

When Healing Becomes Educating

Selected Articles from the
Journal of Anthroposophical Medicine
(1986-1998)

Volume I:

Archetypal Themes in
Anthroposophical Medicine

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IN ANTHROPOSOPHICAL
MEDICINE**



Published by:

The Research Institute for Waldorf Education
PO Box 307, Wilton, NH 03086

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Volume 1: Archetypal Themes in Anthroposophical Medicine

ISBN # 978-1-936367-33-7

Editor: Douglas Gerwin

Layout: Ann Erwin

Articles originally published in the

Journal for Anthroposophical Medicine

c/o Anthroposophical Society in America

1923 Geddes Avenue

Ann Arbor, MI 48104

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Physicians' Association for Anthroposophic Medicine

4801 Yellowwood Avenue

Baltimore, MD 21209

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An Introduction to Anthroposophical Medicine*

RUDOLF STEINER

The following essay on a new medical method was written by Rudolf Steiner in 1923 for the then director of the Weleda, Mr. van Leer. Van Leer was on his way to America to promote the Weleda preparations. He asked Rudolf Steiner for some suitable material and received the following essay handwritten. We see from its content how he envisaged the basis for such promotion. Upon closer study the seeds for the subsequent book Fundamentals of Therapy, written by Rudolf Steiner and Ita Wegman, are revealed in concentrated thought sequences.

- M. Kirchner-Bockholt, MD

I. What are the intentions of our new medical method?

The new medical method here imparted to the world distinguishes itself from the old one through a different understanding of man. With the old method, based on the natural-scientific conceptions of the modern age, we gain knowledge of man by dissecting the physical organization and building it up again in thought.

But man is not merely a physical organization. He is also a supra-physical one. The latter reveals itself in the experiences and activities of his soul and spirit. As the physical organization is the basis of the organization of soul and spirit, so the soul and spirit, in turn, fashion and vitalize the physical organization. Without insight into this interrelationship, we cannot attain a real comprehension of the healthy or the ill human organism.

Therefore, this new medical method adds to the knowledge of the physical nature of man that of the supra-physical. The essential nature of the method consists in the fact that it attains the insight that spiritual processes—developing in the human organism in relative separation from the physical ones—present the true nature of man, but become at once detrimental if they enter into a wrong connection with the physical processes of the human organism.

*Translated by L. Monges from Rundbrief Nr. 1, Medical Section, Goetheanum, Dornach, Switzerland..

The physical organization of man, in the course of his growth and development, arrives at a state that makes it capable of bearing the soul and spirit. It must not, however, enter into a connection with these soul and spirit elements which exceed a certain measure. If this happens, man becomes ill.

That man is subject to illness is attributable to the fact that he is a being of spirit and soul. Only through observation of the spiritual in the physical do we attain knowledge of the nature of illness. In the physical organization abnormal processes are recognized only as changes that are subject to natural laws in the same way normal processes are. (That is, both normal and abnormal processes are natural processes. Ed.) We recognize abnormal processes in their particular nature as processes of illness only if we can pass over from the observation of the physical to the supra-physical. It may sound paradoxical, but a human being becomes ill if something in his physical organization develops too strongly toward the spiritual.

Only out of such a knowledge of illness can real therapy arise. All extra-human substances and processes are in a distinct relationship to man. If one introduces such an extra-human substance or an extra-human process into man, then that which acts physically outside of man acts supra-physically within man. This is in contrast to the fact that everything acting physically within man acts supra-physically outside of him.

On the basis of a real knowledge of man's relationship to the outer world, one can always find a substance or a process in the extra-human world that transforms a wrong relationship of the supra-physical and physical within man into a right relationship. But such a knowledge can be attained only through insight into the supra-physical aspects of man.

Therapy without a knowledge of the supra-physical in human nature is not true therapy. This is the reason for the unsatisfactory character of customary medical practices which want to base everything upon the physical human being.

Physical science is beneficial only as the basis of lifeless technology; therapy needs a science aiming for the spiritual. The medical method recommended here provides such a science. Its essential nature lies in the fact that it offers remedies that are based on a physical *and* a spiritual knowledge of man. And only through the latter is it possible to recognize the curative forces of substances and processes.

By testing these remedies, one will become aware of how the ill human organism changes under their influence, and thereby one will gain faith in them.

II. Pathology and Therapy According to the New (Anthroposophical) Method

The Nature of the New Remedies

Processes in the human organism are not the same as those in extra-human nature.* We cannot, therefore, learn to know them in the same way we learn to know the latter. Only when the human being becomes a corpse do the processes take place in him that can be known through sense observation and the intellectual operations based on it. As long as man lives, senses, and thinks, he continually wrests his organism from mere nature processes. Processes take place in him that cannot be comprehended by knowledge of external nature.

To consider knowledge of external nature as the only possible means of cognition is equivalent to renouncing insight into man's essential being.

This knowledge of external nature may be contrasted to another one. It is based upon spiritual perception, which needs to be developed in the human soul. The capacities for this perception are slumbering in everyday human nature in the same way that the soul forces appearing in later life are slumbering in the young child.

A first faculty that may be developed is the capacity of thinking and the force of memory. Thinking and memory may, purely spiritually, be enhanced through exercise, as muscular strength can be enhanced through exercise. This enhancement may be achieved by inwardly concentrating, again and again, upon very clear thoughts. In so doing, one imparts strength to thinking itself out of the depths of the human being. One must, however, direct all attention to the inner thought faculty itself. One must have thoughts not in order to picture a thing or process of the external world, but in order to live in a thought with all one's inner strength. One then experiences that thought allows a force to stream into itself from one's inner nature. Previously, thought permitted this force to sink down into the depths of the subconscious in order to contain nothing in itself, and thereby to be able to receive the impressions of outer nature into itself.

This submerged force can be rediscovered in inner experience. Thinking becomes something that fills man like the muscular force. One senses a second human being within oneself.

Once one has inwardly experienced this "second man," one has also experienced a "second world" within the entire world. Let us here call it the *etheric world*.

*Here we shall speak only of man. To be sure, one can learn much about the human organism by observing the animal organism. To begin with, however, here we shall not take such observations into consideration.

Man stands within this etheric world with his etheric organization as he stands with his physical organization within the physical world. The etheric, however, has laws entirely different from those of the physical world.

The substances that man takes in by way of nutrition are on the path to passing over into purely physical nature. They may be, from the outset purely physical substances such as, for instance, table salt. But also what man consumes from the plant or animal kingdom is on the way to becoming purely physical. As a matter of fact, it is subjected to purely physical processes by dissolving, cooking, and so forth. This purely physical element must then, in man, enter on the path to revitalization. This happens as it is taken up into the working of the etheric organization.

In the etheric organization purely physical effects cease. Growth, nutrition, and so on, are supra-physical processes, taken care of by the etheric organization.

If the etheric part of the organism is strong enough to carry out the transformation of the physical forces to a sufficient degree, then it is healthy. If the etheric organization is too weak, the organism becomes ill. It then contains substances and processes that are appropriate to extra-human nature, but within the physical organism they represent a foreign element. The study of pathology consists in the recognition of these foreign elements in man.

If the organism is unable to bring about, through itself, the transformation described, it must be supported through external means. An example will demonstrate how this can work. Let us suppose that the etheric organization is too weak to give to certain substances the constitution they must have in order to incorporate themselves into bone formation in a way that enables the bones to stand in a right relationship to the entire life process. The bones then withdraw too strongly into their own being. They withdraw their life from the organism. If this is correctly observed and if one introduces lead in very small amounts into the organism, the effect will be that the forces of the etheric organism are strengthened in the very direction in which they were deficient.

The therapeutic aspect of medicine consists in the knowledge of the extent to which the foreign element in man can be overcome, so that the transformation of the physical can take place in the proper way. One does not yet know man completely, however, if one has grasped only the etheric organization besides the physical one.

Beyond thinking, we can develop other soul forces for spiritual perception. If one has experienced strengthened thinking leading to the ether world, one may then suppress it by the inner force of the soul. In

normal life, such an inner happening will produce sleep. But through exercise one may succeed in preventing the soul from falling asleep when it suppresses strengthened thinking. Consciousness then persists despite the cessation of impressions from the outer world. To this consciousness a real spiritual world reveals itself. Perception of a spiritual world is added to that of the ordinary world. In this spiritual world one recognizes a third human organization, a “third human being,” as it were. We call this the *astral organization*.

In conscious or semiconscious life, the sensations emanating from the organs, the dim feeling of life, the indefinite sense of the organism in general, proceed from this astral organization. Hunger and thirst, the feelings of satisfaction, fatigue, and so forth, also proceed from this astral organization.

Furthermore, one recognizes not only that this astral organism is the bearer of these conscious or semiconscious conditions, but also that this is only *one side* of its activity, namely, that which is inclined toward the consciousness of the soul. The other side reaches down into the subconscious organic processes. The same astral body that, for instance, makes man conscious of fatigue, lives in the organs producing fatigue.

Now, however, the proper relationship must be established between these two sides of astral activity. This can occur only if the etheric organization places itself properly between the activity of the astral and that of the physical organization. If the etheric organization is too weak, then it is incapable of keeping the astral sufficiently away from the physical; the astral then interferes too strongly with the physical.

For normal human life it is necessary that the astral be kept forcefully enough away from the physical and that it act only as a soul element. For if the soul element joins with the physical too strongly, then processes in the physical will approximate the extra-human processes. The human organs themselves will become foreign bodies that will then act like something foreign that penetrates into man and cannot be transformed by the weak etheric organization.

Man owes to the astral organization the lower part of his soul capacities; however, he is also exposed to illnesses through it because, in certain cases, this organization is not separated strongly enough from the physical organization and thereby, in a wrong way, implants something foreign into the physical organization.

One has to know the extra-human substance or the extra-human process that drives the astral out of the physical. This substance or process constitutes a remedy.

Accordingly, all healing rests upon the ability to see into the connections of the physical and the supra-physical in the human organization and, if these connections take on an abnormal character, to find in extra-human nature the means to counteract the abnormal.

There is a polar contrast between the purely physical and the etherically oriented processes in the organism, and those processes upon which consciousness depends. The stronger the former, the more the latter have to retreat. The physical-organic element, through its own forces and laws, suppresses consciousness.

The bodily processes that underlie consciousness cannot continue to be active in their way and according to their laws if consciousness is to arise. They must be held back, somewhat paralyzed in themselves, indeed, their intrinsic character must be destroyed. What in spiritual terms is known as astral organization paralyzes the etheric organization. In order to shape the indefinite semiconscious and subconscious experiences, the life processes dependent upon the etheric organization must be subdued.

These elements still do not encompass the whole human organization. Spiritual perception that takes hold of the astral organization can proceed further. Then a fourth organization, a “fourth man”—the *ego-organization*—arises before spiritual vision. This ego-organization acts for the physical organization in the same way that the astral acts against the organization dependent upon the ether-organism.

In man, physical substance must continuously take on a living shape. Thus springs forth the activity of the physical and etheric organisms. The etheric carries on its processes by dissolving in the fluid element that which wants to take on solid forms.

The astral organization paralyzes the life-producing activity. This takes place by transformation of the fluidic into the aeriform. An example of this activity is the breathing process. It carries the living fluid of the organism over into the inhaled air and thereby subdues it to such a degree that it may become the bearer of the semiconscious or subconscious soul processes.

The ego-organization participates in these processes. But it carries everything that happens here still further. It immerses all the processes taking place in the solid, fluid and aeriform states into the differentiations of warmth in the organism. In the warmth processes taking place in diverse ways in the organism, the ego-organization is constantly transforming all the substances and all the processes of the organism in such a way that the organism can become the carrier of a soul life conscious of itself. If the force bringing about this transformation becomes too strong or too weak, illness occurs. It is then a question of recognizing through diagnosis how

and where the action of the ego-organization is deficient. For example, the deficiency may lie in a general weakness of the ego-organization, preventing it from providing sufficient warmth to the body. Or it may lie in the fact that one organ system, at the expense of another, receives too much or too little influence from the ego-organization, and so forth.

In all these cases it is possible to bring the ego-organization to its proper activity. If one is familiar with the annihilating processes in extra-human nature, one can always find a substance or a process that, introduced into the body, can aid the ego-organization. One may, for example, establish through diagnosis that a certain organ is provided with too little warmth. One can then introduce into the organism a substance that will act upon this organ. This substance delivers oxygen because it has previously been subjected to a process that gives it this capacity. Thereby the damage may be balanced out.

A truly rational therapy is founded on a knowledge of the supra-physical in human nature.

In this way one arrives at an exact insight into the working of remedies in the entire human organism. Such medical thinking overcomes mere experimenting with remedies. The remedies that are recommended by the pharmaceutical laboratory at the Goetheanum came into existence in this way. They are the result of a rationally exact medical mode of thinking. Some remedies resemble those that are already in use. In this case, the new mode of thinking provides the necessary insight into the reason for the remedy's effectiveness. But most of the remedies are new, because their health-giving effects derive from the new medical knowledge of the being of man described here.

The Members of Being in Man and Nature*

WILHELM PELIKAN

The Fourfold Kingdoms of Nature/Man and Plant

Surrounded by three kingdoms of nature, man himself represents a fourth kind of being on earth. Very close connections exist between him and the other three kingdoms of nature. The kingdom of unenlivened being, most perfectly expressed in the minerals, is as much part of man's being as is the world of formative forces of life—which finds its purest expression in the plant. The possession of soul man shares with the animal. He is man in the full sense of the word because he is able to comprehend himself as spirit. The world *is* in the mineral; it *lives* in the plant; it *experiences* in the animal; in man it comprehends itself, and in this sense man is the “core of nature.”

The science of chemistry uses analysis to break down substances into their elements, showing that water, for example, seemingly a uniform substance, may be separated into two primary components, hydrogen and oxygen. In the same way, a sublime “universal alchemy” reveals to us that plant and animal, and also man, are composite beings; in a process of “universal analysis” it lays bare before us the various “ingredients” of plants, animals and man, aspects which in the previous chapters¹ have only been established by a process of thought: the different members of being.

One process of “universal alchemy” in which the members of being are revealed to us is the process of dying. Plant, animal and man are subject to it. First of all, this process leaves behind the *corpses* of these three beings. But the corpses produced by death immediately begin to change—all three of them—and this change has a definite final goal. They gradually become part of the fourth, unenlivened, mineral kingdom. The corpse may be perceived by the senses. The second result of the process of separation, *life*, escapes; that is, it withdraws from the sphere of sensory perception—where it could be seen, if not directly, at least in its effects—and returns to the supersensible sphere.

*Translation by R.E.K. Meuss, reprinted by kind permission from the October 1970, *British Homeopathic Journal*.

As the “result of analysis,” death demonstrates that all bodily substance of plant, animal and man consists of dead mineral on the one hand, and of life on the other. As long as a being is alive, the dead mineral element cannot reveal its own inherent nature. It is in the service of higher forms of existence. But when death has reduced the skeletal system of an animal, say, or of a human being to a skeleton, then this structure, consisting of mineral substance (phosphate and carbonate of calcium), will for a time retain the animal or human form that has been impressed upon it, but only *externally*. It immediately becomes subject to the formative forces of its mineral constituents (the calcium salts just mentioned), and after some time it is possible to show that such a bone now only appears to have that form. The crystalline structure of calcite, of calcium phosphate, develops, penetrating the apparent form and becoming the *true* form of the fossilized bone.

The second part of the living being, life, can no longer be followed up by the senses once the analysis of death has liberated it—but it may be perceived with the aid of life organs. These do not function of their own accord as the sense organs do. Certain functions of life must first be developed into life-perceiving organs. It is something that must be actively done by the human being, for unlike the other kingdoms of nature, he is no finished being, with his development fully predetermined, but develops according to inner, self-determined impulses. Every human being is given the possibility for this in so far as he does not need the whole of his life-organization for the development and maintenance of the processes of life. Certain organic systems submit to a partial death, damping down their vitality—for instance the sense organs, nervous organs and brain. This means that part of the life-formative forces organization, or the etheric body, as we shall call it in brief, is liberated to some extent and may now be made use of by a higher level of existence, for instance the spiritual form of life, the ego. In that form the etheric body becomes the foundation of thinking, for example. We think with the same forces which we also grow with—Rudolf Steiner has often described this.

The analysis of death therefore divides all things in nature into two groups: the mineral kingdom which has only the one member of being, i.e., physical existence, and the kingdoms of plant, animal and man which also possess etheric bodies.

These last three kingdoms are subject to another “universal alchemistic process of analysis” which separates them out further, the process of sleep and waking. The animal and man may be subjected to it, but not the plant, for this is always asleep and cannot undergo change through a process

of going to sleep, just as the mineral cannot be changed by a process of death. The animal and man can go to sleep, changing to a plant-like form of existence in so far as they remain enlivened beings. They can waken from this state, rising above the level of plant-being. This reveals a further member of being in them, one that the plant does not possess. For reasons to be discussed later we shall call this the “astral body.” Rudolf Steiner, whose fundamental teachings we are following in this, also called it the soul-body. This is the awakener of a body which in sleep is given over merely to the vital processes; it is the bearer of consciousness. By nature it is “supersensible”; the sense organs can only perceive its manifestations in the physical bodily sphere—just as in the case of the etheric body. Its external manifestations are the two processes of going to sleep and waking. As we are able not only to experience, but also to observe these processes, it is obvious that in principle “soul-perceiving organs” are possible. We may direct the process of going to sleep and of waking to our own soul develop “sense organs of the soul”—the world of the soul may make the same impression on these as the physical world does on the physical sense organs. It then becomes obvious that the physical tools of the sense must also be penetrated by the astral body if they are to experience in full awareness the sense impressions arising in them, as experiences of the soul. A sleeping ear—the ear of an animal or human being who is asleep—is no ear. Having no astral body, plants also have no sense organs in the true sense. When, according to the strict laws of development operating here, soul-perceiving organs have been formed, then the astral body—which on going to sleep separates from the physical and etheric bodies (these remain one whole throughout life), disappearing into the supersensible sphere—becomes visible to itself; with this, a soul world becomes visible, and the astral body is connected with this just as the physical body is linked with a physical world.

There is a further process that will also separate the animal and human kingdoms for us, revealing yet another member of being which belongs to man alone. This is the process of forgetting and remembering. The latter requires not only a member of being which can experience consciousness, but one that bears consciousness of self, and hence also a self, an ego. The faculty of remembering leads to awareness of the progression of life, to biography. Through it, I have the experience that I am a human being and not only this, but one particular individual human being. If I am wholly subject to forgetting, I still remain a being with feeling and therefore consciousness, but I am no longer human in the full sense. To have to admit to oneself: I have forgotten myself (in this or that), always means: I have fallen back from the level of humanity to that of the animal. Only in

remembering oneself does one experience the continuity of self-awareness and hence the self as such. This element, spiritually developing, spiritually enduring, spiritually observing itself, is not just a mere member of being, but at the same time also the very center of being. And only a being like this is capable of such human activities as thinking and willing.

Through the power of remembrance and of thinking—something only a being with memory is capable of—such a “center of being” may rise to a point that is god-like (plants cannot do this). Goethe has expressed this in the following words: “As soon as man perceives the objects around him, he regards them in relation to himself; and rightly so, for his whole fate depends on whether they please or displease him, attract or repel, serve or harm him. This quite natural way of looking at objects and evaluating them appears to be as easy as it is necessary, and yet man is subject to a thousand errors which often shame him and make life bitter for him. A far more onerous task is taken on by those whose active thirst for knowledge drives them to observe the objects in nature by themselves and in their relations to each other; for they soon forget the standard which helped them when as human beings they observed the objects in relation to themselves. They do not have the yardstick of like and dislike, of attraction and rejection, of usefulness and harmfulness. They are to do entirely without this; as indifferent and more or less god-like beings they are to search and examine what is, not what pleases. And so the true botanist is not to be moved by the beauty or usefulness of a plant, he is to examine its structure, its relations to the rest of the plant kingdom; and like the sun who calls them forth and shines upon them all, he is to regard them all with the same impassive eye, see them all together, and take the standard for this knowledge, the data for evaluation, not out of himself, but out of the world of the objects which he is observing.”

The god-like sphere which comes to life in man when he uses his faculty of memory is that of the spirit. By perceiving himself as a being, by being able to experience things entirely outside himself which just are there, not merely pleasing or troubling him—in that respect man is a human being and not merely animal. Spiritual comprehension of self leads to experience of the ego, developing the sense of ego which is needed to comprehend the highest member of man’s being. It is through the ego that man is man.

Just as a stone cannot be changed by any process of death, nor the plant by a process of going to sleep, so the animal cannot be changed by any process of forgetting; forgetting and remembering do not determine its existence, but they do in man.

Summary

The processes of dying, of going to sleep, and of forgetting perform an “analysis of existence” on the different forms of being on earth, demonstrating that there are different “members of being.”

It is shown that the mineral has a physical body.

The plant consists of a physical and an etheric body (life-body).

The animal possesses a physical, etheric and astral body (soul-body).

Man has a physical, etheric and astral body, and beyond this is a spiritual world which may show itself to him when he develops spiritual organs, just as the development of physical sense organs allows him to take part in the physical sensory world.

To find thyself in the infinite, thou must differentiate, and
then combine.

– Goethe, *Wolkengedicht*

Analysis should be immediately followed by synthesis, otherwise one may well hold the parts in one’s hand, but the spiritual bond is lost. After all, mineral, plant, animal and man are all in one common world, existing together and for each other, intertwined and interwoven in a thousand ways. The purpose here is to show the healing relations between plant and man, and therefore it is necessary to show up the synthetic power, the archetypal unity, that which makes the kingdoms of nature into a whole, and archetypal entity from which the individual beings in nature are derived as variations. The key must be found which opens up the mysteries of the archetypal relationship of all kingdoms of nature.

This archetypal being and archetypal motif of earthly existence is man himself. Just a brief outline shall be given of how the spheres of being below man can be seen as variations of the archetypal motif of his fourfold nature.

In the ego, man comprehends himself as a spiritual being. The ego is the impulse center from which he can unfold free creativeness. With this, he can develop spiritual powers of perception, to discover and know the spiritual not only within himself, but also all around him. Man can become a spiritual scientist. In discovering the spiritual all around him, he first of all perceives the nature of his fellow men. (The starting point for such a faculty of knowledge is the power of love, and the capacity for selflessness.) If such a person directs the spiritual senses he has developed at the animal, it becomes apparent to him that the animal, too, is not without spirituality, without a form of ego. But this form of ego is not given to the individual animal, but is part of a “group-spirit,” or “group-ego” belonging to all the

animals of a species. The group-ego does not embody itself in the body of the individual animal, and so this cannot become a true individual. The group-ego remains in the spiritual realm. In it lie the impulses, the instincts, the way of life of the group of animals concerned. To perceive this is the crowning achievement of a “study of animal nature” truly deserving of that name. The group spirit of animals does not go through life and death; the birth and death of the individual animal therefore mean something quite different to it than all these aspects of life mean to man. In the animal body, therefore, physical, etheric and astral elements are present; but not the group-ego, for that remains in the spiritual world.

For someone able to perceive spiritual entities in the way just described, the plant, too, has both soul and spirit (astral element and a form of ego). But it is even less able than the animal to house these higher members of being in its body; they remain worlds away from it, unborn, in the spiritual realm. But contacts and impulses are constantly passing to and from between the physical-etheric body of the plant and its astrality as well as the plant ego. It is impossible to gain a fully comprehensive picture of the plant in its relations with the fourfold human being unless one takes into account the fact that the plant, too, is a fourfold being. In this “relatedness to man” must be sought the causes for the plant’s actions on all four members of man’s being.

It is not the intention here to develop a study of mineral nature, but just to round out the picture it may be mentioned that to a natural science which takes into account the spiritual aspect, the mineral, too, has connection with etheric processes, astral actions, and a spiritual element. But in the physical world we have only the physical body of the mineral. The three higher members of its being remain, eternally unborn, worlds away from it, in the spiritual realm. But in the fourfold nature of the mineral lies also the reason why it has such manifold relations to the fourfold being of man. Out of this, one can understand why it is possible to influence the total constitution of man with mineral remedies, and not only its mineral aspects, or those directly related to the mineral.

