993, p71.

which of these was the case it is necessary to see if a hollow was scooped out of the ground, or material placed deliberately around and on the corpse. The next question is the position of the body. Then there is the question of the material surrounding or associated with the body; were they placed there deliberately and therefore have some symbolic meaning?

Questionable Evidence for Graves

The answers to these questions are not clear in the majority of supposed burials. Since many of the discoveries were made in periods when archeology was in its infancy and exact records were not always kept, it is simply not possible to tell.[17] Most of the skeletons have been found in a fetal position with the knees drawn up as if sleeping. This suggests that they either died in this position or were placed in it by their friends. The "grave" material claimed to have been found alongside the remains includes arrangements of animal bones, horns, stone tools and flower pollen. These claims are the subject of much discussion.

Ralph Solecki, who excavated Neanderthal remains from the Shanidar Cave in Northern Iraq, was convinced he had found evidence that the bodies had been laid in a "bower of wild spring flowers." He called his book *Shanidar: The First Flower People* (published during the Vietnam War in 1971). In spite of more recent skepticism by anthropologists, it is such an evocative image one is loath to reject it. The very idea of Neanderthal people laying their deceased on a bed of local wild flowers was important in changing attitudes towards these much maligned people. A rather more prosaic explanation has been put forward that the pollen grains may have sifted through from later soil layers. In the end the interpretation of this evidence will depend on whether we imagine Neanderthals capable of laying a bunch of wild flowers in the grave of a dead friend or not. If not other explanations will have to suffice.

One theory suggests that burials occurred only in places where carnivores did not make regular use of caves, such as the Middle East and in southwest France, which is where the most complete burials have been found. This argument only establishes the point, however, that where bears, hyenas and so on regularly dug around in caves, any buried remains would have been disturbed. It does not preclude the possibility that deliberate burials were widespread, but only the undisturbed ones have survived.

Indisputable Evidence of Human Behavior

In summary, I can only say that there is some evidence that Middle Paleolithic people and the Neanderthals in particular may have responded to the death of members of the group in a deliberate, though probably limited way. Burials in the modern sense were not part of normal behavior. The contrast with the Upper Paleolithic makes this clear. And yet some humble gestures, some dim awareness of the transitional state of death, are plausible and even likely. Even the vaguest experience of self-consciousness must have found its expression in an awareness of death. They almost certainly experienced a group consciousness, and the death of a member of the group could not have been insignificant, given that the Ancients almost certainly lived in small tight-knit socially bonded groups of extended families.

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[17] Detailed descriptions of the main Neanderthal finds can be found in James Shreeve, *The Neanderthal Enigma*, 1995, Erik Trinkaus and Pat Shipman, *The Neanderthals*, 1993, Chris Stringer and Clive Gamble, *In Search of the Neanderthals*, 1993.

Perhaps the most compelling evidence for Neanderthal humanity is their care for the wounded. We know that they were capable of caring for and supporting group members who had suffered debilitating illness or injuries over many years when they would have been more or less helpless. The Shanidar 1 Man who was paralyzed down one side and probably blind lived for years in this state, judging by the evidence of his skeleton. Someone must have cared for him. Several other healed bones show evidence of the individuals having been cared for too.[18] Such altruistic behavior is a clear indication of the value placed on individual life.

The Neanderthals

And yet, given that Neanderthals lived very much embedded in their environment with few material possessions and almost certainly little sense of territorial ownership, the act of burial involving grave goods was simply too material an experience. That they cared for each other in a communal way is certain. This care may have extended for a brief time after death, but they showed no evidence of long-term planning either for life or death. Their consciousness, I imagine, was focused on the present, in the group and in the dynamic of their environment.

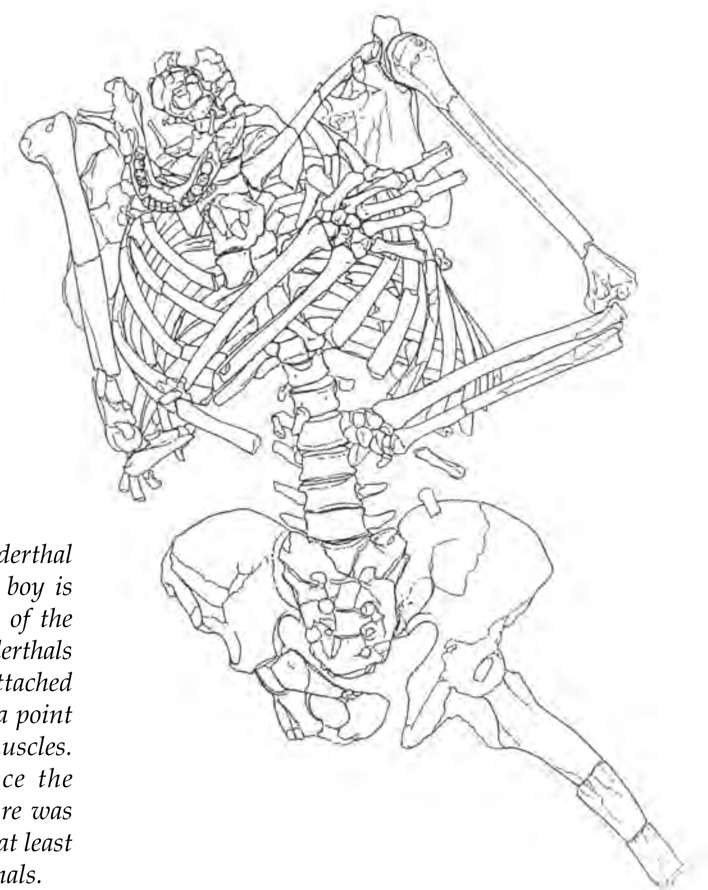

Fig 7.9 *A drawing of the Kebara Neanderthal burial. Though the head of the young boy is missing, the neck reveals the presence of the hyoid bone, physical evidence that Neanderthals could vocalize. The hyoid bone is not attached to other bones in the throat but forms a point of attachment for various vocal tract muscles. The evidence is not conclusive since the cartilaginous part of the hyoid structure was not preserved. Nevertheless it suggests at least limited vocal abilities among Neanderthals.*

[18] See lead article by Rick Gore in *National Geographic*, Vol. 189, No.1, January 1996.

Fig 7.10 *A map showing the extent of the ice sheet in Europe during the height of the last Ice Age. Many of the key sites mentioned in the next chapter are marked (after Stringer and Gamble).*

Neanderthal Language

Their spoken language, as far as we can tell from fossil remains and an analysis of their behavior patterns, was probably not that dissimilar to our own. The hyoid bone (to which the tongue is attached and forms the Adam's apple), found recently with the Kebara Neanderthal fossil, indicates a virtually modern vocalization ability. Yet the behavioral indications suggest that a fully modern syntax had not yet evolved, thus keeping language structurally simple at the level of proto-language (see section on language in Chapter 6). We can only guess whether they danced, chanted, beat out rhythms on wood or bone. The evidence for their decorative or artistic work is very sparse.

Although the comparison with social animals is largely inappropriate, it is useful to put things into perspective. When one considers how complex chimp social life is, then we must imagine vastly more subtle experiences at the feeling and intuitive levels for the Ancients. They were, after all, human! As such they were endowed with a spiritual life. It was clearly one that required little outer expression and least of all material form. No doubt they expressed their spirituality through their connection with the environment; they lived it rather than reflected on it. It was only rarely self-conscious. There was presumably little need to give it concrete form, as later humanity did in works of art and ritual. Group identity was more intuitive and required less or no symbolic representation. Memory was collective, impersonal and natural, in the sense of being part of the natural world, which is not the same as instinct.

My intuitive feeling is that when they spoke it was to pass on vital information, warnings, sightings of prey, or to express their sense of well-being or discomfort. I imagine their souls found profounder expression through extended vowel sounds, perhaps in song which more resembled the resonances of the wind and the imitation of animal sounds. Their vocal apparatus was well suited to articulating such sounds, and their barrel chests would have provided the lung control for long, drawn-out intonations. Their large nasal and sinus cavities would have contributed to the resonance.

Fanciful or not, I feel that reflections in this direction are appropriate in trying to understand the nature of the humanity of the Ancients and their so very different level of spirituality. The difficulty is, we have so utterly lost the experience of being at one with the natural, not to mention the spiritual, world that we have to rack our brains trying to interpret what a human is like without most of the accoutrements of ethnic identity, complex language, technology, religion and acute self-awareness. These last few pages have been a limited attempt to grant some human dignity to a people who successfully managed to live over such a long period of often incredibly hard conditions, and who, on the whole, have not had the respect from our more self-important age that they deserve .

Chapter 8

The Moderns

Over the last 100,000 years human beings have appeared on earth with whom we can more strongly identify than any of the hominids we have so far discussed. This is because they seem more "like us." Certainly our ancestors resembled us physically since around 100,000 BP. It is only during the last 40,000 years, however, that they began to behave like us too, so like us, in fact, that the geneticist Christopher Wills speculates with confidence that if a group of Cro-Magnon infants were transported to the present and raised by modern families, they would be as able as other children to take advantage of the complex opportunities available to them.[1] This huge gap between the emergence of anatomically modern humans and behaviorally modern people is something of a mystery.

Even if the origins still remain vague, the outcome of this latest evolutionary phase is not in doubt—the peopling of the entire world by one human species known biologically as Homo sapiens. How this came about remains a very large question with significant aspects unanswered. There are essentially three schools of thought concerning the origins of anatomically modern humans and the fate of all former human species. Briefly they are,[2]

1. A regional continuity of Archaic, Ancient and Modern forms produced the present diversity of human populations including the main groupings of African, Eurasian, East Asian and Australasian peoples, with sufficient gene flow between the groups to maintain humans as one species

2. Modern humans evolved from African (or Near Eastern) archaic Homo sapiens (African Heidelbergs) and spread out of Africa to all continents, interbreeding with, absorbing and/or replacing all regional Ancient populations

3. All Ancient peoples were totally replaced by Modern humans migrating out of Africa (or the Near East) within the last 100,000 years.

[1] Wills, C., 1998, *Children of Prometheus*, p215.

[2] See Wilson, A.C. and R.L. Cann,1992, *The Recent African Genesis of Humans;* and Thorne A.G. and M.H. Wolpoff, "The Multi-regional Evolution of Humans," in *Scientific American*, Vol. 266 No. 4, April 1992 pp7–83. See also Stringer and Gamble, 1993; Trinkaus and Shipman, 1993; and Gamble, 1993, 1994; Stringer and McKie, 1996; Tattersall, I., 1998, 2000; McKie, 2000.

The majority view these days favors the last of these three models, usually referred to as the Garden of Eden, Out of Africa or Replacement Model. This view has by no means answered all the outstanding issues, particularly the convincing evidence for some kind of continuity among the populations of China, Indonesia, New Guinea and Australia as well as Eastern and Central Europe. Replacement is most clear for Western Europe and the Middle East. The evidence for continuity in Europe and the Levant, however, was recently dramatically undermined by substantial new evidence[3] based on DNA studies on material taken from the original Neanderthal specimen (from the Neander Valley in Germany) that showed that Neanderthals and present- day populations last shared a common ancestor as long ago as 600,000 BP. This means that the Moderns are only distantly related to the species who had long been inhabiting Europe. The Moderns must therefore have migrated into Europe from elsewhere, probably from the Middle East. Any interbreeding that occurred between Moderns and Neanderthals in Europe could only have been after the death of that most famous of Neanderthals. It also implies that there was likewise no interbreeding in the Middle East, though we know Moderns and Neanderthals co-existed in that region for thousands of years.

But Then Again …

This dramatic piece of evidence that Neanderthals and Moderns are, relatively speaking, genetically distant cousins was countered by the discovery in 1999 in Portugal of a Neanderthal child skeleton from a very late date of 28,000 years ago, showing anatomical traits typical of both Neanderthal and Modern types.[4] This is the first unequivocal evidence for inter-breeding between the two populations, a possibility long discounted. This discovery raises the possibility that infertile hybrids were produced by inbreeding, just as the Finnish Ice Age expert Bjorn Kurten predicted in his 1980 novel *Dance of the Tiger*.

The two discoveries, of the genetic distance and of the Portuguese skeleton, are not mutually exclusive. The fact that the Neander Valley Neanderthal was distantly related to Modern humans does not rule out the possibility that Neanderthals and Moderns, though originating in different continents from two genetic lines widely separated in time and space, interbred as the two peoples encountered each other in Europe many thousands of years later. Notwithstanding the genetic evidence of distance between Ancients and Moderns, there is still strong support for the model of regional continuity from well-respected scientists, notably Professor Alan Thorne from Australia and Professor Wu Xin Zhi and Dr. Huang Wanpo of China, not to mention their most vociferous champion, Professor Milford Wolpoff of the University of Michigan. They cite good anatomical evidence of continuity in fossils from China, Java and Australia, as well as question the interpretation of the genetic data.

Humankind Spreads by Love not War

In March 2002 a paper in the journal *Nature* by Alan Templeton, professor at Washington University, St. Louis, Missouri, made a case for long term migrations out of Africa and continuous cross-breeding on the basis of extensive DNA testing of peoples around the world. Professor Templeton concludes that "human populations in Africa and Eurasia have not been genetically isolated from one another, but rather have

3 Lewin, R., "Distant Cousins," in *New Scientist*, July 19, 1997, p5.

4 Described in McKie, 2000, p186.

been interchanging genes for 600,000 years. This gene flow was restricted, primarily by geographical distance, which meant that local populations should show genetic differences, as they do today. But over a long time there was sufficient genetic interchange to insure that all humanity evolved as a single species."[5] This recent genetic survey implies that there were two significant waves of emigration from Africa, one about 600,000 and another about 95,000 years ago. This finding seems to confirm two important aspects of human evolution: that we seen a continuum of evolution with constant genetic interchange maintaining the reproductive integrity of the human species and that species such as the Neanderthals were absorbed through cross-breeding rather than being marginalised into extinction, or worse as some authorities would have it, wiped out through ethnic cleansing! As we shall see there are many different ways of interpreting the evidence!

Fields of Research

The main areas of research contributing to these models of the origins of Modern humans include the study of fossils by physical anthropologists, the study of genetic material by molecular biologists, archaeology, linguistics, biogeography and the various branches of chronology. Each discipline has its own techniques and methodology. The study of human evolution is often a specialism within a specialist subject. It is also a science of extremes, involving on the one hand the patient and observant eye of workers like Kamoya Kimeu, foreman of Richard Leakey and Alan Walker's "Hominid Gang," who can stand for hours under the burning African sun searching among the dusty rocks for tiny fragments of hominid fossil. At the other extreme is the arcane and theoretical world of the taxonomist's diagrams. Many of the tools are state of the art computerised instruments, some are trowels and paint brushes. The art, however, is to integrate and synthesize these various approaches into a unified theory. This has naturally not been easy, given the diversity of material and data. It becomes particularly difficult when the different fields come up with conflicting theories, as happens frequently. Added to this is the on-going pressure of publicity, prestige and the competition for the big research grants necessary to carry out the work. The academic world is a competitive one and nowhere moreso than in the high profile world of human evolution.

For many years physical anthropologists have been comparing fossils, searching for evidence of morphological continuity that would indicate lineages that link the fossils with Modern humans. Chris Stringer and Günter Bruer were among the first to promote the Garden of Eden (or Replacement) model on the basis of comparative anatomy. This theory was given significant support in 1987 from genetic research published in a now famous paper[6] in *Nature* by Rebecca Caan, Mark Stoneking and Allan Wilson of the University of California at Berkeley. This revolutionary and controversial piece of work hypothesizes that all living peoples share a common ancestor who lived in Africa between 140,000 and 290,000 years ago. These calculations were based on the assumed rate of mutation in human mitochondrial DNA[7] (mtDNA for short). By comparing mtDNA samples taken from placentas of birthing mothers of different ethnic groups, these researchers were able to measure the "genetic distance" between the various racial groups. Since mtDNA is exclusively inherited through the mother, the press soon coined

[5] Reported in *The Independent*, March 7, 2002.

[6] Cann, R., M. Stoneking and A. Wilson, 1987, "Mitochondrial DNA and Human Evolution" in *Nature*, Vol. 325, pp31–36.

the phrase African Eve to represent the original ancestral population from which all modern peoples have evolved.

Since this original publication there has been considerable doubt cast on both the methods used and the interpretation of the data, doubt which gave renewed ammunition to the anti-Replacement camp, for those who see some form of regional continuity. There was heavy criticism that of the 148 samples tested, 98 came from hospitals in the San Fransico Bay area and all but two of the Africans came from Africa, the rest being Afro-Americans, known to have had some inter-breeding in the time since slaves were brought over from West Africa. Since 1987, however, this genetic research has been refined, repeated and confirmed both by the original researchers and by other independent laboratories.[8] Apart from which, other molecular biological methods using nuclear DNA and comparison of blood groups[9] have also confirmed the view that anatomically modern humans evolved in Africa. There are still doubts about the date of this origin with some investigators reading the data to say that this occurred as long ago as one million years.[10] On its own the genetic data does not prove the Garden of Eden hypothesis, but it does provide evidence that is increasingly hard to refute since it matches several other lines of approach.

Another field of research, this time linguistics, has provided support for the Garden of Eden scenario. A number of leading researchers, foremost among them the geneticist Luigi Luca Cavalli-Sforza, noticed remarkable similarities between the genealogical trees drawn up by geneticists for the evolution of modern human populations and the family tree of languages drawn up by linguists studying the origins of the world's languages. Like many others Cavalli-Sforza was convinced that full modern language was the vital characteristic of Modern humans and the key trait that made world colonization possible. The close correlation between the genetic and linguistic clusters in the various regions suggests that languages evolved as people migrated around the world. The oldest groups by a long way were those from Sub-Saharan Africa.[11] This suggests an African origin for Modern humanity, followed by migrations out of Africa into Eurasia, Southeast Asia, Australasia, and later to the New World.

Such evidence is compelling but also problematic, as Clive Gamble has shown in his book *Timewalkers* (1993). Gamble cautions against correlating genes with language

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[7] Mitochondria are organelles within cells that generate energy. They also contain their own sets of DNA, independent of the cell nucleus' complement. When sperm penetrate the ovum during fertilization, only the nucleus of the sperm cell is admitted and the tail containing the mitochondria is separated off and lost. Thus the male mitochondrial genes are lost and only the female mtDNA is inherited by the offspring. Neutral mutations in the mtDNA accumulate over the generations at a rate which is assumed to be constant, thus providing a measure of genetic distance. MtDNA is particulary important because it is not combined at every conception and thus represents a "purer" line from the maternal side. Nuclear DNA is more complex to map.

[8] See Wallace, D.C., 1997, "Mitochondrial DNA in Aging and Disease," in *Scientific American*, Vol. 277, No. 2, pp28–29. See also Chapter 6 in Stringer and McKie, *African Exodus*, 1996.

[9] See Bilsborough, 1992, Chapter 8 for a summary.

[10] See debate, "Where Did Modern Humans Originate?" *Scientific American*, Vol. 266, No. 4, April 1992.

[11] See Cavalli-Sforza, L.L., 1991, "Genes, Peoples and Languages," in *Scientific American,* Vol. 265, pp71–78.

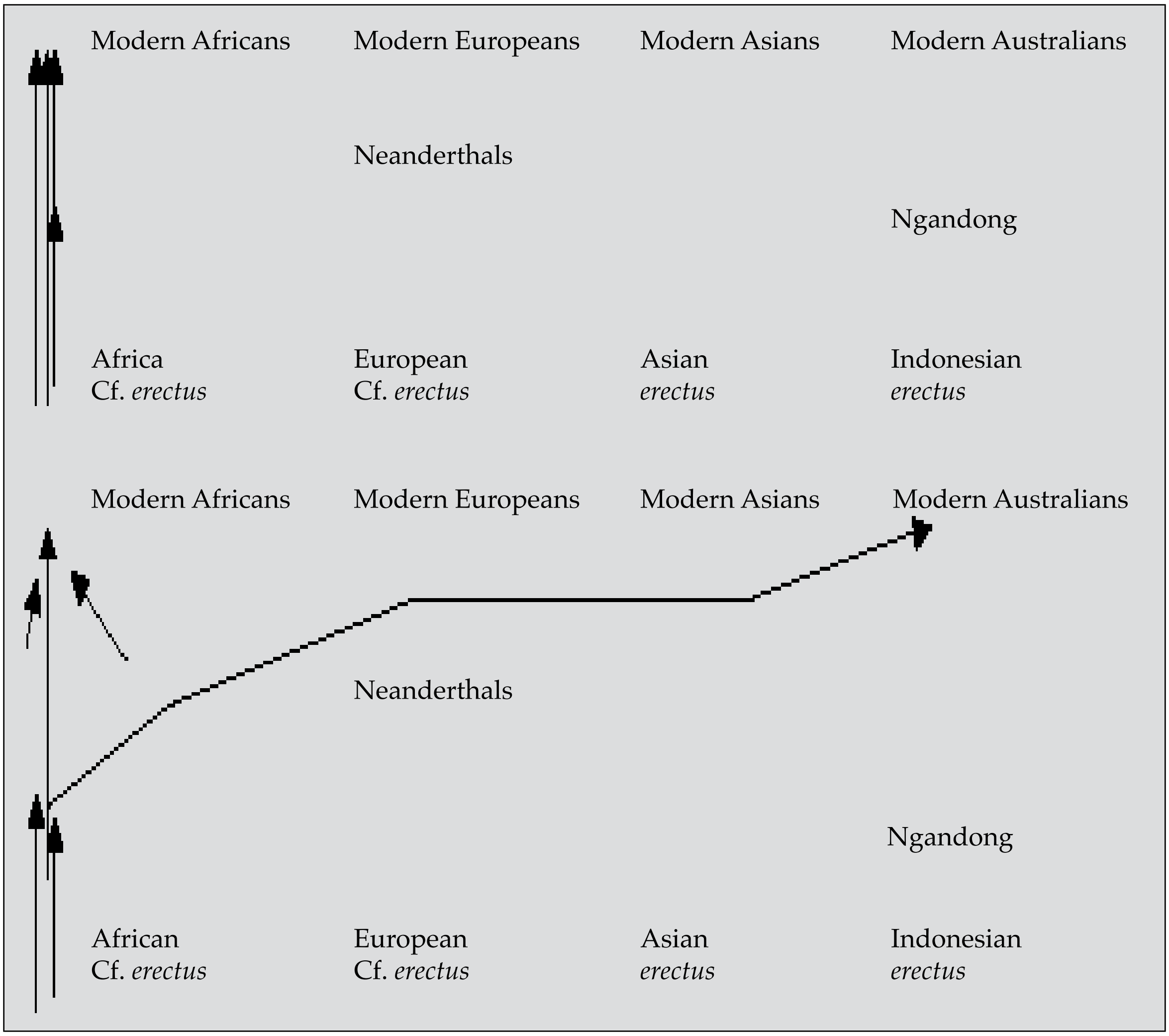


Fig 8.1 *A chart showing the two main theories of the emergence of Modern humanity; the regional continuity theory, which sees Moderns emerging in all the main population centers across the Old World, with sufficient genetic drift at the margins of each group to maintain a single species, and the single origin theory, which sees the emergence of Moderns in Africa, followed by migrations and the gradual replacement of all other existing human species (i.e., either Neanderthals or regional variants of Homo heidelbergensis).*

development,[12] just as he points to the dangers of judging species by their tools or assuming behavioral change when the fossil skulls change shape. Major questions remain as to the underlying evolutionary processes at work in the emergence of Modern humans, questions which actually go to the heart of our understanding of evolution. Was human evolution different in some way from the known mechanisms of evolution as assumed for other species? Can passive adaptation explain behavioral change? Or does what we know about human evolution challenge biologists to rethink evolution in general? As Stephen Jay Gould has pointed out, the Garden of Eden model does at least conform

[12] See Gamble, C., 1993, pp177–179.

to the usual evolutionary pattern of successful species with wide distribution, namely that they arise in a single place and spread out from there. As Gould puts it, "No one envisions proto-rats on all continents evolving together towards improved ratitude."[13]

Nevertheless, how the Great Leap Forward,[14] as Jared Diamond calls it, occurred, is an unresolved evolutionary question. I will now examine what anatomy and behavior reveal to us of the Modern stage of becoming human. The "Ariadne's Thread" I will endeavour to follow, into and back out of the labyrinth, will link various aspects of the emancipation principle working through the human spirit. It is this approach which is the main anthroposophical contribution to the subject.

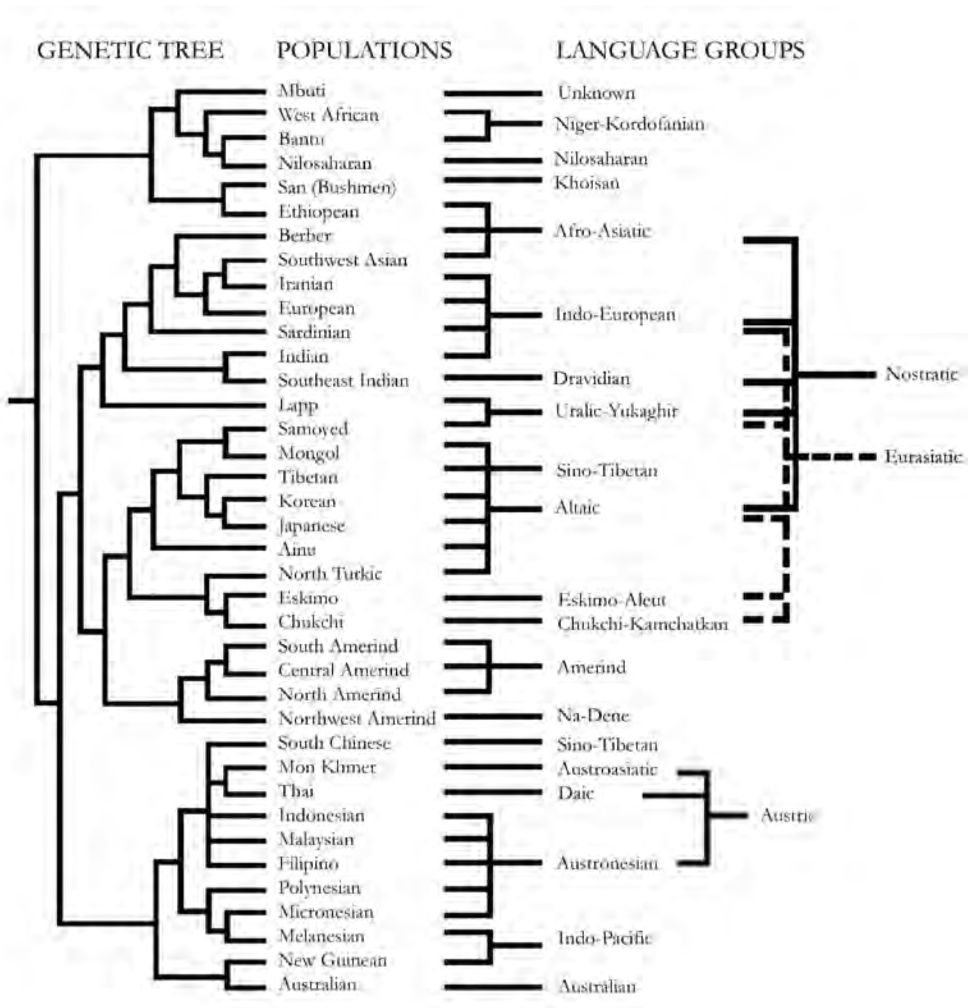


Fig 8.2 *A diagram showing the correlation between genetic and linguistic genealogies (after Cavalli-Sforza).*

[13] Gould, S.J., "In the Mind of the Beholder," in *Natural History*, February 1994, pp14–23.
[14]Diamond, J., *The Rise and Fall of the Third Chimpanzee*, 1991.

A Modern Anatomy

Anatomically modern people have widely variable body shapes as is apparent every time one sits in the London Tube (subway), and yet we all have sufficient similarities to distinguish us from all previous human or hominid species. The differences between short, stocky Pygmies and the extremely tall, slender Nilotic peoples whose traditional homelands are only a few hundred kilometers from each other in central equatorial Africa, highlight the fact that plasticity is a major characteristic of Modern anatomies. Many, though not all, of these differences are due to climate and other biogeographic factors.

