

Experimenting in Tongues

STUDIES IN SCIENCE
AND LANGUAGE

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The Linguistic Creation of Man: Charles Darwin,
August Schleicher, Ernst Haeckel, and the Missing Link
in Nineteenth-Century Evolutionary Theory

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While reflecting on various aspects of his new theory of species transformation, Charles Darwin (1809–82) conjured up a singing ape and then one groaning its desires while eyeing a well-proportioned member of the opposite sex. Such utterances, he mused, might have been the phonetic resources for primitive speech. The problem of language had captured Darwin's attention from a quite early period in his theorizing about species descent. His initial concern was to show that language—that most human of traits—had a natural origin and that it developed in genealogical and progressive fashion.¹ In a collection of notes, which he jotted down in 1837 shortly after returning from the *Beagle* voyage, he reflected on these putative features of language. On the very first page of this collection, he wrote, “all speculations on the origins of language—must presume it originates slowly—if these speculations are utterly valueless—then argument fails—if they have, then language was progressive.—We cannot doubt that language is an altering element, we see words invented—we see their origin in names of People—Sounds of words—argument of original formation.—declensions &c often show traces of origin.”²

A bit later he thought of that harmonious ape, when he queried himself: “Did our language commence with singing?” Were we originally like howling monkeys or chirping frogs? Alternatively, perhaps words arose out of expressions of emotion at certain events (for example, the ape with the opposite sex on its mind), or maybe from efforts at imitation of natural sounds.³ These latter were the kinds of conjectures that Friedrich Max Müller (1823–1900), the great Oxford linguist, would later derisively call the “pooh-pooh” and “bow-wow” theories of language formation. Darwin worried, even at

this early juncture, that if his views about language origins could not be sustained, then his whole argument regarding evolution might fail, since that argument could not then explain one of man's essential traits.

For the evolutionary thesis, no other trail lay open than the one Darwin initially began to follow. In the late 1860s, while focusing more determinately on constructing a theory of language, he came to rely in particular on his cousin Hensleigh Wedgwood (1803–91), who had endorsed a quasi-naturalistic account of linguistic development in his *On the Origin of Language* (1866); and while working on the *Descent of Man and Selection in Relation to Sex* (1871), Darwin made frequent inquiries of his cousin about the subject. Wedgwood had allowed that it was part of God's plan to have man instructed, as it were, by the natural development of speech. He argued that language began from an instinct for imitation of sounds of animals and natural events, which under "pressure of social wants" developed into a system of signs. According to Wedgwood, onomatopoeia served as the "vera causa" for a natural evolution of language.⁴ Darwin embraced this confirmation of his original ideas, dispensing, of course, with the theological interpretation. In the *Descent of Man*, he mustered this naturalistic account of language acquisition to a surprising purpose.

The principal concern of the *Descent of Man*, as the title signals, is the evolution of the human animal, with all its distinctive properties, especially that of high intellect.⁵ Darwin admitted that, as his friend Alfred Russel Wallace (1823–1913) had argued in the late 1860s, for survival, man's ape-like ancestors needed a brain hardly larger than that of an orangutan—actually not much larger, Wallace thought, than that exhibited by typical members of a Victorian gentleman's club. Wallace was reinforced in this conclusion by his turn toward spiritualism. He came to believe that man's ascent from the animal state occurred through the ministrations of higher, spiritual powers—a proposal that drove Darwin crazy.⁶ Yet Darwin recognized the force of Wallace's objection. If a large brain, with all that such entailed, were not required for survival, then natural selection could not account for it. Darwin thus needed another way to explain the refinement and perfection of human intelligence. Language provided the instrument, although not in the way one might acknowledge today. In the *Descent of Man*, he argued in this fashion:

The mental powers in some early progenitor of man must have been more highly developed than in any existing ape, before even the most imperfect

form of speech could have come into use; but we may confidently believe that the continued use and advancement of this power would have reacted on the mind by enabling and encouraging it to carry on long trains of thought. A long and complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra.⁷

Darwin proposed that man's apelike ancestors must have developed considerable intellectual capacity prior to breaking into the human range of intelligence. That animals displayed conspicuous understanding, approaching that of the human, no English huntsman seriously doubted. Even the great British idealist F. H. Bradley (1846–1924) remarked to a friend, "I never could see any difference at bottom between my dogs & me, though some of our ways were certainly a little different."⁸ (This may say more about late-nineteenth-century British philosophy than about the abilities of English canines.) What was needed, in Darwin's view, to steam our animal ancestors across the Rubicon of mind was the engine of language. As language evolved through a natural development out of emotional and imitative cries, it would rebound on brain, promoting, as Darwin indicated, a more complex train of thought. Darwin would differ from contemporary neo-Darwinians, however. He believed that the complex patterns of thought that language stimulated would progressively alter brain structures and that these new acquisitions would produce an "inherited effect."⁹ Language created human brain and, consequently, human mind. Darwin thus dissolved Wallace's objection to a naturalistic explanation of man.

From the beginning of his career to the end, Darwin believed in the inheritance of acquired characteristics. From our current perspective, we can see that he need not have argued in this fashion. He could have employed his own device of natural selection to explain the reciprocal pressures that mind and language might have exerted on one another to produce a continued evolution of both. Darwin did not appreciate that ever-more-complex language and thought might have had distinct survival advantages—for example, language might have served to weave together mutually supportive social networks for our protohuman ancestors. Like Wallace, he conceded that for sheer survival, our progenitors did not require a brain more advanced than that of, say, a great ape. Hence, in those cases in which natural selection seemed inapplicable, Darwin fell back on that device he always had at the ready—the inheritance of acquired characters.

Darwin's theory of the influence of language on developing mentality seems, at first blush, puzzling. This is not because of his employment of the idea of use-inheritance—common enough for his theory and his time. The puzzle rather arises because Darwin's proposal ran counter to the usual British empiricists' assumption that language merely expressed or mirrored ideas—it did not create them.¹⁰ What then was the source of Darwin's conviction that language could mold human brain, could create human mind? In what follows I wish to argue that the ultimate source for his conception is to be found in German romanticism and idealism, especially in the work of Wilhelm von Humboldt (1767–1835), linguist and pedagogical architect of the University of Berlin, and of Georg Friedrich Hegel (1770–1831), Germany's greatest philosopher in the first part of the nineteenth century. German romanticism and idealism thus forged, I believe, a missing link in nineteenth-century evolutionary theory.

DARWIN AND THE LINGUISTIC RUBICON

Although Darwin realized that he would have to give an account of human mind and language if his general theory were to win the day, he kept all overt discussion of human evolution out of the book that first detailed his theory, the *Origin of Species* (1859). He simply forecast in the concluding chapter that "light will be thrown on the origin of man and his history."¹¹ The *Origin* is, nonetheless, larded with oblique but succulent references to human activity and history.¹² The case of language stands out among these. In his chapter on classification and systematics, for instance, Darwin observed, "If we possessed a perfect pedigree of mankind, a genealogical arrangement of the races of man would afford the best classification of the various languages now spoken throughout the world; and if all extinct languages, and all intermediate and slowly changing dialects, had to be included, such an arrangement would, I think, be the only possible one."¹³ In this passage, Darwin recognized an isomorphism between language descent and human biological descent. Not only could the human pedigree serve as a model for tracing linguistic development, as he here emphasized, but also the reverse, as he implied, could be the case: the descent of language might serve as a model for the descent of man.

Darwin's suggestion about a similar genealogy for human beings and language passed casually through only one paragraph of the *Origin*. He himself

did not really employ the model in any systematic way. His illustration of species evolution, the only graphic illustration in the *Origin*, was certainly not modeled on language development. The bare suggestion of this apparent isomorphism between the development of language and the development of human varieties, however, caught fire almost immediately. Although initially Darwin warmed himself contentedly in the blaze, his friend Charles Lyell (1797–1875) pushed him a little too close.

Lyell was a scientist out of whose brain, Darwin said, came half his ideas. Lyell immediately took up Darwin's suggestion about language descent and further advanced it in his book *The Antiquity of Man* (1863). Lyell had observed that although there were wide gaps between dead and living languages, with no transitional dialects preserved, competent linguists did not doubt the descent of modern languages from ancient ones. Therefore, gaps in the fossil record of species ought prove no more of an obstacle to transmutation theory than gaps in the record of language proved in linguistic theory. Moreover, the two kinds of descent should have a common explanatory account, he believed. So the formation and proliferation of languages were due, to quote Lyell, to "fixed laws in action, by which, in the general struggle for existence, some terms and dialects gain the victory over others."¹⁴ He thus maintained that the processes of biological evolution could be likened to those of linguistic evolution—in both the more fit types were selected. Lyell, one of Britain's leading scientists of the time, in this way offered significant support for his friend's theory.

