

1 Prologue: the framework of this book

Already as a young man, I was fascinated in Nature and the complexity of Life. Consequently, I began to study human anatomy in 1981-1982. I did this study in a library as well as in a dissection room. And I am still doing so ever since.

Sure, it is possible to learn a large part of the anatomical nomenclature by studying standard authors. But my experience from doing numerous dissections myself, led to the awareness that all these books do not cover specific features of that same anatomy. **The 3-dimensionality of the Form** is one of the specific anatomical features that you cannot find in a book. Even the best pictures of the best illustrators cannot give the student the same insight. Neither can students get a real picture of **how all the different structures are (positionally) connected**, when they are not doing the dissection by themselves. Moreover, we should not forget that all pictures, even made by the best illustrators, are already a distortion of reality – what is it that the dissector wants us to show, and what did the dissector have to remove in order to demonstrate? In their book “*Objectivity*”, Lorraine Daston and Peter Galison make it clear that **all illustrations are essentially a perfect representation of what is not Nature**.

“... *objektiv sein heist, auf ein Wissen auzusein,
das keine Spuren des Wissenden trägt ...*”¹

(Translation: *being objective means, searching for Knowledge that bears no traces of the Knower*)

Without any exception, every illustration gives us an incomplete and sometimes even false representation of what really is. With other words: every picture is a representation of what the author or illustrator wants us to see. He or she wants us to see what is in front of us, through their eyes. So, we should not wonder that even the best student in (theoretical) anatomy is lost during the first moments of his/her first dissection – he/she does not recognize of what is present in his/her head.

As an example: the beautiful picture of the *Tractus iliotalibialis* is a perfect representation of what participants without practical experiences fail to see and find in the dissection room. Unless they “shape” this structure by themselves when they dissect in a very specific way. So, to reshape their mental picture, they must cut away some of the structures in front of them. And in doing so, they can notice that for some of these structures (such as fat) it is easy. Whereas for others (such as fascia) it is more difficult. In doing so, in performing the dissection, the students receive an additional and very important characteristic related to the structures of a Form. An insight that they do not acquire by simply studying anatomy from books only. This characteristic is called **the texture of a tissue or organ**. The fact that different structures have different textures is – to my opinion – a very important insight. Especially for persons who have a physical (manual) approach to the human Form.

By studying anatomy, I tried to understand the relationship between Form, Structure and Function. And it became clear to me that if I truly wanted to understand, I had to study **anatomy in all its dimensions**. This means that besides classical anatomy, I also had to study histology, cytology, and even (bio)chemistry. In fact, we should study **Morphology**.

By doing a dissection by yourself, one of the first things that you truly understand is that **every form is built by many different structures**. Moreover, each of these structures has a form of its own. So, when we study anatomy by dissection, we are separating each part from the rest. And by doing so, we get a notion of the proper Form of each individual part. When we continue this dissection, we become aware that there are many different dimensions in our anatomical study. And in each dimension, we encounter new structural components.

Form is built up by structures. This insight may not be so revolutionary new. But during my dissections, I became much more conscious of it, and it led to the notion that certain questions always came back. One particular question always popped up, again and again. It was the question about the origin of anatomical structures: where do they come from? Consequently, I began to study **embryology as a part of the morphological study**.

¹ L. Daston, P. Galison, *Objektivität*, page 17.

Almost immediately at the beginning of studying embryology, I encountered several difficulties. One of them was the notion that all standard authors use a rather **chemical approach** to explain why a certain form is changing. In most books, development is explained as the result of a genetic expression. According to these authors, the information for development is apparently somewhere stored in the DNA of each cell. Using the DNA as a starting point for every change of form, we describe development as an inside-outside-phenomenon. This is one way of describing and explaining transformations. However, it does raise some questions. One of these questions is: how does the cell know what it should become? And last but not least: how does it happen? Moreover, if we study embryology in the contextual frame of a chemical inspired DNA concept, what can we do with this information when we have a physical approach to Form in daily practice?

Studying standard authors of embryology who use the “DNA wild card²”, it leaves us all too often with too many fundamental questions unanswered. This changed for me somewhere in the late eighties when I received the copy of a book written by Prof. E. Blechschmidt³. This opened a completely new perspective and was the beginning of a completely different approach.

