KIELMEYER AND THE ORGANIC WORLD

Texts and Interpretations

EDITED BY
LYDIA AZADPOUR AND DANIEL WHISTLER

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CONTENTS

Part III
INTERPRETATIONS

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Chapter 1

EDITORS' INTRODUCTION

Lydia Azadpour and Daniel Whistler

This is the first English-language volume dedicated to the work of Carl Friedrich Kielmeyer (1765–1844). It includes the first ever English translation of his famous 1793 Speech, *On the Relations of Organic Forces in the Series of Organisations*, in which he establishes nothing less than a conceptual framework for the understanding of the living natural world and its interactions. Further key texts by Kielmeyer are translated in Part Two of the volume and are followed, in Part Three, by a series of interpretations of his work that attempt to show its significance for both historical and contemporary reflections on nature.

In sum, these translations and commentaries aim to make sense of the recent resurgence of interest in Kielmeyer's project of conceptualizing organic nature among anglophone historians of philosophy and science, for whom he has increasingly come to represent not only the 'father of philosophy of nature', as Cuvier once described him[1], but also a key figure in the development of the life sciences in general. As long ago as Timothy Lenoir's *Strategies of Life* in 1982, Kielmeyer's contribution (alongside those of Kant and Kielmeyer's teacher, Blumenbach) to the 'teleomechanism' of early German biology had been appreciated[2]; however, it was not until the 2000s that Kielmeyer fully resurfaced in anglophone scholarship. One important landmark was Iain Hamilton Grant's influential *Philosophies of Nature after Schelling*, in which the significance of Kielmeyer's 'dynamic natural history'[3] was acknowledged not just in terms of its influence on F. W. J. Schelling and other philosophers of nature, but also in its own right. Indeed, according to Grant, Kielmeyer intervenes in transcendental philosophy to 'convert … [Kant's] phenomenal and somatic nature … into a priori dynamics.'[4]

If these are some of the recent historical precedents, then the years 2017 and 2018 marked a real watershed moment: two significant English-language works have appeared which are in large part founded on the demand to take Kielmeyer seriously. Hence – drawing on an earlier resurgence of German-language scholarship on Kielmeyer in the 1990s (one inaugurated by Kai Kanz' *Philosophie des Organischen in der Goethezeit* and continued by Thomas Bach's *Biologie und Philosophie bei C. F. Kielmeyer und F. W. J. Schelling*) – Andrea Gambarotto's *Vital*

Forces, Teleology and Organization subjected Lenoir's earlier work to scrutiny by focusing on Kielmeyer's mediating position between Blumenbach and many later developments in biology. The 1793 Speech, he writes, stands as 'the earliest *Systemprogramm* for biology as a unified science in Germany' insofar as it 'implements Blumenbach's framework and its lexicon but, instead of applying it to the individual organic body, applies it to all organic nature.'[5] Kielmeyer makes possible for the first time 'biology as a general, unified field – one concerned with the laws that regulate the organization of all living nature.'[6] Likewise, for John H. Zammito in *The Gestation of German Biology* (which appeared some months earlier), Kielmeyer's Speech contributes substantially to the creation of the scientific domain of biology, but such a founding gesture, nevertheless, goes far beyond the Göttingen connection to Blumenbach (still emphasised by Gambarotto) to ultimately encompass 'the essential impetus of the life sciences since Haller'[7], one 'that offered a systematic basis for the emergent science'.[8] Even more recently, Joan Steigerwald's 2019 *Experimenting at the Boundaries of Life* has furthered this anglophone Kielmeyer-renaissance by pointing to the importance of his 'cross-disciplinary … explorations of the boundaries between organic and inorganic processes'.[9]

This volume constitutes the next step in this explosion of interest in Kielmeyer's biological programme and, in particular, furthers anglophone research on Kielmeyer in relation to three broad contexts: (a) in terms of the emergence of biology as 'a general, unified field' with its own distinct disciplinary identity; (b) in terms of his receptions in Idealism, Romanticism and the philosophy of nature; and (c) in terms of the intrinsic conceptual interest of his own thinking – that is, as a philosophical and scientific figure in his own right. The commentaries that make up Part Three of this volume contextualize him within the history of the life sciences, within philosophies of nature, Idealisms and Romanticisms; they discuss his relevance to contemporary theoretical perspectives on the organism, on ecology and on the social effects of developments in life science; and they analyse Kielmeyer's use of concepts of force, recapitulation, sexual difference and natural law. This volume, then, is an attempt to provide a comprehensive point of departure for future English-language research on Kielmeyer's historical and contemporary significance.

The Alpha and Omega of Philosophy of Nature

In order to contribute further to the growing case for why Kielmeyer matters, it is worth spending a moment on one example: his central importance to the evolution of comparative physiology at the turn of the nineteenth century in Idealism and philosophy of nature.

