

Did Goethe and Schelling Endorse Species Evolution?

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Charles Darwin was quite sensitive to the charge that his theory of species transmutation was not original but had been anticipated by earlier authors, most famously by Lamarck and his own grandfather, Erasmus Darwin. The younger Darwin believed, however, his own originality lay in the device he used to explain the change of species over time and in the kind of evidence he brought to bear to demonstrate such change. He was thus ready to concede and recognize predecessors, especially those that caused only modest ripples in the intellectual stream. In the historical introduction that he included in the third edition of the *Origin*, he acknowledged Johann Wolfgang von Goethe as “an extreme partisan” of the transmutation view. He had been encouraged to embrace Goethe as a fellow transmutationist by Isidore Geoffroy St. Hilaire and Ernst Haeckel.¹

Scholars today think that Darwin’s recognition of Goethe was a mistake. They usually deny that the *Naturphilosophen*, especially Friedrich Joseph Schelling, held anything like a theory of species evolution in the manner of Charles Darwin—that is, a conception of a gradual change of species in the empirical world over long periods of time. Dietrich von Engelhardt, for instance, in commenting on an enticing passage from Schelling’s *Erster Entwurf eines Systems der Naturphilosophie* (First sketch of a system of nature philosophy, 1799), declares “Schelling is no forerunner of Darwin.” Schelling,

¹ Darwin mentions in his historical introduction to the *Origin* that Geoffroy St. Hilaire had recognized Goethe as a transmutationist. See *The Origin of Species by Charles Darwin, a Variorum Text*, ed. Morse Peckham (Philadelphia: University of Pennsylvania Press, 1959), p. 61. Early in their correspondence, Haeckel suggested to Darwin that Goethe was one of his predecessors (Ernst Haeckel to Charles Darwin (10 August 1864), in *The Correspondence of Charles Darwin*, eds. Frederick Burkhardt et al., 18 vols. to date (Cambridge: Cambridge University Press, 1985-), 12: 299.

according to Engelhardt, advanced no real theory of descent, rather only “a metaphysical ordering of plants and animals.”² This is also the view of other Schelling scholars. A comparable assumption prevails about Goethe. Manfred Wenzel simply says: “An evolutionism . . . establishing an historical transformation in the world of biological phenomena over generations lay far beyond Goethe’s horizon.”³ George Wells, who has considered the question at great length, concludes: Goethe “was unable to accept the possibility of large-scale evolution.”⁴

The assessments of these contemporary scholars are, however, opposed to judgments by earlier thinkers. In the 1860s, when Ernst Haeckel at Jena began championing Darwin’s evolutionary ideas, his friend Kuno Fischer—the great neo-Kantian historian of philosophy—offered his colleague a mild rebuke. In his two-volume history of Schelling’s thought, Fischer claimed: “Schelling was the first to enunciate with complete clarity and from a philosophical standpoint the principle of organic development that is fundamental to the Darwinism of today.”⁵ And, as I mentioned, Haeckel, himself, convinced his English friend of Goethe’s priority in holding the transformational hypothesis. I believe Fischer and Haeckel were entirely correct. I will argue that Goethe and his young protégé, Schelling, mutually reinforced each other’s theories of species evolution.

² Dietrich von Engelhardt, “Schellings philosophische Grundlegung der Medizin,” in *Natur und geschichtlicher Prozess: Studien zur Naturphilosophie F. W. J. Schellings*, ed. Hans Jörg Sandkühler (Frankfurt a.M.: Suhrkamp Verlag, 1984), pp. 305-25; quotations from pp. 312-13.

³ Manfred Wenzel, “Naturwissenschaften,” in *Goethe Handbuch*, ed. Bernd Witte, et al. 4 vols. (Stuttgart: Metzler, 1996-98), 2:781-96; quotation on p. 784.

⁴ George Wells, *Goethe and the Development of Science, 1750-1900* (Alphen aan den Rijn: Sijthoff & Noordhoff, 1978), pp. 45-46.

⁵ Kuno Fischer, *Friedrich Wilhelm Joseph Schelling*, 2 vols; vol. 6 of *Geschichte der neuern Philosophie* (Heidelberg: Carl Winter’s Universitätsbuchhandlung, 1872), 2: 448.

Pre-history of the Evolutionary Conception

The reflexive denial to individuals like Goethe and Schelling of any tincture of the notion that empirical species might change over time gains strength from the assumption that species evolution was not a conceptual option prior to the nineteenth century. But this assumption is simply incorrect. Speculations about species change far antedate Lamarck and Darwin. Aristotle, for instance, entertained the idea, in *De generatione animalium*, that men and quadrupeds might originally have been spontaneously generated from something like insect grubs, with later development into recognizable form—a metamorphosis comparable to that of the caterpillar into the butterfly. He seems not to have believed this, but did think it a conceptual possibility.⁶

In the mid-eighteenth century, Charles Bonnet proposed that originally God created a plenitude of germs, each encapsulating a miniature organism that in turn carried germs containing yet more homunculi and their germs, enough to reach the Second Coming. He thought that within each line of germs one species might have given rise to another species according to a “natural evolution of organized beings [d’Evolution naturelle des Etres Organisés].”⁷ When Bonnet used the term “Evolution,” he adapted it from its use in embryology, wherein it was synonymous with preformationism—the conceit that the embryo was already an articulated organism that simply had to unroll—that is, evolve—during gestation. This term, which had its original

⁶ Aristotle, *De generatione animalium*, 762b28-763a5.