These traits may evolve relatively quickly, as the case of the Pygmies demonstrates. It appears that the development of the Pygmy physique is a relatively recent adaptation to living in a rain forest environment. The rain forests of central Africa are thought to have been first inhabited as recently as 10,000 BP and the Pygmies may have moved into the forests at a time when agriculture began in the surrounding plains. A further example of the rapidity of human physical adaptation is the enormous variation among the Native North American peoples, most of whom are assumed to have evolved from small founder groups of migrants from Asia within the past 15,000 years. In even less time, the Inuit/Eskimo peoples have evolved their recognizable cold-adapted short, squat body-shape to conserve body heat and broad nose to protect the brain by warming incoming air. If further proof of Modern abilities to adapt physically in relatively short evolutionary times is needed, we have the many examples of skin color and hair type, both of which have a close relationship to climate and particularly the amount and intensity of sunlight.[15]

Skin Deep

Dark skin provides protection against high levels of ultraviolet radiation through sunlight. Obviously this is an advantage in the tropics. In northern latitudes, however, it is a distinct disadvantage because dark pigmentation inhibits the formation of vitamin D_3 in the skin which is critical to calcium metabolism and bone building. Lack of vitamin D_3 during pregnancy can lead to a drain on the mother's resources. In childhood this can lead to conditions such as rickets in which normal growth is limited, causing girls to develop small pelvises, which in turn can lead to a high risk of death during childbirth. On the other hand too much sun without pigment protection can be harmful: sunburn, depletion of various vitamins and nutrients leading to loss of fertility, and skin cancer.

There is, however, no absolute correlation between black pigmentation and geographical regions of high ultraviolet radiation levels. Tasmanian peoples, now sadly extinct, were almost as dark skinned as their tropical Aborigine relatives despite living for millennia in a climate comparable with Northern Europe. The peoples of the Central American Andes do not have dark skins despite living in an area of the highest ultra-violet levels. Behavior certainly plays a role in this. Most peoples including such desert specialists as the Khoisan, avoid the noonday sun or wear protective clothing like the Tuaregs in the Sahara. Indeed, apart from the extremes of fair Scandinavians and very black peoples of Ethiopia or the Negritos of Southeast Asia, most peoples tend to

[15] For a full discussion of the nature of human physical adaptation and in particular skin color, eye color, hair types, facial features, body hair and adaptations to high altitudes, see Jonathan Kingdon, 1993, Chapter 6.

have brown skin which possesses the ability to tan when exposed to sunlight or lighten when exposure is reduced. Jonathan Kingdon has argued that the shore dwelling Banda peoples were the first to evolve truly black skins and tight curly hair as an adaptation to foraging along the tidal or tropical coastlines of the Indian Ocean.[16] In fact Kingdon presents a scenario in which Banda peoples migrate back to Africa bringing with them their genetic heritage of black skin and tight curly hair, suggesting that the original Moderns were not black but the human archetypal brown.

Cultural Selection

As we have seen, natural selection is not the only factor in determining physiological traits. Cultural selection has also played an important role. There are strong arguments for the view that many racial traits have in fact been determined through sexual selection. Many peoples have strong cultural preferences for certain traits, hair color, eye shape, facial features, stature, breast, hip or buttock size. Even today there are noticeable statistical preferences for body shape. As Jared Diamond has shown, men still prefer woman who appear young, healthy, and fertile as suggested by bodily form and skin tone. Women apparently seek out men who are likely to be good providers of support and protection.[17] Whilst such preferences may vary between cultures and change with the course of time, there is no doubt that in earlier more conservative tribal times, these factors lead to significant sexual selection. It is perhaps characteristic of the trend to increasing individualism that people's preferences for partners are increasingly based on individually- and less on culturally-determined norms.

Many of these physical traits belong to what we normally think of as "racial" characteristics. When encountering strangers we can usually identify their ethnic groups quickly on the basis of skin color, hair type, build and especially facial features. These observations no longer tell us about people's origins, as they might have done a hundred years ago and certainly would have done in the fifteenth century. These outer traits were once highly significant in identifying people. In our times when multiracial societies are becoming the norm, such differences are much less significant. We are now beginning to learn to recognize the unique individuality in another person as primary and what he or she looks like as secondary. As Jonathan Kingdon put it,"What it is to be human will always be more complex, interesting and important than what it is to be any particular type of human."[18]

The Concept of Race

The very concept of race is deeply flawed and comes with an immense amount of useless historical baggage. We know (but could never quantify) how much human suffering has been caused by religious and scientific dogmas with regard to supposed racial distinctions. We also know that the five classic racial types, Negroid, Caucasoid, Mongoloid, Austronesian and the group including the Khoisan peoples of Southern Africa, are inappropriate categories in genetic terms. The word Caucasian, which was coined by Dr. Johann Blumenbach in 1770 because he possessed a skull purporting to come from Mt. Ararat and which he took to be the type specimen for the ideal for the

[16] Ibid., Chapters 6 and 7.
[17] Diamond, J., 1997, *Why is Sex Fun?*
[18] See Kingdon, 1993, p294.

Western Eurasian race, has no real meaning biologically. The so-called Negroid races are amongst the most genetically diverse peoples in the world. They only seem to constitute a "race" in the naïve judgment of Europeans because they share one single characteristic, skin color. The peoples of the Indian subcontinent are equally heterogenous. The Mongoloid peoples appear to be the only one that merits being in a group together and even then the category only works at the broadest "macro" level. There is a strong case to make for a group of peoples of the Mediterranean type with dark hair and light brown or olive complexions who originally inhabited north Africa, The Mediterranean coastal lands, the Middle East and Western Asia as far as the Bay of Bengal.

Whichever categories we choose, the differences between the so-called races are very blurred at the edges and there is much overlap. Apart from the major racial groupings there are population groups such as the Melanesian peoples of Papua, New Guinea, the Negrito peoples of Indonesia and the Andaman Islands, the Ainu of northern Japan, the Pygmies of Central Africa, the Vedda of Sri Lanka, the Basques of northern Spain, to list a few of the many anomalous groups who defy easy classification. Human being are simply very diverse. Indeed some research suggests that the differences between individuals of the same ethnic group are greater than the differences between ethnic groups, "in other words, racial differences are only one sixth as significant as individual differences."[19]

What is clear is that any study of racial types that wishes to deal with the phenomenology of the material and is truly free of any value assumptions, racist or politically correct, needs to see all ethnic groups as variations of an original archetypal human model, as points along one spectrum. Each so-called racial type expresses the tendency of one or another organ complex within the whole human organism to develop a degree of one-sidedness. Humanity as a whole, in all its geographical distribution, has to be seen, at least conceptually, as a total integral organism. Just as all organ systems within a human being have to effectively relate so that the whole is biologically viable, so too we see the necessity for diversity of human types. This diversity and plasticity is an essential human trait. It is the ultimate message of the Human Genome Diversity Project.

Given the increasingly multiracial nature of our societies, at least in the cities, we see a significant and probably unprecedented mixing of racial types. This will not produce, as some might fear, mediocrity and uniformity but increased individual diversity. The genetic consequences will be as profound as the social and cultural ones. As human beings become increasingly emancipated from tribal and ethnic consciousness we could see the expansion of what seems at first a paradox, individual global consciousness. Each individual will become increasingly confronted with the need to find his or her own relationship to the world around him or her. The ultimate source of this understanding is the objective world of thought which, in being accessible to all regardless of individual subjectivity or culturally determined perceptions, is truly global. In the free spiritual realm of thinking, the individual can be truly and consciously global whilst at the biological level of DNA we carry within each cell our entire human heritage with the potential of almost infinite variation in the recombinations of our genes.

[19] A study by B.D. Latter on polymorphic protein variation within and between populations of the major human groups quoted in Kingdon, 1993, p257.

We Are All African, from Our Origin, Under the Skin

Of course much in our cultural environment is doing its best to separate us even further from our environment. Nor should we forget that even today racial or ethnic conflict is still the primary cause of war in our world. As Chris Stringer and Robin McKie stress in their recent book *African Exodus*, "We are all African under the skin."[20] Our common origin reminds us that in infancy our racial characteristics are least evident. We are born universal, we become the children of our parents before we become ourselves. As Ben Okri, the poet and writer, said,"How far back is childhood? I think our childhood goes back thousands of years, farther back than the memory of any race."[21] The question of our racial origins is only interesting insofar as it confirms our common humanity.

One of the significant aspects of the Garden of Eden versus Regional Continuity dispute is the question of the origin of the races. The latter model sees the origin of the major racial groups as very old indeed. It sees, for example, racially distinguishing anatomical characteristics in fossils from Java and China which span over a million years and cites these as examples of regional continuity of evolution. Indeed this is one of the multi-regionalists' chief arguments. This view sees Homo erectus (or habilis) migrating out of Africa some million years ago and evolving in numerous isolated regions into the proto-races. What prevented these populations from becoming separate species was gene flow. This means that individuals at the "edges" of such groups would always breed with those of other groups and so on around the world and back, thus ensuring that each group was sufficiently related to all others, that humans remained one species.

Chris Stringer has highlighted the implications for our understanding of human races if one follows the logic of a multi-regional origin: "All the early human types of the Ancient World, Java Man, Dali Man, Rhodesian Man, Solo Man, Neanderthal Man—were therefore part of our collective ancestry as their genes were constantly shuffled together like cards in a global pack of human evolution, although they also held the seeds of modern 'racial' variation because some cards stayed put through all the shuffling."[22] This argument, Stringer says, would reduce all fossil forms known from the past 1.5 million years to variants of one species, Homo sapiens. This flies in the face of all known evolutionary mechanisms.

Fig 8.3 *A typical example of a European Homo sapiens sapiens (Cro-Magnon) skull (photo from cast by author).*

[20] Stringer and McKie, 1997, p170.

[21] Ben Okri, 1995, *Astonishing the Gods*, quoted in Stringer and McKie.

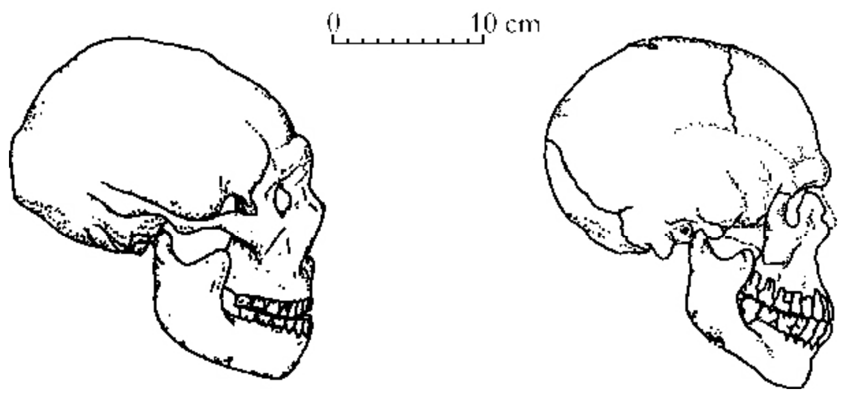
[22] See Stringer and McKie,1997, p50.

Certainly the genetic evidence suggests that humans are a young species. Despite all our apparent outer differences, human beings are all remarkably similar genetically. An Eskimo and an Aborigine are genetically more closely related than two gorillas taken from the same group living in the Zairean rainforest. Humans are unique in this fact. All other mammals of the same species shown considerably more genetic variation than among humans for the simple reason that humans are a very recent species.

Modern Anatomy an Expression of the Human Spirit

Before moving on to examine the behavioral characteristics of Modern humanity, we need to briefly review other aspects of Modern anatomy. The people who are referred to as Moderns in prehistoric terms, however, were on the whole more robust than mankind is now, and so anthropologists can distinguish through anatomical criteria whether skeletons belong to recent times or whether they are 2,000 or 40,000 years old. Modern anatomy, in the prehistoric sense, is distinguished by a number of features most easily recognized in the skull and face, but limb and other bones do show distinctive features.

The main characteristics of Modern skulls include the vertical forehead, the absence (or significant reduction compared to earlier forms) of prominent brows about the eye sockets, the small size and regular arch of the teeth, and a prominent chin. These characteristics are perhaps best seen in comparison with the shape of a Neanderthal skull.



Shanidar 1 *Qafzeh 9*

Fig 8.4 *Comparison of a Neanderthal and a Modern skull (after Stringer and Gamble).*

Though early Moderns were more robust than contemporary people, they were also characterized by generally thinner and lighter bones than those of Ancients. Here again the range of variation among Moderns is remarkable. Two skulls are known from Lake Mungo in Australia, one of which is eggshell thin and the other has the thickest cranial vault ever found. Both of these specimens belong to the Modern species and are around 30,000 years old.[23]

Anatomically we can see the expression of "I" -forces at work. These forces express themselves physically in the verticality of the face and the new frontal shape of the cranium which presumably reflects a new form for the brain within it. The

[23] See Gamble, 1993, p149.

pronounced juvenilization process seen in the thinner bones, domed forehead and reduced teeth size are, as I have pointed to above in discussing heterochrony, prime expressions of the “I” -principle.

When we consider the rest of the anatomy, there are other subtle but significant differences between Moderns and Ancients. Modern shoulder blades are lighter and narrower, the collar bones shorter, and arms generally lighter and more mobile. The fingers, particularly the tips, are smaller and, like the rest of the arm, the musculature is less massive. The rib cage is less barrel- and more bell-shaped, and it is thought that modern speech requires more muscular control of the ribs and diaphragm than earlier humans had. Subtle changes have also been identified in the shape of the pelvis, the hip joint and the femur in Moderns which has altered our mode of walking. This realignment has adjusted the position of the spinal column in relation to the pelvis, enabling modern humans a more cushioned and bouncing style of walking and running.[24] This arrangement provides modern humans with a more effortless stride compared with Neanderthals. Perhaps the long distance runners that enable East African nations, Kenya and Ethiopia in particular, to dominate these events at international athletics meetings show this quality in its most perfect form.

Finally, one should note the highest levels yet achieved by hominids in terms of their universality and adaptability and which are the hallmarks of Modern anatomy, notably the speech organs and hands, as well as the manifest plasticity of form, as evidenced by the extremely wide range of variation occurring in a relatively short time-span among Modern populations. These are all typical expressions of the emancipatory trend inherent in the “I” -principle. The “I,” as I have stressed throughout this book, is that aspect of the whole human being which bears the greatest potential for individual expression. The Modern anatomy has a greater scope of individual variation and expression than any of its forebears.

The Fossil Record

In terms of the fossil record, transitional forms which show some Modern features in skull shape have been found in Africa with dates ranging from around 130,000 BP. Specimens such as Florisbad in South Africa, which may be older, or Ngaloba from Laetoli in Tanzania show some modern features, as do some skulls from Jebel Irhoud in Morocco and the Omo Kibish 2 skull from Ethiopia. From around 100,000 BP fossils show not just a mosaic of Ancient and Modern features but are predominantly modern.

The oldest known Modern specimen is thought to be the Omo Kibish 1 skull from Ethiopia dated around 130,000 BP. This fossil was found by the young Richard Leakey on one of his very first expeditions. Since its reconstruction by Michael Day and Chris Stringer, it has come to be seen as the most likely candidate for the title of “our oldest known ancestor.” Other Modern skulls of the period around 100,000 BP include specimens from Qafzeh and Skhul in Israel and Klasies River Mouth in South Africa as well as Jebel Irhoud in Morocco. Specimens from Border Cave in South Africa may belong to the period around 70,000 BP, though dating of these finds has proved very difficult.

The next batch of fossils with impeccable credentials as Moderns appears in the fossil record from around 35,000 BP in Europe, where they are known as Cro-Magnons, and skulls of this age have also been found in Australia.

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[24] See work by Trinkaus, E. andY. Rak, quoted in Bilsborough, 1993, Chapter 8.

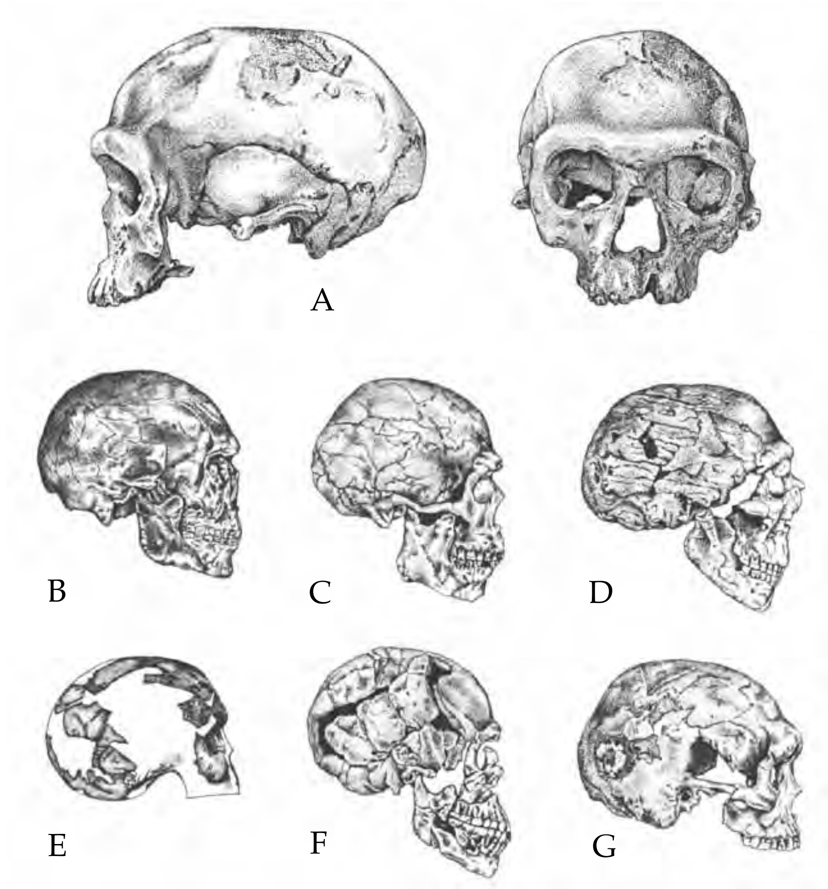

Fig 8.5 *Early Modern skulls: A) Jebel Irhoud 1 from Morocco; B) Qafzeh 11, from Israel; C) Omo Kibish 2, from Ethiopia; D) Skhul from Israel; E) Border Cave 1; F) Jebel Qafzeh 9; G) Jebel Qafzeh 6.*

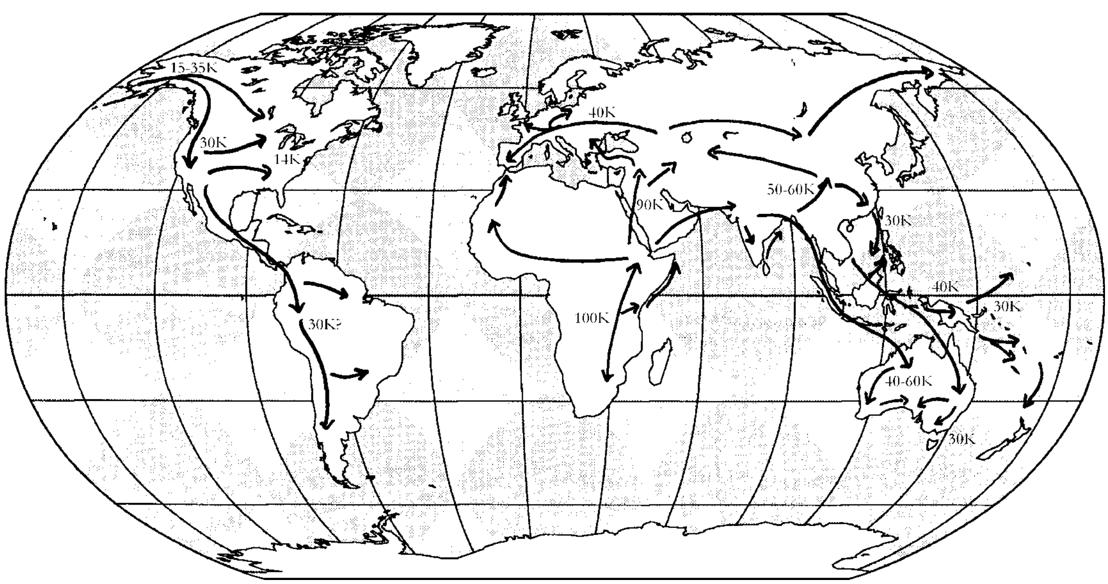

Fig 8.6 *Map showing the likely migrations of Modern humans and possible dates for the earliest known evidence.*

On the basis of this fossil evidence it appears that the Moderns evolved from Ancient people in Africa (usually referred to as late archaic Homo sapiens or African Heidelbergs) and then spread from their savannah homelands to the Middle East by around 100,000 BP. From there they migrated southeast through the Indian subcontinent, down through the Indonesian islands, reaching Australia possibly around 55,000 BP. Only later did they migrate northwestwards into Europe and, later still, across central Asia, ultimately reaching the Americas around 15,000 BP at the latest.

The Human Revolution

We are now certain that anatomically Modern humans were present in Africa and the Middle East in the period around 100,000 BP. The question is, when does evidence for modern behavior appear?

What made the Moderns distinct was the appearance around 40,000 BP of a whole range of new behavioral and cultural traits which mark what has been termed the Upper Paleolithic or simply the Human Revolution. These included new blade tools, use of worked bone, the construction of hearths and dwellings, burials, indications of ritual and that most characteristic trait of all, art. Less visible but implicit in this list of traits are fully developed language and complex social structures, what we would otherwise term society. These innovations mark the greatest step in human evolution since the achievement of upright walking.

The core question is whether the nature of the Ancient-Modern transition should be seen as a kind of cumulative increment and extension of behaviors that had long been established, or whether there was some kind of quantum leap in, for example, the cognitive or linguistic abilities of these people. Furthermore we need to ask whether the Human Revolution came about by virtue of biological factors, such as neurological adaptations, or to what extent mankind created its own evolutionary chances. Did Modern humans pull themselves up by their own cultural and technological bootstraps? To begin to answer these questions we need to look more closely at about how this great transition came.

Transition to the Upper Paleolithic

Classical archaeology has drawn a dividing line between the Middle and Upper Paleolithic (UP) cultures (or Middle and Late Stone Age in African terms) primarily on the basis of stone artifact types. Mousterian assemblages characterized by flake tools often produced by the Levallois technique were typical for the Middle Paleolithic. These were replaced by lighter, smaller, more slender blades in numerous shapes, including tiny microliths. Blades are flakes struck from a core, but are distinguished from flakes as a tool type by being defined as flakes at least twice as long as they are broad. The earliest known blade culture of the UP is known as the Aurignacian.

The assumption has long been that the transition from Homo sapiens (i.e., heidelbergensis) to modern Homo sapiens or Cro-Magnon Man, as the European representatives used to be known, coincided with the shift from Middle to Upper Paleolithic industries. The most marked period in which this transition occurs falls within the period between 35,000 and 40,000 BP. These dates seem to be typical for Europe, sub-Saharan Africa, the Near East, India and China. Throughout these regions there seems to have been a broadly similar shift to blade technology and a gradual disappearance of the Levallois technique.

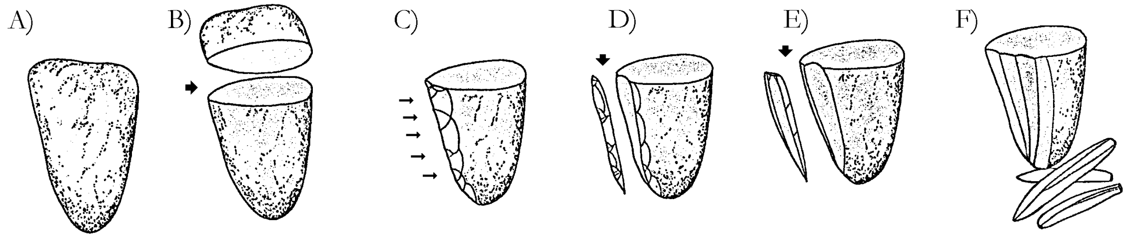

Fig 8.7 *Drawing showing how blades were struck from a core.*

The pattern, however, does not seem to be quite as consistent as was once thought. Techniques once thought to belong exclusively to the Upper Paleolithic have been noted at much earlier sites. Stone points, often leaf-shaped, that were clearly hafted onto wooden shafts used as spears, were once thought to be distinctive of the Upper Paleolithic and, by implication, a Modern form of technology. It was felt that the degree of planning and combinatory thinking required were Modern. The North African lithic culture known as Aterian is considered by many archaeologists, notably Desmond Clark,[25] to date back to 100,000 BP. These Aterian points were made using Levallois technique and are often found with Middle Paleolithic assemblages.

In South Africa and the Near East a number of sites have presented equally strange anomalies. At Klasies River Mouth, Border Cave and Howiesons Poort in South Africa early blade and even microlith artifacts have been found in essentially Middle Stone Age contexts. A similar story is told at Tabun and Amud in Israel. These anticipations of UP techniques have been referred to as Pre-Upper Paleolithic (PUP). The most curious fact about their appearance is their subsequent disappearance from the archaeological record. At Klasies River Mouth they were replaced by typical Middle Stone Age artifacts and techniques.

The Katanda Harpoons and Other Curiosities

A similarly anomalous discovery is the presence of barbed harpoons carved out of bone at African Middle Stone Age sites in Northeastern Zaire at Katanda that have been dated to 82,000 BP.[26] Barbed harpoons are known from UP sites all over Western Europe. They are almost the symbol of the Magdalenian culture. It has long been accepted in archaeology that barbed harpoons carved out of bone could only have been produced by Modern humans. Their presence alongside relatively crude stone tools has to be an intrusion from much more recent periods. The scientists who found them were extremely cautious about publishing their discovery until they had dates that would bear the weight of the heavy criticism they expected. When the dates finally arrived from the dating labs, many colleagues found the information so hard to accept that it was largely ignored.

In fact there are a growing number of anomalous discoveries in Middle Stone Age sites, such as symbolic marks on bone, pierced tooth ornaments and carved shells, all artifacts that one would usually associate with a Modern site. The number of such discoveries remains small and they do not add up to much set against the

[25] Clark D., "The Origin and Spread of Modern Humans," in Mellars and Stringer 1989, pp565–588.
[26] James Shreeve discusses the Katanda harpoons in his book *The Neandertal Enigma*, Chapter 9, 1995.

overwhelmingly monotonous picture of typical Mousterian or Middle Stone Age flake tools.

Equally puzzling is the appearance of the Charaman culture. Between and along the Limpopo and Zambezi rivers distinctive stone artifacts have been found and referred to as the Charaman culture, including blades and other tools apparently used for working wood and plant materials. Jonathan Kingdon suggests that the Charaman finds represent an intrusive new culture from more tropical regions.[27] Wherever they came from, the fact is that Charaman artifacts do not fit easily into the traditional categories of the Middle and Late Stone Ages.

When the Time Is Right

The First Human Revolution, like subsequent moments of major transition, clearly had its antecedents. Modern humans did not suddenly appear fully equipped on the world stage, like Pallas Athene springing forth from the forehead of Zeus! Here and there various aspects of the Upper Paleolithic culture had emerged in the previous millennia. They were, however, isolated occurrences that do not seem to have spread and changed human lifestyles significantly. Like many technical innovations, they did not revolutionize society if the "time was not right," which means that they did not occur in the right context. The history of technology is littered with inventions that did not take hold because their potential could not be realized; the wheel was known to Pre-Columbian societies in Mesoamerica, but in a mountainous region with no suitable domesticated draft animals, the advantages of wheeled transport could not be used. But it is not only the lack of a suitable technical context that counts. Sometimes what is lacking is the social need necessary to fully harness the discovery. Examples include the technique of printing, long used in Korea and China, or the knowledge of the steam engine in Ancient Greece which was solely directed to pumping ornamental fountains.