In 2001, Frederick Beiser inaugurated a decisive shift in the way in which English-language German Idealism scholarship approached the various attempts at the turn of the nineteenth century to philosophize about nature with the following programmatic statement:

> Above the portals of the academy of absolute idealism there is written the inscription, 'Let no one enter who has not studied *Naturphilosophie*.' Without an understanding of at least the central doctrines, basic arguments and fundamental problems of *Naturphilosophie*, the absolute idealism of Schelling and Hegel is all but incomprehensible.[10]

Despite the compelling nature of this call to arms, it is nonetheless surprising that so few readers of German Idealism – Beiser himself, sometimes, included – have heeded it. Research on Hegel, Schelling and the early German Romantics still tends to be undertaken in isolation from serious study of the details of nature-philosophical doctrines. Beyond small pockets of Schelling scholarship, the domains of speculation, experimentation and analysis in the philosophy of nature remains unknown to many. Grant's 2006 claim still holds true: the writings of philosophers of nature remain 'largely unread'.[11]

Kielmeyer, however, can here act as a 'gateway thinker', for not only does he mediate between philosophy of nature, Kant and the life sciences in a genuinely transdisciplinary fashion, he is also a frequent source for later nature-philosophical thinking. It is Kielmeyer – rather than Kant, Leibniz or even Goethe – whose paternity of philosophy of nature is most frequently asserted, because it was his 1793 Speech (*On the Relations of Organic Forces in the Series of Organisations*) that took on the dual status as the first proper document of German philosophy of nature itself and as catalyst for much of the research into the organic that was to follow over the next twenty years. The Speech directly or indirectly inspired every major contribution to the philosophy of the organism in Germany at the turn of the nineteenth century – and its role as origin for the nature-philosophical tradition is encapsulated in Schelling's 1798 comment that it marked 'the advent of a new epoch in natural history'[12]. Nevertheless, it is also true that to reduce Kielmeyer *merely* to the role of precursor alone would be to ignore his continued – if relatively silent – presence over the subsequent decade. Indeed, one of the major frustrations for the later generation investigating the organic world was how little Kielmeyer went on to publish after 1793: his researches were made known only by way of the circulation of unofficial manuscripts, correspondence or the gossip of his Karlsschule and Tübingen students.[13]

His continued renown among philosophers of nature in the late 1790s can be gleaned from a debate that took place between Schelling and A.C.A. Eschenmayer at the turn of the century. In his *First Outline of the System of Philosophy of Nature*, Schelling had mentioned Kielmeyer among a list of philosophers capable of 'providing a *comparative physiology*' – 'a science not yet attempted', but which, when accomplished, would greatly further the cause of philosophy of nature.[14] And in one of his 1801 reviews of the *First Outline*, Eschenmayer – a former student of Kielmeyer at the Karlsschule – exploited this passing reference. He makes use of his insider knowledge of Kielmeyer's research to substantiate Schelling's hope and so portray Kielmeyer's 'second coming' – his return to the fray of academic publication – as the long-awaited messianic completion of the science of philosophy of nature. For Eschenmayer, the future of philosophy

of nature depends on nothing less than the production of 'the first lines of a *physiologia comparata* of both plants and animals.' And he continues

> Perhaps Prof. *Kielmayer* [sic] in Tübingen might make known to us his results in these fields … Unfortunately, this wealthy property owner provides so little assistance to our poor public funds. I mean here his invaluable *zoology*, a work in which he has equally invested his power and his time, two aspects which – in other minds not capable of subduing the natural law of inertia – stand typically in an inverse proportion. Furthermore, [this is] a work in which felicitous analogies and inductions and frequent intellectual insight (divination, as it were) have long been developed from the highest principles of philosophy of nature.[15]

According to Eschenmayer, therefore, Kielmeyer does not solely occupy the position of 'father' of philosophy of nature; rather, he is cast as the 'Messiah of nature-philosophical reason' as well. Kielmeyer is seen to both have begun the intellectual epoch and to promise its fulfilment in a comparative physiology. To his contemporaries, Kielmeyer's name represented hope for the salvific enrichment of their 'poor public funds'.[16]

Kielmeyer's Programme

Comparative Physiology

As Eschenmayer and Schelling appreciated, the comparative work that Kielmeyer was engaged in was not confined to formal anatomical comparisons, but also looked at anatomical differences as manifestations of proportions of organic force. This, for Kielmeyer, amounts to a focus on *function* in his understanding of organic force, and thus on a *comparative physiology*, rather than a morphology.[17]