⁷ Charles Bonnet, *La Palingénésie philosophique, ou Idées sur l’état passé et sur l’état future des êtres vivans*, 2 vols. (Geneva: Philibert et Chirol, 1769), 1: 250.

provenance in embryology, was used by Bonnet, then, to refer to species unfolding.⁸ Schelling would adopt the same term, but with him it would shed something of its preformational character.

Johann Friedrich Blumenbach, in the 1780s, advanced the idea that a special force, a *nisus formatives*—*ein Bildungstrieb*—caused the embryo to develop in an epigenetic fashion, that is, become articulated out of a homogeneous mass. Like Bonnet, he thought the earth was salted, as it were, with germs that under the aegis of the *Bildungstrieb* would unfold new species to replace the old that were wiped out by the catastrophes of which fossils of extinct organisms gave evidence.⁹

Though Immanuel Kant condemned the notion of species evolution when it was suggested by his one-time student Johann Gottfried Herder, he had a change of heart after reading Blumenbach, a real natural philosopher in his estimation.¹⁰ In the *Kritik der Urteilskraft* (Critique of the power of judgment), Kant allowed as a conceptual possibility that species might be transmuted through a mechanical expansion or contraction of a basic organization. He did, however, reject the further idea that living organization might arise out of the inanimate, the unorganized, in a kind of spontaneous generation. Nonetheless, he tolerated the conception of a change of species over time

⁸ I have traced the transition in the usage of the term “evolution” from its provenance in embryology to that in species theory. See Robert J. Richards, *The Meaning of Evolution: The Morphological Construction and Ideological Reconstruction of Darwin’s Theory* (Chicago: University of Chicago Press, 1992), pp. 5-16.

⁹ See Johann Friedrich Blumenbach, *Beyträge zur Naturgeschichte* (Göttingen: Johann Christian Dieterich, 1790), part 1, p. 25. See also my discussion of Blumenbach’s notion of species development in Robert J. Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago: University of Chicago Press, 2002), pp. 222-25.

¹⁰ Kant reviewed the first two parts of Herder’s *Ideen zur Philosophie der Geschichte der Menschheit* (1784-1791) in the *Allgemeine Literatur-Zeitung* in 1785-86. See *Rezension zu Johann Gottfried Herder: Ideen zur Philosophie der Geschichte der Menschheit*, in *Immanuel Kant Werke*, ed. Wilhelm Weischedel, 6 vols. (Wiesbaden: Insel Verlag, 1957), 6: 781-806 (A17-2, 309-10, 153-56).

and described that notion as a “daring adventure of reason.” He ultimately refused to participate in this daring adventure, since he thought the evidence of such species transmutation to be wanting.¹¹ Species transmutation was obviously a live conceptual option in the last part of the eighteenth century.

Kant would be challenged by both Schelling and Goethe on two counts. Both would allow “mother earth” to generate organic life because, as Schelling would maintain, the earth and its chemical processes were already organic, not dead matter responsive only to mechanical forces; and secondly, as Goethe would show, fossils, as well as the metamorphosis of plants and insects, provided ample evidence of species transformation.

Finally, Darwin should be mentioned, not Charles but his grandfather Erasmus, who in the late eighteenth century advanced an evolutionary theory according to which God created the first living filament, after which natural processes—mostly in the form of the inheritance of acquired characters—gave birth to all the animal and plant species populating the world. Darwin’s book *Zoonomia or the Laws of Organic Life*, the first volume of which appeared in 1794, was immediately translated into German and read by both Goethe and Schelling.¹² These *Naturphilosophen* were thus quite familiar with transformational ideas coming from England and the continent.

Goethe’s Early Morphological Theories

¹¹ Kant’s construction of the idea of species transformation and his rejection for lack of evidence appear in his *Kritik der Urteilskraft*, in *Werke*, 5:538-39 (A363-65, B368-70).

¹² Erasmus Darwin, *Zoonomie, oder Gesetze des organischen Lebens*, trans. J. D. Brandis, 3 vols. in 5 (Hannover: Gebrüder Hahn, 1795-99). See my discussion of the impact of Erasmus Darwin’s work on Schelling and Goethe in *The Romantic Conception of Life*, pp. 300-301.

By the mid-nineteenth century, Hermann von Helmholtz recognized Goethe as having founded the dominant theoretical framework in biology during the earlier part of the century. He credited his great predecessor with establishing a science of morphology that became vital to evolutionary conceptions in the second part of the century.¹³ And Helmholtz's judgment was entirely correct. For Goethe, morphology was the doctrine of plant and animal forms, especially in their dynamic properties. As he put it in the late 1790s: "The doctrine of forms is the doctrine of transformation. The doctrine of metamorphosis is the key to all signs of nature."¹⁴

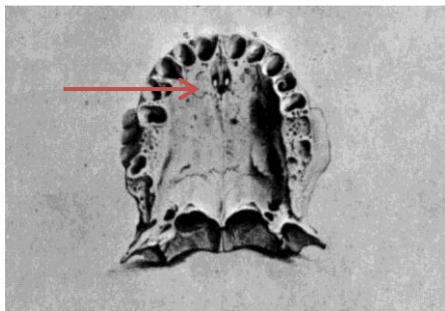


Fig. 1: Wilhelm Waitz's illustration prepared for Goethe's essay on the Zwischenkiefer. It shows the faint suture of the intermaxillary bone in the human upper jaw, similar to that found in apes and other animals.

