

# Dynamic Morphology and Embryology

In: Foundations of anthroposophical medicine - A training manual, Chapter 4

Edited by Guus van der Bie and Machteld Huber, Published by Floris books in 2003

© Nederlandse Vereniging van Antroposofische Artsen, ISBN 0-86135-417-4

Last revision of this article by the author: 6-Nov-12

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The aims of this chapter are:

- to give additional examples of dynamic morphology in order to familiarize the reader further with this way of working, building upon the phenomenological approach as an earlier chapter, where it was termed *dynamic perception*;
- to give the reader an experience of the kinds of insights which can be gained when one looks for polarity in human and natural phenomena, taking the *participant stance*;
- to demonstrate that this scientific approach, in contrast to the regular natural scientific approach, leads to the conclusion that nonmaterial principles are at work in the physical world. It enables one to come to these conclusions on the basis of observations of material phenomena, perceived through the ordinary senses.

Since this training manual primarily directs itself to medical practitioners, the examples chosen are mainly taken from human biology. Later chapters will also apply this method to other areas of biology. The methodology and fundamental stance demonstrated in this chapter can be given a broader practical application in physiology, psychology and pathology.

## Steps and method

We will start with a brief introduction concerning the methodology of the dynamic approach and the way the idea of polarities is used in this context (Section 4.1).

In Section 4.2 the previously described approach will be applied to human conception. Brief interludes will refer back to points made in Chapter 3 regarding scientific principles. By means of these examples the essence of the concept of polarities will be elaborated.

Section 4.3 of this chapter will deal with the human skeleton and posture, following the same dynamic approach. We will also elaborate on a central concept in the anthroposophical view of the human being, the middle.

Using examples of the dynamic morphology of the human embryo, fundamental principles of anthroposophy will be demonstrated once more in Section 4.4.

## 4.1 A minifying glass as a tool for observation

*We must use the darkness*

*To make the light visible.*

J.W. Goethe<sup>1</sup>

Goethe always stressed in his scientific work how one must 'look at things in context.' This applies especially to polarities. After all, they can only be recognized when one looks at the whole within which the polarities appear (see quotation above).

In Section 3.1.1, where different sets of teeth were discussed, it was shown that much can be learned from observing each detail separately. There it was termed the analytical approach. The comparative approach then takes the isolated elements and places them in connection with one another, thus creating an overview. Seeing a 'higher' coherence opens up possibilities to see more of the essence of the separate parts, and discover things which remain hidden when one only focuses on isolated parts. In other words, one develops an eye for the total picture, which encompasses all the possible variants. Three steps were described in

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<sup>1</sup> From J.W. von Goethe, *Goethe's Theory of Colour*

Chapter 3, the third of which was seeing dynamics which led to the final form-composition of the total picture. This dynamic approach adds a significant dimension: one begins to experience sculptural gesture in what one observes. By penetrating to the level of gesture, which gave rise to the outer form, one enters via the phenomena into the nonmaterial realm which lies behind the phenomena.

To elucidate the method applied here, let us now turn to the following example. Let us ask ourselves the following question, 'Why do we see the head as round?' We all experience the head that way, yet on closer scrutiny, it cannot stand up to scientific analysis. Modern natural scientific morphology cannot see the head as round anymore. In medical school, students become familiar with scores of protrusions, crests, ridges, and angular edges. No 'roundness' is to be recognized in such an approach. On the contrary, the more one focuses on the human skull, going into ever more detailed observation, the more one loses the naive perception of the head as round. The question posed above, 'Why do we see the head as round?' was meant to bring us to the following dilemma: Which of the two perceptions is more real, the naive assumption of roundness or the anatomical observations?

Many people will solve the 'dilemma' outlined above by explaining the naive perception as correct in a general sense. One can call this perception 'more or less correct,' and point to children's drawings to indicate that they always, and strikingly, represent the head as round. With such an argument, one can depict the perception of the head as round as literally naive. But Goethe would have opposed any suggestion to therefore apply a simplistic 'global' approach. His own observations were painstakingly exact, and his descriptions never shy away from details. On the contrary, in his scientific works he goes into minute phenomenological descriptions to document and underpin a gesture, which he saw expressed in certain organic forms, be it of individual organs or whole organisms.

In the spirit of a Goetheanistic approach, an answer to the 'dilemma' posed above, could run more or less as follows: By fixing one's gaze solely on the head or skull, one will fail to see the roundness. The context of the skull and the head belong to the human skeleton and the human body respectively. Our starting point in this approach is the entities as they occur in nature. Head and skull are analytical entities, produced by reductionistic thinking and isolating them out of the whole of the skeleton or body concerned. If we start from the human skeleton or body as a whole and let our gaze wander from head to arms, back again to the head and then to the legs, back and forth, in short, if we regard the head in its polarity to the extremities, we will learn from the extremities how round the head or the skull really is.

It will be obvious that dynamic perception, as described in Chapter 3, applies here as well. The 'mobility' of perception should perhaps be taken even more literally here than in Section 3.1.3 (the dynamic approach). To be looking within a certain context, comparing and going back and forth, is meant here in contrast to the kind of gaze that fixes. However much one studies the bones of the extremities, one will never get at the character of 'straightness' as long as one keeps seeing them in isolation. Yet straightness is an essential characteristic of the extremities when one compares them with the head or skull. One will see ever more knobs, ridges, and convexities if one looks with an analytical eye at the bones of the extremities, but only a comparative approach such as the one described in Chapter 3 will reveal the character of straightness of an arm or a leg. The two approaches form a contrast. In the one case one approaches the object using a magnifying glass, which will reveal more and more detail. In the other case one takes a step back and looks at the detail in the context of the whole to which it belongs. This kind of survey allows one to view the whole, thereby practicing the advice which the Dutch anatomist Louis Bolk once gave, which was to 'look at life through a minifying glass.' To see the head as round is not the product of looking in a general or naive way; it is the result of clear, exact, but at the same time dynamic and mobile observation.

In such an approach details are not distracting or redundant. On the contrary, they are an essential prerequisite. Once the polarity straight-round has been discerned in extremities-head, one can then go on to see, in a Goetheanistic phenomenological way, whether other phenomena fit and support the polarity observed. The gesture which has initially been discovered (inductively, if you will) can then be underpinned (deductively) by observing details. Thus an important consequence of the choice of looking dynamically, and taking the participant stance, emerges. *It becomes clear that the analytical approach which results in isolated perceptions can be included within the comparative / dynamic approach, but not the other way around. An analytical approach with its resultant perceptions principally excludes perceptions gained in a dynamic approach.*

Obviously the concept of polarities will become an important key to a dynamic morphology, understood as a morphology of gesture. After all, when one is able to discern polarities, one has already 'risen' to a different

level of perception. If one stays within the narrow framework of reductionistic thinking, only looking at things in isolation, polarity cannot reveal itself. For it to be recognized, one must leave the level of fixing one's gaze on a detail, and make room for mobility and comparison. It should also be emphasized that the term morphology was chosen here for a reason. The term anatomy is reserved here to denote the analytical approach. Thus one could say that the head is round in a morphological sense, not in an anatomical sense.

*We have gotten used to tracing life through magnifying lenses in order to perceive matter which would otherwise remain invisible to us. How different, how much broader would our concept of life become if it were given to us to look at life through minifying lenses. Then we could survey all that would otherwise remain hidden for the naked eye, and rather than seeing material connections, as we do now, the interconnectedness of phenomena would become the object of our studies.*

Louis Bolk <sup>2</sup>

## 4.2 From two to one — polarities in conception

We have chosen conception as the first area in which to practice observing polarities. A close study of the phenomena of the egg cell and the sperm cell will give us a chance to practice comparative and dynamic observation; a participant stance will bring formative gestures to light. This example will also show us more about the nature of polarities in a Goetheanistic sense. Rather than opposites, we will see how the one is similar to the other, but 'turned inside out'; such an observation refers us to the level of a shared essence living behind the polarities under consideration. This will be elaborated in Section 4.3.

### 4.2.1 Polarity and contrast

Emphasizing the differences between egg cell and sperm cell is no longer customary, undesirable even, in current scientific thinking. It has become common practice to reduce living nature to the same building units (think for example of cells, DNA, molecules). Rupert Sheldrake calls this practice, somewhat derogatorily, '*nothing butterm*.' <sup>3</sup> This derives from descriptions like, 'traits are based on *'nothing but'* a nucleotide sequence on a DNA molecules.' Current descriptions of fertilization will speak of two reproductive cells which must merge in order to pass on their hereditary material to the resulting conceptus. The two cells derive their significance primarily from being carriers of DNA. This, then is what it's all about. The morphology of the two cells thus seems to be of little significance. This appears to be confirmed by the many modern techniques to manipulate them, accomplishing the seeming 'goal' of conception: bringing together two entities of DNA.

Now let us approach the same matter in the way Goethe and Bolk would have done, taking the phenomena for what they are and looking at the human sperm cell and egg cell in the context in which they appear. On the one hand that is the context of anatomy and physiology of the two sex cells themselves and the corresponding sexual organs. On the other hand it is the context of the *pre-conception attraction complex*. This refers to the biological complex which is formed, under normal circumstances, by both gametes together; it lasts a certain period of time before the actual penetration by a sperm cell can take place.

It is only through a comparative approach that one can come to the conclusion that an egg cell is big and the sperm cell is small. A quantitative description on a sliding scale of numbers and measures (head of the spermatozoon: 2–3 µm; egg cell diameter: about 200 µm) cannot express the qualitative difference between big and small. A dynamic approach to egg cell and sperm cell adds an extra dimension here. If one takes into consideration how big and how small both cells actually are and especially how they come to be big or small, an enormous polarity is revealed right away. Measured in terms of human biology, the egg cell is gigantic. With a diameter of 0.2 mm and a cytoplasm volume of 0.004 mg in weight, it is without a doubt the most voluminous ball of cytoplasm a human being can produce. Certainly, neurons can reach formidable lengths (up to many thousands of times the average cell size, which is about 10 µm), but in terms of volume the egg cell wins out. This comes to expression in the dynamics of the way it matures. The egg cell matures in a process of both increase and maintenance of volume. The relatively large volume of cytoplasm which

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<sup>2</sup> Bolk, L. *Hersenen en Cultuur*, 1917, p. 25 [*Brains and Culture* p.25] (Dutch. NT)

<sup>3</sup> R. Sheldrake, *A New Science of Life*

\* The question about the actual moment of conception is left open here. After considering the thoughts presented in the rest of this chapter, the prevailing assumption that conception takes place at the moment that the male and female pronuclei fuse might appear in quite a different light. It might need to be reconsidered altogether.

characterizes the original sex cell in the embryonic phase is at least maintained. During the first reduction division which the egg cell completes at the moment of ovulation, this impression of 'striving to maintain the cytoplasm volume' is confirmed by the phenomenon that the primary oocyte separates into two sister cells, which are totally disproportionate in terms of volume. One of the 'cells' — the polar body — contains the requisite DNA substrate, the other one (the secondary oocyte) keeps the cytoplasm.

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### Assignment 1

Using the chart on the next page, try to find as many contrasts as possible between the sperm cell and the egg cell. See also the Figure of the two gametes (sex cells) below, if needed. Look not only for contrasts on the level of individual cells with their morphology and physiology, but try to look beyond that. Think for example of the different roles the two gametes play in the process of fertilization and also of the physiology and morphology of the two corresponding sexual organs (gonads).

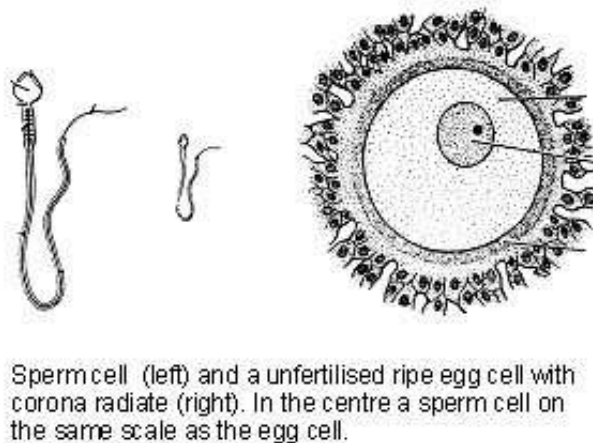


Figure 4.1

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### Methodological remark

The observations and facts presented so far are fairly straightforward and are still only relative, because they are not the result of looking at the egg cell and its size in isolation, but of comparing egg cell and sperm cell. Through a process of looking back and forth between them, indications like 'big,' 'volume retention,' and 'expand' acquire their profile.

As a polar opposite the sperm cell shows its 'smallness.' Let us begin with the quantitative part, which is relative. The diameter of the head of the spermatozoon is about to 2 or 3  $\mu\text{m}$ , and the length from head to tail is about 60  $\mu\text{m}$ . Two  $\mu\text{m}$  is quite a small size for a cell, but 'smallness' becomes more significant, when one considers that the decrease in size of the eukaryote cell simply has a limit due to the amount of genetic material (DNA) that has to be carried and therefore be retained for it to still be a human cell. Seen in this light, the germ cell's performance is a remarkable achievement. During the last phase of the spermatozoon genesis, so much cytoplasm is discharged and secreted that at the end of the germ cell maturation very little cytoplasm, and a relatively high amount of nucleus material, remains. Moreover, the latter becomes highly concentrated. The DNA is considerably dehydrated, so that an almost pure, highly structured form of DNA remains. The germ cell shows the characteristics of a cell entering into a so-called 'programmed cell death,' (apoptosis). As a consequence, the DNA becomes highly concentrated and the cell becomes pycnotic. On a submicroscopic level the DNA in the germ cell head makes an almost crystalline impression. This process of condensing or shrinking gives the germ cell as a whole the possibility to become so small.

### Methodological remark

The analytical approach gives us the measurements (2  $\mu\text{m}$ , 60  $\mu\text{m}$ , 200  $\mu\text{m}$ ) and the intracellular relationships (ratio of nucleus to cytoplasm). The comparative approach shows the strong contrasts playing in here, also in the underlying processes which are part of the picture, such as the expelling of the polar body and the separating out of the cytoplasm. The dynamic approach with a corresponding participant stance allows us to experience the process of becoming large or small. Thus we live into the

formative process (see Section 3.2.2), and become aware of the gesture and the movement. By taking these three steps, we become less tied to the bare material facts, which is necessary! This allows us to conclude that the egg cell is characterized by the gesture of expansion and the sperm cell by the dynamics of shrinking or concentrating. When we arrive at such a conclusion, the physical size of the tail of the sperm cell of 60  $\mu\text{m}$ , (still quite big), becomes irrelevant.

	EGG CELL	SPERM CELL
PARAMETER		
Size of the gamete		
Shape of the gamete		
Motility		
Metabolic relationship to the environment		
Condition of the nucleus, especially the DNA		
Relationship of nucleus to cytoplasm		
Number of gametes		
Vitality and biological vulnerability		
Age; lifespan		
Character (sequence) of the reduction division		
Relationship to (body) temperature		
Relationship to gonads & genitalia		

Considerations concerning simple things like ‘large’ and ‘small,’ as in the methodological remark made above, bring yet another essential fact about polarities to light. Before we can elaborate, let us first return to the object we were observing. When the egg cell has left the ovary and has completed its first reduction division or meiosis, it is metabolically active. One could say that it communicates with its surroundings. This entails physiological vulnerability. An egg cell is a precarious organism which should not be manipulated by physiological force. Consider how sensitive it is to chemical, osmotic, or temperature shock. If we take the corona radiata into account as well — which we can do since we’re concerned with the egg cell organism — we are dealing with a biological entity which is able to excrete substances capable of influencing the immediate surroundings, even though the amounts may be tiny. Think of EPF, Early Pregnancy Factor, for example.

By contrast, the sperm cell seems oblivious to its surroundings. That is not to say that the sperm cell does not react to its surroundings — think for example of the way the sperm cell automatically ‘swims against the stream,’ or how it reacts to chemotactic substances — but it does not metabolically communicate with the surroundings the way the egg cell does. Freezing spermatozooids (to temperatures as low as  $-60^{\circ}\text{C}$ ) does not seem to affect the life of these cells. Thawed months later, they merrily continue. This quality of remaining relatively untouched by influences from the outside fits with the cellular structure of the sperm cell. Whereas one can see the egg cell as a gigantic cytoplasm reservoir, the sperm cell is reduced to a highly structured nucleus package (DNA package) with a relative lack of vitality.

Which morphologic concepts would apply in this situation? To sum up the dynamics of the polarity described above, one could characterize the sperm cell as closed, and the egg cell as open to its surroundings. Now if one really lives into the dynamics of this situation, one can bring them in line with the previously mentioned dynamics of large and small. After all, expanding and striving outwards goes together with being open, whereas concentrating and centering goes together with being closed.

*Methodological remark*

At this point we invite the reader to try to find even wider and more encompassing terms to characterize the gesture we have discovered. To point the way, we offer the concepts centrifugal (towards the periphery), and centripetal (towards the centre). One could also attempt to approach the phenomena by asking the following question, Which of the two gametes shows the dynamics of 'being fertile,' which of 'fertilizing'? This may seem trivial from the perspective of basic biological knowledge of today. But the point here is to try to imagine the underlying gesture. Later on in this chapter we will return to this inevitable corollary of an approach such as this one. Describing dynamics and gesture increasingly pushes the boundaries of language, as one progresses beyond the level of form to that of process. One starts off by describing characteristics of the two cells; from that basic level one proceeds to get at the formative process by thinking and describing more in terms of the typical forces that shape the egg cell or sperm cell, and after that one penetrates to an even higher level. At that point one begins to need abstract words such as 'centre' and 'periphery,' 'open' and 'closed,' whilst getting ever nearer to the essence of the dynamics.

#### 4.2.2 Polarities and turning inside out

The above phenomena could still be described in terms of contrasts. Yet it may have become obvious that more is at play here than contrasts in terms of polarity, of repulsion, and of inequality. In the case of the processes and dynamics of the egg cell and sperm cell discussed so far, there is an additional factor. It was shown, for instance, that the egg cell with its dynamics of 'cytoplasm retention' carries out a highly symmetric division in reproduction (meiosis), whereas the sperm cell must expel cytoplasm. If one looks at this in terms of the dynamic characteristic of egg cells or sperm cells, one can postulate that the egg cell casts off the sperm cell principle ('sperm-cellness') at the moment of its first reduction division and that the sperm cell, in turn, excludes the egg-cell principle ('egg-cellness').