On the other hand, we know from cultural revolutions that when new inventions or ideas coincide with other complementary ideas and technologies, life can change dramatically. The emergence of modern science itself is such an example. Even more dramatic has been the transition from the age of steam and iron to the nuclear power and electronic age—a Great Leap Forward possibly unparalleled in human history since the original Human Revolution! Curiously, no one today tries to find genetic causes for the sudden emergence of the electronic age, no neural mutations are invoked to explain that revolution.

Interestingly this was the ultimate difference in views between Darwin and his great rival and fellow evolutionist Alfred Russel Wallace. Wallace simply could not accept that the higher human faculties emerged through natural selection since selection can only select what is there. He felt that such an "appearance out of the blue" could only be explained by divine intervention, a gift from the spiritual world, which he strongly held as a reality. Wallace's problem remains unresolved.

A Biological Breakthrough?

The real problem posed by such anomalies as blades or harpoons in Middle Stone Age contexts is the question of what actually created the Human Revolution or Great Leap Forward. Clearly it was not directly caused by anatomical changes, at least not of the kind that are detectable in fossil material. Anatomically Modern humans were

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[27] See Kingdon, J., 1993, pp115–117.

around for a long time before 40,000 BP without producing new technologies or behavior patterns. If it was some kind of biological event, there is no trace of it in the fossil record. Of course there might have been some kind of neurological adaptation that left no trace in the fossil record.

The recent discovery of so-called mirror neurons recently by Vittorio Gallese and Giacomo Rizzolatti of the University of Parma may be just the kind of neurological breakthrough needed. These neurons respond when their owner observes another person doing something, in other words they form a neurological basis for imitation. These mirror neurons are linked to pre-semantic understanding, what researchers like to refer to as mindreading, the ability of an observer to empathize with another person and be able to "read" emotional states intuitively. This intuition is ultimately based on imitating the muscle movements of another person engaged in an activity or expressing an emotional state.

Vilayanur Ramachandran of the University of California believes this discovery is crucial to our understanding of the Great Leap Forward. Ramachandran believes that mirror neurons not only provide the missing link between gesture and language thus enabling one to imitate others, but set "the stage for the complex Lamarckian or cultural inheritance that characterizes our species and liberates us from the constraints of a purely gene based evolution."[28]

He feels their development goes, "a great way towards explaining human learning, ingenuity and culture in general. Their emergence and further development in hominids was a decisive step."[29] Mirror neurons are certainly not exclusive to humans, indeed they were first discovered in monkeys. As we have seen, imitation has probably been a feature of hominids for several million years. However an increase in the capacity of such mirror neurons may have contributed to the Great Leap Forward. As Ramachandran himself notes,

> Mirror neurons are necessary but not sufficient: their emergence and further development in hominids was a decisive step. The reason is that once you have a certain minimum amount of "imitation learning" and "culture" in place, this culture can, in turn, exert the selection pressure for developing those additional mental traits that make us human . And once this starts happening you have set in motion the auto-catalytic process that culminated in modern human consciousness.

The resulting increase in ability to imitate and learn (and teach) would explain the explosion of cultural change that we call the "great leap forward" or the "big bang" in human evolution. This argument implies that the whole "nature-nurture debate" is largely meaningless as far as human are concerned. Without the genetically specified learnability that characterizes the human brain, Homo sapiens would not deserve the

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[28] V.S. Ramachandran, 2001, "Mirror neurons and imitation learning as the driving force behind the 'great leap forward' in human evolution," paper published on Edge website: www.edge.org/documents/archive/edge69.html

[29] Quoted in *New Scientist*, January 27, 2001, p26. See also V.S. Ramachandran, paper on Edge website quoted in footnote 28 above. See also "Mirror neurons and the simulation theory of mind-reading" by Vittorio Gallese and Alvin Goldman in *Trends in Cognitive Sciences*, Vol. 2, p493, 1998.

title "sapiens" (wise) but without being immersed in a culture that can take advantage of this learnability, the title would be equally inappropriate. In this sense human culture and human brain have co-evolved into obligatory mutual parasites, without either the result would not be a human being. Thus I regard Rizzolati's discovery, and my purely speculative conjectures on their key role in our evolution, as the most important unreported story of the last decade.[30]

Yes, But …

Theorizing about the emergence of some neural breakthrough only begs the question, among others, of how we account for Pre-Upper Paleolithic innovation such as Katanda harpoons? And if such a neurological breakthrough occurred in any one group, how come the whole package of UP cultural traits does not appear as well? Why just harpoons in one place, or just blade industries in another? Above all, why did these innovations remain localized for so long and then disappear only to be "rediscovered" later elsewhere?

As we have seen, some researchers, such as Cavalli-Sforza, see the critical event as the emergence of full human language ability (and the theory of mirror neurons provides a mechanism for rapid transmission of language). Language was certainly decisive. The question is when. Anatomical Moderns clearly had the anatomy and the Neanderthals probably did as well.[31] Why should full language wait so long and then suddenly appear around 40,000 BP? The arguments begin to appear circular.

The appearance of these anomalies is significant in a number of ways. Firstly, they show that it is a risky oversimplification to associate specific technologies with specific human species or to correlate cultural periods with biological adaptations. Secondly, so-called "advanced" techniques have not always had their expected triumph over less advanced techniques, and especially not where the full range of "advanced" behavior is not already fully established. Different aspects of the Human Revolution occurred in different places at different times. Each anticipated the future in a one-sided way. It was only around 40,000 BP that these events occurred simultaneously.

The first point we can make is that the Great Leap Forward was probably not confined to a short glorious period but that crucial inventions and developments occurred over a long period, possibly 50,000 years or more. Secondly one innovation becomes a catalyst for another. Thirdly the factors which appears to provide the critical mass that makes the Revolution visible to us in the archaeological record was increased by what Ramachandran calls "learnability."

Here we see yet another example of heterochronous development in human evolution. As with the emergence of Homo, the threshold was crossed at different times by different hominid grades. Just as we cannot rule out the possibility that australopithecines also fashioned stone artifacts and not only Homo habilis, so too the transition from Ancient to Modern is not clear cut. The decisive factor was the level of consciousness that accompanied the technological breakthrough. It appears that at some point a "critical mass" of consciousness emerged. What brought about the necessary breakthrough is a complex question. In order to grasp what this shift of consciousness

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[30] Ibid.

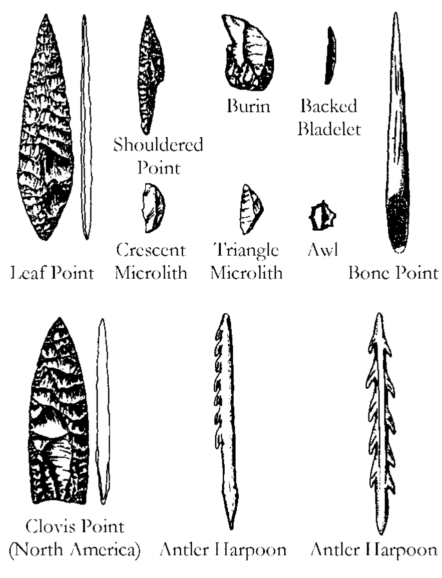
[31] The Neanderthal fossil from Kebara in Israel has a fully modern-looking hyoid bone. This small bone forms in the throat region and anchors the muscles of the tongue, larynx and jaw and suggests a vocal tract capable of fully developed speech.

might have meant, it is useful to take a closer look at the innovations that mark the Upper Paleolithic.

The UP Toolkit

The transitional period dating from 60,000 BP to 40,000 BP has been termed the Pioneer Phase by Clive Gamble. The pioneer quality comes variously to expression through Ancients such as Neanderthals and early Moderns. We find Ancients anticipating Modern behavior and Moderns using Ancient techniques. To cap it all, at Anthony Marks' excavations in the Negev Desert in Israel at the site known as Boker Tachit Ancients have refitted flakes and blades to one nodule of flint.[32] At one end, the knapper had been making a Middle Paleolithic Levallois point. As the nodule got smaller he/she changed to an Upper Paleolithic blade technique to produce the same end product. The site is dated at 47,000 BP, more or less at the middle of the Pioneer transition phase. As Clive Gamble put it, "One lump of flint, two different techniques which should be unrelated and one common end product."[33] This is very much a case of a human "Archaeopteryx," a living being combining past and future forms in a pragmatic mosaic in the present. Archaeopteryx is the fossil of the first known bird which shows a mosaic of reptile (dinosaur) and bird traits, thereby combining an older evolutionary form with a new one.

The distinctive features of UP tools are their small size and their multiplicity of shapes. Blades were struck with astonishing economy from carefully prepared cores. Literally dozens were struck from one core. The revolutionary aspect of blades is not so much their production but the consciousness they imply.



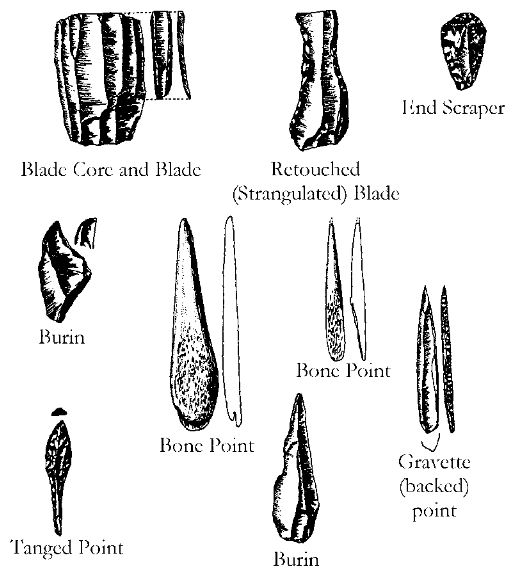


Fig 8.8 and Fig 8.9 *A selection of tools typical of the Upper Paleolithic (UP).*

[32] Marks, A.E., "The Middle and Upper Palaeolithic of the Near East and the Nile Valley," in Mellars, 1990, pp56–80.
[33] Gamble, C., 1993, p162.

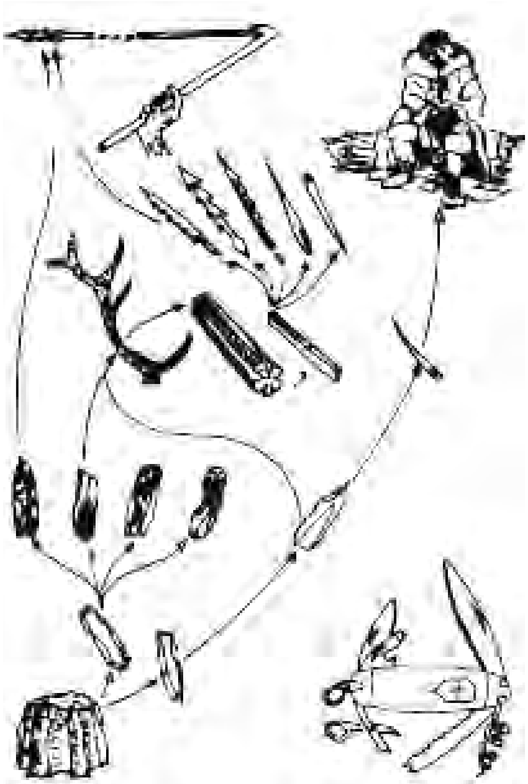


Fig 8.10 *Picture showing the so-called Swiss Army Knife model of blade production. From an original piece of flint a core is shaped from which blades can be struck. These in turn can be further modified to become a range of tools used to cut, saw, bore, scrape or pierce. Such tools can be used to work other materials such as antler into other tools such as harpoons and spear heads which can be attached to shafts, or into needles which can then be used to sew clothes. Likewise fine tools can be used to make beads or engraving ornaments on other artifacts, or to draw on slates or cave walls (adapted from Fagan).*

Stone Swiss-Army Penknife

Brian Fagan describes what he calls the "Swiss army penknife effect."[34] A core can be carried in the "pocket" and a blade produced (usually by pressure flaking) which, with further retouching, can be turned quickly into a knife, a saw, a bore, a scraper, an awl, or an arrow head. Furthermore, these precision tools can be used to work other materials such as bone, antler, wood and so on, to produce additional tools and artifacts. Quality stone used as a raw material for such "Swiss army" cores is known to have been transported distances ranging from 100 to 450 kilometers. Blades, or indeed tool components carved out of other materials, could be combined to produce complex tools such as arrows, spears, sickles and so on, whereby the usefulness of the tool is enhanced by having a custom-made handle or shaft. The points on both carving tools and projectiles could be exchanged relatively quickly to suit circumstances or to replace damaged points. We know too that, just as care was taken in choosing the best material available in the first place, many tools were re-sharpened and recycled.

The Presence of Mind

We have come a long way from the so-called "fifteen-minute culture" of Ancients, such as those strong-boned (as we know from the famous shinbone) people from Boxgrove. Now we can speak with justification of a portable tool-kit, depots of raw materials, trade and exchange, and the expansion of craft skills. The level of planning, conceptual thinking, observation and knowledge of raw materials and the range and

[34] Fagan, B., 1990, Chapter 12.

complexity of artifacts have become truly Modern. Whereas the ancients tended to make expedient use of natural resources to tackle problems at hand, using skills no doubt learned from generation to generation by emulation but also borne deep in their psyche, the Moderns equipped themselves for future eventualities. The difference between the cultures lay not so much in sudden acts of great technical invention, for during the long Pioneer phase elements of both old and new were present by degree, but in the depth of planning and in the presence of mind to respond to situations. The phrase "presence of mind" may be understood in various ways. With the Moderns we can deduce a heightened awareness in the present of learned past experience and expected future outcomes. Does this heightened awareness reveal itself in other aspects of archeology?

Home Bases and Hearths

We saw, in looking at evidence of lifestyles among the Ancients, that theirs was an existence that left little permanent trace on their environment, with the exception of the deliberate burning of savannah grasslands which led to a preponderance of fire-resistant plant species. Evidence of campsites, home bases, even dwellings is meagre. A well-built, perhaps scooped-out, stone-lined hearth is an indication that a group of people established a semi-permanent base to which they returned after hunting or foraging in the vicinity. A hearth does not necessarily imply cooking, but it does suggest the containment and intensification of the fire. After all, a bonfire would provide light, warmth and protection against carnivores. To line a hearth with stone means one wanted to do something more with the fire.

Cooked meat is easier to digest, and requires less energy to chew (to suggest grilled steaks taste better is tempting but inadmissible evidence). Certain plants lose their toxins when heated or baked. Flint is easier to flake when heated, and wood can be hardened and formed with the aid of fire. As we shall see, the colonization of the cold regions depended absolutely on fire not only for warmth but also to thaw out frozen carcasses. But whatever practical uses control of fire offered, the picture of the hearth is also evocative of social focus, not to mention the numerous qualities of fire in human ritual of all kinds.

From around 40,000 BP onwards (the earliest well-dated hearths are around 34,000 at the Abri Pataud by the Vézère river in France) there is clear evidence for substantial sites which include hearths and a clear spatial pattern of use, that is to say, specific areas of the site were used for stone knapping, carving, butchering, dumping of waste, and so on. What is more, these sites, some amounting to prehistoric villages, are found not only in the entrances to caves and rock shelters, but out on the open plains. Some of the best-researched of these open-air sites are on the loess plains of central and eastern Europe, such as Pavlov and Dolni-Vestonice in the Czech Republic, and Kostenki, Mezhirich and Mezin in southern Russia and the Ukraine.

At these sites there is ample evidence of substantial dwellings being built out of earth, stone and mammoth bones over hollowed-out pits. The most remarkable of these are the mammoth bone houses from Mezhirich in the Ukraine. Along with the evidence of dwellings are deliberate and elaborate burials of individuals of both sexes and all ages often literally under the floor. Notable among these is the triple burial at Dolni Vestonice, which I shall refer to later in more detail.

Hearths, huts, burials and even villages give us unambiguous evidence of a highly organized and structured society for the period between 40,000 and 20,000 BP, radically different from all previous periods. As Paul Mellars puts it, "Allowing for all possible caveats, these figures (for population densities) can only indicate a fairly massive increase in the overall densities of human populations in many regions of Europe, coinciding broadly with the transition from the Middle to the Upper Paleolithic."[35]

Ornament

The presence of hearths, structured living sites, deliberate burials and evidence of worked artifacts which clearly had no utilitarian function, such as beads, pierced shells, worked amber, and art, points to social structures of a complex nature. Personal ornament expresses a wide range of human experience other than aesthetic considerations, which no doubt have always played a role. Even within the essentially egalitarian hunter-forager cultures the individuals within the group have their status, whether based on sex, age or experience. Such differentiation can be seen in the association of bear and wolf teeth with the skeletons of men, armbands and necklaces of pearls, snail shells and mussel shells for women, antler pieces for old men, and so on. One of the graves at Dolni-Vestonice contained a female skeleton with evidence of a malformation of the facial bones. A small carved head as well as a small ivory plate with stylized eyes, nose and mouth both indicate asymmetry on the left corner of the mouth, similar in fact to that of the skull. This remarkable find certainly points a very personalized expression of art and ornament, the carved head is called the first portrait in world history. At any rate, personal ornament is clearly an indication of an emerging self-consciousness within a social group.

Many of the ornaments, as well as pieces of good quality stone used for blade production, are known to originate from regions geographically remote from their find sites. Amber from the Baltic has been found in southern Europe, sea shells have been found far from the sea, and fossils such as sharks' teeth from known geological sources have been found in areas remote from their origin. Among hunter-forager peoples exchange of objects considered valuable because of their intrinsic qualities is known to be part of the complex relationships linking separate groups. The exchange of group members through marriage is a well-known feature of such societies. It seems reasonable to assume that Upper Paleolithic exchange could be seen in this light, rather than as evidence of trade in any commercial sense. Such relationships not only express awareness and recognition of the other group but also strengthen the self-identity of the group itself.

Good Communications

Such relationships are unimaginable without full modern language abilities. While the Ancients may well have managed with basic proto-language forms for naming things, identifying elementary relationships such as "ours/yours," the kind of human society implied by the archaeological evidence of the Moderns, would have required the full range of syntax, especially the temporal forms of verbs with their supporting adverbials. Researchers such as Luigi Cavalli-Sforza have argued that the acquisition of full language skills more or less represents the prerequisite for global migrations such as we know took place. Certainly, once mankind started inhabiting the more extreme environments such as the Eastern European steppes during the last Ice Age, fully comprehensive language skills were essential.

[35] See *The Oxford Illustrated Prehistory of Europe*, 1994, p64.

When one considers the conditions under which people of the Russian steppes lived at the height of the last Ice Age, between 25,000 and 20,000 BP, we get a picture of the remarkable demands made on social groups. These hunters inhabited an environment which saw 6 to 9 month winters on exposed plains with an icy wind-chill factor of -40°C. These hunters depended on mammoths in the way Inuit depended on seals or the Native Americans of the Great Plains on buffalo. Mammoths were large and dangerous, on average around 217 meters at the shoulder. In the short summers the steppe people no doubt hunted, fished and foraged among the network of meltwater streams at the edges of the ice sheets. In winter they either hunted or foraged in the snow for carcasses which they thawed out in their hearths. The mammoth population has been estimated at between 0.13 and 0.5 per square kilometer, which is not a dense concentration of meat on the hoof. Judging by the enormous piles of mammoth bones found at sites, fairly extensive hunting or foraging activities must have been undertaken, requiring high levels of organization. The similarities of both functional artifacts and dwellings, and the style of art objects shows that cultural impulses were common across vast geographical regions. This also could indicate extensive exchange between widely scattered and mobile groups.

We know that materials such as high quality stone were transported great distances and that shells and fossils with less obvious utilitarian functions also made great journeys. Clearly these materials had value for the people who carried them so far. Taken together with the evidence of personal ornamentation, we have to ask, why was this important?

Friends or Foes?

Hunting-gathering groups co-existing in a harsh Ice Age environment where resources were scarce and survival precarious were forced to see other groups they encountered as either competitors or allies. Conflict could be disastrous since the loss of able-bodied members of the group could be fatal. Cooperation was the alternative. Information about the location of herds, of fish or bird migrations would be crucial to exchange. Knowing the other group's intentions was also key to avoiding clashes of interest. One can easily imagine that such groups would meet periodically not only out of a need for social exchange but out of necessity. Such encounters were vitally important and probably not without their tensions.

When large groups of people meet, as they certainly did at sites as Dolne Vestonice, the levels of social complexity are dramatically higher than within the familiar group. (They are complex even among higher primates.) Since we are dealing with humans we can be certain that there was a lot going on at the interactive level. In a close-knit hunting group such a group of Ancients, the mutual understanding between the members of the group must have been almost intuitive. On meeting other groups it would have been necessary to have codes of behavior, rules which structured and ordered such encounters. This must have involved much ritual and symbolism. It was necessary to identify quickly that a stranger was one of "them" and that "they" were allied to "us." Such information can rapidly be conveyed by all manner of ornament, markings, styles or behavior. Just as the headdresses of New Guinea tribesmen convey crucial messages to friend and enemy alike, so too we can imagine UP people communicating.

Art, Ornament and Ritual as a Search for Meaning

To imagine, as some theories have, that art, ornament and ritual evolved because Ice Age hunters had time on their hands is simply demeaning. The idea that successful hunters sat around the campfire dreaming of the tribal Venus and whittled bone figures as a leisure activity is absurd—if leisure is taken in the modern sense of amusement, filling time or idle curiosity. The very intensity of the activities alone argues against the leisure idea. Painting a cave, carving a spear-thrower or making hundreds of ivory beads to decorate a grave, such as that of a man and two children found at Sungir near Moscow, involved a huge investment of time and energy. Those Ice Age people were living at the very edge of human survival possibilities in a very harsh environment. They depended for survival on cooperation and that cooperation depended on intensive social interaction. Art, ornament and ritual, were essential activities for those highly intelligent people, giving continuously renewed meaning in their lives, strengthening their social structures and meeting a deep spiritual and existential need, as I shall examine more closely in the following section.

Where such cooperation and exchange exist, symbolism soon becomes necessary because objects and deeds are imbued with meaning beyond their literal or functional significance. Objects acquire a representational function. Symbols derive their agreed meaning through the context in which they are used. A simple deed becomes ritual through a consensus that it represents a mutually-agreed-upon meaning. In most cases ritual involves performing actions in which the meaning is reinforced and confirmed through repeated participation in shared activity.

We can see that a heightened consciousness of group identity certainly belonged to the UP mentality. Along with this went a stronger sense of self-consciousness which must arise when individuals have to relate to and interact with strangers or at least to people beyond the immediate family group. Previous peoples, such as the Ancients, were presumably less frequently confronted with this situation. The groups were more self-contained and simply kept out of each other's way. Exchange was not necessary either for practical purposes, social need or in response to the genetic imperative to reproduce. Perhaps it was this shift in consciousness which most typifies the UP. It was this need to communicate that enabled the Human Revolution to take off in the way it did. It was perhaps this quality that meant that the discovery of how to fashion and use a bone harpoon could not merely remain the curious possession of one people but would henceforth fundamentally change everything.

To grasp something of the quality of consciousness experienced by Upper Paleolithic peoples we need to examine the most enigmatic and yet certainly most expressive cultural form they have left us. We must study their art. This is the nearest we can get to their being.

Prehistoric Art: Impressions and Expressions: A Global Phenomenon

The UNESCO-sponsored World Archives of Rock Art (WARA) has catalogued over two million examples of prehistoric art world-wide.[36] The oldest dated samples come from Zimbabwe where fragments of painted stone date back some 40,000 years. Border Cave at Kwa-zulu in South Africa has yielded engraved pieces of wood and bone as old as 37,500 BP. Rock engravings from Karolta in South Australia have been dated to around 32,000 BP. The oldest well-dated finds in Europe come from Lonetal in southern Germany where mammoth ivory carvings have been dated to around 33,000 BP. Similarly aged carved figures are known from Siberia. The recently discovered cave paintings in the Chauvet Cave in the Ardéche, southeast France have been dated to around 32,000 BP. Slightly younger, at around 27,000 BP, are a cluster of dated art works from as widely dispersed locations as China, Australia, Africa, Arabia and India. Around 40,000 BP seems to have been a watershed and only a few objects have any serious claim to being older.

As we have seen, the occurrence of art is one of the main criteria archaeologists have used for defining the Upper Paleolithic, the period in which anatomically modern humanity began to "conquer" the world. 40,000 BP was the beginning of the "Human Revolution." The Upper Paleolithic lasted until the end of the last Ice Age, some 10,000 years ago. No doubt the two million examples of prehistoric art referred to above. Some of the main regional concentrations of artistic activity such as southwest France represent only a tiny fraction of the art produced since 40,000 BP. Much has been lost, up to 100 kms of coastal regions, to rising sea levels since the end of the Ice Age. Some, perhaps, remain to be discovered; major new finds have occurred within the last few years even in intensively researched areas like southern France. In densely populated regions with a long history of human settlement such as India and China much has been lost to quarrying, building sites and farming.

What Remains?

As ever, only durable art forms survive. Most biodegradable materials perish quickly. Dance, song and instrumental music have left only indirect traces, but we can be certain that they played a significant role in early cultures. Some illustrations of dancing figures, a few bird bone flutes and percussion instruments give tantalizing hints at what was probably a major component of prehistoric art and ritual.[37]

As modern archaeological methods are applied to ever more regions of the world, we can expect the present picture of distribution to be extended. Africa, which already has the widest range of prehistoric art, will almost certainly contribute much in future. Australia too, is rapidly becoming a major center.

The Full Spectrum of Arts Right from the Beginning

As one might expect in a period spanning some 30,000 years, there have been distinct changes in styles and techniques. The range of artistic media used has been

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[36] A variety of sources have been used in this chapter, mainly:
Anati, I ., *Felsbilder: Wiege der Kunst und des Geistes*, 1991 (Italian original 1989, *Arte Rupestre*).
Bahn, P.G. and Jean Vertut, *Images of the Ice Age*, 1988.
Kühn, H., *The Rock Pictures of Europe*, 1966.
Müller-Beck, H. and G. Albrecht (eds.), *Die Anfang der Kunst vor 30,000 Jahren*, 1988.
Laming-Emperaire, A., *Lascaux: Paintings and Engravings*, 1959.
Leroi-Gourhan, A. *The Dawn of European Art*, 1982.
Marshack, A., "Exploring the Mind of Ice Age Man," in *National Geographic,* Vol. 147, No.1, pp64–89.
Leakey, M., *Africa's Vanishing Art*, 1983.
Mirimanow, W.B., *Kunst der Urgesellschaft*, 1973.
Solomon, A., "Rock Art in Southern Africa," in *Scientific American*, Nov. 1996, Vol. 275, No. 5, p86.
Chauvet, J-M, E.B. Deschamps and C. Hillaire, *Chauvet Cave*, 1996.

[37] Clottes, J. and J. Courtin, *The Cave Beneath the Sea: Palaeolithic Images at Cosquer*, New York, 1996. To keep the text relatively uncluttered I have not noted the source for each example of prehistoric art cited. Most of the examples are well enough known and reproduced in numerous publications.

extensive since the earliest of times. All manner of surfaces, including human bodies, were used for linear and chromatic designs. Full sculpture is present almost from the beginning, springing apparently fully formed from nowhere, as the superb ivory carvings from Lonetal in the Swabian Jura attest. Bas-relief and engraving were common, as was the ornamental decoration of functional artifacts and the manufacture of jewelry. Both figural representations and abstract forms appear very early, and the range of themes portrayed is extensive.

The recent spectacular discoveries of cave paintings in the Chauvet Cave at Vallon-Pont-d'Arc in the Ardéche region of southern France,[38] which were reported worldwide in January 1995 and which have been given preliminary dates of between 33,000 and 30,000 BP, show the incredible mastery of Paleolithic artists some 15,000 years before the famous paintings at Lascaux and indicates that prehistoric painting did not progress from simple and crudely drawn to more sophisticated forms. The paintings at Vallon-Pont d'Arc not only match those at Lascaux and Altimira, but show that their artists possessed the ability to present spatial perspective, movement and volume through the use of shading. We look forward to the results of the detailed studies that are planned for this magnificent discovery. What then does this worldwide appearance of creative activity after 40,000 BP tell us about the emergence of self-consciousness?