In the 1793 Speech in particular, identifying organic forces and drawing them into a comparative physiology was a central aim. Kielmeyer's goal is to explain the composition and development of organic nature through the distribution of proportions of the organic forces that he identified: sensibility, irritability, reproduction, propulsion and secretion. His aim was to reveal regularities in the ways these forces combined within individual organisations, in species, and in the whole of the organic world or nature, such that he could discern laws governing the dynamics of these proportions. His resulting speculation was that animal kinds could be arranged in a series according to the proportions of force they manifest. According to Kielmeyer's hierarchical series, 'higher' animals demonstrated a greater share of sensibility, whose share is increasingly restricted as Kielmeyer's chain of being is descended. As the share of sensibility is decreased, though, reproduction is increasingly manifest. As Bersier and others have discussed, Kielmeyer conceives of this via a 'law of compensation', where a lack in one force in a species is offset by a wealth in another.[18]

What does it mean to say that Kielmeyer was interested in the 'organic' world – as the title of this volume suggests? For Kielmeyer, the 'great machine of the organic world' was comprised of a series of 'organisations'.[19] At this time, the emphasis on organisation would have suggested not only a particular structure[20] of the phenomenon under consideration, but also that this phenomenon itself was the result of a process or activity. These features of 'organisations' – as structure that is activity or process – can be seen clearly in Kielmeyer's introduction of the description of the interrelations of organs in a system. An organisation is spatiotemporally 'animated by its organs' in such a way that 'each organ is so adapted to the changes of all other organs and so united in a system of simultaneous and consecutive changes that according to our manner of speaking, each is reciprocally cause and effect of the other.' (p. 30)[21] Kielmeyer's description of the 'organic world' as a larger whole shares such a description of its structural and processual character with that belonging to particular organisations, where an organisation is 1) a certain kind of structure, and 2) a structure that is the result of ongoing processes or activities. This claim about organs in an organism – that each is 'reciprocally cause and effect of the other' – of course echoes Kant's discussion of organized beings in the *Critique of Judgment*, which claims that 'we must think of each part [of a product of nature] as an organ that produces the other parts (so that each reciprocally produces the other)'.[22] That an organisation seems to manifest mutual determination is only possible given the organic forces Kielmeyer identifies, because they supply this simultaneity of means and ends by way of combining within an organism.

Method and Ontology of Nature

When we study nature, Kielmeyer claims, the object of study is often not clearly defined (pp. 53–4). The term 'nature' has indeed been applied very broadly, he claims – more and more so over time. This has happened particularly to 'nature', because the concept includes at its root the idea of emergence, and 'emergence' is extended to describe the cause of a change, a historical presentation of the phenomenon, denoting a kind, or the laws governing some change. Because of the proximity of cause and effect, the term can also denote *natura naturans*, *natura naturata*, physiological laws, laws grounded in a highest cause, something's essence, or the sum of God's properties (pp. 54–5).

Given this proliferation of possible meanings, Kielmeyer isolates what he thinks the natural scientist proper must mean by 'nature':

> Nature is everything emergent or actually appearing to our senses and which is perceived with our inner and outer sense, connected in space and time, and apt to follow certain laws.
>
> p. 55

His decision to define nature in this way, i.e. by focusing on its phenomenal appearance – rather than on some of the other possible, more ontological meanings he enumerates – suggests a refusal to develop robust ontological theses. And

unsurprisingly, throughout his work, the ontological status of the forces Kielmeyer identifies is unclear – perhaps deliberately so. Many of Kielmeyer's phrases suggest a provisional attitude to his hypotheses, and his discussion of force is no exception: he writes, for example, that his use of the concept of force is 'makeshift' (p. 32) and that his schema of five forces could be 'cancelled by a higher understanding' (p. 32). Throughout, he remains open to the possibility that we may perceive differences where there are in fact expressions of a unified power of some kind. To Kielmeyer in 1793, it seemed acceptable for the time being – and even 'conducive' (p. 31) – to postulate hypotheses in a provisional way.

Kielmeyer was undoubtedly influenced by Blumenbach, with whom he spent time in Göttingen: both of their projects seek to discern the vital forces at work in organisations. But while Blumenbach held that his formative force was 'not referable to any qualities merely physical, chemical, or mechanical'[23], it is not the case that Kielmeyer believed that his organic forces were ultimately unconnected to mechanical or chemical ones. As his claim about the 'makeshift' character of his forces shows, care must be taken not to hypostatize the organic forces in Kielmeyer's investigations. We can see this not only in the provisional, hesitant rhetoric of his writing, but also in the content of his works. When discussing the reproductive force, he writes that it *could* be seen as a distinguishing feature of organic beings if it were not that 'as in previous cases [it could] be sufficiently demonstrated, that it too sprung from inorganic nature and can be derived from forces internal [to the inorganic realm]' (p. 38). This hesitation leads to all sorts of scholarly debates: Lefèvre and Klein claim that Kielmeyer, 'in principle, also believed in a chemical explanation of the processes of life' (in his early work, at least)[24]; however, according to Lenoir, he did not yet think that chemistry had reached a stage at which it would be able to undertake this task.[25]

The History of Nature

As evidenced by the manuscripts and lectures in this volume, Kielmeyer held that investigating nature's past is critical to properly understanding it. This held not only for geological change, which was widely accepted, but for living phenomena too. That we must ask not only how nature *is,* but how it *was* and *will be* distinguishes natural history proper, for Kielmeyer, from mere description. This commitment from his early manuscripts (p. 60) is carried over into his concern to discuss the course of animate nature in his 1793 Speech and into his later discussions of the possibility of species extinction in his correspondence with Cuvier.