Unlike his colleagues, he does not use chemical parameters to explain development. He is aware of the presence of a chemical context, but he also emphasizes that there are specific physical features to the process. So, unlike most of his colleagues, he uses **physical parameters**. Parameters such as space-time, dimension, position, direction, etc. to explain the phenomenon of differentiation. In a complete and logical way – no gaps or jumps in the way of reasoning – he explains **not only how but also why** a Form changes.

The “HOW”. By using the physical parameters, Prof. Blechschmidt describes every smallest detail of change in position, structure, or form. He describes each of these changes as a so-called **developmental movement**. We can describe these developmental movements as **morphokinetic patterns**.

The “WHY”. Describing development as a morphokinetic pattern makes it clear that this phenomenon takes place under very specific **environmental circumstances**. It becomes crystal clear that the environment plays a significant role in the phenomenon “development”. It becomes obvious that the changes that take place are a response to the environmental pressure on the form, and all of its structural components. And this means that unlike his colleagues, he does not speak of an inside-outside but of an **Outside-Inside-Phenomenon**.

And there is more to it. Not only is he speaking about the how & why, he also explains us “**where & when**”. Using physical parameters as conditions, it becomes obvious that a certain morphokinetic pattern is repeated over-and-over-again. We can compare it with a repeated **algorithm** that leads to an increasing **complexity**.

From an anatomical point of view, we are often looking at the result of a developmental process. In most cases, we notice the enormous complexity of its result. But at the same time, we often fail to see the simple algorithm of the morphokinetic pattern and the related (same and simple) circumstances. Wherever and whenever (in a certain part of space and at a certain moment) specific physical circumstances are present, it is possible that under these circumstances a form will change. When this is the case, when the form does change, we should keep in mind that in the end **nothing new is created, it is all about transformation**. With other words, development does not lead to something new but much more to a different way of appearance – a different way of spatial (re)arrangement.

*“... was sich während der Entwicklung ändert, ist nur das
Erscheinungsbild, nicht aber das Wesen ...”⁴*

(Translation: *what changes during development is the way of appearance but not its essence*)

Transformation is a phenomenon that we can observe in all dimensions. But neither necessarily in all dimensions at the same time, nor in all parts of that dimension. We should keep in mind that in the end, this transformation will only take

² The DNA is all too often used as a “deus ex machina” (see also footnote 344) to explain development/differentiation in a sense of “we do not know exactly how it happens, but it must be somehow genetically related”. Is this assumption correct? And if so, in what context, in which reference frame?!

³ Blechschmidt, *Humanembryologie. Prinzipien und Grundbegriffe*, 1974.

⁴ Blechschmidt, *Anatomie und Ontogenese des Menschen*, page 13.

place in a specific dimension of certain part of space. It will be that part of space where we encounter the specific environmental conditions that will lead to that change. And this brings us to the term **metabolic field** or **morphokinetic field**. The term “Field” indicates that we can distinguish a very specific part of space where a transformation takes place. The physical parameters enable us to determine a morphologically delimitable area. This area indicates the specific location of the transformation.

The fact that this morphokinetic approach is a physical and not so much a chemical description has a direct consequence for our anatomical study. Because it does not only explain where the different structures come from, it also shows us the physical traces of the developmental pattern. Meaning: if we study anatomy, we can notice not only many anatomical relationships between different structures, but we can also notice what unifies them. The latter is the morphokinetic pattern. Structures are “spatially aligned” by these developmental changes. We are looking at Form and see how these patterns represent circumstances. We can notice how patterns have turned circumstances into “living pictures of anatomy”⁵. These patterns are showing us the large number of possibilities of how structures can interact. **Looking at a Form and seeing the morphokinetic pattern turns every anatomical relationship into a functional relationship.**

In the attempt to describe and understand human development, we will study the specific circumstances for these transformations. And with the help of physical parameters, we will describe how these changes take place. Moreover, we will be able to formulate a large number of principles behind the phenomenon of any morphokinetic pattern. When we study these principles, we acquire an insight that will bring us far beyond the borders of human development. We will go back to the origin of the concept of Morphogenesis. Consequently, a profound insight in these principles will become a solid foundation for an understanding of the relationship between *Form*, *Structure* and *Function* of the Human Being.