From what has been given, the following aphorism, daring but nevertheless justified, may be permitted: The whole earthly world is man. It is built up in a fourfold way, according to the basic pattern and archetypal motif of man. And it is thanks to this structure that the different earthly beings are able to exist together in one, common earthly world: at the same time with, on, in and through each other. The harmony of creation lies in this fourfoldness. From such a point of view, as ancient Greek wisdom has also expressed it: Man is the measure of all things on earth.

The Four Members of Man and the Four States of Being Embodying Them

The mineral, its body being dead physical substance, finds the best expression of its nature in the solid state. The crystalline form, definite and characteristic for every type of mineral, can only exist in its richly structured form because of the properties of the solid state. A change to the fluid or gaseous state will at once cancel this form. The solid state alone makes it possible for the mineral to have this form, fixed in three spatial dimensions, laid down once and for all.

The plant, however, needs a further state of being for its embodiment: the fluid. It has to embody not only a physical, but also an etheric entity. Its forms do not arise from the physical nature of the substances it consists of, but from the etheric nature of the plant. Because of this, it does not express its being in permanent form, but in a constant metamorphosis of form—as described in the first chapter. This flowing change of form with its laws of metamorphosis needs a state of being which is just as ready to take up form as to give it up at once and without resistance, if the life principle (the etheric body) should demand it. This requirement is met by water, fluid water, the main component of the plant body. Those parts of the plant which are solid only serve to give contour to the liquid, to hold up the formative flow for a time, to hold a shape for a short period, to emphasize it; but the solid element in the plant does not produce any form of its own, it merely becomes the vessel of the life-form and of the life-formative forces. Where the plant grows too hard it has previously used a process of devitalization, has withdrawn life and at the same time water from its bodily substance, or brought them to a standstill—for instance in the formation of wood and bark, but also in the development of seeds. Man and animal also need the fluid element, in so far as they, too, are living beings, in order to develop the activity of the etheric bodies. The more alive, the more fluid; the more dried out, solid, the more dead: This applies to all forms of life, in plant, animal, or man. This “fluidity in all that lives” is, of course, borne by the physical substance of living protein, but then this protein is a colloid containing extremely large amounts of water. Its marvellous properties, impressionable from all sides, the plastic material for that inexhaustible sculptor the etheric body, can only attain its burgeoning life in conjunction with the watery element. In every one of its physical properties, creation has intended water for life. On the other hand the plant is not yet able to form its own air and warmth organisms. It is aired through and warmed from its surroundings, with its breathing, its warmth determined and regulated by an external, cosmic process.

Making the gaseous, the airy element part of oneself in an inner breathing organization is something that is only possible—step by step, and more and more so, from the lower to the higher—to the animal, and fully so only to man. The process has many aspects. The most important one is that together with the airy element the soul-like, the astral body, enters into the body. This gives rise to a world of internal organs, an organic cosmos, which from the inside takes over actions which the external cosmos performs for the plant. Together with the air, an external cosmos is incorporated and interiorized. With the pneumatization of the body, right into its finest ramifications, *pneuma*, the soul principle, enters into the bodies. The airy now enters into the fluid, dissolving in it, combining with and separating from it; at the same time, however, the actions of etheric and astral body combine and separate rhythmically. Lower marine animals with their dulled soul-life breathe the air dissolved in water. Correspondingly the etheric then has greater influence than the astral. Insects must send their body fluid outwards to meet the air; here the astral is still to a high degree in contact with the outside world, not yet “tied off” in the individual animal as much as it is in the higher animals. Because of this, the insects are still living in a very close relationship with the etherically determined plant world. The development of true lung organs means an important step forward towards interiorization of the soul.

In the gaseous state of physical substance, the supersensible soul principle finds the form and properties which enable it to enter the physical body. The gas has given up any formative will of its own, it resists all limitation. The force of earth gravity has been overcome in it, *levity* has replaced it. Infinitely open to light, responding to every warmth impulse by expanding strongly, fully open to cosmic impulses, and placed as an outer mantle (in the atmosphere) between earthly and cosmic existence, the gaseous is a physical state to which the physical side of earthly life adheres only in remnants, having been largely overcome. Expansion and contraction, tension and relaxation, highs and lows, storm and calm, wafting and slackening, extending and compression: These express the nature of the airy element, but also of the soul. Only in the breath of an ensouled creature does the being of air achieve full expression. Its highest form and *gestalt*, the sound of speech, is air *gestalt*, but at the same time the most perfect physical expression of the innermost soul. In the air, speech may become expression of the universal word of creation, making known that which has created the whole world.

Even more impossible than having an air organization of its own is for the plant to gain possession of the *warmth* element, as a warmth

organization, an autonomous warmth-being. The plant-being finds for itself this or that condition of warmth and climatic zone, it exposes itself to stronger or weaker warmth-impulses. But the center of the warmth-impulse always remains sun-like for the plant, worlds away. The lower animals, too, right up to the mammals, are determined by *external* conditions of warmth and bound to certain regions of the earth by their nature, dependent on conditions arising from the relation of the earth to the cosmos. Man alone rises completely above such conditions for warmth and this enables him to live anywhere on earth, whatever the climatic conditions. Man has gained ascendance over fire *within* himself; because of this, he is the only being on earth who also rules fire externally. With the power of heat it is possible to rule over every physical state of material substance, to form and transform it at will. In conjunction with the element of warmth, the human spirit, the ego, finds the possibility to live in a material body, rising above the captivity and fetters of the forces and laws of the earthly world; for in warmth lies the power to overcome them, rule and master them. In man, this warmth is borne by the blood process. The polarity between blood pigment and leaf pigment also indicates the opposite directions in which one must look for human ego and plant spirituality, particularly also with regard to the centers of their warmth-impulses. (The blood process holds *within* itself the blood temperature of about 37°C, or 98.6°F., and holds on to it hard; the process of assimilation in the green foliage of the plant has to rely on *external* conditions of warmth, but again it is most intensive at an external temperature of about 37°C.) The highest form of warmth, however, is the warmth of enthusiasm, and this can inflame the human will.

In conclusion let us put once more in tabular form what has been said, however briefly, about the four members of being of the four spheres of earthly existence, and the states of being they use to embody themselves.

	Physical members of being, present in the sphere of the senses	State of being	Present in the spiritual, supersensible sphere
Mineral	Physical body	<i>Solid</i>	Etheric, astral, form of ego
Plant	Physical body, ethetic body	Solid, <i>fluid</i>	Astral element, form of ego
Animal	Physical body, etheric body, astral body	Solid, fluid <i>airy</i>	Group-ego
Man	Physical body, etheric body, astral body, ego	Solid, fluid, airy, <i>warmth-like</i>	

“In-Between Forms” in the Plant Kingdom

The plant has been represented from certain points of view as an in-between being between the mineral kingdom below it, and the animal kingdom above it. This made the root organization the member which grappled with the mineral, earthly sphere and overcame it, and the flower organization on the other hand the member which grappled with animal nature, and was clearly defined against it. Being chiefly determined by etheric forces, the plant being stands between the dead mineral kingdom governed by physical forces, and the ensouled animal kingdom which is determined by astral forces.

However, if one allows one's eye to wander over the whole abundance of living plant forms one will find some very strange in-between and transitional forms where plant life shows a tendency towards the mineral, taking up the earthy element more strongly than usual; but also forms where the plant combines more of an animal nature with its formative forces—mineral-plant on the one hand, animal-plant on the other.

Many of the succulents (Cactus, Euphorbia, Mesembryanthemum, Crassula species), which live on particularly dead, mineral soil, have a form showing an almost crystalline rigidity. The living, moving spiral progression of normal leaf formation has here become a rigid rib-formation. Some of these plants even look like stones. Another way in which mineral laws reach across into the life processes of plants may be seen in many salt plants, particularly those on the sea shore, such as Salicornia, Halopeplis, Salsola; here the shoots look like swollen stems of blown-out roots growing above ground which have never developed leaves. In all these forms the life processes, and with them the fluid organization, have been congested into highly vital, but little-formed and differentiated structures which seem to want to swell into spherical shape; the flowering processes are greatly delayed, forced back, even atrophied. The plant formation cannot separate from the salt and root process, remains fixed to it. In the first example it resembles the dead, solid, crystalline element, in the second the dead, fluid, drop-shaped element.

Another instance of mineral, earthly laws entering into the plant element is the formation of trees with the tendency to lignification. According to an aphorism by Rudolf Steiner, a tree trunk may be regarded as turned up earth. The tendencies to tree formation increase considerably towards the tropics.

Relations between Geographical Zones and the Major Processes of Plant Life

Just as every physical plant, and altogether the physical aspect of every living being, is based on an etheric organism, a body of formative forces, so the whole earth is surrounded by a huge sphere of formative forces. This enables the earth to be a place not only of death, but also of life. Rudolf Steiner has explored this world of formative forces in many respects, and his followers have described it in relation to the various kingdoms of nature.^{2,3,4,5} This world of formative forces makes the earth a member of the cosmos as a whole, for the formative forces are cosmic in nature. (Through the world of physical forces, every bit of earthly substance is a part of the earth.) We can only comprehend what goes on on earth if we see it all as based on an infinitely varied interplay between physical, earthly and etheric, cosmic forces.

The tropics: Here the interaction between earthly and cosmic forces is particularly close. In the tropics, the earthly element proliferates towards the cosmic; the cosmic on the other hand is drawn down into the earthly, it is made earthly.

At the poles: Here the earth withdraws into itself; the cosmic is pure and strong in its action, though not wanting very much to combine with the earthly. The earthly is just like a mirror here, taking nothing in, throwing everything back.

In the temperate zones: Here a balance has been achieved between earthly and cosmic laws.

It is obvious therefore: With regard to its organization of formative forces, the whole earth is just as threefold in structure as the plant itself. And it is due to this threefoldness that the plants of the tropics, the polar regions and the temperate zones differ so characteristically from each other. In the tropics, the boundaries of earth and cosmos are dissolved into each other; the root element proliferates upwards, giant trees develop, with wood hard as iron. The earth does not stop with the soil, and its forces rise up into the air; roots hang from branches; they find their element in that air, an indication that the air there bears within it something that is "earthly." Many other plants wind upwards like lianae. On the other hand, the cosmic sphere and the flowering process connected with it penetrate deeply. Certain plants become nothing but flowers, their other organs being atrophied, and have to grow as parasites on other plants. In others the flowers break forth from the stem, even from the root. Scent and color, otherwise properties of the flower, appear in leaf, wood, bark. The colors of flowers become strident, the flower-forms animal-like, the scents heavy and

overpowering. The number of poisonous plants increases greatly. (In the poisonous plants—and this will be discussed in more detail later—cosmic, astral spheres of being break overwhelmingly into the physis of the plant concerned, breaking through the etheric forces.) In the plants of the polar regions, on the other hand, the root element is strongly bound to the rocky soil, the plant may be said to be creeping back into the root, so that this is the largest organ of the plant. Leaves tend to be tiny, but the flower-forms are pure and large, with wonderfully dear and glowing colors. What in the temperate zones is a tree becomes a shrub here, often just a tiny, creeping growth; for instance the polar birch. But the aroma is incomparably strong and noble. (A similar contrast like that between polar and equatorial regions exists between high mountains and lowland country, and also between winter and summer.) The temperate zones again represent the balance; in them the pure plant element is least distorted. In the cycle of the year, spring and autumn correspond to them, and it is only in these regions that these two seasons develop fully.

The Evolution of the Earth and Its Earlier Forms

The four natural kingdoms on earth represent four stages of being. According to anthroposophical spiritual science these came into being through four acts of creation. Not one, but four acts of creating the world were necessary to obtain these four stages. The symphony of the world's creation may be said to have four movements. It took its origin in the decisions and creative powers of high spiritual beings. Every physical fact that is finally open to perception is preceded by a purely spiritual cause. How the evolution of the world is described by anthroposophical spiritual science may be seen from the detailed descriptions given by Rudolf Steiner and his followers. It is not possible to reproduce them here, but only to give a brief outline. A first, but very comprehensive orientation may be found in Rudolf Steiner's *Occult Science*.⁶ In it, the four stations of world creation are represented as the creation of the Old Saturn, of the Old Sun, the Old Moon, and of the Earth. The first three are preliminary to the creation of the Earth, and without them the Earth could not have evolved. As to the creatures of these four stations of creation, a different natural being was created on each: on the Old Saturn the human germ, but this only developed to the level of mineral organization. The Old Saturn was a world of warmth. The second station, the evolution of the Old Sun, which arose after the death of Old Saturn as a new impact of creation from the spiritual world, raised the human germ to the level of plant being; it now had not just a physis as on the Old Saturn, but this physis was given an etheric body; the

building material at its disposal was a physical substance condensed into an airy, gaseous state, filled with light processes.

As a second kingdom of nature, there existed on the Old Sun a “remnant” of warmth-and-mineral being which had remained at the level of the Old Saturn. The next station of creation, the Old Moon world, raised the human germ to the level of animal being. The creative sacrifice of high spiritual beings gave of their own substance of being to provide man with a soul quality, the astral principle. With this, the Moon substance condensed as far as the fluid state. As “remnants” of the earlier creations, two natural kingdoms below that of man continued to exist, a plant one and a mineral one. Then came the creation of the earth. By filling the human germ with spiritual substance from the sphere of spiritual being itself, it raised it to a spiritual being able to comprehend itself, a bearer of Ego. As remnants of the three preceding creations, the three kingdoms of nature below man have remained. Man therefore is the first-born of creation, its key-note—even though he is the last to make his appearance, as the apex of humanity. He never went through the mineral, plant and animal kingdoms existing today; these are only remnants which could not be transformed into human beings, cast-offs, one might say on the road to human development.

For continuing the studies that are the aim of this book it is necessary to study the evolution of the Old Moon which immediately preceded the evolution of the earth. The Old Moon had three natural kingdoms. From these arose the four natural kingdoms of the earth. Those three natural kingdoms of the Old Moon world were of a peculiar nature, however. They were not mineral, plant and animal in the present-day sense, but *in-between* beings which were in-between the natural kingdoms of today. In them rested the germs of development of the earth world lying ahead of them. Otherwise they would not have been capable of true development. The highest kingdom was that of an animal-man—beings higher than the animal of today, but with no ego and therefore lower than man of today. The second kingdom represented an in-between sphere between the plant and animal beings of today. Here one must speak of animal-plants and plant-animals. The lowest kingdom on the Old Moon was a mineral-plant or plant-mineral kingdom somewhere between the plant and the mineral of today. There was no dead, solid, stony mineral ground on the Old Moon. “We have to imagine the whole ground and body of the Moon consisting of this plant-mineral substance, just as the earth today consists of rocks and stones, arable soil, etc. As here and there rocks protrude from the earth today, so in the Lunar mass, harder portions also were embedded. These might be likened to forms made of hard wood or horn. Moreover, as plants today

spring from the mineral soil, so was the ground of the Moon bedecked, and also penetrated, by a second kingdom, consisting of a kind of plant-animal. Their substance was softer than the basic mass, and more mobile in itself.”⁶

Once one has come to accept the idea of this Old Moon world with its “in-between beings,” it is possible to understand how as relics of that ancient evolution the natural kingdoms of the earth have within them the tendency to develop in-between forms, though now only as abnormalities. As we are primarily concerned with the plant kingdom, this may help us to gain a better understanding of the half mineral, half plant phenomena in plant life, as well as those showing an interplay between plant and animal. In marshy regions and swamps one will see and comprehend forms reminiscent of the lowest kingdom on the Old Moon, their consistency somewhere between solid and fluid: On those soils actual animal-plants also tend to arise, like the carnivorous plants for instance. The many different parasitic and semi-parasitic plants also bear reminiscence of the Old Moon world. They are not able to grow on the earthy soil of today, but only on a living or half-living basis. On the other hand these plants often tend to animal-like processes, they hypertrophy in this direction, producing flower forms resembling animal forms. Orchids, Bromeliaceae, Rafflesiae are just a few of these. Another aspect which is illuminated through this point of view are the numerous instances of symbiosis between animals and plants. Many bonds still exist where once there was a complete life-unit. Plants today have “their” animals, animals “their” plants; at one time they were complete animal-plant beings. Only the general principle is outlined here, details will be discussed under the plant families concerned.

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Archetypes of Form in the Human Organism

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This article arose out of a fascination for the forms and gestures of eurythmy, and their relationship to various physiological and psychological processes. This sparked an interest to discover the forms and gestures within human anatomy, and then to attempt to build a bridge to the eurythmy gestures. In this article, I will limit myself to discussion of the first part; that is, the archetypal forms within the human organism.

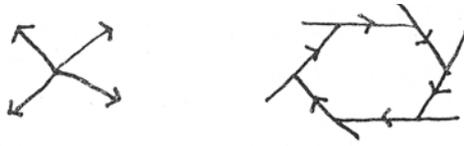
Preliminary Thoughts

If one views the body externally, there are certain simple, yet nonetheless striking observations that can be made. To begin with, we note a contrast between the head, which is more or less spherical, and the limbs, which are linear. To understand the significance of this, we must ask ourselves the question, “What are the typical qualities of a sphere, of a line?” A sphere has the quality of being complete within itself at rest, whereas a line implies directionality, or movement from one point to another.

If we then view what lies under our skin, we’re struck by the image of how the nerves from all the different parts of our body are drawn together into a single organ, the brain. The polarity to this is seen below our diaphragm, where there seems to be a separating tendency, without any obvious ordering principle, into the many different organs of our abdominal cavity. We can see how the quality of convergence appears in our nervous system, whereas separation, or divergence is present in our abdominal organs. Further light is thrown on these observations if we ask the question of how different forms arise in the body. The finished forms arise from particular shaping tendencies. From a certain viewpoint, we can say that there are two different dynamics at work in the creation of forms. These can be described as forces which radiate in a linear fashion from a central point (centrifugal) and those which come tangentially from the periphery and tend to form surfaces and spheres.*

*In *Sensitive Chaos* (Rudolf Steiner Press, 1965), Schwenk describes these dynamics in a different, but complementary manner in relation to fluids. He speaks of the tendency of fluids to form a sphere and of the effect of gravity upon fluids. When these two forces interact over time, spiral and meandering forms arise.

This can be illustrated by looking at the diagram below:



The forces radiating from a center push out and tend to separate things whereas those coming from the periphery limit and force the form inwards and back on itself.

The study of physiognomy affords numerous instances to see these shaping forces at work. The forehead has, for instance, a predominance of the peripheral, surface-forming forces, whereas the chin has a predominance of the central radiating forces. Of course, both chin and forehead demonstrate the interaction between both of these forces.

What happens when these two shaping tendencies meet in a rhythmical, repeating manner? In that situation, as seen in the diagram, rhythmically oscillating curves arise. First one is predominant, then the other.

The wonderful curves that one sees in the nose and ear arise this way. As we shall later see, the heart muscle is also formed in this manner.*



In looking at the threefold picture of the human being (nerve-sense, rhythmic, metabolic-limb systems), we can make certain preliminary statements, based on the above observations. The head has a concentrating, or converging tendency, and the predominant shaping force is the peripheral, surface-forming one. Our limbs, as a polarity, tend to divergence or expansion, and have a predominance of the raying-out forces. Our rhythmical system demonstrates the rhythmical meeting of these two, and therefore develops oscillating curves.

We will now proceed to look at these three systems in detail. Our procedure will be fundamentally the same in each situation. In this way, the similarities and differences will appear more clearly.

Nerve-Sense System

In looking at the skeleton, we notice an interesting relationship between the skeleton and the organs. In the head, the skull surrounds the primary organ, the brain, which is located inside the skull. In the limbs, the opposite relationship occurs. The chief organs, the muscles, lie outside the structure.

**Sensitive Chaos*, Schwenk.

What kind of movement tendency is there in the nerve-sense system? There is really very little actual movement, but our previous observation of the convergence tendency can help us. Our senses are always aware of our environment. This environment can be outside, as in the sense of sight, or it can be inside, where, for instance, the sense of the life processes is active. One can perceive that these sense impressions come into our brain from all directions. They not only come in, but we can have a sense that they're drawn, almost sucked in, by our brain. When we see an object, not only are we drawn to it in our vision, but in order to cognize it, we "draw" it into our consciousness, and thereby have a conscious, inward experience of it.

The nervous system is relatively symmetrical, especially when compared to the rest of our body. Nevertheless, it is questionable if we are ever completely symmetrical, or if complete symmetry is even possible for a conscious earthly being. This relative symmetry is connected with what is the dominant form gesture of the nerve-sense system; the crossing of nerves from one side, over the midline, to the other side.

These crossings, as shown in the diagrams, are not only right to left or left to right, but also inside (medial) to outside (lateral). (See Figures 1 & 2.)

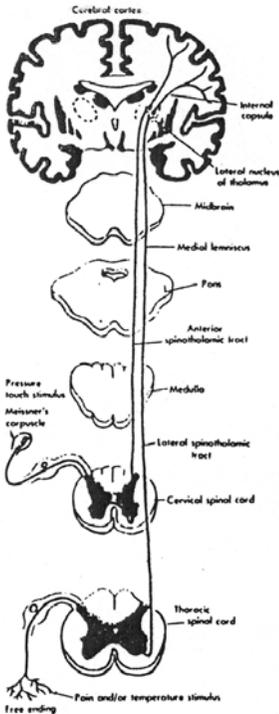


Figure 1

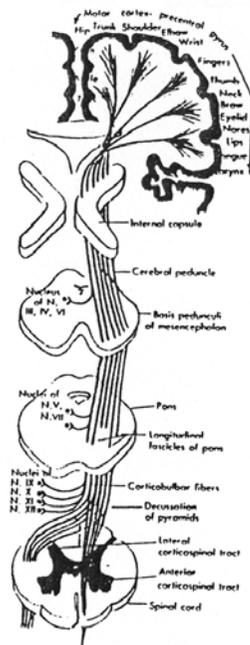


Figure 2

This is also shown by the fact that in the brain, the gray matter (cell bodies) is more lateral, whereas in the spinal cord, the situation reverses, and the white matter (axons) is more lateral.

As with all things, exceptions often help us to understand the rule, and there is an exception to this crossing over. This is seen in the reflex arc. In this singular situation, the nerves don't cross over the midline.

What is of importance about this is that the reflex arc doesn't involve any conscious mediation. The crossing over tendency must be deeply connected to consciousness.

As an additional point, we should look at the directions of front and back. Indications of their importance are seen in the spine and the brain itself. In the spinal cord, we have the anterior columns, connected with the so-called motor nerves, whereas in the posterior columns, we have sensory nerves.

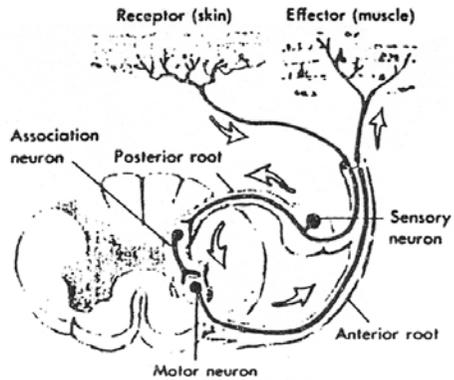


Figure 3

In our brain, the area anterior to the central gyrus is the motor cortex, while posterior is the sensory cortex. Our relationship to language shows this division as well, as our speech center is anterior, while our auditory center is posterior. Disregarding the question of whether there is such a thing as a motor nerve, one can see that the structures located posteriorly (posterior columns, sensory cortex, auditory center) have more of a pure perceiving function, while those located anteriorly (anterior columns, motor cortex, speech center) are intimately related to will and movement activities.

In summary, we can say that the nerve-sense system has a tendency to be enclosed, to converge, or be “sucked” inwards. It has strong relationships to directions in space, with crossings its most impressive gesture. The posterior has a clear sensory quality compared to the anterior, which has an intimate relationship to will and movement.

Rhythmic System

In studying “form” in our rhythmic system, we must realize that we can only understand a part of the reality. This is because the element of time begins to play an important role. Whereas the forms in the nerve-sense system are relatively fixed, our rhythmic system and metabolic limb system are always changing, in very particular ways. In our nervous system,

we function in three directions, while in our rhythmic system, time, the fourth dimension, appears.