In the previous decade, Goethe had begun to develop ideas about the dynamic character of animal forms, especially in his discussions with Herder, who was composing his *Ideen zur Philosophie der Geschichte der Menschheit* (Ideas toward a

philosophy of the history of mankind) in the early 1780s. Their mutual interest revolved around ideas of

the unity of nature and the transformations within that unity. In 1784, Goethe discovered the os intermaxillaris, or *Zwischenkiefer*, in the human fetus.¹⁵ It is barely visible in the adult skull (fig. 1). Most anatomists thought that this bone in the upper jaw was only characteristic of animals. For Goethe and Herder, the discovery meant that

¹³ Hermann von Helmholtz, "Ueber Goethes wissenschaftliche Arbeiten. Ein Vortrag gehalten in der deutschen Gesellschaft in Königsberg, 1853," in his *Populäre wissenschaftliche Vorträge*, vol. 1 (Braunschweig: Friedrich Vieweg und Sohn, 1865), pp. 31-55.

¹⁴ Johann Wolfgang von Goethe, "Morphologie," in *Samtliche Werke nach Epochen seines Schaffens*, ed. Karl Richter et al., 21 vols. (Munich: Carl Hanser Verlag, 1985-98), 4.2:188.

¹⁵ Johann Wolfgang von Goethe, "Dem Menschen wie den Tieren ist ein Zwischenknochen der obern Kinnlade zuzuschreiben," in *Samtliche Werke*, 2:2:530-45.

the human vertebrate form displayed a unity with other vertebrates. At this time, both individuals began to speculate on the development of the universe and its various creatures. As Goethe recalled his discussions with his friend: “Our daily conversation concerned the origins of the water-covered earth and its organic creatures, which have developed [entwickelt] on it from very ancient times.”¹⁶ This was the kind of speculation that Kant initially regarded as uncontrolled fantasy, and so chided his former student in a stunning dismissal Herder’s *Ideen*. Charlotte von Stein, Goethe’s intimate friend, wrote to the court Administrator Karl Knebel in May 1784 to describe the extent of the pair’s transformational ideas:

Herder’s new work makes it probable that we were first plants and animals. What nature will further stamp out of us will remain well unknown. Goethe now ponders [grübelt] thoughtfully these things, and anything that first has passed through his imagination becomes extremely interesting.¹⁷

Two years later, in 1786, Goethe began conducting experiments on spontaneous generation, watching as microscopic animalculae seemed to arise out of bits of plants soaked in water and sealed in containers.¹⁸ Many theories of evolution in the eighteenth and nineteenth centuries postulated some sort of spontaneous generation, of the sort that Kant wished to condemn.

¹⁶ Goethe, “Der Inhalt Bevorwortet,” in *Sämtliche Werke*: 12:16.

¹⁷ Charlotte von Stein to Karl Ludwig Knebel (1 May 1784), in Heinrich Düntzer, ed., *Zur deutschen Literatur und Geschichte: Undedrückte Briefe aus Knebels Nachlass*, 2 vols. (Nürnberg: Bauer und Naspe, 1858), 1: 120.

¹⁸ Goethe’s notes on the generation of infusorial animals are in *Sämtliche Werke*, 2:2:563. He speculated that various seedlike organisms, if exposed to light became plants and if kept in the dark became animalculae.

In 1790, Goethe saw his *Metamorphose der Pflanzen* through the presses. That tract argued that the various parts of a plant—the stem, petals, stamen, and other organs—could be understood as transformations of a fundamental, underlying structure, which he denominated the “ideal leaf.” This underlying structure, only graspable by the mind’s eye, contained, as it were, all the potential of its many instantiations in different parts of the plant and in different plant species. This plenum conception would distinguish Goethe’s archetypal concept from the alternative, developed particularly in Britain, where the archetype was treated as a minimal structure, not a plenum structure. Also in 1790, Goethe undertook an intensive study of the new critique by Kant, the *Kritik der Urteilskraft*. His study of Kant, from whom he had originally kept his distance, helped consolidate a set of ideas about aesthetics and teleology that he had been turning over in his imagination for some time.¹⁹

Through the 1790s, Goethe composed five essays, mostly uncompleted, on the morphology of animals.²⁰ In these essays he attempted the kind of developmental analysis he had conducted on the morphology of plants. He formulated a theory of the animal archetype, or *Urtypus*, that would be comparable to the plant archetype. These essays maintained that just as the plant archetype served as the pattern exhibited by all plants, so the animal archetype was the pattern by which all animals—at least the vertebrates—could be comprehended in unity.

¹⁹ I discuss Goethe’s Kantianism in the *Romantic Conception of Life*, pp. 427-30.

²⁰ The essays are: “Versuch über die Gestalt der Tiere” (1790); “Versuch einer allgemeinen Knochenlehre” (1794); “Versuch einer allgemeinen Vergleichungslehre”(1794); “Erster Entwurf einer allgemeinen Einleitung in die vergleichende Anatomie, ausgehend von der Osteologie (1795); “Vorträge über die drei ersten Kapitel des Entwurfs einer allgemeinen Einleitung in die vergleichende Anatomie (1796)

He conceived this archetype as a common osteological pattern of bones; so, for example, the fox and the sea-lion have skeletal features that display an underlying pattern that has been altered in respect of their different environments—the sort of unifying pattern that Kant imagined could be mechanically deformed or altered to correspond now to this vertebrate, now to that. Further, Goethe adopted the idea of Blumenbach's *Bildungstrieb* to maintain that a creative force was exhibited in embryological development, so that all vertebrates, for instance, displayed the common form. Like Lamarck and the young Darwin, he also recognized another external force, which adapted animals to their environments. Thus while the fox and the sea-lion exhibited the same general body structure, that structure had been altered to adapt it to their particular circumstances—the land, on the one hand, and the sea, on the other.²¹