Lyell, however, could not cross the Rubicon. He thought the principle of natural selection was unable to account completely for the intricately designed fabric of language, even that of the more primitive languages of native groups. He judged—as Darwin groaned his great frustration—that natural selection of both language and life-forms could only be a secondary cause, operating under the guidance of higher powers. "If we confound 'Variation' or 'Natural Selection' with such creational laws," he cautioned, "we deify secondary causes or immeasurably exaggerate their influence."¹⁵ Such a repair to higher wisdom, of course, eviscerated Darwinian nature of the fecund force with which the *Origin* invested it. And nature in Darwin's theory resonated of that romantic power of creative action and evaluation that it soaked up from German sources, especially from Alexander von Humboldt (1769–1859), whom Darwin incessantly read while on the *Beagle* voyage some years before.¹⁶ But another German writer came to Darwin's attention in the mid-

1860s, one whose analyses of language he found considerably more congenial than Lyell's and one whose ideas he would weave into his own theory of human evolution. This was August Schleicher (1821–68).

SCHLEICHER AND THE ROMANTIC THEORY OF LANGUAGE

Schleicher's Response to Darwin

Schleicher was a distinguished linguist working at the university in Jena. He had been urged by his good friend Ernst Haeckel (1839–1919) to read the German edition of the *Origin*.¹⁷ Haeckel, who had recently converted to Darwinism, recommended the book because of Schleicher's horticultural interests.¹⁸ But it was Schleicher the linguist who resonated more deeply to Darwin's work. He responded to Haeckel in an open letter, which he published as a small tract with the title *Die Darwinsche Theorie und die Sprachwissenschaft* (Darwinian theory and the science of language, 1863).¹⁹ The book excited considerable controversy, evoking critically negative responses from the likes of Friedrich Max Müller and William Dwight Whitney (1827–94), and supportive efforts from Frederick Farrar (1831–1903).²⁰ In the *Descent of Man*, Darwin referred to his cousin Hensleigh Wedgwood and Farrar as sources for his ideas about evolutionary descent of language. He silently prescinded, as one might expect, from the fact that each of his sources reserved a role for the Creator. And he credited Schleicher as well. It was on Schleicher's thoroughgoing linguistic naturalism on which he principally depended for his theory of the constructive effect of language on mind.²¹

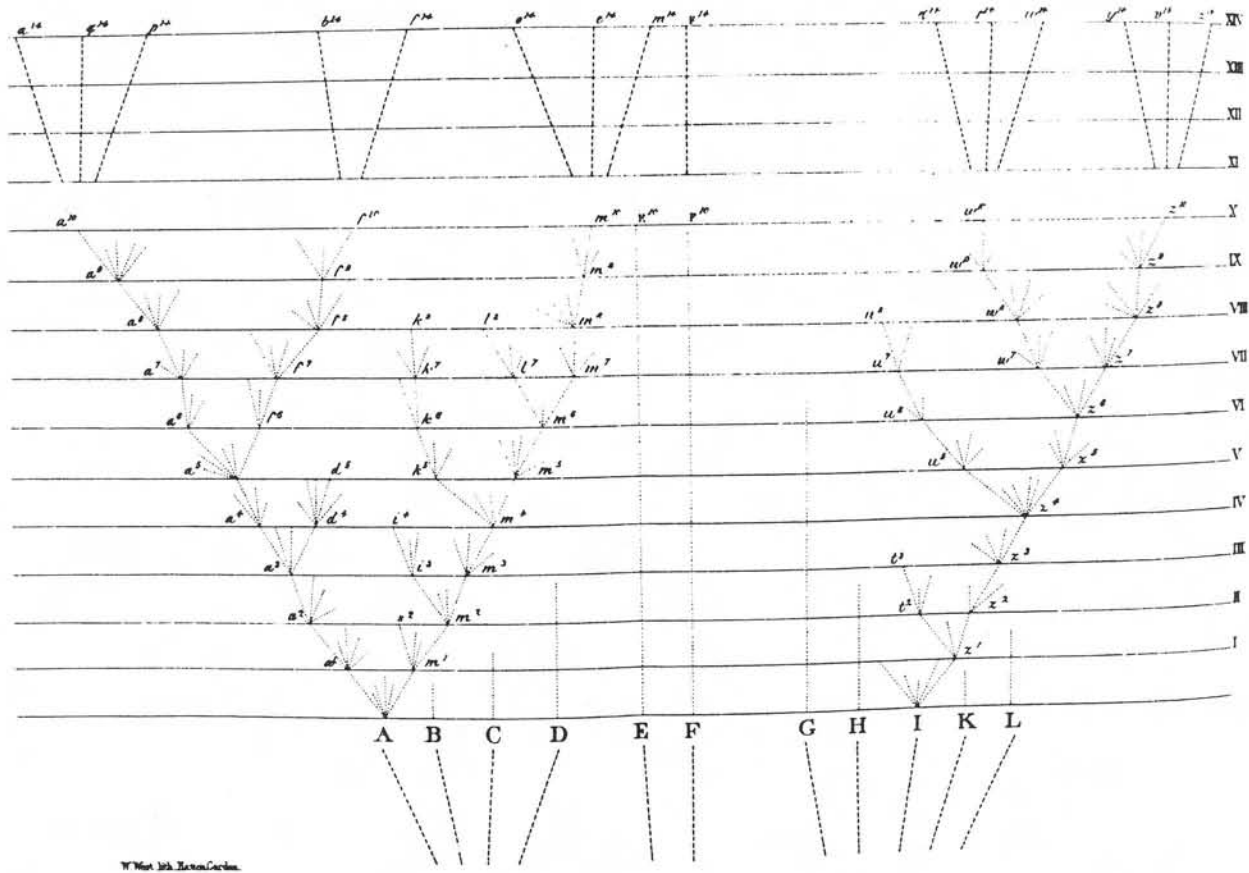
Schleicher indicated that contemporary languages had gone through a process in which simpler *Ursprachen* had given rise to descendent languages that obeyed natural laws of development. He argued that Darwin's theory was thus perfectly applicable to languages and, indeed, that evolutionary theory itself was confirmed by the facts of language descent. This last point was crucial for Schleicher, since it suggested the singular contribution that the science of language could make to the establishment of Darwin's theory. In the German translation of the *Origin*, Heinrich Bronn, the translator, had added an epilogue in which he allowed that Darwin's theory showed that descent was *possible* but that the Englishman had not shown that it was *actual*. According to Bronn, Darwin had provided no direct empirical evi-

dence, only analogical possibilities.²² Schleicher, like many other Germans, accepted Bronn's evaluation. He yet insisted that language descent, unlike the imaginative scenarios Darwin offered, could be proven—it was already an empirically established phenomenon. Moreover, the linguist's descent trees (*Stamm bäume*) might be used as models for construing the evolution of plant and animal species.

Schleicher was quick to point out that the only graphic representation of descent in Darwin's *Origin* consisted of a highly abstract scheme, in which no real species were mentioned, only letter substitutes (see Figure 2.1). He contrasted this with a descent tree of the Indo-Germanic languages—his own graphic innovation—that he attached as an appendix to his tract (see Figure 2.2). Darwin had thus only represented a possible pattern of descent, while the linguist could provide a real pattern, empirically derived. Here, Schleicher believed, was a genuine contribution of linguistics to biological theory, a contribution that undercut Bronn's objection.

Schleicher maintained there were some four other areas in which the linguistic model could advance the Darwinian proposal. First, the linguistic system might display a “natural history of the genus Homo,” because “the developmental history of languages is a main feature of the development of human beings.” Second, “languages are natural organisms [*Naturorganismen*]” but have the advantage over other natural organisms since the evidence for earlier forms of language and transitional forms has survived in written records—there are considerably more linguistic fossils than geological fossils. Third, the same processes of competition of languages, the extinction of forms, and the development of more complex languages out of simpler roots all suggest mutual confirmation of the basic processes governing such historical entities as species and languages. Finally, since the various language groups descended from “cellular languages,” language provides analogous evidence that more advanced species descended from simpler forms.²³

Schleicher intended that these four complementary contributions of linguistics to biological theory should buttress an underlying conviction that received only vague expression in his *Darwinsche Theorie*, namely, that the pattern of language descent perfectly reflected human descent. The implicit justification for this proposition was simply that these two processes of descent were virtually the same. And this justification itself was grounded in



W. Hart, 1881, London, England.

FIGURE 2.1 Darwin's diagram of possible descent relations of species. From the *Origin of Species* (London: John Murray, 1859).