*Methodological remark: corroborative data from pathology*

Knowledge of pathology often helps to gain a better insight. If the sperm cell does not succeed in ridding itself of superfluous cytoplasm, it does not function properly. It would be too heavy and hampered in its mobility by the bag of cytoplasm attached at the height of the neck. When one looks for polarities, pathology shows the following pattern: *What is good and fitting for one pole and promotes its function, is disturbing for the other pole and makes it dysfunctional.*

One could describe the egg cell as a cell which has an inside; there is a content. The sperm cell has sacrificed its inner side, it has given its content away. In that (dynamic) sense the sperm cell has no 'inside.' The egg cell absorbs light (to which end it has its mass) but the sperm cell refracts light, a phenomenon directly observable under the microscope. In that sense it fits that the separated polar body is strongly light-refracting. Moreover, the polar body is no longer characterized by the optimal fertility which is so characteristic of its sister cell (the secondary oocyte). In human beings, it is highly questionable if a polar body would still be capable of human development. If such a thing occurred it would only be rare and sporadic, in which case it would be a very rare form of fraternal twinning.

Even more captivating is the phenomenon of *mobility*, which we mean here in a literal, physical sense. Indeed, one cannot fail to notice that the sperm cell is highly mobile. Pathology shows that sperm cells which cannot swim will not function. The characteristic ability of sperm cells to go against the current and determine their direction that way is foreign to egg cells. An egg cell cannot move independently. It is passively carried along in the stream of ovarian fluid. Again we see a contrast, but is this also a polarity? Up to now we observed outer movement, but what is going on inside? Almost absolute quiet reigns inside the sperm cell, which is due to the structure (in the form of the DNA formula), but we hardly see any intracellular metabolic dynamics. The situation inside the egg cell is quite the opposite. Plenty of cytoplasmic dynamism of cell organelles and metabolic activity reigns there. It could be postulated that the sperm cell shows mobility on the outside, whereas this is internalized in the egg cell. In their interaction with the surroundings, the two cells are polar opposites. In their manner we can see a parallel with the 'open' vs.

'closed' gestures signaled above. Whereas the sperm cell relates to its surroundings by pushing *against* them, the egg cell communicates with and is open to its surroundings; it moves *along* with them.

The latter brings us to the phenomenon of *turning inside out*. Deeper consideration reveals that the observed contrast is at heart a commonality. This can be easily demonstrated in biological terms for the spermatozoon and the ovum. Both cells are derived from primordial sex cells which have the same shape at the cellular level in a six-week old human embryo, even though they each contain a different genome (either XY or XX). After this commonality at the beginning, the spermatozoon and the ovum become one-sided and go their separate ways. *Seen in terms of morphological dynamics, one could postulate that the sperm cell specializes in 'nucleus,' and the egg cell in 'cytoplasm.'* This is in complete harmony with the biological principle that a spermatozoon, just like the polar body, is incapable of producing a cell (an organism). An ovum does have that capacity (in principle), as can be seen, for example, in parthenogenesis.

#### *Methodological remarks*

These observations mark a clear break between this approach and the current reductionistic, dissecting method. For most of today's biologists it would be undesirable to proceed in this direction, they would even consider the territory we have entered 'out of bounds.' To call a germ cell a 'nucleus-head,' or to designate an egg cell as a 'ball of cytoplasm,' is only justifiable within the framework of the phenomenological approach practiced here. It could be objected that the sperm cell also contains cytoplasm (even if it is not much), or that the egg cell also has a nucleus, and that they both have the trappings of a proper cell. Fair enough. But if one remains at the level of details, one will never see what this approach opens up. If one stays within one basic paradigm, these observations are indeed not 'true.' The dynamics of the germ cell as 'nucleus' and the egg cell as 'cytoplasm' simply do not reveal themselves within that framework.

Calling this a break is justified, because the analytical approach would exclude insights which can be gained through the dynamic approach. *The reverse, however, is not the case.* These remarks run along the same lines as the conclusions we reached when we talked about 'seeing the roundness of the head' at the beginning of this chapter. This strongly underpins the postulate that facts are not value-free, but that a perceptual content is always intertwined with interpretation.

The following considerations supply further support to show that we're dealing with polar gestures between 'nucleus' and 'cytoplasm.' Of course the egg cell has a nucleus, but it is embedded in a completely different process from that of the sperm cell. The DNA in the egg cell is metabolically active; it is 'rolled out' as far as is necessary and involved in well-known processes of transcription, translation, etc. One can postulate that the egg cell shows the processes of a cell in *interphase*. By contrast, the biological dynamics of the sperm cell have the signature of a cell in the *mitotic phase*. The DNA is ordered and structured, the nucleus is correspondingly pycnotic and metabolically resting. In the current analytical, 'magnifier' approach the sperm cell and egg cell have both nucleus and cytoplasm; in the comparative, 'minifier' approach the sperm cell is 'nucleus' and an egg cell is 'cytoplasm.' Viewed this way, an interphase bears the signature of cytoplasm and could thus be characterized as peripheral, centrifugal, and open. In other words, it is like an egg cell. The mitosis bears the signature of the nucleus and could therefore be characterized as central, centripetal, and closed; in short, it is like a sperm cell. In that sense it could be postulated that if constant cell division were to take place in a living human being (every second, day in day out, a whole life long), we could call this a huge breathing process. There would be a large rhythmical alternation of cells closing themselves off from the surroundings and turning towards the replication of the 'inner' ('sperm cell gesture') and cells opening towards the periphery ('egg cell gesture') and so on.

#### *Methodological remark*

Recognizing such a gesture in the process of cell division obviously requires a rather high degree of 'dynamic perception.' But imagine where this can lead. It enables us to gain a first glimpse of cells in a larger breathing process. First, they open up to influences from the surroundings (periphery). Then, they turn to concentrate on reproduction, so that they can stamp those influences from the surroundings onto the inside of the cell (the process of cell specialization and differentiation). The dynamics of the two gametes which are involved in conception resound like a first chord in a symphony. The first manifestation of the living organism!

### **4.2.3 Preliminary conclusion — polarity and unity**

One can look at ovum and spermatozoon as one-sided, polar developments from one many-sided, common origin. By forming a concrete image of the original sex cell it is even possible to picture the original unity out

of which the two gametes polarized. Building the image up in thought, one can transform the one into the other, that is to say, the polarity exists in fact within a unity.

'Egg-cellness' can manifest because 'sperm-cellness' is cast off, and the other way around! If we take a step further, we could say that they owe their existence to one another. They belong together. Understood in this sense, it is no wonder that sperm cell and egg cell meet one another. They complete one another! How they manage to do that (by means of the preconception attraction complex), will be dealt with later. In the dynamics of cell division with its alternating mitosis and interphase we can see a rhythmical 'repetition' of the gestures of the ovum and the spermatozoon, which indicates that we are beginning to gain insight into a higher level which is at work in the formative gesture of the particular egg cell and sperm cell.

#### 4.2.4 More polarities in conception

Why can we think of the sperm cell as 'straight? Thinking back to the corresponding question we asked with respect to the naive assumption of the roundness of the head, this question is relevant. For that waving 'creature' is of course straight in that it has the form of a radius. The spermatozoon is a radius with a beginning and an end; the ovum is a ball. The anatomical facts make this obvious: there is hardly a more perfectly spherical cell. Spherical cells are an exception. Maybe this is so because cells are never found on their own, but always form tissue together with many others. The ovum is a solitary cell. Egg cell tissue does not exist. The sphere is a self-sufficient form, it has no beginning and no end.

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#### Assignment 2

*Imitating the found gesture by acting it out and thus experiencing it physically can often be a great help. One can 'play' spermatozoon by standing upright and stretching up as far as possible, and feeling how that is. After that one can withdraw into oneself and roll up into a ball, thus getting a sense for that condition. Apart from sensing the sphere and the radius, there's also an experience of dark and light. The sphere can be felt as a self-contained form. The sphere has no direction, no beginning and no end.*



*Figure 4.2 Preconception attraction complex  
Drawing from Appenzeller, Genesis im Lichte der Embryologie*

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The analytical eye might have difficulty seeing the radius character of the sperm cell, but for comparative and dynamic perception it is clear as daylight. Moreover, it is an impressive thing to witness the process of turning inside out. In a geometrical sense, there are myriad radii within the sphere of the egg cell, only they have not manifested in a physical form. The sperm cell makes the radius visible. In that sense the two cells are polar opposites again, and at the same time the one is the other one turned inside out. The egg cell shows what the sperm cell hides, and the other way around. What can we read in the whole preconception attraction complex? In Figure 4.2 we see the unity formed by hundreds of sperm cells and the single egg cell, which lasts for hours before penetration of the sperm cell can take place. Do the sperm cells not make visible what the egg cell carries invisibly within? Sperm cells literally radiate that invisible dimension back to the egg cell. Do the sperm cells not form one large sphere, consisting of rays?



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### Assignment 3

*Form drawing can also support one's own experience when one recognizes the gestures. Draw a circle with a pencil, do it in a large format and repeat the circular motion for quite some time. Accelerate the movement and then slow it down. Notice how you feel, pay attention to your consciousness. In drawing this kind of 'perfect' circle, which you're quite likely to succeed in, you will find that you make the centre of the circle visible even though you do not draw it. After all, everything revolves around that point. Is the circle not a collection of points equidistant (radius) from a chosen centre? And that centre is an 'invisible' point. Now take a new piece of paper, concentrate on the central point and try approaching it from every direction, swooping down to the paper, landing, going through that chosen centre, and then lifting off from the paper in the same movement. Try this several times and once again notice how you feel, paying attention to mood, consciousness and inner experience. Is it not very different? How easy or hard is it this time to exactly draw a point? This time, too, the radii make visible a sphere, which also 'is not there.' Can you sense how these are two ways to deal with a centre? Try to experience how these are literally two 'approaches,' substantiating the press of the turning inside out of sphere and radius.*

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We will now go on to discover even more polarity. For conception in the normal definition of the word (the fusion of two pronuclei), one sperm cell and one egg cell would suffice. If one looks at what actually happens, however, one sees how during the period of the preconception attraction complex hundreds, even thousands of spermatozoa need to be present. With fewer than that it does not work. The numbers supplied by fertilization physiology confirm this. When a man is not able to produce 20 to 40 million spermatozoa per ejaculation, he is physiologically infertile. Tens of millions of sperm cells are produced every single day! That means hundreds of them per second! Out of every 10 to 20 primary oocytes which commence the final stage of maturation prior to ovulation, the majority will perish. One ovum will be released, at most two.

Now let us consider the concepts *one* and *many*, or a lot. Do they form a polarity? Here the same principle applies as in the case of 'small' and 'large.' In ordinary thinking, these words are used to denote quantities or measurements; in the series 1, 2, 3, 4, ... and up, we progress from the number 1 to *many*, i.e. a large number. But there is a different way to look at this. *One* is also a dimension, a quality. In the Middle Ages, people regarded *one* as the largest number. Something (or somebody) of which (whom) there is only one, that is a lot. *One* human being is not much in terms of physical matter, but very much when considered as a unique entity. One could say that a unique entity 'fills the cosmos.' In contrast, one can think of the cosmos as being filled with countless material Milky Ways, galaxies, stars and planets, usually experienced as *many*. Seen this way, *one* and *many* are polar opposites. The one form of *many* is material, in the sense of a lot of physical presence. That could be viewed as *many* in the spermatozoic way. Over against that there is the other *many*, or rather much: the immaterial vastness of something unique. That could be viewed as *many* in the ovum way. As qualities, *one* and *many* are poles, whereby the one is the other turned inside out.

#### *Methodological remark*

Perceptive readers will have noticed that there is more that distinguishes the polarity of egg cell and sperm cell — or rather 'egg-cellness' and 'sperm-cellness' — more than mere contrast. We have already remarked on the principle of turning inside out; this is not a simple matter of + and –, but rather of +/- and -/+. One also has to keep distinguishing at which level one makes the comparison, and within which parameters. Thus, when focusing on the metabolic, we spoke of an 'open' egg cell and a 'closed' sperm cell dynamics of the cell. But if one uses the concepts 'open' and 'closed' to express formative dynamics, then things are reversed. At the level of form (sphere–radius), the egg cell is the one that is 'closed,' and the sperm cell is the one that is 'open.' This methodological remark aims to point out once more that one is dealing here with a higher 'Gestalt-level' where polarity manifests.

To round this off, we now turn our gaze to the dynamics of 'sperm-cellness' and 'egg-cellness,' but this time at the level of the gonads. Directions and qualities of the gestures are again reversed here. The dynamics of the ovaries versus those of the testes portray a kind of 'counter image.' Whereas the sperm cell as a cell has the gesture of concentration and the egg cell of expansion, the testes and the ovaries show us the reverse in dynamics. The testis is an organ which bursts with bubbling vitality, displaying an enormous mitotic activity. The sperm cells are also relatively 'young.' They will exist for 65–70 days at most, after which they are reabsorbed. Much calmer dynamics prevail in the ovaries. We cannot speak of productivity here. Already

during the foetal life of the woman, egg cells lose their mitotic capacity and from that moment (the sixth foetal month) the number only decreases. The ovaries preserve and protect; the gesture is more centripetal, one of a slow 'decease' until the number of egg cells is reduced to zero when menopause is completed. The bubbling, explosive, centrifugal, radiation sensitive dynamics of the testes contrast with the quiet, imploding, centripetal dynamics of the ovaries. Macroscopically, the testis is a hard, shielded organ; microscopically we see a vast surface opening up to the outside. With 200 meters of seminiferous and efferent ducts plus 12 meters of epididymis, the testis is all surface and openness. The ovaries are tender, but massive; the egg cells are embedded in them, and hard shielding off is a pathology here (Stein-Leventhal syndrome).

#### *Methodological remark*

It will have become obvious by now that it becomes more and more tricky to find concepts and terms for the gestures one begins to track. More and more concepts are needed in order to express the dynamics manifesting here. Those concepts are not synonymous, each capturing a different facet of the gestures. Take for example the sequence mentioned above: centrifugal/centripetal — open/closed — periphery/centre — radius/sphere — light/dark — explosive/implosive. The researcher can get the somewhat unpleasant feeling of using a plethora of concepts while hardly, if at all, being able to name the central concept or the all-encompassing gesture. At that point it feels as if one loses the firm ground of clear facts and concepts. Yet at the same time one can begin to gain a definite sense for the concept (see the consideration below). The orthodox materialist might feel at this point that things are getting too nebulous, but for the phenomenological approach this experience indicates one is penetrating to the heart of the matter. The essence cannot be caught in words, but is nevertheless palpable.

Metaphorically speaking, the researcher is 'treading water' in the world of concepts. A form of certainty can yet be found when one keeps moving. The fact that we need to 'tread water' now can be regarded as inherent to the level we are beginning to reach. We're no longer concerned here with shape, nor with process, but with Gestalt, gesture. With this one reaches the world of formative forces, which are at work behind every shape which has come to visible manifestation. Spiritual science calls this the etheric world. This level can only be perceived in pictorial form, using imaginative consciousness. This exercise of 'treading water' is a prelude to this.

#### *Considerations regarding Sensing and Seeing*

*Blaise Pascal made a distinction between the esprit de géométrie and the esprit de finesse (the spirit of geometry and the spirit of finesse). \* The esprit de géométrie is needed for visual discernment. In the natural sciences the esprit de géométrie is the basis of every method. Its main feature is communicability. ... It can be made clear to anybody that a papilionaceous flower has an undivided corolla, 10 stamens, one pistil etc. ... But that flowers are 'passions of the earth,' as Goethe calls them, can only be communicated to someone who already 'sees' it.*

J.H. van den Berg <sup>4</sup>

#### **Assignment 4**

*From Sphere to Radius — An Exercise in Transformative Thinking We have been working with the polarity of radius and sphere (straight and round). Were not those the dynamics of head versus extremities? The extremities can be seen as radii made manifest. Yet it is those very arms and legs which are able to describe a cone shape by spherical movement. Thereby the form is moved, placed in space; it becomes external movement. Is the head not spherical movement come to rest? If so, where are the radii? Are they the invisible dimension of the head, in the same way that the sphere or cone is the invisible dimension belonging to the extremities? And what is the movement which belongs to the head? Is that external, spatial movement, such as arms and legs can perform, or is it more inward, nonmaterial?*

*Figure 4.3 is part of a 'meditative drawing' by Karl Heinz Flau.<sup>5</sup> The assignment is to come to an experience of the geometrical principles of point, curved and straight line, centre and periphery as 'mathematical gesture language.' The task here is to try to transform one thing into another in thought, turning them inside out. One literally 'comes out at the other end.' Please note the process indicated with the word 'mixture' in the drawing. This concept will be elaborated in the next chapter.*

\* The *esprit de finesse* refers to that part of reality which one 'sees' in a different way, and which can be just as tangible as that which can be communicated. Pascal puts it like this, '*On les sent plutôt qu'on les voit*,' 'It is more sensed than seen.'

<sup>4</sup> J.H. van den Berg, *Het menselijk lichaam*, Vol. 3 p. 100, Callenbach, Nijkerk, 1961 [The human body] (Dutch. T).