We will follow the same sequence of observations as in the nerve-sense system. We begin with the relationship of our skeleton to the organs. We notice an alternating relationship, best seen in our ribs. First they're outside the lungs, then there's an open space, then again a rib, an open space, etc., until finally the ribs disappear, and the organs are on the outside. We see a transition between the situation in our head, where the brain is enclosed by our skull, and our limbs and abdomen, where the organs are exposed.

The quality of movement in the rhythmic system is one of alternately moving towards a center (as in the heart's contraction), and then to the periphery (as in the heart's relaxation). We should note that the dynamics of the heart and lungs in these movements are very different; in fact, almost polar. The heart has an active contraction and a passive relaxation, whereas the lungs are actively expanded and recoil passively.

The difference between the heart and lungs is understood more deeply by exploring the quality of symmetry. Though the lungs are not totally symmetrical, there is a tendency towards symmetry. The heart, on the other hand, deviates markedly from symmetry. It moves out of the midline, lies at an angle, and the left side is much more developed than the right. Here we can see that the lungs are related more closely to the nerve-sense system with its symmetry, whereas the heart tends more towards the asymmetric metabolic system, those organs below the diaphragm.

Our respiratory system begins with our nose, where we note the curves we spoke of in the first section. We then go through our pharynx, which we share with our digestive system, and come to our trachea. Here the rhythmic element shows itself in our tracheal rings. These are arranged in a regular, somewhat fixed pattern. This regular segmentation persists until we come to the terminal bronchioles. We then come to the alveoli, which surprise us by their totally unexpected shape. The form of the alveoli, as we shall see, is very reminiscent of those shapes found in our metabolic system, in our glands. Here one of the great mysteries of the lungs appears, as embryologically, the lungs develop as an outpouch from our intestine, our primitive digestive system. This mystery is revealed especially in the shape of the alveoli, which are glands (as are all of our digestive organs), secreting the substance surfactant.

If we further contrast the heart with the lungs, we note the differences in how they move. The lungs have no inherent ability to move. The muscles of the chest wall expand, and the lungs passively follow. Then the chest muscles relax, and the lungs passively recoil. The heart, in contrast, has an inherent ability to contract and relax.

The lung shows two form tendencies—one of somewhat rigid segmentation (tracheal rings) and the alveoli with a budding form. The heart shows totally different forms. These appear as spirals and vortices (see Figure 4).

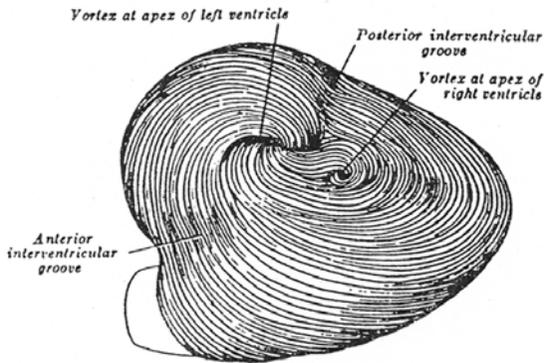


Figure 4

Can we discover any other archetypal forms in the rhythmic system? We find lemniscates (figure 8s) everywhere we look. Looking at the embryological development of the lung, we see the lemniscate appearing (see Figure 5).

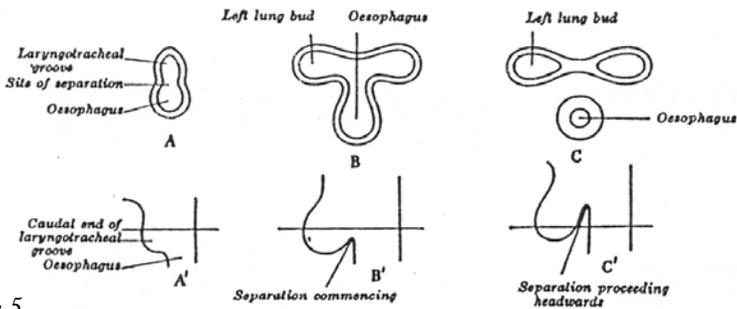


Figure 5

If we look at the spinal cord, we note lemniscate forms in the nerve patterns (see Figure 6). The muscle fibers of the heart wind around in the form of a lemniscate (see Figure 7). Lastly, if we take any circulatory circuit, between the heart and any organ, this is always the form of an irregularly shaped lemniscate.

Summing up our observations of the rhythmic system, we see a rhythmic, alternating relationship between center and periphery. Curves, especially spirals and vortices, are found. The predominant form gesture is that of the lemniscate. The lungs are more closely related to the nerve-

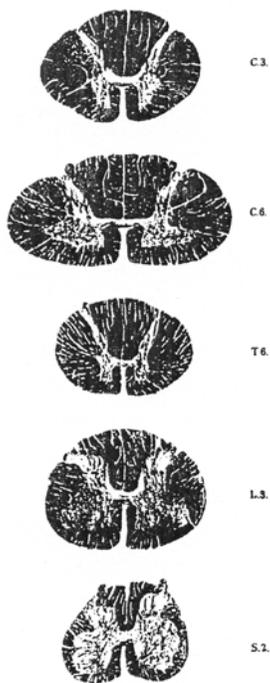


Figure 6

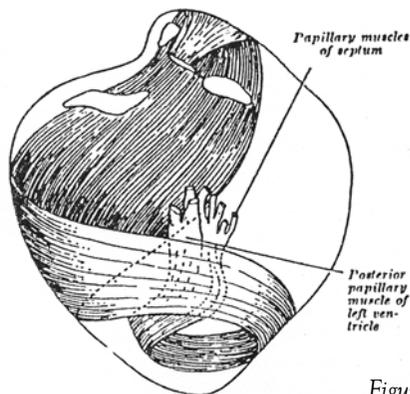


Figure 7

sense system and show their rhythmical quality in somewhat rigid structures, while the heart tends towards the metabolic side and shows its rhythmical quality in a more dynamic, flexible way. Whereas the lungs still have polar elements of the nerve-sense system (symmetry and rigidity) and the metabolic-limb system (alveolar buds), the heart has harmonized these to a far greater degree.

Metabolic-Limb System

Our nervous system deals extensively with the three dimensions of space. Time becomes an element in dealing with our rhythmic system. Our metabolic-limb system is involved with the transformation of substance, for example, the digestion and metabolism of food. In this process, the original form of the substance is broken down, and a kind of “chaos” prevails, until a new form appears. This polarity of the “chaos” of our metabolic system, in contrast to the fixed immobile structures of our nerve-sense system, points to the difficulties in understanding “form” in the metabolic system.

At first glance, one could despair at ever finding a unifying principle of form, as there is such a diversity of seemingly unrelated forms in our abdomen.

We’ll begin our observation, as before, with the skeleton. Except for the vertebral column, our abdomen is almost devoid of skeletal structures until we come to our pelvic bones, which partially enclose our reproductive organs and lower urinary tract. Here we have a sense that we must distinguish

between those organs above and below our pelvis. We will return to this point in our further discussion. Our abdominal organs, therefore, display a polarity to our nerve-sense system, in their being exposed, while the nerve-sense system was enclosed. The skeletal relationship is similar to what we found in our limbs, where our muscles are exposed.

If we proceed to the question of symmetry, we're struck by the total lack of it. The liver is on the right, the spleen on the left; the intestine is incredibly asymmetrical. Symmetry, however, begins to reassert itself when we come to the genito-urinary system. Here again, we see that the kidney and reproductive system must be considered as organs very different from those purely metabolic organs (liver, pancreas, etc.). In the rest of the discussion, when we speak of metabolic organs, we will be referring only to the latter. The form of the kidneys and reproductive organs betray, as is well known, their deep relationship to the nerve-sense system in anthroposophical medicine. (In this article we cannot go into more detail regarding this relationship of the kidneys to the nervous system. One can find a detailed discussion in Wolff-Husemann, *The Anthroposophical Approach to Medicine*, Anthroposophic Press; also in H.P. Vogel, *The Kidneys*.)

Regarding movement, we noted a "sucking inward" in our nerve system. In our rhythmic system, there was a movement to and fro between center and periphery. In our metabolic system, there is a movement, taking place slowly over long periods of time, which can be best characterized as budding, or sprouting.

We can understand this if we study the embryological development of our metabolic system. All our metabolic organs develop as outgrowths from our primitive gut, our intestine. They're actually described as buds (liver bud, spleen bud, lung bud).

All of our metabolic organs are glands. What is a gland? A gland is an amorphous structure that secretes substances. Embryologically, when these secretory cells increase in number, they separate off from the intestine, but remain connected by a long tube, called a duct (see Figures 8, 9, 10).

What is the typical form of our abdominal organs? There is none! They simply fill the space that's there. The liver has its form because the diaphragm is above, and limits it from outside. The intestine, with all its winding, is simply the best way to fit a long tube into the space available. This changes somewhat when we come to the kidney and reproductive organs which have more clearly defined structures. The surface-limiting force, mentioned in the beginning of the article, is almost absent in the metabolic organs. One finds it to a small degree in the peritoneal coverings, which, interestingly enough, are the sensitive part of our metabolic organs.

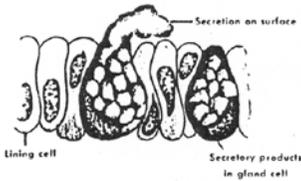


Figure 8

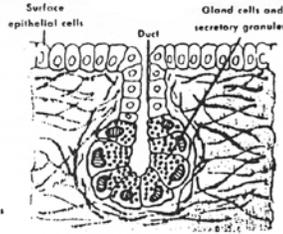


Figure 9

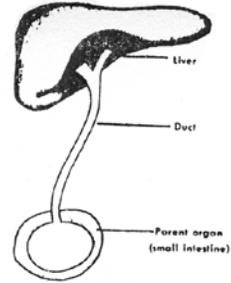


Figure 10

To summarize the observations in our metabolic system: We first note that we must distinguish the purely metabolic organs from our genito-urinary system, which has a relationship to the nerve-sense system. The skeletal relationships show an openness, similar to what we find in our limbs. The typical gesture is one of budding from a center, with minimal limiting forces except those brought from outside. There is an amorphousness, with little inherent form of its own.

In diagram form, this can be presented as follows:

	Nerve-Sense System	Rhythmic System	Metabolic-Limb System
Skeleton	Outside	Outside-Inside	Inside
Movement	Sucking inward	Movement between center and periphery	Budding outwards
Symmetry	Symmetrical	Lungs-Symmetrical Heart-Asymmetrical	Asymmetrical
Shaping Dynamic	Surface limiting, Peripheral moving inwards	Rhythmical meeting of limiting and radiating tendencies	Raying outwards
Typical Forms & Shapes	Crossing from Right-Left Inside-Outside	Lemniscate Spirals Form Segmentation	Amorphous imposed from without

Conclusions and Further Thoughts

Out of a fascination with eurythmy gestures, we pursued a study of human anatomy. A polarity was discovered between the nerve-sense and metabolic limb systems. Interestingly, simply through their form gestures, we could discover similarities between seemingly very different organs

(nervous system, lungs, kidneys). In anthroposophical medicine we know these organs are extremely important carriers of the impulses of the astral body. The mystery of the lungs' development from the primitive digestive tract is seen in the shape of the alveoli. This would suggest a further study of the lung as a metabolic organ. The appearance of the lemniscate in our rhythmic system, that part of us which is in a healthy balance, would suggest the potential uses of this form. The different methods of potentizing demonstrate this. For instance, classical succussion as used by the homeopathic pharmacists would bring about a "chaotic" situation in the potentizing medium. This might be very appropriate, since we're dealing with transformation of substance, similar to what we find in our metabolic system. The anthroposophical methods, employing a lemniscate pattern (Weleda) or vortical pattern (Wala), have more of a relationship to our rhythmic system. In certain instances (for instance for heart remedies) this might be more appropriate. As in everything, this would have to be confirmed by clinical and laboratory methods.

Another interesting area of research would be to discover where these archetypal forms appear in unusual places. For instance, in our inner ear, there are numerous spirals. This must point to a relationship of the ear to our rhythmic system. This method could help to discover unknown functions and relationships of our organs.

Lastly, the discovery of these archetypal forms could help to throw light on the eurythmy gestures, specifically regarding their relationship to man in his threefold organization.

Anthroposophy and Psychiatry

JAMES DYSON

It is a great pleasure to have been invited to an event which is, I think, embedded in the tradition of the Camphill Movement in America. I actually met the Camphill Movement originally during my first visit here in 1970 through Carlo Pietzner. Something of that encounter has lived on in me and contributed to the modest beginnings that we have made in the British Isles in anthroposophically-based residential medical care, particularly in the Park Attwood Clinic.

As Bernard said, in the Mental Health Seminar in Great Britain, we occupy ourselves with this theme for 32 days over a three-year period, and this only provides an introduction. All I can imagine achieving in this initial contribution is to alert us to some of the core issues that psychiatry is bringing forward at the present time and to do so in such a way that we recognize the challenges cannot be satisfactorily addressed without a spiritual understanding of the human being.

If we go back to the early 1920s when Steiner was beginning to develop his medical work, medicine stood at a crossroads. A few years after Steiner gave his medical lectures, insulin and vitamin B12 were discovered. Shortly after that, in the early 1930s, the sulfonamides were developed; then followed antibiotics during the Second World War, and in the 1950s there followed the main impact of psychiatric medication, which has transformed the management of a great deal of mental illness. I am referring particularly to the major tranquilizers, the anticonvulsive drugs, the antidepressants, and so on. At the time when Rudolf Steiner was speaking, manipulation of the bodily basis of much that we would now call mental functioning had not even started, yet at that time psychoanalysis had already made a beginning.

Freud's work was becoming established, and it wasn't long before the work of Carl Jung came into the foreground. Steiner had major reservations about psychoanalysis, but it is important for us to understand what these were based on. He did not, for instance, deny the validity of the concept of

*Based on the opening lecture given at a conference on Mental Health held at Triform Community, Hudson, New York, on 29 February 1996; slightly elaborated by the lecturer.

the unconscious. He stressed, however, that without an understanding of the spiritual nature of the human being, including reincarnation and karma, and without an understanding of how substances in the body really support the life of soul, any attempt to penetrate into the sphere of the so-called “unconscious” or “subconscious” would be fraught with misunderstanding. He stressed that any attempt to penetrate this realm would involve an awareness of the threshold between what belongs essentially to the soul-spiritual nature of the human being as it has evolved over many incarnations and the everyday conscious experience of the self. This corresponds to the threshold between the point-centered consciousness of our earthly, waking ego and the peripheral consciousness of our life of will. Although an awareness of the existence of an “unconscious” had surfaced during the early part of this century, its interpretation—without a basis in spiritual scientific training and understanding—was, in Steiner’s view, at best misleading and at worst dangerous. He was particularly concerned with some of the more specifically sexual interpretations which dominated Freudian methods at the beginning and which, in his view, had already created many illusory interpretations.

Steiner gave a particular insight with respect to our understanding of mental illness which redresses the one-sidedness of the psychoanalytical approach. He emphasized that one must first understand the bodily basis of the soul life before trying to interpret what comes to expression in the soul as such. Alongside this statement he suggested that, with respect to the nature of organic physical illness, one should search for its origin more in the realm of the soul and spirit.

You can see how he was both anticipating and countering a trend that was to increase in momentum during the following decades, a trend which to this day dominates current thinking as strongly as ever. I am referring to the trend to separate our understanding of the human being into a biochemical model on the one hand and a psychotherapeutic, psychoanalytic model on the other—the former without reference to the soul and spirit, the latter without reference to the actual bodily basis of consciousness. It might seem that Steiner was anticipating the biological basis of psychiatry in pointing to bodily dysfunction as underlying much mental illness. He was speaking from a very different perspective from that which has since evolved and given rise to the current “psychopharmaca.” He was challenging us to see physiological processes and substance transformations within the body as the basis or expression of the soul-spiritual element while at the same time seeing soul-spiritual processes as being accompanied on some level by physiological ones. I would say that the central challenge of the anthroposophical contribution

to psychiatry lies just in this: to bring together the realm of creative spirit with an understanding of substance and metabolism.

This is a challenge which has not yet fulfilled its potential although very encouraging and exciting beginnings have certainly been made. Behind this, there lies the deeper challenge of understanding the nature of matter or substance in its soul-spiritual aspect. This is, of course, the challenge of anthroposophical medicine. The part which belongs specifically to psychiatry is to see how the substances and processes which these substances undergo in the organs are connected to possible deviations or aberrations of consciousness, which psychiatry describes and attempts to address.

Steiner describes two streams of time. The one which we are aware of in our everyday consciousness goes from the present into the future. The other stream works in the opposite direction and comes from the future into the present. These two streams of time, the former connected more to the conscious astral body, the latter more to the etheric, meet within the human being. They meet in the realm of the ego, which is the only instrument of consciousness that can really integrate past and future, thereby bringing the destiny that we bring with us from former incarnations into the freedom-space from which new impulses may be born.

Much mental and soul confusion arises in the encounter between these two streams of time, even some forms of mental illness may arise from this. The substance-processes taking place in our organs contain within them the seeds for our future consciousness. If these seeds are released prematurely from their etheric basis in the organic life and enter consciousness too soon, they will produce delusion, deception, hallucination, fear, anxiety, mania. All possible forms of soul aberrations may come about through the tendency for the etheric forces within the organs to rush forward into the future too soon. On the other hand, when the forces working from the past bind us too strongly to our organs, then tendencies to hardening and sclerosis take hold of the body. We become locked into our earthly personalities, and therein lies the basis for the more characteristic physical illnesses. In the healthy human being, the latter processes predominate in waking life and the former during sleep. During waking life, the etheric up-building processes in our organs become subordinate to the more conscious experiences of soul life and vice versa. The two streams of time also oscillate between our waking experience and our sleeping, hence the possibility for dreams with prophetic overtones.

Most of us know that Waldorf education emphasizes the fact that the organic forces, which build the body during the first seven years and which also belong more to the state of sleep, become released to some extent at

the age of seven. In fact, they only become released from the head and nerve-sense organization, where they become available after this time for thinking and memory. The etheric substance which has formed and shaped this part of our body is the same substance through which, at a later stage of development, we are able to think. We must imagine that this is only the first of many etheric metamorphoses that may take place during the course of life. The etheric forces that release themselves for thinking belong essentially to the instrument of the brain. The brain is an organ whose development proceeds faster than any other organ; by the time we are seven, it has reached a certain completion. We call this stage neurological maturity which is witnessed, for example, in the establishment of dominance and in nerve myelination in the central nervous system through which the basic pathways of sensory integration are laid. We also know that the actual nerve cells in the brain, from before the time we are born, have been slowly dying and degenerating. In fact, degenerative processes accompany our brain and nerve sense system during the course of our life. This is the corollary of the fact that our brain and nerve-sense system form, for the most part, the basis of waking-day consciousness.

This “slow death” of the physical body in the brain is that which allows the etheric forces, which formed and sculptured it and which contributed to its organic development, to be used for conscious thinking activity. With the other organs, however, this process does not take place to the same extent. If we consider an organ which stands in a certain polarity to the brain, namely the spleen, we find an organ which hardly appears to be a physical organ at all. In contrast to the brain it lacks internal form and structure. Also, unlike the brain, it is an organ which is continually regenerating itself. If we consider the spleen, however, we have an organ which carries within itself the basis not of our self-conscious image memory but of our substance memory.

In the modern world, we call substance memory the science of immunology. In recent years, the importance of our physiological uniqueness in the form of our immunological memory has become almost general knowledge. Without it we are unable to maintain our identity against the outside world. The spleen can be removed without apparent detriment to health, although, in a child, its loss leaves some degree of compromised immunity, depending amongst other things on the age when this happens. It is an organ with a kind of peripheral sphere of activity. I am referring to the millions of smaller lymph nodes throughout the body which have a kind of satellite function in relation to the spleen itself, but which can exist independently after the foundations of immunity have been acquired.

We are dependent not only on our image memory for an earthly biography but on our substance memory too, although it is not so immediately obvious why this is the case. Animals, for example, do not have individually-based immunological specificity. Immunological identity belongs more to the species. Animals, however, do not have individual biographies. The animal's identity is "species-based," not "specimen-based." In recent years, immunology has become threatened as never before. Indeed, it is no longer something which can be taken for granted.

Without our brain, we would not know who we were when we woke up in the morning; without this, earthly consciousness would be chaotic as, indeed, it becomes in certain conditions of cerebral degeneration. If image memory is connected with the brain and substance memory with the spleen and immune system, must it not follow that our image memory is the basis of our waking-day consciousness of self and our substance memory the basis of our sleeping or unconscious self? This may be identified with our true individuality or higher-self working and weaving between incarnations.

From this perspective, it is perhaps possible to make the connection between individual human immunity and personal karma although I am aware that this may appear as a big jump to make. Our normal habits of thought would lead us to assume that metabolism proceeds in its own way and that we meet our karma from a completely different realm in a somewhat metaphysical manner. I strongly suspect, however, that this is another trick of dualistic thinking. We meet the outside world in essentially three ways: through the portal of the senses, the portal of the breath and the portal of metabolism. In all three, substance is involved: In the metabolism, the connection is very obvious; in the breath, we meet the substance of air; and through the senses, we meet light. Just as in our metabolism we first have to break down and digest what we eat before it is rebuilt, a similar process must also take place in our senses. Our entire nerve-sense organization has the characteristic that it first has to hold back sense impressions and digest them, as it were, before they can become integrated and internalized in the life of soul. The processes of sensory digestion and substance digestion are working together all the time, continually playing into one another. It is quite clear that we meet our destiny and karma from that which we encounter via our senses. What we have breathed in and digested through our senses unites itself inwardly with that stream of substance which has first been broken down in our digestive organs. In this way, individual destiny becomes imprinted within the very substance of our bodies. Can you sense how the normal boundaries of logic, which separate substance from spirit, begin to disappear? The dualistic distinction between these two realms is not

quite so clear. Ahrimanic forces have taken hold of the material realm and are continually trying to widen the gap between their realm and the realm of creative spiritual being. On the other hand, however, the substances we eat have been created by photosynthesis from the light. The substances of earth and light essentially belong together, although these two concepts have become mutually estranged.

During the time of our embryonic development and, to a lesser extent, throughout our childhood, the substance-building processes of our body are at their most creative. The child's unconscious life of will is working with those very etheric forces which will later develop into forces of consciousness. At the beginning of life, these forces are involved in the forming of the sense organs themselves, which become built and inter-connected like resonance chambers, through which what is received from the outside world can take shape within bodily substance. The etheric processes whereby this happens have been called by Steiner the life processes. The eye, with a lens and so forth, is the most obvious example of a sense organ. Mediated by the eye, an interaction takes place between that which comes toward it from the outside world in the form of outer light and that which we bring toward the perception from inner experience.

In theory, we can imagine that we first experience the light as a pure sense perception or percept. However, for a human being a pure percept can scarcely exist. The moment the outer world impinges upon any sense organ, it is taken up and "digested" by inner processes working on a more or less unconscious level. Contrary to theories of ordinary sensory psychology, which attribute everything of a cognitive nature to the nerves, these are connected to processes in the blood which carries the element of will.

Through this digestion of the percept in its encounter with blood-processes there arises an entire spectrum of possibilities of soul life. Broadly speaking, the life element of the blood brings the instinct and drive towards the percept, and between these two poles there arises everything connected with concept, memory, feeling and judgment. The formation of a concept in relation to a percept, already involves a degree of judgment. Against this backdrop we can see that the seven life-processes actively transform what, to begin with, came toward us as a purely outer phenomenon into something internalized and incorporated into the sphere of soul and body. This process which is most active in the developmental period of embryonic life and childhood is, of course, liable to all manner of aberrations through, for example, sensory deprivation or overstimulation. If a child meets inconsistent behavior or even frank abuse, the judgment-forming processes of the soul will be impaired. The earlier this takes place, the more deeply

rooted will be the aberrant forms and structural developments in the body arising from it.

The bodily basis for the future life of soul depends intimately on how the life-processes interact with the sense organs, particularly during the developmental stage. It is also through this process that the adult relationship between the etheric and the astral bodies is slowly established in the organs. In fact, the character of this relationship is distinct for each organ—and organs are just as much sense organs as they are metabolic ones. In this way the developmental basis is established for much that later on expresses itself in the form of psychiatric illness.