FIGURE 2.2 Schleicher's diagram of the descent relations of the Indo-Germanic languages. From his *Darwinsche Theorie und die Sprachwissenschaft* (Weimar: Böhlau, 1863).

the doctrine of monism that Schleicher advanced in his tract. The doctrine, as he formulated it, recognized:

Thought in the contemporary period runs unmistakably in the direction of monism. The dualism, which one conceives as the opposition of mind and nature, content and form, being and appearance, or however one wishes to indicate it—this dualism is for the natural scientific perspective of our day a completely unacceptable position. For the natural scientific perspective there is no matter without mind [*Geist*] (that is, without that necessary power determining matter), nor any mind without matter. Rather there is neither mind nor matter in the usual sense. There is only one thing that is both simultaneously.²⁴

For Schleicher, the doctrine of monism provided a metaphysical ground for his theory that the organism of language simply represented the material side of mind, which meant, therefore, that the evolution of one carried the evolution of the other. This organic naturalism had its roots in the German romantic movement. That movement rejected the mechanistic interpretation of nature and advanced the concept of *organism* as the fundamental principle in terms of which human mentality and all natural phenomena were ultimately to be understood.²⁵

In a small work published two years after *Darwinsche Theorie*, Schleicher developed some further features of his complementary theories of linguistic and human evolution. In *Über die Bedeutung der Sprache für die Naturgeschichte des Menschen* (On the significance of language for the natural history of mankind, 1865), he argued that the superficial differences among human beings, which morphologists often exaggerated, proved simply insufficient to classify them. He observed:

How inconstant are the formation of the skull and other so-called racial differences. Language, by contrast, is always a constant trait. A German can indeed display hair and prognathous jaw to match those of the most distinctive Negro head, but he will never speak a Negro language with native facility. . . . Animals can be ordered according to their morphological character. For man, however, the external form has, to a certain extent, been superseded; as an indicator of his true being, external form is more or less insignificant. To classify human beings we require, I believe, a higher criterion, one which is an exclusive property of man. This we find, as I have mentioned, in language.²⁶

Since some languages were more perfect than others, this would provide a progressive arrangement of human varieties. Schleicher held, perhaps not

surprisingly, that the Indo-Germanic and Semitic language groups were the most advanced, since they had features, such as tenses, declensions, and true noun and verb forms lacking in languages like the Chinese. By implication, he thus suggested that the most evolved human groups in the evolutionary hierarchy were those whose native languages were of the Indo-Germanic and Semitic families. Schleicher's justification for using language to classify human groups was quite simple: "The formation of language is for us comparable to the evolution of the brain and the organs of speech."²⁷ This was the position that Darwin endorsed, and it became for him a central feature of his evolutionary conception of mankind.²⁸

Schleicher claimed that he himself had been convinced of the natural descent and competition of languages before he had read the *Origin of Species*. Although it is difficult to corroborate his assertion that he had previously urged a "Kampf ums Dasein" to explain language change, there is little doubt that he had affirmed language competition and descent as natural phenomena prior to reading Darwin and that he had used these concepts to argue for human evolution. Schleicher's argument, however, displays quite fascinating archaeological layers of earlier ideas.

Origin of Schleicher's Evolutionary Theory of Language and Mind

Schleicher was born February 19, 1821, in Meiningen (southwest of Weimar in the Thuringian Forest) to a physician with a taste for nature and his musically talented wife.²⁹ The professors of his gymnasium cultivated exotic languages but did not, amazingly, have high hopes for this particular pupil. In fall 1840, Schleicher began the curriculum in theology at Leipzig and the next semester traveled to Tübingen for more of the same. At Tübingen his passion for the transcendent found secular liberation in Hegel's writings, which had been recently collected by his students (1832-40), with many works appearing for the first time. Schleicher also began acquiring languages at a frightening rate: Arabic, Hebrew, Sanskrit, and Persian initially. With the reluctant permission of his father, he went to Bonn, in 1843, to devote himself to the study of classical languages. There he entered the seminar conducted by the famous classical philologists Friedrich Ritschl (1806-76) and Friedrich Welcker (1784-1868), who introduced him to the linguistic ideas of Wilhelm von Humboldt.³⁰ Although of oscillating health while at Bonn, Schleicher yet braced his study with participation in gymnastic competitions,

a recreation that he and Haeckel would later together pursue with avidity. He received a doctorate in 1846 and would normally have then spent time as a professor in a gymnasium before pursuing further study. He fell, however, under the protective wing of Prince Georg von Meiningen, who, admiring of his landsman's talents, arranged for a generous stipend. The money enabled Schleicher to continue his study during a period of two years of extensive travel (1848–50).

In the summer of 1848, after the February Revolution and the establishment of the Second Republic, Schleicher journeyed to Paris to continue his linguistic research in the Bibliothèque Nationale. He augmented his income during this sojourn by serving as correspondent to the *Allgemeine Zeitung* (Augsburg) and the *Kölnische Zeitung*. He reported on the fluctuating political events occurring in Paris and a bit later in Vienna, as revolution spread to the capital of the Hapsburg Empire. Schleicher's reports, tinged with the sympathetic color of a liberal democrat, followed the fate and abortive efforts to establish a republic in the Germanies.³¹ In addition to his political reporting, Schleicher managed to produce a number of important linguistic studies, which elicited a call from the University of Prague to the position of extraordinary professor. Three years later, he advanced to ordinary professor of German, comparative linguistics, and Sanskrit. He remained in Prague until 1857, when he received an offer to return to his own land. He accepted a position in the philosophy faculty at Jena, the venerable university that two generations earlier, at the turn of the century, had nurtured the romantic movement, serving as redoubt for the likes of Schiller, Fichte, the brothers Schlegel, Schelling, Hegel, and with Goethe right down the road at Weimar. Jena was also the university of Schleicher's father, Johann Gottlieb (1793–1864), who in the summer of 1815 helped found the first Burschenschaft, the student organization that agitated for democratic reform and political unity.³² In the 1850s, the university looked back to a glorious past and forward to a financially precarious future.

Although he initially had high hopes for his time in Jena, undoubtedly recalling his father's stories of revolutionary days at the university, Schleicher quickly came to feel isolated from his colleagues, whose conservative considerations bent them away from the more daring of his own approaches both in linguistics and politics. The poor finances of the university, making scarce the necessities of scholarship, did not improve his attitude. A friend remembered Schleicher remarking that "Jena is a great swamp and I'm a frog in it."³³ The

frog was saved from wallowing alone in his pond when Ernst Haeckel arrived at the university in 1861. They took to one another immediately and remained fast friends through the rest of Schleicher's short life. He died in 1868, at age forty-eight, apparently of a recurrence of tuberculosis.

In 1848, after he returned to Bonn from research in the revolution-torn Paris, Schleicher saw published his first monograph, *Zur vergleichenden Sprachengeschichte* (Toward a comparative history of languages).³⁴ This work framed the theory that would guide him through the rest of his career. In it, he distinguished three large language families by reason of their forms: isolating languages, agglutinating languages, and flexional languages. Isolating languages (for example, Chinese and African) have very simple forms, in which grammatical relationships are not expressed in the word; rather, the word consists merely of the one-syllable root (with position or pitch indicating grammatical function). Because of their simple structure, these languages cannot, according to Schleicher, give full expression to the possibilities of thought. Agglutinating languages (for example, Turkish, Finnish, Magyar) have their relational elements tacked on to the root in a loose fashion (indeed, the relational elements themselves are derived from roots). Flexional languages (for example, the Indo-Germanic and Semitic families) are the most developed. Roots and relations form an "organic unity," according to Schleicher.³⁵ So, for example, the Latin word "scriptus" has "scrib" as the root or meaning; "tu" expresses the participial relationship; and "s" indicates the nominative relationship. Schleicher believed that even the most highly developed languages, the flexional group, originated from a simpler stem, much like the Chinese, but continued to develop into varieties with more perfect forms. Isolating and agglutinating languages, by contrast, simply did not have the potential to move much beyond their more primitive structures.