<sup>5</sup> Karl-Heinz Flau, *Urbild und Wandlung* Ottersberg, 1980 [Archetype and Chance] (German. NT)

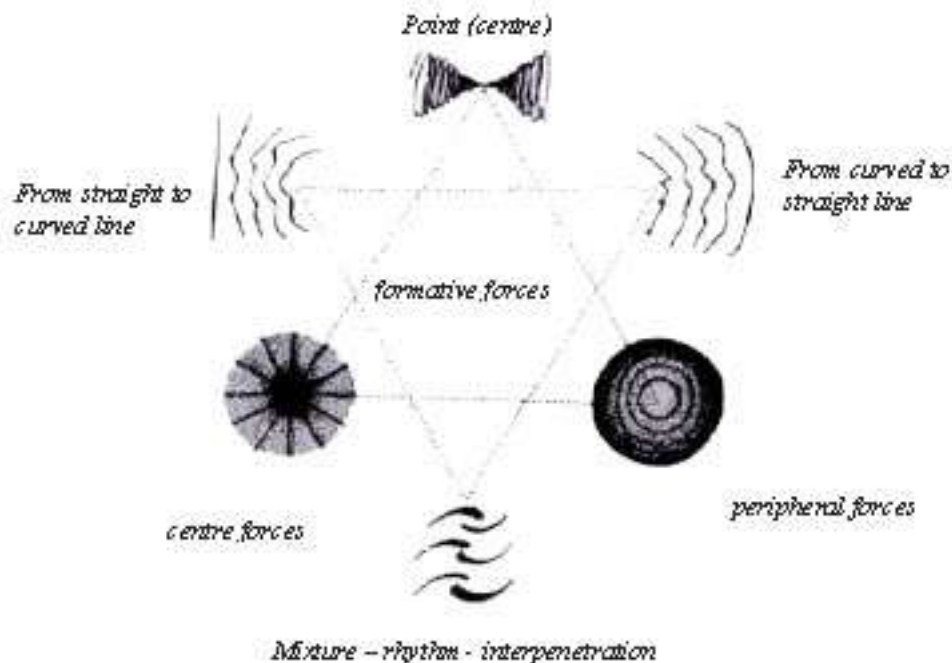


Figure 4.3

### Assignment 5

*Drawing Exercise to Experience Transformation Turning 'Sperm-cellness' into 'Egg-cellness' (and vice versa). Take a piece of paper, and first put down three points which will form the ends of three sides of an equilateral triangle. Do not draw the sides straight, but curved slightly inwards. The idea is now to experience a force pushing in. Continue drawing the sides, whereby the force pushes them further in each time. The lines will curve in further and further, making the enclosed triangle smaller and smaller, more and more like a sperm cell. Once one has the feel of a rhythmical movement, moving through the line segment, coming to rest in the point, moving through the next segment, coming to rest in the next point, and so on from angle to angle, one almost gets into a circular movement and loses the feeling of the angular shape of the triangle.*

*If one analyses the resulting drawing, one can see the still point, the transition where the form is turned inside out. After that, one comes out 'on the other side,' and another triangle slowly emerges, this time with the base up, and 'bulging out' on all sides. Is this not how a concentrating, sperm cell movement is turned into an expanding, egg cell movement?*

*In Figure 4.4, the series drawn by Karl Heinz Flau, note that he uses a totally different terminology, speaking of sucking and welling, and from the outside and from the inside.*

*Encore*

*At the end of the drawing exercise, one could continue the lines, taking them from the angles and extending them out in thought. It will appear that it is thus possible to imagine the continuation of the lines into an infinite periphery.*

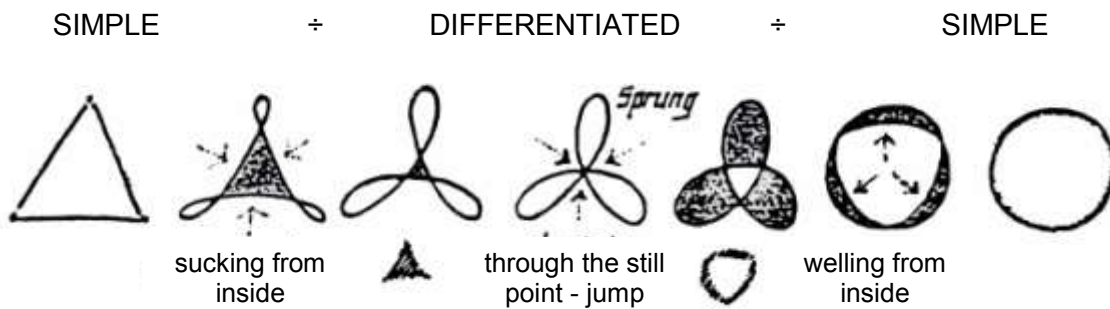


Figure 4.4

### Assignment 6

Try finding characteristics of 'egg cellness' and 'sperm cellness' in individuals. This is best done by looking dynamically at pairs of individuals and comparing them. This is a good practice especially when one is considering children.

First concentrate on the way the chosen individuals are built, and consider posture and/or constitution. Keep a list of points of comparison between the two, and note down what you think the characteristic gestures are. The next step could be to compare the found gestures with soul dynamics. What is inner, what is outer? For example, are there people who externally seem to be always on guard, hiding their inner feelings? And are there also people who are socially very accessible, but couple this with deeper psychological dynamics of reclusiveness?

It would be harder still to go on to examine the relationship between 'soul dynamics' and outer appearance. One could ask the question, for example, whether a person who outwardly has an open attitude also has inner psychological and social openness. Do outward appearance and inner reality go together?

## 4.3 One plus one makes three — the middle

One conclusion we could draw from the foregoing paragraphs is that polarities exist within a unity. Having seen that polarities are transformations of one another we can surmise that a higher principle connects or unites them. In this section we will begin to research the nature of this principle and see if it can be known. To that end we will direct our attention first to the human skeleton.

### 4.3.1 Polarities in the human skeleton

In chapter 3 we studied teeth, looking at their different elements both on their own and comparatively. Our focus now will be on the totality of the human skeleton (and human bearing), within which we will look for polarities. The main one is between *head-skull* and *arms/legs-extremities*, so we are operating in the dimension of *centre-periphery*.

### Assignment 7

Once again, as in the case with the polarities between egg cell and sperm cell, it is a good thing to start with our own observations. On the checklist on the following page first note down polarities, using the approach we chose. Start from the principle of transformation, consistently thinking through to 'the other side'.

As we know, the skull bones are a set of flat plates of bone tissue which can be regarded as the surface of a sphere, manifesting in bone. Together, these plates form a round container which holds the brain and is known as the neurocranium. One could comment on this by pointing at the viscerocranium. Such a comment, it could be postulated here, would come out of an analytical approach, something which we will come back to later in this paragraph. The flatness of the skull bones and the spherical character of the skull as a whole will only come into perspective when we direct our attention to the bones of the extremities. For there we are dealing with long tubular bones. They do not form a sphere, but rather a long stretched out chain of skeletal elements.

The skull bones form close connections. The sutures are known for their tightness. Although, histologically speaking, we are dealing with connections built out of ligament (syndesmoses), they are extremely tight and hard to break due to their complicated jigsaw structure. In infants the connections can still be severed; in adults a skull will be more likely to rupture or break in case of trauma; the seam is unlikely to become disconnected. e could postulate that tightness and form retention are the normal function here, whereas mobility would be pathological. With the bones of the extremities, the situation is reversed. Here we are primarily dealing with *synovial connections*, which rather have the character that they are not really connections, for there is a space in between. This is functional because the joints need to be free to move. Tightness, characteristic of the physiology of the skull, would be pathological here. Concrecence within the connections would cause malfunctioning of the extremity.

	HEAD-SKULL	EXTREMITIES
PARAMETER		
Bone shape		
Nature of bone connections		
Mobility of the parts		
Degree to which bones are recognizable in vivo		
Relationship to temperature		
Open or closed		
Internal vs. external mobility		
Vitality		
Blood flow		
Relationship to consciousness		
Relationship to outside world (periphery)		

In connection with this, a striking feature of the skull should be mentioned: it is an exoskeleton. Through the skin the bony skull can almost be directly examined in vivo. An individual's typical physiognomy is reflected in the bone structure of the skull. The bony elements of the extremities, on the other hand, are hidden from view. They are an endoskeleton, mostly covered by soft tissue, especially muscle. The presence of muscles in the extremities and the seeming absence of muscle in the head goes with this. The facial muscles are not meant to move the separate bones of the skull in relation to one another. The chewing muscles seem to be an exception, something which we will return to later on. A striking feature of the skull is that it is an exoskeleton; the soft parts (brain) are located on the inside. In the case of the extremities it is the other way round: the soft parts surround a hard centre, they are on the *outside*. Whereas the bony elements of the

extremities are embedded in muscle tissue directly involved with movement, in the case of the head, movement is harmful for the soft contents. This is illustrated by the fact that the brain malfunctions (temporarily) in case of a concussion.

The head has an 'inside.' The skull encloses that, which goes with its spherical shape; the skull is *closed*, in contrast to the extremities, which 'radiate' out, have a beginning and an end, and are *open* in character. Here we once again meet the polarities of sphere and radius. The pathology of (now rare) rickets gives us the picture of the reversal: the round head becomes *caput quadratum*, the straight extremities become bent.

The character of extremities is to diverge, split and fan out. If one follows the series of bones down the arm, one sees this pattern clearly: 1 humerus, 2 forearm bones (ulna and radius), 3 proximal carpals, 4 distal carpals, 5 metacarpals and corresponding phalanges. In order to characterize the dynamics expressed in skull and extremities, one could use the terms *concentration* vs. *divergence*. The extremity diverges out to the periphery, and 'opens out' to it. Each in their own way, the extremities are turned to the outside world, ready to adapt to it or change it with their actions. The extremity finds its centre 'out there.' By contrast, the head closes off, concentrates, and finds its centre 'here.' The extremities exist and develop gravity. The head encloses a space free of gravity, within which the brain is suspended in the cerebral spinal fluid.

#### *Methodological remark*

It is hard to find the right terms to sum up the gesture which is at play here. Does the skull form a picture of detachment? Do the extremities make a gesture of shooting out towards the periphery? How is the relationship of the human being with the environment and the world expressed in these two areas? Do we not in our head reflect about the world, whereas with our limbs we act in the world? Perhaps the words separate and connect would be fitting terms to express the two gestures.

In this connection, we should further pursue the theme of mobility, and try to find out about being active inwardly and outwardly. We found this equally helpful in order to understand the gesture inherent in the sperm cell and the egg cell. The extremities clearly move, they move in space and they are subject to gravity. In the extremities, the human being moves in a physical, material, sense perceptible way. In the physical body, the human being moves with his arms or legs. As indicated above, the head has a different relationship to movement. Outward, material, sense perceptible movement is limited to a minimum here, it even hampers proper functioning of the brain and the senses. In order to observe accurately with eyes and ears, one holds the head still, otherwise perception is disturbed. This goes for other functions performed by the head as well. There is, however, a quiet mobility of a nonmaterial kind. If one observes the brain and the skull, one notices that they are strongly formed and shaped. In making that observation, we think not only of the fact that the skull is highly 'chiseled,' but also of the neurons, which lie in a strictly neuroanatomical order. Even the movement of stimuli thought to take place along the neural passageways is only a semblance. In 'reality,' spatial structures, which neurons are, depolarize. Whereas we move *with* matter in our extremities, in the head we **relate to** matter with a different movement. That type of mobility, characteristic of thoughts and imagination, is of a very high order. In fact, the mobility inside our heads is much more subtle and ephemeral than any motor movements of our actions can ever be. We recognize this in common expressions — one can 'change one's mind,' ideas can 'come' or even 'hit' in a flash. Imagination has no bounds, and thoughts can move anywhere they want.

The extremities are radii which have become visible, and the head is likewise a sphere which has manifested in the visible world. The extremity, however, is invisibly connected to the sphere. This underlines once again that the extremities are polar opposites of the head, because the mathematical centre lies in the periphery, whereas the spherical head actually has its centre within. The extremities have their centre 'out yonder,' but the centre of the head is 'here.'

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#### **Assignment 8**

*At this point it would be good to go over Figure 4.2 and Assignment 3 and either review Assignment 6 once again, or take it up anew.*

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It may have become clear by now that the range of polarities which unfold between the head on the one side and the extremities on the other, is inexhaustible. This is no wonder, because they have to do with the nature of the way we relate to the world, which is indeed quite different for different areas of the body. The nature of cognition is in many ways the polar opposite of the nature of action (or volition). To be conscious and awake are two prerequisites of cognition, without which we are dealing with a pathological situation. In the sphere of action, the domain of volition, there is of course a certain degree of consciousness also. However, if one wants to be fully conscious when one carries out an action, and be fully awake in every facet of the motion, one would actually hinder its fluidity. It is even so that someone who fully masters a motion, say, of playing an instrument, will say, 'As soon as I stop and think about it, it goes wrong.' At a certain point, it is 'in the fingers,' and no longer in the head. Experiences of this nature point to a certain degree of unconsciousness as being beneficial for uninterrupted motion and adequate action. We might well be dealing with a totally different relationship between body and spirit in these two spheres. There will be more to say about this in Section 4.3.6.

To round this off, let us make some observations concerning blood flow and temperature. The blood supply in the extremities is less precarious than that in the head. This is illustrated by the fact that it is possible to operate on an extremity for quite some time in a 'blood vacuum.' Cutting off large vessels in an extremity does not immediately lead to necrosis. The vascularization of the head is very different. Blood supply to the different regions is regulated with great precision. Interruption, even if only for a few minutes, will soon lead to damage (necrosis). In that respect, the head is much more vulnerable than a limb. Apparently the buffers of vitality are greater there than in the head. Later in this chapter, we will return to this question of the connection of vitality with consciousness. With respect to body temperature, extremities differ from the head. The extremities really are further out, which goes together with a lower temperature (34°–35°C). The head, together with a large part of the trunk, has the core temperature (37°–38°C). If this is reversed, it is clearly unhealthy; 'keeping your head cool' is a well-known expression, and everybody is familiar with the fact that fever can lead to unclear thinking. A hot, feverish head is not the place for wakeful consciousness! But the extremities do not function well in the cold. In physiotherapy, many applications are based on the wholesome effect of warmth on muscles and joints.

With these initial observations, we focused on the polarity of head and limbs. The aim of the chapter, however, was to find the way in which they form a unity. It will have become obvious that looking at head and extremities confronts one with the difficulties of the reducing, 'minifying' lens, by which we mean that one has to be very precise about the level at which one applies the comparison.

#### 4.3.2 Connecting polarities — the lemniscate

We would like to go on now to the realm of the *middle*, and its importance with regards to polarities and threefoldness. First, however, some considerations about the lemniscate as a connecting figure.

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##### Assignment 9

###### *Transformation in a Lemniscate*

*We would like to begin by recalling Assignment 3, which dealt with the sphere and the radius.*

*Using a large piece of paper draw a large lemniscate, like a form drawing, i.e. keep moving as you draw. As in Assignment 3, take note of how this activity feels, and notice your consciousness.*

*Once you have the shape, begin to bring in a variation by expanding one loop, and making the other loop correspondingly smaller. What do you notice?*

*Try drawing a lemniscate with several parallel bands of color.*

---

Strictly speaking, the lemniscate is not a shape but a movement. If one only concentrates on the shape of the lemniscate (see continuous line in Figure 4.5), one might fail to see the polarity which is so characteristic. Only by following the line, moving along with it through the drawing, can we distinguish the different character of the inside loop and the outside loop. When we follow the direction (along the dashed line), it becomes obvious how that takes us from the inside to the outside. Doing that, one also will realize how the midpoint is a *turning point*, where the transition takes place from 'outer' to 'inner.'

The 'secret' of the lemniscate is that it is a movement which combines and transcends the polarities of sphere (here a circle) and radius. At the periphery (point P) the movement is circular; the centre (A) is not actually drawn, but is invisibly and necessarily there for the circular movement to be able to be carried out around it. After all, a circle is a combination of all the points which are equidistant to a given central point (remember Assignment 3). In drawing a lemniscate, the circle with centre A is not completed. One could put it this way: before the circle could be completed, another point begins to attract and pulls one away from a one-sided circular movement, and this point B 'wins out' and takes over. This time, however, the movement is similar to the one of the radii moving through the centre of drawing Assignment 3. A straight line moving towards middle point B now gives direction to the pencil and this time one does go through the visible central point B. This straight movement could potentially be carried on to the periphery in infinity, but the invisible centre A' now attracts the movement and bends it into the circular movement around it, and so on. In this lemniscate movement, the central point alternates all the time, shifting from A to B to A', back again to B, etc.

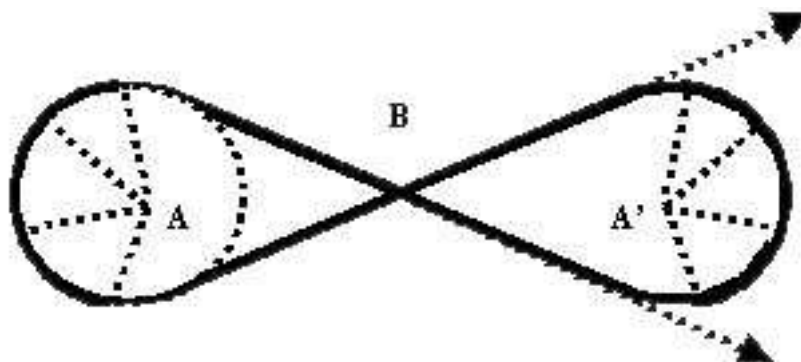


Fig. 4.5

The lemniscate is, so to speak, a 'breathing' figure, one that transcends the polar one-sidedness of radius and circle (sphere) in a movement which connects both polarities. The lemniscate is neither circle nor radius, while being both at the same time. The lemniscate is the continuum which combines the two, yet also stands 'above' them.

The concepts 'transcend' and 'connect' can help one understand the unity within which the polarity does in fact exist. The one polarity helps us recognize the other. In the quote at the beginning of the chapter, Goethe said, 'We must use the darkness in order to make the light visible;' to this we could add, 'and also the other way around.' We showed this in a dynamic and comparative approach to ovum and spermatozoon, and to head and extremities. If we were to imagine a dimension which would simultaneously be light and dark, it could be no other than one which carries both light and dark 'inside,' without *being* either light or dark. Were this dimension to be *either* light or dark, it would present itself as one of these. Goethe called it *sinnlich-übersinnlich* (sensory-supersensory); <sup>6</sup> he pointed to a dimension which is not exactly visible, yet can be known. Polarities could thus be looked upon as two manifest extremes of a middle dimension which can be surmised from the extremes. The two poles are visible, the middle transcends the visible.

In the case of the sperm cell and the egg cell one can even form a concrete image of this in thought. Are sperm cell and egg cell not one-sided, polar developments of something like a primordial sex cell? Out of that sex cell they have developed into polar opposites: the egg cell as 'cytoplasm,' the sperm cell as 'nucleus.' To help us imagine this in the example of head and extremities, study the drawing at the right (fig. 4.6)

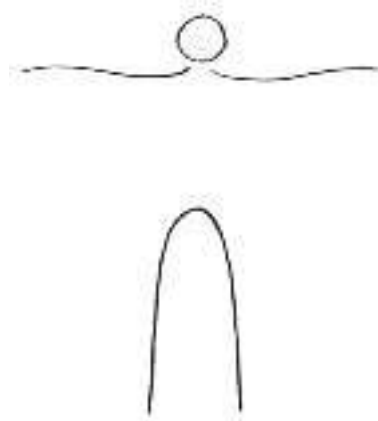


Figure 4.6.

#### The human form

Let us recall the two poles into which a lemniscate can diverge.

On the one hand there is the closed-off circle, focused on the centre,

on the other side there is the open radius, focused on the periphery.

The drawing illustrates this principle at work in the human figure.

<sup>6</sup> Rudolf Steiner, *Goethe's World View*



## 4.4 The middle as a place of meeting and interaction

The exercise of thinking through the lemniscate brings home how one pole is the other one turned inside out. The other thing it teaches us is that the two poles are in fact connected. That is a general law of polarities. The poles are to be seen as one-sided (specialized) manifestations of something which lies between them, a middle dimension, to be thought of dynamically as being of a higher level, straddling and uniting both poles, not coming to manifestation itself. One could postulate that the two poles reached 'form,' whereas the middle dimension remains in the 'process.' So the middle carries within it the potential for both polarities (and-and character), while at the same time standing above the poles and being neither (neither-nor character).