I will have to assume for the moment that what Steiner has described about the seven life processes is not entirely unfamiliar to you. They are connected, of course, to the seven planets, which Steiner has also described as having a connection to the seven main internal organs. During the course of embryonic and child development, the astral forces, which belong to the planetary realm, and the etheric forces work very closely together. Through the particular affinity between the organ and the planet, a kind of resonance chamber arises in the body for each of the seven planetary spheres which, when taken together, comprise the entire astral body. The moon sphere, which is most closely connected with the earth, forms the brain. The Saturn sphere, which is the most removed from the earth, forms the spleen. The Jupiter sphere and the Mars sphere work together in the formation of liver and gall bladder. Mercury works into the lung and Venus into the kidney. The planetary forces working within each organ help the etheric forces of the organ to remain held and integrated in the body. They bring boundaries to bear on the otherwise expansive tendencies of the etheric body. During the developmental period, the relationship between the etheric body and the astral body is laid down in the organs themselves. Astral forces have more of an affinity to connect with the sense impressions from the outside world, in relation to which they then unfold as faculties of soul. As I have said, each organ is in fact just as much a sense organ as it is a metabolic organ. In the brain we see an organ whose substance comes closest to death—thereby it is particularly suited to forming the basis of waking consciousness. In the spleen we see the opposite processes at work. Here the blood processes, which belong to the very depths of our unconscious life of will, have taken hold of everything coming from the outside world and metamorphosed it into bodily substance. In the brain, the forces of the outer world, i.e., the sense impressions, become dominant and the astral body and the etheric body both withdraw from the physical body after creating their most complex imprint within it. This may be seen in the language of modern brain physiology in terms of the complex network of nerve growth factors,

which are activated only to the extent that the child's life of will is aroused to a creative relationship to sense perceptions. Perhaps we are seeing in these processes what Steiner has described in referring to a co-operation between blood and nerve processes. After the imprint has been created they become emancipated from the body, thereby becoming free for the conscious life of soul. In the brain the outer world is always in danger of conquering the inner world; that is to say, through the brain we lose touch with our inner being.

In the spleen, however, we can say the opposite, namely that the inner forces of self are continually triumphing over the forces of the outer world. The astral and etheric bodies remain active metabolically in the blood processes and the spleen therefore retains a strong connection to the unconscious ego which remains active in the body directly rather than via the kind of structural imprint which is to be found in the brain. We may therefore say that the way the life processes take hold of these two organs expresses a polarity.

Between the spleen and the brain we find the inner organs of the liver and the lung. In the lung we see an organ which is, in many ways, similar to the brain. It has a very strong and hard endoskeleton in the form of its bronchial tree, composed of cartilaginous rings. Steiner has characterized the lung as having the closest relationship of all the organs to earthly thoughts—that is to say, to the brain. Steiner connects the lung, for instance, to the ability to memorize facts and figures, quantity rather than quality, for example, telephone directory memories. He describes all our memories as being imprinted into the etheric sheath or etheric surface of our organs—and the actual etheric forces through which the lung has been formed have a particular affinity to earthly thoughts, to everything that lends itself to being weighed, measured and quantified. Steiner has called this aspect of our etheric body, the life ether. These life ether forces which work on a bodily level in a kind of additive way, as is expressed, for example, in the continuous growth pattern of a fungus, these life ether forces in the lung become something like the guardians of those sense perceptions which belong to the essentially earthly element of cognition based on factual memory.

We are all very familiar with various clinical ways in which this comes to expression. For the curative teacher, for example, the child will come to mind who can sometimes quite literally remember every single detail of everything that has happened, not only today and the day before, but perhaps last week, last month, last year, or even ten years ago. Some children display remarkable encyclopedic memories of this kind.

We see a similar phenomenon, albeit in a different form, in the adult who displays obsessive tendencies or fixed ideas. In a fixed idea a spiritual happening becomes de-contextualized—it is made into something of an isolated entity. The way the ether body works in the lung is continually appealing to this kind of isolating, fixating tendency. The forces of the outer world are therefore not being so thoroughly internalized, digested and metamorphosed into fantasy as they are in other organs, for instance, the liver. The outer world imposes itself on the soul in too direct a form—hence we can say that in the lung, as in the brain, the outer forces are, relatively speaking, conquering the inner forces.

Just as the lung stands in an intimate relation to the brain and the nerve-sense system, in so far as it isolates the individual elements from the whole being, making a kind of self-contained entity from them, so the liver, in contrast, is an organ which cooperates very closely with the spleen in the whole system of metabolism. Just as the sense organs all converge on the brain, where the sense impressions become metabolized within the life of soul, so does the intestinal tract converge in the liver, through which substances from the outside world begin to be elaborated into the unique substances of our own bodies.

This substance-building activity of the liver, when imbued with the impulses from the spleen, also forms the bodily basis of our will life, but it exerts its influence a little closer to the level of the soul than does the spleen. If the spleen is the guardian of our pre-earthly intentions, then the liver is already attempting to bring these to manifestation here and now on this side of the threshold. It is the organ which gives the bodily basis for the exercising of initiative and motivation, it is the origin of our vitality and, to some extent also, our enthusiasm. All these soul functions are intimately connected with the way metabolic processes interface with what is taken in from our senses. It is possible, indeed up to a point normal, for cognitive life, which has developed itself on the basis of our sense perceptions, to follow a different direction to the life of deeper motivation or intentionality. Without the tension that arises between these two realms, both connected as they are to our life of will, but in very different ways, we would not find the power to pursue our earthly biography from a condition of inner freedom. However, it is possible for the normal healthy tension that should exist between these two realms to diverge to such a degree that the seeds are planted for a real split between the cognitive world and the world of more unconscious will life. This may manifest itself fairly quickly in some form of depression or inability to put intention into deed, or be delayed by years, decades or even life-times! Liver physiology is in turn connected with the biliary system. Secretory processes of the liver are focused in the production of bile, which

is stored in the gall bladder before being ejected into the intestines. Here it encounters substances from the outside world and contributes to their breakdown. Biliary processes are even more strongly connected to the more conscious pole of will than is the liver. The liver stands at a kind of mid point between the biliary processes, through which our will encounters the outside world, and the spleen, which is the guardian of the deeper nature of the will. Any obstruction or congestion in the process of bile production or excretion may have a laming effect on the conscious life of the will and this may be often observed in medical and psychiatric practice if one is awake to this possibility.

The liver is an organ with a strong kinship to the fluid realm. If the substances of the outer world overwhelm the liver, then it becomes something like a stagnant pool of water. Substances are taken in, but are not vitalized and may sit more heavily, as it were, undigested or impenetrated. When substances are incompletely digested, allergies may arise. Classical allergies are fairly easy to identify but nowadays one meets an increasing number of a more insidious variety which may manifest only through more subtle symptoms such as tiredness after eating, loss of vitality and so on. This tendency is often exacerbated in a clinical depression, or in someone with chronic fatigue syndrome, where a vicious circle of interactions is often seen.

You may remember the very famous example from Steiner's Curative Education Course of the child who has difficulty with his will in actually stepping into a tram. Steiner connects this description of a child who is, as it were, paralyzed in his will, who is unable to release himself from the conscious life of thought into the spontaneity of a deed, to a weakness in the activity of the liver. He actually suggests that the disorder may have been inherited. Whenever weakness of will manifests itself in the child or adult in any form, we can ask ourselves if the liver—or for that matter, the gall bladder—is in need of support. This sometimes shows itself at times of transition in life, for instance, in the menopause or following a pregnancy. At both these transition-times a person is increasingly vulnerable to suffering from depression. During the menopause, a further metamorphosis of organic etheric forces into the conscious soul life is taking place—or at least the potential is there for this to happen. Forces which have been active on a bodily level in the glands until this time become available for new soul-spiritual activity or development. If they are not appropriately taken up, however, congestion of the liver and biliary system may ensue. Indeed, moderate degrees of this are almost normal at such times, since processes of metamorphosis are usually only gradually accomplished.

On a more day by day level, we also experience physiological transitions at three o'clock in the morning and three o'clock in the afternoon. At three o'clock in the afternoon, blood sugar levels are usually on the low side, signifying that the substance building aspect of liver function is at its weakest at this time. At three o'clock in the morning, however, bile production is at its weakest point. Both these times of transition tend to be difficult periods during the day or night for people struggling with depressive illnesses. Waking at three o'clock in the morning with morbid thoughts—that is to say, thoughts which it is not possible to properly digest and integrate into the waking consciousness, are very familiar examples of this. In more severe forms of manic depressive illness, tendencies of this kind can be much more dramatic.

Steiner has connected the liver with that part of the etheric body which is called the chemical ether. This is also sometimes called the tone ether, the number ether or the sound ether. Through this ether, physical growth is inwardly organized according to the inner harmonies of number and measure, which also become manifest in the inner harmonies of music. When this etheric quality becomes prematurely released into the realm of soul, the stream of time coming from the future to the present is likely to overwhelm the normal state of waking consciousness. All manner of experiences can then arise to which the soul feels connected but no longer in a free way. Such things as ideas of reference, *deja vu* phenomena, and even deeper states of paranoia, may thereby arise. The etheric forces which are particularly connected with the liver give us the experience of becoming contextualized in our environment. When these forces unfold their activity too strongly in consciousness, a disturbance in our relationship to the surrounding environment may ensue. Paranoia is one of the most frequent forms that such a disturbance takes. One feels threatened by the environment, but in a very personalized way, almost as though the substances of the outside world are working their own life out at our own expense! Paranoia may, in turn, be a fairly transient phenomenon, with a more neurotic character, or it may be major symptom of a severe psychotic depression, or even a schizophrenic illness.

I mentioned a few moments ago that an astral quality from one or other of the planetary spheres works together with the etheric body of a particular organ, constraining these forces and guarding against their tendency to jump, as it were, too quickly out of the body, too quickly into the future. Whenever that planetary or astral activity within an organ becomes weakened—and weaknesses may be inherent or acquired—the soul becomes vulnerable to encountering forces from the etheric body which

it should not meet until after death or until one is suitably prepared for a conscious encounter with the spiritual world. Any drug or poison will also to some degree deflect the life-processes from their bodily manifestation, leading to the premature release of etheric forces into the soul realm. This phenomenon forms the basis for the anthroposophical understanding of certain aspects of drug abuse. Different drugs may display certain organ affinities—for instance, the qualitative effects of cocaine may be seen in terms of the lung, of LSD more in terms of the kidney. What one is then meeting as a disturbance of the etheric forces of the organs is also a disturbance on the life-processes of the organs. It is a kind of foretaste of the experience that we meet after death, when we see the panorama of the life that we have just lived. After death this experience—known as the etheric tableau experience—normally happens only when our entire ether body becomes freed from our physical body. At the time of our death this experience is strongly held within the sphere of the Being of Christ and the Spirit of the Guardian of the Threshold. If this happens prematurely, albeit only in a modified form through a drug, the soul may experience later difficulties or impediments in returning properly into the body and this may also sow the seed for different forms of disorientation and dislocation of the conscious life of will. I cannot expand in this talk on the theme of drug abuse or addiction. I would, however, like to point to the close connection that has often been noted between certain drug experiences and certain spiritual experiences. This becomes much more readily comprehensible when we are able to understand it in terms of the organs. The forces that are released from the etheric activities of the organs, the forces more bound up with the inner side of the life processes, are expressions of the living activity of spiritual beings that are still active within the substance of our own body. The threshold to the substance-building processes is indeed the same as the threshold to the spiritual world altogether. We meet the spiritual world where the substance-building processes of our bodily organs are taking place. But it is quite a different thing to meet this through a process of inner training and inner development, or to meet it after death when these forces have been naturally released, so to speak, than it is to do so through substance abuse or through weaknesses within the activity of the planetary sphere belonging to a particular organ. For the anthroposophical doctor and psychiatrist, the field of possible medicinal therapy opens up at this point through, for example, an understanding of the connections between the different metals, the planets and the organs. It is not possible to develop this further, however, at this point.

I hope that this broad overview serves to indicate how anthroposophy spans so many aspects of the realm of psychiatry, opening up new possibilities of understanding, of diagnosis and also of therapy. I have also tried to point out the extent to which the realm of psychiatry and the realm of inner development or initiation are intimately connected. I have often had the feeling that much that is met in the realm of psychiatry may be a kind of result or expression of an uncompleted process of initiation in a former life. I would certainly not suggest that this is so in every case, but an insufficiently prepared initiation may be the result of an attempt to cross the threshold into the spiritual world too soon. We see the same gesture becoming manifest when our etheric body in the one or other of our organs wishes to become released too quickly. Thoughts such as this are sometimes helpful in those cases of mental illness in which it is not possible to discern their origin in this life on earth, and with which a person may have to live for a whole incarnation.

It is, however, often possible to understand a great deal of mental illness or psychological disturbance in relation to childhood development. Nowadays childhood development is under threat and it is very difficult for most people to go through childhood in such a way that they achieve a healthy soul-spiritual penetration of the body. Many things are responsible for this, including poor nutrition, an education that has no respect for phases of bodily development and which already draws organic processes too soon from the body into the realm of soul; through a general deprivation of what Steiner has called the bodily senses—that is to say, the senses of touch, life, movement and balance. When the life processes withdraw from these senses too quickly, the astral body is not able to create a sufficiently strong resonance chamber or imprint for itself within the physical and etheric bodies. This may show itself in later life in the form of soul insecurities, anxieties, hyperactivity and so on. Childhood is also threatened through the general dissolution of society. Conventional securities, accepted modes of behavior, and so on, are rightly falling to one side, but all too often parents are not able to replace them from their own individual resources. We continually find ourselves thrown back upon ourselves, needing to rely on personal judgments too soon before the organic basis of our body has been properly equipped to fulfill this task. This crumbling of the social and moral fabric of society throws the developing child all too easily into a state of turmoil. At an increasingly early age the adolescent has often to encounter the sense of inner void, meaninglessness, the realm of inner darkness. Existential questions to do with self-identity confront the adolescent nowadays almost as a normal phenomenon, whereas even 30 years ago the

securities that applied to generation after generation acted as a form of protection against this.

When we really meet the existential question, “Who am I?”, the answer never can be found in the outside world which we meet via our senses. It can only be found from that same eternal self which lives behind the threshold of our physical organs. Between our conscious experience of self and our eternal being, however, there lies that interface of soul which I mentioned a few minutes ago—the realm in which there is an ongoing battle between our conscious self and our eternal self. The bodily basis of our life often looks for ease, comfort and security. Spiritual intentions on the other hand threaten earthly securities, and deep-seated fears, doubts and so on may be evoked by them in the soul. These forces belong to those instincts and, to some degree necessary, egoistic drives which are implanted within our physical body and which work into our earthly personality at a deeply unconscious level. These forces are constantly enticing us to build our identity on the outside world—on something upon which we can apparently rely and from which we can derive a certain sense of security and predictability. Everything that derives from the outside world and which we meet through our senses—particularly those aspects to which the lung has an affinity, such as obsessions, fixed ideas and so on—all these will tend to offer us apparent solutions in the face of the spiritual challenge in meeting the inner void.

In so many of the psychiatric illnesses of adolescence, we see particularly clearly how this phenomenon comes to expression prematurely. I refer, for instance, to the phenomenon of anorexia, which has almost become a kind of epidemic at the present time.

In more recent years psychiatry has developed a new interest in the personality, particularly through the descriptions of so-called multiple personality disorders—now referred to as dissociative identity disorders. In this type of condition the tension between opposing elements is no longer held or integrated within the framework of the single person, but different elements become seeds around which apparently independent personalities develop. There is sometimes a lack of continuity of ego consciousness and even memory between the one personality and the other—a fragmentation has taken place. The more severe forms of this disturbance are usually connected with sexual abuse during early life. I am sure that through deepening our understanding of the co-operation of the senses and life processes during the time of childhood development, our insights into this type of disturbance would take on new dimensions. In fact, a number of anthroposophical psychiatrists have already begun to do just this.

As many of us are aware, however, this phenomenon can lead to some of the most frightening of phenomena which we as human beings may have to encounter. When an ego fragmentation takes place, islands of our etheric and astral bodies have become dislocated from the overall sphere of the ego organization. It is here that the borderline between the realm of medicine and psychiatry on the one hand and that of social and personal morality, becomes almost indistinguishable. Those of you who are familiar with the works of Scott Peck, particularly his book "People of the Lie," will be aware that he addresses this problem. He challenges contemporary psychiatry to build a new scientific understanding of the realm of evil, stressing how until the present time this realm has been considered to fall outside the scope of science. This book was not written with dissociative identity disorders particularly in mind, but I am sure that there is a close connection between these phenomena and many of his descriptions. He relates much of what he has to say to possession—a concept which, until recently, was considered to be virtually medieval. I think that this book by Scott Peck is a clear example of the condition that modern psychiatry finds itself in, when it attempts to confront the spiritual nature of the human being. I believe his book is courageous and, in many ways, quite masterly. However, it struggles without having any way of connecting the realm of substance with the realm of the spirit.

And, as I began my talk by saying, I think that it is just this potential that is unique to the anthroposophical contribution to psychiatry. The original polarity between substance and creative spirit arose during the time of the Fall on Old Lemuria. From this time onwards the creative world of the spirit and the actual substantial happenings in matter started to separate. We are now at the point in human evolution when out of their own nature these two forces will continue to diverge ever more and more strongly. Steiner forecast that by the end of the century we would be blighted by epidemics of mental illness of one kind or another—and I am sure that amongst other things anorexic disturbances and dissociative disorders are among the examples that could be cited to bear out his prediction. I believe that ultimately the task of mental illness is to stimulate in us the call to inner development, to truly know ourselves. Whereas up until the present time we had a certain license to decide not to follow this path, it is nowadays almost imperative to do so if we are to confront and deal with problems, if not exactly in epidemic, then certainly in escalating proportions. Modes of being that were once regarded as extreme pathologies become ever more and more common. Unless a sufficiently strong impulse is ignited in humankind to hear this call, then this separation between substance and spirit will

continue. It will then become increasingly difficult for human bodies to sustain a basis for integrated ego consciousness into the future. They then become the basis for the activity of those evil beings—so called “anti-spirits” of personality to which Steiner has given the name of “Asuras.” The loss of immunological identity that we are also witnessing at the present time is, I believe, the mirror image of this. That is to say, it is the polar expression of the same phenomenon. In the realm of psychiatry, the possibility of the conscious ego to integrate itself with its own karma is threatened, and at the level of immunology, the possibility for the unconscious organization of the ego to penetrate physical substance is also threatened.

This theme is obviously one with which we could occupy ourselves not only in coming days, but also in the coming decades and centuries. We live in a time when developments are accelerating around us, but this was something that Rudolf Steiner anticipated at the beginning of this century and which anthroposophy is intended to help us to master. We are, however, still only at the beginning of doing just this—it lies in the hands of each of us to help to realize this aim.

The Universals Debate in Biology and Medicine*

HELMUT KIENE

Three great dogmas in conventional science

The theme of our conference is: finding our way to the medicinal plant. What does this signify? This may sound provocative in the ears of well-informed contemporaries at the pinnacle of scientific erudition. It has to be admitted that the title goes against the three great dogmas in modern science. These are not openly proclaimed and, indeed, generally not even perceived, but they govern the whole of modern science, providing its basis and orientation and setting its boundaries. They are:

1 *There is no creator principle in nature.*

This dogma states that there are no forces that create forms holistically; all forms in nature are built up “from below,” i.e., through interaction of their parts (molecules, atoms, subatomic particles). This is the “dogma of particularism.”

In terms of this dogma, it is pointless to look for the essential nature of a medicinal plant as a whole. Instead, efforts should be made to identify, isolate and reproduce effective single phytopharmacologic principles.

2 *There is no spirit in nature.*

This dogma states that there are no laws governing form-giving principles (according to the first dogma these do not even exist) or, in other words, there is no overall natural order. The natural world has arisen due to random mutations, changes that had no particular orientation. This is the Darwinian dogma in its widest sense.

In terms of this second dogma, it is pointless to look for the essential nature of a medicinal plant as a whole for according to this dogma there can be no laws governing the relationships between plants and human diseases that could be put to clinical use.

*Original title: Der Universalienstreit in Biologie und Medizin. Lecture given at the Methoden der Anschauung-Wege zur Heilpflanze Conference at the Hofgut Fischermuehle in Rosenfeld on 1-5 June 1995. To be published in *Methoden der Anschauung-Wege zur Heilpflanze*. Stuttgart: Freies Geistesleben 1995. English by A.R. Meuss, FIL, MTA.

3 *There is no human spirit truly capable of cognition.*

This dogma states that an individual person is unable to perceive causality in the individual case; experimental findings capable of statistical analysis are essential in establishing causes. This is the “dogma of statistics.”

In terms of this dogma, it is pointless to imagine there can be ways, methods of direct perception, that will enable an individual person to perceive the medicinal principle of a plant (which is what the title of our conference proposes). It is also impossible, according to this dogma, for an individual person to assess the activity of an herbal preparation reliably in the case of an individual patient.

So we have three dogmas:

- the dogma of particularism, i.e., there is no creative principle in nature;
- the dogma of Darwinism in its widest sense, i.e., there is no overall natural order, no spirit, in nature;
- the dogma of statistics, i.e., there is no human mind and spirit truly capable of cognition.

These three dogmas form a whole and are the dogmatic opposites, at least in the context that applies to science, of the Christian principles known as Father, Spirit and Son. They dominate modern science, and the theme of our conference is more or less obviously going against them.

A new universals debate

If, in spite of these dogmas, an individual biologist, pharmacologist or physician looks for ways to find the essential nature of the medicinal plant, scientists and the whole present generation, which is governed by science, will not be able to follow him—because of these dogmas. Ways must therefore inevitably be sought by individuals. From the point of view of modern science they’ll have to be and remain clearly nonsensical, leading people astray, unless it proves possible to develop a way that can be used by the whole of humanity—a way of finding the essential nature of the medicinal plant.

It is clear this cannot be achieved unless we enter into scientific dispute concerning the three great dogmas: particularism, Darwinism and statistics. To do so does, however, mean a new universals debate.

What does it mean when we say “universals debate”? The original debate occurred between nominalists and realists in the 12th and 13th Centuries.¹ The general view is that the point at issue was the following: Are general conditions—meaning “universals”—such as the concept “horse”

merely general names for individual objects (the way the term “horse” is the general name for all individual horses)? Or is there a horse as such, i.e., the idea “horse” as something that truly exists and is therefore real? The point at issue was whether universals are nominal or real.

Those who considered ideas to have reality thought universals existed in three forms: *ante rem*, *in re* and *post rem*.² *Ante rem* meant as a causal principle prior to the things themselves, as the creative thought of God; *in re* meant within things, as the cause generating their form; and *post rem* meant after the things, in the individual human being’s comprehension.

The final victory in medieval times went not to the realists but to the nominalists, who considered universals to be mere names.

Looking back, we have to be aware that the universals debate reflected an age where thinking was primarily religious, with rational or “scientific” views only of secondary importance. Today, the opposite is the case, with thinking essentially scientific, and the search for wider views secondary to this. We therefore have to use the opposite approach today, beginning not with God but with the human being. The issues, then, are as follows:

- 1 Does the human being have the—even merely potential—ability for causal perception where the individual object is concerned? This must be the case if there are to be *post rem* universals, i.e., universals in human comprehension;
- 2 Is it possible (and if so, how?) to use this ability to perceive a form-generating cause? This must be the case (in the widest sense) if modern, mainly scientifically-oriented human beings are to be justified in speaking of *in re* universals;
- 3 Is it possible to perceive connections between such form-generating principles that follow specific laws? This must be the case if modern human beings are to be able to see that the natural world reflects a spiritual order and that *ante rem* universals therefore exist.

To take up the universals debate today, therefore, means facing up to the three unspoken dogmas on which modern science is based. They are the modern denials, the modern opposition to the three classes of universals in medieval realism of ideas.

Both debates, the medieval one and the one which now at the end of the 20th Century is becoming both possible and necessary, basically are an attempt to use rational thinking to establish whether the reality of the natural world and of the human being bases on the principle of Christian trinity or not.

What form should the new debate take?

It has to be realized that modern philosophy is not able to deal with such a debate or, to put it more crudely, if it were to be held merely between philosophers and scientific theorists, with no influence on methods and contents of specialist scientific research, it would be just empty words—a nominalist debate—and it would immediately be obvious who the winner would be—the modern successor of nominalism.

