
Evolving Morphology

2017 Conference of the Natural Science Section at the Goetheanum, Dornach - Switzerland.

João Felipe Ginefra Toni



Keynotes and contributors in the closure of the conference.

First row below, from left to right: *Craig Holdrege, Malte Ebach, Peer Schilperoord, João Felipe Toni and Rolf Rutishauser.*

Second row above, from left to right: *Rolf Sattler, Ruth Richter, Mark Riegner, Susanna Kimmel, Johannes Wirz and Louis Ronse De Craene.*

“To observe things in their becoming is the best way of explaining them.”

Turpin

Morphology in its original context and development

One of the central motivations of the Evolving Morphology Conference, held on the 4th-8th of October 2017 in Dornach, Switzerland, was to encourage the dialogue between the Life Sciences on the one hand and Humanities and Anthroposophy on the other. By offering a global platform for biologists, historians and philosophers of biology, Goethean scholars and anthroposophists, with a common interest in Morphology, the organization team of the Natural Science Section aimed, besides celebrating the 200 years anniversary of Morphology, primarily, to contribute towards a reassessment of theories of organic form – since its foundation in the publication of Goethe’s morphological journal *Zur Morphologie* in 1817.



Welcoming by Johannes Köhl, followed by Ruth Richter’s introduction and a World-Café.

As the eminent fuzzy-arberian morphologists Rolf Sattler and Rolf Rutishauser, have pointed out; Morphology has been traditionally interpreted in either a narrow or a broad sense. In the narrow sense, morphology refers only to external form or organography. In the broad sense, it comprises structure at all organizational levels, i.e the structure of whole organisms, organs, tissues, cell, organelles, molecules and domains. Thus Morphology *sensu lato* includes anatomy and even structural biochemistry. However, regardless if it is defined narrowly or broadly, *Goethe's original conception of Morphology, i.e Morphology sensu stricto, deals primarily with the change of form during time, or in other words, during ontogeny and phylogeny.* It does not only comprise morphogenesis (the development of form), but rather it is, in its core and origin, the study of morphogenesis itself.

Goethe had already made this point explicit at the inceptions of Morphology by giving the title *Bildung und Umbildung organischer Naturen* for the opening of the first volume of his *Zur Morphologie*. Some months later Burdach stressed further that Goethean motto in his *Über die Aufgabe der Morphologie*, influencing the next generations of evolutionary morphologists (e.g Ernst Haeckel and Carl Gegenbauer) in the 19th century, and helping to institutionalize the discipline in the German universities.

During the 20th century, morphological research was eclipsed by genetics and molecular studies. Although the molecular approach has led to a great advance in many fields of biology, for instance; in systematic botany and evolutionary developmental genetics, it grew at the expense of more traditional approaches such as anatomy, embryology and morphology. As a result, form was equated to structure and the task of the modern biologist was to search for its genetic causes.

However, since morphology has become again, in the transition of the 20th to the 21th century, a keyword among biologists proclaiming its *renaissance* in our understanding of evolution, there is an strong urge for a reappraisal of Goethes conception of morphology in contemporary research areas. For example, D. Wake (1982) proclaimed the “renaissance” of morphology in modern biology; M. Wake (1992) examined the field of “*evolutionary morphology*” and recognized five then-current subareas of analysis (functional morphology, biomechanics, ecomorphology, developmental morphology, systematics and phylogenetics of morphology) and predicted a sixth (integrative evolutionary morphology). Minelli and Schram (1994) and Koehl (1996) appraised morphology in various contexts; Sattler and Rutishauser (1997) and Endress et al. (2000) demonstrated that morphology understood as a “process morphology” has fundamental relevance to

plant research. Kaplan (2001) offered a review of the concepts and definitions in the history of plant morphology and their roles in modern plant evolutionary biology; Stuessy et al. (2003) proposed a “*deep morphology*” as a renaissance of the morphological method in systematics; and Davidson and Ebach (2008), in their *Foundations of Systematics and Biogeography*, traced important morphological concepts in homology and classification from the 19th century to the present through the provision of a unique anthology of scientific writings from Goethe, Agassiz, Geoffroy St. Hilaire, Owen, Naef, Zangerl and Nelson, among others. Ronse De Craene and Wanntorp (2011) argued in favor of re-establishing morphology as center stage in contemporary botanical research, against the lack of support and interest for the formation and education of professional morphologists in the careers of biology and related areas dominated by molecular approaches. Riegner (2013) described a “new ancestor of an archetypal biology” by re-thinking the dynamic way of seeing in Goethe’s morphology and its compatibility with the conceptual framework of Evo-Devo, and also Wanninger (2015) in a similar direction proposed a “Morpho-Evo-Devo” approach to molecular Evo-Devo and phylogenomics.