In the Third Critique, Kant maintained that the organization of living creatures had to be understood according to archetypal ideas; plants and animals could not simply be regarded as mechanisms. He further argued that archetypal ideas suggested an intentional will that causally imposed organizational structure on living creatures, providing the characteristic design that particular species exhibited. Of course, for Kant, this assumption of an archetype and its intentional, creative force was regulative, guiding our human understanding in the quest for more scientifically appropriate mechanical conceptions. Goethe, however, still in thrall to a latent Spinozism in the 1790s, regarded archetypal ideas as constitutive: that is, they were *adequate* ideas having creative potency really residing in nature. They existed in nature as a dynamic force, which Goethe called the *Bildungstrieb*, adopting that term from Blumenbach and Alexander von Humboldt. Thus Goethe amalgamated ideas from several of his

²¹ Goethe, "Versuch einer allgemeinen Vergleichungslehre," in *Sämtliche Werke*, 4.2: 182

contemporaries, and gave them his own particular enticing twist. One who was so

enticed was the British morphologist, Richard Owen.

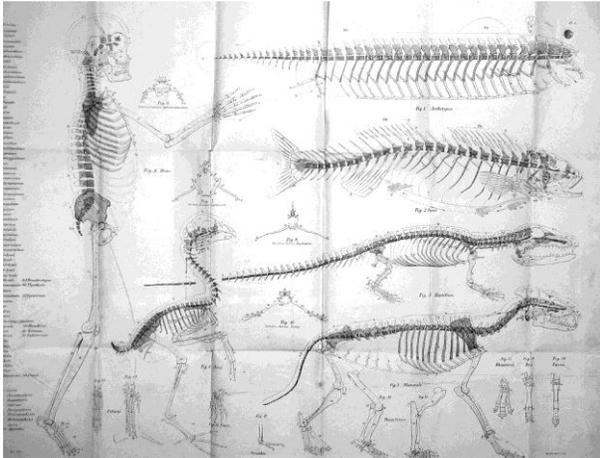


Fig. 2: Plate from Richard Owen's *On the Nature of Limbs* (1849), showing the vertebrate archetype at the upper right, the homologous pattern for the skeleton of all vertebrate species.

In British biology, Richard Owen—the most influential biologist of the first half of the 19th century and one thoroughly immersed in German biological ideas—would recognize the two forces that Goethe discriminated. He postulated one force producing homologous relations among

animal organisms and another, a teleological force, adapting those homologous structures to particular environments. Owen showed, for instance, that the vertebrate limb displayed both archetypal unity across a variety of species and teleological adaptations characteristic of particular species. So the same topological arrangement of bones could be found in the forelimb of a mole and the wing of a bat, though each has been adapted for use in its particular circumstance, digging in the ground or flying through the air.²² More generally, Owen contended that the vertebrate skeleton displayed a common plan or archetype that was specified in different vertebrate species according to their environment (fig. 2).

Owen based his own theory of the archetype on that of Goethe's protégé Carl Gustav Carus. In his *Von den Ur-theilen des Knochen- und Schalengerüstes* (On the fundamental parts of the bones and the hard structures, 1828), Carus synthesized ideas from several sources to construct the Goethean ideal type of the vertebrate skeleton

²² Richard Owen, *On the Nature of Limbs* (London: John Van Voorst, 1849), pp. 4-14.

(fig.3). Carus emphasized the “idea of parallelism between the development of the higher animal forms—yes, even man himself—and the development of the particular

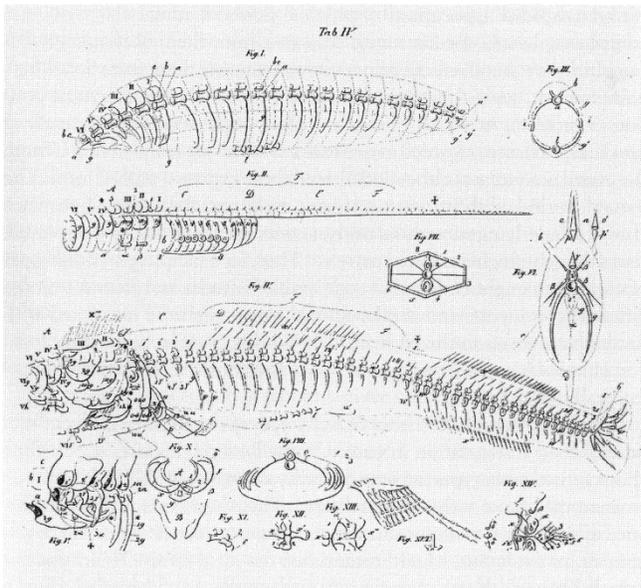


Fig. 3: Illustrations of the vertebrate archetype (upper left) and of the ideal vertebra (upper right), from Carl Gustav Carus, *Von den Ur-Theilen des Knochen und Schalengerüstes*, 1828.

classes and species in the animal kingdom.”²³ Owen, not always forthcoming about his sources, utilized Carus’s ideas for his own theory of the archetype, as is obvious from notes he took on his predecessor’s book and a comparison of the illustrations from the books in question (figs. 2 and 3).²⁴ In

his little book, *On the Nature of Limbs* (1849), Owen drew proto-evolutionary conclusions from his application of

archetype theory, even though evolution—at least in its Lamarckian version—was highly suspect in Britain. Only after Darwin published did Owen begin to make bolder claims of priority for his implicit theory of the descent of species. This is simply one vein of Goethe’s thought which led to the evolutionary hypothesis, and it was a telling one.

Goethe’s Aesthetics

²³ Carl Gustav Carus, *Von den Ur-theilen des Knochen- und Schalengerüstes* (Leipzig: Fleischer, 1828), p. vii.