The debate must, therefore, be taken into the specialist fields and conducted there, mainly in two areas:

- in biology, because modern science and its technology are generally recognized to be a threat to life on earth;
- in medicine, because this is the most detailed application of biology and affects human beings most deeply.

We therefore need to open up an avenue for the debate to take place in biology and in medicine. What might it look like? How can it be planned? What are the preconditions today? What specific questions need to be considered? What research projects will be needed to answer those questions? How can the research projects enhance one another, and how can they be linked? Is there a way of getting quick intermediate results, perhaps in just a few years? Are there people who would like to take part in such a scientific debate? What is the historical situation of conventional science with reference to such a debate? What is the historical situation of anthroposophy in this respect? This last question is important to us. I shall attempt to present answers to these questions in this lecture.

Initially, let us consider what powers of perception a modern scientist may be said to have, powers that are historically determined. This will be followed by a discussion of the historical situation of anthroposophy, and finally a kind of outline strategy for the new scientific debate that has now become possible.

Secondly, the historical situation of conventional science (parts of this section come from a manuscript for publication: Kiene H. *Essential Science*, c. 250 pp).

Beginning with Plato and Aristotle

The historical situation of conventional science presents a set of problems originating in a dispute between Plato and Aristotle.³ Plato held that every individual member of a species (e.g., every individual horse) had its own ideal counterpart, which was its essence and could be perceived by the mind's eye in the world of ideas. Aristotle held that the idea of an

individual thing did not exist separately from it in a world of mind and spirit but lay in the sense-perceptible thing itself, i.e., that the idea of the horse is the essence to be found in the individual horse itself. 1500 years later this original conflict in occidental science was got rid of when the universals debate ended in favor of nominalism. Nominalists saw things like this: Looking at the real world around us, we do not see the idea of the horse but only individual horses. Reflecting on our own thoughts, we again do not find anything like the general idea “horse” but only thoughts of individual horses and apart from this the general name “horse.”

When medieval scholasticism came to an end, therefore, the general idea, the essence of the thing, was found neither by directing the senses to the outside world nor by turning the mind to one’s own thoughts. The claim made by both Plato and Aristotle, that scientific cognition of the essence was possible, was thus blocked by scholastic nominalism.

Despite that outcome, mathematics, a science based on human thinking, developed further both before and after the debate. In the human mind and spirit, where medieval nominalists saw nothing but the names of things, sufficient certainty was gained to develop mathematics. This science of purely ideal concepts developed in the mind fell heir to the old Platonic impulse. The original Aristotelian impulse for observation based on the senses became part of modern science. The Platonic view thus survives in modern mathematics and the Aristotelian view in modern science, though the original claim of perceiving the essence has been abandoned.

Collapse of Aristotelian impulse

In the modern scientific age, the two axes of cognition, Platonic and Aristotelian, underwent further pruning. This happened, first of all, to the Aristotelian impulse to base perception on the senses. John Locke⁴ was the first to wield the knife. He maintained (as did Rene Descartes⁵ and Galileo Galilei⁶) that the individual horse perceived was not the real, objective horse. Only the quantifiable part of it was objective reality, i.e., its configuration in space, extent and movement. The colors, sounds, odors, warmth, taste, etc., perceived in the horse, he said, were not objective reality. These sense-data were subjective elements produced by the human observer, products of his sense organs and brain, and according to Locke due to small particles coming from the spatial form of the horse.

Locke considered the (spatial) properties of things to be objective reality, railing them “primary qualities”; other properties such as color, sound, odor, etc., he called “secondary qualities.” In his view, therefore, human beings neither find the objective, universal ideas postulated by Aristotle in

the physical world, nor do they perceive the individual object as a whole, only its primary qualities!

Immanuel Kant made the second cut at the end of the 18th Century. He drew the radical, ultimate conclusion from Locke's approach. In his view, we know that not only secondary qualities but, in fact, everything we know about an object (including its primary qualities) is mediated by the sense organs and nerves. This would mean that all human knowledge of an object is merely subjective idea in the brain. The reality of the individual object—the “thing it itself”—cannot be known by human beings, according to Kant.⁸

With Kant, then, all certainty of being able to know the reality of the outside world had come to an end. Validity and value was given only to the rational mind and to inner mathematical (a *priori*) knowledge.

Collapse of the Platonic impulse

A few years later, the basis of the other, originally Platonic, axis, that of science based on pure thought, also broke down. This started with the great mathematician, Friedrich Gauss,⁹ and the break was completed by Johann Bolyai,¹⁰ Nikolai Lobachevski,¹¹ and Bernhard Riemann,¹² founders of the non-Euclidean geometries. Euclid's axiom of parallels helped them to see that the truth of traditional mathematical views and axioms was doubtful and that new axioms could take the place of the old.

The conviction grew that human powers of perception were doubly incapable. It was felt they could neither get at the reality of physical objects in the outside world nor arrive at guaranteeable truths in the inner world of thought.

There still was, it seemed, a residue of certainty in perception based on thought, and that was the world of epistemology, the philosophical theory of knowledge, of reflection on the problems outlined above. Epistemology proved to have little power, however; it had not been able to guide human perception to reality or truth, but quite the contrary. So epistemology, too, had to fall silent. Ludwig Wittgenstein realized this in the early 20th Century: “Whereof one cannot speak, thereof one must be silent.”¹³ Occidental science had, thus, reached absolute zero by the beginning of the 20th Century. Technology based on it was developing at a tremendous pace, but its inner certainty, validity and truth had died out completely.

Three ways forward

After Wittgenstein, three ways of taking things further could be seen. The first possibility was to let scientific thinking go whichever way it

would according to Paul Feyerabend's happy-go-lucky "anything goes, civic initiatives instead of epistemology."¹⁴

The second possibility was to tie science firmly into machine-type thinking, cognition techniques for which computers may be used, cognition technology making no claim for truth, programmed, recorded, monitored, randomized techniques, i.e., developing a global science machine.

The third possibility was that the two original Aristotelian and Platonic impulses be taken beyond the zero points they reached with Kant and Wittgenstein so that they finally come together within the human being and are applied one to the other. On one hand, this means that the mathematical Platonic method of thinking is explored using the empirical Aristotelian approach, that is, thinking itself becomes the object of empirical study. On the other hand, it means that the empirical Aristotelian method of sensory observation is penetrated with the mathematical Platonic method; observation is filled with thought in full awareness.

If we considered the dynamic of conscious awareness development in the history of science, this would be the logical next step. It would also be the right method for entering again into the universals debate.

In short, Platonism and Aristotelianism must interpenetrate at the methodological level. Encounter and collaboration between Platonism and Aristotelianism are very much our concern in anthroposophy, though at another level and in a different sense.

Historical situation in anthroposophy

Platonists meeting Aristotelians

In his karma lectures, Rudolf Steiner put great emphasis on two karmic streams—Platonic and Aristotelian. He said that representatives of the two streams would incarnate on earth before the end of the century and work together to achieve maximum spread of anthroposophy at a particular point in time. Their mission was to nurture spirituality in a civilization that would otherwise go into decline and perish.

Steiner went on to say that it was important to discover to which of the two groups each of us belongs. Characterizing the groups he referred to "being tired of paganism" on one hand and of Christianity on the other. It is not easy, however, to work with this today for it refers to earlier forms of incarnation. Indeed, what do we mean by "Christianity" and "paganism"? Isn't it true that what we call Christianity is sometimes paganism and vice versa?

It is my personal belief (in spite of and, indeed, in consequence of careful study of the records made of the lectures) that those lectures do not provide

useful criteria for the identification of Platonists and Aristotelians, though people are always trying to do so. I am therefore going to try and develop another means of identification. This may be daring, not being based on Steiner's lectures, and there can be no guarantee that this characterization will exactly agree with Steiner's view. The attempt shall nevertheless be made, for I am convinced that it may prove fruitful.

Note, this does relate to the universals debate in biology and medicine and very definitely to humanity finding the way to the medicinal plant.

Attempt to characterize Platonists and Aristotelians

We may ask who was the original Platonist? Plato himself, of course. We may also ask who was the original Aristotelian? The obvious answer is Aristotle himself. We may go on to ask how the two differ from one another. To discover this, we can read their books.

The works of Plato and Aristotle show important differences. Plato's Socrates said he knew that he knew nothing. Aristotle presented masses of knowledge. He wrote about heaven and earth, the parts of animals, the soul, ethics, physics, logic, and so on.

Another difference is that Plato carefully substantiated everything; he actually made Socrates speak of the midwifery method needed for this, demonstrating with the example of a completely uneducated slave who with the aid of Socrates was able to establish proof of a geometric principle out of his own resources. Aristotle hardly ever substantiated but offered incomparably greater conceptual riches. Yet no reasons are given why he chose those particular ten categories or those specific opposites, etc. Aristotle never went into reasons; he merely presented. He had the thoughtful mind, he had conceptuality, he had the form of logic and introduced these into the world of science.

It is generally thought that Aristotle was considering the sense-perceptible world. This is true; but he was able to do so only because he had made the mental and spiritual, e.g., knowledge of categories, of types of causes, his own. Plato was very different. He described his starting point in the passage that is most characteristic of him—the cave analogy. His starting point was the fetters in the cave which he cast off to work his way up into the world of the Sun and of ideas.

A commonplace view is that Plato sat in the heaven of ideas, Aristotle among the objects of the physical world. This is not the case. Plato was always endeavouring to find earthly explanations that individual people might understand and, from this basis, turn to the world of ideas. Aristotle's Scientific work, on the other hand, had its foundation in the realm of the

spirit (though in abstract, conceptual form), and with a mind thus equipped he turned to the world of individual objects. Plato was working towards the realm of the spirit, Aristotle out of that realm.

Plato, Aristotle and the School of Athens

The two central figures in Raphael's *School of Athens* are often said to be Peter and Paul. I base myself on the painting itself, however, where one of the figures holds a book with the title *Timaios* and the other a book with the title *Ethikon*. I therefore see them as Plato and Aristotle, making the truth of the work of art my basis for distinguishing Plato and Aristotle.

You see the two figures come from a direction where the sky, the cosmic principle, can be seen through the arch. The sky is blue. And which of the two is wearing a blue cloak? Aristotle. He is shown as the bearer of the cosmic principle. Plato is wearing a red cloak. And it is surely reasonable to take red as the color of the blood, of the individual, earthly human principle. (The Virgin Mary is often painted with a red inner and a blue outer garment.) Plato is shown as the bearer of the earthly individual principle.

The gestures of the two figures are also strikingly different. Aristotle's five fingers are spread apart and pointing down, as if he wanted to imprint something on the earth world, using the whole hand. Plato is pointing upwards, using only his index finger which is singled out, individualized, as it were.

The painting thus tells us exactly the same. Aristotle, bearer of the cosmic principle, imprints it into the earthly sphere. Plato, bearer of the earthly, human principle, points to the cosmos. Taken as a whole, Aristotle's gesture speaks of coming out of the sphere of the spirit. That of Plato speaks of moving towards that sphere.

Platonists, Aristotelians and anthroposophy

I would now ask you to transfer these two archetypes to the anthroposophical movement and the Anthroposophical Society. There you see the same typology, with some working "out of anthroposophy" and others working "towards anthroposophy."

The first have anthroposophy behind them, as it were, working out of its fullness to make all kinds of different spheres of human life fruitful. They are working out of anthroposophy.

The others have anthroposophy not behind them but as something that gives direction and orientation to their work. In their public activities, they depend entirely on what they are able to substantiate and feel they can answer for out of their own, individual powers, in sovereign fashion, and they seek to change the outside world in the direction they perceive

as the essence of anthroposophy. In this sense they are working towards anthroposophy.

In the discussion that followed the lecture, it was pointed out that there are Aristotelians who initially have the Platonic orientation and vice versa. This results in “Aristonics” and “Plateliens.” The two types of people tend to misunderstand each other thoroughly. Those working towards anthroposophy often consider the others to be dogmatic (consisting of body, soul and collected works of Rudolf Steiner, is the derisory way of putting it). Those working out of anthroposophy often consider the others to be unanthroposophical. Aristotelians, as defined above, feel it is dishonorable not to be representative of anthroposophy in every respect; Platonists, as defined above, feel it is wrong to present anthroposophical contents unless they are independent views.

Influence of anthroposophy on the present civilization

So far, the Aristotelian element—that is, people “working out of anthroposophy”—has been most effective. Waldorf education, the Demeter movement, eurythmy, pharmaceutical production, treatment of patients, etc., have so far been essentially based on anthroposophy and, thus, proved fruitful.

The question is, where has anthroposophy had practically no influence in the outside world? In science. This is remarkable if one considers that anthroposophical scientists distinctly claim to be scientific. The reason is simple. Science cannot be changed out of anthroposophy. That would be asking the impossible, for many positions held in anthroposophy go against current scientific views.

For example, the four principles solid, fluid, gaseous and heat are a basis of the anthroposophical view of the world and the human being. Science has only the three states of aggregation solid, fluid and gas, whereas heat is seen as a form of energy unrelated to these. Another example is the anthroposophical trinity of spirit, soul and body, or neurosensory system, rhythmic system, and system of metabolism and limbs. Science, on the other hand, works entirely with Cartesian dualisms. Also, the search for causes forces conventional scientists to use statistical analysis (with randomized double-blind trials an extreme case). Anthroposophy, on the other hand, claims perception is capable of individual development.

Opposite views of this kind are tolerable in other spheres of life (education, medicine, art, etc.) and are seen as open-minded pluralism. It is in the nature of science, however, that contradictions are not acceptable. It is always against pluralism. Scientists are always seeking to overcome contradictions or eliminate them. Followers of modern science must

therefore inevitably reject anthroposophy, where contradictory views are held. “Working out of anthroposophy” is therefore doomed to fail where modern science is concerned.

A scientific revolution, with individual specialist fields taking new forms, will only be possible when a new approach is used in anthroposophy, and that is “working towards anthroposophy” (in my view a Platonic element). Then at last we shall have a new universals debate in biology and medicine in relation to anthroposophy, and it will be possible for humanity as a whole to find the true way that leads to the medicinal plant.

Scientific debate at the end of the 20th Century

Rudolf Steiner’s epistemology

Having taken a look at the karmic encounter between Platonists and Aristotelians, something which according to Steiner is or should be characteristic of the present situation in anthroposophy, I’d now like to go back to the methodological fusion of Platonism and Aristotelianism.

One contribution to the historical evolution of philosophy, which I omitted when discussing the evolution from Plato to Wittgenstein, definitely merits attention. Wittgenstein’s end point was also the call for a new beginning, and such a beginning had been made a few years before Wittgenstein when Rudolf Steiner published his books on the principles of knowledge.

It is not possible to go into detail here, and I assume that these works are essentially known. Let me briefly refer to the following important aspects in Steiner’s efforts to find a new approach:

- Steiner aimed for an unconditional approach to the theory of knowledge and to science. He found it in what he called the “purely given,” i.e., sensory perceptions not penetrated by thought or put in a particular order;¹⁵
- Considering the “purely given,” we discover the vast extent to which everyday observations (even more so scientific findings) are based on thinking.¹⁶

With these two aspects, Steiner rehabilitated the rank of sensory percepts and restored reality to the thought element which had become obscured in the universals debate. The central statement in his theory of knowledge is: “The act of cognition is the synthesis of percept and concept; percept and concept together represent the object as a whole.”¹⁷

At this point, a vital question arises, at least in the present context. Is Steiner’s approach sufficiently stable to stand up to a new universals

debate? The answer has to be: not entirely. Steiner himself no doubt clearly realized this for in later lectures on the point of origin of modern science in world history he made the interesting statement: In earlier times, human beings experienced “what they brought to mind in cognition in communion with the world. Thus, there was no uncertainty in their essential nature as to how they should apply their concepts and ideas to the world. This uncertainty has only come with recent civilization, and we see it penetrate slowly into the whole of modern thinking, with modern science evolving in that uncertainty. This fact must be clearly understood.”¹⁸

It means that the synthesis of percept and concept, which Steiner made the core element in his theory of knowledge, is far from easy.

The following example will help to make this clear. Take the simple concept of a straight line and consider how scientists see it. The theory of relativity states that there are curved spaces, hence also crooked straight lines. In non-Euclidean geometries you find that there may be less or more than one straight line running parallel to a straight line and passing through a point outside that line. We see, thus, that considerable uncertainty exists even with a simple concept such as a straight line.

How can we gain certainty? Or, to use Steiner’s own words: “Is there a possibility to reach the initial state of essential nature?”¹⁹ He answered this himself: “You have to go back to the human being and now consider the human being, who previously experienced himself from inside, from the outside in his physical organism.”¹⁹ What does this mean?

Scientific no-man’s-land

In the case of the straight line, it means that we must not stop at the abstract concept but must take it to the physical human organism from outside. In practical terms, it would need a relatively complex procedure to check if a straight line really is straight (the whole procedure cannot be given here). The simpler part of it is as follows: You look at a nearer and a further away point on the line, and if the further away point and all points between it and the nearer point are covered by the nearer one, the line is a line of sight (i.e., not yet a straight line, but at least a line of sight).

Such a line of sight is a case where Steiner’s demand is met and physical reality is brought to the physical organism from outside. What is more, in such a line, simple as it may seem, Platonism and Aristotelianism can meet. Conventionally speaking, the line of sight is in an intermediate sphere scientifically, in a scientific no-man’s-land. It does not exist as pure inner thought separated from the outer physical world (the objects studied in conventional mathematics are pure thought structures, separate from the

outer physical world). A line of sight extends to the outer physical world and therefore does not belong to the field of mathematics. It is too physical, involved in the world of objects. On the other hand, a line of sight exists not only in the outer physical world, separated from the scientists' inner mind and spirit (this applies to the objects studied in conventional natural sciences as physical structures separated from the inner mind and spirit). A line of sight always starts with an individual scientist, a human subject who has inwardness of mind and spirit, and therefore does not come into the area of competence of conventional natural sciences, having too much inwardness and subjectivity attached to it.

That this sphere—the line of sight—may serve as its representative does, indeed, establish a secure link between percept and concept. It is an area where concepts can be developed in certainty, providing a basis for precise observation of conceptualization, i.e., of thinking and, conversely, penetrating sensory perceptions fully with our thoughts. This is a method of bringing Platonism and Aristotelianism together.

Anthroposophical physics

How does this fusion help us develop a new approach to science? Rudolf Steiner himself added that the methodology should first be used to develop a new science of physics and then of chemistry, a new pneumatology and then psychology. With anthroposophical physics and chemistry established, it would then be possible to develop anthroposophical medicine: “We shall then not have physicized anthroposophy, chemicized anthroposophy, but truly establish anthroposophical chemistry and anthroposophical physics. Nor shall we have a new medicine which is a slightly amended form of the old, but true anthroposophical medicine.”²⁰

At this point, I have to digress into a personal matter. I have been working on the development of such a science of physics for many years, quite independently of the above statements made by Rudolf Steiner. A whole book has resulted, though the birth pangs have been tremendous.¹⁹ When I agreed last year to give this lecture today, I thought the book would be finished and published, but sadly that is not the case. You therefore have to bear with me if I am unable to give all the proper references. The main aspects of such an anthroposophical science of physics are the following:

- 1 In conventional physics, the aim is to see nature objectively, leaving aside the subject-object relationship. In this anthroposophical science of physics, the subject-object relationship—which is that intermediate region, the scientific no-man's-land—is considered with great care and made the methodological basis;

- 2 In conventional physics, concepts are always “finite,” as it were; in anthroposophical physics, investigation is made, above all, of the way concepts develop on the basis of subject-object relationships;
- 3 In conventional physics, the ultimate content and basis is movement against inertia; in anthroposophical physics, the content and basis is a polar pair of movements—movement due to gravity (up and down, to the center) and movement due to light (one-sided, to the periphery);
- 4 In conventional physics, quantitative laws of nature such as the law of gravity ultimately have to be found by measurement; in anthroposophical physics, these laws can be logically derived the same way as geometric laws can. (The specific conceptualization technique makes this possible.) Anthroposophical physics is therefore superior to conventional physics;
- 5 In conventional physics, one speaks of three states of aggregation (solid, liquid, gas) and various types of energy; in anthroposophical physics, a polar, symmetrical system is used with five substances: solid, liquid, gas, heat and light. The axis of symmetry goes through the gaseous state, with solid and light and liquid and heat as pairs of polar opposites. (In the case of light and, to some extent, heat it is evident from their properties that the boundary between the purely physical and the “etheric,” as we may call it, has been crossed.)

It is my personal opinion that we urgently need such a science of physics so that we may build on it. We also need it so that we may show the conventional physical world that the three great dogmas cannot be maintained:

- 1 The gas law can be logically derived from conceptualization, leaving aside the particle model of kinetic theory. This means it is possible to develop a science that goes against the particularist dogma;
- 2 The polar symmetry of substances is a comprehensive natural order established entirely in the mind. This means it is possible to develop a science that goes against the dogma that there is no overall natural order, i.e., the Darwinian dogma;
- 3 Going beyond geometry and making physics a purely ideal or “mathematical” (super-mathematical, “essential”) science, it is possible to demonstrate the principles of non-statistical, purely ideal causal relations. This means it is possible to develop a science that goes against the dogma of statistical proof.

Program for the debate

This science of physics can be developed further; the two-directional changes of matter can be conceived in ideas, and it will be possible to arrive at concepts of a positive and a negative “salt process” and a positive and a negative “sulfur process.” On the basis of their polarity, rhythmic processes (waves, oscillations) can be understood as resulting from the interaction of polar processes.

All this is only a first breach made in the wall. For a successful universal debate we need a wide-ranging research program. The following projects are essential in my view:

Relating to the dogma of particularism

1st project

Determine what is the existential status of molecules, atoms and elementary particles. Are they echo effects of specific methods of experimental investigation? Do they have a primary mode of existence, based on the sphere of physical reality, or a secondary one that is the outcome? This question should certainly be soluble if the right effort is put into it.

2nd project

Establish a critique of the gene concept. Peter Heusser has already started work on this,²¹ but even more systematic, detailed research is needed.

3rd project

Reproducible demonstration of the activity of high potencies above the 25x when, according to Lohschmidt's numbers, no molecule of the original active principle remains. Clinical and experimental proofs are available, but none has been reproduced. We need a reproducible experimental model. This would have a maximum de-dogmatizing effect on particularism. A number of approaches can be envisaged and should prove successful.

Relating to an overall natural order and to Darwinism

4th project

A critique of Darwinism. It would not be difficult and needs to be done. The best thing would be a well-written, easy-going pamphlet, perhaps even a bit sensationalist, with a title such as: Darwinism—error of the century.

5th project

Demonstrate overall natural orders. A first such order is the polar and symmetrical order of substance shown above. A second one, also from the

anthroposophical point of view, is the polarity of man and plant. Everything written and said on the subject needs to be collected and developed further. Not an easy project, but urgently necessary.

6th project

Steiner referred to Goethe as the “Copernicus and Kepler of the organic world.” We need to find an analog to Newton’s achievement, i.e., the basic law of mechanics which covered not only movement as such, as in the case of Copernicus and Kepler, but the relationship between movements and forces. Finding an analog in the organic sphere would be the most important but probably most difficult piece of scientific work for the immediate future. *Relating to the dogma of statistics, or the human being’s ability to see the truth*

7th project

This is an area where our small group has been able to do relatively good publicity work. In the medical field, critical papers have been published on placebo effects, double blind trials, randomization, statistics, the causality concept, ethics, pluralism, single-case studies, etc.

8th project

The moment we reach a new level of science (as in physics, see above), where ideas have reality and insights are gained in natural sciences that bear the stamp of truth—so that the truth dilemma of conventional science is overcome—we can begin to develop a psychology based on theory of knowledge, that is a psychology of insight, psychology evolved in mind and spirit. (This is probably what Rudolf Steiner called “pneumatology” in his lectures.¹⁹) The psychology of needs and drives known from the Freudian tradition may give way to a psychology of human insight and freedom.

Further prospects open up with the following projects:

- what is rhythm? How do rhythmic processes evolve? What do they do?
- what is a “rhythmic system”?
- human threefoldness based on neurosensory system/metabolism and limbs/rhythmic system. This has been used in anthroposophy but not yet substantiated.
- what is a “sense organ in the wrong place” (with reference to understanding carcinogenesis)?