Bearing in mind that all shapes come into being through movement (discussed in Section 3.1.3), we can postulate that the two poles are one-sided manifestations of one single dimension which comprises and unites the movement (process) of both.

This realm of the middle is characterized by rhythm, which will be shown below. Rhythm can be understood when one pictures breathing. The two extreme poles of breathing are inhaling and exhaling. In themselves, these are 'deadly.' Breathing, which is closely associated with life, connects these extremes in a process of rhythmical alternation between the two. Breathing is not a fixed thing, but a process; being within that process and maintaining it is essential.

Goethe described this connecting dimension of the middle as being on the sensory-supersensory level. The feeling of 'treading water' that was mentioned before, is naturally connected with this dimension, due to the fact that it is not visible, unlike the two poles. However, it can be known, and we will now look for manifestations of it in the skeleton.

### 4.4.1 Ribs

The individual rib should initially be classified as an 'extremity.' Even though it is bent, it does have a beginning and an end. In anatomical nomenclature one speaks of caput, collum and corpus as one does with regular long tubular bones. When one looks at the rib cage as a whole within the totality of the skeleton, the picture changes. The thorax then appears to us as a 'head.' The soft parts are inside, and, inspectable and palpable as it is, the rib cage is unmistakably an exoskeleton. The connections are not as rigid as those of the sutures, but neither are they as flexible as the joints in the extremities. The rhythmical movement of breathing in and out is limited; it is a mixture of quiet form on the one side and movement on the other. The cranial ribs are almost exclusively enclosing, as is the head. Going down, they gradually become less connected to the sternum until finally, in caudal ribs 11 and 12, they end in two pairs of loose 'extremities'. The lower ribs are also more mobile. The thorax thus occupies a kind of middle ground between head and extremities. Cranially, we see the closing, spherical gesture of the head (skull), caudally we see the radiating openness of the extremities. We're dealing with more than a mixture, however. Neither are we looking here for a middle in the sense of a dimension on a higher level. The mixture as such is a sense perceptible reality in the shape of the thorax. But we can also look at the rib cage as a *function* of the activity of the two polar qualities, whereby the whole is more than the parts. With this we mean to say that individual ribs are certainly like extremities, but transcend that quality in their total function of the thorax, wherein they become a head. The skull is an anatomical given; it remains intact long after death even though its 'enclosing function' within the living organism is no longer needed. With ribs, it is different. Soon after death, when the body has decayed, they 'return' to what they also are, namely a collection of loose 'spokes.' The 'thorax head' is something one can see not so much in the parts, but from the parts. The thorax head is on a higher organizational level.

### 4.4.2 Vertebrae

What is the place of the individual vertebra within the polarity of skull and extremities? Spina bifida shows that 'openness' is pathological. The vertebral arch closes itself off into the vertebral foramen, like a mini-skull. The spinal cord, which lies within the spinal canal formed by these foramina together, is enclosed as the brain is in the neurocranium.

Taking a step up and looking at the vertebrae within the totality of the human skeleton, we see the *spinal column*. Over thirty vertebrae together form a firm yet flexible column which physiotherapists sometimes call 'the fifth extremity.' Just as with the thorax, one sees how the individual components transcend their

individual nature and together build their counterpart. The vertebrae have built something that has the character of a radius in this column. The 30 odd 'heads' make an 'extremity.' The fact that the spinal column is unmistakably an endoskeleton fits in with this observation. In vivo, all that is noticeable of the whole complex spinal column are the spinal processes. The enormous muscular columns of the erector spinae cover the rest. The resulting column, however, does not have the rigidity typical of the long tubular bones in the extremities. The radius character here is not one of shape, but of *process*; the spinal column 'achieves' the form of the radius in its totality. The possibilities for movement are quite different from the extremities; no angular movement is possible, the spinal column as a whole can bend into curves, whereby the rhythmical element stands out again, which we also recognized as a characteristic of the thorax. We thus recognize the spine as an extremity not in the parts, but from the parts. The spine is extremity at a higher organizational level.

#### 4.4.3 The unity of rib and vertebra

Looking at rib and vertebra together, the similarity to a lemniscate is striking. The vertebra can be seen as a head, the ribs as extremities. Heads have minimal mobility (too much movement is actually pathological); for the extremities movement is possible, in fact, they must move. This unity as such does not reveal the essential character of the organization of which it forms a part, namely the trunk. When we picture the trunk, it turns out we can speak of the head and extremity dimension again, but reversed this time. Head is now extremity (spinal column), and the extremities are head (thorax). The trunk is head and extremity at the same time, but not only in the sense of 'in between.' In the dynamics of the shape of the trunk we see the anatomical manifestation of the process which is both head and extremities simultaneously, while also being neither. But this process of 'coming to manifestation' does not go as far as it does in the case of the two poles. The thorax, for example, never becomes an anatomical 'enclosure.'

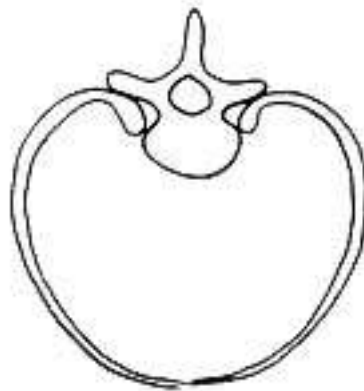


Figure 4.7

#### 4.4.4 The concept of *Steigerung*

In a case like this Goethe used the word *Steigerung*, intensification, progression, enhancement, rise, or increase.<sup>7</sup> In the meeting of the qualities 'head' and 'extremity' a higher organizational level becomes 'visible.' One is faced here with a dimension which is neither of the polarities, yet has them. Goethe derived this concept from his theory of colors. After countless experiments and a long period of research, he came to the conclusion that colors manifest where light and dark meet. The color grey is the mixture, the passive confluence of light and dark. Colors, however, are the active middle, the active meeting of those two qualities. If one would have asked him the question of what preceded dark and light, Goethe might have answered something like this, 'Light and dark are expressions of a dimension of a nonmaterial order which is neither light nor dark and at the same time both light and dark. Colors are that nonmaterial dimension made visible.'

Thorax and spinal column are the picture of the dimension which can be 'seen' in every lemniscate. This dimension itself does not become visible, but is at work 'behind' the visible phenomena and can only be known as such. That is what is meant here by the middle, a supersensory quality that can nevertheless be experienced, and thus be understood and known. In Figure 4.8 the relationship between the two poles and the middle with its rhythmical quality is expressed in a triangle.

<sup>7</sup> Rudolf Steiner, *Goethe's World View*.

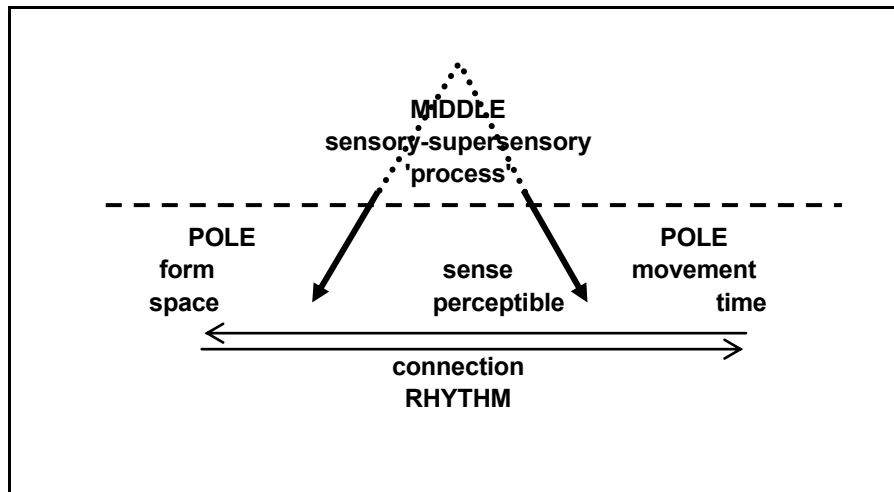


Figure 4.8

#### 4.5 Rhythm as the quality of the middle — rhythm and life

Next to the polarity of closed and open (sphere and radius) we came to see in head and extremities \* the polarity of rest (form) and movement. These two qualities are united in rhythm. Rhythm is a constant swing of the pendulum between the boundaries imposed by form and the radiating out of movement.

We have seen that poles are one-sided. This one-sidedness is transcended in the rhythmic quality of the middle. The realm of the middle expresses the quality of not falling into one-sidedness; it mediates, because it both connects and creates space between the two polarities. We have seen this above in the shape of the skeleton, and the picture gains considerably in richness when we think of the rhythmical processes of inhaling and exhaling, of systole and diastole, of contraction and relaxation, etc. In this example breathing is the process of life. Continuing in the one-sided activity of inhaling leads to death. This also goes for exhaling. Life gets stuck in the extreme polarities. This example also shows that the middle is much more than 'mean,' or 'average.' In the middle there is a process which comprises both poles and is of a higher order, which is certainly not present in a kind of halfway point between inhalation and exhalation.

*Life is a process, a 'breathing' between poles. Life is rhythm.* Much is contained in this statement. Rhythm is always **threefold**. There are three parts to it, two of which, the polarities, are manifest and visible. The middle, by its very nature, remains invisible. Therefore visibility implies polarity.

#### 4.6 Making the invisible middle visible

In all these considerations the following question plays in, 'To what degree can the dynamic, participatory stance contribute to achieving supersensory perception?' Having arrived at the middle sphere, it may have become clear that this quality has taken us one step further in grasping gesture. In the poles one seeks to discern the results, the end products, of the formative forces. Those are the visible phenomena. Dynamic perception sees *through* the physical manifestations and penetrates to the level of gesture. Once one pushes through to the quality of the realm of the middle, one has reached a dimension which is unmistakably both sensory and supersensory, and enters the level of the original process behind visible phenomena. In the case of the skeleton, one has the calcified bones in which the formative gesture can be recognized. The gesture of the Gestalt which expresses itself in the threefold division into *head — trunk — extremities* can only be recognized when one starts from a higher systemic level. If one restricts oneself to an analysis of the parts, one has no access to the experience of this Gestalt or process. Once again, Goethe summarizes this concisely:

In the palm of his hand he holds all the sections,

\* One could ask the question here why there is only one head but several extremities. An answer might lie in what was said above concerning the dimensions one and many in our discussion of the sperm cell and the egg cell.

Lacks nothing, except the spirit's connections.  
[Dann hat er die Teile in seiner Hand,  
Fehlt, leider nur das geistige Band.]<sup>8</sup>

Towards the end, we introduced the notion of threefoldness. Dynamic perception was a necessary prerequisite for recognizing polarities, and once one sees the polarities, the perception of threefoldness follows logically. In the following paragraph we will go on to demonstrate this approach in another example of human anatomy.

## Interlude

### Conception seen as a meeting in the middle

Before conception proper takes place (i.e. before the pronucleus of the egg cell fuses with the pronucleus of the sperm cell), one single egg cell and several hundreds (even thousands) of sperm cells form a biological unity, which exists for several hours. This preconceptional attraction complex (PCAC) is a necessary prerequisite for actual conception, which starts with the penetration of the sperm cell. PCAC lasts several hours, and it is a crucial period of choice. Much hangs in the balance; both egg cell and sperm cells have to meet very specific conditions before a specific sperm cell will penetrate. This is a period in which a very fragile equilibrium exists. When optimal conditions are reached the whole 'mechanics' of penetration, melding etc. happen in a flash. Before that, it is a time of 'putting out feelers.' There is no obligation and everything is open. Both sides are in a precarious balancing of probing conditions.

With regard to the biological relationship one can see a transformation taking place. One must imagine that both gametes are derived from an original sex cell. The one gamete has become a one-sided 'nucleus-head,' the other has turned into a 'cytoplasm-ball' (see Section 4.2.2). During this time, ordinary biological conditions are totally reversed; normal cell conditions have turned inside out. In normal cells, the nucleus is both structured and structuring inside a dynamic, active and changeable periphery of cytoplasm. But during PCAC, cytoplasm is the quiet centre with the nuclei moving around in the periphery.

One can picture this as follows: Imagine turning the cell inside out the way one does with a glove, and think this through to the end. Eventually this leads to the situation of the preconceptional attraction complex. (Compare also Assignment 5). It is as if the two gametes create 'the cell' at a higher level during this subtle and fragile play of reconnaissance. PCAC is a joint achievement: the two polar components progress together to 'the cell,' bringing it about anew. In contrast to the cell as we normally know it, this one is of a higher order. One can imagine that something else enters in during this stage of openness and meeting. It is as if matter is lifted outside normal biological circumstances. In this state (less biological, less like ordinary matter), it makes itself accessible for another, nonmaterial dimension, which can connect with substance (incarnation).

## 4.7 Threefold perception

### 4.7.1 Introduction

Perhaps the title 'Threefold Perception' does not quite correctly characterize our methodology. In this chapter we have practiced the dynamic approach up to now. This is inseparably connected with discerning polarities. As indicated in Section 3.1.3, dynamic perception includes three aspects: 1) describing *details*; 2) including the *total picture* within which the various details must move; 3) perceiving the *dynamics* resulting in the eventual proportions of the forms within the total picture. Recognizing polarity is not possible without comparing. That, combined with the dynamic approach, gave us insight into the *gesture* behind the polarities. Going further, one inevitably comes to the dimension of the middle which bridges and unites polarities, something which is both sensory and supersensory. The two poles appear in the sense

<sup>8</sup> J.W. von Goethe, *Faust*, Full quote: "Who for living knowledge thirsts seeks to drive out the spirit first. In the palm of his hand he holds all the sections, lacks nothing except the spirit's connections."

perceptible realm, but by its very nature the middle lies in the realm of the invisible. Whereas polarity therefore always implies the visibility, the middle always implies a rhythmical process.

When we speak of threefold perception, we mean an approach to nature and the human being which recognizes that creation manifests the polarity of *spiritual principles* and *matter*. In the anthroposophical view of the human being and the world, this spiritual reality is the starting point. Although this spiritual reality does not lend itself to conventional 'proof,' it is, however, verifiable in observed phenomena of threefoldness in the human being and nature. The dynamic approach demonstrated here, combined with thinking and observing in polarities, is the minimum requirement for perceiving this threefoldness. In the next paragraph we will give another example of how to direct our observation and thought, followed by a summary of the consequences of this approach.

#### 4.7.2 Upper and lower pole

To begin with, let us posit the polarity *cranial–caudal* in the human being. In that framework, let us compare the dynamics of the head/skull on the one side with the dynamics of the belly/pelvis on the other side. Many of the polarities we discovered when we looked at the 'axis' of head in contrast to the extremities, will be recognized here too. Next to that, other polarities become manifest. Once again we suggest starting with independent observations. In the chart you will find a number of criteria offered as a guide to discovering the polarities. It will be obvious that the head forms a polarity with the 'counter-head' pole of belly and pelvis along this axis, and also that the principle of turning inside out is recognizable again.

The chart uses the term 'anti-head,' because this axis of *upper pole* and *lower pole* should be seen in connection with the aforementioned axis head–extremities. In that case we were dealing with centre (head) and periphery, here we are dealing with upper (head) and lower. This also makes it understandable how the terms *upper pole* and *lower pole* are often used in anthroposophical terminology to indicate the *nerve-sense pole* and the *metabolic-limb pole*. Within such a frame of reference one does away with the dissecting approach. Most current textbooks of anatomy and physiology treat limbs and intestines in completely different chapters. With this approach one sees connections between domains which are currently seen as belonging to completely different disciplines. Threefoldness in the human being is not so much an anatomical framework, at best it could be seen as a morphological framework: we are dealing with the spatial relationship of *process*. It would be better to speak of 'spheres.' These spheres (or poles) do exist in space, but not in a Cartesian sense. Recognizing threefoldness automatically leads to seeing connections with the field of psychosomatics and different disciplines and makes a connection between different and now separate disciplines visible. Later on we will show how the polarities of threefoldness can be seen in more than one axis or direction. Take for example the unity of the rib and vertebra. Dorsally, it has the character of the upper pole and ventrally the character of the lower pole. Moreover, once we have learned to see it in one place, we will recognize the principles of threefoldness if manifesting within each part of the body, and within every organ and on every level which can be perceived macroscopically or microscopically. Think of the nervous system which has its upper pole in the neurocranium (above) and the spinal cord (behind) and its lower pole in the peripheral nerves on the axis centre–periphery, whereas the vegetatively autonomous intestinal plexus forms the lower pole on the axis centre–intestines.

This gives a little indication that one can see threefold polarities in several directions and dimensions and the more one sees, the more the certainty of topographical space falls away. We may feel we are treading water, but we will find a new foothold in the *topography of processes*. This topography stands 'above' physical anatomy, while weaving 'through' it at the same time. Here we enter the sphere of the sensory–supersensory again.

#### 4.7.3 Three levels of consciousness

Two of the criteria mentioned in the chart will be elaborated here, because they can help us to understand the polar relationship between the spiritual and the physical, working in the two spheres. The polarity *vital–non-vital* is one which obviously goes through the whole of human morphology. On the axis upper–lower, the non-vitality of the nervous system stands opposite the belly/pelvis area with its predominating vitality. One manifestation of this is the fact that nerve tissue is far less able to regenerate itself. The scope of this polarity widens when one takes into account the criterion of sensitivity to radiation. Apart from nerve tissue, striking examples of tissues which are totally or almost totally insensitive to the mutagenic effect of radioactive radiation are fat tissue, muscle tissue, and collagenous connective tissue. By contrast, bone marrow, testis tissue, and almost all epithelia (skin and intestinal tissue among others), are very sensitive to radiation.

	HEAD POLE	COUNTER_HEAD POLE
PARAMETER		
Form (spherical or radial)		
Concentric-centrifugal		
Motion - rest		
Temperature		
Exoskeleton - endoskeleton		
Articulation (one – many)		
Hardness / consistency		
Closed / open		
Smell		
Sound		
Degree of moisture (relation to water)		
Degree of consciousness		
Degree of vitality		

Presence or absence of mitotic activity is evidently related to this difference. In the one type of tissue, cell division, growth and regeneration (signs of vitality) have become lost, which is a hallmark of the upper pole.

The organs concerned are fully formed. *Form* and *structure* predominate, which is a characteristic tendency of the upper pole. In the opposite type of tissue, time is still a factor in the biological process: the anatomical form is a shape in time. The physical representative of these organs and their tissues is a passing one. The lower pole tendency of *process* still predominates. We use the word 'still' here because we know of the history of the embryo that all organs and tissues have partaken in processes of growth, transformation and regeneration. In the upper pole the process comes to rest and hardens into form. In extreme terms, the brain is all but dead. In the lower pole the process remains active and vitality predominates. Think of it this way: the organs and tissues of the lower pole remain 'embryonic' in a certain sense. This also helps us to understand why the human body as a whole is sensitive to radiation in the embryonic phase. In this phase the whole of the human being must be like the lower pole.

