11. The unity of form and content

One often hears it said: the unity of form and content, the unity of form and content... When it comes to literature and the arts this is obvious; but is there scope to understand the statement in a more profound way? And how can it actually be realized?

I have tried to understand this for myself by thinking in the following fashion. Content, in essence, is the function of the form: and function cannot be separated from form. Any discussion of one or the other in isolation is an abstraction, although it might be a convenient one. I think you will agree that it is just impossible to talk of *moving* an arm without imagining the arm as such. The function of an arm is dictated by its form, and the form allows the corresponding function to be carried out. So when we speak in the abstract of form in isolation, we always understand by it the unitary nature of form and function. And *vice versa*, function can be visualized, for instance, mathematically in the form of a graph; and we know that there always exists a form that gives rise to this function. Once again, an example is needed here.

When I worked in emergency cardiology, I naturally needed to make a deeper study of electrocardiography, in order to use it. As is clear from the name itself, electrocardiography records electrical signals from the heart in a prescribed graphical form on paper, that is, in two-dimensional space and in time.

ECG analysis is conducted by studying the changing *form of the signals* in accordance with the pathology of the heart. This is quite a complex task, since each change to the ‘teeth’ of the ECG must be correlated with changes in the heart itself by empirical means, and the knowledge of any specialist in this field is based on a good memory. There are, of course, logical principles; but they are not to be found on the surface.

Out of curiosity, I once opened a book on the history of cardiography, and discovered something that had existed since the 1930s, and still exists today: *vectorcardiography*. The signals are recorded on a television screen in so-called ‘polar’ coordinates, cyclically, by means of a vector that rotates around a central point where the coordinates begin. With today’s technology, the two-dimensional depiction on the screen can also be represented in three dimensions. A vectorcardiogram looks something like the illustration in *Fig. 1*.

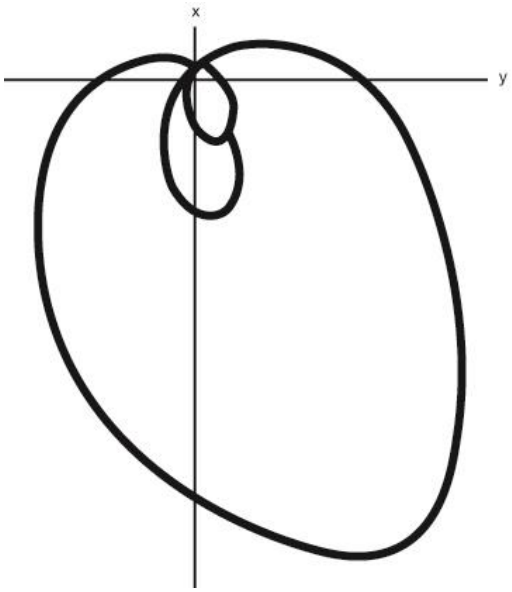

Fig. 1. A vectorcardiogram

But this is a depiction of the *form* of the heart itself! Even mathematicians call such a curve a cardioid. And there is more. In the case of a diaphragmatic infarction, for instance, the vectorcardiogram will display an altered form (as shown in *Fig. 2*).

Fig. 2. Vectorcardiogram: a case of diaphragmatic myocardial infarction

The infarction has ‘eaten up’ part of the cardioid on the vectorcardiogram, corresponding to its actual location on the real wall of the heart. It is strange, especially given that vectorcardiography is now an old technique, that we do not make use of such a convenient way of recording ECGs, but choose instead to analyse, ‘in the sweat of our brow’, complex hieroglyphics of two-dimensional graphs that combine many leads. But that is not the point right now. I think the obvious conclusion will be understood: the form of the electrical field of an organ (in this case

the heart) in three-dimensional space replicates the form of the organ itself. This is the unity of form and content—or, more properly, of form and function.

In which case it will be possible to generalize this thought into the bold hypothesis that the form of any field replicates the structure that gave rise to the field, and that the structure is itself, in essence, a field. Here I make no claims to originality: confirmation of this point can be found in many departments of physics and quantum mechanics.

But I have always been interested in the unity of the structure and function of the living body. If it is possible to describe mathematically the form of the body, then this gives a key to understanding its function. I shall say it directly and openly: what is necessary is a description of the fundamental principle of the formation of the *morphogenetic field*. This will also be a description of the body's factual form and its function.