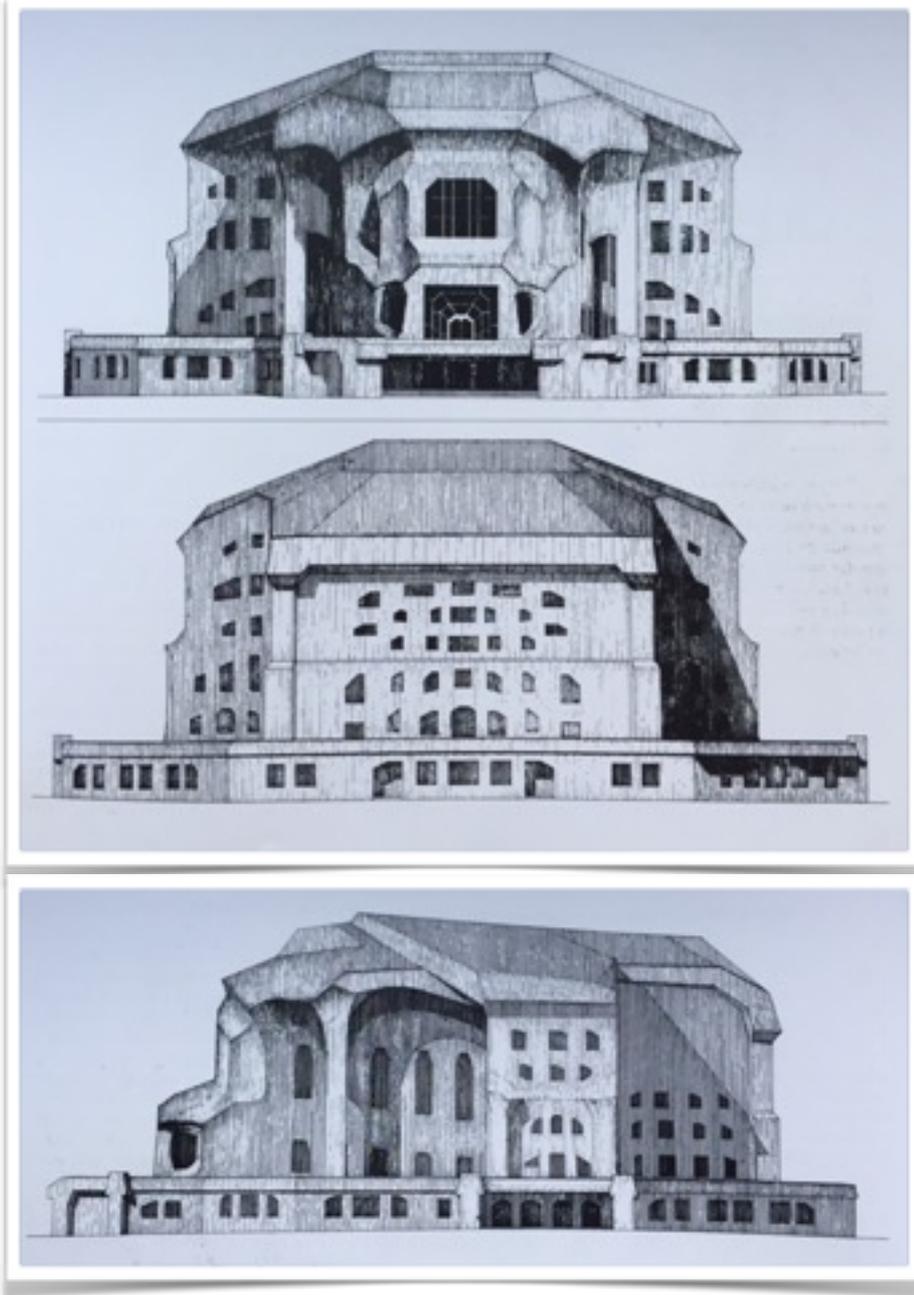
As a science of developmental processes, one should consider the role of morphology at center stage in the evo-devo research. A confirmation from this thesis is given by the fact that, not surprisingly, Goethe has been cited by many plant developmental geneticists, due to a number of findings which, by way of molecular models and experimental tests, corroborate some of the foreseen ideas in his essay *An attempt to explain the metamorphosis of plants* published in 1790. However, this has been done by sacrificing the epistemological and methodological contributions of Goethe’s Morphology and their results. It will be, indeed, a loss for the evolution of biology and a terrific social impact on the education of evolutionary biology in universities, if morphology is to be understood only in a narrow and static sense according to which it would refer only to mature form, i.e. *structure* (Gestalt) and be explained exclusively by its underlying “mechanisms”. As a consequence, the dominant ideologies in orthodox Neodarwinism, expressed in inflationary concepts such as competition, survival of the fittest, natural selection and adaptive advantage, will continue to occupy an exclusive position in the curriculum of Biology and in the elaboration of many textbooks, influencing the world view of many generations of children and young people. An alternative to avoid that shortcoming is to integrate the Goethean Morphology into the extended evolutionary synthesis, as a more process-oriented approach to the evolution of biological form and function.