These projects must be completed before we can develop an understanding of and treatment of cancer that is entirely founded in anthroposophy. This should be our goal.

Principles of the scientific debate

Many individual projects could still be listed, but that would be of little use. What is important is that anyone undertaking such a project sees its position and rank within the whole dispute. Projects entered into just because someone else, e.g., Rudolf Steiner, considers them possible or important would not contribute to the debate. It would be helpful, however, to know the general strategic aspects of this much-needed scientific debate:

- Medicine will have to be the battlefield. (Sorry about the martial expressions—they are intentional, though no external aggression is implied.);
- The strategy will have to be a pincer movement: going on one hand for the scientific basis of medicine that leads to clinical treatment, i.e., physics, chemistry, biology, etc., and, on the other, for the methods of judging the efficacy of such treatment, i.e., methods that do not relate to the subject and are mechanical;
- The weapons we must use need to be forged in the theory of knowledge, in reflective perception, i.e., in a methodology to be taken in its widest sense;
- Every attack must be directed to the point where the sciences are today. This is where we must meet them, first criticizing and then truly transforming them;
- The basis of this new universal debate will be the fusion of the Aristotelian and Platonic impulses which must be achieved by the Platonists.

In conclusion, let me say that Aristotelians conducted the medieval universal debate. The new one will have to be largely fought out by the Platonists. The Aristotelians in our ranks will need to prepare the individual routes to individual medicinal plants. The Platonists will need to show the one and only route to the medicinal plant, that is the route for science and humanity. We have to see that this succeeds in the next few years.

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The Central Dogma According to Watson and Crick and Its Refutation by Modern Genetics

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(Lecture at the Scientific Society in Basel, November 23, 1988)

Abstract: The “central dogma” of genetics says that information can only be transferred from DNA to proteins, but not the other way around from proteins to DNA. Though actually it is certain that the DNA code only contains one part of the total organic information and that certain proteins are information carriers for the structure and function of DNA in the same way that DNA is an information carrier for protein structures. As examples of this the DNA polymerases, topoisomerases, amino acyl-t-RNA synthetase, and the recombinases are discussed. In the recombination of immunoglobulin genes (Nobel prize 1987) the recombinases even transmit DNA structural information which had not been previously coded or utilized in the organism, and therefore it was not inherited. The main question is where such information comes from. The thesis is presented that on the basis of embryological regeneration experiments it must come from a plane which is superordinate to the organic material (including DNA). The difference between information and information carriers is pointed to epistemologically, and it is established that information is in any case nothing material but is something ideal, and that this ideal something must be an objective, concretely working reality outside in nature, although it is only experienced as an abstraction or a mere thought within thinking consciousness. The factual refutation of the central dogma leads to the idea that it is necessary to detach the biological problem of information from the nominalism of a Kant and Popper, and to go over to a modern natural scientific realism of ideas, and, interestingly enough, this is in agreement with the view of the organic which was inaugurated by Goethe.

In the 20th Century the most important achievements of the biological sciences have been in the field of molecular biology and especially in the investigation of the genetic material DNA. DNA was first isolated from the spermatozoa of Basel Rhine trout by F. Miescher in 1871. In 1944 Avery and MacLeod unequivocally identified DNA as the hereditary molecule.

In 1953 Watson and Crick published their epoch-making double helix hypothesis³³ and thus first stated that the creation of identical DNA copies was explainable by such a double-stranded DNA structure. In 1958 Meselson and Stahl proved the existence of this copying process, which is known as semi-conservative replication. Since 1961 the dependence of proteins on DNA has been unraveled more and more, after the genetic code and ever more details of protein biosynthesis were discovered. Thus the foundation was laid for today's generally recognized explanation of inherited protein characteristics from the genetic material.

Yet already in 1958 Crick had formulated his so-called central dogma of genetics which states that transfer of information is only possible from DNA to protein but that reverse transfer from protein to DNA does not occur. Crick once summarized this dogma as follows: "The central dogma is a negative statement... a hypothesis which says that you can't translate backwards ... (that is) from protein to DNA or from protein to RNA."⁶

Today in 1988 this central dogma is still the foundation stone of molecular biological theory and is therewith also the foundation of current views about living things even though this dogma has been refuted by the facts for some time. I would like to present these facts in what follows:

1. The central dogma attributes all characteristics of living things to DNA, that is, to one substance. Therefore one sees the chemical explanation of life in it,⁶ especially now that the details of the genetic code and of protein biosynthesis are known. The genetic code is based on the fact that a specific sequence of 3 nucleotides on the DNA strand corresponds to a specific amino acid in a protein chain or in the so-called gene product. Therefore one calls this DNA base triplet the information carrier for a specific amino acid on the protein thread, and we now know that the primary structure of the protein, or the beginning sequence and ending of the amino acids on the protein chain, is completely determined by the sequence of base triplets on the DNA strand. In this way the protein's growth is "explained" by the genetic material, i.e., we have a "chemical explanation of life."

But one can ask whether the uninterrupted decoding of the gene expression really does result in a chemical—and therefore *material*—explanation of protein or even of life.

2. One can answer this question unequivocally if one becomes aware of the difference between the *material information-carrier* as such and the *information* as such which is "coded" by this substance. This distinction is very important, but unfortunately it is often made in an inadequate way by

prominent scientists who are engaged in deciphering the genetic code. An example of this is Crick's own statements.⁵

Let us clarify this distinction between information-carrier and information on hand of a simple example:

For example, one who only *stares* at the letters and signs in Goethe's *Wilhelm Meister* and doesn't *think* while he reads it, will only arrive at the code but not at the information which Goethe wants to convey. But the essential thing in *Wilhelm Meister* is the information and not the code, for the Roman letters in the book could be replaced by Braille characters or Morse code or computer signals or other symbols without affecting the information in the slightest. The content of the information is something quite different from the information carrier, and the former can not be gained from the content of the latter. This also holds if the association between content and carrier is not arbitrary as in the example given, but is fixed in a regular way as in biological information. The information content and information carrier are not identical for the latter either. In this case one can only say that the carrier and content have the lawful relation which they are known to have. But the content of the information can not be derived from the material content of its carrier.

Information as such is perceived in a completely different way than its material "carrier." Unlike its carrier, information is not perceptible to the sense organs or with the aid of apparatus but it can be thought, and thus it is *perceptible through thinking*. Only the material information-carrier is perceptible to the senses; information is always *ideal*. And therefore there is no material (biochemical) explanation of life.

3. Let's leave genes for a moment and look at the information coded by them. It is often said of this information that it contains *all* the instructions which are necessary for the life of a cell or of an organism.⁵ Is this true? We will soon see that it is *not true* either in a *quantitative* or a *qualitative* sense.

For example, as far as quantity goes it has been shown²⁷ that the maximum amount of available information in DNA would not suffice to explain the complexity of the neuron network in the central nervous system. The same must apply to the total content of information in other networks such as in the interactions within the immune system. Stent (1981) for example, refers to this.

But also in a qualitative respect, the information coded by DNA is only a *part* of the organism's total information. For as far as its content goes—that is, qualitatively—what is this information coded by DNA? It is nothing else than the law of the primary structure of protein or the ordering

principle for the beginning, sequence and ending of amino acids on the protein chain. Not contained in this information are laws for the tertiary structure of protein (we will come back to this later), for the macromolecules of carbohydrates and fats, for superordinate structures, forms, arrangements and functions in organelles, cells, organs, organ systems or for their complex relations and coordinations in the overall organism.²⁷ The total organic information or the overall organic plan is not reducible to the information coded by the DNA either qualitatively or quantitatively.

Therefore, even if one disregards the information carrier and limits oneself to the content of the information, one can only ascribe one part of the structural and functional instructions for organic formations to this content. Thus DNA can not be the highest or only law-giving instance of the organism, as the central dogma basically claims.

4. In fact, DNA is a command receiver just as, in principle, protein is a receiver of information or commands. DNA is just as dependent on the protein as protein is on the DNA. Let's look more closely at this: To build up its primary structure protein is dependent on a definite DNA nucleotide sequence. Conversely, for the build up of its primary structure DNA is dependent on a quite particular protein known as DNA polymerase. DNA has a primary structure just like a protein, namely a regular sequence of building blocks on a molecular chain. In protein these building blocks consist of amino acids, and in DNA they are nucleotides. The individual amino acids on the protein chain each correspond to a particular base triplet on the DNA chain. Therefore one says that the base triplet or nucleotide triplet carries the information for a particular amino acid.

However, the same thing applies to the DNA chain, except in the way it is carried out, because a specifically acting polymerase corresponds to the nucleotides on the DNA chain, and this polymerase sees to it that a specific nucleotide is built into the DNA chain at each point.¹⁴ One can therefore call the nucleotide-specific polymerase an information carrier for the DNA nucleotide with the same justification that one calls a base triplet an information carrier for a specific amino acid. And the DNA-polymerase transmits information for the corresponding DNA chain in the same way that the DNA transmits information for the protein chain. This also holds if one considers the fact that the DNA polymerase is dependent on the prototype of the complementary DNA strand. In any case it is a transmitter of information for the DNA strand which is being synthesized.

Therefore this enzyme is just as much an information carrier for the primary DNA structure as the DNA strand is an information carrier for a

primary protein structure. This fact is very important because in principle it signifies the refutation of the central dogma of genetics: *Information does not only flow from DNA to the protein but also in the reverse direction, from protein to DNA.*

5. To continue this theme, this class of enzymes “contains” more and even quite other information for the DNA than DNA contains for the enzyme. Because, strictly speaking, DNA only codes structural information, namely the information for primary protein structures. However the world of enzymes which is connected with DNA contains structural as well as functional information. Structurally it contains information for the primary DNA structure, as we just said. But it also contains information for the higher DNA structure, like the superhelix formations, as recent topoisomerase research shows.³² We now know that the whole double DNA strand which is coiled up as a double helix is coiled up again in higher helical formations. However, these superhelix formations are not rigidly fixed, but when necessary they are changed by the organism with the help of so-called topoisomerases. The materialization of these dynamic, higher DNA structures is the presupposition for the function of DNA, i.e., for gene expression. And in addition, all functions of DNA and all functions of RNA are regulated by such specific enzymes.

But the regulator is always superordinate to what is regulated and one has to differentiate between the two. For instance, in the regulation of circulation one can very well distinguish the regulator valve and duct system from the regulated fluid, and the relation of superordination and subordination can be clearly discerned. The regulator is always the law-giver, and what is regulated is always the receiver of the law or information. As soon as one realizes this it becomes completely clear that structurally and functionally the protein world is a giver of information for the world of nucleic acids. According to this, *genes are just as much the product of proteins as proteins are the product of genes.* Temporally and according to the substrate, information flows in a very differentiated and well-coordinated way in both directions, namely from DNA to protein and from protein to DNA.

6. One can not make the objection that it is not customary to call proteins information carriers in this way, because it has in fact been customary for some time. Thus the first sentence of Burgi’s introduction to Labhart’s standard work on endocrinology (1971) reads: ‘Hormones are chemical compounds which—when dissolved in extra-cellular fluids—transfer information from cell to cell, and therefore serve as intercellular

messengers.”³ Hormones are a particular class of information-carrying proteins for specific purposes. The enzymes which regulate DNA and RNA are another class of such proteins with a different information content. But even in genetics itself proteins are now being called information carriers for nucleic acids in the way meant here. For example one calls those enzymes which join transfer-RNA with specific amino acids, aminoacyl-t-RNA synthetases. Each of these synthetases can “identify” the anticodon of t-RNA and one of the 20 amino acids.¹¹ This is possible because these synthetases contain a definite, but not yet decoded sequence of amino acids in a particular spatial arrangement, which enters into a regular relation with the anticodon mentioned and with an amino acid. Therefore one now calls this amino acid structure of synthetase a “code,” that is, an information carrier.³⁰

Note well: In DNA the code is always a nucleotide sequence, and this carries information for an amino acid. Now in this synthetase the code is an amino acid arrangement, and this carries information for a tri-nucleotide. (And incidentally also for amino acids, which would be interesting to investigate). In other words, proteins are just as much information carriers for nucleic acids as nucleic acids are information carriers for proteins.

7. This becomes especially clear if one considers the regulation of genes where DNA has to acquire a primary structure which never existed in the organism before and which therefore is not inherited, and it is not made after a model, as in gene replication. In this case DNA is made into a carrier for a specific, entirely new unit of information. I’m referring to the now famous recombination of genes which has been detected in bacteria since about 1970,¹ and in the lymphocytes of higher organisms in immunoglobulin synthesis since 1980,²⁹ in the field of molecular biology. We know that scientists in Basel have accomplished great things in this field. Prof. Arber’s discovery and use of bacterial restriction enzymes was of primary importance for all of these research areas, and Tonegawa did a lot of his work on immunoglobulin gene recombination here in Basel. Almost everyone knows that this work was recognized with two Nobel prizes in 1978 and 1987.

The main features of this gene recombination are so important that I’d like to spend a little time on them. Through its lymphocytes the organism continually produces specific antibodies for all kinds of foreign substances. Now and then new substances appear for which the organism has to create specific antibodies. Among these substances are ones which never existed before, because they were synthesized by our pharmaceutical manufacturers

for the first time. An organism can produce quite specific antibodies for most of these substances. These antibodies, or their functional parts, consist of protein and therefore presuppose specific genetic information. But the question is, where does DNA get this specific counter-information against all these foreign substances, especially if the latter never existed before? Could it be that all defensive information against such macrocosmic substances which will only be discovered or synthesized in the future, is already contained in the microcosmic genetic material? This interesting but absurd hypothesis was popular for awhile.²³ But through the work of Tonegawa and others we now know that the organism can carry out an original, creative deed and can code this counter-information for the first time. By means of particular enzymes called recombinases, particular, already existing gene sequences are put together in such a way that a new primary DNA structure is created, which then becomes the information carrier for the desired, specific, primary antibody structure. In accordance with the latest developments one imagines that the organism continuously produces many thousands of such lymphocytes with recombined genes, and that the lymphocytes whose antibodies match an attacking antigen are then selected and multiplied (the so-called clone selection theory).¹⁷

It is clear from what has been said that DNA is an information receiver in the recombination act as such and that recombinases are givers of information for the creation of the new, primary DNA structure. Therefore information first flows from protein to DNA so that later (in the gene expression) information can flow from DNA to the antibody. Thus in the first part of this act, recombinases become a carrier for the recombination law or information according to which DNA will be reconstituted.

Let's look a little more closely at these important, primary information carriers, or recombinases. Where do they get their information? Do they have this right from the beginning or do they acquire it later? If so, where does it come from? Now we know that recombination enzymes have a so-called degree of freedom, that is, they can realize a number of different recombination laws. And this is what the lymphocytes' capacity to produce millions of different kinds of specific antibodies is based on. The recombination enzymes can only actually realize one kind of information in a particular case. But before they do that they are potential carriers of any one of a number of recombination laws. These different informations are not coded in the enzymes to begin with, but the enzymes first become carriers of one, specific recombination information. Why can one say this?

Firstly, because from the work of Karplus, McCammon (1986) and others we know that functional proteins with their spatial, 3-dimensional

structures are not rigid, crystalline formations, but are dynamic and mobile ones, and secondly because from the work of Koshland (1959) we know that the function of enzymes depends on their conformation, that is, on the spatial arrangement of particular amino acid groups in the 3-dimensional structure of these proteins. In other words, if the recombination enzymes are to take on a particular function and are to become a catalyst for the realization of specific information, they must have a particular conformation in each case. They can't be in another conformation at the same time. So if they're capable of assuming different conformations and if their function depends on the respective conformation, then this proves that they only become information carriers for a recombination law when this is actually necessary.

8. Where do the enzymes get their information to work with if it isn't coded in the enzymes or realized in the DNA and thus isn't present in the organism's material at all? We can begin to answer this question if we connect genetics with certain embryological experiments and the investigation of regeneration. For example, let's take Spemann's classic experiments (1936) which have been confirmed many times, and also by other kinds of experiments. If a fertilized, dividing sea urchin's egg is split down the middle at an early stage (between mono cell and the beginning of gastrulation) then what develops from both halves of the division is not two halved organisms but two complete, smaller ones. But if one half of the dividing germ is deliberately injured in such a way that this half atrophies, but stays connected with the uninjured half, then the healthy half begins to develop half an organism. What does this mean? It means that at first all of the organic material was subject to the organic plan but that then—depending on the injury—only half of this material was subject to the same organic plan. In other words, the overall organic information to be realized can obviously detach itself from this shaping of the organic material and can reunite with it in a completely new way. This proves in principle that the planning or regulation of this organic growth comes from a plane which is superordinate to the material substrate. Please note that this statement is not an unjustified hypothesis but that it is based on the preceding and similar phenomena.

9. Now we know that all the cells of this growing germ have the same genome. A young gastrula already has thousands of cells whose line of development in various regions is already determined. This differentiated determination is brought about by the regionally differentiated regulation of

the genomes, which are the same everywhere. This regulation of genes occurs through the mediation of specific enzymes. These enzymes are catalysts for the realization of structural or functional gene information and one can therefore call them the carriers of this information. But as said before, enzymes only become carriers of specific information if they are brought into a certain configuration. And as the example of gene recombination shows, there obviously are enzymes which can become carriers of different regulatory information. According to what has been said so far, where does all the information for gene regulation, and for the planning of all these new organic forms, and for organic growth in general, come from? These items of information come from a plane which is superordinate to organic material (which includes protein and nucleic acids) and it is therefore a non-material plane. This simply follows from the facts if one relates the findings of contemporary molecular biology to those of embryology and of regeneration research in a consequent way.

10. Such a statement about the non-material planning of organic events may sound strange to a modern scientist at first, and make him feel slightly uncomfortable. But this is only true of someone who never stopped to think what information really is. In connection with what we said in the beginning let's make it quite clear to ourselves that it is only the information carrier which is material, but not the information. We can only look at the carrier or the genetic material and proteins outwardly and physically with the aid of our sense organs and other apparatus. But we cannot see the content of information in this way. We can only look at it inside us (that is, spiritually) by grasping it with our thinking. Information is not material by nature. It is ideal. Unfortunately, there are few scientists who really want to understand this fact. But one of them is none other than the father of modern cybernetics, Norbert Wiener (1948), who says that "Information is information, not matter or energy. No materialism which does not admit this can survive today."³⁴ One could hardly point to the non-material nature of information more succinctly. But what does "ideal" mean here?

This question is of the greatest importance for modern natural science, even though this may seem paradoxical to someone who's trying to investigate the material foundations of life phenomena and not their spiritual ones. But since it was precisely through genetics that molecular biology has become aware of the significance of so-called information for the realm of the living, one can no longer avoid dealing with the fundamental question about the nature of information and about the nature of the ideal in general. So please bear with me as we make a brief digression into this area.

Following Kant and Popper one usually says theoretically that ideas are subjective and do not have anything to do with the objects themselves. Laws and ideas are just abstract categories in man's minds but they are useful in bringing order into a variety of initially disconnected sense impressions. Yet this order actually has nothing to do with objects in the sense world. It is only of importance to the subject. The order as such is nothing real. The only real thing is the matter underlying sense impressions.

This is the way one thinks *theoretically*. But it is important to note that in *practical life* one doesn't stick to this theory at all. On the contrary, as a practical natural scientist one looks for laws according to which the world actually functions, and is ordered. If for example, someone investigates the structural law of a snowflake, then as a rule he thinks that the structural law which is found actually underlies the snowflake. Practically every working mineralogist will maintain that the structural laws he has recognized actually underlie the investigated material as a real order. Practically every molecular biologist will declare that building blocks of DNA or protein are really subject to the specific arrangement which has been recognized as the primary structure.

This is the only way one can act in cognitional practices. Cognition would be impossible if the subject's thinking couldn't grasp the objective laws by which the investigated objects are actually ordered. As a matter of fact, every natural scientist is looking for such an objective knowledge. It is still possible to be a Kantian or Popperian, as far as theory goes, but in practice one always acts as if objective materials were actually ordered according to the ideals, laws of nature, or contents of information which one has discovered through one's thinking. Even Popper's thought practice is inconsistent with his theory. For example, when Popper (1976) says that there are no truths but only "psychological hypotheses,"²¹ then his statement is obviously not a psychological hypothesis for him, but a truth. But this cancels his theory.

Theoretically one is a *nominalist*, but practically one is an *idea-realist*. For you see, what we're experiencing today at this important point in scientific evaluation is basically the *modern continuation of the scholastic dispute between nominalists and idea-realists about universals*,³⁵ except that now there's been a switch to the natural scientific front.²⁶

Kant and Popper and many theorizing natural scientists are still offshoots of the *nominalists*. The latter think that ideas and thought contents are only "nomina" or purely abstract schemes with which the subject summarizes and orders the essential characteristics of the object, but these schemes have no importance for the object. Opposed to them are *idea-realists* like Thomas

Aquinas who thinks along the lines of a Plato or an Aristotle. The universals or laws of the world are something spiritual and ideal for the realists. But for the realists this ideal element doesn't only exist in the subject's mind as something abstract, but it also exists outside in the material of the object as something real and concrete. Therefore they are idea-"realists." The matter which is perceptible to the senses is ordered in a real way. But the order as such, or the regular form of this matter is not accessible to sense organs but only to thinking or the capacity for ideas. Nevertheless this regularity which is only accessible to thinking is something real. For form is always the law giver with respect to matter and matter is always the law receiver with respect to form. And since matter is ordered by form in a real way the ideal form in the object outside must be something real, this is something effective¹³ although the same form in the subject is only experienced as an abstract, feeble and ineffective form. Therefore the scholastics distinguished different states of form for the laws or universals.

Since these distinctions are important for our discussion we will list them:

1. The "*universalia in re*": The laws actually working outside in the object.
2. The "*universalia post rem*": The same laws as in 1. but "after the thing," i.e., when it has been recognized by the human spirit and is therefore in the latter's consciousness. It then no longer has an active, concrete form but only an abstract one. It has become a human concept.
3. The "*universalia ante rem*": Again these are the same laws as in the first two cases, but in this state of form it neither works in the thing nor is it thought by me. It is a real form here also, but its work on matter is only "potential" and not "actual."

It is very important for the natural scientist to think about these three states of form and about the reality of laws and regularities. Then he will no longer find it so strange that regularities already exist before they work in matter, i.e., they exist in a purely spiritual sphere which is independent of matter. For instance, what happens to the structural law of a snowflake when the latter melts? It obviously isn't working in this matter anymore.

But is this any reason for the law to stop existing? By no means, because next year more snowflakes will form, and according to the same law. The objectively ideal is a spiritual reality which is self-subsisting whether or not it happens to be realized in the material of the object.

11. With this we come to the last part of our remarks. We want to apply the realistic-idea viewpoint just gained to the problems of structure and information in biology and then draw some consequences from this

for genetics. Thus we will try to look upon these laws as objectively working realities.

As soon as we do this it throws light on the fact of so-called self-organization in nature, which has been fiercely discussed by biologists ever since the work of Eigen (1971), Haken (1977) and others. What does self-organization mean? It means that real nature produces its own order. Under the right conditions matter spontaneously submits itself to a regular form.

Unfortunately, it is a widespread error to believe that the superordinate form can be derived from the subordinate material, and that for example, the forms and laws of living things can be explained by the substances of these things.¹⁸ Polymer chemistry has shown that this is practically impossible.³¹ That this is not possible in principle is shown simply by the categorical relation of form and matter. Matter is always the thing which is regulated and which received the laws, whereas form is always the regulator or the law giver. Form is superordinate, matter is subordinate. It is true that form and matter constitute a unity, but this unity is no uniformity. Form doesn't arise from matter. But since matter is always ordered in a real way, the ordering principle or form as such must be a reality itself, even though it is only experienced as a shadow of a reality or as an abstraction in man's consciousness.

Self-organization always means that an ordering principle spontaneously goes over from the state of "ante rem" to the state of "in re" (only if the necessary conditions are present, of course). A previously potential form becomes an actual one. A new unity of form and matter arises—the newly ordered matter. It is very important to realize that the full reality of this ordered matter is not just the matter by itself but that the real law giver, or form, also belongs to this reality. We can continue to call this unity of form and matter "substance" in accordance with the scholastics' use of the word⁷: Only form makes matter into substance.