Schleicher regarded these three language forms as exhibiting an internal, organic unity. Indeed, he compared them to natural organisms of increasing complexity: crystals, plants, and animals, respectively.³⁶ Such comparisons had the authority of those linguists upon whom Schleicher most relied: Wilhelm von Humboldt, Franz Bopp (1791–1867), and August Wilhelm Schlegel (1767–1845). These researchers, all tinged by the romantic movement, employed the organic metaphor with alacrity.³⁷ Schleicher, however, did suggest an important disanalogy between languages and biological organisms. Languages had a developmental history, whereas biological organisms, although they came to exist through a gradual process, did not alter once they were

established. They essentially had no history. At least this was Schleicher's view in 1848.

In 1850, Schleicher completed a large monograph systematically describing the languages of Europe, his *Die Sprachen Europas in systematischer Übersicht* (The languages of Europe in systematic perspective). He now explicitly represented languages as perfectly natural organisms that could most conveniently be described using terms drawn from biology—for example, genus, species, and variety.³⁸ Some of his contemporaries, as well as later linguists, have thought Schleicher's conception of language as a natural, law-governed phenomenon to be erroneous, a denial of man's special status. Such critics then (and now) failed to understand that this was not a demigration of the *geistlich* character of language; rather, it was, in the romantic purview, an elevation of the natural.³⁹ Romantics and idealists—such as Schelling, Schlegel, and Hegel—deemed nature simply the projection of mind. Schleicher, then, did not reduce in vulgar fashion the spiritual dimension of language to some nonanimate concourse of atoms in the void.

In his *Die Sprachen Europas*, Schleicher suggested (but did not yet graphically illustrate) that the developmental history of the European languages could best be portrayed in a *Stammbaum*, a stem-tree or developmental tree. He first introduced a graphic representation of a *Stammbaum* in articles published in 1853, representations that indeed looked like trees (see Figure 2.3).⁴⁰ By the time of the publication of his *Deutsche Sprache*, seven years later (1860), he had begun to use *Stammbäume* rather frequently to illustrate language descent (see Figure 2.4). Schleicher is commonly recognized as the first linguist to portray language development using the figure of a tree.⁴¹ Certainly he thought carefully about how illustrations could make more clear, more intuitive the descent relations that purportedly obtained among languages. So, for instance, he used the angular distance separating the branches of the *Stammbaum* to suggest the morphological distances of daughter languages (see Figure 2.5).⁴² Such illustrations, so intuitively seductive, acted as tacit arguments for the theory they depicted.

In *Deutsche Sprache*, Schleicher reiterated the argument of *Die Sprachen Europas* that more recent languages had descended from *Ursprachen* and that their descent conformed to natural laws. He now, however, started to formulate those laws (for example, "When two or more branches of a language stem [*Sprachstamm*] are quite similar, we may naturally conclude that they have not been separated from each other for very long").⁴³ He also

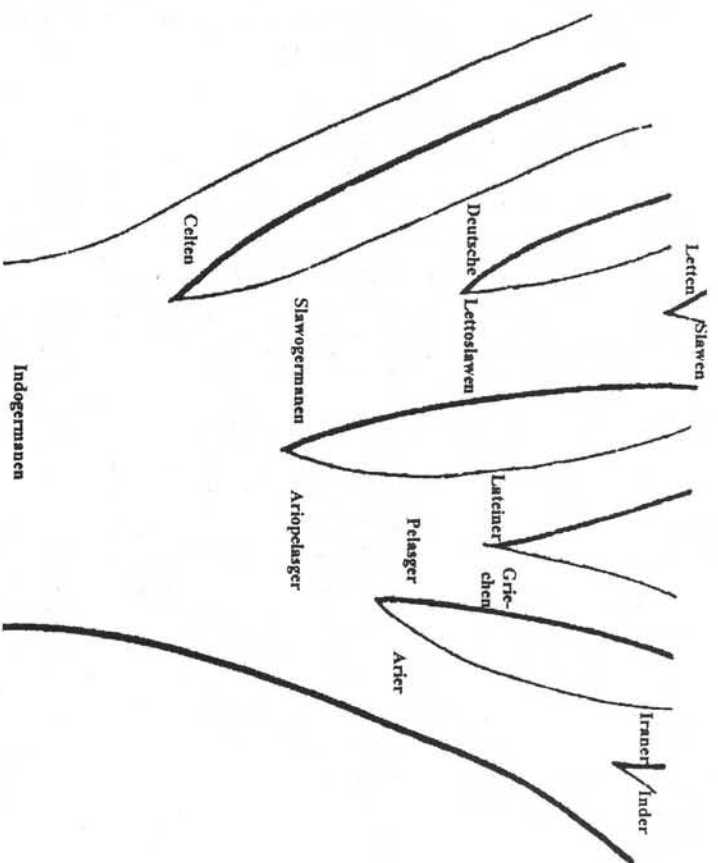


FIGURE 2.3 Schleicher's first diagram of language descent. From "Die ersten Spaltungen des indogermanischen Urvolkes," *Allgemeine Zeitschrift für Wissenschaft und Literatur* (August 1853).

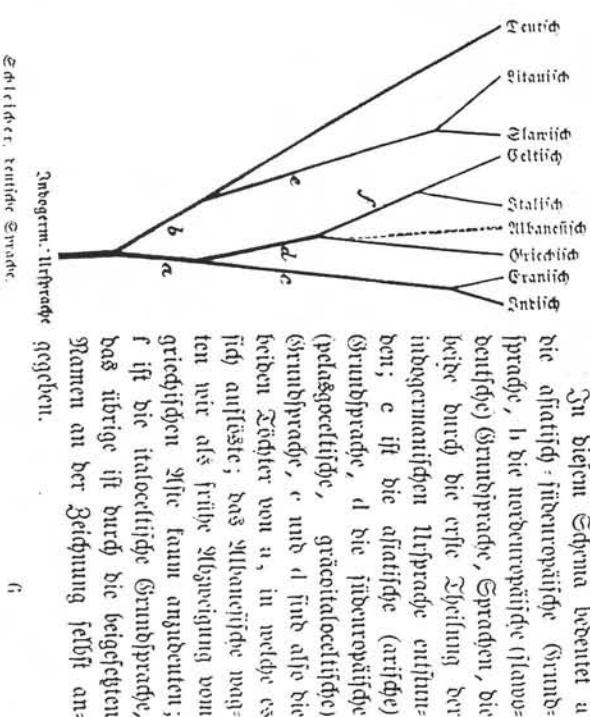
made explicit a vague notion that had been floating around in his earlier works. He argued that the descent of languages paralleled the descent of man, that indeed, more primitive animal forms achieved their humanity precisely in acquiring language. As he expressed it: "According to every analogy, man has arisen out of the lower forms, and man, in the proper sense of the word, first became that being when he evolved [*entwickelte*] to the point of language formation."⁴⁴ Schleicher further maintained that since human languages were polygenic in origin, so was man. That is, he believed that there was no one *Ursprache* whence the other languages descended; rather, there were many *Ursprachen*, each having developed in different geographical regions out of cries of emotion, imitation, and ejaculation. Since language and thought were two sides of the same process, as language groups developed and evolved independently of one another, so did the different groups of human beings who spoke them.⁴⁵

Ursprünge der Indogermanen.

indogermanischen Sprache ausdies, also am längsten ein selbstständiges Leben führte und so sich individueller entwickelte. Elawisch und Litauisch stehen sich aber außerordentlich nahe, sie sind erst sehr spät aus einer gemeinsamen Grundsprache, der slavonlettschen hervorgegangen. Die slavonlettsche Grundsprache schied sich also zuerst in baltisch und slavonlettsch, dieses sodann in lettisch und slavonisch.

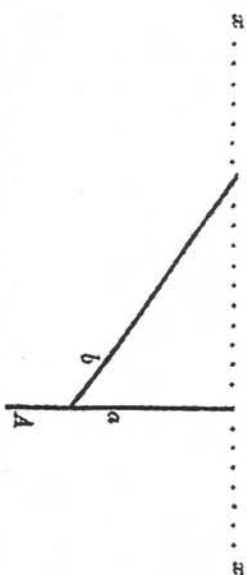
So sind wir beim durch genauere Betrachtung der Verwandtschaftsverhältnisse der einzelnen indogermanischen Grundsprachen (Famillien) und durch die auf die Grundlage solcher Erkenntnis notwendig sich aufbauenden Schlässe auf die ältesten Sprachstufen gelangt; nehmen wir noch hinzu, daß wir mit gleicher Sicherheit die indogermanische Sprache selbst noch in ihrem Absterben zu begreifen im Stande sind, so wird man den Leistungen unserer noch so jungen Disziplin Anerkennung, ja Bewunderung wohl kaum verjagen können.