²⁴ The notes are kept at the London Museum of Natural History. See also Nicolaas Rupke, *Richard Owen: Biology without Darwin*, revised ed. (Chicago: University of Chicago Press), p. 121.

From his morphological ideas, the ever-synthesizing Goethe drew implications for understanding the other end of the Kantian Critique, namely aesthetics. Kant had defined artistic genius as:

the talent (natural gift) that gives the rule to art. Since the talent, as an inborn productive ability of the artist, itself belongs to nature, we can also express it thus: genius is the inborn mental trait (*ingenium*) through which nature gives the rule to art.²⁵

The artist of genius executes a work of fine art through an aesthetic feeling generated by unconscious consideration of those rules of the beautiful with which the artist of genius is endowed. These rules, according to Kant's conception, remain embedded, as it were in the artist's nature, only guiding the artist's hand, not through conscious, rational consideration but only through aesthetic feeling.

Prior to reading Kant's Third Critique, Goethe came to a quite similar view, one of the reasons he found the new Kantian conjunction of art and science in the Critique so congenial. Goethe maintained that the artist of genius created his products by comprehending archetypal ideas, the same *adequate ideas* (in his Spinozistic terms), as the biologist; and the artist executed the art-object by exhibiting the same creative force as nature herself displayed. As he put it in a letter to von Stein during his Italian Journey in 1787:

²⁵ Kant, *Kritik der Urteilskraft*, in *Werke*, 5:300 (A34-35, B34-35).

These great works of art are comparable to the great works of nature; they have been created by men according to true and natural laws. Everything arbitrary, imaginary collapses. Here is necessity, here is God.²⁶

A similar comparison between artistic and natural production occurred in an essay of 1789 that Goethe jotted in his travel diary (and published shortly after his return from Italy that year). In “Einfache Nachahmung der Natur, Manier, Styl” (Simple imitation of nature, manner, style), he distinguished artists of modest ability, who faithfully copied from the surface of nature, from those who also expressed a deeper part of themselves, which he called “style”; and he distinguished both of these from gifted artists who became more deeply aware of the what lay behind nature’s productions. The artist of great talent would be able to combine all of these modes of artistic expression. He or she would be able to utilize the laws—or archetypal ideas—that nature herself deployed in her creations and execute a work of art that was not simple imitation, but deeply expressive of nature’s own principles.

Prior to 1800, Goethe had thus developed a conception of morphology as postulating dynamic forces resident in nature. These forces, he contended, explained patterns to be found in animal and plant organisms. He merged this conception with his aesthetic ideas, suggesting that the artist of genius employed the same power in artistic creation as nature did in her organic creations. In this respect the artist was nature—a characterization, incidentally used by Schiller to describe Goethe’s particular kind of naïve genius. For Goethe, this meant that artistic representation could reveal the deep laws of nature, or as he epigrammatically put it: “The beautiful is a manifestation of

²⁶ Johann Wolfgang von Goethe, *Italienische Reise* (6 September 1787), in *Sämtliche Werke*, 15: 478. It is unclear whether this entry—in the form of a letter to von Stein and his friends in Weimar—was contemporaneous with the trip or added in the 1820 when the book was composed.

secret laws of nature, which without its appearance would have remained forever hidden.”²⁷

These Goethean notions would be quite favorable to the conception of species transformation; but aside from von Stein’s mention that Goethe was speculating that we were once fish and then animals, there is only circumstantial evidence that prior to 1800 he endorsed species evolution. I believe that he came to hold firmly such a theory, at least in a manifest way, as a result of his interactions with an individual about whom he took a paternal interest, Friedrich Wilhelm Joseph Schelling.

Schelling’s Biological Theories

The editor of the *Philosophisches Journal* Friedrich Niethammer, the idealist philosopher Johann Gottlieb Fichte, and the theologian Heinrich Paulus conspired to bring the twenty-three year old Schelling to Jena, while his father attempted to secure him for Tübingen, where he had finished his university studies.²⁸ Schelling’s glittering reputation as a philosophical Wunderkind had impelled the three co-conspirators to seek his appointment at Jena. Initially Goethe was opposed, being greatly suspicious of anyone spouting Fichte’s kind of idealism, but even this empirical grounded spirit was won over by Schelling himself, who, during a party thrown by Friedrich Schiller, quite generously recognized the older man’s scientific acumen, especially in respect to essays on optics that the older scientist had recently published. Goethe wrote Christian Gottlob Voigt, chief administrator for the Duchy of Saxony-Weimar-Eisenach, that the

²⁷ Goethe, *Maximen und Reflexionen* (no. 1344), in *Sämtliche Werke*, 17:942.

²⁸ While a student at the university in Tübingen, Schelling had as roommates Friedrich Hölderlin, whose poetic genius was already in flower, and Georg Friedrich Hegel, who would shortly champion his younger classmate.

young philosopher had “a very clear, energetic, and according to the latest fashion, a well-organized head on his shoulders.” Moreover, he gave “no hint of being a sansculotte,” unlike Fichte.²⁹ With Goethe’s endorsement, Schelling became extraordinarius professor in 1798 at Jena.