Art and Self-Consciousness

Art and artifact have in their origin an overlap of meaning. A functional object such as a flake tool, as I have shown in preceding chapters, is also an expression of the consciousness and mentality of its maker. The classic Acheulean hand-axe or biface is as much an expression of an inner activity intrinsic to the being of the person who made it as it is a functional tool. Its spiritual content, as expressed by its superbly balanced form, extends far beyond its function as an effective cutting or chopping instrument, a fact which is also true of many subsequent tools and artifacts up to industrial times. As I have shown above, the activity of producing a biface may have been as important in schooling conceptual faculties, as its functional use. Yet, I suspect, the countless stone-knappers who produced them for over a million years would have been as unaware of this as a weaver-bird is of why it builds its nest as it does. The difference is that the stone-knapper was imbued with an evolving spiritual core, striving towards self-consciousness.

Art implies that form and activity have been informed by a conscious content greater than the resulting sense-perceptible outcome. Nature creates beauty artlessly. Its meaning does not exceed the means of its expression. Art implies conscious activity of the mind, intention of the will. It expresses, represents and acts on behalf of forces beyond those intrinsic to the medium used, such as color, material, shape or musical tone. Art enhances the value of its materials. What the source of this added value is, be it divine grace, inspiration, social values, or personal projection, is a question of interpretation. The contribution of the artist Joseph Beuys has been seminal in re-establishing this central aspect of art. Art is nature imbued with consciousness. It uses the forces and qualities of nature to express something more. Art may also be a means to understanding nature.

[38] Chauvet, Deschamps and Hillaire,1996, *Chauvet Cave*. Jean Clottes, *Discovery of a Palaeolithic Painted Cave at Vallon-Pont-d'Arc*, 1996-02-12 Archaeology on Internet.

Fig 8.11 *The "portrait" carvings from Dolni Vestonice, Czech Republic. The skull in the grave showed the same facial deformities as this piece of mammoth ivory found in the same grave.*

Art is therefore a means of communicating representative and symbolic meaning. As such it expresses universal qualities in a language related to specific people, times and places. We may not understand prehistoric art but we can comprehend that it could be, and no doubt was, understood. Our sense of thought or concept tells us that prehistoric art had meaning, it does not necessarily enable us to understand what that meaning was. However vast and all-embracing or small and simple the concepts were, prehistoric art was a language expressing both universal and group and individual human experience. Since art is a form of language, prehistoric art gives us an invaluable glimpse into how Paleolithic people felt and thought about themselves and the world. The danger of our projecting our concepts onto their art is great and certainly the short history of prehistoric art research reveals plenty of modern projections, a case in point being the interpretation of the enigmatic signs that have so often been interpreted as female vulva, which I shall discuss below. Apart from this, our concept of art has undergone major sea changes.

Professor Randall White of New York State University cautions us in a survey of Paleolithic art, "In anthropology, representation … must always be understood in terms of its technical, economic, social and ideational context of creation and use."[39] Conkey has noted that "it is now mandatory to view Paleolithic art as an extremely diverse and abundant repertoire of material culture that cannot be accounted for by any inclusive interpretive umbrella. …" This is merely to say that visual representation cannot be treated as a monolithic entity but must be understood in terms of the diversity of cultural contexts that generated it.

[39] Randall White, 2001, "What is the evolutionary significance of material forms of representation?" BBC website Online Apeman, www.bbc.co.uk/science/ape.man.

Making the Invisible Visible

Since the discovery and recognition of prehistoric art at the end of the last century and the beginning of this, our relationship to art as such has radically changed. It is one of those historic moments of synchronicity that the discovery coincided with the breakthrough of modern art. The change in attitude to art that characterized the new challenge was aptly formulated by one of the great theorists and practitioners of modern art, Paul Klee. In an often-quoted phrase he defines the new task of art: "Art does not show the visible but makes the invisible visible." We may reflect that this axiom holds true for all art, however naturalistic. Art always reveals some element of invisible intention. This certainly holds true for prehistoric art.

In a way all art deals with two worlds that meet in the human being. The great transition between nineteenth century Impressionism and twentieth century Expressionism is only the most marked recent and conscious manifestation of two fundamental artistic experiences that reach back to the earliest, primal artistic endeavour. Children too, in their early drawings reveal both expressive and "impressionistic" tendencies, the latter representing the outer perceived world, the former, the expression of inner forces.

Wassily Kandinsky, in describing the sources of his own art in his book *Concerning the Spiritual in Art* wrote about these two paths leading to art.[40] He described in fact three types of art, the third being a kind of synthesis of the first two:

1. The direct impressions of "outer Nature" which come to expression in artistic form.

2. Unconscious, suddenly arising expressions of inner processes, that is impressions of "inner nature." I call these improvisations.

3. Of a similar nature, expressions which occur to me and which are worked on in a long, almost pedantic way, continuously corrected. Here conscious reason, intention and functionality play a central role. Only here, feeling rather than calculation hold sway. I call these kind of pictures "compositions."

Ways of Seeing

Kandinsky's three types of art form offer a useful model for understanding prehistoric art. Art is a way of seeing. If we can empathize with the way of seeing implicit in the cave paintings and other prehistoric art forms, we can begin to grasp how the artists experienced the world and themselves. By patient observation and "observational thinking," to use Goethe's phrase, we can let the language of prehistoric art speak to us. We need, of course, to see the art in its context, which is not easy when our access to caves is limited, when museum showcases provide a sterile environment, and even color reproductions do little justice to either the presence or context of Paleolithic art. We also need to imitate the gestures of the artists, understand their techniques, re-enact the activity of making the work, since there is no doubt that the creation of the work may have been as important, as ritual, as the end result. It is this involvement in the art which so marks the work of Immanuel Anati and Jean Vertut from the many academics who have interpreted prehistoric art.

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[40] Quoted in Randebrock, E.,1981, *Impressionismus und Expressionismus*, pp48–49.

We cannot hope to know how the artists of Vallon-Pont-d'Arc thought or felt about their work but we can begin to listen to their language. We will not ever be able to understand it in the sense that scholars can read hieroglyphs, but we can begin to recall in our own consciousness those regions of the mind that form some kind of substrate of our collective memory. Our modern consciousness arose out of such a Paleolithic state of being, it is part of our human heritage, just as the consciousness of the young child seems so remote to us as adults. We can, I feel, with patience get some intimations. A fluid, holistic kind of thinking will be needed so that in immersing ourselves, we do not lose our rational combinatory thinking in analyzing and correlating what we perceive.

Ice Age Consciousness

How then did Upper Paleolithic people see the world? There are some clues other than the works themselves. Out of his spiritual research, Steiner stressed that ancient mythology retained some traces of earlier states of consciousness, a fact that has now been more or less taken for granted but which in the early years of this century was a fairly radical view shared only by a few like-minded contemporaries such as Frazier, Schuré, Freud, and Jung.

Ancient mythology gives a picture of earlier forms of consciousness, though by no means as old as the Paleolithic. Taken together with what modern ethnological research has discovered, it does, however give us a stepping stone out of the consciousness of historical times, and as such, points towards the prehistoric mind.

All the sources relate how early humans, and in fact most people up to industrial times, experienced the world as animate, inhabited by living beings, indeed imbued with being. The relationship to the world was personal but not in a simplistic sense personified. This does not mean that natural phenomena were simply explained by being given human characteristics or filled with "ghosts" of ancestors. People experienced the world in a "dynamic reciprocal relationship." The Dutch archeologist Henri Frankfurt showed a perception of this untypical of his generation. He wrote:

> The world appears to primitive man neither inanimate nor empty but redundant with life; and life has individuality, in man and beast and plant, and in every phenomenon which confronts man, the thunderclap, the sudden shadow, the eerie and unknown clearing in the wood, the stone which suddenly hurts him when he stumbles while on a hunting trip. Any phenomenon may at any time face him, not as "it," but as "Thou." In this confrontation, "Thou" reveals its individuality, its qualities, its will. "Thou" is not contemplated with intellectual detachment, it is experienced as life confronting life, involving every faculty of man in a reciprocal relationship. Thoughts, no less than acts and feelings, are subordinated to this experience.[41]

Steiner describes how prehistoric people increasingly awoke into the inner pictures created in the soul through the intensity of sense impressions flooding in from the surrounding natural world.[42] He speaks of the formative lifeforces being driven into ever-closer union with the physical body, the effect of which was to make the individual identify ever more strongly with his or her own experiences, in other words, to gradually

[41] Frankfurt, H., 1946, *Before Philosophy*, p14.

[42] Steiner R., Lecture 23, June 1909, GA104.

experience more sense of self. Just how powerful and formative these impressions of "outer nature," to use Kandinsky's term, were, is shown by Steiner's description of prehistoric humanity's experience of nature.

> For those prehistoric humans, trees did not appear as they would to us. In every tree and bush, in every cloud and in every spring there was something that revealed itself as soul-spiritual cosmic meaning. Everywhere one looked, the sense world was permeated with spiritual content. The babbling waters of a stream were not merely inarticulate sounds, but were the expression of soul-spiritual experience. In the rustling sound of the wind in the branches of the trees one could hear the language of spirits. Today we can hardly imagine how intensely alive the world seemed to early humans.[43]

Inner and Outer Worlds

The anatomically modern human being was forced by virtue of his or her very stature, and especially through the gesture expressed in the verticality of the face, to face the world out there. Standing thus back from the world, the awakening of mental pictures created a complementary "in here." The inner gesture of confronting both the world and the experience of self provides an inner perspective. The powerful sense impressions imprint themselves and are retained within the rhythmic formative forces.

The ability to recall such experiences into present consciousness in the form of mental pictures enables the individual to compare experiences, and this reflective comparison provides an inner perspective. The human being can turn away from the outer world and can re-create inner mental pictures in the mind's eye. The directing forces that are an intrinsic living part of natural phenomenon are experienced as being of the same nature as the directing forces within one's own soul and which bring the inner pictures to consciousness. The same formative forces at work in nature are at work within the human mind generating mental pictures.

A consciousness of those forces, which comes with the ability to form intense mental representations, makes the human being experience a deep inner connection to the familiar world of nature out there. Herein lies the power of "primitive" identification with nature. This marks a significant new development in the evolution of consciousness, from unconscious sympathy to being at one with the environment, to conscious antipathy and separation.

Unity of self and world is gained, or at least striven for, through re-creating mental images in which are generated mentally not merely symbolic representations of things in the world outside but images which express the inner being of the phenomena as well. Following the biological emancipation brought through bipedal walking, manual skills and language ability came the beginnings of freeing the inner psychological realm. The ability to actively remember and to form inner mental images is a profound step towards a freeing of the psychological realm and, to a degree, of self-control of the soul's experiences.

[43] Steiner R., Lecture 24, December 1921, GA209.

The Fall

But this emancipation was also a profound loss. The human being was no longer embedded in the natural environment but, through intensified self-consciousness, was separated from the embrace of nature, at least inwardly—where it hurts most. Cast out of Paradise by tasting the fruit of the Tree of Knowledge, the human being became the proverbial "Stranger in a Strange Land." And in a very literal sense many Ice Age peoples were in fact inhabiting a world that was literally new to them, radically different from the warm savannah landscape of most of human history. The Upper Paleolithic human being looked at the world, its mighty images resounding in his or her soul, and experienced that things did not quite all fit together as they once had. Aspects of the world became incomprehensible. Questions arose, perhaps initially as dim intimations or moments of unease.

As we have seen, the riddle of death, of the hereafter, of the existence of other states of being, comes to expression in the attention that is given to dead friends. Their continued existence in some other realm and their integral relationship to the living, finds eloquent expression in the Upper Paleolithic practice of burying the dead beneath the floor of the dwelling. The dead were placed there with the symbols and tools belonging to their status or rank in the assumption that they needed them. Perhaps, as is the custom in many cultures, the bodies of the dead were first exposed to the elements and only later the bones interred. At any rate the procedure of burial was seen as being as essential to the living as to the dead.

Modern humanity at this stage, through its own inner activity, imposed, or rather re-imposed, an order on a world experienced as "unstable." Things had to be consciously restored to their original unity of meaning, and in the process mankind had to find a new relationship to the world.

Recognizing Being in the World

I think we must assume that the Moderns were still far more intensively connected to the natural world than we are now. Their heightened senses would have been clairvoyant compared to ours. They saw being in everything. The world was spiritually alive. They recognized the traces of the beings of place in the shapes and cracks in the rocks, in the play of shadow, in looming cloud formations and in the acoustic qualities of hollow tree trunks, caves and rock overhangs. In order to make a conscious connection to the being of the place, to make the link and reunite themselves to this spirit, people made their mark, literally on the rock. Signs and symbols were left behind.

One of the most overlooked aspects of prehistoric art has come to light in recent reviews of the locations. Naturally occurring shapes and forms were marked or altered in some small way. Many of the paintings and carvings take their starting point from the chance shape of a rock, a ridge, or crack, the form of a stalagmite or piece of bone. The addition of an eye was often sufficient to turn a rock into a face, or a few scrapings all that were necessary to suggest an animal profile. This characteristic of prehistoric art remains throughout the period. Examples include the Face on the Rock Wall at Altamira, a human figure around a phallus-like stalagmite in Le Portel, Ariege, in France, a bison carved into a stalagmite at Castillo, near Santander, Spain, the Fissure in the Salon Noir at Niaux, and countless more. The most famous examples are the bison painted onto bulges in the ceiling of the cave at Altamira.

Special Places

Many locations where prehistoric art is found have a quite discernible special quality of atmosphere. They are often remote, inaccessible, deep in caves, on mountain tops, in gorges, on prominent outcrops of rock. Clearly the qualities of the place are important. Though much portable art is found in association with living sites and burials, a great deal of art is far from such places. Living caves and rock shelters were rarely decorated. Instead one must follow an arduous and often dangerous path to the places where the artists worked. Some paintings are over a kilometer into labyrinthine cavern systems. Courage was needed to enter such places, and the guidance of one who knew the way. There can be no doubt of which the journey, the way in, was an important preparation for the initiation rites of which the art works were a part. The youthful footprints preserved in the Niaux Cave (Ariege) hint at puberty rites. Access to this point of the caves involves swimming through underground lakes. It is not fanciful to imagine that part of the rites of passage for these Upper Paleolithic youngsters involved a descent into the dark realms and a confrontation with painted images illuminated by the flickering lamps burning animal fat.

Flickering Lamps

The visual impact of the images in caves depended on the use of an artificial light source. Recent work by Sophie de Beaune and Randal White has shown the ingenuity used in creating relatively long burning, effective lamps.[44] Tests done at the Kodak-Pathe laboratories has shown that the typical Ice Age lamps gave off less light than a modern candle, though they were quite adequate in total darkness to both work on paintings and see them. Experiments have shown, however, that up to 150 lamps, each placed 50 cms from the wall would have been necessary to illuminate the full color potential of a 5-meter-long frieze of paintings. It is unlikely that Upper Paleolithic people ever saw the paintings as they are now shown in color reproductions. No doubt the flickering quality of the light enhanced the experience of movement in the figures. The only other possibilities are that the Ice Age people had other unknown light sources and that their perception of color and form was more intense than our own. It is an interesting observation that the cave artists went to some lengths to produce pigments that lost most of their chromatic qualities in the dim light of the lamps. Perhaps the colors had numerous qualities, the efficacy of which went beyond their cave appearance.

As to the lamps themselves, de Beaune and White conclude that "it is impossible to overstate the importance of artificial light in freeing humans from their evolutionary adaptation to the daylight world." Cave art, in particular, marks in many ways the breakthrough not only into the darkness of the inner realms of the earth but also into the inner realms of the soul.

Forming Mental Pictures

To remove oneself from the familiar world and recreate images, impressions of the outer world, implies the ability to form mental images from memory. Just how exact these images could be is shown by the remarkable way in which animal species are characterized by their profile or shape, to such an extent that zoologists are able to identify, in most cases, the species depicted. The ability to create mental pictures implies the ability to create an inner world of soul out of one's own resources. Out of the oneness

[44] S. de Beaue and R. White, "Ice Age Lamps," in *Scientific American*, March 1993.

with the world which characterized earlier humans, cave art marks the emergence of a self-created individual world.

Alongside these impressions of things, mostly animals, from the outer world, belongs a whole series of abstract images which do not apparently correspond with phenomena in the sense perceptible world. These may consist of rows of dots, symbol-like forms, patches of color or bundles of lines. One has the impression that whatever meaning they may have had to the artists, they were clearly powerful expressions of some inner experience. To use Kandinsky's phrase, they are "improvisations" or "suddenly arising expressions of inner processes, that is impressions of 'inner nature.'"

Both impressions and improvisations express inner activity, only the first are inspired by outer nature, the latter come from more unconscious realms of the will. Art is by its very nature a mediator, a communicator of feeling. In the realm of feeling the mental activity of visualizing and the powerful experiences of the unconscious will forces meet and are integrated. Whatever else prehistoric art was, it was also an exercising and schooling of the life of the soul. Prehistoric art reveals to us a differentiation within the "naïve" wholeness of the soul of early mankind.

The Schooling of the Soul

Just as the Acheulean biface was a schooling and an exercise in spatial qualities through a differentiation of the forces of the formative-life forces, so prehistoric art is an expression of a differentiation of the soul forces of thinking, feeling and willing. Spatial qualities are experienced through the interaction of the etheric body with the physical body, our only body in space. Through the interaction of the formative forces with the mind in memory and mental picturing, the human being becomes conscious in the dimension of time. In both processes, forces are freed from their primary biological function and become available for higher development in the sense of giving expression to an ever more autonomous inner life. The formative life forces become available for memory, the soul forces once freed from their bodily processes (expression of reactions to sense impressions, heat, cold, hunger, fear, and so forth) and become available for cultural expression and self-awareness. The agent active in individualizing experience in both realms is the "I," the spiritual principle striving continuously to come ever more completely to expression.

In the following sections I will examine the periods of prehistoric art in more detail. Since Eurasian art has been best researched and dated, I will focus primarily on this region. The reader is asked to overlook this Euro-centrism. My access to the art of other regions has been unfortunately too limited!

Hands-On Art

Some of the earliest traces of artistic activity consist of dense and tangled swirling lines or grooves on the walls of caves. These have been formed by people tracing their fingers across the soft calcium carbonate precipitates on the cave walls. Parallel rows of 2 to 4 grooves meander across the surfaces. Known as finger-flutings or tracings, or sometimes disparagingly as "macaronis," these fingertip expressions are found in many regions. The highest concentration was discovered recently near Mount Gambier in South Australia where 22 caves, used until recently by farmers as dumps for old farm machinery, were found with finger-flutings beneath engravings.

The flutings follow closely the contours of the cave walls. Among the European examples of finger-fluting some have been found which outline figures amongst the swirl of overlapping lines.

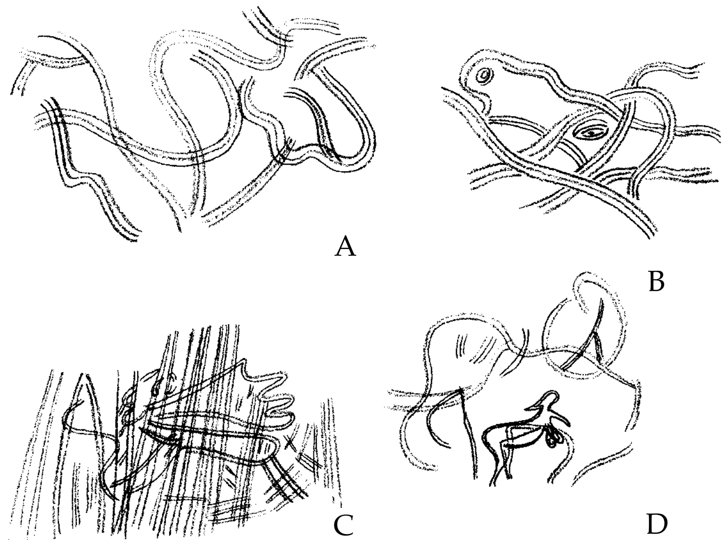

Fig 8.12 *Examples of finger-fluting: A) finger-fluting in clay on the cave walls, Altamira, Northern Spain; B) possible image of a boar or bovid scratched into clay from Altamira; C) finger-fluting showing giant elk antlers from Pech Merle, France; D) finger-fluting in soft clay showing a mammoth and a human female figure, also from Pech Merle. Examples of finger-fluting have also recently been discovered at Katlie-ngoinpool Cave and Koonalda Cave near Mt. Gambier, South Australia.*

While interpretation of such activity is pure speculation, imitating the process in the dark makes one aware of the rhythmical tactile quality of the experience. Through the sense of touch on the cold clay one has a dim experience of the boundaries of "self" and through the contact with the contours of the rock beneath, one learns to experience the sense of form of the "other." Working with pupils in clay modelling has often shown that by feeling the surface of the clay sculptures with the eyes closed, a far more profound experience of form is possible. The activity itself creates a mood of quiet inwardness very conducive to subsequent artistic activity. At any rate such a "hands on" approach does seem a highly appropriate preliminary to artistic expression. I suggest that whatever finger-fluting may have meant to prehistoric people the relationship of touch to the sense of self must have played a role.

Handprints

A similar but far more conscious form of prehistoric artistic expression was the widespread practice of hand stencilling. The hand and sometimes the forearm were placed on a rock surface and color was applied, usually by spraying, leaving, once the hand was removed, an outline of the hand on the wall. It is thought that the pigment, usually some form of red ochre, was mixed with water and blown through hollow tubes such as bird bones. Experiments have shown that this process is by no means as simple as it sounds. In fact the most effective method seems to be the most direct, though fairly unpleasant, of blowing the mixture through pursed lips from the mouth. It can take up to 40 minutes to do one hand stencil.[45]

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[45] Paul Bahn reports (1989, p104) on the experiments conducted by Michel Lorblanchet, who is also featured in Don Johansen's BBC film "In Search of Our Ancestors," program transcript February 24, 1994.

Fig 8.13 *A collection of handprints from Fuente del Salin, near Santander in northern Spain. Handprints come in the form of direct prints of hands dipped in color, stencils blown onto the wall leaving the outline of the hand and hand prints pressed into a soft surface such as clay.*

Perhaps the symbol of the human hand on a cave wall is so pregnant with meaning that no further explanation is needed. The act of blowing blood-red pigment is itself symbolic. Stencilling, as an early form of printing, also implies a degree of combinatory thinking. After all, a simple handprint would have been easier to make, and there are also many such examples.

Whatever meaning they may have had, and we should assume that such a widespread phenomenon meant different things to different people at different times, the act itself implies a deliberate statement of the relationship between the people and the place. In a very concrete sense a person leaves his or her mark on a place. The stencil technique implies a different order of principle than a simple hand print. The halo of color sprayed onto hand and wall unite both in one focused sphere. Removed, the hand takes some of that quality with it, leaving an empty, hand-shaped space behind. A unity is consciously formed and then divided. The place retains the outer part, the person takes the inner part with him, with the color as a reminder. The two parts can be reunited. What better image could we have for the template-like nature of conceptual thought! By applying the conceptual template onto outer nature, the unifying link between self and world is restored to oneness.

Much debate and experimentation have sought to explain hand stencils in some caves in the Pyrenees, notably at Gargas, which appear to show the outlines of mutilated or deformed hands. Some theories have drawn on analogues with recent peoples who have practiced ritual finger mutilation. However the idea that Ice Ages hunters would cut off the very fingers they would need to produce and use precision tools is hard to credit. Ali Sahly who has made a study of the stencils at Gargas has shown that fewer than 20 people made the 231 prints between them, including adults

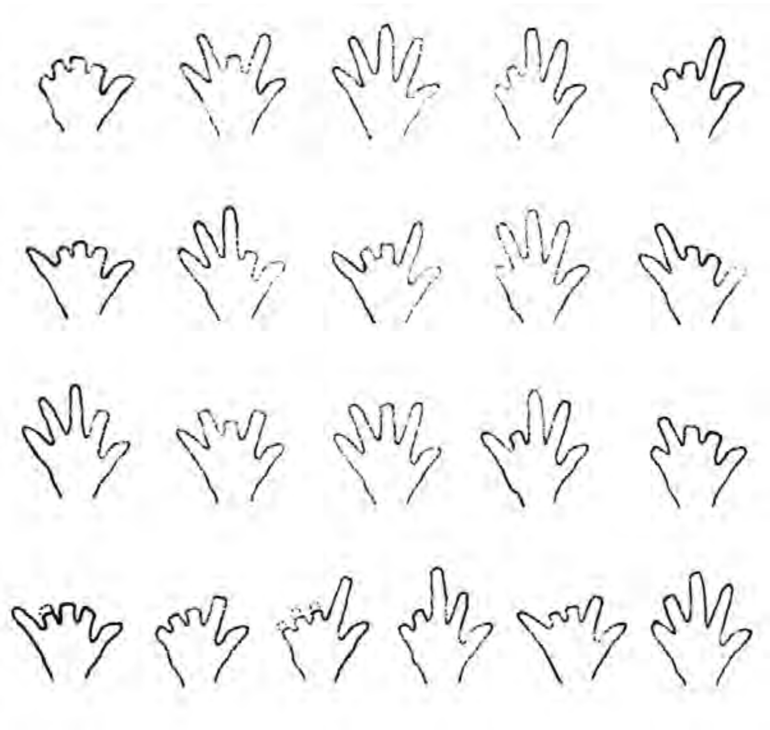


Fig 8.14 *Some of the mutilated hand prints from Gargas, in the Haute Pyrenees, France.*

Fig 8.15 a *A mammoth painted in the cave at Rouffignac, Dordogne, France, in typical Aurignacian style, showing a simple outline of the head and back, open below (photo by author).*

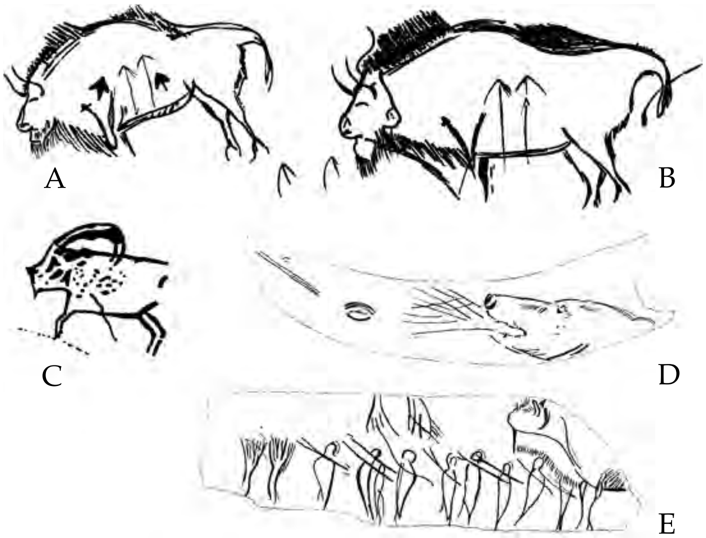
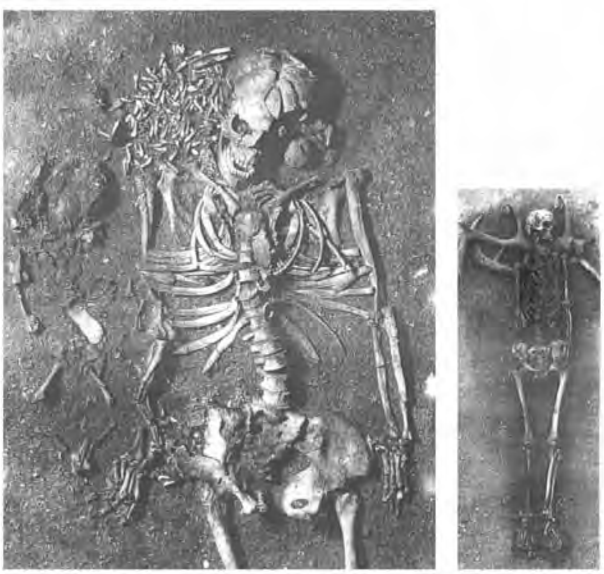


Fig 8.15b *A compilation of prehistoric images in which symbols appear to express an activity in connection with animal or human figures. Some of these symbols or traces of activity have been interpreted as arrows or spears (in fact bows and arrows were invented much later). They may well be spears but they may equally express an activity linking the artist and the image. A) a bison with anthropomorphic face, marked with deeply engraved lines. Contemporary spear heads did not resemble these symbols at all (from the Cave at Niaux, Ariege, France). B) Another bison from Niaux, this time with a double face, facing forwards and backwards –an indication of time perhaps? The 'arrows' are this time highlighted in brown and red paint (A and B after H. Breuil). C) A deeply engraved outline of a steinbock. The body is scarred by deep indentations, as if stones had been hammered against the surface of the rock. From Kilwa, Jordan (after Anati). D) A carved piece of horn engraved with the head of a bear with lines coming from its muzzle and several other markings, one resembling an eye. It has been suggested that the lines represent the animal's breath or voice, but could equally well indicate the departing life-forces of a dying animal (from Massat, Ariege, France). E) A piece of bone with what appears to be a row of anthropomorphic figures 'floating' along. Other shapes may be trees (highly unusual in Ice Age art). The figures may be carrying bundles of forked spears (the hunting explanation) or the lines may represent a distinctive activity in a certain direction. The figures appear to be moving towards a large bison. These and thousands of other images may incorporate pictograms as well as semantic symbols expressing relationships between objects, or indeed none of these!*



A B

Fig 8.15c *Two graves from the end of the Ice Age: A) This grave contained a mother and her infant. Both are laid on the wing of a swan—an image which needs no explanation with regard to the afterlife. Freshly struck flint blades were also placed on the bodies. B) shows the skeleton of an old woman who has been laid out with a large pair of roe deer antlers under her head. Antlers were believed by people in historic times to possess spiritual qualities, as evidenced in the many images of a halo or a vision of the Virgin between a deer's antlers. Robert Graves identified the illusive roebuck as an aspect of the White Goddess, the deity which in Neolithic times represented the spiritual principle of life and death (The White Goddess 1961). Both graves are from Bøgebakken in Denmark (photographs by L. Larsen in the catalogue of the exhibition 5 millions d'annees l'aventure humaine).*

of all ages, juveniles and even infants.[46] Sahly suggests this group represents the entire membership of a Paleolithic extended family who had suffered together the disaster of frostbite, probably caused by being caught in the open by a sudden and extreme blizzard. It is known that both red ochre and calcium carbonate have analgesic properties and that this may have been an added element in the stencilling activity. At Gargas, and at some other caves, casts of holes sunk vertically into the carbonate deposits show they were made by finger stumps. The loss of fingers would have been a disaster of some order to an Ice Age hunter community, and their need for healing and wholeness would have been great.