Die über das successive Hervorgehen der acht indogermanischen Grundsprachen aus der gemeinsamen Ursprache gewonnenen Ergebnisse mag folgendes Schema veranschaulichen.



Im diesem Schema bedeutet a die altsittische: sibetropische Grundsprache, b die nordwestliche (slavonlettsche) Grundsprache, Sprachen, die beide durch die erste Theilung der indogermanischen Sprache entstehen; c ist die altsittische (arische) Grundsprache, d die sibetropische (pelagoceltische, gräcoitaloceltische) Grundsprache, e und f sind also die beiden Zöchter von a, in welche es sich aufspaltete; das slavonlettsche magten wie als frühe Theilung vom griechischen Theile kaum abzuheben; f ist die italoceltische Grundsprache, das übrige ist durch die beigefügten Namen an der Zeichnung selbst angeschlossen.

FIGURE 2.4 Schleicher's Stammbaum of the Indo-Germanic languages. From *Die Deutsche Sprache* (Stuttgart: Cotta'scher Verlag, 1860).



Die Grundsprache A theilt sich in die Sprachen a und b in der beschriebenen Weise nämlich so, daß der Theil der Sprachgebiete b stärkeren Veränderungen unterliegt als der mit a begrenzete. Bis zum Durchschnitte xx hat also b sich viel weiter von A entfernt als a, und dies macht eben unser Schema dadurch anschaulich, daß es bx stärker von der geraden Richtung abweisen läßt als ax, was mehr als eine direkte Fortsetzung von A ersieht.

FIGURE 2.5 Schleicher's graphic method of intuitively showing the greater divergence of daughter language b from the mother language A and the more linearly descended daughter language a. From his *Die Deutsche Sprache* (Stuttgart: Cotta'scher Verlag, 1860).

Schleicher on the Evolution of Man, the Language User

Prior to having read Darwin, Schleicher seems to have already convinced himself that human beings had derived from lower animals. Certainly from the beginning of the nineteenth century, several German biologists—for example, Gottfried Treviranus (1776–1837), Friedrich Tiedemann (1781–1861), and Johann Meckel (1781–1833), stimulated by Jean-Baptiste de Lamarck (1774–1829)—had become full-blown evolutionists.⁴⁶ But was Schleicher full-blown before 1859? His argument for human descent depended on the identification of language and thought. The linkage itself has a venerable history. Authors as far back as Plato understood language and thought to have a close relationship. Johann Gottfried Herder (1744–1803), an author every German intellectual of the first half of the nineteenth century assiduously read, contended, in a prizewinning treatise of 1772, that language was necessary for thought, “that indeed the first and most elementary application of reason cannot occur without language.” Contrary to the creationists, Herder urged that speech arose gradually in human groups, initially through imitation of

natural sounds. "No Mercury and Apollo," he protested, "descend from the clouds as by opera machinery—the whole, many-sounding, divine nature is the language teacher and Muse for man."⁴⁷ Schleicher would endorse the notion that languages first arose out of imitation of natural sounds, but he conceived an even tighter relationship between language and thought, namely, that of virtual identity.⁴⁸ In so doing, he seems proximately to have developed a theoretical position initially laid down by Wilhelm von Humboldt in his *Über die Kawi-Sprache auf der Insel Java* (On the Kawi-language on the island of Java, 1836).

In his introduction to the *Kawi-Sprache*—a work often cited by Schleicher—Humboldt argued for the intimate relation between thought and language. He formulated the relationship in this way: "Just as without language no concept is possible, so likewise without language there is no object for the soul, since it is only by means of the concept that any external object can express its complete essence for the soul."⁴⁹ Humboldt also suggested, equally darkly, that the descent (*Abstammung*) of language "joined in true and authentic union with physical descent."⁵⁰ It would take only slightly more conceptual boldness for Schleicher to conclude, as he forthrightly did, that the descent of language paralleled the descent of thought or mind. Thus the conclusion of *Deutsche Sprache*: with the evolution of different languages comes the evolution of different kinds of human beings.

Yet one can still ask: Did Schleicher's conclusion amount to endorsing something like the Darwinian thesis before Darwin? A clue to the answer to this question can be gleaned from examining a most curious theory in *Deutsche Sprache* concerning the evolution of language in human groups. Schleicher argued that human beings, in their acquisition of language, went through three periods of development: a prelinguistic period, a prehistorical period of language emergence and development, and then a historical period of language decline. In the earliest stage, when no true languages existed, neither did human beings—since without language there could be no human thought. In the next, the prehistorical phase of earth's history, languages (and thus human beings) began to develop. During this period, many different language groups sprang into existence and many died out—indeed, most languages went extinct before achieving their full potential. Others, however, began to spread from one region to another. When languages achieved their maturity, human beings entered the historical period, during which they became self-conscious through the medium of historical

understanding. However, with the advent of the historical period, no fundamentally new languages arose. Indeed, during this time, languages began to decline, to devolve! Words started to fall out, forms became simplified, and grammatical relations were lost. Thus Greek and Latin have a much richer store of grammatical forms than modern languages descended from them. Yet, during this historical period, culture and reason dramatically advanced. Schleicher's scheme of language evolution, with its initial progress and then devolutionary decline, seems perfectly paradoxical—that is, until its roots are uncovered.

The fundamental features of this scheme appeared in Schleicher's first monograph, where it is obvious that the basic conception came from Hegel. In the *Zur vergleichenden Sprachengeschichte*, Schleicher depicted the three language forms (the isolating, agglutinating, and flexional) as moments in the development of the "World Spirit" (*Weltgeist*). The Spirit, in the Hegelian view, strove to realize itself, to become fully self-conscious. This striving would be instantiated in the development of human mentality and revealed in language formation. Thus languages would move through dialectical stages, from simple expressions of meaning (in isolating languages), to the structural antithesis in languages that loosely joined meaning and relationships (agglutinating), to a higher synthesis in the "organic unity" of the word, characteristic of the flexional groups—the Semitic and Indo-Germanic. "Whatever we recognize as significant in any sphere of the human spirit," Schleicher averred, "has blossomed from one of these two groups [that is, Semitic and Indo-Germanic]."⁵¹ In Hegel's view, one explicitly adopted by Schleicher, during the prehistorical period the World Spirit established the intellectual resources—namely, highly developed languages—so as to begin the process of historical self-reflection and the attainment of freedom. Once the process had begun, however, the energies required for the refined articulation of language began to be employed in the development of rational laws, state governments, and the aesthetic products of advanced civilization. "Hegel thus recognized," according to Schleicher, "the fact that the formation of languages and history cannot take place at the same time, that in the advance of history, rather, language must be worn down."⁵²

In Hegel's *Vorlesungen über die Philosophie der Geschichte* (Lectures on the philosophy of history, 1840), from which Schleicher initially drew his theory, the prelinguistic period of human existence is represented as nonetheless *potentially human*, with the "germ or drive" to reflective consciousness

already built in.⁵³ Hegel certainly stopped short of a full-blown biological evolutionism, and this may be where Schleicher himself stopped in *Deutsche Sprache*. Yet, there can be little doubt that Schleicher was brought to the conceptual brink of biological transformation theory by Humboldt and Hegel—even if, after 1848, Hegel's name never again appeared in Schleicher's texts. The reading of Darwin's *Origin of Species*, under Haeckel's tutelage, provided the shove for one who was ready to take the plunge into a new conceptual sphere.

Schleicher's own evolutionism obviously went through stages of development, finally resting in his adoption of Darwinism in language and human evolution. One significant index of Darwin's impact on Schleicher's linguistic ideas was the absence of the theory of language decline in his *Darwinsche Theorie*. Darwin's theory of development was thoroughly progressivistic; therefore, it would have been anomalous to suggest that the natural selection of languages led to a devolution of language. Yet Schleicher would have realized that his original assumption of the perfection of ancient languages was one still widely shared by linguists and cultural critics in love with the classics. He would appear to have only one recourse, which he took—namely, silence. For the most part, however, Darwin's ideas simply overlaid the fundamental features of Schleicher's prior evolutionary project, which derived from the work of those individuals immersed in German romanticism and idealism—especially Humboldt and Hegel. They had initially argued that the model of organic growth formed the basic category for understanding the development of consciousness. Their fundamental metaphysical view was monistic—mind and matter expressed two features of an organic Urstoff—and this sort of monism became the assumption of evolutionists during the latter half of the nineteenth century, especially of Haeckel.