The fact that we speak of an Outside-Inside-Phenomenon (environmental circumstances quantified by physical parameters) will make it clear that a morphokinetic pattern does not only occur during the embryological stage of a Human Being. It will become clear that this phenomenon also occurs during our complete lifetime. Being able to observe this in all life forms even leads us to the conclusion that the presence of a morphokinetic pattern is a **universal phenomenon**. It even goes this far to say: an understanding of the principles behind the phenomenon of development helps us to understand any kind of transformation. **Beyond the period of 9 months of pregnancy, terms such as development, growth, transformation, differentiation, specialization, and many more (such as symptom and pathology) can be seen, described, and even understood by applying these principles.**

This book is written for all of you who are fascinated by the beauty and complexity of the Human Being. This book is written for all of you who are trying to find answers about the origin and nature of what is Form & Function. Within this book you can find hidden answers of Nature. But to be able to find them, you have to **think-out-of-the-box**. For instance, one of the first things that we need is another awareness. The awareness that if we want to study Form, we always need to **study Form in (at least) two different dimensions at the same time**: the dimension of the form itself as well as the (underlying) dimension of its structures.

To help the reader in the exercise of studying Form by looking into two different dimensions at the same time, this book contains a chapter for each dimension. Starting with the dimension of the atoms and molecules, the book will follow the **chronology of evolutionary transformation** that will lead to the very first cell – the next (overlying) dimension. From there the chapters continue chronologically by describing the dimension of tissues and then organs, and finally a complete organism. In each new chapter, the reader will become aware that the content of the previous chapter contains the ingredients to understand the form of the next dimension. Like sand and cement build the bricks, the bricks build the wall, the walls will build the room and finally, the rooms will build the house. If we want to understand the house called “Human Being”, we need an insight into all its parts, in all dimensions and in respect to the chronology of their appearance. So, let me take you on a **journey of 13,8 billion years** to discover a universal **Mechanism** that we can use every day again, in theory and practice.

⁵ Still, [The Philosophy and Mechanical Principles of Osteopathy](#), page 9.

Note about Embryology

Embryology is a relatively young science. Nevertheless, there are many scriptures indicating that already a long time before we talk of embryology as such, we have asked ourselves questions about our origin. In the sixth century BC for instance, Plato came up with the idea of the (perfect) archetype of which we (and all other subjects) are merely copies. A thought that somehow came back during Christianity when it was believed that we are human since the beginning (we are merely a reflection of God's own image; the theory of preformation – see also Nicolaas Hartsoeker 1656-1725). In the 18th century things started to change. A new concept is presented: Epigenesis (see also Friedrich Caspar Wolff 1734-1794). This concept rejects the idea of preformation and rather describes all the observed changes that take place during a process called differentiation. Epigenesis (NOT epigenetics: the concept of genetics comes later – see Gregor Mendel 1822-1884 and Watson & Crick 1955), this concept describes accurately what can be observed but does not necessarily explain the why of the changes. In the attempt to find an answer to the questions about the why and how, different concepts were developed. Concepts such as the idea of “effectiveness” or “repetition of phylogenesis”.

At the end of the 19th and beginning of the 20th century, the Russian medical scientist Alexander Gurwitsch and the German biologist Hans Driesch came up with the “Morphogenetic Field Theory” (published by Gurwitsch in 1912). Although the German Professor Erich Blechschmidt does not make direct references towards this theory, there are several indications that he seems to have been inspired by this approach. For instance: Blechschmidt does not deny that the DNA has a meaning for the phenomenon of development, but he emphasizes that it is not so much about *genetics* but much more about *genesis*. To explain this with an example: The cell is a cooking pot, the DNA is the cooking book – so who is the cook? Although the concept of morphogenesis does show its value, unfortunately it became pushed into a corner. It almost became forgotten because of the revealed (metabolic) importance of chromosomes and genes in the 1930's. In the late 20th century, the field concept was “rediscovered”.

Note about Physics and Chemistry

In this book, we will use physical instead of chemical parameters. But please keep in mind that one does not exclude the other automatically! It should be clear to the reader that every chemical reaction is characterized by several physical features and vice versa. We can use both scientific languages to describe one and the same natural phenomenon. Each language is valid and does not rule out the other. In the context of this book, we have chosen specifically for the physical language. A language that suits a person who has a more physical (manual) approach of the Human Being rather than a chemical. But nevertheless, I am convinced that for every developmental movement, as described in this book, there might exist a specific chemical reaction as well (as for instance described in physiology).