Much has already been written about the morphogenetic field. This term stands for the complete plan for the construction of the adult body, for which the information encoded in the DNA is utterly inadequate. Just imagine the quantity of information that is needed to construct all the three-dimensional structures of the body, let alone to make them capable of adaptation to changing external conditions.

The essence of the morphogenetic field is as difficult to define as the nature of gravity. We make judgements concerning it on the basis of the field's effects: the apple falls whether we will it or not. But *what* pulls it down—that we do not know. Likewise, the body grows to a determined size and form, and there you are.

But why do we nonetheless have *just the same form*, while differences between bodies are only within the limits of similarity and no more?

Despite the abundance of concepts and declarations, a formal description of the structure of the morphogenetic field, its fundamental principle, is still lacking. To speak more simply: no one has 'drawn' the body, or its separate organs, geometrically. There have been attempts. I shall cite here the names of only two scientists, George Adams and Lawrence Edwards. They succeeded in describing the external forms of flower buds, and even the external form of an embryo at the early stages of development. But there have been very few works on this theme anywhere in the world.

I think it is clear that the job is a complex one. I already imagine my opponent hurrying to ask the questions: and why is it a job that needs doing? What, can't we treat people without it? Aren't there enough other unsolved medical problems for you?

To which I reply: no, without it we can't treat people. Without an answer to this question, the quantity of problems in medicine is growing like a snowdrift. We are not managing to chase them down and solve them one by one. Over recent decades the situation as regards health has changed dramatically. And doctors have proved utterly unprepared for it. According to the stereotype, doctors look for a pathology that has formed; they try to cure infections or inflammations. And when they can't find any physical signs of illness, they consider the patient they are seeing to be healthy. Or 'incomprehensible'.

But no one has taught us doctors how to treat functional disorders, even severe ones. There are no data whereby they can be diagnosed. But everyone can now see that we have 'new' diseases. Every day people receive an enormous quantity of information through computers and television. They are pressed down by a strict working timetable of meetings and conferences, at which attendance must be punctual. Information stress and information pollution of the social environment are becoming more dangerous, often, than viral infections. And there are simply no methods of individual diagnosis, let alone treatment, of this condition. There are only the helpless doctors' general recommendations, like the famous five principles of health:

1. Don't smoke
2. Don't drink
3. Eat healthily
4. Take exercise
5. Use a condom

———————

And you will be happy.

But then what do we need doctors for? That much would be clear without them. Half the world follows these 'five commandments' anyway. Every day in the press you can read new 'scientific' confirmation of these principles. But bring me just one (without any statistics), just one *really and completely* healthy person, and I'll

shake you by the hand. Such people just don't exist any more. And there is no definition forthcoming from the *hostile* as to who is to be considered healthy, and why. I might even add, so as to throw you off balance, that we are reacting normally to abnormal circumstances, and that if we did not act like this, then we would be abnormal.

Where then is the boundary between the concepts of *being healthy* (normal) and *being ill* (abnormal)? It is obviously time to change the paradigm of our thinking.

15. On the Möbius strip and the origin of the Universe

I shall ask a *hostile* question: the number one, is it much or a little? And if the number one is the unitary Universe, is that much or a little? It is easier to answer as to what half the Universe is. For the Universe is **its two** halves. That is, any number in general is arrived at by dividing a whole into parts, and not *vice versa*. Then we can compare, and we get to a scale of assessment. From which it follows that we can make judgements about the structure of the world if we begin from a definition of its **wholeness** and **unity**, from the number **one**. Everything else will be a part or parts of it. Remember the example of the bricks.

Let us return to the body. In complexity the structure of the body is no less than that of a whole galaxy. The very possibility of even imagining all this Complexity seems improbable. But is it?