Though yet suspicious of Fichtean idealism, Goethe began reading Schelling’s *Weltseele* (World soul) in late June of 1798. He later remarked in his diary that he saw Schelling’s *Weltseele* “incorporated into the eternal metamorphosis of the external world.”³⁰ In the preface of that work, Schelling made a claim that would later catch Kuno Fischer’s eye, a claim concerning the transmutation of species. The passage referred to Kant’s assertion in the Third Critique that organic life could not be derived from the inorganic according to any natural laws. Schelling countered that it was “vintage delusion” to hold that “organization and life cannot be explained from natural principles.” He further proclaimed:

“One would at least take one step toward [such] explanation if one could show that the stages of all organic beings have been formed through a gradual development of one and the same organization.—That our experience has not taught us of any formation of nature, has not shown us any transition from one form or kind into another (although the metamorphosis of many insects . . . could be introduced as an analogous phenomenon)—this is no demonstration against the possibility. For a defender of the idea of development could answer that the alteration to

²⁹ Goethe to Christian Gottlob Voigt (9 May 1798), in *Goethes Briefe* (Hamburger Ausgabe), ed. Karl Mandelkow, 4th ed., 4 vols. (Munich: C. H. Beck, 1988), 2: 349.

³⁰ Goethe, *Tag- und Jahres-Hefte 1798*, in *Sämtliche Werke*, 14:58.

which the organic as well as the inorganic nature was subjected . . .
occurred over a much longer time than our small periods could provide
measure.³¹

Schelling thus would chance that “daring adventure of reason” from which Kant himself backed away.

Schelling, though, agreed with Kant that the organic could not be derived from the inorganic by some kind of spontaneous generation. He differed from Kant in holding that mother earth herself was organic, so that perfectly natural principles of development could produce organic life out of the *apparently* inorganic. He suggested in the above passage that the evolution Kant rejected because of lack of empirical evidence might yet occur if we considered that the transition took place over a very long span of time. During the period when Schelling was writing, scholars had already stretched the earth’s history back further than any Biblical chronology would indicate. Buffon, already in the in the mid-eighteenth century, had estimated the world to be at least ninety-thousand years old—not, of course, within the range of our contemporary estimates, but far beyond the age calculated for Adam and his brood.

During the winter term 1798-1799, Schelling and Goethe met often to discuss the subject that the young philosopher was lecturing on at the time, namely *Naturphilosophie*.³² And from mid October 1799 to mid-November, the two companions met almost every day to discuss Schelling’s *Erster Entwurf eines Systems der Naturphilosophie*; they spent an intense week discussing his *Einleitung* (Introduction) to

³¹ Friedrich Joseph Schelling, *Von der Weltseele*, in *Schellings Werke*, ed. Manfred Schröter, 3rd ed., 12 vols. (Munich: C.H. Beck, 1927-1959), 1: 416-17.

³² Johann Wolfgang von Goethe, *Tagebücher* (12-13, 16 November 1798), in *Goethes Werke* (Weimar Ausgabe), 133 vols. (Weimar: Hermann Böhlau, 1888), III.2: 222-23.

the *Entwurf*.³³ These works, especially the *Einleitung*, show the impact on Schelling of Goethe's insistence that knowledge claims be empirically grounded. In these tracts, Schelling claimed that all knowledge came through experience and that empirically acquired laws could be cast into an autonomous system. This was a first big step away from his mentor Fichte, and a move toward his objective idealism.

In the *Erster Entwurf*, Schelling did seem, however, to take back what he declared as a possibility in the *Weltseele* concerning a temporal transformation of species. In the *Erster Entwurf*, he asserted:

Several naturalists seem to have harbored the hope of being able to represent the source of all organization as a successive and gradual development of one and the same original organization. This hope, in our view has vanished. The belief that the different organizations are really formed through a gradual development out of one another is a misunderstanding of an idea that really lies in reason.³⁴

Von Englehardt latched on to this passage in his dismissal of the suggestion that Schelling held anything like a Darwinian thesis. Schelling did reject the Darwinian thesis, but it was that of Erasmus Darwin that he rejected.

What brought a shift in Schelling attitude was the reading of Erasmus Darwin's *Zoonomia*, which, as I mentioned above, was translated into German almost

³³ Goethe read Schelling's *Einleitung* on 23 September and talked with him about it, and then from 2 to 5 October, they read through the work together. See Goethe's *Tagebücher*, in *Goethes Werke*, III 2.2: 261-63.

³⁴ Joseph Friedrich Schelling, *Erster Entwurf*, in *Schellings Werke*, 2:62-63.

immediately.³⁵ Darwin's genealogical theory supposed that all organic features of living creatures had been mechanically derived, during the deep past, from a simple structure bereft of any tincture of more advanced organization. That original living filament had been endowed by God to be sensitive to the external environment and to respond in Lamarckianlike ways. In his lectures at Jena, Schelling frequently derided the kind of flatfooted English empiricism found in John Locke and Erasmus Darwin.³⁶

It was, I believe, Darwin's concept of the mechanistic evolution of organisms, in a genealogical fashion, that Schelling rejected, not the fundamental idea of species change in the natural world. In place of Darwin's conception of the foundations of species evolution, Schelling instead proposed a principle of *dynamische Evolution*, which, as he explained it, postulated a rational archetype that served as the ideal standard for empirical instantiations. This archetype

would be the absolute, the sexless condition that is neither the individual nor the species, but both together, in which the individual and the species are conjoined. This absolute organization cannot be represented through a particular product, but only through an infinity of particular products, which particulars deviate from the ideal in infinite ways, but in the aggregate are congruent with the ideal.³⁷

³⁵ Darwin's *Zoonomia* was translated in multiple parts. While finishing the *Weltseele*, Schelling read part 1, which did not contain Darwin's evolutionary ideas. He read part 2, which does, shortly after finishing the *Weltseele*. See Schelling, *Weltseele*, in *Schellings Werke*, 1: 603.

³⁶ Henry Crabb Robinson, an Englishman who studied at Jena, wrote in a letter home that he was amused by Schelling's "contemptuous treatment of our English writers, as last Wednesday I was by his abuse of Darwin and Locke." See Henry Crabb Robinson, *Diary, Reminiscences, and Correspondence*, ed. Thomas Sadler, 3 vols. (London: Macmillan, 1869), 1: 128.

