

**John H. Zammito, *The Gestation of German Biology, Philosophy and Physiology from Stahl to Schelling*, The University of Chicago Press, Chicago and London 2017, pp. 560, \$ 45, ISBN 9780226520797**

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Even if they are more studied in the last decades, the relationship between *Naturphilosophie* and natural sciences, and the influence of the former on the latter are still discussed. In the present book Zammito proposes to examine the major part *Naturphilosophie* played in the gestation of German biology. More precisely, for Zammito, *Naturphilosophie* might be viewed “as historical evidence that something essential to the character of biology as a special science was at stake” (p.4); *Naturphilosophie* helps biology to become an independent science and here, the point is to highlight all the underlying dynamics that gave birth to biology as an autonomous discipline. In doing so, Zammito’s goal is also to show how “this episode in the history of biology might reopen issues in our own philosophy of biology” (p.4); in studying how *Naturphilosophie* was elaborated and how it impacts on the formulation of a life science, the point is also to bring a fresh perspective to our modern biology.

In order to do so, *The Gestation of German Biology* is organized into 11 chapters that historically and conceptually stress different aspects of this huge birth of biology. Even if the reflexive path between the parts is sometime obscure, at the end, all the elements are articulated in a way that the *quod erat demonstrandum* clearly emerges. In each chapter, Zammito takes time to contextualize, to present the main concepts and the main arguments of the concerned scholar and makes a good use of the impressive bibliographical sources he bases his work on. Consequently, we only highlight here the main themes, without conveying all the richness of the text.

In chapter 1, Zammito first frames the landscape of the University of Halle in order to put Stahl into perspective. Indeed, in Halle, between the legal and political philosophy (with Thomasius) and the pietist theology (with Francke), there is a mix of different traditions. Even if Stahl’s students are quite close to Francke, it is important not to confound his own

thoughts with pietism, or with the perspective of the *Ecole de Montpellier*, or with Haller's highly critical understanding, especially as "this Stahl-Haller conflict shaped the consolidation of a new research program in German physiology over the course of the eighteenth century" (p.21). In examining the controversy of Stahl with Leibniz, Zammito also shows how Stahl distinguishes between life and non-life, the relationship he establishes between body and soul, or the interaction with metaphysics he thinks might contribute to the autonomy of physiology in Germany.

Chapter 2 focuses on Haller and the way he leans on an experimental Newtonian approach in order to improve natural sciences. After a presentation of the main impact of Newtonian ideas over Europe, Zammito notes that Haller never explicitly refers to Newton during his studies; it is rather "his time in Paris that crystallized Haller's understanding of Newton's epochal centrality" (p.53). And yet, in Paris the Newtonian physics is often close to occult qualities (p.57). Consequently, for Haller, the point is to embrace the whole of Newtonianism; that is why, for Zammito, "Studying with Bernoulli, instead, would enable him to understand and embrace the English and Dutch tradition of 'experimental philosophy'" (p.61).

It is this experimental approach Haller establishes at the University of Gottingen. During those Gottingen years, Haller is involved in many controversies all around Europe. Each of them helps him to clarify his thoughts (about the unity of anatomy and physiology, about irritability and sensibility, mechanism, animism, materialism...) in relation with his disputants (such as Gerard van Swieten, La Mettrie, Georg Erhard Hamberger, or his former student Zimmermann). As Zammito recaps this chapter 3, "Each of Haller's many controversies teaches us something very important about the prehistory of biology" (p.80); in particular, concerning irritability and sensibility, "Europe had never before seen such a mobilization of study and debate on a topic in life science" (p.89).

In the German area, a French influence also drives the biological development, and it is what Zammito deals with in the chapter 4. Indeed, in France, scholars such as Maupertuis, Buffon or Diderot develop a vital materialism that creates new dynamic links between physiology and mathematics, between inert and living particles, and that leads preformationism to deeper enquires. In this context, the point is still to withdraw from a

mathematical paradigm and to embrace a more experimental physics where the scholar interpretation plays an explicative part as important as factual observation. In particular, Zammito relies on Sloan's approach in order to know whether or not Buffon established a genuine revolution (p.108). Considering that Buffon is in favour of an independent natural science, and that he regards science as an irreducible and a plural initiative, he strives to the scientific autonomy of the living area. In this sense, Zammito concludes: "We best do justice to the 'Buffonian revolution' if we link it not only with experimental Newtonianism and nonmathematical *physique* but with vital materialism, or adamant *naturalism* in inquiry into nature" (p.113).