I propose that we regard the living body from an unexpected viewpoint: the body consists only of planes, curved in various ways. Yes, it does. Let us begin from the surface of the skin and pass to the organs, muscles, glands, and nerves. They all consist of films, tubes, fascia covering muscles, bent in a spiral and nowhere directly intersecting along one direction. And even cells consist of maximally fine membranes—planes, visible at the highest resolution of an electron microscope. If you are familiar with anatomy you will easily agree that any point in any organ of the human body can be directly reached by just sliding along the surfaces of structures, without needing to violate membrane walls. It is theoretically possible, for instance, to move from the mouth and the oesophagus into the duodenum, and from there to enter the bile duct and to pass from there into the liver by way of the bile caniculi,

ending up between the cells of the liver, or, more accurately, between their membranes. All that is necessary is to keep sliding along the surfaces of structures. It is for this reason that you never manage in the kitchen to clean all the tendons off the meat: they always go without a break into the depths of the muscles. There can be no doubt that there must exist a general principle that organizes the structures of organisms in such a way. Beginning from the fact that all the laws of the physical world are ultimately described mathematically, let us try to make a start from geometrical principles (projective geometry). All we need do is to explain the formation of the planes of the body, that is, in fact, its form, and also the fractal character of its structure, without forgetting that the body is a part of the Universe.

We will begin from the *outward* part of the Universe. However large it might be, there can always be found a most outward plane, *a plane infinitely distant from us*. Since there is nothing outside it, we can speak only of the surface facing us. To an observer from any point within the Universe it is clear that this is a plane with only one surface. This paradox is hard to imagine, but it is a logical fact. In geometry a plane with only one surface is called a *projective plane*.

Of course, instead of an infinitely distant projective plane, we can make a paper model of it by twisting the ends of a band through 180° and joining them together. This will be the so-called Möbius strip,[1] a one-sided surface, which—if we forget its size and the width of the band—does not differ in principle from a projective plane. If we stretch our abstract imagination and increase the width of the band to infinity, we will see the self-intersection of the one-sided surface. From this moment the one-sided surface becomes two-sided. Everyone can perform the experiment simply by tearing a Möbius strip along the centre line. If the two halves are placed one into the other, we get a figure that externally resembles a Möbius strip but that consists of a paper band of double thickness. The operation can be repeated: there will then be two double bands, but connected. In theory this operation of tearing can be repeated to infinity and the quantity of bands will keep doubling. In practice we get the same result if we wind the bands of paper, obtaining ever new figures along their surfaces. The initial plane, then, can be infinitely halved along the inward

[1] August Ferdinand Möbius (1790–1868) was a German geometer. He was the discoverer of one-sided surfaces, one of which is the Möbius strip.

direction, while the general dimensions of the whole figure in space remain unchanged. It is tempting to call this a model of the Universe, satisfying all the necessary requirements: it possesses a fractal character, from any strip taken in isolation one can easily reproduce the structure as a whole, the form of each part replicates the form of the whole.

So it becomes possible to compare the various projections and transformations of this figure to the actual structures of the living body, and to draw the logical conclusion that we have found the most appropriate model for the mathematical description of the geometry of living structures. Which I shall endeavour to demonstrate in the illustrations below.

I have encountered questions from a number of different people, asking how it a precise, but nonetheless abstract geometrical description of a person can be practically used in treatment. After all, knowing the geometry of an object does not in itself provide an instrument with which that object can be influenced. But do not rush to conclusions. I did not rush either: from the very beginning of my work as a doctor I encountered the absurdities and paradoxes of accepted treatment methods.

21. Information about the body is ‘recorded’ on its surface

Further confirmation that the path I have chosen, that of constructing a geometrical model of the living body, is the correct one has been provided by serious scientific work in fields that might seem remote but that, from a philosophical standpoint, are connected with our problem. One such field is fundamental physics: specifically, the study of black holes. A new research direction has emerged.

Above all, Stephen Hawking[2] has demonstrated that, as a result of quantum effects, black holes have the property not only of swallowing but also of *radiating energy*.

Jacob Bekenstein, now professor at the Hebrew University of Jerusalem, has demonstrated that the entropy (the measure of chaos in the organization of a system) of a black hole is proportional to the area of its horizon. In his research in

[2] Stephen William Hawking, one of the world’s leading theoretical physicists.

the 1980s into entropy as a measure of information capacity, Bekenstein concluded that the information required to describe any object is limited by its outward surface.

In 1993–1994, the Dutch theoretical physicist Gerardus ’t Hooft, who has also studied the physics of black holes, introduced the concept of gravitational degrees of freedom. His conception has been called ‘the holographic principle’.