In addition, Kielmeyer is often acknowledged as a forerunner of recapitulation (the assertion that ontogeny recapitulates phylogeny), due to his claim that the distribution of proportions of force across the series of organisations follows the same order as their distribution within a single individual's development. Given this, Kielmeyer adds, 'one could be led by carefully selected analogies to [the point of] assuming such a material cause as an explanation of the developmental appearances that could be imagined as at work in the first production of organisations on our Earth' (p. 43). However, as Gliboff points out, such parallels

between embryonic development and development of species were 'not morphological', but rather 'kindred developmental processes, governed by the same laws and forces, which became active in similar temporal patterns.'[26]

The Structure of this Volume

The translations and interpretative essays that make up *Kielmeyer and the Organic World* are arranged as follows. This Introduction is followed by a detailed intellectual biography of Kielmeyer by Kai Torsten Kanz that thoroughly contextualizes the accompanying translations in terms of his scientific context and personal trajectory. Kanz argues that it is only through such a a close study of Kielmeyer's biography – based on his unpublished correspondence and papers – that a more balanced view of his place in the history of science will finally emerge.

Parts One and Two consist of a series of translations. Part One reproduces the 1793 Speech on the relations between organic forces. It was this speech, of course, that proved to be a catalyst for much of the research in philosophy of nature that came after Kielmeyer and that, therefore, stands as one of the key texts in the genesis of philosophies of nature in German Idealism and Romanticism, as well as a monument of reflection on the principles of the eighteenth-century life sciences. Short, unpublished texts in Part Two supplement the 1793 Speech by giving further evidence of Kielmeyer's thinking about nature, natural history, geological formation, the earth and contemporary philosophy. The lecture notes from 1790 on natural history provide a fragmentary insight into his broader conceptions of the possibility, remit and method of scientific inquiry into the organic world; the letter to Windischmann from 1794 shows Kielmeyer's sober assessment of the attempts to draw geological investigation and the life sciences into conversation and thereby sheds light on the 'global' implications of his research programme; and, finally, the letter to Cuvier from 1809 is Kielmeyer's most explicit and sustained intervention into the philosophical developments of his time and comprises a number of rigorous criticisms of the Kantian and post-Kantian intellectual landscape that had come to dominate the German world of letters.

Part Three comprises a number of commentaries on the meaning of Kielmeyer's 1793 Speech, on its place in his thinking as a whole as well as in the context of contemporaneous developments in the life sciences and philosophy, and also on the enduring significance of its conceptual framework. In Chapter Seven, Andrew Cooper reads the 1793 Speech as an exemplary instance of 'analogical Newtonianism', transposing the agnostic forms of reasoning authorized by Newton into the study of living beings. Thomas Bach also focus on the intellectual traditions in which Kielmeyer's project is to be situated, switching from the Newtonian context to the extension of 'physics' into the organic realm in Germany at the end of the eighteenth century. For Bach, Kielmeyer's Speech furthers a phenomenological programme of describing the effects of forces without determining precisely their causes.

Chapter Nine and Ten shift to specific Kielmeyerian concepts. Lydia Azadpour undertakes a detailed reading of the 1793 Speech to explain Kielmeyer's account of

the history of the organic world in terms of his use of the concept of equilibrium. Her account shows how, in contrast to earlier 'natural economies', Kielmeyer's view of the equilibrium of organic forces allows him to see genuinely historical changes in nature – such as extinctions – as part of the internal dynamic of the organic world. Iain Hamilton Grant then moves attention to the concept of recapitulation implicitly formulated in the speech and elsewhere in Kielmeyer's corpus and subsequently developed by Schelling. Looking to the letter to Windischmann in particular, Grant discerns recapitulation at play in not only biological, but also geological and noological phenomena, suggesting that much more work needs to be undertaken on the temporality and historicity of Kielmeyerian nature.