Though all the main artistic media appear to have been present from the earliest times, Upper Paleolithic art falls into three main developmental phases, and many subdivisions have been suggested. The end of the last Ice Age brought profound changes, and these are reflected in the art of the period, which I shall examine below.

Phases in Ice Age Art

The early phases of prehistoric art seem to have almost universal significance in that the earliest art in all known geographical regions has similar characteristics. The later stages become increasingly differentiated on a regional and stylistic basis. The following table offers an overview of the generally accepted cultural stages for the European region. The French place names which have been used to denote the periods reflect the early dominance of the Franco-Cantabrian region in prehistoric research.

Chatelperronian	starts	c 37,000 BP
Aurignacian	"	c 34,000 BP
Gravettian/Pavlovian	"	c 27,000 BP
Solutrean	"	c 22,000 BP
Early	"	c 17,000 BP
Middle Magdalenian	"	c 15,000 BP
Late	"	c 12,000 BP
Azilian	"	c 10,000 BP

The Aurignacian (35,000 – 28,000 BP)

The earliest phase of prehistoric art began with finger-fluting, hand stencils, rows of dots, carved notches and other markings. Some finger-fluting may in fact belong to even earlier times but generally speaking the first art belongs in the Aurignacian. Cave painting and sculpture also appear in this period. In painting and engraving the figural forms often appear as large, single figures with unclear outlines with usually only the head and spine of the animal portrayed in profile. The forms are rarely "closed." A typical example is the mammoth from Rouffignac.

The earliest figures are almost exclusively monochrome. Towards the end of the Aurignacian the first experiments using perspective appear in that animals are shown with hooves or antlers seen in three-quarters view.

In parietal (cave-wall) art generally, including painting, drawing, engraving and bas-relief, the characteristic quality of the Aurignacian is linear. This is true both of the figural "impressions" and the abstract "improvisations." In the three dimensional

[46] Quoted in Bahn, P., 1988, p105.

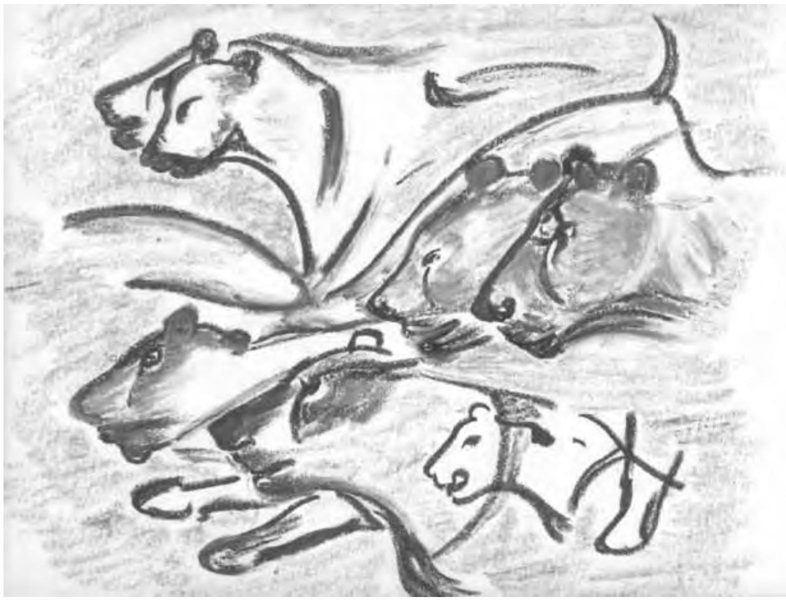


Fig 8.16 *A detail from the Panel of Lions in the Chauvet Cave. Discovered in 1994 this cave contains some of the most remarkable images from prehistoric times. In order to preserve the archaeology of the cave it cannot be visited. However there are excellent photographs and several websites showing the images (pastel drawing based on photographs by Jean Chauvet).*

media of carving in ivory, antler, soft stone, or modelling in clay, this linear quality is replaced by a compact monumentality. Usually less than hand-sized most Aurignacian carvings have a powerful concentration of form, that is to say the volume is retained within a tight outline shape, often influenced by the nature of the material.

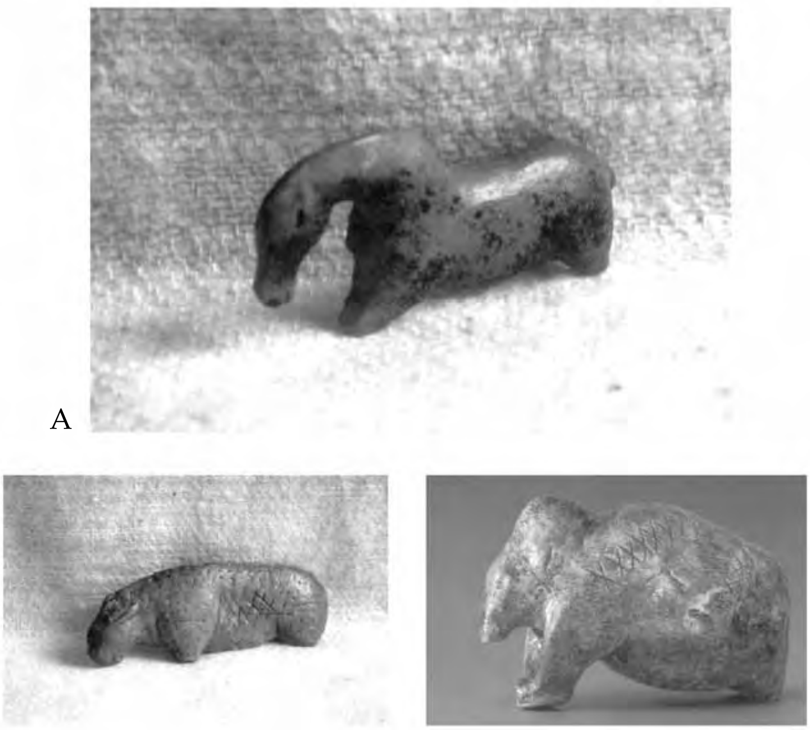
The earliest known carvings come from the Lonetal region of the Schwabian Jura in southern Germany, not far from the source of the Danube. These include some of the masterpieces of prehistoric art, while being the oldest! Dated to around 33,000 BP these figurines show a remarkable mastering of carving technique and handling of form. Such skills cannot have sprung from nowhere and a long phase of development prior to this date has to be assumed, though there is no evidence of this or any indication where these Ice Age hunters and artists came from. The Lonetal area at the time consisted of a series of deep gorge-like valleys in a narrow corridor between the southern edge of the Scandinavian Ice Sheet and the northern rim of the Alpine Glaciers. This corridor, which approximately runs East-West along the Danube Valley, across the Rhine Valley and into France via the Rhone, may have been the route taken for migrations of people, though it is not clear in which direction.

The themes of the Lonetal carvings are limited to animals such as mammoths, bison, horse, lion and bear and the occasional anthropomorphic figures. Joachim Hahn from the University of Tübingen, who has recently reviewed the material, feels that, "generally one has the impression with the (carved) animals that the artists portrayed the largest, strongest and fastest species."[47]

[47] Hahn. J., in *Die Anfange der Kunst vor 30,000 Jahren*, 1987, ed. H. Müller-Beck and G. Albrecht.

Hereby the mammoth, because of its size, played, no doubt, an important economic role, as evidenced by their high proportion within the range of themes. On the other hand, the second most common theme was cave lions, which were certainly not hunted for food. He also notes that the examples of horse and bear tend to be portrayed in threatening or imposing gestures.

Hahn also notes that the carvings all show marks and notches that obviously were not intended to represent the animals' natural markings. Alexander Marshack suggests these marks are some form of computational notation, in some cases of a calendrical nature.[48] The carvings were worn smooth by regular handling and may well have been part of some ritual process over time. Given the mobility of these Ice Age peoples and the small size of the groups, periodic meetings between groups may have been arranged on some kind of calendrical basis. Symbols such as these animals may have played role in clan identification, in exchange and in alliance forming.



A

B

C

Fig 8.17 *Ivory carvings from Lonetal, southern Germany: A) a 4.5cm long wild horse carved in mammoth ivory from the Vogelherd Cave, with carved notches along the back; B) an 8.8cm long complete cave lion carved in mammoth ivory from the Vogelherd Cave; C) a 5cm long mammoth carved from mammoth ivory, marked crosses and notches on the back from the Vogelherd cave (photos taken by the author of casts at the University of Tübingen).*

[48] A. Marshack, "Early hominid symbol and evolution of the human capacity," paper for *The Origin and Dispersal of Modern Humans*, Cambridge: March 1987.

The circumstances of the finds in the Vogelherd and Hohlenstein caves suggest that the carvings had been deliberately deposited with other items, carved ornaments, fox teeth, stone tools. The Hohlenstein "Lion-man" figure was found with a human tooth at the back of a shallow cave "on the boundary between daylight and darkness" as the excavator put it.[49] At any rate the evidence from Lonetal and other sites shows that these art objects clearly underwent a change of function from being made, being handled and periodically marked with notches, to finally being deposited as grave offerings. It would be inaccurate to see a causal link in this process, but rather a flexibility of function.

Finally, a word or two about the anthropomorphic figures found among the German ivory carvings. These consist of highly stylized tiny figures made out of fossilized charcoal and bored, presumably to string onto necklaces. The rarer and more revealing figures include the tiny, 318cm long carved relief of a human figure with upraised arms. The little figure has 12 or 13 notches on each edge and groups of 3 to 5 marks in rows on the back. Marshack has noted that all attempts to identify arithmetical systems only reflect the researchers' projections but points out that the significance of these and other notation systems reveals a consciousness of periodicity.

With the notable exceptions of the large upright figure with a feline, probably lion's face found in the Hohlenstein cave, the tiny ivory figure with upraised arms from Lonetal and the figure in the Chauvet Cave with an upper body resembling a bison but with human torso and legs, anthropomorphic figures are rare in Aurignacian art.

Fig 8.18 *The 28cm long Hohlenstein Cave lion-man carved out of a curved piece of mammoth tusk, reconstructed from many fragments,(after catalogue of the exhibition Die Anfaenge der Kunst vor 30.000 Jahren, edited by H. Mueller-Beck, 1987).*

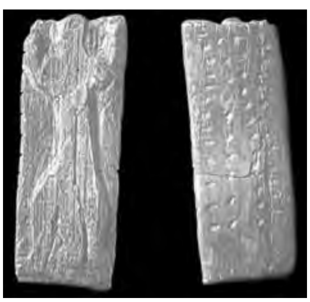


Fig 8.19 *Anthropomorphic figure in half-relief carved into a piece of mammoth ivory standing only 3.8 cm tall. The edges and reverse side are marked with rows of notches and pits, which have been identified as probably calendrical, or at least numerical in nature. Found in the Geissenkloesterle cave in Lonetal (after exhibition catalog* Die Anfaenge der Kunst*).*

[49] Hahn, J., 1987, p30.

Fig 8.20 *A bison from the Cave of Marsoulas, France (after Anati).*

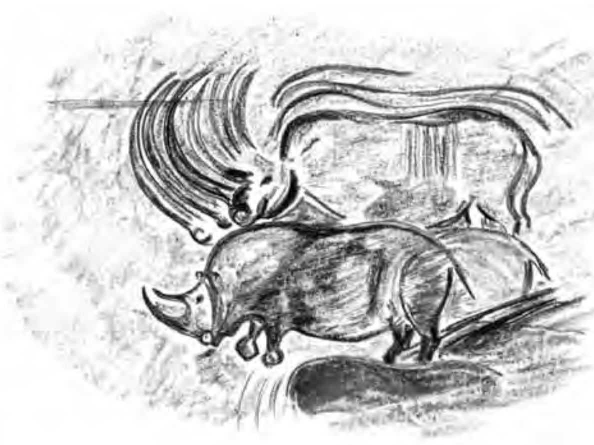


Fig 8.21 *Early perspective: A detail from the Chauvet Cave, Ardeche, France, showing a group of woolly rhinos both in movement and in perspective. This panel has been dated at around 32,000 years old (pastel drawing after photographs by Jean Chauvet).*

Fig 8.22 *These images from the La Pileta Cave in Northern Spain, show a pictogram of a horse marked with ten repeated faint double lines in brown and red colors. Above the horse is what Emmanuel Anati calls a psychogram, a symbol expressing "an outbreak of energy and emotion, expressing perhaps perceptions such as light or dark, warmth or cold, life or death, love or death" (Anati, 1991, p162). Anati includes the frequently seen rows of dots and splashes in the category of psychograms.*

The Gravettian/Pavlovian Phase (27,000 – 20,000 BP)

The following phase of prehistoric art, known as the Gravettian or Pavlovian (for Central and Eastern Europe), saw a continuation of the main themes of the Aurignacian. Animals remained the main themes in parietal art. The Gravettian period is characterized by a wide range of figural sculptures and engravings on portable objects such as stone plates or bone. The people who created these works of art were primarily mammoth hunters living on the steppes which reached from France to the Ukraine and on to Siberia.

Typical for the Gravettian are a wide ranging group of female figurines referred to as "Venus" figures, though "Gaia" (Earth Mother) may be a more appropriate term. Known from Siberia to the Pyrenees, these small carved figures appear to come from a "relatively narrow time horizon centered on c.25,000 to 23,000 BP,"[50] a period noted for its particularly unstable and unpredictable environmental conditions. These Gaia figures are generally small with an emphasis on the primary and secondary sexual organs. On the whole, facial features, clothing, arms and hands are minimal. They can be long and thin and almost abstract such as these from Dolni Vestonice, reduced to torso such as the example from Trasimeno in Italy, of noticeably realistic form with slender waist and broad hips (hourglass-form) such as the carved torso from Petrovice in the Czech Republic made out of hematite, or rotund and obese like the famous Venus from the Austrian open-air site of Willendorf. What they all have in common is their relatively small size and the emphasis on the organs of reproduction and fertility. The sexuality that has sometimes been ascribed to these figures, indeed to anthropomorphic art in prehistory in general, does not really bear examination. The majority of "Venuses" emphasize the buttocks, breasts and hips, very few draw attention to the vulva or even the pubic triangle. Indeed in the whole of prehistoric art, including the so-called "vulva-engravings" there are only very few objects where the sexual organs as such appear to be a focus of attention. These include the headless bas-reliefs of Angles-sur-l'Anglin (Fig.8.23).

In the Venus or Gaia figures the emphasis appears to focus on fecundity, though Batin records that only 17% could be described as pregnant.[51] As Bahn put it, "'Venus' figurines do not, therefore, seem to glorify maternity or fertility; they appear instead to be about womanhood." Discounting for the moment the rare cases in which the figurines may actually represent individuals, such as the head at Dolni Vestonice, these representations of "womanhood" clearly embody in very compact form very broad concepts. These must include aspects of the entire life-cycle of conception, gestation, birth and nurturing. The creative, life-giving and protective qualities inherent in the eternal feminine form are brought to expression in concentrated, though monumental form. It was Henry Moore who stated that a monumental quality can be ascribed to a figure as small as your thumb if it bears such latent potential within it. The Gravettian Venuses or Gaias in many cases qualify for this description by virtue of the vast concepts they may embody in a single unified form.

Much modern research has begun to unravel the layers that have obscured what is perhaps one of the oldest mythological figures, that of the Earth Goddess or Mother, the most ancient creative force in cosmology. One of the earliest and still arguably the most profound examinations of this mythological phenomenon is Robert Graves' book *The White Goddess*. An understanding of the breadth of meaning implicit in the Venus/Gaia figurines must certainly include the subtleties of Graves' "Goddess."

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[50] Mellars, P., *The Upper Paleolithic Revolution*, 1994, p64.
[51] Bahn G. and J. Vertut, 1987, p164.

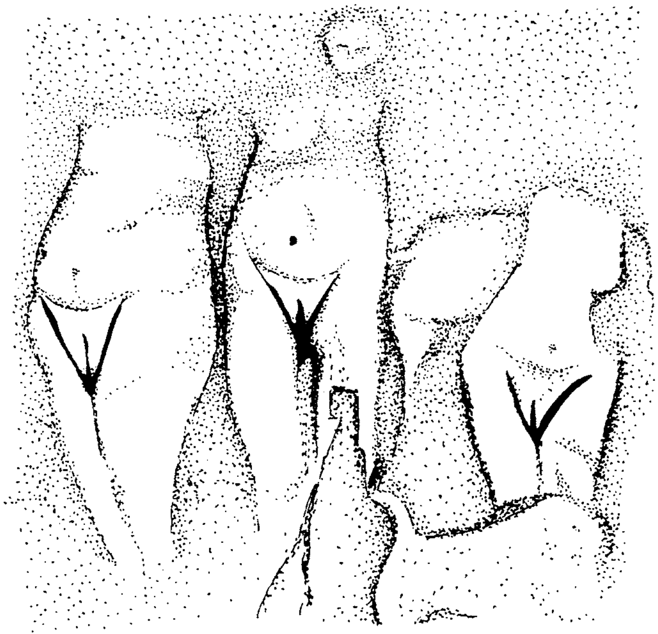

Fig 8.23 *Part of a large wall-relief from Angles-sur-Anglin, Vienne, France, showing several female torsos with animal figures (after Anati).*

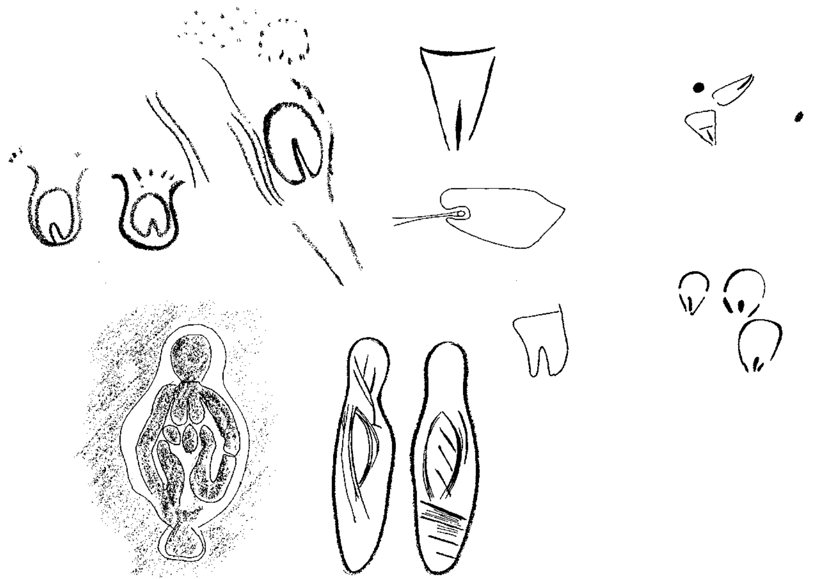

Fig 8.24 *A collection of images from Ice Age art that are often labelled as vulvas. As Paul Bahn, a leading authority on prehistoric art, has pointed out (in* Journey through the Ice Age, *p187), there are in fact very few unambiguous examples of female genitalia in prehistoric art. We should therefore be cautious in ascribing them to fertility magic or indeed any relation to sexuality at all. Many of the carvings, engravings, drawings, or paintings may in fact have related or unrelated as symbols to aspects of life and generation. Indeed if we place these symbols alongside the huge repertoire of other symbols collected from prehistoric art (see Figs 8.31/32), one would have to say that they fit into a bigger picture of symbols. They no doubt meant different things to different people at different times. The important thing is to see them as belonging to a large body of ideograms (expressing concepts), some of which may be pictograms (representing objects, which themselves may have semantic or conceptual meaning).*

Fig 8.25 *Venus or Gaia figures:*

A) Venus from Willendorf, 10.6cm tall limestone figure colored with red ochre. It is thought that the head was covered in either a woven hat or head garment composed of tiny shells sewn onto cloth;

B) 11.5cm tall female figure made out of fired clay from Dolni Vestonice in the Czech Republic;

C) 14.5cm tall Venus of Lespugue from the Haute Garonne, France, carved out of mammoth ivory (these three photos taken of casts by the author);

D) Venus of the Horn, 44cm figure carved in relief from Laussel, Dordogne, France, was once carved on a 4 cubic metre block of rock outside a rock shelter and was later removed. The number of notches carved on the horn has given rise to speculation as to their numerical and calendrical significance (photo taken of the original by the author in an exhibition in Brussels).

The Gravettian/Pavlovian period also saw a wide range of other artistic media and the extensive use of different materials. Perhaps most remarkable was the use of fired clay to make zoomorphic and anthropomorphic figures. These are known particularly from sites in the Czech Republic (Pavlov, Dolni Vestonice and Predmost), but examples from the Pyrenees, North Africa and Siberia are also known. The Czech examples were made of a mixture of fine clay and bone ash, fired in a hearth-like oven. Dated to around 24,400 BP, these statues, which in effect resemble porcelain, anticipate the invention of ceramics by some 20,000 years!

This is not intended to be an exhaustive study of prehistoric art but I will refer to two techniques which belong to the Gravettian/Pavlovian period and which give some insight into the consciousness of late Atlantean peoples (Upper Paleolithic in conventional terms).

The first concerns the evidence of puppet-like anthropomorphic figures with apparently moveable limbs. The best known example comes from a grave found in Brunn in the Czech Republic. This ivory figure was clearly fashioned out of several pieces which show that the head and arms were intended to be articulated. Without speculating as to its purpose or its significance as an offering in a deliberate burial, we have in many respects a polarity to the compact wholeness of the Venus/Gaia figures. The conceptual difference is profound, the masculine figure, the emphasis on the limbs and mobility of the parts over against the whole. Pavlovian people were clearly able to conceive of quite radically opposite concepts within one world view.

The other interesting facet of the Pavlovian world-view, in this case literally, is shown in a number of engravings which resemble ornamental patterns but which archaeologists at the find site have been able to interpret as stylized maps of the location. A piece of mammoth tusk some 37cms long was found at the open-air Pavlov site in the Pollau Mountains of Czech Republic (and which gives its name to the Pavlovian period). The curving lines along its length have been identified as representing the meanders of the river, the valley bottom with parallel fields. To the left and right can be seen the scree slopes and the peaks of the mountain. A double circle marks the location of the village.

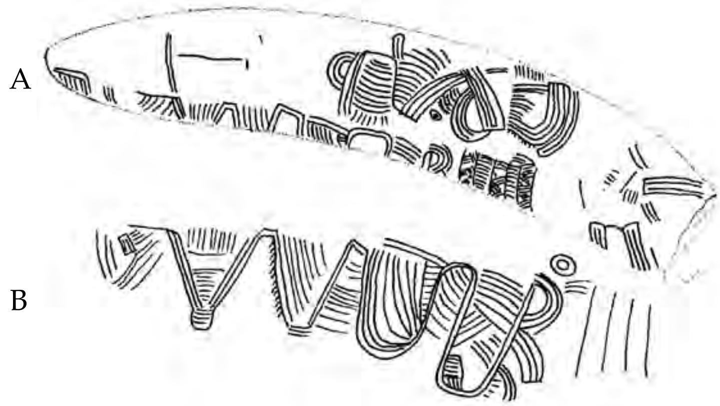

Fig 8.26 *Pavlov landscape carved on the pointed end of a mammoth tusk, 37cm long, from Czech Republic. A) shows the tusk B) shows the entire drawing. The lines resemble the actual landscape in the vicinity of the original site where the tusk was found. One can see the meander of the river in the valley, fields, scree-slopes below outcrops of rock, and nearby peaks (drawing after the original in the Archaeological Institute in Brno).*

Fig 8.27 *Female torso, 4.5cm tall, carved from a piece of hematite (red ochre), found at the Petrkovice site in the Czech Republic (drawing after the original in the Archaeological Institute in Brno).*

Similar finds from Predmost, Meshiritsch in the Ukraine and Malta in Siberia show that this was not an isolated phenomenon. Interestingly at Predmost, a similar tusk is illustrated with curved lines in much the same fashion as the Pavlov landscape, only here the theme quite clearly portrays a very stylized female form. It seems quite likely that the Pavlovian people, who may also have marked or tattooed their bodies Maori-style, experienced the same rhythmical lines of forces in their bodies as in the landscape. One can see how closely the people were connected to the landscape and how their own geographical orientation was bound up with their own self-orientation in a form of spiritual-geography, in the sense that the landscape was experienced as an animate extension of their own bodies. Norse mythology has retained something of this in the image of the giant Ymir, always a picture of earlier, less self-conscious stages, whose body was the landscape, his shoulders the mountains, his hairs the forests, and so on.

The rhythmical lines that apparently ornament so many prehistoric objects must, I feel, be seen in this light. Just as the meltwater streams leave traces of their flowing in the fine gravels and sand, or animals leave their tracks streaming across the snowfields, or flocks of birds follow invisible paths overhead, all life leaves its rhythmical traces on nature and so, too, on art.

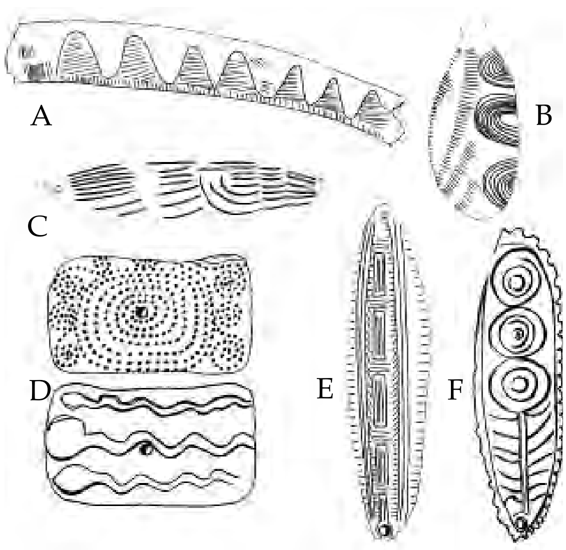

Fig 8.28 *Use of flowing lines as ornaments on various Ice Age objects:*
A) 32cm piece of mammoth tusk from Predmost, Czech Republic;
B) 9.8cm long ivory pendant, Predmost;
C) 12.5cm long ivory pendant or spatula, Predmost;
D) two sides of an 14cm ivory plate with hole in the center from Malta, Siberia;
E) a 12.6cm tjuringa or "bull-roarer" (when attached to a string and whirled round creates a loud humming sound) carved in reindeer bone from Saint-Marcel, France;
F) another tjuringa 14cm long carved in reindeer antler from Dordogne, France (drawings by the author after museum pieces).