Vital materialism impacts on the German context and participates in the reformulation of questioning: the soul plays a part in the animation of the body, but how much does it intervene in the explanation of vital phenomena? More generally, the main problem is that nature self-develops but physics is not enough for explaining it. Moreover, are the natural sciences enough to explain the living world? And if this is so, how are natural sciences (and the epigenetic question in particular) related to religion? Thus Zammito recaps "the question divided the intellectual community between those who believed that natural science *could* provide this explanation and those who believed that only a *supernatural* recourse was possible" (p.134). In order to elaborate the questioning, in chapter 5, Zammito draws a line that passes by Reimarus (who opts for a *supernatural* recourse), Herder (who reads the French savants and tries to find the proper theory of the soul), C. F. Wolff (also inspired by the French naturalists and who tries to find an eclectic balance between experience and theory in order to assert epigenesis), Unzer (who sets a new neurophysiology theory, different from Haller), and Tetens (who hardly blames Bonnet's preformationism).

In parallel with this expansion of experimental Newtonianism, a historical concern grows – "By midcentury the historicization of nature had had a place in the minds of key philosophers and students of nature, and its consequences for other inquiries, particularly in life science, preoccupied the balance of the century" (p. 173). This historical concern has its roots in Leibniz, Maupertuis, and Buffon above all, and in the understanding Kant and Herder make starting from them. In

particular, at the end of this chapter 6, Zammito accurately examines the fact that Herder is at the basis of an interpretation of nature as a self-maintaining and a self-creating entity that the 18th century massively develop; in this approach, the point is to emphasize a unique universal force which interprets and embraces all the forces from the experimental physics.

The second half of the 18<sup>th</sup> century also reformulates the natural history and links it with other areas of research, such as compared anatomy or compared morphology. In such a context, the place of the human being on Earth takes a new dimension: what is the nature of the human mind? Do humans and monkeys like orangutans share some genes? On the contrary, is the human species one? Does language help to distinguish the human being from the rest of the animal reign? All those questions are highly detailed in this chapter 7.

In chapter 8, Zammito comes back to the question of the historicization of nature, mainly focusing on Blumenbach and his interest in palaeontology. Indeed, for Blumenbach, there is no doubt that the Earth passed through different periods of catastrophes that lead to more or less massive extinctions. In this sense, how to consider the renewal of the extinct species? With a creation *ex nihilo* of new species or in considering that some former species remain beyond catastrophes? This transcendental question is also linked to a teleological structure, and “that teleological construction was, moreover, ascribed to *natural forces*, which, even more importantly, remained constant across the catastrophe. This allowed Blumenbach to have recourse to his own master concept, the *Bildungstrieb*, to grasp the phenomenon” (p.233). Here this natural history is not possible in the Kantian critical turning point; Zammito examines the relationship between Kantian Blumenbach and shows that the affiliation of Blumenbach with Kant results from a misunderstanding (p.236) and that the shaping of natural science is the result of a mix of influences.

With the *Bildungstrieb*, Blumenbach initiates a work around the notion of force that makes the 18<sup>th</sup> century re-examine the natural philosophy. In this sense, chapter 9 focuses on the vital forces that “constituted the basis for the autonomy of biology” (p.245), *i. e.* the *Lebenskraft*, the *Triebfeder*, or the *Bildungstrieb*. Are vital forces one or plural? Chemical – and so do they embrace inorganic? – or with no possible materialistic understanding? Do they take part in the emergence of the first

living being? How are they related to galvanism? Here, Zammito mainly focuses on Kiehmeyer and puts him into perspective with Haller, Wolff, Blumenbach, Herder, Link, Brandis, and Reil.

As Zammito introduces in chapter 10, “there was a crucial intermediary between the deliberations over *Lebenskraft* and the impact of Schelling’s *Naturphilosophie* on German life science: Johann Wolfgang von Goethe” (p.286). In other words, here, the chapter shows how *Naturphilosophie* uses and mixes considerations about forces, drives, and more speculative ideas about productivity in nature. In order to do so, Zammito details the Goethe’s key concepts, such as polarity, intensification, the *Urpflanze*, the type etc. He shows how, in nature, form and design join and how, in a post-Kantian way, living beings are empirical actualisations, tokens, of the becoming nature. Here, Goethe reveals a “propensity toward historicization” (p.295) and an approach of “ontological intuition” (p.299) he eventually shares with Schelling. In this sense, the rest of the chapter highlights how Schelling links the different areas of research in order to constitute a “dynamic approach [that] might even achieve a unified theory of nature” (p.303); in particular, Zammito stresses how Schelling readapts the field of force that we have previously seen.

This aspiration to a general view in *Naturphilosophie* and its ability to integrate any scientific advance make it a proper movement in German thought (p.318). For Zammito, it is clear that *Naturphilosophie* is as important as the Kantian criticism. When Schelling loses interest in *Naturphilosophie*, different savants gain interest in it, such as Steffens, Schelver, or Ignaz Döllinger. For Döllinger, having a romantic vision on nature allows to examine what common positive sciences cannot do. It allows to study the very beginning of life, even if it is unproven, to study life with no focus on the dead components analysis shows, or to apprehend organisms as objects and subjects at the same time. In this sense, in allowing a new approach on life, different from the Kantian criticism, *Naturphilosophie* presents a program that fits with the ambitions of emergent life science (p.325); *Naturphilosophie* has a big part in the elaboration of the 19<sup>th</sup> century biology.