In the subsequent two chapters, Andrea Gambarotto and Susanne Lettow begin to consider the implications and significance of Kielmeyer's research programme for concepts of teleology and sex difference, respectively. Gambarotto places Kielmeyer's remarks on intention and purpose in a tradition that leads into mid-twentieth-century cybernetic debate over self-organisation, and Lettow shows the intersections and interactions that emerge out of Kielmeyer's work into a whole host of idealist and nature-philosophical discourses on sex difference in the natural world. Of course, by making Kielmeyer available to an English-speaking audience, and by engaging in thematic analyses of Kielmeyer's work, what follows also invites further investigations into varied fields of influence, such as Kielmeyer's relation to the history of racism and the idea of race, particularly given his proximity to Blumenbach and Cuvier who are deeply involved in that history.[27]

In the final two chapters, attention shifts to Kielmeyer's legacy. In Chapter Thirteen, Jocelyn Holland reconstructs Kielmeyer's 1799 response to the work of his former student at the Karlsschule, Eschenmayer. This dialogue, she demonstrates, is not merely of interest for understanding criticisms of Eschenmayer's 'nature-metaphysics', but also sheds light on the relation between mechanism and organicism – between the images of the 'clock' and the 'organism', as Dorothea Kuhn once put it[28] – at the heart of Kielmeyer's thought. Finally, in Chapter Fourteen, Benjamin Berger focuses on one of the many responses to Kielmeyer from the Idealist tradition – Hegel's criticism of the 1793 Speech in both the *Phenomenology of Spirit* and the sections on philosophy of nature from the *Encyclopaedia*. Berger shows that at the heart of the Hegel-Kielmeyer constellation is a question over logical versus historical understandings of the natural world..

In short, therefore, the translations and commentaries that follow attempt to provide a comprehensive set of provocations that both introduce Kielmeyer to an English-language readership in a more sustained way than has previously been possible and stimulate further debate on the meaning, implications and significance of his writings.

Notes

1 See the sustained discussion of Cuvier's claim in T. Bach, 'Kielmeyer als "Vater der Naturphilosophie?" Anmerkungen zu seiner Rezeption im deutschen Idealismus', in

K. T. Kanz (ed.), *Philosophie des Organischen in der Goethezeit: Studien zu Werk und Wirkung des Naturforschers Carl Friedrich Kielmeyer (1765–1844)* (Stuttgart: Franz Steiner, 1994).

2 T. Lenoir, *The Strategy of Life: Teleology and Mechanics in Nineteenth-Century Biology* (Dordrecht: Reidel, 1982).

3 I. H. Grant, *Philosophies of Nature after Schelling* (London: Continuum, 2006), 49.

4 Ibid., 137.

5 A. Gambarotto, *Vital Forces, Teleology, and Organization: Philosophy of Nature and the Rise of Biology in Germany* (Dordrecht: Springer, 2018), 42–3.

6 Ibid., 46.

7 J. H. Zammito, *The Gestation of German Biology: Philosophy and Physiology from Stahl to Schelling* (Chicago: University of Chicago Press, 2018), 251.

8 Ibid., 3.

9 J. Steigerwald, *Experimenting at the Boundaries of Life: Organic Vitality in Germany around 1800* (Pittsburgh: University of Pittsburgh Press, 2019), 196.

10 F. C. Beiser, *German Idealism: The Struggle against Subjectivism, 1781–1801* (Harvard: Harvard University Press, 2002), 506–7.

11 Grant, *Philosophies of Nature*, ix.

12 F. W. J. Schelling, *Von der Weltseele – Eine Hypothese der Höhern Physik zur Erklärung des allgemeinen Organismus* (Stuttgart: Frommann-Holzboog, 2000), 201.

13 See, for example, S. Lettow, 'Generation, Genealogy, and Time' in Lettow, *Reproduction*, 31 and T. Bach, *Biologie und Philosophie bei C.F. Kielmeyer und F.W.J. Schelling* (Stuttgart: Frommann-Holzboog, 2001), 63. Owing to the fact that Kielmeyer published little besides his 1793 Speech, it is to his lectures that we must turn to gain some idea of his intellectual occupations and the key problems he was engaged with: besides teaching chemistry, he lectured on zoology, comparative anatomy and plant physics – for more details, see Ingrid Schumacher's outline of the courses Kielmeyer was teaching at the Karlsschule (in 'Karl Friedrich Kielmeyer, ein Wegbereiter neuer Ideen', in *Medizinhistorisches Journal* 14.1/2 [1979], 81–99).

14 F. W. J. Schelling, *First Outline of a System of the Philosophy of Nature*, trans. Keith R. Peterson (Albany, NY: SUNY Press, 2001), 50.

15 A. K. A. Eschenmayer, 'Spontaneity = World Soul, or On the Highest Principle of Philosophy of Nature', trans. J. Kahl and D. Whistler, in B. Berger and D. Whistler, *The Schelling-Eschenmayer Controversy, 1801: Nature and Identity* (Edinburgh: Edinburgh University Press, 2020), 44.

16 On the messianic structure of philosophy of nature alluded to in the above, see further D. Whistler, 'In the Hope of a Philosopher of Nature', in A. Ezekiel and K. Mihaylova (eds), *Hope and the Limits of the Self in Classical German Philosophy* (Berlin: De Gruyter, 2021 forthcoming).