Based on Bekenstein’s conclusions that all the information contained in a given area of space can be represented as a ‘hologram’, that is, by a theory that is located around the edge of the given area, ’t Hooft came to the conclusion that the information on the edge of the area of space under investigation contains no more than one degree of freedom for every Planck area (the length of one Planck area is approximately 10^{-33}cm). According to the holographic theory, the number of degrees of freedom to delimit an area of space is proportional to the area of the surface, not to the volume!

More simply, all the information in any system, including ourselves, is recorded on its outside surface. Gerardus ’t Hooft was awarded the 1999 Nobel Prize for Physics for that.

But I wrote something rather similar on the preceding pages. Remember, the whole Universe is a plane with one surface, infinitely divided by lines of self-intersection into fractally self-similar substructures (in accordance with the holographic principle). Everyone can reach fundamental principles by a different road: the principles are no different as a result.

But then all the information about the system of the human body must be recorded on its surface—on the skin. In what form? In the form of a field. A two-dimensional projection. And the form of the field does not depend on the frequencies that compose it, as with colour or black and white images. The essence remains one and the same. And then all we need is the infrared spectrum of this field in order to make judgements concerning its form, which will itself be a real manifestation of the actual morphogenetic field in real space and time. By comparing the actual form of a given subject’s field with an ideal form calculated for him, we discover the necessary corrective information that can be introduced into the body as a method of treatment.

Phew! Perhaps this has been written in quite a complicated fashion, but there is no other way of conveying the fundamentals of the theory. And yet this still isn’t a theory. A theory needs to be concrete, not declarative. Hitherto the columns have

been driven into the basic principles. The world is full of declarations about holism, oneness, and universality. But the question that always comes next is: how is it to be done???

22. Mathematical models of organs are comparable to their anatomy

Like this. Any model must correspond to reality, that is, to an actually existing prototype. In the body there is a multitude of structures: cells, arteries, veins, capillaries, nerves, lymph glands. If we do not divide the body into separate systems, which nonetheless work together, then we can easily be persuaded that arteries, veins, and nerves have a common *direction* (vector), sometimes opposite, but always following a single line. This line is the path information takes through the body. What is more, muscle fibres and lines of cells organized into structures also coincide in direction. We can speak of the *directions* of information, without becoming involved in the details of the structures that follow these directions. Of course there is always a *material bearer* of the information; no one is arguing with that. But being obsessed only by concrete structures means losing the picture as a whole. All the systems of the body are united by one common goal: to preserve the body as oriented in time and space and to secure the permanence of the internal environment. So I would not advise anyone to interfere in the working of our living and super-perfect ‘computer’; rather, I would help it to work in a natural way, as nature intended. But how did nature intend it?

In 1978 the Spanish surgeon Francisco Torrent-Guasp was declared an official candidate for the Nobel Prize for Medicine. In studying and preparing the heart he had discovered that its structure was none other than a single planar muscular band, turned twice around itself. That was the name he gave it: the ventricular myocardial band.

On closer inspection it is clear that this is none other than a Möbius surface twisted by a mass of neighbouring planes. Torrent-Guasp did not get into the mathematics, but he did publish photographs of his brilliant anatomical work. It follows from his work that the morphology of the heart and, logically, of our body, is organized perfectly geometrically. Take a look at *Fig. 5* and *Fig. 6*: pictures of the

muscular bands of actual hearts correspond entirely with the bands of one of the projections of my mathematical model.

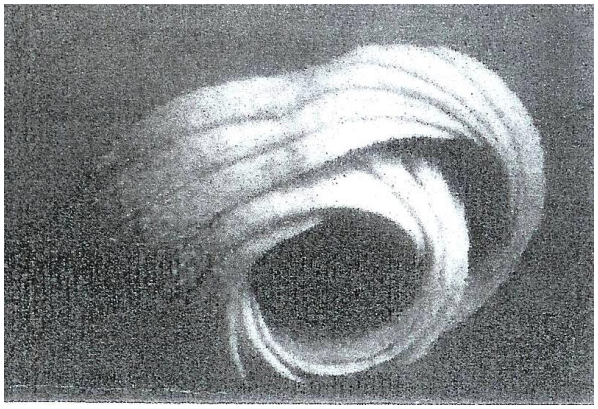

Fig. 5. Muscular bands of actual hearts (Torrent-Guasp)