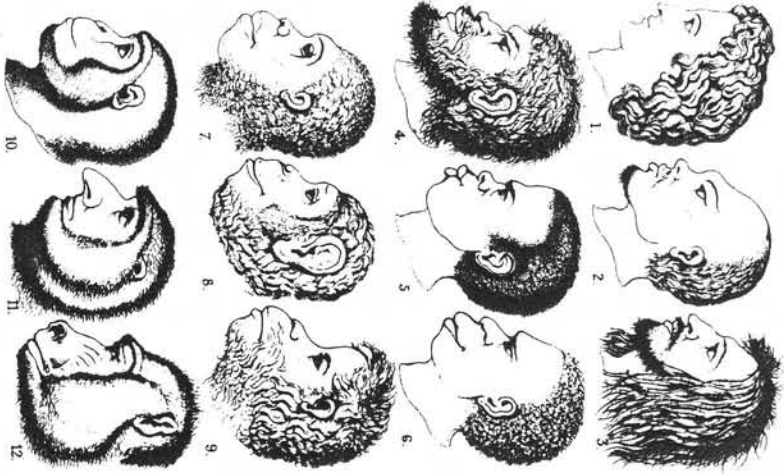
HAECKEL'S THEORY OF THE LINGUISTIC EVOLUTION OF MAN

Ernst Haeckel, to whom Schleicher's *Darwinsche Theorie* had been addressed, had converted to Darwinism in 1860, virtually as soon as he read the German translation of the *Origin*. At the time, he was working on his habilitation, in which he would describe and systematically classify the radiolaria, simple one-celled creatures that inhabited the oceans and exuded an exoskeleton.⁵⁴ Darwin's theory helped him make sense of the myriad of families, genera,

and species these creatures displayed. Haeckel, like Schleicher, had been ready for such a theory as Darwin's; he too was thoroughly imbued with romantic ideals. His letters to his fiancée—written while working on his habilitation in southern Italy—are smeared with quotations from Goethe. The romantic élan so took his soul in thrall that he contemplated giving up his scientific work for that of the life of a painter and free spirit. For a time he wandered over the island of Capri with a poet friend, who almost seduced him, quite literally, away from his eventual career as a university professor. It was only the thought of his fiancée, with whom he was deeply in love, and the realization that the life of a Bohemian did not pay very well that steered him to finish his habilitation and return to Jena.⁵⁵

Haeckel remained at Jena throughout his career and under his influence during the last half of the nineteenth century, the university became a bastion of Darwinian thought. Schleicher, who quickly slid to the Darwinian side under his friend's guidance, in turn contributed to Haeckel's own version of Darwinism, a version that became part of the standard view throughout the early years of the twentieth century. Schleicher made several significant contributions. First, he confirmed, from a quite different perspective, Darwin's theory, and thus supported Haeckel in what would become a comprehensive scientific philosophy. Second, he solidified for his friend that important metaphysical vision that became the basis for evolutionary theory in the latter half of the nineteenth century, namely monism.

Monism could support a variety of philosophical refinements. For instance, the American pragmatists William James (1842–1910) and John Dewey (1859–1952) both avowed monism. Henri Bergson (1859–1941) also claimed that metaphysical doctrine, as did most other evolutionists. Haeckel himself elevated the doctrine into a “monistic religion,” as he termed it.⁵⁶ The philosophy of monism could be given, as the works of these individuals suggest, different spins, different emphases. Haeckel always reminded his readers that anything called *Geist* had a material side. So, for example, under the rubric of monism in his *Natürliche Schöpfungsgeschichte* (The natural history of creation, 1868), which was a popular version of his fundamental theoretical work, *Generelle Morphologie der Organismen* (The general morphology of organisms, 1866), Haeckel insisted that “the human soul has been gradually formed through a long and slow process of differentiation and perfection out of the vertebrate soul.”⁵⁷ Or, as he also put it, “Between the most highly developed animal soul and the least developed human soul there is only a



Die Familiengruppe der Kalarrhinen (siehe Seite 555).

FIGURE 2.6 Frontispiece and title page of Ernst Haeckel's *Natürliche Schöpfungsgeschichte* (Berlin: Reimer, 1868).

quantitative, but no qualitative difference.”⁵⁸ Indeed, Haeckel thought that the mental divide separating the lowest man (the Australian or Bushman) and the highest animal (ape, dog, or elephant) was smaller than that separating the lowest man from the highest man, a Newton, a Kant, or a Goethe.⁵⁹ Haeckel regarded differences among men as so significant, that he thought humankind should be classified not simply into different races or varieties of one species, but into some nine separate species of one genus (see Figure 2.7). Morphological similarities led Haeckel to argue that human beings evolved through a kind of bottleneck, that of the narrow-nosed apes (see Figure 2.6). There must have been, according to Haeckel, an *Urmensch*, or *Affenmensch*—an ape man—that stemmed from the *Menschenaffen*—the menlike apes.

N a t ü r l i c h e
S c h ö p f u n g s g e s c h i c h t e

Übersetzt von
Dr. Ernst Haeckel

in Gemeinschaft mit
Dr. Ernst Haeckel,
Schriftf. an der Universität Bonn.

Berlin, 1868.
Verlag von Georg Reimer.

Mit einer, vollständig illustrierten und farbigen Tafel.

Zweite Auflage, über die Erweiterung derselben auf den
Hilfsraum des Originals
und andere kleine Verbesserungen
erweitert von Haeckel.

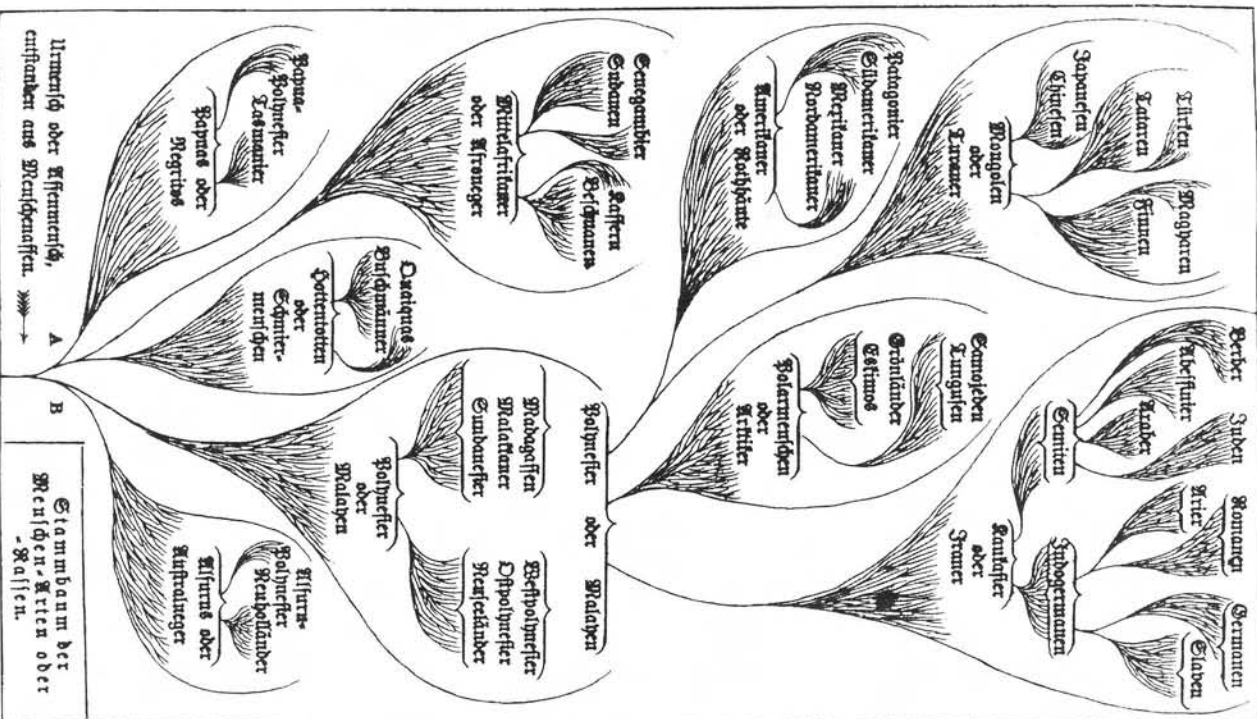


FIGURE 2.7 Haeckel's *Stammbaum* of the nine species of men. From his *Natürliche Schöpfungsgeschichte* (Berlin: Reimer, 1868).