17 Thus, 'irritability' denotes various perceivable effects, such as a reflex motion in a muscle fibre. However, it also denotes the underlying, unperceived cause of these effects (for example, what excites certain muscles to move the limb). When describing each force, Kielmeyer writes that each is defined as a certain 'capacity', and, he uses this term not only to refer to potencies and their actualization, but also sometimes to refer to the organ that possesses the power.

18 See, e.g. G. Bersier, 'Visualising Carl Friedrich Kielmeyer's Organic Forces: Goethe's Morphology on the Threshold of Evolution.' *Monatshefte* 97.1 (2005).

19 While Kielmeyer tends to discuss 'organisations', rather than 'organisms' in his 1793 Speech, he does also use the term 'organism'. The latter is used to denote (1) that the

organism *of* a living individual is made up of a system of organs; (2) that the 'organism' is the bearer of systems, such as irritability and sensibility; and (3) that the 'organism' is that in which systems or kinds of force are united. For Kielmeyer, 'organism' at least emphasises a key aspect of living *individuals* (i.e. that they are composed of systems). Cheung has credited Kielmeyer with being one of the first to 'systematically use the term "organism" as a generic name for individual entities' – a new use of the term that is 'focused on the "material individuality" of the "organism" as a specific form of Dasein and Organisation' (T. Cheung 'From the Organism of a Body to the Body of an Organism: Occurrence and Meaning of the Word "Organism" from the Seventeenth to the Nineteenth Centuries' in *The British Journal for the History of Science* 39.3 [2006], 330). For the most part, however, Kielmeyer discusses 'organisations' (always in plural) – various things, living beings, which are 'organised'.

20 See e.g. the entry for 'die Organisation' in *Deutsches Wörterbuch von Jacob und Wilhelm Grimm* (Leipzig 1854–1961).

21 Throughout, citations to Kielmeyer's texts translated in this volume are given in the form of in-text page numbers referring the reader to our translations themselves. Other references to Kielmeyer's writings taken from his *Gesammelte Schriften* (*Natur und Kraft. Gesammelte Schriften*, ed. F.-H. Holler [Berlin: Keiper, 1938]) are cited in-text using the abbreviation *GS* in what follows.

22 I. Kant, *Critique of Judgment*, trans. W. S Pluhar (Indianapolis, IN: Hackett, 2010), §65: 253.

23 J. F. Blumenbach, *Über den Bildungstrieb* (Göttingen: Dieterich, 1791), 22.

24 U. Klein and W. Lefèvre, *Materials in Eighteenth-Century Science: A Historical Ontology* (Cambridge, MA: MIT Press, 2007), 252. Klein and Lefevre point out that, later in the 1800s, he thought that the elements constituting an organism 'could only be destroyed, but not created, by chemical art, since chemical art is not in command of the forces necessary for their resynthesis'.

25 Lenoir writes that Kielmeyer 'conceded that the French chemists had made advances in the chemical analysis of plants and animals. But he added that the chemical analysis of organic materials was still in its infancy, and further that no satisfactory application of chemical methods to the general theory of organisation could be expected in the near future.' (*Strategy of Life*, 64).

26 S. Gliboff, *H.G. Bronn, Ernst Haeckel, and the Origins of German Darwinism* (Cambridge, MA: MIT Press, 2008), 45.

27 Discussions of this issue in the period can be found in Suzanne Lettow's 'Introduction' in Suzanne Lettow eds, *Reproduction, Race and Gender*, (Albany: SU NY Press, 2014) and in P. H. Reill's *Vitalizing Nature the Enlightenment* (Berkeley: University of California Press, 2005), 199–236.

28 D. Kuhn, 'Uhrwerk oder Organismus. Karl Friedrich Kielmeyers System der organischen Kräfte', in *Nova Acta Leopoldina*, Neue Folge 36 (1970).

Chapter 2

Kielmeyer's Fame and Fate

Kai Torsten Kanz

Introduction

Today more than ever, the natural scientist Carl Friedrich von Kielmeyer (1765–1844) has become a subject of interest for historians of science, over 250 years after his birth. This recent growth of interest in his work and its impact is manifest in essays and book chapters on Kielmeyer, as well as in the translation of his major work, first into French[1] and now into English. This widespread reappreciation of his work raises the question: how did a scientist so famous in his own time go unrecognized for so long? That is, it raises the question: how could one of the key figures in medicine, natural science and philosophy at the turn of the nineteenth century have been forgotten for such a long time?

In the following chapter, I will describe Kielmeyer's renown during his own lifetime as well as the impact of his work on his contemporaries and on the history of science. I will argue that the key to understanding the complexity of how he has been viewed throughout history lies in Kielmeyer's biography. Both his contemporaries and later historians credit him with a quite specific role in the history of science, whether as a teacher, as a founder of a certain discipline, as the representative of a new scientific methodology, or even as the father of philosophy of nature in the Romantic era. Most of these, in part, contradictory and, in many cases, unfounded claims were already in the air during Kielmeyer's lifetime. In recent years, some of them have again been the cause of intense controversy. When looking at the significance of his work and its impact, it is necessary to critically interrogate the warrant for such claims.