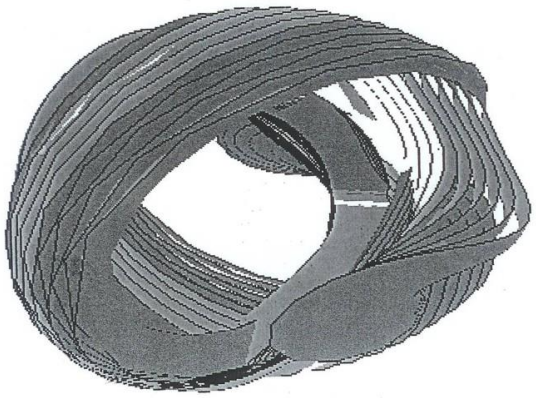

Fig. 6. Mathematical model of the muscular structure of the heart

By the way, I came across Torrent-Guasp's work after I had already independently created the models you have seen.

Since we are discussing the forms of organs and structures, it will be appropriate to demonstrate the geometrical images of other organs too.

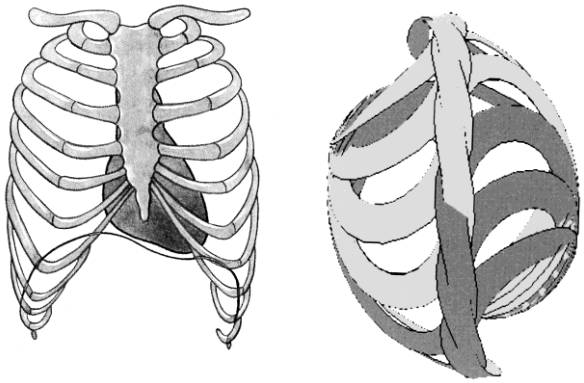

Fig. 7. The rib cage (a) and its mathematical image (b)

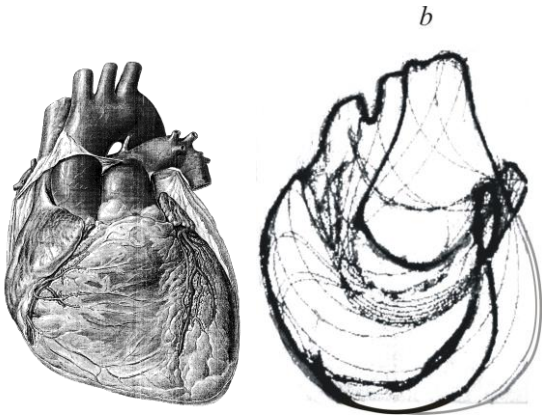

Fig. 8. The human heart (a) and its mathematical image (b)

Now let us simply turn the mathematical model of the heart through 90° and we shall obtain the following:

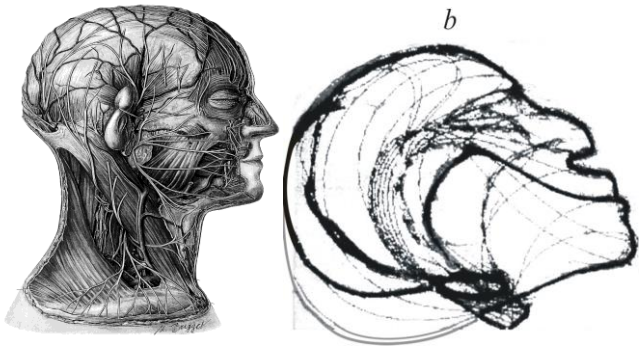

Fig. 9. The human head (a) and its mathematical image (b)

Curious, isn't it? And these are only various projections of one and the same mathematical model. Note that the direction of the lines of the mathematical model basically corresponds to the direction of the anatomical lines of the abovementioned organs.

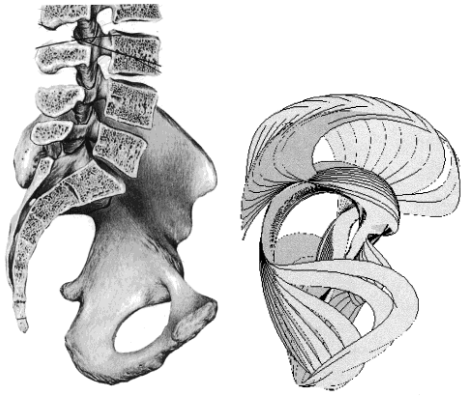

Fig. 10. The bones of the pelvis (a) and their mathematical model (b)