The polarity *vital–non-vital* is related to the polarity *conscious–unconscious*. Where there is vitality, only sleeping consciousness is possible. Sleep is so much the state of consciousness connected with vitality, that it is actually pathological when the functioning of the lower pole organs and tissues comes to consciousness (think, for example, of a stomach-ache). On the other hand, vitality must apparently recede to enable consciousness to light up. An absence of vitality is a necessary prerequisite for consciousness. *Vitality and consciousness are opposites*. Where things are broken down and where there is form, consciousness can arise. In this polarity of waking–sleeping, one can imagine a middle realm of dreaming consciousness, having on one side the wakefulness of sense perception, on the other side the sleeping character of sinking into unconsciousness.

All this throws a new light on the threefold organism of the human being. In the anthroposophical paradigm the human being mediates between spirit and matter, and the relation between the two apparently varies inside the body. 'Form follows movement' was the adage of Chapter 2. The dynamics living in the upper pole and the lower pole confirm this. The upper pole — characterized by form, structure, and lack of vitality with corresponding wakeful consciousness — is *secondary*. The lower pole comes first; process is *primary*. Consequently, death is no longer primary, but comes forth out of life; not only does this totally reverse current dogmas, but it throws new light on the two different ways in which the relationship between body and spirit can manifest. In the sphere of the lower pole the relationship between shaper and shaped, i.e. the relationship between spirit and matter, is close, like hands shaping clay. In this sphere where the formative processes disengage from matter, like hands leaving the sculpture when the final product is achieved, process stops, form 'appears,' and the spirit is freed. Viewed this way, consciousness is like a waking up *from*. Where spirit disengages itself from the body and 'leaves' it, consciousness lights up; where the closeness of the lower pole relationship remains, spirit submerges into the unconscious.

this view has tremendous consequences; it totally changes the way we look at the human being. It enables us to see that the spirit is not exclusively linked to the nerve-sense system (upper pole). It is not limited to that; the human being is also present and active as a spiritual being in the lower pole. The nerve sense sphere, with its upper pole relationship between spirit and matter, can now be understood as a 'carrier,' which enables us to have waking consciousness. In this view, spirit is present throughout the body, but there is a different relationship in different areas. In the lower pole, spirit works *with* matter (process; shaping; metabolism), there is no consciousness, and the sleeping quality of the embryo is retained. In the upper pole, spirit can free itself from the body, one of the consequences of which is waking consciousness. Here spirit works *from* matter. When one follows this train of thought, threefoldness acquires its true *psychosomatic* meaning: it is about three levels of relationship between spirit and body. Roughly formulated, that comes down to a tripartite division of human consciousness into:

*waking — dreaming — sleeping,*

which, in the respective spheres of

*upper pole — middle realm — lower pole,*

allow the soul functions of

*thinking — feeling — will*

to work in three distinct levels of consciousness.

More of this later in this training manual. Here we just wanted to show that a participatory stance, practiced together with the dynamic approach, can be the key to seeing sense perceptible, physical data quite differently. These data need not lead inescapably to a materialistic worldview; through this approach, those very data allow us to recognize the spiritual dimension of the human being. Whether one penetrates to the reality of the spirit does not depend on the facts by themselves, but is determined by one's orientation. It all depends on where one stands.

### Assignment 10

Consider the verse by Rudolf Steiner below. When one has studied and considered what has been written up to now, one might have a good foundation for understanding this verse, which is a pithy condensation of the threefold view of the human being. Try to live into the 'directions' which sound in the verbs. Note that this verse, which aims to summarize what makes us human, starts with the middle.

#### ECCE HOMO

<i>In the heart feeling weaves,</i>	In dem Herzen webet Fühlen
<i>In the head thinking radiates,</i>	In dem Haupte leuchtet Denken
<i>In the limbs will surges.</i>	In den Gliedern kraftet Wollen
<i>Weaving of radiant Light,</i>	Webendes Leuchten
<i>Strength of the Weaving,</i>	Kraftendes Weben
<i>Light of the surging Strength,</i>	Leuchtendes Kraften
<i>Such is man</i>	Das ist der Mensch

## 4.8 Four phases of human development

This section deals with prenatal development, with human embryology. We set ourselves two aims:

- The first is to give an example of the phenomenological, dynamic approach to the human being. We will deal with the central question, 'What is the human being involved in during the embryonic phase?'
- The second is to demonstrate the dynamics of the four members of the human being in embryonic development.

This section presupposes familiarity with the dynamic, comparative approach as explained in sections 4.0 to 4.3.2. Our focus is as follows: we will specifically look at the *somatogenesis* of the embryo as a whole, i.e. the process whereby the outer form of the body comes into existence and develops during the embryonic phase. We will thus limit ourselves to a specific aspect of this development; the formation of the different organs and organ systems (*organogenesis*) will remain outside our focus.

### 4.8.1 The four kingdoms

By way of introduction, we would like to give a brief sketch of what is at work in the four kingdoms of nature. This is a subject in itself, worthy of a much more thorough treatment than can be given here. This chapter will also describe the dynamics of the four members of the human being. These dynamics resemble the dynamics in the four main phases of *individual* human development — *ontogenesis*, which in turn are mirrored in the four large phases of the development of humanity *as a whole* — *phylogenesis*. We will start with a brief summary of the four phases of human development as they are distinguished in anthroposophy.

As an entry into these four phases, we should first recognize the dynamics of the four kingdoms of nature. Anthroposophy recognizes these as 'precipitations' of an evolutionary process which has taken place in the course of time. As stated before, every shape is the end product of a process and in every form one can 'read' how it came into being, by empathetically living into the formative processes. The gestures of the four kingdoms therefore bear the stamp of the underlying evolutionary *process*. This is also where the link to embryonic development lies, because the dynamics have a related signature. In the course of the chapter it will become clear how the study of the dynamics of the great phases of evolution deepens our understanding of embryonic development and vice versa.

Anthroposophy recognizes an increasing separation into the different members, taking place in the course of evolution. This goes for the whole Earth, nature, and humanity. The *mineral* kingdom is characterized by the presence of pure (dead) *matter*. The higher kingdoms (of plants, animals and humans) have *life* in addition to matter. To distinguish animals from plants, we recognize the presence of *soul*. Next to matter, life, and soul, the human being is permeated by *spirit*. The visible kingdoms are the result of the activity of formative forces.

	<i>physical body</i>	<i>etheric body</i>	<i>astral body</i>	<i>I (am)</i>
spirit				HUMAN BEING
soul			ANIMAL	
life		PLANT		
matter	MINERAL			

*This chart presents only a rough indication, which will be elaborate.*

#### The mineral kingdom

As stated above, the *mineral kingdom* is characterized by the presence of a physical or material body. Here, the spiritual levels which have induced the formation of the minerals, have as it were 'released' their product.' The spiritual entity which has formed the mineral does exist, but does not dwell inside the mineral. Of course the physical characteristics of the mineral do show us which spiritual being shaped this matter. In essence, minerals are pure form, occupying space. We are dealing with a formed end product. One could



best describe it as an 'upper pole process' which has been carried all the way to the end (see Section 4.7.2). In that sense matter can be compared to an organism which has died. The members which were shaping it have 'left it alone'; shaped matter (mineral kingdom) is all that remains. In what is left, only the laws of matter, of physics and mechanics, rule. In anthroposophical terms, the mineral 'only' has a physical body. Note that the concept 'physical body' is not totally synonymous with the concept 'material body.' By physical body we mean that body which is only subject to the laws of lifeless nature. In the present phase of Earth development, those are the laws of matter.

### The plant kingdom

We look upon the plant as a living being. In anthroposophical terms this means that there is an etheric body. In this kingdom, matter is not only subject to the material laws of physics and mechanics; it partakes in a higher level, namely that of a living organism. In contrast to minerals, time plays a part in the living plant organism. The plant also interacts with its surroundings, which is an interaction in the sense of metabolism. The ether body is sometimes described as a *time body* or *body of formative forces*. Having a physical body, the plant is of course also subject to, say, the law of gravity, but in essence it strives against these laws. The apple falls from the tree because of its material character; it grows and ripens on the tree because of the life forces.

### The animal kingdom

The plant organism is characterized by life; the animal organism has an additional dimension or level, in that living matter is *ensouled*. In contrast to the plant, the animal has an inner life which can interact with the environment. The plant certainly does have a form of 'behavior', but that is expressed in its morphological outer shape. The animal has the possibility to behave by moving that outer shape. With animals, we can begin to speak of perception and consciousness. In anthroposophical terms, the astral body is what distinguishes animal from plant. One can know this new dimension from the whole complex of instincts, behavior, and actions which animals present. One also speaks of *sentient* body, or *soul* body. The metabolism of the animal organism becomes dominated by *catabolism*, which is an expression of the fact that soul processes, perception, and consciousness cost energy and lead to the breaking down of 'life.' The ether body, by contrast is *anabolic* because it is permeated by vital forces which build up.

### The human being

Anthroposophy speaks of the incarnation of the individual, who, like the animal, has this inner world of instincts, sensations and experiences, but can also face them and become aware of them. Self-awareness and independence are hallmarks of the *I (am)*.

This summary introduction to the anthroposophical view of the four kingdoms of nature can never do justice to the complexity of the subject but it is one way to enter into the dynamics of the four members. There are several ways to read the signature of the four kingdoms. One of them is the approach which starts with the *four elements* of earth, water, air, and warmth (see Chapter 7). We can connect the mineral kingdom with earth, the plant kingdom with water, the animal kingdom with air, and the human being with warmth. Students are referred to this as a topic of independent study.

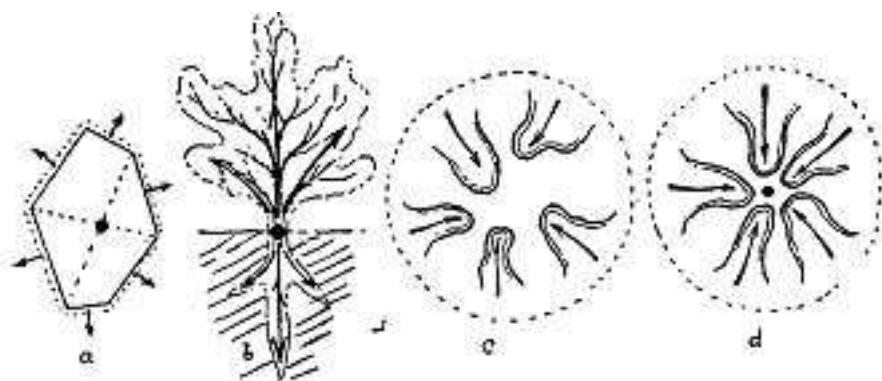


Figure 4.9. In these illustrations, the basic directions which the four natural kingdoms have in relation to space are represented. These are respectively: Centre and periphery; Outer and inner; Direction out from the self; Direction towards the self. a. Crystal; b. Plant; c. Animal; d. Human being. Notice the reversal of direction and the polarity between plant and animal. Derived from O.J. Hartmann.<sup>9</sup>

<sup>9</sup> O.J. Hartmann, *Die Gestaltsstufen der Naturreiche*.

Our starting point in this section will be the approach of O.J. Hartmann (see bibliography). He describes the relationship of the 'organism' (insofar as one can speak of an organism in the case of minerals) to its surroundings and expresses that in the relationship between *centre* (point) and *periphery*. Figure 4.9 is from Hartmann and to begin with, we propose that the reader try to meditatively feel into the dynamics of the four kingdoms represented here.

The schematic representations of Figure 4.9 characterize the *directions* of the four natural kingdoms with regard to the relationship of periphery to centre. We intend to elaborate on these four directions and elucidate them further in the course of this chapter. We are dealing here with directional processes and dynamic principles which are characteristic of the four natural kingdoms and distinguish them from one another. The recognition of these dynamics will enable us to get to know the gestures of the four natural kingdoms.

For the considerations below, it is important not to see the four members as 'stacked on top of one another,' either in the course of evolution or in the sequence mineral, plant, animal, human being. It is important to stress that the dynamics — 'direction' in Hartmann's terminology — of one level is opposite to the dynamics of the next one up. So the dynamics of the plant do not come out of the mineral; they are not a continuation or 'more of the same.' A new principle manifests in the plant which stands in direct opposition to the mineral. One could think here of entropy (the striving of dead matter to reach the lowest energy level), and the contrasting striving of the plant to reach a higher level of energy. The ether body is not a product of the level below, which is the physical body, but stands in opposition to it in a sense. Hartman expresses this in his chart of the dynamics of the various directions. With the mineral, the point is the physical centre. Growth and expansion come about by repeating that point. Space is filled with more and more particles (points) which are as many physical repetitions of the same. L.F.C. Mees refers to this kind of 'growing' as accruing, or adding on, whereas the plant, by contrast, grows out from a starting point, which is the seed. It does not come about through physical repetitions of the initial point, but through the metamorphosis of the initial point, repeated *in the course of time*. There's no such thing as a plant particle which repeats itself and has one form. This also helps us to understand that the animal is not a continuation of the plant. Once again, we can speak of opposition.

As noted above, the animal distinguishes itself by the presence of an inner life, which we could simply call 'inside.' This should not be taken only in the anatomical sense (the inner world of the organs) but also in a psychological sense; the animal has an 'inside,' which gives it independence from the world around it. Instead of growing out as the plant does, one could speak of growing *in*. This happens literally in the embryo (gastrulation), which distinguishes it from the seed. Plant and animal, *etheric* and *astral*, form a polarity; they are 'opposite in direction' Hartmann would say.

In the human being, this 'inside' further acquires a centre, serving as a point of orientation for the inside. In contrast to the starting point of the crystal, that point is not physical, but spiritual. That does not mean it cannot be perceived; everybody is familiar with the core experience of the I in the human being. So once again one can speak of an opposition. The animal's inner life is 'undirected,' the human being has a centre towards which the inner life orients itself. The same principle applies as before: the human being is not a continuation of an animal principle. Something different takes the stage. Self-awareness presupposes an object (the self) which one becomes aware of; it is not the product of awareness.

So much for the first general characteristics of the four natural kingdoms and their dynamics, or 'directions.' Before we go on to look at the dynamics of the human embryo in order to deepen the highly summary observations given above, we insert an exercise for the reader to consider, and a methodological remark.

#### *Methodological note*

The problem of finding words for observations such as these has been remarked on before, in Section 4.2.4. There are many ways to indicate dynamics or gesture, say, of 'the plant,' or 'the etheric.' Each describes a different aspect of the dynamics. It is practically impossible to find universal concepts for the gesture of the mineral world as a whole, or to indicate what lives in plants. The feeling one gets, which we called 'treading water' in Section 4.2.4, is literally one of losing the ground under one's feet, but it belongs with the territory. It is inherent to the conceptual level which one enters, namely the level of gesture.

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### Assignment 11

The chart below contains key words relating to the four kingdoms of nature. They are partly from this text, and are partly inspired by the work of O.J. Hartmann and L.F.C. Mees. Going down, they try to characterize gesture and dynamics of the physical body, the etheric body, the astral body and the I respectively. Try to live into the indications and also connect them both horizontally and vertically.

MINERAL	PLANT	ANIMAL	HUMAN BEING
dead (body)	life	soul	spirit
grow on (= accrue, add on)	grow out	grow in	grow out of (beyond)
.....	extent (exterior)	content (interior)	.....
maintain self	form self	feel self	know self

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#### 4.8.2 Our mineral nature

Figure 4.10 depicts human embryonic development in the first week. The fourth drawing in the top row represents the morula stage which under normal circumstances is reached around the third day after conception. The last drawing (right below) depicts the situation just before or during nidation or implantation. This is the *blastula* stage. All this takes place during the first week of human development.

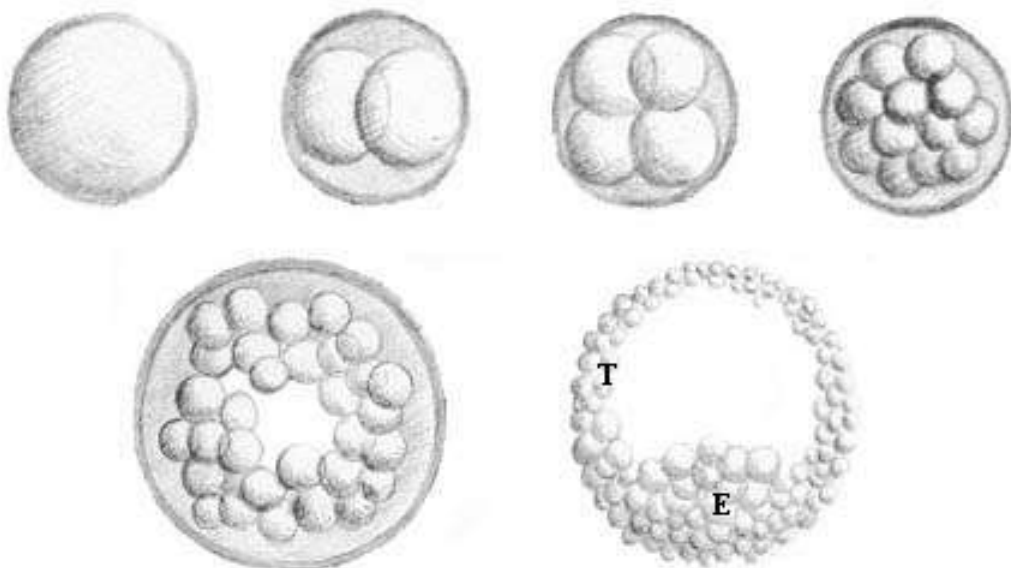


Figure 4.10. Stages during the first week of embryonic development, going from zygote (top left) to blastula (bottom right). E = embryoblast. T = trophoblast.

It is very important to realize that the last two drawings are not in scale with the first four; they are considerably enlarged. In reality there is no increase in mass or volume during the whole of the first week. It is characteristic for this first phase that all cell divisions occur within the mass of cytoplasm given with the zygote (fertilized egg cell). This finds expression in the word *cleavage* which is sometimes used for segmentation. There is as yet no growth, otherwise so characteristic for a living organism. The *zona*

*pellucida* which surrounds the egg cell only dissolves in the last phase of the first week. Only from that moment will the embryo begin to grow. As stated, during the first week all cell division takes place within the fertilized egg cell. After about three days the stage of the 16-cell *morula* is reached, and after five to six days the embryo has been divided into about 100–120 smaller cells (*blastula*).