Aside from the effect of his work, Kielmeyer himself formed part of an intellectual tradition that has not yet been explored in proper detail. Standing between the Age of Enlightenment and the Romantic period – and at the same time anticipating many developments from the nineteenth century – his work is both a reflection of his period but also timeless. Its focus lies between medicine, a subject Kielmeyer himself studied, and foundational natural science across many diverse research fields. Owing to the incredible philosophical impact his ideas had, it is not easy to intellectually position or contextualize Kielmeyer. He is described

by some as a 'forgotten genius'[2], so as to make the question of his intellectual influence all but irrelevant. Others, however, reduce the originality of his thinking to his education at the Hohe Karlsschule in Stuttgart or his years of study at the University of Göttingen. Kielmeyer, it is certain, was significantly influenced by his professors at both these distinguished institutions, which were so influential on the history of German education. It is too simple just to see him as another renowned student of the Karlsschule alongside the more famous Friedrich Schiller, Georges Cuvier or Johann Heinrich Dannecker. But it is equally unsatisfying to view him as one of the intellectuals associated with the Göttingen professor Johann Friedrich Blumenbach. There are persistent images of Kielmeyer as just a 'disciple of Blumenbach's', as well as 'Cuvier's teacher'. And such images do have certain advantages; indeed, this gesture of turning Kielmeyer into a transitional figure on the threshold of two significant epochs is even to be found in the picture presented by one of his students a hundred years after his birth. According to the anatomist August Mayer in Bonn[3], Kielmeyer's lectures 'fill the great gap both in the history of comparative physiology from Blumenbach to Cuvier and in the history of chemistry from Fourcroy to H. Davy'. Yet, so positioned, Kielmeyer's debt to the preceding era as well as his impact on the subsequent era still remains indeterminate.

Kielmeyer's Education

To begin, I want to briefly outline Kielmeyer's scientific education, so as to identify some of the influences on him and his work, beginning with the Karlsschule in Stuttgart, his studies in Göttingen, his tours through Germany, his professorships in Stuttgart and Tübingen, and ending with his work as privy counsellor in Stuttgart.

Born on 22 October 1765 in Bebenhausen near Tübingen, as the son of a ducal keeper of hunting equipment, Kielmeyer was admitted to the Karlsschule in Stuttgart in 1773. After a period of philosophical instruction, he went on to study medicine. At the Hohe Karlsschule, natural history was taught by Carl Heinrich Köstlin, an inspiring young researcher. Whilst on a trip to Italy, Köstlin had met Alessandro Volta and he went on to translate Volta's work on the inflammable air of swamps into German. Köstlin, who taught there from 1780 until his premature death in 1783, used Blumenbach's *Handbuch der Naturgeschichte* as his textbook,[4] and, in fact, at this time, almost all the science teachers at the Karlsschule were using the popular textbooks penned by the professors at the University of Göttingen.[5]

Even more important than these references to his teachers and their choice of textbooks is Kielmeyer's self-education in chemistry and physiology described in his autobiographical sketch. Such autodidactic study was necessary because, for reasons unknown to us, he was forbidden by the director of the Hohe Karlsschule from attending the chemistry lectures. Moreover, when confronted with a lack of useful lessons in physiology, he again overcame such a difficulty through his own study. At this time, he primarily attended lectures on practical medical subjects;

yet, it was these two self-taught subjects that would go on to become Kielmeyer's central fields of research and teaching: 'He taught himself those aspects of medicine, which, like physiology, were later the focus of his work' (*GS*, 8). Surprisingly, considering his lack of formal education in the subject, Kielmeyer completed his medical studies in 1786 with a chemistry dissertation on the analysis of the mineral waters from Göppingen and Stuttgart-Berg.

Following his degree, Kielmeyer spent nearly a year and a half – from 22 December 1786 until 1 June 1788 – in Göttingen, supported financially by Duke Carl Eugen. During this time, he encountered a group of fellow students from Stuttgart, including his friend Johann Friedrich Pfaff. In Göttingen, he attended lectures by Georg Christoph Lichtenberg, Blumenbach, Johann Friedrich Gmelin and Abraham Gotthelf Kästner. His choice clearly demonstrates that he was not concerned with deepening his medical knowledge as part of his training, rather, his focus was on fundamental subjects of natural science, such as astronomy, physics and chemistry. He attended Blumenbach's lectures on animal anatomy (*Thieranatomie*) and natural history (*Naturgeschichte*), but the main reason for his acquaintanceship with Blumenbach was to gain access to the professor's famous natural history cabinet.[6]

Kielmeyer developed a much closer connection with Lichtenberg than with Blumenbach: Kielmeyer regularly visited and corresponded with Lichtenberg. Lichtenberg declared when discussing the solution of a scientific problem: 'I have never seen such a well-developed spirit of observation in someone of his age. I have the greatest expectations of him'.[7] The illustrious reputation of the University of Göttingen lay not only in the publications and lectures of its professors but also in the accessibility and size of its library. Kielmeyer was a frequent user of this rich source of literature. The lending records of the university library precisely document his reading matter at that time.[8] Moreover, he made use of the Göttingen inventory while preparing a manuscript on the sixteenth-century botanical reformers in Württemberg, which was edited posthumously (*GS*, 257–73).