³⁷ Schelling, *Erster Entwurf*, in *Schellings Werke*, 2:63-64.

Like Goethe's conception of the archetype, Schelling's was that of a plenum standard, one that included all its differentia. But it was also an ideal that would, nonetheless, be realized in time through the temporal development of a huge variety of types responding to natural forces. Schelling made this clear in a letter to Goethe in January 1801, after having spent the Christmas period with his mentor. He wrote:

The metamorphosis of plants, according to your theory, has proved indispensable to me as the fundamental scheme for the origin of all organic beings. By your work, I have been brought very near to the inner identity of all organized beings among themselves and with the earth, which is their common source. That earth can become plants and animals was indeed already in it through the establishment of the dynamic basic organization, and so the organic never indeed arises, since it was already there. [This was his answer to Kant's objection that organic life cannot arise out of inorganic earth.] In the future we will be able to show the first origin of the more highly organized plants and animals out of the mere dynamically organized earth, just as you were able to show how the more highly organized blooms and sexual parts of plants could come from the initially more lowly organized seed leaves through transformation.³⁸

For Goethe, of course, the plant does go through a temporal transformation, from seed-leaves through stem and mature leaves, to flower, and finally the sexual organs—that is, the archetype is gradually realized in the temporal sphere. And it is this notion of

³⁸ Schelling to Goethe (26 January 1801), in F. W. j. Schelling, *Briefe und Dokumente*, ed. Horst Fuhrmans, 3 vols. to date (Bond: Bouvier Verlag, 1962-), 1:243.

dynamische Evolution that Schelling adopted after he had abandoned what he came to

identify as Erasmus Darwin's mechanistic version of transmutation.

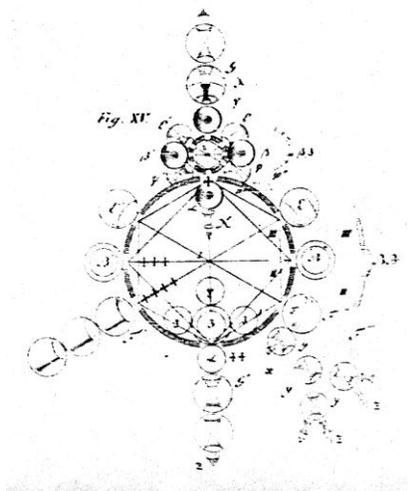


Figure 4: a geometrical reconstruction of the ideal vertebra, from Carl Gustav Carus, *Von den Ur-Theilen des Knochen und Schalengerüstes*, 1828.

Carus—a man after Goethe's own heart—yet attempted to render visible what his master contended could only be perceived by the mind's eye (fig. 3). Carus was an artist as well as an anatomist; and the need to illustrate the Goethean ideal required a metaphysical shift. He made the archetype a minimalist structure, essentially a string of vertebrae. Indeed, in his abstractive and mathematizing way, Carus reduced even the string

of vertebrae to a single vertebra, and this he attempted to understand as comparable to a mathematic construction out of solid spheres (fig. 4). And this is how the archetype came to British shores, brought over in the work of Richard Owen.³⁹ It was the Carus-Owen rendering of the archetype that Charles Darwin historicized.

Goethe's Evolutionary Theory

While Goethe helped shift Schelling toward what became his objective idealism, Schelling moved Goethe to a more idealistic position, and, I believe fostered his incipient evolutionary ideas. Evidence of this comes in March 1813 from Johannes Daniel Falk, a satirical writer and casual friend of Goethe. Falk records a conversation he had with Goethe, as they began to talk about Schelling, who had left Jena. Goethe

³⁹ See Nicolaas Rupke's account of the vertebrate archetype in his *Richard Owen: Biology without Darwin, a Revised Edition* (Chicago: University of Chicago Press, 2009), pp. 90-140.

indicated a fundamental agreement with his protégé that “it is as clear as day that the whole realm of appearance is an idea and a thought.”⁴⁰ In the course of the conversation, Goethe echoed that earlier letter from Schelling that I have just quoted. Falk had abruptly asked Goethe “Whether it did not seem likely to him that all the many different animals have arisen from one another through a metamorphosis similar to that by which the butterfly has arisen from the caterpillar.” Though Goethe initially demurred, he did say:

We are now awfully close to the chemistry of the whole thing, yet we all now choose terminology to disguise the transformations that occur in life. . . . I have given in my *Metamorphosis of Plants* the law whereby everything in nature is built up (this is through polarity, through generation). According to this law, things move into ever more splendidly and progressively higher syntheses.⁴¹

Goethe’s remarks about being close to the chemistry of the whole thing echoes both Schelling’s *Weltseele* and is consistent with his own earlier experiments on spontaneous generation. The notion that organic structures move to progressively higher syntheses seems just his way of talking about species development.

The clearest evidence of Goethe’s commitment to evolutionary transformation comes, however, in his collection *Zur Morphologie* in the 1820s, when he commented on a new work by Christian Pander and Eduard d’Alton, their *Die vergleichende Osteologie*.

⁴⁰ Johannes Daniel Falk (13 March 1823), in *Goethes Gespräche*, ed. Flodoard von Biedermann and Wolfgang Herwig, 5 vols. (Munich: Deutscher Taschenbuch Verlag, 1998), 2:786.