Therefore renowned morphologists from international universities and research institutes were invited to participate and to contribute in the conference, emphasizing the dynamic-causal nature of form and structure, i.e, *Bildung*. This is of special concern not only for researchers working in the areas of evolutionary developmental biology, developmental genetics, phylogenetic systematics, and in the extension of evolutionary synthesis, but also for professors and high school teachers active in biology education.

The Goethean concept of *Bildung* carries in its core an educational aspect, which invites the morphologist to engage, develop and evolve her or his cognitive capacities in a process one could call *Participation*. In his *Maxims and Reflections*, Goethe himself proposed a Delicate Empiricism connecting one with the conceptual content of a phenomenon. Thus morphology is a participative science, in so far as it provides the possibility of recognizing the intrinsic correlation between mind and form, and being in this sense, simultaneously, a Morphology of Human Knowledge.

Such ontological claim was developed further by Rudolf Steiner in his *Outlines of a Theory of Knowledge implicit in Goethe's World View*, by identifying what he thought to be the most significant result of Morphology, namely, the Copernican and Keplerian revolution of Goethe's concept of *the nature of the organism*. As a logical and far-reaching consequence of such notion, we find Steiner's morphological-physiological discovery of the *Threefoldness of the Human Organism* and its artistic embodiment in the architecture of the Goetheanum on the hills of Dornach. Steiner described it in his book *Von Seelenrätsel (1917)*, dedicated to the philosopher Franz Brentano, and published it exactly 100 years after Goethe's *Zur Morphologie*.

In this sense, to celebrate the 200 years of Goethe's Morphology is, simultaneously; to celebrate the formal origins of the Goetheanum and to seed its future towards a renewed culture of transformation in scientific education: *Goetheanism*.



The idea of metamorphosis in the architecture of the Goetheanum

Evolving Morphology

As an attempt to encompass most of these nuances in the evolution of morphological thinking, the program of the conference was diverse, ranging from lectures, panel discussions with the speakers, research presentations, open space for specialised professional meetings (Symposium) to artistic workshops for nature observation and eurythmy with the interaction of the participants.

On Wednesday evening (4.10), Wolfgang Schad kicked off with an opening lecture on a phenomenon he termed *Verzeitlichung* of nature in the evolution of human consciousness, specially in art and science, and its implications in the development of the idea of metamorphosis. Over the next four days, the theme of the conference evolved from historical and methodological aspects, passing through the philosophy of morphology, and diving into contemporary morphological research in Botany, Zoology and Medicine.

In such way, the conference was taking shape into a threefold-integrated whole by keeping with the intentions, content and nature of Goethe's morphological notebooks:

1. *The History of Morphology*: In Goethe's time, scientific writings were usually accompanied by much-appreciated historical and autobiographical treatments. The eminent historian of science and Goethean scholar, Dorothea Kuhn, stressed this aspect of Goethe's scientific writings, calling it the principle of *the autobiographical form*. Bearing that in mind, João Felipe Toni explored in his keynote the original intention and meaning of morphology as an independent and auxiliary scientific discipline in Goethe's *Zur Morphologie*.
2. *The Philosophy of Morphology*: Central to Goethe's conception of Form is his "anschauende Urteilskraft." This epistemic principle permeates the entire *Zur Morphologie*, prescribing the methods of morphological research ("vergleichende und entwickelnde Methode") and encompassing the 9 philosophical world-views presented by Rolf Sattler. Other aspects of Goethe's method were exemplified by the lecture of Peer Schilperoord on the model of the perennial plant as an aid to expanding the horizons of the concept of plant metamorphosis. Michaela Glöckler provided us an account on Steiner's philosophy of the seven life processes as a method of approaching the Goetheanistic mode of observation and its implications in medical praxis and training.
3. *The Science of Morphology*: Malte Ebach, Johannes Wirz, Rolf Rutishauser, Mark Riegner, Susanna Kümmel and Craig Holdrege addressed the content of morphology through presentations of contemporary work and evaluated the relevance of these concepts in current scientific fields like taxonomy and