This was the missing link, and the currency of this idea is due to Haeckel. He thought the *Affenmensch* would likely have come either from Africa or perhaps from the area of the Dutch East Indies, where the orangutan was to be found. Later, Haeckel would name this Ur-ancestor *Pithecanthropus alalus*—ape-man without speech. His protégé Eugène Dubois (1858–1940), a Dutch army doctor, actually found *Pithecanthropus* in Java in 1891; and the missing link, which Haeckel had predicted, became widely celebrated.⁶⁰ It was later re-christened *Homo erectus*, and Java man was the first of his remains to be discovered.

The unspoken question about human evolution, for which Haeckel had a spoken answer, was: What essentially distinguished the various species of men, what led to this great mental differentiation—a differentiation that persuaded him that the Papuan, for instance, was intellectually closer to the apes than to a Newton or Goethe? Morphologically, after all, aside from skin color and hair differences, human beings were pretty much alike. On this question Schleicher made another contribution. The monistic metaphysics that he professed emphasized the mental side of things, which is not surprising given his early commitment to romantic idealism. In *Zur vergleichenden Sprachengeschichte*, he argued, in Hegelian fashion, that the systematic representation of beings, from the logically simple to the more complex, was identical to the becoming of those beings in time, in a kind of evolutionary emanation. Animal cognition, in this philosophical consideration, remained decisively different from human mentality. By the 1860s, Schleicher could confirm his philosophical conception with a scientifically articulated one, namely, Darwin's. But in the 1860s, he still maintained that human beings were quite distinct from animals in their mental ability. Human mentality was exhibited in language, of which no animal was capable. What this now meant, however, was that the advent of language created man out of his apelike forebears, a creation that would not be repeated. Since, according to Schleicher, the basic language groups did not evolve from one another, each protohuman group became human in a distinctively different way. After the initial establishment of the isolating, agglutinating, and flexional languages, which created the different groups of men, they evolved at different rates and in different directions. Only the Indo-Germanic and Semitic languages reached a kind of perfection not realized in the other groups. Here, then, was Haeckel's solution to the evolution of the various human species.

In the *Natürliche Schöpfungsgeschichte*, Haeckel maintained that human beings had a quasi-monogenic origin in *Pithecanthropus*. He imagined that these original protomen evolved on a continent that now lay sunken in the Indian Ocean, somewhere between Malay and South West Africa, and that these primitive *Urmenschen* eventually split into two groups, which migrated respectively toward both east and west. Later he would call this fanciful continent "Atlantis" or "Paradise," with the full irony of that latter name in mind. Although the human physical frame could be traced back to this one kind of ape-man, Haeckel yet maintained that in a proper sense, the human species were polygenic, as Schleicher had suggested:

We must mention here one of the most important results of the comparative study of languages, which for the *Stammbaum* of the species of men is of the highest significance, namely that human languages probably had a multiple or polyphyletic origin. Human language as such probably developed only after the species of speechless *Urmenschen* or *Affenmenschen* had split into several species or kinds. With each of these human species, language developed on its own and independently of the others. At least this is the view of Schleicher, one of the foremost authorities on this subject. . . . If one views the origin of the branches of language as the special and principal act of becoming human, and the species of humankind as distinguished according to their language stem, then one can say that the different species of men arose independently of one another.⁶¹

The clear inference is that the languages with the most potential created the human species with the most potential. And, as Haeckel never tired of indicating, that species with the most potential—a potential realized—was that constituted by the Semitic and Indo-Germanic groups, with the Berber, Jewish, Greco-Roman, and Germanic varieties in the forefront.⁶² Their vertical position on the human *Stammbaum*, indicated the degree of their evolutionary advance (see Figure 2.7 above).

But Schleicher's greatest and lasting contribution to evolutionary understanding may simply be his use of a *Stammbaum* to illustrate the descent of languages. Not long after Schleicher published his open letter, Haeckel finished his magnum opus, his synthesis of evolutionary theory and morphology, his large two-volume *Generelle Morphologie der Organismen*. The end of the second volume included eight tables of phylogenetic trees. Although there are some vague antecedents for the graphic use of treelike forms for the expression of descent relationships, Haeckel quite obviously took his

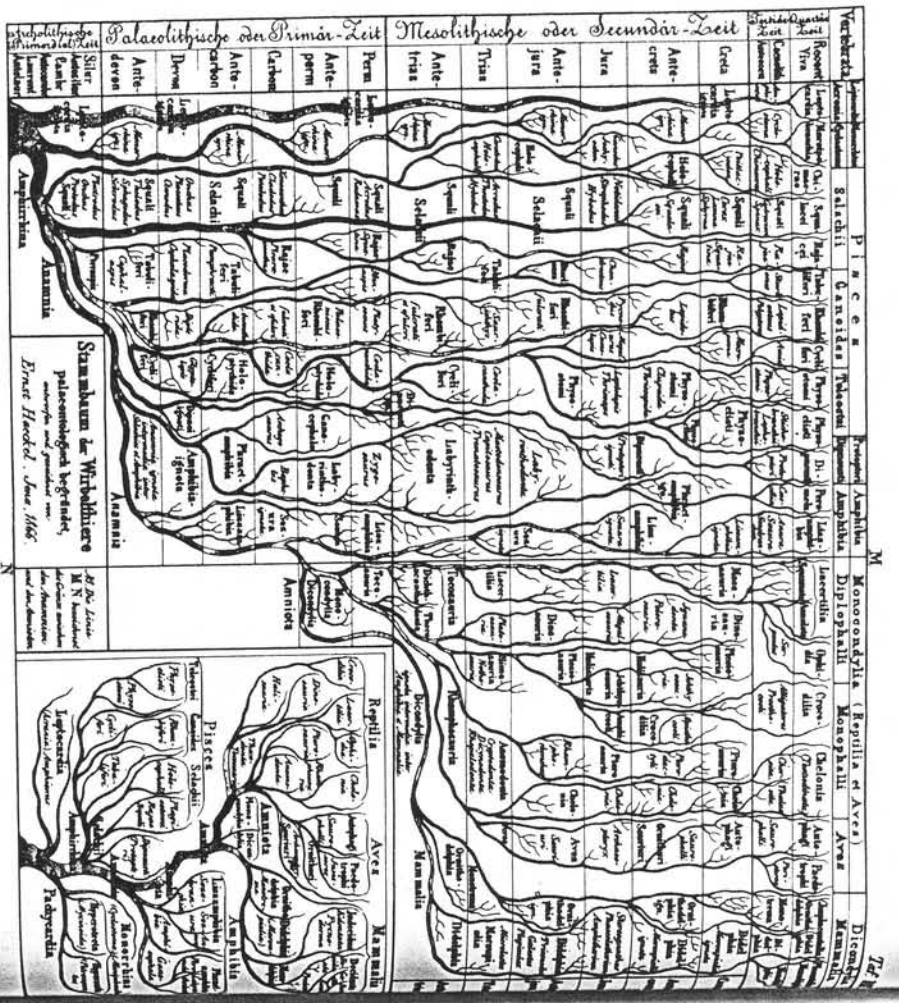


FIGURE 2.8 Haeckel's *Stammbaum* of the descent of vertebrates. From his *Generelle Morphologie der Organismen* (Berlin: Reimer, 1866).

inspiration from his good friend Schleicher.⁶⁵ And Haeckel's *Stammbäume* have become models for the representation of descent ever since. Haeckel's tree of vertebrates (see Figure 2.8) might be compared with both Darwin's diagram and Schleicher's. Unlike Darwin's but like Schleicher's, Haeckel's illustration shows a single origin of the vertebrate phylum, although each of the major phyla (for example, Mollusca, Articulata, and so on), he maintained, had independent origins. And, of course, again unlike Darwin's but like Schleicher's, Haeckel's *Stammbaum* depicts actual species, the extinct and the extant. Schleicher's tree captured both time, marked as the distance from the Indo-Germanic *Ursprache*, and morphological differ-

entiation, represented by the separation of the branches. Haeckel's diagram depicts this too. Haeckel's tree has an added feature, of course: it actually looks like a tree, whereas Darwin's and Schleicher's sketches are merely line drawings. This might seem, at bottom, a trivial difference, arising from the fact that Haeckel was an accomplished artist. Certainly his talent made the depiction possible. But the living, branching, gnarled, German oak functioned as a kind of graphic rhetoric: it vividly displayed the tree of life, in all its gothic and romantic textures. In the case of all three authors, but with increasing vivacity, a visual argument was made, which with Haeckel had become a powerful, if silent, linking of the very newest theory in biology with the traditions well established at Jena of German romanticism.