After his studies in Göttingen, Kielmeyer toured through Germany, a trip that took him via Helmstedt and Magdeburg to Berlin and Potsdam. The return journey led him to Dresden, Freiberg, Halle, Jena and Erlangen, allowing Kielmeyer to visit the leading universities of the time. On this educational trip he met famous and less well-known academics – the latter group being preferred, since they were 'not so preoccupied with their own immortality'. He particularly mentions Johann Reinhold Forster, Marcus Elieser Bloch, Martin Heinrich Klaproth and August Johann Georg Karl Batsch (*GS*, 10).

On 1 February 1790, Kielmeyer was appointed Lecturer (*Lehrer*) of Zoology at the Hohe Karlsschule. At first, for his lectures on animal history (*Thier-Geschichte*) he used Blumenbach's *Handbuch der Naturgeschichte*, of which a third edition had just appeared. However, from 1791 onwards, he read from his own papers; and so, crucially, from this point onwards he based all his lectures on his own findings.[9] Two years later, in 1792, he became Professor of Chemistry and a full member of the medical faculty. On 11 February 1793, in celebration of the sixty-fifth birthday of Duke Carl Eugen von Württemberg, he gave the speech which would make him

famous: *Ueber die Verhältniße der organischen Kräfte unter einander in der Reihe der verschiedenen Organisationen, die Geseze und Folgen dieser Verhältniße*.[10] This short work, which, when printed, ran to just forty-six pages, represents the moment in his career at which Kielmeyer began to be publicly recognized.

Freed from his teaching duties following the dissolution of the Hohe Karlsschule in Easter 1794, Kielmeyer undertook a second scientific journey that led him once again to Göttingen. From there he travelled to the North Sea, the Baltic Sea and to Heligoland where he spent time undertaking marine-zoological research. In 1796, he was transferred to the University of Tübingen with a full professorship in chemistry. Five years later, in 1801, he entered the medical faculty where he taught, additionally, botany and materia medica. Here he remained until 1817, productive and inspiring many, yet publishing next to nothing.

Kielmeyer's Lectures

Kielmeyer gave lectures at the Hohe Karlsschule in Stuttgart between 1790 and 1794 and at the University of Tübingen from 1796 to 1817. These lectures, covering a wide range of medical and scientific subjects, were primarily intended for students of medicine but were also attended by those from other faculties.

To begin, Kielmeyer's lectures at Stuttgart (1790–4) focused on zoology, but, from 1792 also covered chemistry. They were attended by the botanist Carl Friedrich von Gärtner, the physician Johann Heinrich von Autenrieth, the physicist Christoph Heinrich Pfaff and the psychologist Karl August Eschenmayer. These men – except Gärtner, who was a private scholar – became renowned professors and all referred to Kielmeyer's lectures in their later publications. Pfaff's dissertation on Galvanism in 1793 created a furore and was highly praised by Alexander von Humboldt and others[11], and it was Pfaff who was responsible for sending Georges Cuvier in France his notes from Kielmeyer's zoology lectures. This raises the question of whether Cuvier in fact adopted Kielmeyer's ideas for the purpose of his comparative anatomy and his law of correlation (then used as the basis for the foundation of vertebrate palaeontology). It is certainly true that, when Cuvier was a student in 1785/86, Kielmeyer introduced him to the art of animal dissection, and also that he was often thereafter described as 'Kielmeyer's pupil'.

In Tübingen between 1796 and 1817 following his appointment as a member of the medical faculty, Kielmeyer supervised the doctoral theses of thirty-two students.[12] His well-known postgraduates include the physicians Carl Eberhard Schelling (the brother of the philosopher Schelling) and Friedrich Schnurrer, the botanists Johannes Hegetschweiler and Ernst Gottlieb Steudel, the physician and palaeontologist Georg Friedrich Jäger, and the future Tübingen professors Ferdinand Gottlob Gmelin, Gustav Schübler and Wilhelm Ludwig Rapp. Numerous others, of whom he was not the tutor, also belonged to his circle of students, e.g. the chemist Leopold Gmelin in Heidelberg, the physician and poet Justinus Kerner in Weinsberg, and the anatomist August Karl Joseph Mayer in Bonn.