The total process has the character of a *subdivision*. In other words: The *whole* zygote splits into ever smaller *parts*. Remembering what has been said about conception in Section 4.2, we could postulate that the egg cell after conception behaves like a sperm cell. For example, immediately after fertilization, the zona *pellucida* undergoes a change. The 'open,' communicating character of the egg cell turns into 'closed off' and inaccessible. The metabolic character of the egg cell disappears and it becomes a separate space, just like the sperm cell. It is no longer open to its surroundings. As a 'result,' we see cell divisions and segmentation. We begin to see even more 'sperm cellness,' because every new cell means another nucleus, more DNA and also more cell membranes. At the same time there is a loss of inner malleability, which used to distinguish the egg cell from the sperm cell, and an increase in structure. We could 'prove' this as follows. Whereas the egg cell was vulnerable and hard to manipulate, a morula can easily be frozen with state-of-the-art technology; at least it is not as hard as freezing an egg cell. Was this not a typical trait of the sperm cell? The relationship of the nucleus to the cytoplasm slowly goes in the direction of what typified the sperm cell. One could formulate it as follows: what was still *outside* the egg cell before conception — and had its physical representative in the sperm cells — now appears as process *inside* the fertilized egg cell. It is a bit like an island; it gives the impression of a 'spaceship' which floats in the Fallopian tube and the uterus without having any particular metabolic exchange with the environment. In a sense the fertilized egg cell slowly dies; it begins to show characteristics of death and goes towards the form pole. Some cells in the centre even die (lysis), and a space with fluid is created (blastula stage).

We can imagine how such a process, if carried to the end, would be final. Predictably, development would come to a halt if there were more subdivisions, and the conceptus would change into a mass of DNA (like a sperm cell). Without the impulse of a new principle, development would stop here, which it actually does in many cases (modern estimates mention 30 to 50 percent of fertilized egg cells). Nidation does not occur, or is not sufficiently successful, and with the next menstruation the remainders of the embryo are 'removed.' Further on in this chapter we will discuss the new impulse which becomes visible in the embryo when nidation is successful. It is important to note here that this represents a critical stage. If the development of the first week were to continue in the same way, there would be stagnation.

What speaks to us in the dynamics of this first phase of embryonic development? We are clearly dealing with a living entity. The fertilized egg cell is not just one cell, but an organism consisting of one cell. The morula and blastula are the next manifestations of the living organism which is the human embryo. It is a living organism, but shows more and more signs of death. Can we see tendencies of the mineral here? Something which supports this is the fact that this phase always lasts a week, both in mammals and the human being. \* We reiterate: the phase up to the implantation (*blastula*) stage always lasts 'a week' *regardless of the total time of the pregnancy!* This total time can be twenty-one days for a mouse, twenty-one months for an elephant, or nine months for a human being. There even are animals, such as deer, in which development starts right after fertilization, reaches the blastula stage, but then halts in a kind of hibernation. This stagnation lasts from mating season until implantation is continued in the spring! All this goes to illustrate that *time is not there yet* in this first one week. Did we not just recognize time as a hallmark of life? It seems as if this stage, in which the embryo is floating like a 'spaceship,' is deprived of life, like a mineral. Of course this is not correct if it is taken literally (the blastula is after all a living organism), but the observation is correct, when it is understood in terms of gesture, or as a signature. Remembering how Hartmann describes the characteristics of the minerals, it is easy to see how the beginning of the process can be described as a splitting into a number of the same elements. Is that not a trait of the mineral, this being subdivided into identical particles, this repetition? We also see the verb 'maintaining' of the chart borne out: the whole is kept from falling apart.

If we return for a moment to the chart with Hartmann's drawings of Figure 4.9, we can say that the morula shows the gesture of the 'crystal'; it has a mineral character in that it is like a point in space, a particle which repeats itself. The aforementioned 'accrual' is a repetition in space of the same thing. We see the same dynamics in the zygote when it splits into equal segments, albeit in a reverse sense, so to speak.

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\* We should realize that a week is a variable concept in biology. In human beings it is known that nidation can occur after five days in some cases, in other cases only after eight to nine days

If we read this gesture correctly, it is plausible that the moment of nidation represents a break. After all, something new has to happen if it is to continue. This break could thus be compared to the chasm existing between dead and alive in the mineral and plant, as explained in Section 4.8.1. There we postulated that life does not come from death, and that the plant is not a continuation of the mineral. Here we see something similar, a turning point which marks the transition to a new principle in the development of the embryo. The next sequel in the story of the embryo does not follow straight from the first week. Before going on to elucidate the next stage in human development, we insert a few remarks about the concept of differentiation.

### Differentiation

The last drawing of Figure 4.10 shows that more has taken place than a mere splitting into equal parts. It is highly likely that the 16-cell stage still contains equal cells, but just before implantation a differentiation between 'inside' and 'outside' has formed within the population of about 100–120 cells; there is a centre and a periphery. The whole of the conceptus has separated into an *embryoblast* in the centre, containing about 10 cells, and a *trophoblast* in the periphery, containing about 100 cells, which forms a mantle around it. Between the two, cell fluid has accumulated, partly osmotically drawn in from the surroundings, partly the residue of cells which have died.

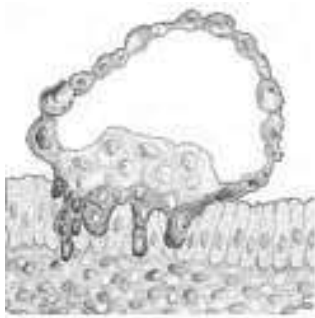
This is an excellent example of the process which characterizes the (embryonic) development of all organisms: *differentiation*. We are used to thinking that organisms are built up out of separate parts, so we think in terms of the whole being the sum of its parts, and with those parts, their characteristics. This way of thinking is deeply anchored in all of us; embryonic development serves as a constant reminder that this thinking model is not true to life. Ever and again, one sees how the *whole* splits into *parts*. There is an endless series of differentiations, following one another in the course of time, creating the organs and the different parts of the body. It is never the other way round!

An anatomist starts from the separate parts and thinks in terms of building blocks, out of which the human being is assembled. But even in anatomy we once started 'at the other end,' and separated the whole into parts. Think of the Greek roots *ana-temnein*, to cut into separated parts; compare also the word *ana-lysis*. In our thoughts, we then put those parts together. It should be stressed once again that this is a *mental picture*, not actual fact. In the reality of life, the *undivided entity* comes first; *division* follows. The embryologist Blechschmidt hits the nail on the head when he says that the 'law of the preservation of the individuality' applies to the embryo. One might question the word individuality, but the tenor is clear. 'It is the *appearance* which changes, not the *essence*,' he says. In the desert of modern-day thought-life, it is the embryo which cries out that *wholeness* comes first in living nature.

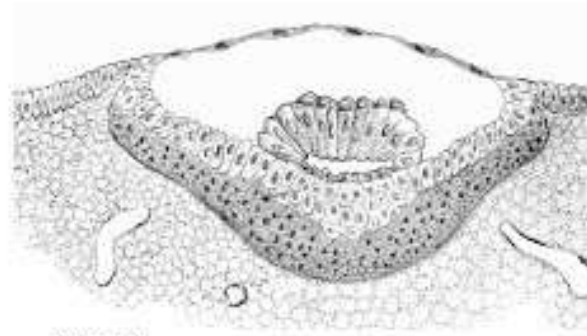
### 4.8.3. Our plant nature

After the phase of the first week the unity of the zygote has developed into a duality: the embryoblast and the trophoblast as an inside and an outside. It would be better to speak of a centre and a periphery for the embryoblast and trophoblast. We will now go on to discuss the next phase, using Figures 4.11 and 4.12.

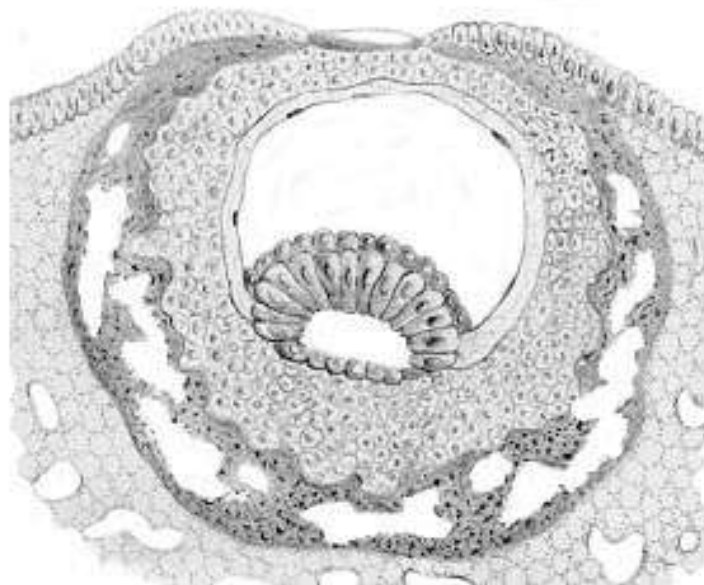
In the days that follow, the development of the embryo undergoes a radical change in character and dynamism (the 'direction,' in Hartmann's terminology). The periphery especially begins to show a completely different development. A huge activity in growth and metabolism manifests there. The trophoblast expands enormously. The activity of cell division is so vehement that cells on the outside even lose their structure and merge into a kind of cell-syncytium (the syncytiotrophoblast). It all even makes an almost malignant impression, because the trophoblast transgresses its boundaries, entering the maternal tissue. With many enzymes the endometrial tissue of the mother is 'digested' and the embryo nestles further and further into the mucous membrane of the uterus. The character of transgression is emphasized even more by the fact that the maternal organism puts up no defenses by creating a boundary: after a few days the embryo even 'eats into' the maternal blood vessels. The embryo, however, reaches out even further into the periphery, beyond the anatomical boundaries of the syncytiotrophoblast! The trophoblast excretes quantities of hormones which may be tiny (best-known is the HCG, the hormone of pregnancy), but which do have enormous consequences in the far periphery. The whole maternal organism is influenced by them and brought into such a state that it can accept the new organism, which is in fact foreign to it. It seems as if the basic gesture of pregnancy is one of relinquishing the boundaries of identity and immunity, which the maternal organism does in order to give the embryo room to nestle and expand within it.



**Fig. A**



**Fig. B**



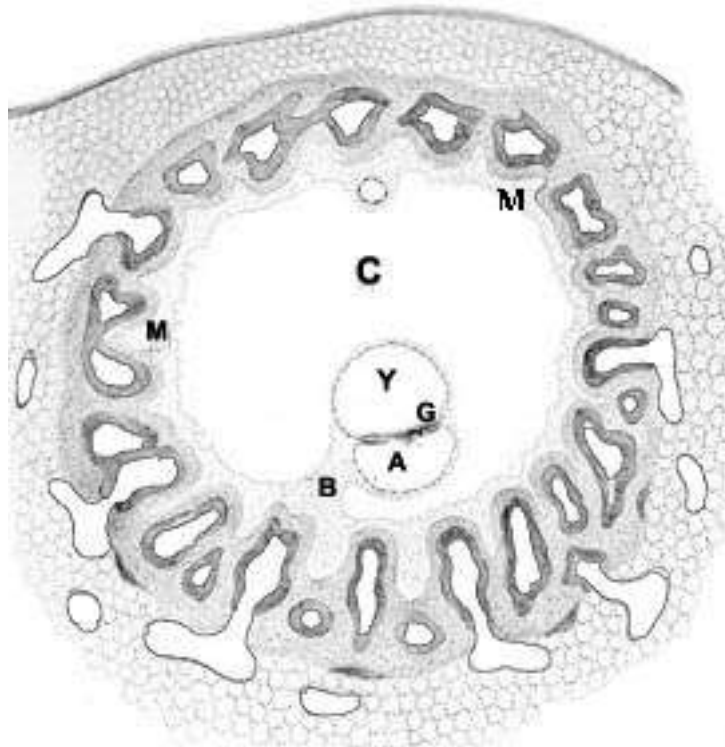
**Fig. C**

*Figure 4.11. Stages of human embryonic development. A. Directly after nidation; B. Day 7/8; C. Day 9/10. All drawings are in the same scale.*

This trophoblast is much more than the anatomical externals. Its dynamic gesture is one of striving outwards, being without boundaries, of growing beyond itself. It flows out and merges with its surroundings, while at the same time showing characteristics of taking root and attaching. One could rightly call the trophoblast the outer body of the embryo. The outside is where it interacts with its surroundings, where it has metabolism and growth, and where it expands. In the outer body the embryo grows and lives, reaching from centre to periphery. The change from the first week is evident. We have gone from a state of being a closed off 'spaceship' to a growing, expanding and interacting organism. Do we not come upon the same concepts here which were used in Section 4.2.1 to characterize the ovum? Do we not see once again how a 'cosmic pole' is at work? Once again we meet up with the problem of finding adequate words; there are many ways to describe the gesture which one can experience here. The gesture comes out more clearly when one takes the centre of the embryo into consideration. The *embryoblast* does show changes, but the dynamics are totally different. What occurs is a differentiation into (pre-)ectoderm and (pre-)endoderm, a polarity which we will not go into here. The growth, however, and the relationship to the periphery is entirely different from that of the trophoblast. What we see here is slow growth with a slight differentiation, but not the loss of form and the expansion of the trophoblast. The dynamics are not directed outwards; rather, they turn away from that and the amniotic cavity comes into being, and thereby the bilaminar germinal disk loosens itself from the trophoblast. An enormous internal tension now arises in the embryo. On the one hand there is the periphery (the trophoblast) striving outwards, on the other hand there is the centre (the embryoblast), directed inwards. This tendency continues into the second week, even though the parts change and new differentiations change the details. Inside and outside of the embryoblast and the trophoblast have now become manifest as *endocyst* (inner egg) and *ectocyst* (outer egg). Endocyst denotes the complex comprising the amniotic cavity, the yolk sac, and the bilaminar germinal disk; ectocyst denotes the trophoblast, which in the

meantime has differentiated further. Even though the parts have changed, the dynamics are unmistakably the same. The embryo is striving outwards during the second week; it grows out continually. The core of the embryo — the bilaminar germinal disk of ectoderm and endoderm — is the *centre around which everything revolves*. The periphery predominates in the embryo; it does not contain, but ‘extains.’ It reaches outwards so strongly, stretching to form roots in the outer world, that the centre stays considerably behind in growth. A whole new space comes into being, lying between the expanding ectocyst and the endocyst which stays behind. A cavity comes into existence which mediates and creates space, called the chorionic cavity. The mesoderm which lines this cavity (see Figure 4.12) forms a *body stalk*, which maintains the connection between ‘outer’ and ‘inner.’

Extrapolating this gesture further, a being would come into existence only consisting of ‘outside.’ Such beings actually do exist, but before dealing with them we first return to the gesture of this second week. The dynamics manifesting here are the polar opposite of those of the first week! At that point the predominating tendency was all that characterizes space, lack of growth, division, splitting into parts and turning in. The embryo of the second week is striving outwards, is reaching beyond. It loses the compactness of the morula. It also begins to grow in the way we are used to seeing in living creatures: there is increase of volume and also metabolism. This embryo does have a centre, but it is no more than a starting point for peripheral striving. Everything seems to revolve around the centre (the germinal disk, or embryonic disk), like a wheel around an axis.



*Figure 4.12. Two week old human embryo. Note this figure is to a smaller scale than Figure 4.11. A amniotic cavity; Y yolk sac; G germinal disk; C chorionic cavity; B body stalk; M mesoderm.*

In the meantime the factor of *time* has become fully present in the development. With metamorphosis, differentiation and growth going on, the embryo has begun to partake in time; it now shows the dynamics of life. Referring back to Hartmann’s chart in Fig. 4.9, the dynamics may be clear: this embryo shows the characteristics of the plant gesture, which is more outward moving. This could be called the ‘outward human.’ A conclusion such as this one is only revealed when one takes the phenomenological approach. We can characterize how plants extend themselves fully to the world around them; they offer themselves and open up, having little possibility therefore to emancipate themselves from their surroundings. Their morphology shows this. The roots extend and open up completely to the earth, while leaves and flowers do the same towards the atmosphere, towards air, light and warmth. Plants are so open that they are also basically defenseless, and completely given over to influences from the outside. We can put a plant in a greenhouse, where it will respond to any artificial influences. The gesture of opening up can not only be seen in its morphology, in branching out and unfolding towards the periphery, but also in its physiology. The

plant completely surrenders to its surroundings and has practically no way to close itself off from influences coming towards it. The plant is also usually bound to the seasons, it is being lived by the rhythm of the year. So one could say that the plant is more 'out there' than 'here,' in itself. Plants are creatures of openness.

When one has lived into Figure 4.9b, and lives into the gesture of the embryo during the second week with equal empathy, one becomes aware of this tendency to be 'out there'; this being is obviously not fully present yet here on earth. Added to this, one can observe that the bilaminar germinal disk of the second week is not only the centre around which everything revolves, but is flat and two-dimensional in appearance. At this stage the embryo is no more than two surfaces meeting, which are the two epithelia. So one cannot yet speak of 'content,' especially when we know that there is as yet no mesoderm, i.e. the dimension of tissue and filling is still missing. Being two-dimensional, the flat bilaminar germ disc only has outside, periphery, surroundings. Its 'direction' goes from centre to periphery. Key words to characterize the human being in the second week are thus: extending, planar, and plant-like.

One could well imagine that if this tendency were to continue unabated, development would stagnate and come to a halt. We met something similar when we looked at nidation. If the mineral tendency that seemed to manifest in the first week had continued, further development would not have been possible. Nidation marks a turnaround in the direction of the development and the gesture of growth. To a certain extent, nidation is thus a moment of crisis, and many embryos do not 'make it.' Is there a similar moment for the embryo in the second week? Living into the dynamics of the strong expansion outside the central body, one can sense the danger which threatens this embryo. The tension which exists between the endocyst and the ectocyst threatens to become a rift. It is also understandable biologically because the 'outside' dwells in optimal feeding conditions for growth and expansion — in the mother's mucous membrane, whereas the inside remains more and more behind and lacks the source of nourishment. At the end of the second week or the beginning of the third, a chorionic cavity has come into being with tissue of a kind that mediates, connects, but also creates space. It connects the two dimensions through a body stalk, which is mesoderm. What would we get if this tendency were to continue? The so-called *hydatidiform mole* clearly shows that. Technically, we can still speak of pregnancy because through hormones the extended 'outer body' has been created and the amniotic sac is visible on an echogram (the later manifestation of the outer body). There is no heart, however, no real embryo, no 'inside' body. The thread is broken; the embryo only has an outside, and there is no human being 'here.' Just as the plant has no 'self' or soul, but only a physical and etheric body, the hydatidiform mole has not made it 'here,' but it remains out 'there.'