The Magdalenian (17,000 – 12,000 BP)

The third great period of Ice Age culture was named after a cave site in France, La Madeleine. To this period belong many of the best known of the cave paintings and some of the finest carvings. The culture of the Magdalenians formed a remarkably consistent cultural impulse in Europe and Western Asia. While the Gravettian/Pavlovian spanned the period of the height of the last Ice Age up to around 20,000 BP, the millennia that followed saw a retreat of the ice sheets in Europe to approximately the Baltic region in the north and up into the European and Eastern Asian mountain ranges in the south. While still some 56°C colder than present day conditions, the tundra periglacial conditions in which mammoths had dominated the fauna gave way to steppe-like grasslands supporting vast herds of herbivores, notably bison, wild horse, reindeer and aurochs. These steppes stretched basically from the Massif Central through central Europe on into Russia.

While the Aurignacian seems to have been an almost worldwide cultural stage, with the following Gravettian-Pavlovian a more localized phenomenon wherever specialized hunters such as the Eastern European mammoth hunting people emerged, the Magdalenian culture seems to be typical of the advanced hunter-forager peoples in the closing stages of the last Ice Age. Most typically we associate Magdalenian with the flowering of art in Western Europe, though a similar proliferation of high quality art can be identified in numerous other regions. Until further discoveries are made, a certain Eurocentric view does seem justified.

Without doubt the Magdalenian phase saw the high point of cave art. This period saw the masterpieces of Lascaux, Altamira, Rouffinac, Niaux, Font di Gaume, Les Trois Fréres and Combarelles among many other cave sanctuaries in the Franco-Cantabrian region. Less well-known series of cave and rock art in Australia, Tanzania, the Mahgreb of North Africa are of comparable complexity, and though less well dated, they certainly belong to a broadly similar period.

So much has been written about Magdalenian cave art and the images so familiar that I will confine myself to a few generalized comments. In these caves we encounter (if we are lucky enough to get a glimpse of the originals) powerful ensembles of animal forms. The paintings reveal a superb mastery of proportionality in the figures, of their spatial representation, their perspective, movement and in their brilliant use of color. It is not surprising that doubt was cast on their age when they were first discovered. Reproduction can rarely give expression to the full power of their appearance.

The photographic work of Jean Vertut has come nearest to their reality, particularly in the beautiful series of composite images he has produced of whole walls of paintings. It is especially the richness of the colors and the transcendence of spatial limitations that characterize the great works of Lascaux, Ekain (Guipúzcoa) and Altamira and which can only be really appreciated in situ.

Though the variety of images can be overwhelming, closer examination reveals that the effectiveness of Magdalenian cave painting is based on brilliant handling of relatively simple artistic techniques. Despite numerous theories, notably those of the great pioneers of prehistoric art interpretation, Henri Breuil, Jorda Cerda, Andre Leroi-Gourhan, Georges Bataille, Annette Laming, Herbert Kühn and Immanuel Anati, who have sought to decipher the language of the art and have variously identified systems of meaning in the arrangements of the figures, the language of the caves remains obscure.

With one or two notable exceptions such as the "shaft-scene" at Lascaux or the "sorcerer" of Les Trois Fréres, it is not possible to identify compositions involving groups of images clearly in a specific relationship to each other. Numerous examples are known where groups of animals, such as horses, bison or deer are shown together but a row of woolly rhinos, one behind the other scarcely tells us more than the obvious.

Earlier theories saw the selection of species represented as a reflection of hunting-magic but this has been shown to be far too simplistic an explanation. Modern research has shown that the percentage of species depicted in a cave does not tally with archaeological evidence for hunting in the locality. At Lascaux ninety percent of the

Fig 8.29 *The so-called 'Sorcerer' scene from the cave at Les Trois Fréres, Ariége in France. The length of the scene is about 30cms. The figures are engraved on the rock. The version shown here is copied from Breuil's tracing. The anthropomorphic figure has a bison's head and the bow-shaped detail in front of the face has been interpreted as a flute. The association of the figure with the animals appears to be a composition.*

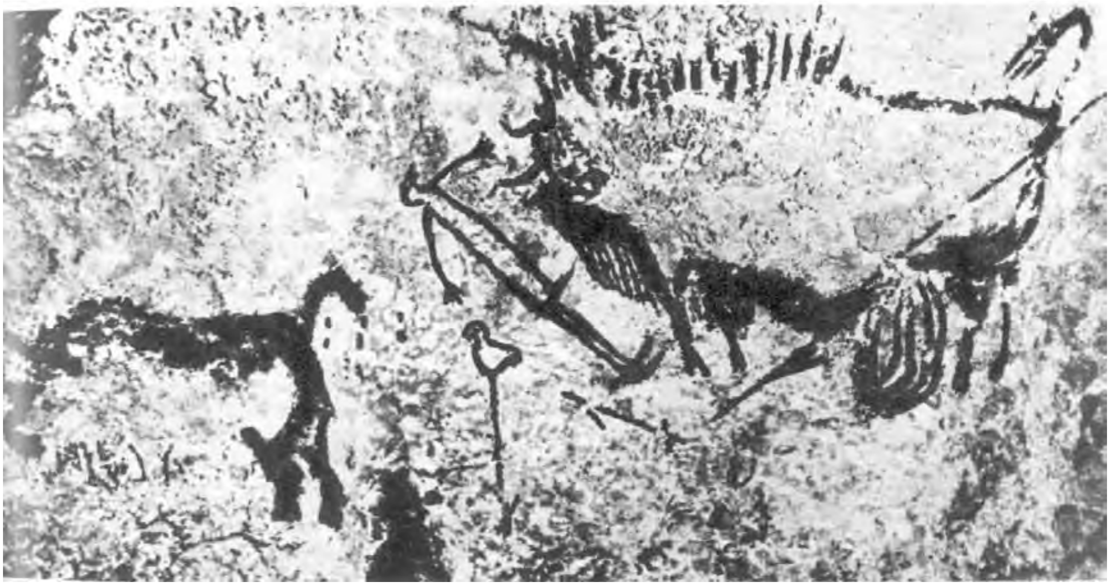

Fig 8.30 *The shaft scene from Lascaux, total length 2.57 meters. The figures include the departing rhinoceros, rows of double dots, the prostrate bird-headed anthropomorphic figure with erect penis, a stick with bird figure on top of it, a symbol, a bison with intestines hanging out of its abdomen and apparently broken spears (drawn after a photomontage by Jean Vertut).*

bones actually found were reindeer, but this animal was only painted once in the whole cave which has hundreds of images. Horses account for sixty percent of the images but do not appear among the bones. Likewise bison, aurochs and ibex appear in the art but not in the bone collections. At Dolni Vestonice mammoth dominates the bone remains in vast numbers but was very rarely a subject for art. These examples can be multiplied from sites around the world with varying degrees of disparity.

For the record, it is worth noting what does not occur in Magdalenian art, but was clearly part of the daily perceived world of the artists. A whole range of animals were hunted but rarely or never portrayed. Plants or trees are almost totally absent and features of the landscape of any kind are extremely rare. Humans or human-like figures make up only a tiny fraction of the images, with females more common than males. In fact a recent survey showed that of the anthropomorphic figures in cave art, eighty percent has to be classified as neither definitely male nor female![52]

Earlier studies of prehistoric art tend to overlook the non-figurative images except where the "signs" appear to resemble arrows and the like. More recently considerable study has been made of these signs, which Immanuel Anati has termed "ideograms."[53] Anati distinguishes between ideograms, which are signs which occur regularly in different contexts, and "psychograms" which are unique non-figural images. Ideograms occur from the earliest times of prehistoric art and accompany many figurative images and also occur on their own. Their frequency of use increases with the Magdalenian.

[52] Ibid., p172.

[53] Anati, I., *Felsbilder: Wiege der Kunst und des Geistes*, 1991.

Figure 8.31 shows a compilation of the most commonly occurring ideograms. The resemblance of many ideograms to the symbols used in early written languages has prompted Anati, among others, to see in Ice Age art precursors of these written scripts. This is difficult to prove or deny since the medium has only a limited number of graphic possibilities.

Before reflecting on what Magdalenian art tells us about the consciousness of late Ice Age mankind, I will briefly look at other aspects of their art. While the masterpieces of Magdalenian cave painting predominate in Western Europe and given that the Atlantic coastline at the height of the last Ice Age extended up to 100 kms further westwards, we may assume that many sites are now lost under the coastal seas and that, the culture that created them also extended far to the east. The Magdalenians were as skilled at carving and engraving as they were at painting. In both Western and Eastern Europe and Russia, magnificent examples have been found.

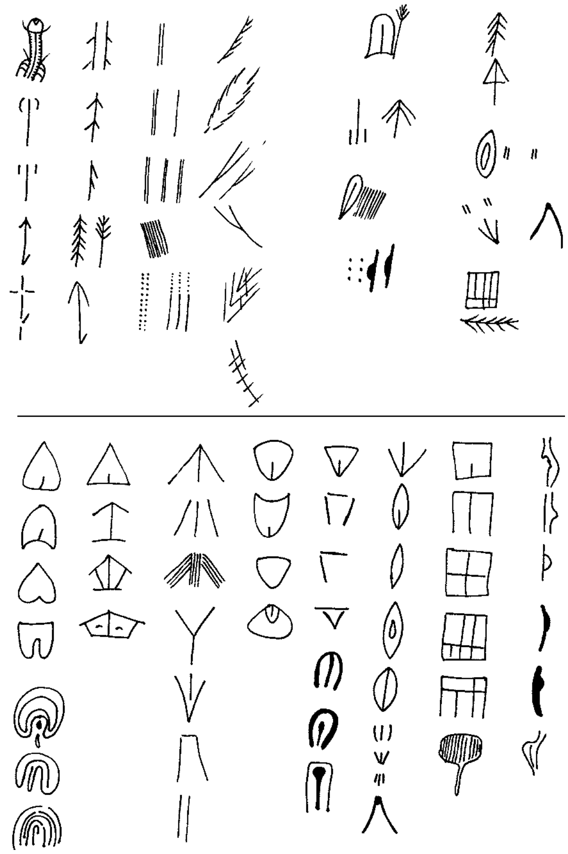

Fig 8.31 *A compilation of symbols found in Ice Age art.*

The same skill in fashioning artifacts such as fine stone tools, lamps and that archetypal symbol of the Magdalenian culture, the bone harpoon, is evident in antler carvings, some of which had both utilitarian and symbolic functions. Such artifacts as spear-throwers and antler "batons," smoothed rods with a circular hole carved at one end, believed to have been used for straightening spear shafts, have been carved and engraved with remarkably naturalistic images of animals.

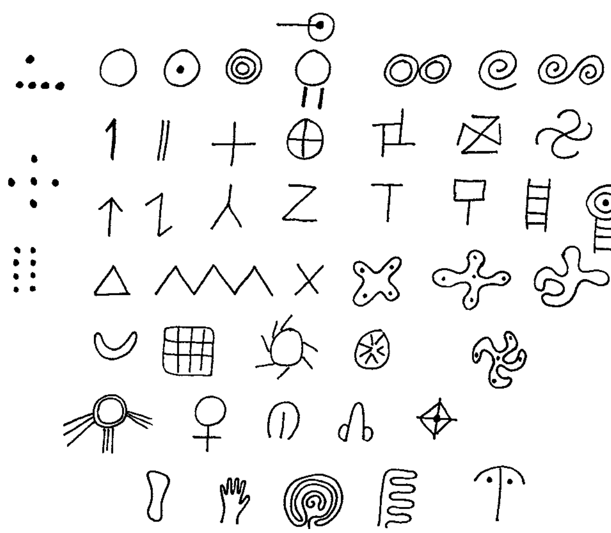

Fig 8.32 *More symbols. In both of these collections, I have simply grouped symbols of similar shape. They come from prehistoric art around the world. We have no way of knowing what such symbols mean. Nevertheless the similarity between such symbols and the forms of early scripts is interesting.*

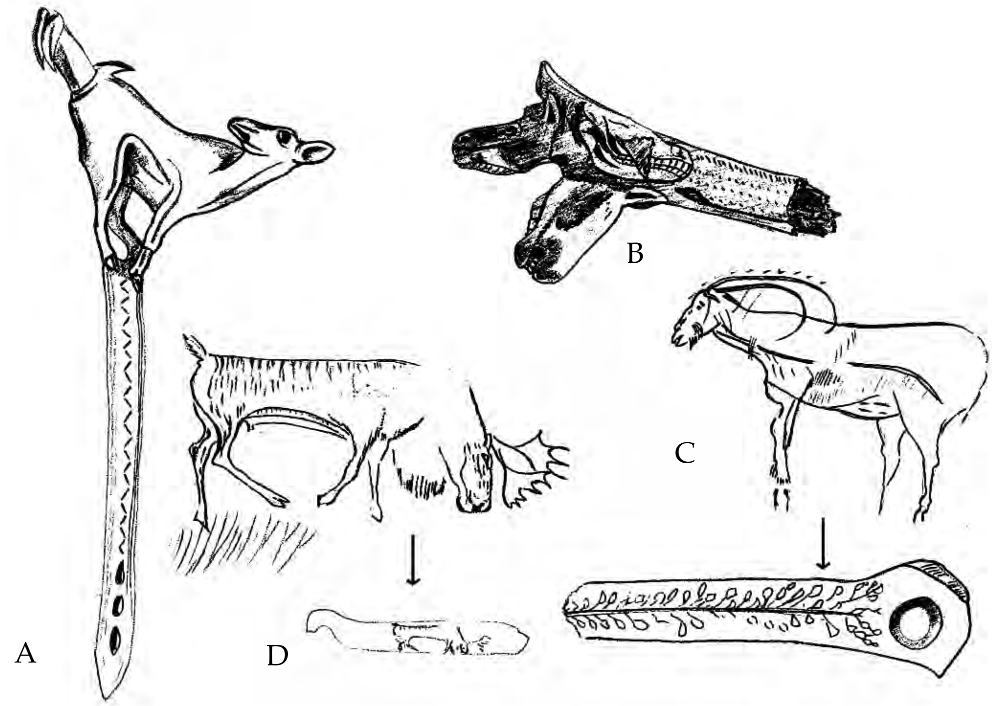

Fig 8.33 *A collection of carved artifacts: A) a spear thrower carved in antler from Le Mas d'Azil in the Pyrenees. This magnificent carving shows a young ibex looking back at two birds perched on a turd coming out of its rear end; B) a fragment of bone, possibly a spear-thrower showing three horse heads, one young, one male and one flayed skull, from Le Mas d'Azil; C) a decorated staff with a hole (thought to be used for straightening heated wooden shafts so they could be used as spears of arrows). On one side we see a rare plant motif, on the other side a steinbock, from Veyrier in Switzerland; D) another hole staff carved in reindeer antler about 20cm long showing a reindeer from Kesslerloch near Lake Konstanz.*

As well as these artifacts, which, if not actually used as such, were designed as functional objects, there are many "pure" carvings, bone discs, and statuettes where a symbolic function must be assumed. What characterizes these carvings is their remarkable integration of the naturalistic proportions of the animal subjects into the given shape of the object, where the whole figure could not be seen all at once. The shape of the bone, antler or stone has been brilliantly adapted to accommodate extremely complex relief or fully three-dimensional representations. Some of the finest examples include the carved gannet bone from Torre, Spain, the spear-thrower from Le Mas d'Azil, which has an ibex perched on the end of a baton looking back over its shoulder at two birds perched on a pellet of excreta emerging from its anus, and the carving of a bison licking its rump that can be seen in the Museum at Les Eyzies in the Dordogne. What makes these works of art so significant is their harmony of technique, material, form and content.

One other group of artistic works belonging to the Magdalenian period in Europe deserves special mention. At Gönnersdorf in the Neuwied Basin, part of the Northern Rhine Valley in Germany, the re-examination of an Ice Age site first investigated in the 1930s revealed the area to be one of the cultural centers of the Magdalenian period outside of the Franco-Cantabrian region. What had originally been seen as broken pieces of paving stone from the floor of the settlement and stacked in the storerooms of the museum at Koblenz were found to be covered in fine engravings. Renewed excavations at Gönnersdorf produced many further examples. The engravings were done on slabs of locally occurring slate using a stone burin (a pointed tool). Much as children in the nineteenth century used slate for writing on, these plates had been lightly engraved with a sharp point, the freshly made lines showing up as white-grey against the dark background. When the dust is wiped off with water, the lines "disappear" and the surface can be used again and again. What remains is a dense mass of superimposed lines that only show up with oblique lighting and must be carefully traced to reveal the various figures among the swirling lines.

Originally the slates had been quite large, up to one meter in width. They had been progressively broken up into smaller pieces and even split into thinner sheets. At each stage the surfaces were used for drawing. Some of the larger drawings were reconstructed from more than a hundred fragments. The pieces of slate finally ended up on the floor, presumably to keep the Gönnersdorf people and their belongings out of the mud. There is no suggestion that the art was intended to end up on the floor, which is not an unknown practice in later cultures.

The engravings include very naturalistic portrayals of a wide range of animals, though there is no unified style. Horse and mammoth are the most commonly represented species, though the list of others is long and varied. The details are often so accurate that it is possible to identify not only different species but even sex and season, i.e., winter coat or summer markings. Individual animals such as the horse are shown with mane, nostrils, accurate hooves, tail and even the anal flap. It is possible to compare the mammoths of Gönnersdorf with carcasses preserved in ice in Siberia. It seems the Gönnersdorf mammoths were a different species with small tusks. The woolly rhino is portrayed, as are several deer species, several bovids and several goat species including a single picture of the rare Saiga antelope. Many bird species can be identified and, interestingly, two species of seal, although Neuwied is some 300 kms from the sea, and in Magdalenian times was at least 550 kms distant!

In total contrast to the animal pictures, those of humans are restricted to very stylized and reduced images of females. Almost exclusively without heads, hands or feet, these images show an extreme of abstraction. With almost masterly skill the female figure was reduced to one or two lines and yet is recognizable as such. Many of the figures is presented in rows or in facing pairs. From the position of the torso in relation to the buttocks there is a distinct impression of rhythmic movement. It is hard to avoid the feeling that dance is being represented. One picture in particular stands out. It shows four female figures all facing (moving?) in one direction. Their bodies are decorated with rhythmic bands of horizontal lines, the hips with "belts" and crossed patterns which may represent clothing. The second figure from the right is more bent than the others in expression of the weight she is carrying on her back. A frame, resembling an Indian papoose is strapped to her back, possibly the earliest portrayal of an infant in the whole history of art.

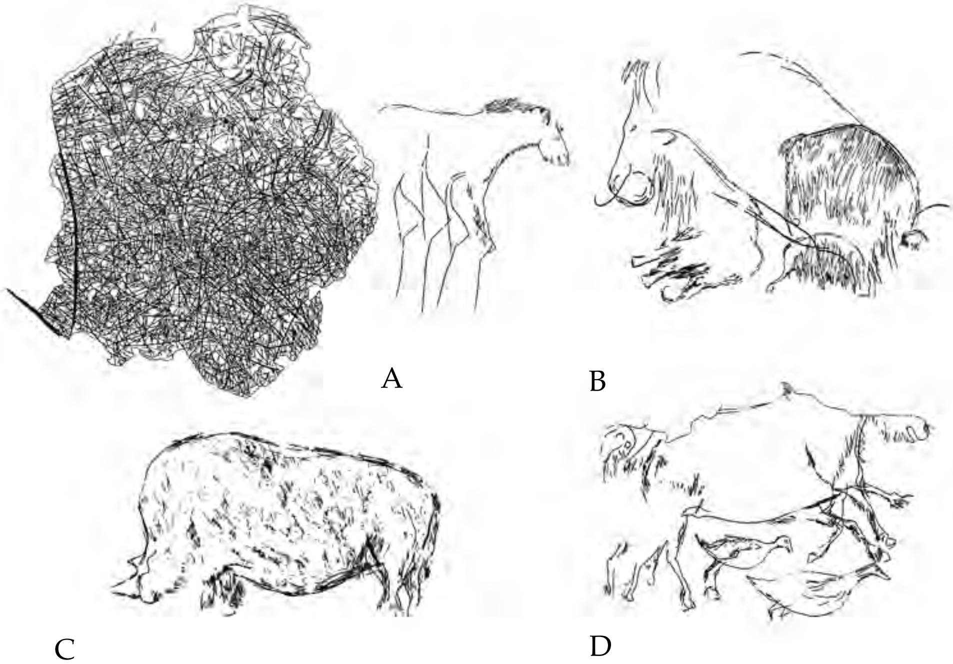

Fig 8.34 *A selection of engravings on pieces of slate that were later used as floor coverings from Gönnersdorf on the Rhine in Germany. Some slates appear to have been used many times, the images erased and new ones superimposed. Traces of the drawing, however, remain: A) a horse deciphered from hundreds of superimposed lines; B) mammoth with curled trunk and small tusks; C) woolly rhinoceros in typical position with head down; D) scene involving a running horse and fleeing birds.*

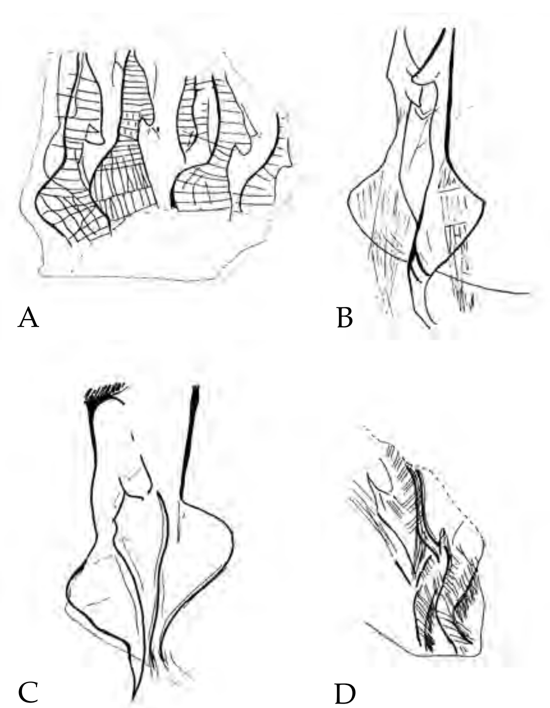

Fig 8.35 *A) four female figures; the second from the right has a child in a back pack; B) two female figures facing each other, possibly in dance; C) two female figures close together; D) this figure appears to be a male covered in hair (drawings after the catalog of an exhibition).*

The images of males or of other "beings" are very limited. One plate shows a horse and two fowl fleeing from an anthropomorphic face with large round eyes. What the purpose of these temporary engravings was is hard to assess. Obviously of great artistic merit, they clearly were not, however, intended to have any permanency as cave paintings had. They were drawn, crossed out and lost almost immediately. It is as if they were preparatory exercises, or perhaps visual aids to accompany oral cultural elements, or simply teaching aids. Had they been found in association with cave paintings, one might assume the artists were practicing. The nearest painted caves are, however, very far off. If they were a preparation, then the end activity has been lost to us. Their spontaneity, sense of movement and rhythm, as well as their sharp eye for detail speak of a heightened consciousness for natural phenomena, or at least of animals, and an exact mental picturing. Self-consciousness is clearly not yet so individual or focused. Self is very much projected into the archetypal image of the female principle.

Magdalenian art flourished until the dramatic changes that marked the end of the last Ice Age. There followed a period of fragmentation of artistic culture followed by the appearance of local cultures with quite distinct art forms.

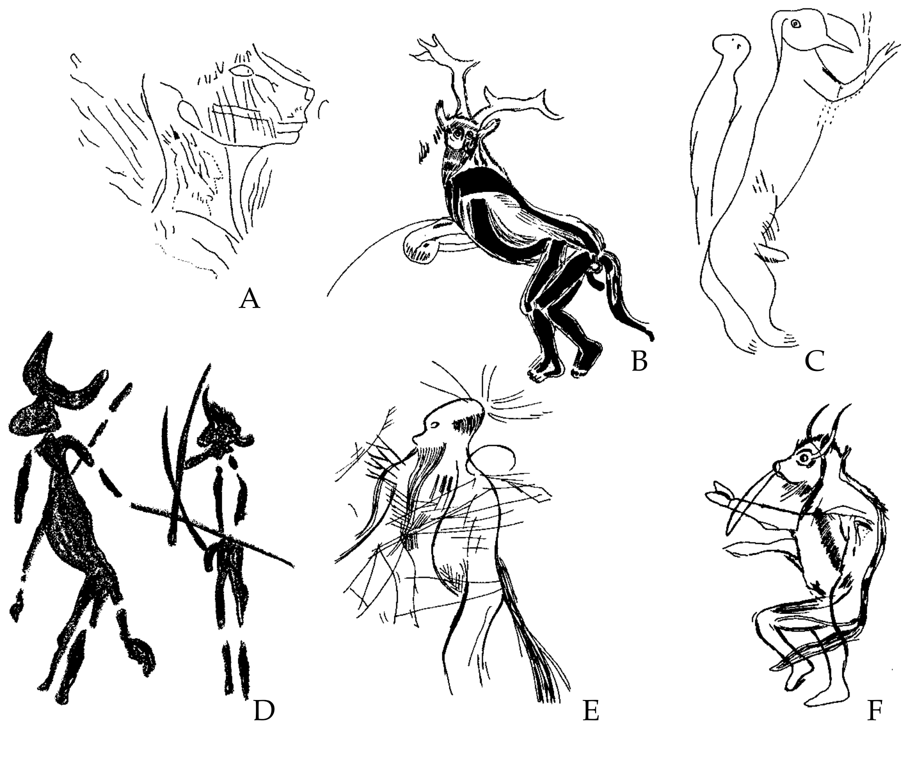

Fig 8.36 *A collection of the very few images of men, some of whom may be wearing masks or head dresses. Some of these figures may represent the shamans who were the guardians of the rites and rituals of the people who made Ice Age art: A) an engraving on a piece of stone 14cm wide from La Marche, Vienne, France; B) The 'Sorcerer' from the Cave of Les Trois-Frères, France; C) figures from Altamira, Spain; D) horned figures from rock art in eastern Spain; E) man with beard, 'tail' and head dress feathers, engraved on a rock wall in the Grotte des Espéluges, Haute Pyrénees; F) figure apparently wearing a bison mask and skin, from Caverne du Volp, Ariège, France.*

Is Not Art a Construct of the Modern Mind?

I have used the term "visual art" as a useful label throughout this chapter for a wide range of human activities. However, in concluding, it is important to qualify this usage. The study of recent indigenous peoples and their cultural activities reveals to us that our application of the term art is not always appropriate. These peoples, and we can assume that this also applies to prehistoric peoples, too, carve figures or paint images for completely different reasons than those we would consider artistic purposes. If by visual art we mean the representation of inner experience or even of external nature, then there is every reason to find the term art totally inappropriate in this context. The purpose of painting or carving (or related activities) for such peoples appears not to have been to represent higher meaning but rather to reveal layers of meaning at a deeper level. The act of making the artifact or painting the picture, as I have alluded to frequently above, may have been more important than the outcome. This makes Ice Age art probably more akin to ritual than to art.