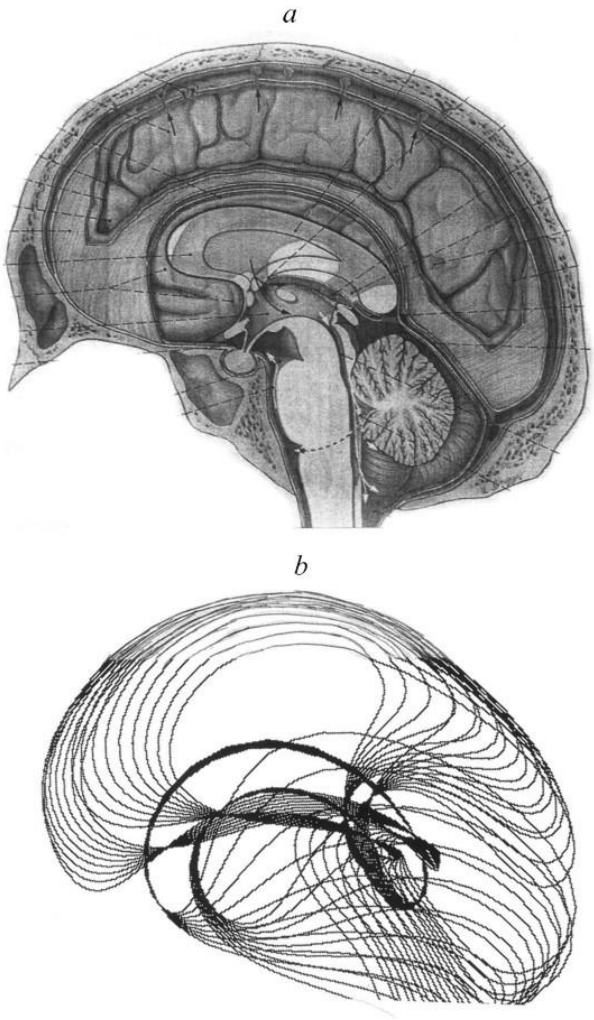

Fig. 11. The brain (a) and its mathematical model (b)

Here too, the direction of the lines in the model corresponds to the anatomical lines!

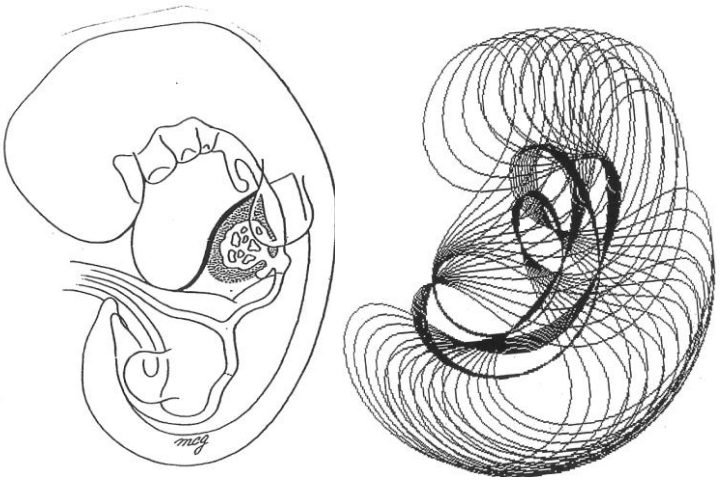

Fig. 12. An early human embryo (a) and its mathematical form (b)

23. The capillary-motor mechanism

Let us return to the orientation of the body in time and space. There must be a basic mechanism that ensures the coordination and joint work of the organs in accordance with the load placed on them. And there is such a mechanism: the capillary-motor mechanism. It was first described by the Danish physiologist Steenberg Krogh, for which he received the 1920 Nobel Prize for Physiology and Medicine. Essentially, the activity of the organs' work in accordance with their task at a given time depends on the redistribution of blood in the capillaries, which, in turn, is controlled by the central nervous system.

Krogh actually described the fundamental mechanism that unites the action of all the body's systems. This is the human body's transport system, bringing oxygen and hormones to the tissues, taking waste and by-products away, and allowing the exchange of substances in the tissues.