⁴¹ *Ibid.*

Starting in 1818, Pander and d'Alton visited natural history museums throughout

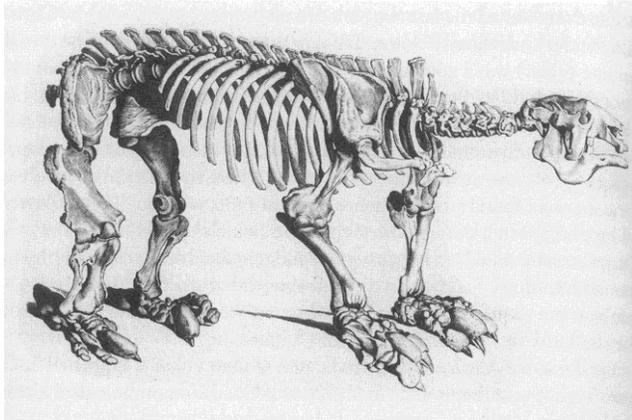


Figure 5: Illustration of a Megatherium, from Heinz Christian Pander and Eduard d'Alton's *Das Riesen-Faultier Bradypus Giganteus* (1821).

Europe to do comparative studies of mammals and birds, including fossil representations. Their first trip took them to Madrid, where a giant prehistoric monster, about the size of a rhinoceros, was on display (fig. 5). It had been dug up in South American. Georges Cuvier had provided a description of the beast. He

called it a Megatherium, that is, "big animal," and remarked on its close affinity to the modern sloth (fig.6). Charles Darwin would dig up another example of the Megatherium during his *Beagle Voyage* to South American some fifteen years later.

In the introduction to their work on the Megatherium, Pander and D'Alton asserted that the resemblance between this ancient giant and the modern sloth was the result of an historical process of species transformation, much as Goethe had shown the transformation of the leaf into the various parts of a plant. The authors then generalized their argument:

The differences in formation of fossil bones in comparison with those of still-living animals are greater the older the rock formations in which they are found (with the

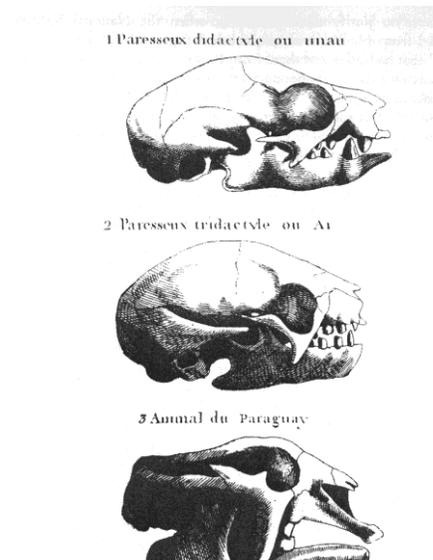


Figure 6: Georges Cuvier's comparison of skulls of two species of sloth (the unau and the ai) with that of the megatherium (the Paraguayan animal). From Cuvier's "Notice sur le squelette d'une très-grande espèce de Quadrupède" (1796)

fossil remains of the most recent formations quite similar to the structures of living animals). This common observation supports the assumption of an unbroken train of descent [eine ununterbrochene Folge der Abstammung] as well as of the progressive transformation of animals in relation to different external conditions. The observation that animals during the last millennium have reproduced with specific similarity in no way contradicts the theory of a general metamorphosis; rather such an observation only demonstrates that during this time no significant alteration in the external conditions of development has occurred.⁴²

The last sentence obviously referred to Cuvier's objection to Lamarck that mummified animals recovered from ancient tombs in Egypt showed no significant deviation from modern forms. Goethe commented on Pander and d'Alton's work in the *Zur Morphologie*. He wrote: "We are in perfect agreement with the authors as concerns the introduction"—and was, as I have indicated, the introduction in which they expressed their view of species transformation. Goethe continued his comment: "We share with the authors the conviction of a common type, as well as of the advantages of an empirical [sinnig] representation of a sequence of forms; we also believe in the eternal modifiability of all forms in appearance."⁴³

Goethe not only endorsed the authors' evolutionary analyses, he even offered what he called a "poetic" sketch of how the descent of the Megatherium might have occurred. He supposed the giant sloth first existed as a kind of whale that got trapped

⁴² Christian Pander and Eduard d'Alton, *Das Riesen-Faultier Bradypus Giganteus* (Bronn: Weber, 1821), [p. 6].

⁴³ Goethe "Die Faultiere und die Dickhäutigen," *Zur Morphologie*, in *Sämtliche Werke*, 12: 245.

along a swampy, sandy beach. To bear its great weight on land, it would have had to develop large limbs, which would then be passed to descendants. Subsequent generations would then further adapt to the land, achieving their modern, ungainly structure.

When Goethe offered this scenario, Lamarck's evolutionary conceptions were already at least 15 years in the past. And several more recent German authors, for example, Gottfried Reinhold Treviranus, in 1805, and Friedrich Tiedemann, a student of Schelling, in 1808, both advanced a conception of the transformation of species based on evidence drawn from paleontology and embryology. So it is quite clear that Goethe knew perfectly well what he was endorsing in his comments on Pander and d'Alton.

Conclusion

From our perspective, many loose ends dangle from the transformational theories of Schelling and Goethe. They initially developed their ideas some time before more systematic presentations of evolutionary theory came before the public—those authored by Lamarck in 1800 and Darwin sixty years later. As a result we cannot expect the kind of conceptual tidiness one finds, for example, in the *Origin of Species*. And many of our questions of detail have to go unanswered. Yet there can be little doubt, I think, that Schelling and Goethe conceived of transformations in species that were not simply ideal, but that happened in time and through natural forces. Kuno Fischer and Ernst Haeckel were correct: Charles Darwin's theory had its predecessors in the evolutionary conceptions of Schelling and Goethe.