What we call art may reflect totally different ontologies. As an example we can take a people such as the Australian aborigines who have a totemic relationship to the land, " for every living being, according to the Aboriginal conception, draws its essential form and substance directly from the land, and the land in turn, embodies creative powers of the ancestors." Human beings and other creatures come and go, they emerge from the land, live out their time, and reincorporate into it when they die. The land will continue to bring forth new life so long as those who dwell on it—by fulfilling their custodial responsibilities towards it—do not allow its powers to be dissipated.[54]

Aborigine art, some forms of which have recently acquired a value in the Western art market, often has a totemic function, according to the people who produce it. As Tim Ingold shows, the depiction of ancestral being (e.g., in animal form) in a rock painting, bark or sand painting is not intended to be representational. The figures "are not depictions of anything. Rather, they are what they depict, the creator beings themselves, forever immobilized in the rock face." Put another way, the activities of subsistence, hunting, gathering, making artifacts, travelling to another place, making shelter, and so on, were no different in purpose. Living itself was a meaningful engagement with the world experienced as spiritual reality. Life was spiritual reality.

To take another example, this time from the polar peoples of the far north, we can see that it was not the land that held primacy but rather the creatures that inhabited it. Animate beings are engendered not by the land but reciprocally by one another. To quote Tim Ingold again, "Far from revealing a world that already exists, as it were out of time, life is the temporal process of its ongoing creation in order to live, every such being must constantly draw on the vitality of others. A complex network of reciprocal interdependence, based on give and take of substance, care and vital force the latter often envisaged as one or several kinds of spirit or soul extends throughout the cosmos, linking human, animal and all forms of life. Vitality must surrender here so that it may be reconstituted there."[55]

These two opposite approaches, the totemic and animistic, lead to very different relationships between, for example a hunter and his prey. It may be an act of mundane food procurement or a highly spiritual act of life-renewal. For the totemic society dwelling

[54] Tim Ingold, *The Perception of the Environment, Essays in Livelihood, Dwelling and Skills*, 2001, pp113–131.
[55] Ibid., p113.

upon the land, "in the senses both of inhabiting it and of sustained focal attention towards its ancestral essence in acts of ceremony" is how people forge their sense of identity.[56] In an animistic society hunting is an expression of the circulation of vital force between humans and animals and thus contributes to the ongoing regeneration of the world. In the making of artifacts, in the creating of visual images, in the carving of figures the animistic or totemic society enacts key parts of the ritual process.

From even this brief description one can recognize that Ice Age art probably had analogous functions, and many more besides. Art therefore was not a universal medium, as language may be but rather an integral part of living. As Professor Randall White puts it,

> The notion of a separate entity known as "art" is peculiar to western civilization. "Art" is an historical category of our own cultural tradition. Few other cultures have such a concept and we can be fairly certain that Upper Paleolithic societies did not. … Paleolithic art is an extremely diverse and abundant repertoire of material culture that cannot be accounted for by any inclusive interpretive umbrella. … The Ice Age (visual representation) cannot treated as a monolithic entity, but must be understood in terms of the diversity of cultural contexts that generated it.
>
> One of the defining characteristics of modern Homo sapiens is that we experience our world through complex conceptual frameworks that are often mutually unitelligible between cultures. While we tend to think of art as evocative, that which is evoked is heavily reliant upon participation in a mutually understood system of meaning, in other words a shared body of ideas, conceptions and experience. Art, far from being a universal language, is culture bound.[57]

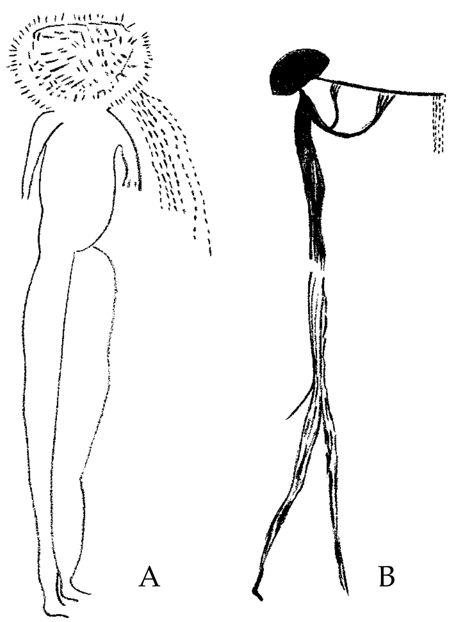

Fig 8.37 *Two images from Africa prehistoric art that reveal the invisible activity of music and song: A) the Singer (60cm tall) from Chungai in the Kondoa district of Tansania, B) the Pipe Player (86cm tall) from Pahi in the same area of Tansania. Both images were originally painted on overhanging external rock walls (after M. Leakey, 1987).*

[56] Ibid., p114.

[57] White, Randall, 2001, "What is the evolutionary significance of material forms of representation?" On the BBC website *Online—Apeman—Dig Deeper*. www.bbc.co.uk/cgi-bin/education.

We have absolutely no way of knowing what the artist/shamans who created Chauvet had in mind, but there is no reason why we should assume that representational purposes such as those we associate with our modern Western conception of art were among them. Interestingly modern Western art itself in its most avant garde forms begins to reflect other concerns than the need to represent. Art as ritual engagement with life can be found in installations and happenings, though one could hardly say they serve any function as forger of cultural identity.

Pioneers and Beachcombers

Prehistoric art is only one of the major new expressions of modern humanity. t has given us some insight into the development of consciousness and conceptual thinking of Upper Paleolithic peoples. As we have seen the earliest art goes back to around 40,000 BP, the major watershed of the cultural streams which flowed into the flowering of advanced hunting and foraging societies and ultimately into the early civilizations which grew out of the Mesolithic period and succeeding New Stone Age (Neolithic).

As we have also seen, anatomically modern humans, however, seem to have emerged as a species long before this date. For millennia they co-existed with other human species who have all since disappeared, leaving the Moderns as the only human species left on earth. As far as we know, the last people belonging to earlier human species, bar the odd Yeti, had become extinct or had lost their biological identity at the latest, 26,000 BP. The apparent success of the Moderns in not only replacing all other species, but extending the range of human habitats way beyond all previous limits, seems to have also occurred around the 40,000 BP threshold.

I think we can confirm that the Human Revolution or Great Leap Forward does justify its title. Like most major revolutions in human history, this first one did not come from nowhere but had a long period of gradual germination. As it happens it is still not clear for certain how and when the Moderns came to Europe. One assumes that they came out of Africa, but when and by what route is not known. It may be that they migrated northeast from the Middle East where they had "settled" after leaving Africa.

As we have seen earlier in this section, the Moderns, of whom Cro-Magnon were a European regional subgroup, had been around for some considerable time before 40,000 BP. As stated above, the bulk of the evidence, but not all of it, does point to an ultimate African origin some time around 130,000 BP. These were the children of the theoretical Eve.

If Eve's people emerged in Africa, when did they first leave their endemic homeland and begin the process of global colonization that took their descendants to all five continents and ultimately a handful of them briefly to the moon? Did the characteristics that led them to supersede other existing human species emerge in the homeland or only later, just prior to the Human Revolution of 40,000 BP?

Fossil Evidence

The earliest Modern fossils come from such widely distanced locations as South Africa, Ethiopia, Tanzania and Morocco and the Middle East. They presumably come from populations that had already dispersed from their original homelands. Colin Groves[58] has shown that new species often emerge not at the periphery or in isolated

[58] Groves, C., 1991, p317.

pockets of populations as classic neo-Darwinist theory has it, but at the center of large well-established populations, which may consist of numerous regional subgroups. This centrifugal speciation seems to be the case for hominids. On the basis of his analysis of the fossils, Groves places the center of this centrifugal process at Omo and Laetoli, in Southern Ethiopia and Northern Tanzania respectively, in other words northeastern Africa. Groves also notes that the appearance of these fossils points to two other characteristic features of hominids, namely the relatively sudden appearance of a new species and at, or near its beginning, the great variation of form within the species' parameters.

Jonathan Kingdon comes to the same conclusion, his view based on ecological and cultural evidence. Kingdon sees Eve's people evolving from the Broken Hill/Kabwe population of Heidelbergs. He suggests that initially there was little anatomical difference but that "technological, psychological, social, cultural and genetic changes"[59] defined Modern humans, there being a time lag before the characteristic Modern anatomy we recognize in the Omo Kibbish and Laetoli skulls evolved. In fact Kingdon sees some of the anatomical changes actually being brought about by the behavioral changes: "sustained speech is thought to demand more refined control of the diaphragm and ribs. Enlargement of nerve canals in the spinal column is one possible reflection of this."[60]

The other changes, notably in the skull, belong to the paedomorphic trend I discussed earlier. All these we can see as symptomatic of the influence of the "I" -principle coming to expression, for where else would the new psychological, cultural or even genetic changes come from but from the spiritual core of the human being? Advanced language skills, greater technical ingenuity and inventiveness and possibly a prolonged childhood, requiring greater social co-ordination on the part of the adults but extending the human learning period, would certainly have given the early Moderns advantages and new opportunities. One need not succumb to crude social Darwinism to see that these advantages enabled the Moderns to succeed.

We need not imagine them driving their less efficient Broken Hill cousins from the field in brutal competition for resources. The Ancients' (Homo erectus, Heidelbergs, and so forth) way of life had been and remained incredibly "successful" for hundreds of thousands of years. It obviously took time for the new faculties emerging in the Moderns to make the kind of difference that would show up in archaeological sites.

The Emergence of Societies

What made the Moderns distinct, was ultimately the scale of social forms they developed, the societies they became. These only reveal themselves to archeology when a certain "critical mass" of size and form has been reached. This point is marked by a larger group size than hominids have hitherto been able to sustain, and a new range of technologies, with the impact they make on their environment. The full package of traits that constitute the characteristic features of the Upper Paleolithic Revolution include as we have seen, blade tools, hearths and campsites, bone tools and artifacts, burials, personal ornamentation and art. These burst on to the scene around 40,000 BP. Prior to this point, however, the early Moderns' social and economic life lacked the content, scale and consciousness to bear the "higher" cultural expressions such as art. Materially

[59] Kingdon, 1993, p98.
[60] Ibid., p97.

however they were distinguishing themselves with skills and organizational capacity to establish themselves in an environment where there was most to gain, namely the East African savannah. As Jonathan Kingdon, who knows the ecology of this region better than most, sees it,

> A co-ordinated pattern of attack and capture could have been a prime hominid advance over the techniques of other savannah predators. Any structured and consistent improvement in the efficiency of group hunting or foraging would handicap less well organized competitors. At first those competitors were carnivores but, with the passage of time, the main competition began to be between different hominid populations.[61]

From 150,000 BP and particularly from 130,000 BP onwards, archeology begins to see new types of stone tools, classified as East African Middle Stone Age. Modern anatomy by this time offered greater precision in the use of the fingertips, rather than the characteristic powerful fist of the Ancients; narrower shoulder blades, less flexed elbows and lighter, more mobile arms, all traits that make accurate throwing easier. The Ancients certainly hunted, though foraging was more their forte. It was not until the Moderns emerged that mankind began to dominate the savannah ecologies, not only with the use of burning, that had long been done, but in systematically hunting the large mammal species.

The new technological skills and better group co-ordination were more likely to have made a difference in the species-rich savannah, particularly in large mammals, than in species-poorer marginal regions, such as uplands. Of course competition from the traditional carnivores is most intensive in such an environment, but the "human-edge" began to prove decisive.

Why Did They Start to Leave Africa?

If the Moderns emerged as big game hunters (for once this image is appropriate for human hunter-foragers) in East Africa and they were doing so well, why did they leave? Surely there were enough resources around for the relatively small populations we must assume. Well, the obvious answer is that not all did. From 40,000 BP the human population of East Africa seems to have considerably increased and there was a proliferation of distinctive cultures, a fact which was also true of equatorial Africa as a whole. But tool assemblages associated with Moderns (even bearing in mind that it is always risky to link tools to specific human grades) very similar to East African types appear in the Middle East at Zuttiyeh, in central Rajasthan in India, and at sites in Southeast Asia from 130,000 BP onwards. Some early Moderns, clearly found themselves far from their homelands, even at such early dates.

The fact that they tended to turn up in savannah environments similar to those of East Africa suggests an originally equatorial homeland. It was only later, through necessity and when the cultural and technical means were available, did they move to more marginal environments, mountains, cooler latitudes, rain forests and geographically peripheral places like Europe and the Islands of the Pacific.

[61] Ibid., p98.

Strandlopers

Kingdon believes that a deteriorating global climate from 200,000 BP to 135,000 BP provoked an original dispersal northwards and southwards out of east Africa. He sees groups of Moderns he refers to as Strandlopers inhabiting one of the richest ecological zones the world has to offer, namely the tropical and sub-tropical coastal strips and their wooded extensions inland up water courses. The television documentary on which Robin McKie's book *Ape Man* was based, showed evocative images of Strandlopers wandering along Southeast African beaches, extending their range along the coast lands north, and by implication all the way round the Indian Ocean to the Indian subcontinent and on down into Southeast Asia. The expanded range of technical skills and social co-operation that were the gifts of the Moderns, made accessible the complex and plentiful range of resources the water's edge has to offer. The steady expansion of range and habitats honed and expanded human skills in a mutually related mesh of cause and effect. New challenges stimulated the development of new skills. New skills enabled new environments to be mastered. Versatility brought its own rewards.

The routes out of the east African savannah lands were those also used by Homo erectus a million years earlier, namely the Rift Valley water courses, the Nile Valley, through the Levant down through Mesopotamia and into northern India. At various times the Afar Triangle was joined to Arabia, which like the Sahara saw periods of cooler, wetter climates and richer fauna than are known today. The savannahs of India supported species of elephants, rhino, giraffe, horse, giant cattle, buffaloes, deer, antelope, gazelles, pigs and carnivores such as lions, leopards, hyena, to name only the larger mammals; it must have felt like home!

Early Modern sites such as Klasies River Mouth and Howiesons Poort in the Southern Cape, South Africa, both of which were coastal locations, give some clues as to how the Strandlopers exploited the seaside environment. Shell middens testify to the importance of mollusks to the diet. Sites such as these suggest a seasonal movement of people between the savannahs and the coast.

Where Did They Go?

It seems quite likely that an early dispersal of Moderns took them beyond India into Southeast Asia and possibly into parts of China. In Southeast Asia they would not have found much resembling savannah habitats, and we must assume that the tropical shorelines and rivers were their homes.

Mollusks in such places offer the highest concentration of protein to be found in any habitat. Apart from which fish, large sea mammals such as dugongs, waterfowl, crabs, turtles, and so on, offered plenty of variety as did the abundant plant material in mangrove swamps and along the edge of the forest. Once simple rafts and possibly even dugout canoes were made, island hopping and harvesting the rich resources of the coral reefs would have been possible. During much of the last 100,000 years or so, sea levels were much lower and many of the island groups of Indonesia were joined in larger land masses. In the north, Malaya, Sumatra, Java and Borneo were linked in a land mass known as Sunda. To the south lay Sahul comprising New Guinea and Australia. Between lay the Island chains of Wallacea.

Most of the time Sahul lay separated from the nearest land northwards by a stretch of open sea some 80,100 kms wide. Several studies by Australian oceanographers and anthropologists have shown that crossing these open waters, though risky is not

Fig 8.38 *Map showing the areas of Sunda and Sahul at the height of the last Ice Age, when sea levels were much lower than today (after Stringer and Gamble).*

impossible, given the levels of technology available to Strandloper people.[62] The earliest evidence for human habitation is around 60,000 years ago, though this is uncertain. Most researchers agree, however, that by 50,000 BP the Moderns had reached Sahul/Australia, and by 40,000 BP had reached the south coast and Tasmania. This means we must place the invention of sea-going craft before the Human Revolution.

Computer simulations have reckoned a journey of around seven days on a bamboo raft from Timor to the nearest point on Sahul, carried by currents and blown along by convenient monsoon winds. Geoffrey Irwin of the University of Auckland, after years of studying sea-currents, wind patterns and distances between islands and submerged parts of the continental shelf, has described the whole region as an ideal place to experiment and discover the skills of sailing and navigation. No doubt there were many accidents, but enough people seem to have made the various crossings to populate a continent in the course of time. That a few were blown off course whilst collecting shellfish on the reef is possible. But that enough obviously had seven days worth of fresh water, mixed-sex crews and the equipment to survive having arrived on a continent where neither flora nor fauna were familiar, this has more than a hint of intention about it. Since all the coastal regions where they might have landed are now underwater, it is unlikely that archaeological evidence of the first Australian pioneers will be found. But the evidence from sites around the continent shows clearly that by 40,000 BP hunters had already been active in Australia and New Guinea, with a good chance that they arrived there even earlier.

Out into the Pacific

The colonization of the Pacific Islands is surely one of the greatest stories of human adventure. It was long thought this vast area of ocean and its scattered clusters

[62] Fagan, B.M., 1990, "The First Sailors."

of islands was one of the last places on earth to be settled. Recent research has shown, however, that the process began very early indeed.[63] A cave on New Ireland has revealed traces of occupation dating back to 33,000 BP. New Ireland lies 600 kms northeast of the Huon Peninsula in New Guinea which has sites at which stone axes dated to 40,000 BP have been found. A chain of islands between New Guinea and New Ireland no doubt provided the route for the early colonists. The next inhabited island is Buka in the Solomons which has a date for occupation of a rock shelter of 28,740 BP. Buka is not visible from New Ireland, some 170 kms of open sea lying between them. Such a feat of deliberate navigation almost 30,000 years ago is truly astonishing!

The island chain of Ryukyu south of the Japanese Archipelago which was never joined to the continental shelf must have been reached by sea as early as 32,100 BP, as evidenced by a skeleton found in a cave on Okinawa. Japan itself seems to have been reached by 40,000 BP and possibly 50,000 BP.

The interesting thing about the early Pacific colonization is that it was achieved without the kind of technological advances in stone tool production usually associated with the Upper Paleolithic. Clive Gamble sees the decisive factor being levels of social organization. Indeed building boats, preparing and storing provisions, navigating open sea, adapting to new and unfamiliar environments are all tasks requiring considerable purposeful planning. Detailed study of the possibilities of drifting and actually reaching all the islands we know were reached in the time in which we know it happened, discounts the idea that it was an aimless process. The evidence points to deliberate planned explorations which could not all have been of a one-way nature. Some boats must have returned for more colonists to follow.

Colonization was often purposeful and what is more, sometimes against prevailing ocean currents. As Clive Gamble summed the situation up, " The colonizers were deliberate in their actions, concerned for their safety, and rational within their own world view."[64]

Brothers on the Path: Co-Existence

When it was revealed that the dates of certain Modern fossils predated Neanderthals in the Middle East by some 30,000 years, some of the central tenets of paleoanthropology were turned on their heads. It had long been assumed that Cro-Magnons who appeared around 35,000 BP had been preceded by Neanderthals in Eurasia. When it turned out that a Modern skeleton found buried in a cave at Qafzeh in Israel had been dated to around 92,000 BP by the thermoluminescence (TL) technique and then pushed back even further to between 100,000 and 120,000 BP by electron spin resonance (ERS) dating, radically new models for human evolution became necessary.

This discovery was confirmed by new dates for other finds in the region. Archaeologists Ofer Bar-Yosef and Bernard Vandermeersch have established that Modern humans co-existed with Neanderthals in Israel and followed a very similar pattern of life from between 100,000 and 40,000 BP.[65] Their lifestyles, their tools and their use of the environment are all basically Middle Paleolithic or Mousterian. Evidence for the practice of burial is stronger in the Middle East than it is elsewhere in Europe or

[63] Quoted in Gamble, 1993, p228.
[64] Ibid., p233.
[65] Bar-Yosef, O., 1993, "Modern Humans in the Levant," in *Scientific American*, Vol. 268, No. 4. April 1993.

Western Asia, but otherwise both Moderns and Neanderthals seem to fall broadly into the pattern of traditional Ancient or Pioneer culture. The fossil evidence appears to indicate that the Neanderthals had no predecessors in the region, which means they must have moved there from elsewhere, probably from Eurasia during periods of extreme glacial conditions "up north." It is not possible to know if these two species of human beings actually met each other on a daily basis in the valley between the caves or whether they inhabited the same place in alternating cycles of hundreds or thousands of years. Dating techniques are not accurate enough to tell us that. What is known is that in the brief space of time between 48,000 BP and 40,000 BP Upper Paleolithic tools and other cultural features appeared in the region, marking the local version of the Human Revolution. The evidence suggests that the Neanderthals had disappeared from the region by about 45,000 BP. It does not appear that the Moderns drove out the Ancients in the Middle East by their use of more effective tools, since these only appear once the Neanderthals were gone.

The co-existence of Moderns and Ancients in the Middle East and later in Europe, and the subsequent disappearance of the latter, has posed questions as to what happened to the Neanderthals and other Ancient populations around the world. All we know for certain is that they gave way to incoming Modern peoples. Needless to say, this is a very hotly debated subject, not least because it goes to the root of the rival theories of the emergence of modern humanity.

Though the majority view among scientists sees the evolution of the Moderns as a unique event in Africa, followed by global diffusion and replacement of all other humans by the Moderns, there are a few tenacious voices questioning aspects of this scenario. Foremost among them are the pugnacious Professor Milford Wolpoff of the University of Michigan and his Australian colleague Alan Thorne of the National University, Canberra. With numerous versions, the two basically opposite views are those of:

- **population replacement** (as described above, these theories are often referred to as Noah's Ark, Garden of Eden, Gardeners, Out of Africa 2, and mtDNA. Eve) and
- **regional continuity** (Candelabra Theory, multi-regional evolution, Sons of Noah, Neanderthal Phase, Center and Edge, Out of Africa 1).[66]

As summarized above, the proponents of the regional continuity theory see a gradual evolution of humans through regional Neanderthal phases into Moderns. The arguments are strongest for Southeast Asia, China and Australia, and weakest for Europe. "Regionalists" like Wolpoff argue that Homo erectus migrated out of Africa (Out of Africa 1) about one million years ago and evolution has proceeded on a regional basis ever since with sufficient gene flow, that is mixing of neighboring populations where regions meet, to ensure that the whole of mankind has broadly followed the same evolutionary path. Wolpoff is famous for his answer as to what became of the Neanderthals: "I see one in the shaving mirror every morning." The Neanderthals changed into European Moderns when that culture no longer needed their robustness or their adaptations to cold climates.

[66] See Stringer and Gamble, 1993, pp34–38, for a discussion of the main models.

Recent reports from a major archaeological site in the Dordogne in France offer us intriguing insight into comparison of Neanderthal and Modern life styles.[67] At the rock shelter site known as Grotto XVI, scientists have been uncovering layer upon layer of evidence spanning over 75,000 years from a site that was inhabited by both Neanderthals and later Moderns. The evidence suggests that both peoples used the site more similarly than had been expected. This site points not to a rapid change of culture but to a long transition, with evidence of Neanderthals fishing and smoke-drying fish.

The real change of life style seems to have occurred during the Magdalenian period about 12,500 years ago. Once again we have an image not of sudden replacement by a culturally and technically superior people but of long progressive development.

The arguments for and against regional continuity are summarized elsewhere.[68] Highly significant, however, is the research (referred to at the beginning of this chapter) done by Svante Pääbo at Munich University and confirmed by Mark Stoneking at Pennsylvania State University, which shows that Neanderthals and Modern humans last shared an ancestor about 600,000 years ago.[69] These researchers were permitted to take a sample of bone from the original Neanderthal specimen and analyze its mitochondrial DNA sequences. These differed sufficiently to rule out the possibility that the Neanderthals were the ancestors of Modern humans. If this research is accepted, and this does seem the case, then the regional continuity argument seems moribund. But in paleoanthropology, you never know!

As reported at the beginning of this section, the Portuguese child skeleton found at Abrigo do Lagar Velho shows that Neanderthals and Moderns almost certainly did interbreed very near to the actual disappearance of the Neanderthals and in one of the last outposts of the Ancients, driven as they probably had been to the very periphery of the European mainland. The Portuguese archaeologist Joao Zilhao who excavated the site and American Neanderthal expert Erik Trinkaus think the child was a four-year-old boy, buried with ceremony similar to that known from Cro-Magnon sites, but possessing a strange mosiac of traits including robust bones and limb proportions typical of a Neanderthal as well as apparently Modern teeth and chin. Dated at around 24,000 years old the skeleton seems to have been buried at least 5000 years after the Neanderthals are assumed to have disappeared from Iberia.

DNA taken from another Neanderthal infant from the Mezmaiskaya Cave in the northern Caucasus and dated to around 29,000 years ago, showed the same kind of genetic distance from the Moderns as the Feldhofer Neanderthal tested by Pääbo.[70] All in all, at the time of writing it seems probable that Neanderthals were replaced by Moderns and that interbreeding was minimal, though some cultural exchange occurred.

A Breakthrough in Consciousness?

Whilst the replacement theory does seem to be more likely than the continuity model, it is clear that the biological aspect is actually of less importance than the impact of behavioral changes in creating the Human Revolution. It was actually a change in human consciousness that made the difference and in this sense the Revolution essentially had underlying spiritual causes. The spiritual dimension is not strictly limited to biological

[67] Report in *Scientific American*, December 2000, p14.
[68] See Trinkaus and Shipton, 1993.
[69] Report by Roger Lewin in the *New Scientist*, July 19, 1997.
[70] See Palmer, D., 2000, *Neanderthal*, p210.

species, as I have shown in the example of upright bipedal walking. The new Modern consciousness came to full expression within a relatively short space of time around 40,000 BP. After a long period of germination, a shorter period (60,000 to 40,000 BP) which Clive Gamble called the Pioneer Phase, in which tool technologies anticipated Upper Paleolithic types and corresponding cognitive skills, the almost universal Human Revolution recorded a spiritual event of global significance.

This breakthrough coincided with the spectacular burst of colonization into regions such as central Australia, Europe and the Russian steppes. In Europe the Moderns found an existing population of Neanderthals. The discovery of the site at Saint-Cesaire in France shows the results of this encounter. A Neanderthal skeleton dated to 36,300 BP was found with tools belonging to the Châtelperronian industry type, characterized by blade tools rather than the flake Mousterian types usually associated with Neanderthals.

Many archaeologists see Châtelperronian as a typically Modern blade technology. The association with a Neanderthal skeleton several thousand years after the arrival of Cro-Magnon in Europe led to the conclusion that the Neanderthals had been influenced by Modern techniques. This fact has been presented to show the last, feeble attempt by the Neanderthals, who were already under pressure from their technologically superior neighbors/competitors, to adapt or die. A more positive view, and one which lends support for a middle way between replacement by superior forces or regional evolution, would be to see the Châtelperronian as evidence that the Neanderthals, stimulated by the presence of Moderns but also perhaps "touched" by the spirit of the times themselves underwent a shift of consciousness. Such a shift in behavior by the Neanderthals, including radically different toolmaking techniques, the new use of carved bone, personal ornament, living sites and deliberate burial, stresses an essential quality of humanity. This faculty enabled them to respond in a flexible way to a new stimulus. Had they not had some spark of human spirituality they could not have responded in such a comprehensive way. Imitation of that order implies not only geographical but spiritual proximity to the Moderns.

Decline and Disappearance

Given the Portuguese hybrid child fossil, there is no reason to imagine that interbreeding was out of the question, though the genetic evidence whilst not ruling it out, does suggest minimal gene flow. Ezra Zubrow, a mathematician turned archeologist, has constructed demographic models for two populations, a Neanderthal and a Modern who meet occasionally in an Ice Age environment.[71]

Zubrow was able to show by including all the known data about comparative life styles, infant mortality, group size, life expectancy and so on, that only a one- to two-percent difference in the mortality rate between Neanderthals and Moderns would lead to the extinction of the Neanderthals in 30 generations, or 1,000 years. His model is highly plausible. The Neanderthals, after a period of assimilation to Modern techniques, remain ethnically, rather than strictly biologically, separate, perhaps confining their ranges increasingly to marginal regions avoided by Modern hunters concentrating on the large herds of reindeer, horse, bison or mammoth. The argument sees their marginalization leading to decline and eventual extinction.

[71] Zubrow, E., 1989, "The Demographic Modelling of Neanderthal Extinction," in Stringer and Mellars (eds.), 1989.

In a recent article Erik Trinkaus argues on the basis of comparative studies of Neanderthal and Modern femurs (in particular the part that articulates with the hip) that young Moderns were less physically active than young Neanderthals and that they were cared for longer at the home base.[72] This would have necessitated a more sedentary lifestyle in comparison to the more mobile Neanderthals. To support the view that Moderns inhabited their cave sites for longer, there is evidence that rats and mice were abundant at such sites. These rodents are known to be associated with longer term human occupation. This view emphasizes once again the significance of a prolongation of childhood in establishing Modern human behavior.