This is that integral mechanism, *holistic*, if you will, learning to influence which would be the dream and chief objective of medical science. For this is the *circulation of the blood*, and blood is life, energy. Without the circulation of the blood, not one process in the body would be possible. The capillaries (the finest blood vessels) run throughout the body and provide a direct contact between blood and tissues. Their condition is itself the fundamental indicator of the functional capability of the organs, and therefore of the functional balance of the body as a whole.

By an irony of fate, Krogh's work, like most works about medicine, has stood in libraries without any visible practical application until the present day. And it was only when I had created my special mathematical theory that I became able to use to capillary-motor mechanism in treatment.

Since capillaries are present in all the body's structures, it is logical to note that they themselves are organized in accordance with its structures. So the geometrical laws that make it possible to describe the form of the body also describe the distribution of the capillaries, and on the same principle.

The capillaries of the surface of the skin are one of the external planes of the body, spiralling inwards towards its internal structures, which are themselves planes.

Of course, there is always an actual path by which information is transmitted from the skin to the internal organs: the cutaneous-visceral reflexes, which have been long and well studied in physiology. But it is strange that these reflexes, so well known to neurologists and to doctors in general, should still not have been successfully used for treatment purposes. The reason is that no reflex works in isolation. It is impossible to trigger one reflex without the participation of other, compensatory reflexes and mechanisms. They always work integrally, cooperatively, and together. I am not saying that 'influencing' a particular zone of the skin in accordance with the principle of its innervation is entirely delusory.

It has been established that acupuncture points do not change their topography after surgical operations in which the skin is grafted and stretched. What is more, the zones on a thermographic map, both cold and got, remain 'in place', for instance, after the removal of the gallbladder or of a kidney stone. Similarly, phantom pains are manifested in cases where an extremity has been removed. This is connected to the orientation of the body in space, which dictates its behaviour, not exclusively with the anatomical map of the nerves. The nerves work 'in line', following spatial laws, rather than *vice versa*. No one, however, denies that in each concrete instance the signal is conducted along a nerve. A material bearer of the information can always be found.

The Zakhar'in–Head zones,[3] which indicate problems in an organ by a greater sensitivity of the skin, behave in the same way. They do not correspond to a neurological chart of the zones of skin innervation, and to this day there is no logical explanation of the phenomenon. It is for this very reason that patients come to see me after several other doctors have tried and failed to treat their chronic pain by cauterizing specific nerves that they think are responsible for transmitting the pain signals. There is no possible sense to such actions, beyond that of savagery. And this in the present century! But the pains remain exactly where they were.

It is clear that using only neurological principles is and will remain inadequate. Again I must refer you to the example of the stone thrown into water. Even profound study of neurology and reflexology has not led to any actual relief's being provided

[3] G. A. Zakhar'in (1829–1897), therapist; H. Head (1861–1940), English neurologist. The Zakhar'in–Head zones are particular zones of the skin which show reflected pain and a greater sensitivity to pain and to temperature when the internal organs are diseased.

for human suffering, although it is doubtless important from a scientific point of view as contributing to an explanation of the physical existence of a great number of connections within the body.

But their joint work should be studied from the integral, or, more accurately, from the integral and geometrical point of view. Geometrical description makes it possible to see the hierarchy of systems and subsystems and to see their dynamic interaction. Just as the whole determines the part, so also the part determines the whole. I shall try once more to translate what I mean into simple language. On the basis of what has been described above I make the bold assertion that all information about the capillaries (that is, about the circulation) can be read off from the surface of the skin. And *vice versa*: acting on the skin *in a particular way (!!!)* alters the distribution of blood in the body's capillaries. The principles of how to act on the skin are the essence of the treatment. In other words, the same can be said of the body as of any system: the information recorded on the surface of the system reflects its internal, three-dimensional condition. And, what is more, considering that two-way communication is the fundamental adaptive mechanism of life, we can assert that if information is introduced in a particular way onto the two-dimensional external surface of a body, its three-dimensional internal condition will change as a result. Which is identical to the expected healing effect.

The body only needs the necessary information to be presented correctly, and on the basis of that information it will correct its own mistakes in the work of its systems, mistakes that for various reasons it had not noticed in time, without especial difficulty. Such is its projected nature. Mechanisms to do this will always be found, they only need to be awoken and set to work.

And the principles by which information is conveyed on the two-dimensional surface are geometrical in character. We must return once again to our search for the geometry of life.