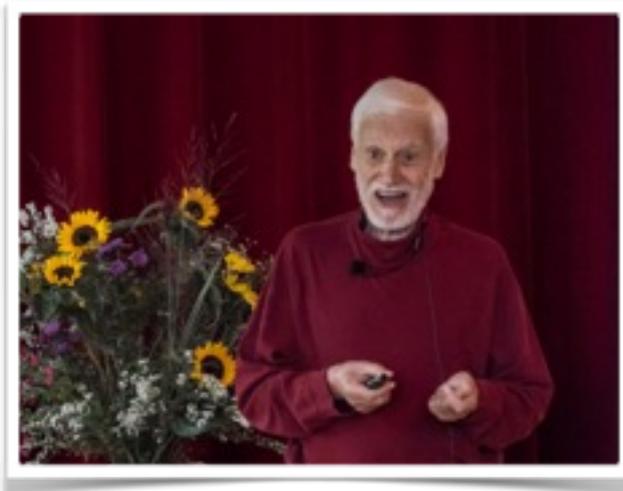
systematics, plant evo-devo, the social behaviour and biology of the honeybee, and the evolution of tetrapods, frogs, and birds.

The keynote lectures were then supplemented by research presentations on special topics: geomorphology (including landscape, agriculture and geography), plant morphology, animal morphology and anthropology. Historical and philosophical questions also continued to be addressed and deepened in the presentations, especially regarding the scientific debate in the Academy of Paris between Cuvier and Geoffroy Saint-Hilaire and Goethe's participation in the dispute (by Jessie De Lage); the relationship between Husserl and Goethe (by Iris Hennigfeld) and the philosophical meaning of *anschauende Urteilskraft* (by Troy Vine).

Moreover, two **Symposia** were offered as an open space for people to meet, make connections, share ideas in smaller groups regarding certain topics and also for existing groups to present their research topic and open for potential participants. It was a remarkable moment for the BELLIS and FLO-RE-S research groups to join the conference and to meet during the Symposia for an enlivening exchange on the topic of **Floral Morphology**. Since most of the members of both groups are engaged not only with research but also with teaching, it was a great opportunity to gather and set up a conversation to introduce their work, approaches, and to bring forth potential collaborations that could lead into new questions regarding the conceptual framework, methodology and praxis in the research and education of floral morphology.



Wolfgang Schad during the opening lecture.



Keynotes from João Felipe Toni, Rolf Sattler and Craig Holdrege addressing, respectively, the historical, philosophical and scientific foundations of Goethe's Morphology.

There was a good feedback from the participants of the Conference:

"Ja, es war eine großartige Zusammenkunft, in einer Art, wie ich sie noch nie erlebt habe. Ich habe das Gefühl, dass dieses Zusammenkommen von akademischen Morphologen aus aller Welt und von anthroposophisch <geschulten> Goetheanisten - dazu noch am Goetheanum - ein Ereignis ist, dass den Beginn einer neuen Entwicklung anzeigt. Es waren keine "Berührungsängste", keine Vorurteile spürbar. Auf keiner der beiden Seiten!"

- *Michael Kalisch, Biologist.*

"As a an emerging eurhythmist, I am becoming increasingly aware that I am striving to build a new sense organ with which I can learn to "see" the Archetypal human being. This conference filled me with inspiration in this work. Not only did I have excellently varied human phenomena to observe, I was also given many opportunities to connect with others who I recognise are also on similar or related missions, each in their individualised way. This is encouraging!"

- *Andrea Moreno, Eurythmist*

"Die Tage haben mir zu mehr Klarheit verholfen, was ich an Pflanzen sehe und gerne zeigen möchte: Dynamik. Meine schlafwandlerische Auswahl der Themen aus der 'Knospen-Kiste' für meinen Vortrag tastete sich genau an dieses Thema heran."

-*Kathrin Studer, Botanist.*

"Beeindruckend für den Berichtenden, der als Biografiearbeiter durch die Tagungsausschreibung die Biografiearbeit als morphologische Methode entdeckt hatte, war neben der inhaltlichen Qualität der Beiträge die warme, aufmerksame, interessierte, offene, teilnehmende und sachliche Stimmung, die die ganze Tagung durchzog. Es wurde deutlich, dass sich hier Menschen versammelt hatten, die sich in der anschauenden Urteilskraft üben, die unter anderem auch darin besteht, Persönliches zurückzunehmen, damit sich das Wesen des zu erforschenden Objekts im Bewusstsein des Erforschenden selber aussprechen und offenbaren kann. Ebenso deutlich wurde, dass sich Wissenschaft und Forschung nicht von Kunst und künstlerischem Tun trennen lassen. Zum Schluss war allen klar, dass diese Tagung einer Fortsetzung bedarf."

- *Phillip Jacobsen, Biographer.*

Sponsors



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