Yet, when one examines subsequent human history, peoples of incredibly different lifestyles have co-existed, keeping out of each others' way, exploiting different resources and even sometimes trading with each other. Of course such situations have often led to conflict when resources got scarce, but rarely did this lead to total extermination. Even the recent colonial conquests and genocidal policies of societies with infinitely more powerful technologies than Cro-Magnon people, rarely led to the total disappearance of the subdued races. First Nation peoples such as the Native Americans, Bushmen, Aborigines suffered terrible losses, and yet some tribes have survived and some have even flourished. The situation during the Human Revolution of the Upper Paleolithic was apparently far more radical. All races of Ancients seem to have disappeared and only the Moderns remain. The technical evidence for the regional continuity theory does, however, seem to be weak. So how can we explain the demise of the Ancients? What comes to expression through their disappearance or assimilation, other than the success of a technically superior form of Stone Age existence?

The Time Was Right for the Human Spirit

Biologically, given that human populations at that time were very small indeed, it does not add up. Why could there not simply be several species of humans occupying different niches, as there are apes, or antelopes, or foxes or dolphins today? Was not the world big enough?

Whenever I address this question I am reminded of the saying of John the Baptist, announcing the Coming of the Christ, "He must increase, but I must decrease," and before the Baptism in the Jordan, "After me cometh a man which is preferred before me: for he was before me." The time was right for the human spirit to incarnate fully, to express itself through the body and soul of fully Modern humans. The emancipation of the human "I" was becoming possible, initially within groups, tribes or races, later within individual human beings. The archetype of the human spirit had been there all along, "for he was before me." Only now was it possible for individual "I"-consciousness to arise. The Neanderthals and all the Ancients had played their part, now they had to give way, not so much for biological/survival reasons but so that higher development could take place. Childhood gives way to adolescence and that stage of life gives way to adulthood. As Rudolf Steiner put it in an article in the magazine *Lucifer Gnosis* in 1904,

> Further development (for mankind) was now only possible in that a portion of the human beings attained a higher form at the expense of the others. Man left a

[72] *New Scientist,* January 15, 1994.

> portion of his brothers behind on the path in order that he himself might ascend higher.[73]

The Neanderthals and Ancients represented a stage of humanity through which we have all been. The relationship of the Moderns to the Ancients was not, as some have suggested, that of Cain and Abel. But as Chris Stringer and Clive Gamble point out at the conclusion of their book *In Search of the Neanderthals*,

> It is pointless to seek winners or losers in the story of human evolution. Rather, we should accept that differences exist, and use them to broaden our definitions and discussions of humanity. … We should celebrate our rich and varied prehistory as a route to enhancing, in these multi-cultural times, our understanding of ourselves.

It is ironic that the Cro-Magnon people in Europe themselves seem to have died out and been replaced by Neolithic farmers some 5000 years ago. It may be that the Basque people represent the last refuge of the original Cro-Magnon blood line.[74]

Conclusion: Purpose and Responsibility

As I have attempted to show, the key stages in human evolution, upright bipedal posture, encephalization, extension of childhood, tool making, language and conceptual thought can be understood in terms of exaptive rather than adaptive changes. Thus human evolution has been, as Clive Gamble put it, "an active rather than passive process; for instance, the exaptive unfolding of culture rather than the adaptive response to the forces of nature."[75] At each stage the human spirit, the "I," has co-opted useful traits to serve its own ends, that is to say, to come more effectively to expression. This has led to a progressive emancipation of humanity from the limits of biological necessity.

Up to the point of language acquisition, human influence on the environment was limited and minimal. With language, the scale of changes increased dramatically. Human evolution and culture became increasingly independent of environmental, natural forces, whilst at the same time having an ever-growing influence on nature itself. Human evolution has been a process of self-realization and since the emergence of Modern humanity has become ever more self-directed. Before "I"-consciousness arose in human beings to direct the expression of intention and purpose, who or what were the directing forces? Of course at one level the direction or goal of human behavior has always been survival and the perpetuation of existing social life. This, if mythology gives us any clues, was also bound up with a largely unconscious sense of maintaining a precarious balance within the forces of nature.

As we have seen, nature was experienced as being imbued with soul; it was animate and later came to be personified in gods, deities, spiritual and elemental beings and mythological heroes and demons. Only recently have these supernatural forces in the literal sense, come to be experienced not as the "will of the gods" or even "the Logos" but as an inner individual need to respond to the directives of the self, spirit

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[73] Steiner, R., 1990, *Cosmic Memory, Prehistory of Earth and Man*, p109.
[74] Douglas Palmer, *Neanderthal*, 2000, Channel 4 Books, p212.
[75] Gamble, 1993, p244.

and soul. We may even no longer think of our intentions and will as the expression of spiritual forces. Nowadays when the term human spirit is used it has a hollow ring to it. Nevertheless human cultural development or evolution is indeed directed by the human spirit, however we wish to term it.

Who Did Humanity Imitate?

Throughout this book I have drawn the analogy of the ontological development of the human being with the evolution of humanity. Naturally this is no naïve literal parallelism, yet instructive all the same. The young child learns through imitation of adult role models and, to a lesser extent, the environment. Who then did mankind imitate? Who were the role models for humanity? This question stands alongside another. In times before individual or even group "I"-consciousness, whose purpose or intentions came to expression? The two questions are linked in that both ask the nature of the higher guiding spiritual principles that work behind or above or within, spiritual prepositions that go beyond space and time, human evolution. If there is no Divine Plan and yet all is not random drift, can there be a spiritual guidance that creates opportunities but does not determine the outcome?

Rudolf Steiner's answers to these questions are profound and challenging. One place to seek some answers is in the book of lectures which Steiner reworked and published under the title of *The Spiritual Guidance of the Individual and Humanity*.[76] In this book Steiner points to a second, higher self within each individual which guides us through life. This higher self guides us as we stand upright, find our balance, learn the language of our community and develop the conceptual faculties that enable us to be universally human. He describes this higher self being under the guiding spiritual principles.

At key moments in human evolution these spiritual forces or beings have intervened to provide opportunities and stimulation for the human spirit to take a step towards emancipation. At each of these key stages other forces, regressive forces were also active, working in the opposite direction, binding humanity to a more one-sided specialization, in effect to a more animal nature. Evolution has been the dynamic tension between these two tendencies.

Had this not occurred, Steiner said, human beings could not have developed the "I"-consciousness we possess today. What the child achieves today out of his or her will forces, guided by a higher self that stands behind the child as a spiritual principle, mankind achieved at various points in evolutionary history.

In the various hominid species the means to achieving the key evolutionary stages such as bipedal upright walking were different. If we observe carefully, we can see that each child achieves these key developmental stages in entirely individual ways that only conform to broad general patterns and maturational timetables. The way each child does it tells us something about him or her, about his or her unique individuality. It must be so because each "I" is striving to bring itself to full expression in genetically different body patterns, in differing circumstances. Nothing in development or evolution is predetermined.

Early hominids were equally guided by a "higher self," only the further we go back the less individual these spiritual directing forces were. Just as all other species have their specific life histories within fairly narrow bands of individual variation, so

[76] Recently reissued by Anthroposophic Press.

too did hominids. The higher, or more emancipated a species becomes, the greater its individual variation. But no species before Homo sapiens possessed an individual spirit. It is as if each individual, from a spiritual point of view was his own species, though naturally biologically we conform to a collective, if very variable species. Through this inner spiritual tendency or potential, the different hominid species took hold of various exaptive features to achieve uprightness, large brains, language and the full suite of unique human traits.

The Struggle Between the Forces of Progression and Regression

The central image of evolution, then, has involved a dynamic struggle between the forces of progression and regression. Progression has been characterized, not by the kind of "I" centric ideas of progress and superiority that informed earlier views of evolution, but by emancipation and freedom.

And with Freedom Comes Responsibility

Humans have come, as the ultimate self-realizing and self-conscious beings, to be the decisive factor in evolution. Thus the responsibility that lies on us is heavy, all the moreso for being within the realm of our freedom. The redemption of the earth now depends on mankind. The spiritual world itself requires the conscious, free deeds of humanity itself in order to evolve. It can evolve and can rejuvenate the earth only through us. We are called upon to recognize being or spirit in nature as well as in ourselves.

Human evolution, as we have seen, has been the process of the preparation of a suitable organism for the incarnation of the human "I." The physical body has had as its blueprint an archetypal form, and this model has been individualized to a greater or lesser extent over millions of years by the human spirit. Each individual human spirit has the totality of the formative forces of the spiritual world as its source of existence. The spirit has sought through the "I" to reflect itself in the human bodily organism and in so doing to unite itself with the material world. It does so in the human being in two ways. It finds reflection of itself within the brain and nervous system through living thinking and full consciousness, and it recognizes itself through the senses reflected in the world around. Developing a creative interchange between these two forms of self-knowledge is the task of being human. This is one of the central tenets of anthroposophy. And because self-discovery is central to the task of the "I," so, too, is the confrontation with the forces of destruction and unconsciousness. A true science of the human being has to work with both poles of knowledge, what the senses reveal to us and what we can know through living thought in which the spirit reveals itself. To understand our true selves we have to recognize both sides of evolution, the spiritual and the physical. This book has been a sincere attempt to do this.

Chapter 9

Postscript

Day by day important new discoveries are being made that expand and deepen our understanding of human ancestors. The fossil record gets progressively more extensive and no less complex.

Among the most significant discoveries that make this postscript necessary is the archaeological finds in a cave on the coast of South Africa where the Indian and Atlantic oceans meet. Blombos Cave is an archaeological gem. Its layers of sediment trace occupations going back 70,000 years or more. Chris Henshilwood, the excavation leader, described what they found:

> We came down to this layer you can see over here which was really quite remarkable. On the surface were lying the most beautifully made artifacts, bone points, spear points as well, and immediately I realized we had gone back a very, very long time. … We noticed a large number of pieces of ochre. Ochre is a soft stone, comes in reds and yellows. If you scrape it it'll produce a powder and that powder can be mixed with animal fat, for example, and used as a paint. At first no one could work out what the ochre was doing in the cave. It did not occur there naturally. In fact it could only have come from miles away. It must have been brought there for reason, but why?[1]

In fact they found 8,000 pieces of ochre in the cave. Then one day Henshilwood found a piece that had clearly been marked with an abstract pattern, a series of cross-hatchings in each direction with a line drawn along the top and bottom. The piece was dated at 77,000 years old, and further tests showed that the markings had been deliberately incised by a sharp point rather than having been caused by scraping or cutting. These were not accidental cut marks but evidence of a carefully executed design made with a tool specifically made for the purpose. This is evidence of art, of abstract, symbolic thinking.

This evidence from Blombos indicates Modern human behavior well before the previously drawn threshold of 40,000 years ago that has long been considered the date which marks the emergence of the Human Revolution.

Blombos does not stand alone but makes a number of other discoveries in Africa—sophisticated stone blade tools at 80,000 intricate harpoons at 90,000—not so

[1] From the Horizon transcript of the program broadcast on BBC2, February 20, 2003, on the www.BBC.com website.

anomalous. In fact it appears that Modern behavior was well on the way long before the Human Revolution. In fact the Blombos discovery also made it possible to reconsider even earlier evidence for human symbolic behavior.

A collection of some 450 crayon-shaped black manganese sticks, which had been found in the Pech de L'Aze cave some 30 years ago have been reassessed in the museum where they have lain since their "anomalous" discovery. These sticks show all the signs of having been used as pigment for drawing on either animal or human skin. The fascinating thing about them is that they were found in association with Neanderthals at a time when Neanderthals could not have been in contact with Modern humans, though at the same time as the ochre was being used in South Africa. Furthermore, it now seems likely that some Neanderthals were capable of making exquisite beads, a clear sign of ornament and symbolic thinking.

So it seems that Modern behavior has a deeper history than we have thusfar imagined. Perhaps something of this human quality even incarnated among populations of Neanderthals. The view is increasingly being taken seriously that Neanderthals may well have been capable of evolving higher faculties. They may well have been on that path when they died out, possibly due to an epidemic which either wiped them out or reduced their number so significantly that their genes could not reach contemporary populations.

The Biggest Discovery of All, a Real Missing Link

Literally as this book was going to the press, the announcement was made in the science journal *Nature* that hominid fossils found in Ethiopia confirm that Modern humans evolved in Africa. Skulls dated at around 160,000 BP found at Herto in the Middle Awash region of Ethiopia show a suite of modern human characters. As Professor Tim White puts it in *Nature*;

> The Herto hominids are morphologically and chronologically intermediate between archaic African fossils and later Modern humans. They therefore represent the probable immediate ancestors of anatomically modern humans.[2]

Of course this discovery does not answer all the questions. In fact it opens up many new possibilities for an even more complex theory of evolution. We still do not know if human evolution was a gradual coalescing of forms spread throughout the African continent and perhaps the Near East, or was there a "punctuational" evolutionary event at one particular place? There are always more questions.

There will undoubtedly be more such discoveries. We can assume the story of human evolution that is told today will change. Up to now each discovery has pushed back the date at which higher human faculties can be substantiated. The Spirit has been expressing itself in self-consciousness in human beings for at least 160,000 years and perhaps longer. This alone suggests that higher human faculties did not just suddenly occur because of a mutation in brain architecture. The human spirit has been gradually emerging all along.

[2] Readers can inform themselves of the full significance of this discovery on the Nature website or *Nature* 423, June 2003, pp742–747.

Glossary

Abbreviations:
BP = before the present in years
Mya = million years ago

Acheulean: a Lower Paleolithic toolmaking tradition characterized by handaxes (bifaces). Named after the find site St. Acheul, near Amiens in northern France. The Acheulean tradition spanned the entire populated Old World and lasted from around 1.5 mya to about 150,000 BP and is generally associated with Homo erectus and Homo heidelbergensis.

adaptive radiation: an evolutionary process that occurs when a group of closely related species adapt to a range of new or different environments or life styles.

allometry, allometric: refers to the relative growth of different organs or parts of an organism, or the relationships between different species

altruism: used in biology to describe behavior that benefits other members of a species, usually at some cost to the donor

apes: a primate group that includes orangutans, gorillas, gibbons, and chimpanzees. They have no tails.

arboreal: dwelling in trees

Archaic: ancient archaic Homo sapiens, a term used to refer to the ancestors of modern Homo sapiens, now usually referred to as Homo heidelbergensis

artifact: any object made, modified or adapted for use by humans and hominids, not only tools

assemblage: a collection of artifacts found in a given archaeological setting

Aurignacian: the earliest cultural tradition of Modern humans in Europe, named after Aurignac, a site found in the French Pyrenees. Usually dated back to 40,000 BP. It was characterized by the emergence of retouched blades, bone points, spears with exchangeable points and in art by single impressive figures such as powerful animals.

Australopithecine: generic name for species of Australopithecus ('southern ape'), one of the earliest hominid grades found in Africa from around 4 mya up to about 1 mya. There are now believed to have been a number of species, some of which were small and light-boned (gracile) and other which were large-boned and heavy-jawed (robust).

biface: another name for handaxe; a stone artifact made by striking flakes from a core which was then usually pear- shaped, with two flat faces, a rounded base and culminating in a point. A very widely found object produced in many different local stone types over a period spanning nearly 2 million years.

bipedal locomotion/bipedalism: walking on two feet, in the case of hominids, in an upright position

blade: a stone artifact struck as a flake from a core, defined as at least twice as long as it is wide. Blades have at least one sharp edge and may form the blank for modification into another tool such as a borer, knife, engraving tool. Usually associated with the Upper Paleolithic beginning around 40,000 BP

brachiating: a method of moving through trees hanging by the arms, swinging on alternate arms, often letting go in between

Châtelperronian: transitional culture between the end of the Middle Paleolithic and the start of the Aurignacian in central and southwest France. Associated with Neanderthals, though showing signs of influence of Moderns

clade, cladistics: a group of organisms derived from a common ancestor

culture: used throughout this book to refer to a coherent set of behaviors belonging to a species, including technology, lifestyle, social structures, organization, artistic and religious activities

core: a piece of stone used as the nucleus to strike flakes or blades to be used as tools. Sometimes the core itself is shaped and used as a tool, such as a biface.

dimorphism (usually sexual dimorphism): refers to distinctions of size within a species such as male and female

ecosystem: a group of plants and animals that share a given environment, e.g., savannah, rain forest

encephalization quotient: the measure of relative brain size in relation to body mass

endemic: refers to species that are restricted to or originate in a certain region

endocast: the impression of the inside of a skull. The Tuang Child has a natural endocast which formed as the soft tissue of the brain fossilized. Usually artificial casts are made of latex to examine brain size and shape in fossil skulls.

ethology: the study of animal behavior

fauna: the animals who inhabit a given habitat or ecosystem

femur: thigh bone

flake: a piece of stone struck from a core. The flake may be used as a tool, often having a sharp edge especially when struck from a stone like flint or chert, or it may be further shaped into other tools or tool components, such as arrowheads.

flora: the plant life in a given ecosystem

foraging: gathering food and other resources in the wild

foramen magnum: the opening at the base of the skull through which the spinal chord passes. Its position is an indicator of uprightness since it shows the position of the skull in relation to the upper spinal column.

fossil: preserved remains or traces of organisms, usually in mineralized form, or as casts and impressions

gene flow: transmission of genes between populations through breeding

gene pool: all the genes of a given population at any given moment

genetic drift: genetic changes in a population due to random variation as opposed to natural selection or controlled breeding by humans

genome: the complete set of a species' genetic makeup

genotype: genetic potential of an organism, in contrast to phenotype, the actual sum of traits

genus (plural **genera**): a group of closely related species

glacial (or **ice age**): a cold, dry period with increased ice caps, usually with lowered sea levels

gracile: small, light-boned, in contrast to robust

grade: term used in classify groups of species that share certain common features

great apes: chimpanzees, gorillas and orangutans, as opposed to lesser apes such as gibbons

habitat: the natural home environment of a plant or animal

handaxe: see **biface**

heterochrony: differentiated development of an organism, as opposed to a uniform developmental pattern

hominid: informal term used to describe species considered part of the evolutionary human family. Does not include apes. The point at which a species can be considered a hominid is a matter of judgment and therefore of dispute.

Homo: classification term for the genus to which humans belong

hyoid bone: small bone between the larynx and the tongue

industry: used in this book to refer to a set of artifacts that belong to a given archaeological setting or known to be identified with a given species of hominid; synonymous with culture, or tradition when referring to stone tools.

interglacial: warmer period between cold glacials. We are at present in an interglacial.

knuckle-walking: method of walking used by apes, in which the animal stands on its hind feet and leans on its knuckles with arms stretched forward.

larynx: organ in the throat at the head of the windpipe (trachea) responsible for production of vocal sounds by controlling the flow of exhaled air. Membranes known as vocal chords vibrate. It also prevents food or fluids from passing into the trachea and lungs.

Levallois technique: method of making stone tools in which the core is pre-shaped so that flakes of a certain shape and size can subsequently be struck. Typical of Mousterian industries associated with Neanderthals. Named after site in France.

life-history: in this context, refers to the typical stages of development that an organism passes through from birth to death

lineage: the line of common descent

living floor: a level in an archaeological excavation which reveals what was once a surface at a particular time in the past, usually containing traces of habitation, debris, waste materials, bones, tools, and so forth

Lower Paleolithic (known in Africa as the Old Stone Age): cultural period beginning with the appearance of the earliest stone tools, usually referred to as Olduwan industries. Started about 2.5 mya and lasted until the Middle Stone Age around 200,000 BP.

Magdalenian: an Upper Paleolithic culture in Europe from about 17,000 to 12,000 BP, named after the rock shelter at La Madeleine, in the Dordogne, southwest France. This was typified by Ice Age art such as the paintings at Lascaux.

mandible: lower jaw

Mesolithic: archaeological period following the end of the last Ice Age about 12,000–11,000 BP and lasting until the Neolithic about 10,000 BP characterized by great diversity of hunter-gatherer life styles and use of very small blades called microliths

microlith: a small stone tool, usually less than 3cm in length. Often used in composite tools, such as arrow heads, barbs on harpoons, blades in sickles

Middle Paleolithic (in Africa known as Middle Stone Age): period lasting from about 200,000 BP with the first appearance of predominantly flake tool industries up until about 40,000 BP

mitochondrial DNA (**mtDNA**): Mitochondria are small parts of cells that were once autonomous microorganisms but have symbiotically become merged with host cells. They provide energetic metabolism for the cell and contain their own genetic substance. Their significance here is that at conception only the mitochondria in the female ovum are retained when sperm and ovum merge. When DNA analysis is carried out to map genetic distance mtDNA is used because it reflects only the maternal line of ancestry, rather the continuous merging of generations of male and female, as is the case in the nuclear DNA contained within normal cells. This method of genetic measurement lead to the proposal of the theoretical original human mother, the famous mtDNA Eve. This genetic evidence has supported the theory which sees a single origin for Modern humanity, as opposed to the multi-regional origin theory.

Moderns: informal term referring to Homo sapiens sapiens, the species to which all living humans belong. The Moderns emerged as anatomically distinct about 130,000 BP in southeastern Africa and culturally about 40,000 BP.

morphology: the shape of an organism

Mousterian: a European flake stone tool culture associated with the Middle Paleolithic, from about 200,000 to 40,000 BP

multi-regional theory of human origins: proposes that Modern humans evolved locally in regional populations. Due to gene flow between populations humans have remained globally a single species. This theory is supported at present by a minority of researchers, though is stronger among Chinese and Australian workers. The strongest evidence for continuity comes from the fossil record of those geographical regions.

Neanderthal: informal name for **Homo neanderthalensis** a hominid species who lived from about 250,000 BP up until about 27,000 years ago in Eurasia (between the Atlantic coast and Uzbekistan). They were a stockily built, large-brained people who were particularly well-adapted to a cold climate. Most anthropologists do not see Neanderthals as directly ancestral to Modern people.

neonate: newborn animal

neotony: the retention of juvenile characteristics into adulthood

Olduwan: the oldest stone tool culture consisting mainly of pebble (cobbles would be a better term) tools from which flakes were struck and the cores used as cutting or chopping tools. Also included retouched flakes, e.g., scrapers and rounded hammerstones with anvils. Oldest sites are around 2.5–6 million years old, in East Africa and Ethiopia.

Out-of-Africa model: theory that all Modern humans derived from populations originating in Africa and migrating from there around the world. There were two major migrations, one around 1 million years ago involving Homo erectus or Homo ergaster hominids and one about 100,000 years ago involving Modern humans.

ontogeny: the developmental history of an individual organism

paleoanthropology: the multi-disciplinary study of human evolution

Paleolithic (**Old Stone Age**): earliest and longest period of human cultural development, beginning with the oldest recognized stone tools around 2.6 mya, ending with the Mesolithic around 12,000 BP. Subdivided into Middle and Upper Paleolithic periods. Throughout this period agriculture was unknown.

phenotype (**phenotypic**): the actual observable characteristics of an organism (see **genotype**, the totality of genetic potential of an organism)

phoneme: unit of spoken sound; words are made up of discrete phonemes.

phylogeny: evolutionary history of a species

plasticity: the degree of flexibility of an organism to adapt to the environment

postcranium/postcranial: skeleton excluding the cranium or skull

postglacial: in archaeology refers to the period following the last Ice Age around 10,000 years ago.

prehistory: refers to human cultural periods before the invention of written records

primates: order of placental mammals that includes monkeys, lemurs, apes and humans

primitive character: a trait present in the common ancestor of a group of related species, in contrast to a derived character

radiocarbon dating: radiometric dating method involving the measurement of the decay of the isotope carbon 14 which living organisms take in through respiration. It can date organic materials up to 40,000 years old with some degree of accuracy.

radiometric dating: absolute dating methods based on measuring the rate of radioactive decay of various materials such as potassium-argon or radiocarbon

retouching: flaking of a larger stone flake previously struck from a core, usually to create a specific shape or sharper edge

robust: heavy-boned, large-jawed, in contrast to gracile. Usually used to distinguish species of australopithecines

sexual dimorphism: differential sizes among sexes of a species

sociobiology: an evolutionary approach to explaining behavior through selection of traits that increase chances of reproductive success. More recently, replaced by evolutionary psychology, medicine, and so forth

Solutrean: a major Upper Paleolithic cultural period in Europe, extending from around 23,000 to 18,000 BP, named after site of Solutré, near Mâcon (Saône-et-Loire), in eastern France.

speciation: the evolution of new species through the splitting of existing species, creating greater diversity

taphonomy: the study of the processes of disintegration and scattering or fossilization of carcasses after death, important in the analysis and evaluation of archaeological sites

taxonomy (**taxon-**singular**, taxa-**plural): classification of organisms according to their evolutionary relationships

terrestrial: living primarily on the ground

Upper Paleolithic: cultural period beginning about 40,000 BP coinciding with the rapid increase in cultural and technological complexity sometimes known as the Human Revolution: appearance of art, new advanced tools, evidence of higher levels of social organization, rapid colonization of new territories. Key determining factor probably the emergence of full human language abilities.

Bibliography

Further Reading

The literature related to human evolution is vast. The following books are either among the more accessible or, in my view, essential reading. I have restricted the reading list to books in the English language. I have quoted from widely from books in German and these are referenced in the notes. Finally, I have grouped them according to broad themes.

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Some Useful Websites
(There are many if one simply searches for topics related to human evolution.)

www.nature.com/nsu
part of *Nature,* the science journal, a science update bulletin

www.sciencedaily.com
publishes updates on recent discoveries

www.modernhumanorigins.com
a very useful site providing information about all the main fossil species, with good illustrations

www.sciam.com
Scientific American

www.nature.com
Nature, the science journal, a science update bulletin

www.bbc.co.uk/science
The BBC has an excellent science site with a section on human origins

www.nationalgeographic.com
has a comprehensive human origins site called Outpost in search of human origins

www.leakeyfoundation.org
a nonprofit foundation to promote public knowledge of human origins

www.ucl.ac.uk/archaeology/
Institute of Archaeology, University College, London

www.amnh.org
American Museum of Natural History

www.nhm.ac.uk
Natural History Museum, London

www.ucmp.berkeley.edu
University of California Museum of Paleontology, Berkeley

As a Waldorf teacher Martyn recognizes the need for continuous inner renewal. This is not just a matter of keeping up with developments in one's subject, important and challenging though that is. Over the years in the classroom he has come to recognize that not only do the students change—they have new interests and abilities, changing thresholds of engagement and motivation—but the cultural climate changes. It is imperative for teachers to keep a finger on the pulse of such changes. For Martyn the teaching is a source of questions which stimulate his own research. Research is often done far from the classroom, which is why it takes so long for its outcomes to influence what goes on in the classroom. He believes the feedback cycle between classroom and research can be a much more dynamic flow. The kind of research that has gone into this present work has stimulated his teaching enormously, and he sincerely hopes the reader will find it equally stimulating.

Born in Glasgow, Scotland, Martyn was a cofounder and class teacher at the York Steiner School. He then joined the Michael Hall School in Forest Row, England, as a high school teacher. As part of the Steering Group of the Waldorf School Fellowship, he was instrumental in curriculum development, editing, and writing. His books include: *Towards Creative Teaching* (with Dr. B. Masters) SSF Publications 1996; *Waldorf Education* (with C. Clouder) Floris Books 1998; *The Educational Tasks and Content of the Steiner Waldorf Curriculum* (with T. Richter) SSF Publications 2000; *Ready to Learn, from Birth to School Readiness* (with M. Rose) Hawthorn Press 2002; *Free Your Child's True Potential*, Hodder & Stoughton 2001; *Language and Learning* (with P. Lutzker) SSF publications 2002; *Quality Development in Education* (with J. Swann) third edition 2002, SSF Publications; *Assessment and Learning* (with T. Mepham) second edition 2001; and *Work and Learning in the 21st Century* (with T. Stoeckli and Dr. M. Brater) IPF Publications 2002. He is a member of the leadership group of the Pedagogical Section in Dornach.

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