The essential gesture of the second week becomes more and more pronounced. The word 'plant-man' might give a partial indication of the character of the conceptus at this stage. One could also say that the embryo manifests the signature and tendencies of the *etheric*. This word denotes the life principle, which is at work wherever we see growth and metabolism, form being dissolved, opening out to the periphery and inviting or even forcing matter to change towards a higher level. The first week of the embryo bore the marks of the physical, the mineral, showing tendencies of hardening, densification and a centripetal direction; in the second week we see the opposite: opening, centrifugal motion towards the periphery.

This whole impression is reinforced by something else we can observe in the second week. We can see a special trait which will be lost afterwards, which is that it can still be divided; up to and even in the second week identical twins can still come into existence. After that the embryo cannot be divided anymore; there is only a short span of time during which a Siamese twin can come into being as an in-between phase. Cannot be divided anymore: Is that not literally in-dividual? The embryo is not yet individual in the plant phase. Could one speak of two human individuals within one body in the case of identical twins? In our sketch of the four natural kingdoms we indicated how we can only begin to speak of the soul in the animal kingdom. That makes it plausible that something else still has to be added for embryonic development to continue.

Rudolf Steiner indicates that the human being 'is not there yet' in this early embryonic phase, but moves around the physical kernel and targets the centre from the periphery. He describes this from the vantage point of supersensory perception. The embryo of the second week certainly makes that impression of 'not being here yet.' This could even mean that Rudolf Steiner indicates something like the existence of a 'pre-embryo,' decades before regular embryologists came up with the same idea (incidentally, using much more questionable criteria). The big difference is that regular biologists conclude that the human being 'is not there yet' — a conclusion with vast ethical consequences! — whereas Steiner speaks of the individual being definitely present, but reaching out from another dimension to its physical kernel; the human being is present, but not yet 'here.'



When *does* the human being 'arrive' more? In order to tackle that question, we need to focus on the next phase. Before taking the next step, we first need to make an observation using Figure 4.9. The animal stands in polar opposition to the plant. The animal does have inner life, something which the plant does not have. What is the fundamental difference between a seed, the starting point of plant development, and the embryo, the starting point of animal development? The seed grows out — from the seed comes a leaf and the beginning of roots, and they both unfold out into the periphery — whereas the embryo grows in (gastrulation) and unfolds the world of the organs within. The plant lacks that inside dimension. The root system 'becomes' intestinal surface; the crown of leaves 'becomes' the bronchial tree; rooting in the earth (the world around) 'becomes' independent movement in relation to the surroundings. Emancipation goes further: an inner environment begins, relatively independent from outside influences. The animal's temperature differs from that of the surroundings; the pace of life no longer follows the rhythm of the year. During animal evolution, this tendency is developed and perfected further and further. More about that later. These observations may suffice for now to point out that the animal chooses to go in a new and different direction. The animal is not a further developed plant, it is the opposite of a plant. Thus begins the process of emancipation and individuation.

#### 4.8.4 Our animal nature

Once again, embryonic development approaches a critical moment. Perpetuation of the developmental dynamics which characterized the embryo during the second week, would lead to a 'hydatidiform mole', an 'exterior human being.' If that were the case, the tie between outer and inner would rupture; the central point on the inside — the germinal disk — would disengage from the outside and atrophy. From the polarity between plant and animal which we studied in the paragraphs above, one could almost predict the turn that is about to occur in the embryonic dynamics. A look ahead shows significant developments at the end of the third week. The embryonic disk is still flat, but there is a crucial difference. Between the ectoderm and the endoderm — the aforementioned two epithelia, a combination which Blechschmidt calls *Grenzgewebe*, border tissue — an intermediate layer appears, the *intra-embryonic mesoderm*. Blechschmidt characterizes this as inner tissue, *Innengewebe*. The mesoderm is no border area, no epithelium, but is a tissue with a third dimension. It creates space and connects at the same time. So one could say that the trilaminar germinal disc, in contrast to the bilaminar germ disc, now has the new element of 'content.' Its predecessor only had surface and surroundings, the trilaminar embryo has inner content in addition to that. This mesoderm has entered *into* the germinal disk, by growing *in* from the *primitive groove*. That process started in the middle of the third week of embryonic development, as shown in Figure 4.13. We are obviously dealing with a radical turn in direction. Where do these new dynamics originate?

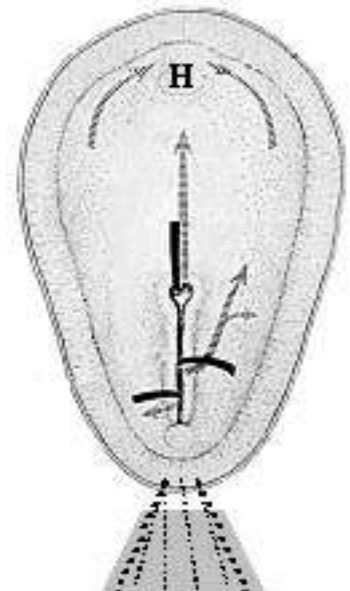


Figure 4.13. Germinal disk in the third week, seen dorsally. The arrows indicate the direction in which the interembryonic mesoderm grows. The body stalk (caudal end) has been drawn in. H origin of the heart.

When the chorionic cavity has formed at the end of the second week (see Figure 4.12), the so-called extra-embryonic mesoderm covers the inside of the ectocyst and the outside of the endocyst. The former is called *parietal mesoderm*, the latter *visceral mesoderm*. The body stalk links the 'inner body' (endocyst) with the 'outer body' (ectocyst). At the beginning of the third week the first blood islands and blood vessels

(capillaries) originate inside this extra-embryonic mesoderm. The formation of blood vessels and blood is the very first functional differentiation of the mesoderm. Within this very primitive system of blood vessels a hesitant circulation begins. This flow finds its 'cause' in the metabolic processes on the periphery of the embryo, the trophoblast (ectocyst). In the adult body the movement of fluids on a capillary level is also initiated by the life processes inside the tissues themselves; this is paralleled in the movement of the blood which takes place in the third week of embryonic development, when it begins to flow from the periphery to the centre. After all, the activity of metabolic processes takes place in the periphery. The blood streams through the capillaries from the parietal mesoderm in the direction of the body stalk. By means of a variety of growing movements which we will leave out of consideration here, this body stalk has moved in the meantime to the caudal end of the germinal disk (see Figures 4.12 and 4.13). This primordial blood streams towards the cranial end of the embryo, flowing alongside the 'flanks' of the germ disk, then dorsally along the amniotic cavity and ventrally along the yolk sac. There it cannot go any further and reaches the most central part of the embryonic body (see Figures 4.12 and 4.13).

Another reversal of direction arises in the embryo. Up to now growth was predominantly directed outward; at this point we see a first indication of 'circulation' going in a different direction. The blood flows from the metabolic periphery of the trophoblast to a central point, where it comes to a halt. The flow of blood turns around when it has arrived at this central point which lies cranially in the germinal disk. It flows back along other capillaries to the periphery of the trophoblast, where it goes back into the metabolic processes as tissue fluid. This point of reversal, where the flow comes to a standstill, turns, and acquires a rhythmical character, is the first indication of the origin of the heart. Here the first real centre arises in the embryo, which is different from the almost virtual, point-like centre of the second week around which everything revolved. By contrast, this is a real anatomical centre, which places itself *over against* the periphery of the outer body. It is the heart. The heart arises out of the circulation of the blood! As is so often the case, this approach places things in a different context, allowing one to gain a perspective which differs from current approaches. Movement is primary, the heart is *secondary*. First there is flow, and where this holds still, the form arises. There are good reasons to look upon the heart as the 'upper pole' of the blood circulation, and the capillaries as the 'lower pole.' This is in accordance with the relationships existing within the whole of the embryo at this stage. The trophoblast on the outside is the lower pole, the heart with the germinal disk on the inside is the upper pole.

In every respect, the origin of the heart marks a turnaround of the dynamics within the embryo. As 'predicted' above, the developmental dynamics become more like those of the animal; now the direction goes from the outside to the inside, from periphery to centre; an inner world is formed over against the outer world. Biologically one can put it this way: the continuation of the inner body, which otherwise would have become detached from the periphery, is now guaranteed. Nutrition flows from the periphery back to the inner body. In the wake of the genesis of the heart area, we therefore see a large number of developmental processes which from now on have their starting point in the germinal disk. The most essential thing is that, starting from the caudal end of the embryo, inward growth starts. Through the primitive groove, ectoderm grows dorsally into the embryo and metamorphoses into mesoderm. The embryo ends its existence as a flat, two-layered disk 'without content,' becoming a three-dimensional entity because it now has real inner content in the shape of intra-embryonic mesoderm. All the impulses to form organs arise in this mesoderm. When one looks at the dynamics of the morphology of the heart within the embryo, this whole process is a model for the way all organs form. The impulse first arises in the periphery, then moves into the centre where it finally comes to rest, manifesting in the final shape of an organ. The developmental dynamics go from the periphery to the centre.

Halfway through the third week we can mark a new turning point in the development. More and more clinical data have reinforced this in recent years. Up-to-date research shows that pregnancy is more frequently interrupted at this point than had hitherto been assumed. The 'missed abortion' is a clinical manifestation of the fact that the embryo has to take a hurdle at this point in its development. If there is no origin of the heart, followed by the formation of all the organs, the embryo will not survive this crisis. This is not without significance, as we will substantiate below. The processes after the third week do not follow in a straight line from the second week. This becomes even more poignant when one takes into consideration what Rudolf

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\* It is only at this point that the polarity cranial-caudal appears in the embryo. On the caudal side are the body stalk with the blood flowing to and fro, on the cranial side lies the future cardiogenic area.

\* Note that we speak of 'blood circulation' for lack of a better word. There is no closed circulatory system yet at this point. Blood is being 'produced' in the periphery, flows to the centre, whence it returns and is absorbed again as tissue fluid in the periphery. There is no closed capillary system. Only in the fourth week can one speak of a first placental circulation.

Steiner said about this phase from the standpoint of supersensory perception. At the beginning of the twentieth century, when orthodox science knew nothing yet about these stages of human development, he pointed repeatedly to a turnaround in human embryonic development 'around the seventeenth day.' He put it this way:

Whereas the incarnating soul-spirit entity was more present *around* the physical kernel up to this point, the 'astral individuality' of the human being now incarnates into the physical kernel itself.

In other words, the human soul comes a step closer 'to the earth,' with the heart as the organ of incarnation! All this becomes even more coherent when we realize that the dynamics which arise 'around the seventeenth day' in the embryo are of an animal (astral) nature. Only now can we speak of a real inner entity which can stand over against the outside world and become independent. Does this not run exactly parallel to the dynamics which marked the division between plant and animal, as we discussed above? (Refer back to the chart in Fig. 4.9.)

#### 4.8.5 Reading the gesture in evolution and embryonic development

We will now review the three phases, gestures, or directions we have covered so far. We started from the characteristics of the three natural kingdoms, that are akin to the dynamics of the physical, the etheric and the astral. In the description of the embryonic development of the human being we have so far described three phases, and more is to come concerning the third phase. The point is to find out in how far 'translating' the phenomena which characterize each of these three embryonic phases is helpful. Can we gauge whether we gain a fuller understanding of what is at work, when we cross-reference the essential dynamics to the characteristic signatures that can be 'read' in the natural kingdoms?

##### The physical body

The following nouns characterize physicality: compactness, three-dimensionality, death, mineral. To what extent do we recognize these traits in the human being at the morula stage? Imagine taking a round ball of clay in both hands. Feel how it rests in itself. Sense the coherence, the mass, and the gravitation. Compare your findings with the way Hartmann's chart gives expression to these qualities. To conclude, we could sum up as follows: The physical rests 'in itself.'

##### The etheric body

Imagine a kind of material which you can pull out towards the periphery and spread out, disperse. The being of the plant opens out to the periphery, and what is of a mineral nature in the plant is absorbed by forces of a higher level. Life counteracts the mineral, physical laws. Life works against gravity, and we now also see interaction with the surroundings (metabolism). We notice a parallel process in the embryo. The way it opens out and strives outward, nearly losing itself in the periphery, is matched by the 'selfless' way the plant relates to the environment.

##### The astral body

Life is broken down, a catabolic tendency appears. Inwardness is created which can hold its own against the outside and emancipate. A different state of consciousness arises in the animal. An inner environment has now been established, leading a life which is independent of the surroundings. It can move of its own accord and establish a relation to the environment.

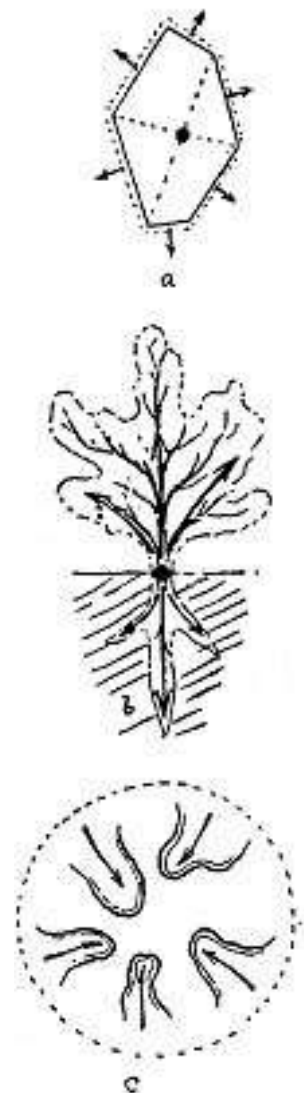


Figure 4.14.

Another thing that the dynamics of the three embryonic phases teaches us is that there is no even transition from one phase to the next. On the contrary, the dynamics of each subsequent phase do not come from the one which has gone before, but stand in opposition to it. The line of development is interrupted, there are marked transitions. Can those be recognized in the dynamics of the three natural kingdoms? Current biology does indicate transitional forms between death and life (think of viruses) and between plant and animal.

However, the comparative approach clearly shows that one cannot think the plant as continuous from the animal, or of mineral as continuous from the plant. The etheric is not some sort of diluted materiality; a totally different principle is at work. The astral is not a further refinement of the etheric; it is a new quality. Seeing polarities alerts one to this. Assignment 12 is given as a suitable preliminary conclusion.

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### **Assignment 12**

*Make a list of as many polarities between plant and animal as you can name. Do the same for dead matter and living creatures. When you have done this, check whether the polarities you found also apply to the corresponding three phases in embryonic development, which we found to be akin to mineral, plant and animal. Make another comparison, this time between a dead person, a sleeping person, and a waking person.*

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### **4.8.6. More on animal nature — emancipation and individuation**

The trilaminar embryonic disk has only a preliminary independence. More is to come in terms of emancipation and individuation. It is still flat and very open. For example, the flanks make a smooth transition into the layers of tissue of the extra-embryonic cavities. The three layers flow into it as it were (see Figure 4.15a). The embryo obviously has a long way to go before it has truly become emancipated enough from the outer body of the mother to separate itself from it and live as an independent entity. At the tail end, the embryo is linked openly to the periphery through the body stalk. Steiner called this phase of human development *Paradiesmensch* (paradise human being), indicating that this is only a first step towards emancipation from the surrounding world, with which the embryo is still connected quite naturally and openly. Is that not what the ancient story about paradise describes in pictures? Human beings had emancipated from their cosmic and divine origin, but 'were still linked to God.'

During the third, but especially the fourth week of human embryonic development, the process of delamination occurs, also known as 'folding.' Interestingly, the Germans call this same process *Abfaltung* (folding off). This folding process, characterized by curving movements marks significant progress in terms of emancipation. The flat trilaminar embryonic disk is folded into a somewhat cylindrical embryo, whereby the folds roll around. In ventrolateral direction, the ectoderm — and with it the initially dorsally positioned amniotic cavity — undergoes an enormous expansion in relation to the ventrally located yolk sack with its connected endoderm (see Figure 4.15). Apart from this so-called transverse folding, there is the longitudinal folding in craniocaudal direction (see Figure 4.16). With the emergence of the embryo out of the two-dimensional plane (delamination means 'coming out of the plane'), we can now speak of a real, spatial outside and inside in an anatomical sense. The term ectoderm now comes into its own: what was behind (dorsal) in the flat disk is now outside. Consequently, what in the endoderm was ventral is now inside. It also becomes clear that the terms 'inner' and 'outer,' until now referring more to direction (Hartmann), or quality, now acquire anatomical meaning. One can easily live into the gesture. Drawing it is one way to do so. Better still, it can be imitated with the body, as outlined in Assignments 13 and 14.