Such a substance can itself become "matter" for another superordinate form, whereby a new substance arises which is ordered at a level one stage higher, etc. This is how the manifest hierarchial order of existence has arisen.

What physicists like Primas (1985) and biologists like Mohr (1986) called "emergencies" at the different organizational stages of existence are nothing else than the superordinate, real forms which are realizing themselves anew each time in an already actualized unity of form and matter. Thus each time a new whole with qualitatively new characteristics arises. At each organizational stage of existence laws and orders realize themselves, which were not yet present at the subordinate stages, and which can also not be derived from the latter,²⁰ and yet the actual existence of the subordinate

qualities is in each case the presupposition for the realization of quite specific superordinate qualities.

Thus for example, the properties of pyrite can not be derived from the properties of iron and sulfur, but the law of pyrite can only realize itself in already existing iron and sulfur. Or, the regularity of the tertiary protein structure can not be derived from the regularity of the primary protein structure, but the tertiary structure can only realize itself if the primary structure has already been realized.

One should note that the superordinate order has its own content with respect to the subordinate and coordinated orders and that all these contents realize themselves by going from an “ante rem” state into an “in re” state, if the right conditions are present. Therefore: “self-organization” of nature. Thus the actual effective cause of this self-organization is the effective law itself. The law carrier or information carrier and the enzyme or other necessary conditions are not an effective cause but an indispensable cause. The term “self-organization” is justified because laws are effective realities.

It is not the task of science to reduce (as one says) the characteristics of all organization planes to the laws or even to the substances of a single plane, but it is its task to find the laws or contents of information in each individual organizational sphere and then to further investigate the circumstances of their subordination, superordination, or coordination to or with other spheres. If one works in this way, then one doesn't have to reduce (as one does if one presupposes the central dogma) the entire, wonderful wealth of living nature and also the inner riches of creatures endowed with soul and spirit, to this stunted, even though marvelous DNA substance.

The insight into the reality of laws and regularities will have far reaching consequences for the way one orients oneself in genetics and for the place of this science within biology as a whole.

DNA has its structural laws and proteins have their structural laws. The laws of these two groups of substances can not be derived from each other and they both have contents which are completely their own. These contents are only closely dependent on each other with respect to their realization; this is, the realization of the laws of the one group depends on whether certain laws of the other group have already been realized. In other words, the structural or functional laws “ante rem” of the one group can only be actualized “in re” if specific structural laws of the other group of substance have already been actualized “in re,” and vice versa. In each case one calls the still unrealized laws “information” and one calls the already realized units of matter and form information carriers.

Of course, in addition to the mutual dependencies between nucleic acids and their regulator proteins dealt with in genetics there are also dependencies between all kinds of other substances with which other branches of biology are working today. For DNA is not the only or highest law giving instance as is supposed by the central dogma, but it only codes one kind of information, even though it is a special kind. And again on its part it is dependent on many other information carriers with quite other contents of information. Hormones, neurotransmitters and even something as ordinary as calcium ions are such substances. All things in the organism are mutually dependent and therefore one has to begin to investigate the specific facts of genetics in their relation to the organic whole ever anew, that is one has to synthesize things and not just analyze them.

12. It is often casually said: *The whole is more than the sum of its parts*. This shouldn't be said so casually, but one should become more aware and really think about what one is saying. One then comes to the following: The organic whole is of course more than the sum of its parts, and the organic overall plan is more than the sum of the information in these parts. One can not deduce the information of the whole from the information of the parts. The overall plan has its own content, which is different from the content of its parts, and this overall content is superordinate to all partial contents. The overall plan is the reference law by which all these parts and the realization of their information are continuously regulated, with a view towards the whole, and namely in a real way. This superordinate overall law is an effective law. Its effect consists in inducing and coordinating the realization of the partial laws in the spatial and temporal order. The highest law giving instance is not the subordinate DNA material, but it is this order which gradually realizes itself—which is also the previously mentioned planning organization of the organism. This is also proven by a number of recent genetic experiments because they show that significant, spontaneous mutations are not a product of so-called chance, but that the organism induces these mutations itself through enzymatic management.^{2, 3a}

And now I will say something which may surprise you but which should nevertheless be said here, namely, that this overall plan of the organism which works on typical organic things in a real way is nothing else than what Goethe calls the type or the entelechy of the organism.⁹ This superordinate law was the main thing which occupied Goethe in his natural scientific investigations about organic formations. Goethe was the first to develop the natural scientific method for the investigation of this entelechy, and he also obtained a few initial results with it.²⁵

Goethe's work was later misunderstood, and little further experimental work has been done with his method because one was taken in by Kantian nominalism, and one directed one's gaze one-sidedly to organic material and one therefore increasingly lost sight of the organic form, which is an equally justified object of science. One result of this development was the central dogma of genetics around the middle of the 20th Century by which all organic processes are ascribed to matter or to the genetic material.

Through genetics biology has again become aware of certain connections between matter and form. Biological information is nothing else than real formative principles, structural laws, or functional laws which are in-"form"-ed or imprinted into matter.

It is necessary today to see that information has an ideal character and that this ideal is not just something subjective, because it can be thought in me, but that it is something objective, and that matter outside is actually ordered by it. If one also sees that these ordering principles obviously have the power to realize themselves in matter, if conditions permit, then one has arrived at an insight into the effective nature of these objective, ideal elements. Then one realizes that all of these laws accessible to scientific cognition which actually work in nature and order it and shape it in such a wonderfully complex way, are ideal and real elements, which are a spiritually real something which underlies matter as form. And therewith one has gone over to a modern natural scientific law-realism.

This law-realism or idea-realism is the only thing which will make it possible to pursue modern biology in a satisfactory way. What is unsatisfactory about biology today is its fluctuation between an unnecessary materialism and an unjustified spiritualism which is hostile to science. Some people obstinately want to explain life from matter with the aid of speculative ideas about chance, and others who are dissatisfied with spiritless reductionism want to explain life in a new way with some kind of transcendental principles which are supposedly inaccessible to scientific cognition.²⁸ But in the future it will be necessary to steer between this Scylla and Charybdis of scientific thinking: This is only possible if the exact investigation of organic forms which was inaugurated by Goethe is extended in harmony with the investigation of organic matter which has developed in such a marvelous way since.

This is the result of a more encompassing thinking about the central dogma of genetics which has long since been refuted by the facts.

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Need for Rhythm Studies in Anthroposophic and Goethean Science*

GUNTHER HILDEBRANDT

In early 1996, at a conference held at the Goetheanum, a “group for rhythm studies” was proposed to consider the significance of rhythms in man, earth and cosmos. The background to this was a statement by Rudolf Steiner that true science would mean penetrating the rhythms in nature. (GA 184, 1918)

On the initiative of Prof. Gunther Hildebrandt of Marburg, Rolf Dorka of the Carl Gustav Cams Institute in Öschelbronn, Dr. Michaela Glöckler from the Medical Section and Georg Glöckler of the Section of Mathematics and Astronomy at the Goetheanum, chronobiologists from the fields of medicine, biology, and forestry and agriculture had a first study session at the Carus Institute in September 1996. Prof. Hildebrandt’s introductory lecture is given below. Individual members of the group then presented their research relating to biorhythms. The meeting concluded with a general discussion in which it was agreed to meet regularly in future. The next meeting on 24 and 25 October 1997 was held at the Carus Institute in Öschelbronn. Reports given by the lecturers and individual members of the group on chronobiology studies are available. For further details contact Rolf Dorka, Carl Gustav Carus Institute, An Eichhof, D-75223 Niefern-Öschelbronn, Germany. Tel. +449 7733/6 84 27, fax /6 84 13.

Systematic development of chronobiology, the scientific study of rhythms, did not begin until the 1930s. An international society for biorhythm studies was established in Sweden in 1937; it was interdisciplinary from its inception. (Menzel 1987) Today, several national and international agencies exist in this specialized field, and some universities have established chairs and institutes of chronobiology.

In biology and medicine, it is increasingly apparent that the time organization (time structure) of vital processes is complementary to the spatial and morphological organization of life forms. Chronobiologic research

*Original title: Rhythmusforschung als Aufgabe einer anthroposophisch-goetheanistischen Naturwissenschaft, *Der Merkurstab* 1997; 50: 329-36. English by A.R Meuss, FIL, MTA.

has shown that practically all biologic functions follow rhythms and show periodicity. The duration of periods for different functions covers a wide spectrum ranging from rhythms with periods of about 1/1000 sec to others that take years.

In certain areas, biologic functions are demonstrably connected with geo-physic and cosmic environmental conditions; in other parts of the spectrum, rhythmic functions show an autonomous internal order.

The mechanisms that determine environmental conditions (time setting effects) are the subject of intensive and successful investigations. Work on the inner ordering principles of and interactions among rhythmic time structures has been less extensive. However, considerable efforts have been made to establish the mechanism of the organism's internal clocks in their molecular biologic aspects, and these have received more attention in chronobiologic research. Practical applications of knowledge gained in various areas of chronobiology have become increasingly more important, especially in clinical medicine, preventive industrial medicine, ecology, pest control, and so on. Special fields such as chronotherapy, chronopharmacology, chronotoxicology, chronohygiene and others have been identified. (For literature review, see Hildebrandt 1981.) There is some justification in asking if the science taking its orientation from anthroposophy and Goetheanism can and should add anything to the work done in chronobiology and chronomedicine, which have already gained general acceptance.

Rudolf Steiner spoke about cosmic and human rhythms in his lectures. The subject was even discussed in the lectures he gave to building workers. Steiner had begun to work with this theme in the first decade of this century, distinctly prior to the chronobiology work done in conventional science. Should one consider his concern and efforts in this direction to be merely those of a forerunner, or did his work offer specifically anthroposophical and Goethean approaches and challenges for a rhythm research with potential for the future?

It is possible to identify at least five aspects in Steiner's statements on the subject that indicate a special anthroposophic approach in rhythm research. As we consider these below, Steiner's words will be referred to in given cases.

Outstanding significance of rhythm research

It is well known that when a student asked Steiner: "What is life?" the answer was: "Study the rhythms!" In his lectures, he put it like this: "Rhythm is implanted in matter by the spirit; man has rhythm as a legacy of his spiritual origins." (Berlin, 21 Dec. 1908) "And the whole of human nature would become clear to us exactly through these rhythms, through the mysterious internal arrangements." (Berlin, 12 Jan. 1909)

The following formulations, given in 1918, are unequivocal and indicate the direction to follow: “You only have rhythmic processes in nature, none that go on *ad infinitum*; you only have something that rhythmically returns to itself again... If people ever give up looking for things immediately apparent to the senses and make this the basis of our natural world, they will discover something very different. They will find rhythms everywhere in nature, rhythmic arrangements... The whole of life is rhythmic. True science will be to penetrate the rhythms in nature.” (12 Oct. 1918)

At the Rhythm in Cosmos, Earth and Man conference, organized by the Medical Section and the Astronomy Section at the Goetheanum early in 1996, these formulations led to the creation of an anthroposophically-oriented study group for rhythm research to bring together groups of scientists working in different places to share their views and research.

Rhythm studies give complete pictures

Anthroposophically-oriented rhythm research calls for a Goethean approach. Steiner asked us to “gain a complete picture of the whole human being... I would say that the course of the day is one such complete picture. It may sound odd when one hears it for the first time, but in some respect the course of the day sums up a number of natural laws that are around us, making them into a whole. Processes simply occur in our environment and in us in the course of the day that, if considered in isolation, divide up into all kinds of physical and chemical processes and so on. We may say that the course of the day is a kind of time organism that includes a number of natural processes which we are also able to study in isolation. The course of the year is another, greater whole... To avoid having the kind of abstract relationship to his natural environment that comes with the definition of physical and chemical experiments... a person should have the organism presented to him which is the course of the day and the organism which is the course of the year.” (29 Dec. 1922)

Clearly, the kind of picture gained in rhythm studies is not limited to the rhythm of the day or the year. In principle, it can be found for every rhythmic process. As this is particularly important from a methodological point of view for our group, a concrete example of finding a complete picture is shown below. It is the daily rhythm of the human temperature organization.

Figure 1 shows the familiar daily changes in core body temperature in its upper part and the diurnal changes in cutaneous circulation in different parts of the body; essentially these correspond to the skin temperature.

Two fundamentally different constellations of these parameters may be seen. In the afternoon half of the biological day (c. 3pm–3am), the organism

shows a tendency to lose heat, with the core temperature going down and cutaneous circulation in the extremities (hand, foot) increased to give off more heat. In the before-noon half (c. 3am–3pm), the core temperature rises, with circulation in the extremities decreasing so that less heat is given off (warming up). The extremities are the main effectors in physical temperature regulation, apart from anything else for geometric reasons (large surfaces, small volume), whereas cutaneous circulation in the head region (more spherical) is congruous with the core temperature.

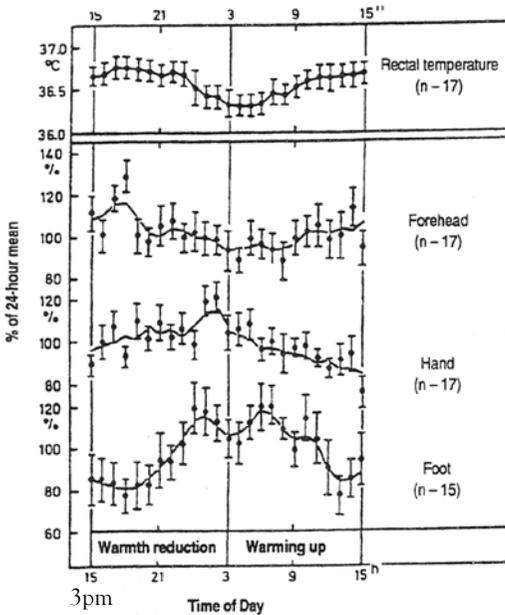


Fig. 1. Mean daily changes in cutaneous circulation on forehead, hand and foot of 17 subjects monitored at hourly intervals under the same resting conditions in an air-conditioned chamber and compared to the rectal temperature. The curves for hourly mean values were smoothed once by means of moving the averages of three. The bars indicate the median error range for the mean values. (after Damm et al. 1974)

These basic aspects of the daily rhythm in the human temperature organism have been known for more than 50 years and widely investigated, yet no reference has been made to them in the anthroposophical literature. (Penter 1996)

To gain a complete picture of rhythmic daily changes in the human temperature organism we have to include many other functional parameters. While these are more or less directly in complex relationship with the temperature changes, they do all fit into the rhythmic changes with the two polar functional trends of 'warming up' and 'warmth reduction'. Table 1 gives some examples. A careful review of existing chronobiologic literature will certainly help in developing complete pictures of a wide range of rhythms.

Rhythmic system – time organism – time body

To my knowledge, Steiner was the first to speak of a rhythmic system that included all the rhythmic processes in the organism: “The second system I then distinguished was the human rhythmic system. This includes everything at the functional level which is subject to rhythm. In the first place, this would, of course, be the respiratory system in conjunction with the blood circulation system and then also, in a wider sense, the rhythm that plays a major role for human beings (at least in essence, for individuals may break it in many ways) which is the day and night rhythm, sleeping and waking, and also any other rhythmic processes, including food intake, and so on.” (28 Oct. 1922, Stuttgart)

This complex time organism (time body, time form) was seen as part of the etheric organization (ether body). In modern chronobiology and chronomedicine, the fact that organisms have a broad spectrum of rhythmic functions, which are in a regular functional relationship has only been considered in passing. Even the polarities in the time organism, which are of eminent importance for understanding time organization, have so far attracted little attention, let alone understanding.

	Warming up ergophase (c. 3 a.m. - 3. p.m.)	Warmth reduction trophophase (c. 3 p.m. - 3. a.m.)
Ideal core temperature	+	-
Regulating Prevalence of behavior behavior regulation	-	+
Core temp. deviation from ideal (load error)	+	-
Sense of comfort/discomfort	-	+
Physical Autonomous sensitivity regulation to heat stimuli	-	+ (dissipating
Autonomous sensitivity heat) to cold stimuli	+	-
Autonomous thermo indifference zone	+	-
Consensual vasodilatation	-	+
Consensual vasoconstriction	+	-
Diuresis	+	-
Hydremia	-	+
Liability to sweat	-	+
Insensible release of water from skin	-	+
Acral heat transmission	-	+
Acral skin circulation	-	+
Acral skin temperature	-	+
Chemical Efficacy of regulation muscle work (heat Long-term ability to perform	-	+ production)
Muscular circulation on effort	+	-
Muscular circulation at rest	+	-
Reactivity of energy metabolism		
Muscle tone, cold tremor	+	-
Spec. dynamic action	+	-
Basal metabolism	(+)	(-)

Table 1. Diurnal phase trends for thermoregulation in man (after Hildebrandt 1984)

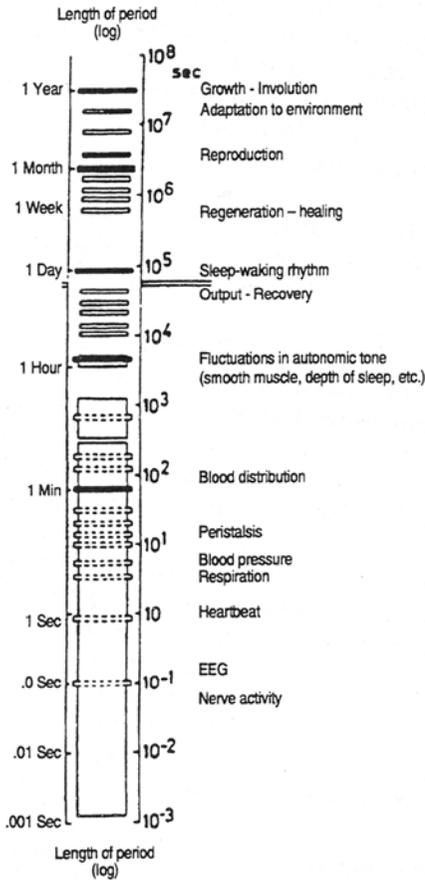


Fig. 2. Preferred periods (frequency bands) of human rhythmic functions. The stable frequency bands of spontaneous rhythms have been emphasized. The double horizontal line separates environmentally-determined long-wave (infradian) and purely automatic (ultradian) rhythms. (after Hildebrandt 1975, adapted)

Figure 2 shows a spectrum of periods for the rhythmic functions of a human being. A hierarchic structure exists insofar as the rhythmic processes get more and more complex as the period increases, progressing from cellular, tissue and organ rhythms to rhythmic variations involving whole systems (circulation, digestion) and changes in the whole organism (e.g., diurnal, monthly and annual rhythms) that involve all functions. Monthly and annual rhythm as fertility and population rhythms go beyond the individual organism.

The internal structure of the time organism shows a division into two (double horizontal line). The range of long-wave rhythms involves processes that have corresponding rhythmic time sequences in the geophysical and cosmic environment and can have a regulative (synchronizing) effect on biological rhythms.

The part of the spectrum where waves are shorter (below the double horizontal line) is limited to purely endogenous rhythms that have no direct relationship to environmental time systems and represent the autonomic part of the time organism in life forms.

Plants, animals and humans have different areas of emphasis in the total spectrum of rhythmic processes. With plants, emphasis is on the annual rhythm (annual plant type) and longer periods of planetary rhythms in the cosmos. In the animal world, and especially among marine animals, lunar rhythms, including the tides, are particularly marked; while among higher animals and in humans, the emphasis is on diurnal rhythms. This phylogenetic developmental tendency with functional rhythms of higher frequency increasingly more developed is apparent in the growing prevalence of rhythmic nerve functions.

The genetically-determined provision of rhythm spectra ('chronomes') taking specific forms relates to the following words by Steiner: "We can divide the animal world into genera on the basis of rhythms, depending on how the rhythms of the astral bodies relate to those of the ether bodies." (21 Dec. 1908, Berlin, and 2 July 1923, Dornach) No data are so far available on this.

A particularly important aspect is Steiner's repeated references to the way the autonomic rhythms are related in humans. This applies, above all, to the relative frequencies of functions. The best known references are those to relationship of the frequencies of the pulse and respiratory rhythms, reflecting an inner equilibrium between the higher and lower aspects of the human being. The data now available have confirmed and, in many ways, extended this characteristic.

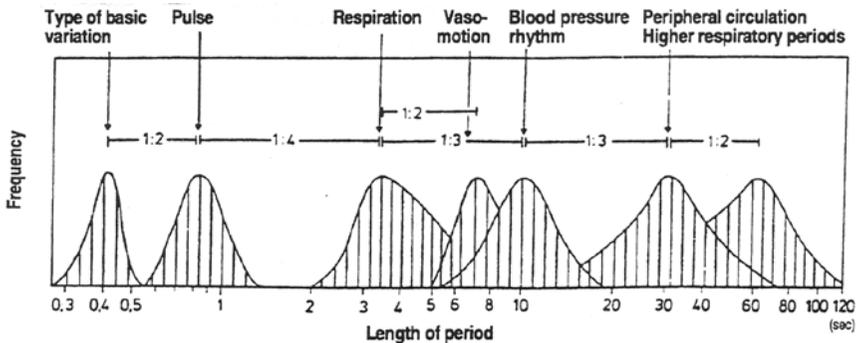


Fig. 3. Frequency distribution of periods for different circulatory and respiratory rhythms in relatively large groups of people. The relative proportions given apply to peak incidences of rhythmic functions. (after Hildebrandt 1967, with additions)

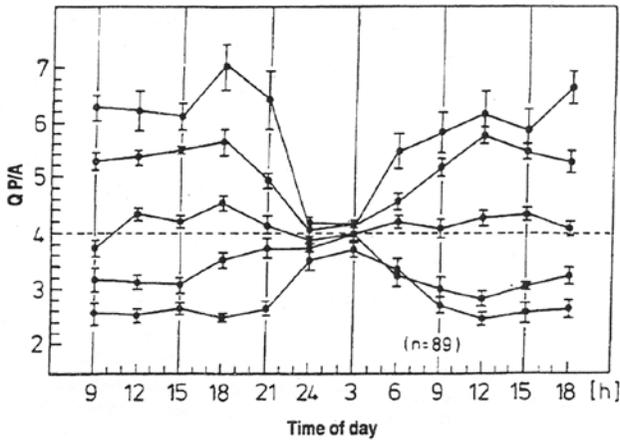


Fig. 4. Mean daily patterns of pulse-respiration frequency quotients (Q P/A) of a total of 89 healthy subjects divided into five groups according to their mean 24-hour readings. The cross bars indicate the mean error range for the mean values. Note night-time normalization between midnight and 3am which occurs irrespective of the direction taken by daytime variations. (based on data provided by Pölimann, from Hildebrandt 1994)

Figure 3 shows empirically-recorded frequency distributions between different circulatory and respiratory rhythms in man. The peaks, marked preferred frequencies or statistical frequency norms, are all in simple, harmonious, whole-figure relationships with one another, with the relationship between pulse and respiratory frequencies, which is considered normal, just a section of this whole musically-organized part of the rhythmic system.

The data represented in the figure merely show the characteristic in statistical cumulation. They were obtained from people who were resting but awake in the daytime. If one studies the frequency relationship between cardiac and respiratory rhythm further, into the night, using the pulse/respiration rate, the normal 4:1 quotient becomes more precise during sleep (normalization) independent of the daytime changes which show considerable individual variation (Figure 4). This is independent of the deviation seen in the day and independent of the individual frequency level of the pulse rate.

Spectroanalytical investigations on sleeping subjects have shown that this whole-figure 4:1 relationship is also seen with other rhythmic functions. It is evidently an important precondition for nighttime regeneration of the organism. (lit. review, see Hildebrandt 1994)

Apart from frequency relations, the autonomic order of rhythmic functions is also maintained by phase relationships. Steiner spoke of “...