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### **Assignment 13**

*Stand upright and spread both arms out. Bend over, and at the same time bend your arms and bring your hands together. Check if and how your awareness of the surroundings and your own 'inner space' changes. Can this be put in terms of 'from extrovert to introvert'? From 'open' to 'closed'? Go back to your original position. Repeat this exercise a few times, doing it slowly.*

---

### **Assignment 14**

*The embryo at this stage is kidney shaped. See, for example, Figures 4.16 and 4.18. Try to find as many kidney forms as you can in nature, the environment, but also in the world of the organs. To what extent is the relationship between outer and inner the same as it is in the embryo? Or is the gesture of closing off (outer, ectoderm) and streaming in (inner, endoderm) recognizable as a polarity, just as it is in the embryo?*

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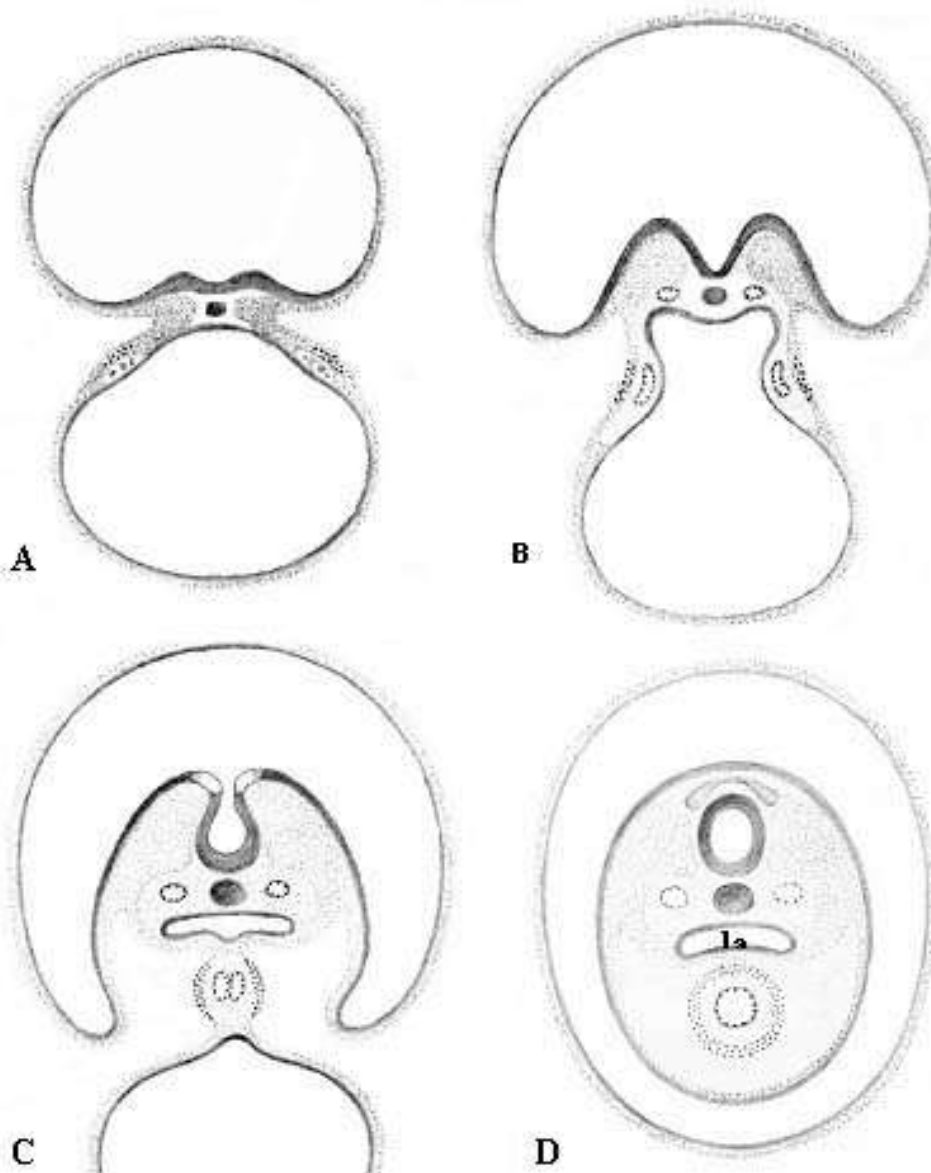


Figure 4.15. Diagram of transverse folding in the embryo during delamination. The dorsal side is up, showing the amniotic cavity (2), the ventral side is down showing the yolk sack (1). Figure A depicts the trilaminar embryonic disk before the folding process. Figure D depicts the completed folding process, where the folds have rolled around to create a roughly cylindrical embryo. Now the ectoderm is outside, surrounded by the amniotic cavity (2a), and the endoderm is inside, having formed the wall of the primal intestinal tube (1a).

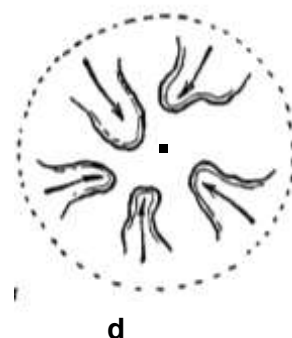
The motion which the embryo performs here is a further continuation of the gesture which characterizes the turnaround of the seventeenth day. The *animal/astral* gesture is further completed here. The embryo emancipates still further from the periphery. It is important to realize that these are *growth* movements, not muscle movements. The formative process of the whole body is involved. It is *somatogenesis*. A growing gesture such as this is a necessary precondition in order to form a human body. One can even enter into the movement and continue it up to the point where one notices that one 'gathers up' the inner body as it were; this 'creasing,' one can feel, has the inherent danger of cutting off. If this process were to be brought to full completion on all sides (cranio-caudal, left-right), it would surround the whole embryo with amniotic cavity and ectoderm, blocking off the nourishment from the periphery and the placenta, which is the outer body.

It does not go that far yet! Because there is one place where the inner body is not completely closed off, remaining open until birth. That place is the navel. It is around the navel that two elements gather, from the tail end and the cranial end. These two elements are the body stalk and the heart. Consulting an embryology book to follow the process in the craniocaudal direction will lead to the logical conclusion that there has to be a concomitant process whereby the heart 'descends.' This is the so-called *descensus cordis*: as the heart and the cranial top end of the embryo exchange places, the heart moves in the direction of the navel. On the other side, the body stalk 'rises' from caudal to ventral, and only now can it really be called *umbilical cord*. And it is through this that communication between the inner body and the outer body is safeguarded. At least for the time being.

We are dealing here with the gesture of growth, as we have stressed before. One can try to follow the tendency of this growth and think ahead to the moment of *birth*. At birth the umbilical cord is definitely (anatomically and physically) cut. One could not think of a more definitive physiological emancipation! The German language calls delivery *Entbindung*. Literally, this means 'unbinding,' so what was bound is now unbound. One could safely say that the dynamics of this process already start in the fourth or fifth week. Morphologically, these dynamics are repeated at birth. The curving processes by which the embryo creates an inner world, with all the organs, could be seen as the further consequences of the astral impulse to which the embryo is subjected. This is highly characteristic of our animal nature.

#### 4.8.7 What's next?

One more step needs to be taken to complement the dynamics of the embryonic process. This fourth phase concerns the transition from animal to human. Or should we speak of a turning point again? This question brings us right into the present-day polemics around the question of whether the human being is an animal or not. Recalling the Figure 4.9, we can expect to find the gesture of opposition again between animal and human. In order to understand this, we need to distinguish between self-awareness and awareness of the *surroundings*. In our deliberations above, we have seen how animal (astral) emancipation simultaneously enables consciousness to arise. With the creation of an inner world over against the surrounding world, the possibility of *awareness* arises: the outer world can now be perceived. This is easy to imagine. The condition for having this awareness and perception is separation. A similar thing can be observed in the dynamics and the morphology of the embryo which we have discussed. Hartmann indicates in Figure 4.9 how the human being takes a fundamentally new turn. The new direction could be described as finding a standpoint towards one's own inner world, i.e. all one's experiences and feelings. The word *standpoint* could be taken almost literally here. Hence the point at the centre of the human diagram in Hartmann's chart (see also the figure at the right of this page). We can experience a centre in ourselves which is conscious of the fact that we are beings with a consciousness.



Teilhard de Chardin put it this way: 'An animal knows, but a human being knows that he knows.' One could follow up on this saying with numerous additions, such as, 'An animal thinks, but a human being knows that he thinks; an animal feels, but ... etc. '. Anthroposophy points to the I in the human being with this. This is the element that is capable of commenting on itself, or, in other words, that can stand over against itself. That what is meant with the 'point' in the figure, the stand-point.

Is this the new direction we were talking about? If one lives into the astral gesture of curvature of assignment 13 once again, one can experience that that is finite. It finds its completion in a state of being closed off. The movement of delamination ends in a close circle with an inner space. What movement stands in opposition to that and liberates us from this state? The Dutch physician L.F.C. Mees characterized the animal with the words *grow in* and the human being with *grow out of*. What movement gets *out of* 'the astral'?

The corresponding morphodynamics are *stretching*, or *getting up*. The upright position is a uniquely human achievement. Although this topic is too large to be covered fully in this chapter, this statement is supported by everything that is written about evolution. When we talk about uprightness here, we do not mean being a biped. Human beings share this feature with penguins and kangaroos, for example. What is meant here is that the head balances on the trunk which in turn balances above the lower extremities. The centre of gravity of the trunk *above* the hip joint is not a little bit in front, as is the case with apes, or straddling, as is the case with kangaroos. In order to acquire this position, the necessary bodily conditions have to be met. Therefore one can anticipate a process of stretching in the course of *somatogenesis* during embryonic development.

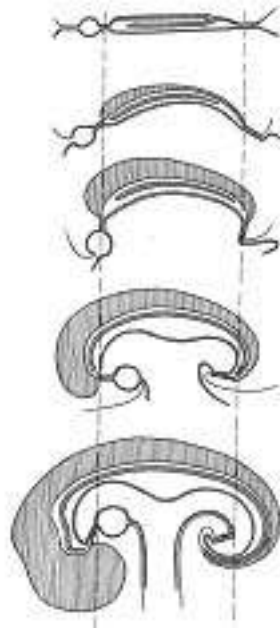


Figure 4.16

When we discussed the birth process, we saw how this was anticipated in the curving of the fourth or fifth week of embryonic development. We recognized a similar tendency in growth, and characterized this as becoming 'unbound,' a process of freeing. Similarly, the tendency towards uprightness, which distinguishes the human being from the animal, has been anticipated in an embryonic gesture. The curving and pursing gesture, with the corresponding organ formation and the further emancipation of the amniotic cavity and the umbilical cord, continues into the third month. Simultaneously, the stretching gesture, the upright tendency which is so typical of the human being, already begins to manifest in the fifth week.

During the process of stretching, the head and the pelvis emancipate out of the round/oval entity which the embryo still is in the fourth week. Gradually, the neck and trunk emerge (Figure 4.17). The side view (Figure 4.18) shows this even more clearly. Both head and pelvis come 'out.' The head grows cranially away from the trunk, whereby the neck is formed, the pelvis 'turns' caudally 'away' from the trunk and comes to lie under it, whereby the waist is formed. This constitutes the visible stretching. The impulse to this is given from the inside by the elongation of the brain, whereby the characteristic flexures between the different parts of the brain come into existence. This is typical for the human being. With it, the development of the brain frees itself spatially, and is no longer a continuation of the trunk axis. The whole process could be described as un-folding; the rolled up embryo opens out. The process proceeds from the cranium starting from the brain, then the whole head, followed by the neck. Then comes the formation of the waist and the emancipation' of the pelvis from the trunk.

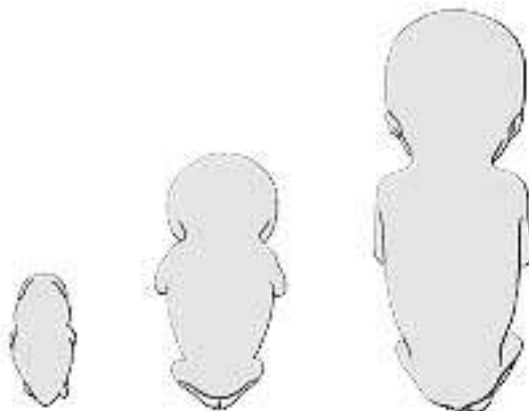
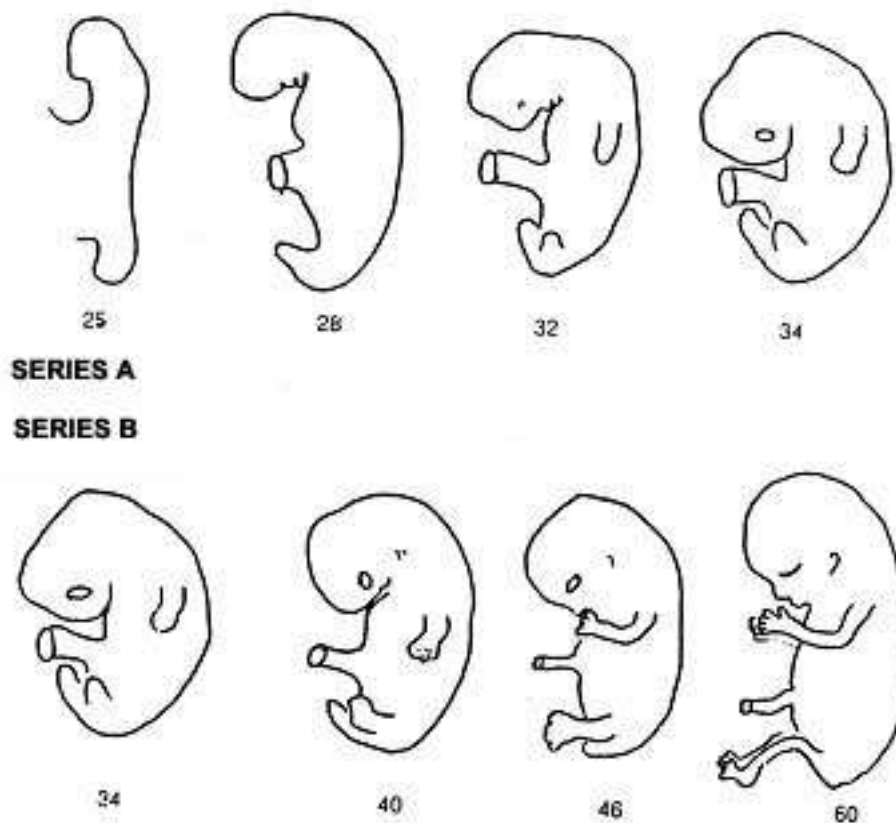


Figure 4.17

Is it not remarkable how this cranio-caudal gradient (predominant in many embryonic processes) is repeated in postnatal motor development? The head goes up first with the maturation of the primary senses, then the baby sits up, the pelvis is turned under the trunk, and standing up comes last. Once again, it is as if the embryonic morphological development (somatogenesis) was 'practice' for physiological functional development after birth. Once the head and the pelvis have turned out of the curvature, the necessary prerequisites have been created for the upright position of the human being.



What is going on is more than stretching, however. A polarity begins to develop between the head on one side and the extremities on the other. The emancipating tendency of the animal (astral) process is apparently preserved in the head. This is actually a condition for proper functioning of this 'pole' in the human being (see Section 4.7). Over against this the extremities begin to develop. Up to now this predisposition was as good as absent in the embryo. At the same time that the stretching process is happening in the head (upper pole), the extremities (radii) are streaming out into the periphery. It is as if the human figure polarizes between closure ('here'), namely the head, and openness ('there'), namely the extremities. One does not have to try all that hard to recognize the two poles of the polarity in the gestures of the head and the extremities (see Section 4.7). Stretching and walking upright are likewise a picture of a balance between these polar tendencies: turned towards or away from the earth. This represents yet another manifestation of the polarity of the radius vs. sphere, which we dealt with when we discussed

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### Assignment 15

*Take your head in your hands and sense how much 'inside' there is. Shift your consciousness to your arms and legs and experience how different they are in that respect. Try to focus on the relationship 'inside/outside,' and 'here/there.'*

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The polarity between cranio-caudal (head–pelvis) also extends to both sets of extremities (arms and legs). In the fourth to the fifth week the hands are positioned with the hand palms turned in on the heart (which at that time is relatively large). The feet are turned slightly outwards (with the soles turned inward) against the umbilical cord. In other words, the extremities are part of the predominantly round and curved gesture of the whole body at that time; just try it. (Come on folks, this is nothing worse than a little bit of eurythmy...!) Subsequently, however, the hands and arms grow outwards, and the legs and feet inwards. The hand palms turn to the ventral side, the foot soles to the dorsal side. This contrast of the endorotation of the arms and the exorotation of the legs leads to the polarity which is so characteristic for the human being (because it belongs with uprightness); it manifests in the anatomical posture. This anatomical posture, one could say, is embryonically incorrect.

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### **Assignment 16**

*Start in an upright position with your arms bent and the palms turned slightly inward at the height of the heart. Now carry out an exorotation, stretching the arms. Continue this movement until the arms are stretched up alongside the head with the palms turned dorsally.*

*Now bring the arms back, rotating inward, continuing until they are stretched alongside the trunk, with fingers down and the palms of the hands turned to the dorsal side. Imagine your legs doing this movement.*

*In conclusion, we might say that the 'embryological posture' is one in which the human being is fully stretched and unfolded.*

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The upper extremities turn away from the earth, the lower extremities turn towards the earth. The latter are connected with the earth and gravity. Poppelbaum explains it as follows, 'No animal achieves the total harmony with gravity in the lower extremities which the human being achieves.' It is because the pelvis and the legs are able to completely carry us that our hands are freed up. They are freed from locomotion, which brings the arms and hands totally within the domain of manipulation. Goethe postulated that the polarity between arms and legs in the human being is an essential distinction; arms and legs differ both in function and physiology, which is the case with no animal.

What does this tell us about the dynamics of the I and the question of human being versus animal? The gesture of stretching and unfolding has to do with becoming freed from the 'inside.' We are looking for a new trend, for something which is not a continuation of the animal/astral (expressing itself in the highly typical curvature with its corresponding dynamics). Is there something which opposes that and frees itself from that? We find this in the stretching motion with its corresponding dynamics. One could say that a new dynamic centre arises in the strong polarity between head and extremities, which is neither the one pole (head/astral/animal/closed), nor the other (extremities/etheric/plantlike/ open). In having to maintain the upright posture, the human being is a creature of *balance*.

One can find this tendency in all higher animals; various forms of stretching and unfolding occur in their embryonic development. But there is one difference: they are never brought to completion. Following the line from lower to higher mammals, through apes to the human being, the tendency to continue stretching and *maintaining* that gesture manifests more and more strongly. The essential polarity of the two extremities (Goethe) *does not appear* in quadrupeds! The anthropoid apes (Pongidae) come very close, but they soon lose the human traits which they have when they are very young. In other words, the morphogenesis of the human being is typified by stretching and becoming upright, accompanied by the unfolding and polarizing of arms and legs, head and pelvis (all the upper and lower parts); all of this is necessary in order to stand straight and *maintain that upright position into adulthood*. Standing upright is more than just an anatomical gesture, it is also a spiritual gesture. It is a gesture of holding back, maintaining an equilibrium in relation to gravity. In the animal, the centre of gravity always lies in front of the spinal axis and it surrenders to its force. At the point where the animal gives in, the human being remains upright. Perhaps being upright is a primary, being a quadruped a secondary quality, but that would go beyond the scope of this book! This implies a view of the relationship between human being and animal which is radically different from the prevailing biological viewpoint. This has been worked out in more detail by authors such as Poppelbaum and Mees. 'Opposition distinguishes the human being,' a revolutionary slogan says. It points to a quality which is a hallmark of the I. The point is not to postulate that 'the human being is no animal,' the point is to recognize that 'the human being is *different from* the animal.' What we have described above gives us a picture of the difference. The

different 'direction' (Hartmann); becoming upright; maintaining that position; finding a standpoint: these are key phrases to fill in this picture. Embryonic stretching shows us the corresponding gesture.

#### **4.8.8 Closing Remarks**

Having gone through all the complexities of this chapter, we will now return to Hartmann's scheme in Fig. 4.9. The aim of this chapter was to highlight four gestures which are characteristic of the way the outer human form comes into being. Corresponding gestures were sought in the four natural kingdoms. The link between these two domains is found in the series of principles which in anthroposophy go by the name of physical, etheric, astral, and I; these are found to be progressively present and at work in the four kingdoms. These four spiritual qualities are likewise to be found working in human development. In order to make these visible, we have tried to live into the directions as indicated by Hartmann, and 'translate' them into 'somatogenetic' gestures. It is probably inevitable that this approach only leads to increased questions for the reader. The intent of this chapter, however, was not to give answers but to stimulate further study. This approach opens up vistas which lie far beyond the discipline of embryology.

February 2005-02-08

Jaap van der Wal

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