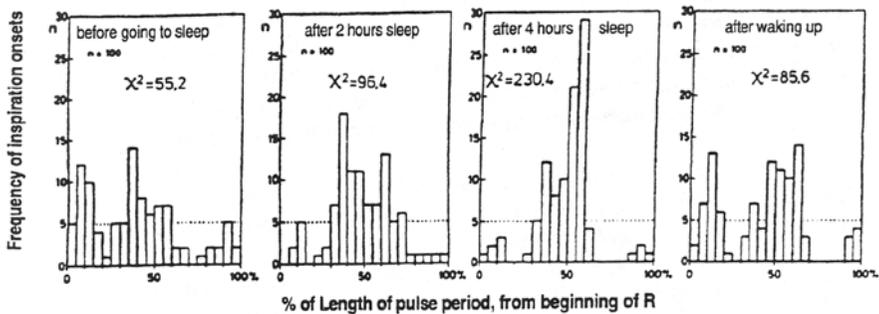


Fig. 5. Frequency distribution of 100 inhalation onsets each plotted against cardiac cycle. This was determined between R and R in the ECG and divided into 20 classes of 5% of the cardiac cycle period each. Healthy subject, before, during and after nighttime sleep. Chi-squared equals the extent to which distribution deviates from equal distribution over the 20 classes (dotted horizontal line). (after Storch 1967)

points of coincidence (phase superimposition points) that could be found for all kinds of human vital phenomena.” (12 Jan. 1909, Berlin)

Figure 5 shows frequency distributions of 100 inspiration onsets, each plotted against the cardiac cycle which was divided into classes of 5% each of the cycle period. This was recorded before, during and after nighttime sleep. In the waking state, inspiration onsets were more or less distributed at random over the cardiac rhythm, but during nighttime sleep they concentrated increasingly on a particular section of the cardiac cycle. Many instances of such phase coupling between rhythmic functions have been established, above all between autonomic and motor rhythms. Further investigation of such relationships and the practical application of insights in diagnosis and treatment are no doubt an important area for future work in anthroposophically-oriented rhythm research.

Relationships between rhythmic system and macrocosm

The relationships of long-wave biologic rhythms (diurnal, weekly, monthly and annual rhythms) are mainly investigated for synchronizing influences in chronobiology, with the effects of visible light considered to be of major importance. The development of these biologic rhythms is seen as the outcome of an adaptation process which enables organisms to initiate effective rhythmic changes at the right time (“adaptive rhythms”) independent of the actual situation (e.g., weather).

Steiner spoke of this from a more comprehensive point of view: “The rhythmic element in the four bodies (aspects of the human being) was

implanted in man over long, long periods, with the hierarchies bringing it about that the different bodies can influence one another... And we would recognize the rhythm of our human aspects in the movements of the heavenly bodies, which make a complete system.” (20 July 1923, Dornach)

Steiner specifically related the individual rhythms of the four aspects of the human being to environmental rhythms as follows (20 July 1923, Dornach):

physical body	annual rhythm
etheric body	monthly rhythm
astral body	weekly rhythm
I organization	diurnal rhythm

Long-wave rhythms modulate more short-wave rhythms in any time organism. The time relationships between the aspects of the human being would thus be as shown in Figure 6 relative to the total spectrum of rhythmic functions. The rhythms of individual aspects interpenetrate completely in

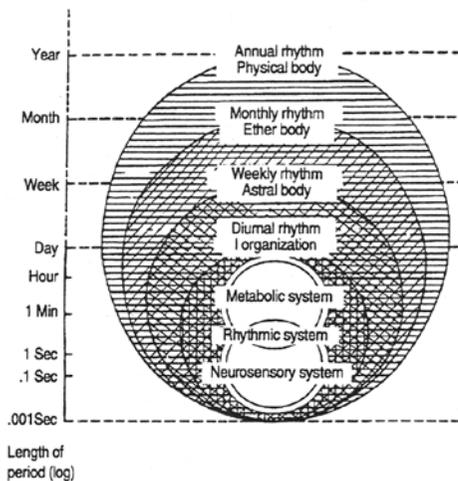


Fig. 6. Diagram to show interaction of cosmically determined longwave rhythms in man. In the region below the diurnal rhythm, all functions are influenced by all four rhythms and organize themselves in a threefold time organism (after Hildebrandt 1986).

the region below the diurnal rhythm, creating a complex, four-level environment that is influenced by cosmic elements. Within it, the more short-wave autonomic time structures are able to form a threefold organization. (Hildebrandt 1994)

Distinct time relationships also exist between long-wave cosmic time systems and the rhythms of autonomic functions. This was known to romantic natural philosophers. (Schubert 1821, 1877) Steiner gave them special emphasis to demonstrate the relationships of which he was speaking: “If human beings reach an age of about 72 years, they have lived 25,920 days. That is the normal

life span of a human being. And if you measure, count the breaths a human being takes, you find that he takes exactly that number of breaths in a day. Someone who lives a normal life span thus has as many days in life as breaths in a day.” (20 July 1923)

Such a clear statement does, of course, ask to be checked, especially as the normal respiratory rate given for adults in physiology textbooks does not agree with this at all, probably for methodological reasons, as the usual methods of measuring the respiratory rate either change respiratory flow resistance or may result in respiratory changes due to psychological reasons.

Investigations of the diurnal rhythms of respiratory rate have already shown that the required norm of 18 breaths/min. is possible. (Hildebrandt 1953) Later determinations of the regulatory optimum frequency as a criterion for the norm have substantiated this. (Hildebrandt 1960) Another finding in support of this is that the minimum energy expenditure in spontaneous breathing is in the range of this normal frequency. (Comroe 1968) (Figure 7)

In connection with the clearly demonstrable normal pulse/respiration ratio of 4:1 and numerous other frequency relations with whole-figure harmony (Figure 3), we have definite, empirical proof of a relationship between the human autonomic time organism and the cosmos.

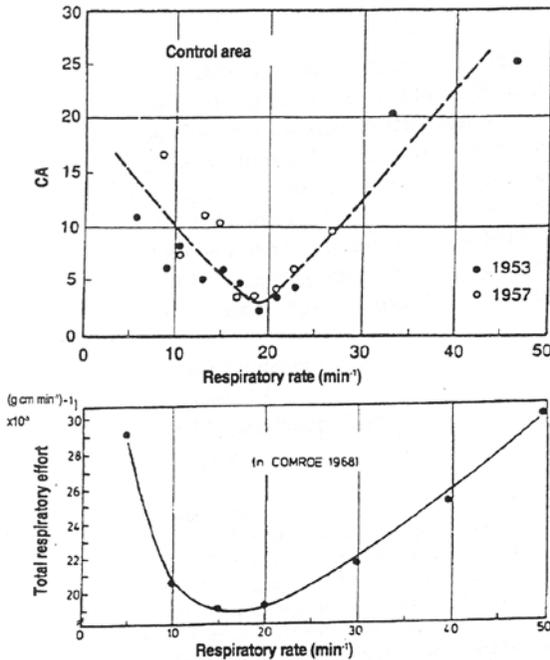


Fig. 7. Above: Control area (CA) of respiratory frequency control following graded stepping effort in relation to respiratory rate at rest prior to effort. Two sets of data (after Hildebrandt 1960) Below: Total respiratory effort in relation to respiratory rate (after Comroe 1968)

There are, however, variable degrees of freedom in this system which developed in the course of evolution: “In the past, up to about the middle of our earth evolution, man was much more in accord with the rhythms in the outside world in all his parts. ... In Lemurian times, it was perfectly normal for human beings to have their internal rhythm based on the external rhythm. ... Since that time things have come to overlap. The inner human being has grown independent of the external rhythm. He has kept his old rhythm inwardly. It is exactly because the rhythms no longer coincide that man has gained independence and freedom.” (21 Dec. 1908, Berlin, and 20 July 1923, Dornach)

Numerous experimental studies in modern chronobiology, eliminating all environmental factors, have substantiated this non-agreement between the inherent frequencies of biorhythms of plants, animals and humans and corresponding environmental rhythms in many respects. These findings have not, however, been evaluated from the evolutionary aspect of developing autonomy.

Rhythm research and human evolution

As Steiner stated on many occasions from 1908 onward, the work to be done in anthroposophically-oriented rhythm research goes well beyond our understanding of the present situation for it will have to provide a basis for the future task of humanity, which will be connected with the whole cosmos. “Man has grown more free of the cosmic influences in his environment.” (21 Dec. 1908, Berlin) “Man would never have gained independence if everything he did had been on the leading reins of cosmic conditions. He gained his freedom because he retained his inner rhythm, getting free of the external rhythm. He has developed and become like a clock.” (12 Jan. 1909, Berlin) “The least of it is that people turn night into day in our cities. What is much more important is that humanity has inwardly torn itself away from the great cosmic rhythms in its way of thinking.” (12 Jan. 1909, Berlin) “We thus see that in order to gain his freedom, man had to come free of the original rhythm. But he must find the laws again in himself, so that he may regulate the clock, regulate his astral body.” (12 Jan. 1909, Berlin) “It is also important that people should not think they can live without rhythm. Having developed their own inwardness separate from the outside, they must recreate themselves in their rhythms from the inside.” (12 Jan. 1909, Berlin) “Man must develop inwardly to the point where he lets his own rhythm go out into the world again.” (12 Jan. 1909, Berlin) “Human beings have emancipated from the outside rhythm. With the science of the spirit, in its true sense, they go back to having rhythm again. Out of our own

inner resources we build a world that has the rhythm in it.” (12 Jan. 1909, Berlin) “In terms of numerical relationships in large numbers, the future created by man will show the same—as the cosmos did in the past—but at a higher level. Human beings must therefore bring the future to birth out of themselves, out of the number principle, as the gods created the cosmos out of the number principle.” (12 Jan. 1909, Berlin) “One day man will also apply his own rhythm to the world, when he has reached the divine level.” (21 Dec. 1908, Berlin)

Rhythm studies using the anthroposophical and Goethean approach will have a role in developing the foundations for such human evolution.

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Scientific Hypotheses – Truth or Error?

DENNIS KLOCEK

If one were to approach a professional scientist and challenge the hypothetical method as a flawed premise for good science, one would surely be met with vigorous protest. And, indeed, the protest would be well founded, because the hypothetical method is a well-proven cornerstone of scientific work. Scientists who are challenged on this point are quick to point out the effectiveness of finding a hypothesis and then setting about trying to prove or disprove it on the basis of experiment.

In the realm of pragmatic physical science this is a most effective strategy for guiding research. However, if one challenges the method on the basis of its creative potential, it soon becomes obvious that even the creative researcher has no real insight into the pre-hypothesis mindset but that most scientific research focuses on the post-hypothesis methodologies. In other words, how a researcher actually goes about forming a hypothesis is of less interest than the subsequent experimental strategy brought into motion by the emergence of the hypothetical concept.

Methods for giving birth to scientific ideas range from the realm of happy accident (many) to the eccentric (hot baths, kite flying, high-speed driving) to the arcane (ouija boards, UFOs). In such a diversified field of possible sources of inspiration it may be advantageous to first try to characterize the differences between creative thinking and personal fantasy.

Creative thinking often eludes the grasp of the intellectually-fixed abstract thinker. It is, however, a definite type of thinking, a cognitional state. One way to look at the fundamental difference between creativity and fantasy is that creative thinking is capable of improvisation, and fantasy is a form of cognitional stagnation. There is an obsessive rhythm that permeates the experience of personal fantasy. As thinkers, fantasy does not leave us free to pursue concepts in a fluid manner.

Goethe recognized this aberration by making a distinction between concept and idea. In Goethe's view the formation of concepts was primarily the function of the intellect. In forming a concept the intellect was called upon to take a sense impression into a higher cognitive state in which the archetypal laws that are at work behind each phenomenon are touched by

the day working consciousness. It is in these higher realms that the laws of Nature reside.

The energy patterns that guide and form the physical manifestations of the sense observable world have their source in these archetypal realms. A scientist who is working to penetrate into the behavior of matter in various conditions finds it a necessity to be able to penetrate with willed thought into these archetypal realms.

An original scientific idea must go through a stern testing by the intellect, which must form an onlooker consciousness which becomes disassociated from the phenomenon and the Idea. The degree of detachment present in the intellect is considered a fair measure of the objectivity of the researcher. This in theory is the way in which most experiments are to be conducted. In the human soul, however, there are a number of polar states. One pole, according to Rudolf Steiner, is the pole of intention or will.

In the will pole can be placed other polar forces of sympathy and antipathy. In scientific research objectivity is considered to be attained when sympathy, or subjective identification with the phenomenon, is held in abeyance. In the scientific onlooker consciousness the analytical force of antipathy is considered to be the only viable tool in the pursuit of objectivity. Subjectivity or sympathy is regarded in science as a kind of tinkering and adjusting of the experimental data in order to better fit the pre-formed conclusions of the researcher. Truly objective research moves forward when the antipathy blooms into intellect. This allows the thinker to reach the realm of the pure concept. The need for the soul to balance the antipathy with sympathy is then experienced in the subsequent experiment, the “doing” of the work. If the alchemy has been successful, then the work rises to a higher stage wherein the soul power of transcendence begins to form universal concepts that are provable through corroboration by other researchers who can duplicate the experiment. This proving puts the results into the thought realm in which the essences and primal laws that govern earthly phenomena are revealed. Briefly put, this is the true striving of scientific work. Having risen above simple likes and dislikes, the thinker begins to see the world as it is, unencumbered by personal fantasies and prejudice. Attainment of this level of cognition is known in anthroposophy as Inspiration.

The seeds of this mode of cognition were developed by systematic thinkers during the Vedic ages. Philosophies and epistemologies of diverse sorts all take root in the sublime cognitive states of Inspiration. Today’s scientific rigor and the accomplishments of analytical thought are a result of thinkers reaching this inspired level of cognition.

However there is an inherent danger in the pursuit of pure thinking. The danger centers around the relationship between human will and Divine Will. In pre-historic times the human capacity for thought was embedded in the will currents of the Universe. Human will and Divine Will flowed in the same streams of consciousness. This state of consciousness can be characterized as intuition. The human consciousness is at one with God consciousness. After the temptation and subsequent fall into matter and individuality human consciousness felt the separation of its forces from the forces of the Godhead. In order for individual selfhood to arise it became necessary for human currents of will to be reversed from the original thoughts of the Creator and focused upon the Self.

According to Rudolf Steiner during Vedic, Persian and Egyptian times the transformation from a God-centered consciousness to an earth-centered consciousness was effected. In effect, human consciousness is like a swirling vortex in a great stream. The vortex sustains its own "selfhood" in the face of the prevailing motion of the whole. Within this vortex of selfhood the flow of the Divine Will is suspended in favor of a self-sustaining internal confluence of past- and future-oriented currents.

Into the center of the vortex flow the forces of the reversed will stream of the individuality. These move quickly from the future filled with limitless potential into objects of desire. Then these forces move through the fleeting present pleasures of fulfilled desires into the past memories so poor in psychic power.

The vortex of "selfhood" arises where the reversed will currents meet the progressive force of Divine will, which originates in the past as the original Divine Word, and works powerfully into the future as deeds of creation. In the human soul the progressive force is found in the capacity of willed thinking. Through willed thinking the human being can create a new future out of past failures. The tension between these two currents gives rise to the vortex of the self which maintains its integrity against the general flow of the great stream of Divine Will.

This vortical confluence can be characterized as human consciousness. The consciousness is a dynamic balancing of currents that gives rise to a formation capable of uniting past and future, above and below in a rhythmical, breathing interplay.

The center of the vortex is oriented toward this motion of the whole current even out into the periphery. In past times and at present in the state of Intuition, the human consciousness can resurrect these peripherally-centered powers and reflect the broadest, most cosmic aspects of reality.

Surrounding the vortex are currents which continually pulse up and down around the vertical axis. Psychically these currents can represent the integrative forces of Inspiration which periodically connect the higher self with the lower self. In esoteric terms these selves can be imagined as two eyes, one higher and one lower. Each sees into its own world. The task of the seer is to unite these two eyes into one whole vision. The vertical orientation of the vortex of consciousness facilitates the union of the two “eyes.” Finally, the vortex creates an area of low pressure in the center to which it draws in objects arranged at random in its environment. It is with this image that we can return to modern science.

The hypothetical method is designed to arrange these seemingly random bits of world flotsam into manageable units. The mind, by virtue of its power of thinking, partakes of the future-oriented, progressive current in the soul, pulling into focus objects placed at intervals in the field of consciousness. When the mind serves in its primal function, it does just this. It can bring forward previously learned concepts, arrange them and then pass them on into the future where they go out of the field of day consciousness and into the hands of the Godhead.

A problem arises, however, when the consciousness infused with self will draws premature conclusions out of the arranged concepts held in the vortex of the day consciousness. The attachment that the “I” then places on the objects in the field of consciousness rises too much out of the sympathy of the will force in the lower self. The concepts formed by the consciousness are then transformed from living, future-oriented units of meaning into dead, past-oriented objects of cognition. The cognizing slips from future to past, and the interest of the consciousness dims into reflected memories.

In terms of the vortex of consciousness the vortex has pulled in so many items that are held in its grip that its force is impeded. It changes from a dynamic, vertically-breathing vortex into a sluggish, debris-ridden eddy, a stagnant backwater isolated from the main evolutionary flow of Divine Consciousness.

In scientific terms, the hypothesis already is filled with conceptual detritus. The intellect, suffused and enamored of its own conclusive power, reaches out into its storehouse of facts and constructs a new arrangement pregnant with experimental possibilities. This in itself is not true Inspiration. The intellect has simply arranged concepts into a new innovative order.

The error lies in the formation of a conclusion that is provable only to empirical experiment, for in the formation of the experiment the intellect has overstepped its primal function. It is in this context that Goethe made his distinction between intellect and reason. The intellect can only order

and analyze the data. It cannot really draw conclusions. The conclusions are inherent in the ideas of the Godhead. These sublime ideas could be pictured as concepts of concepts or constellations of cognitive feelings. Only through reason can the mind approach the Idea. The intellect simply cognizes the objects in the field, the reason cognizes the field and its field of relationships. The original hypothesis that constellates into the mind of a thinker is actually the inspired door to a whole nexus of concepts that constitute the Idea. To immediately employ the intellect to form a train of experiments closes the door on the future orientation of the thought life and banishes it into the backward-moving currents of the individual's self will.

Through vigorous self-observation of cognitive states any scientific thinker can corroborate these perceptions. The mystery and magic of the initial "Aha!" moment of the formation of the hypothesis immediately dims into the "post-hypothesis-partum blues." Where is the delicious joy of discovery, the sense of working one-on-one with the Godhead? And what of the disappointment when the experimental data further tarnishes the initial shining insight? Do we resort to "curve ironing" and other devious ploys of the intellect in order to keep the mind engaged, or is there another strategy that can be employed in stalking ideas?

Creative inspirational thinking springs out of the practice of the essence of mathematics. The inner experience of the proper mathematical unfolding of a phenomenon is a grounding experience for the consciousness. Through this grounding the mind is able to lift its focus of activity into the realm in which the consciousness of the Godhead divines the laws of the world. It is this grounding and ordering of the phenomena that creates the capacity for a scientist to receive creative Inspirations. After an intense effort of concentration aimed at ordering the phenomena the mind must relax. The relaxing allows the mind to lift into the realm of Inspiration where it can listen to the super-conscious melodies that lie behind the world's manifestations. It is at this point where the intellect must give way to reason. For the intellect can only work in the formation of concepts. The intellect fades in the perception of the living ideas that are the source of the concepts. The light from the source is much brighter than the small lantern of the intellect. The cognitive mode must shift from one of intellectual forming or "speaking" into reasoned listening. The mind trained by logical mathematical principles must recognize not the computative aspects of the mathematics but the spiritual creative aspects emerging out of the mathematical ordering. Instead of speaking about all that it has gathered, it must be silent and listen to the real message coming toward it from higher realms.

Modern science here makes an error from the viewpoint of spiritual science. The new hypothesis given to a thinker is but the tip of the iceberg of constellated ideas. To immediately attach the insight gained by the hypothesis to an experimental method forces the mind to enter into a speaking mode. The experience of the numinous character of mathematics becomes muddled in the computational “speaking” mode of the experiment. The results from such experiments are simply dim reflections of the sublime mysteries of the higher realm of cognition. The mind, like a vortex, becomes clogged with the factual flotsam produced by the experiment and is thereafter encumbered in its ability to rise into higher realms of Inspiration. The mind becomes enmeshed in the facts swirling around the phenomenon, and the actual phenomenon itself becomes obscured by the hypothetical construct formed as an abstract model for the experiment. The essential sacredness of number is abstracted into fixed mathematical laws that appeal to the intellect but leave the heart in hunger. The hypothesis then becomes a prison and actually works to obscure the mind from its source of inspiration. To be more exact, the forming of the hypothesis acts in this obscurative way, the experience of the hypothesis still remains numinous.

The formed hypothesis creates an artificial system of logical relationships—atoms, molecules, etc.—that reflect higher laws. The intellect can easily grasp such metaphysical systems and use its innate ordering power to juggle symbols into new hypothetical configurations. These metaphysical abstractions may be capable of predicting the behavior of chemical compounds, the velocity of a moving object and other physical phenomena, but they impoverish the soul by denying the soul any relationship to the outer world other than through intellectual abstractions. This alienation feeds the self-directed impulses of the lower soul, and seeds for a technical arrogance are sown in the thought life. Most of modern science stands at the brink of this chilling wasteland.

The soul-warming Inspirational force of the initial hypothesis is experienced as a proof that God exists and is communicative. When this intimate, warm connection to the creative Godhead is traded for a mechanical, abstract chain of technical events, the vortex of selfhood separates further from the creative streaming currents that are the source of its continued existence.

This is not meant to imply that all hypothesis and experiment be done away with. On the contrary, experiment can be a supremely enriching and empowering activity. The danger lies not in the experimentation but in the drawing of intellectual, logical conclusions from the experiments. A more wholesome technique is to regard the first hypothetical insight as

simply one aspect of the solution. When experiments arise as possibilities the researcher can perform them in order to direct the mind toward the realm of Inspiration. This can be accomplished by converting quantities into qualities, or by focusing on the secondary qualities such as color, taste, and warmth. This can stimulate the Imagination to begin to form images or pictures of the phenomena. Through images the phenomena can be explored as if they were directly connected to the soul life. Converting the data into images by way of developing the imaginative forces of the mind moves the thought life from the coldness of abstract analysis into the warm realm of the creative idea. Intellect is then transformed into reason; concepts are brought into contact with their source of life and change, and the hypothesis regains its aura of numinous mystery. By transforming hard data into images a “breathing” can be established in the mind that connects the upper transcendent eye with the lower physical eyes.

The question remains how such a breathing might be established and what practical results it would yield. The realm of Imagination is limitless and chaotic. This side of imaginative work can often be experienced in the dream state. Even in chaotic dreams, however, there is an inner consistency that rests in the soul’s ability to empower and collate images. The natural world is filled with such empowered images that can serve to regulate and inspire the consciousness. The power that Nature invests in the formation of living forms can be put into service in the training of perception. By carefully observing a phenomenon and then representing the phenomenon exactly before the inner eye, the formative force patterns that regulate the phenomenon are impressed upon the consciousness at a level above the intellect. Through repeated exact observation the essence of the phenomenon gradually forms into an image that can be grasped by the self as a form of imagination. This picture is filled with insight about the phenomenon in that it is actually formed in the human consciousness by the phenomenon. It is thus not a metaphysical concept but a living Idea. The difference is that the living Idea can go on growing and constellating in the higher consciousness, whereas the abstract concept cannot because of being fixed by the intellect.

A scientific hypothesis is such a living Idea. It is born in the discipline of the researcher who inwardly visualizes the variables surrounding a phenomenon. An error is made when the insight is fixed into a quantitative technical procedure. What if the researcher were to design experiments and tools which strive to keep the hypothesis open? This is difficult in the physical sciences of chemistry, physics and engineering but very possible in the life sciences or the social sciences. The open hypothesis is now an accepted

method in ecological studies, peer counseling, management training, new age medicine, and many other fields of research.

Perhaps the time has come when Goethean techniques of observation can be brought closer to the mainstream of science. With these techniques it is possible for the closed vortex of the human consciousness to sense how its center is connected as if by invisible strings to the grand spiral motion of the cosmos and how its small confluence is an exact image of the grand workings of the Universal mind. For each small vortex and eddy in a stream is singing the song of the whole stream, each is growing and contracting, pulsating to the rhythms of the whole nexus of currents in each brook, creek, stream, river and sea on the face of the planet. And the waters are sensing the swinging motions of the moon and sun and planets, and they are images of the great swirling dance of the Universe. All of this knowledge and more is available to a mind whose vortex of selfhood can remain open and responsive to the creative images brought to light by the dance of the Father.

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