CONCLUSION

During the mid-1860s, Darwin's great friend Alfred Russel Wallace had undergone a conversion to spiritualism, on the basis of experimental evidence, to be sure.⁶⁶ In a review article in 1869, Wallace fortified his conviction with some powerful arguments about natural selection's insufficiency to account for man's big brain.⁶⁵ Sheer survival, he thought, simply did not require the intellectual capacity demonstrated by even primitive men. Darwin, in some horror, responded to his friend's article: "But I groan over Man—you write like a metamorphosed (in retrograde direction) naturalist, and you the author of the best paper that ever appeared in the *Anthropological Review!* Eheu! Eheu!"⁶⁶ Darwin, nonetheless, saw the force of Wallace's argument and thus the vexing problem it posed: how to explain the complex mind and big brain of human beings. But during the mid-1860s, another kind of argument came to his attention, one that held the key to the evolutionary resolution of the problem. The argument was Schleicher's for the linguistic creation of man, and it came to Darwin's attention through several sources. Darwin studied Schleicher's *Darwinsche Theorie*, which he then used and cited in his own formulation in the *Descent of Man*. He got two other doses of Schleicher's views more indirectly. Frederick Farrar—whom Darwin named along with his cousin Hensleigh Wedgwood and Schleicher as contributing to his conception of language—had made Schleicher's theories known to the British intellectual community through a comprehensive account in the journal *Nature*.⁶⁷ Schleicher's conceptions also got conveyed to Darwin through a gift of Haeckel's *Natürliche Schöpfungsgeschichte*, which the author sent in

1868. Darwin wrote to a friend after reading Haeckel's work that it was "one of the most remarkable books of our time."⁶⁸ Darwin's notes and underlining in the book are quite extensive. He was particularly interested, as shown by his scorings and marginalia, in Haeckel's account of Schleicher's thesis in *Über die Bedeutung der Sprache für die Naturgeschichte des Menschen*.⁶⁹ Here Darwin had a counterargument to Wallace's, one by which he could solidify an evolutionary naturalism: language might modify brain, increasing its size and complexity, with such acquisition becoming a permanent hereditary legacy.⁷⁰ The irony, of course, is that Darwin's evolutionary naturalism obtained its support, via Schleicher, ultimately from Wilhelm von Humboldt and Georg Friedrich Hegel, two foremost representatives of German romanticism and idealism, the movements that forged the missing link in nineteenth-century evolutionary theory.

36. Heisenberg saw similar problems with logical positivism; see the quotation on page 15.
37. Erich Rothacker, *Das "Buch der Natur". Materialien und Grundsätzliches zur Metaphengeschichte* (Bonn: Bouvier, 1979), 13.
38. The study of language has been central to such different cultures as Europe, India, and China. This would lead to another project about how these very different languages informed and inform views on nature and the world, part of a *longue histoire des textes* of the sort suggested by Karine Chemla in "Histoire des sciences et matérialité des textes," *Enquête* 1 (1995): 167-80; see also for an English version, Karine Chemla, "What Is the Content of this Book? A Plea for Developing History of Science and History of Text Conjointly," *Philosophy and the History of Science* 4, no. 2 (1995): 1-46.

Chapter 2

Cheryce Kramer made many suggestions for the improvement of this essay, and Paul White furnished essential bibliographic help. I am grateful to both for their generous assistance.

1. For a brief discussion of Darwin's later views about language, see Robert J. Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1987), 200-206.
2. Charles Darwin, *Old and Useless Notes in Charles Darwin's Notebooks, 1836-1844*, ed. P. Barrett et al. (Ithaca, N.Y.: Cornell University Press, 1987), 599 (5-5v).
3. See Charles Darwin, *Notebook N*, in *ibid.*, 568, 581 (18 and 65) (note 2).
4. See Hensleigh Wedgwood, *On the Origin of Language* (London: Triibner, 1866), 13-14, 129. See also Richards, *Darwin and the Emergence of Evolutionary Theories*, 205 (note 1).
5. In actual bulk of pages, Darwin's two-volume *Descent of Man and Selection in Relation to Sex* swims in data and discussions of sexual selection in butterflies, birds, and other beasts. The aim of this investigation, though, is to shed light on human traits and human sexual dimorphism. Charles Darwin, *On the Descent of Man and Selection in Relation to Sex*, 2 vols. (London: Murray, 1871).
6. I have discussed Wallace's spiritualistic interpretation of evolution and Darwin's reaction in *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior*, 176-84 (note 1).
7. Darwin, *Descent of Man*, 1:57 (note 5).
8. F. H. Bradley to C. Lloyd Morgan (February 16, 1895), in the Papers of C. Lloyd Morgan, DM 612, Bristol University Library.
9. Darwin, *Descent of Man*, 1:58, 2:390-91 (note 5).
10. John Locke (1632-1704), as usual, established the common British view. He held that God furnished man with language in order "to use these sounds as signs of internal conceptions; and to make them stand as marks for the ideas within his own

- mind, whereby they might be made known to others, and the thoughts of men's minds be conveyed from one to another." Although thought used language, according to Locke, "thought is not constituted by, nor identical with language, which on the contrary is originated and formed by thought." See John Locke, *An Essay Concerning Human Understanding*, 2 vols. (New York: Dover, 1959 [1670]), 2:3, n. 2.
11. Charles Darwin, *On the Origin of Species* (London: Murray, 1859), 488.
12. For an analysis of the several places in the *Origin* where Darwin makes fleeting reference to human beings, see Kathy J. Cooke, "Darwin on Man in the *Origin of Species*," *Journal of the History of Biology* 26 (1990): 517-21.
13. Darwin, *Origin of Species*, 422 (note 11).
14. Charles Lyell, *The Geological Evidences of the Antiquity of Man* (London: Murray, 1863), 463.
15. Lyell, *Geological Evidences*, 469 (note 14).
16. Alexander von Humboldt not only conveyed a conception of living nature that Darwin incorporated into his own evolutionary theory, but he also suggested that language helped to create human intellect. In the English translation of Humboldt's *Kosmos*, which Darwin read in the 1850s, the following may be found: "But thought and language have ever been most intimately allied. If language, by its originality of structure and its native richness, can, in its delineations, interpret thought with grace and clearness, and if, by its happy flexibility, it can paint with vivid truthfulness the objects of the external world, it reacts at the same time upon thought, and animates it, as it were, with the breath of life. It is this mutual reaction which makes words more than mere signs and forms of thought; and the beneficent influences of a language is more strikingly manifested on its native soil, where it has sprung spontaneously from the minds of the people, whose character it embodies." See Alexander von Humboldt, *Cosmos*, 5 vols., trans. E. C. Otte (New York: Harper & Brothers, 1848-68), 1:56. This general view of language is also to be found in August Schleicher, as I explain below in the text. Both theorists, however, seem to have had a common source: Wilhelm von Humboldt (see below). For a discussion of the impact of Alexander von Humboldt's ideas on Darwin's conception of nature, see Robert J. Richards, "Darwin's Romantic Biology, the Foundation of his Evolutionary Ethics," in *Biology and the Foundations of Ethics*, ed. Jane Maienschein and Michael Ruse (Cambridge: Cambridge University Press, 1999), 113-53.
17. See Charles Darwin, *Über die Entstehung der Arten im Tier- und Pflanzenreich durch natürliche Züchtung oder Erhaltung der vortollkommenen Rassen im Kampfe um's Daseyn*, 2d ed. (from the 3d English ed.), trans. H. G. Bronn (Stuttgart: Schweizerbart'sche Verlagshandlung und Druckerei, 1863).
18. Schleicher was indeed a serious gardener and wrote a review of the *Origin* for an agricultural journal. See August Schleicher, "Die Darwin'sche Theorie und die Tier- und Pflanzenzucht," *Zeitschrift für deutsche Landwirth* 15 (1864): 1-11. In the review, Schleicher summarized Darwin's argument and added elements that he undoubtedly thought rounded out the theory, including the suggestion that human beings descended from the "higher apes" and differed from them only by reason of

language and "high brain development" (6). Schleicher neglected to mention that Darwin himself did not discuss human evolution in the *Origin*. Schleicher sent this review to Darwin, and it is now held in the Manuscript Room of Cambridge University Library. Scorings indicated Darwin read the review.

19. August Schleicher, *Die Darwinsche Theorie und die Sprachwissenschaft* (Weimar: Böhlau, 1863). Recently two works have discussed Schleicher's book with skill and insight. See Liba Taub, "Evolutionary Ideas and 'Empirical' Methods: The Analogy Between Language and Species in Works by Lyell and Schleicher," *British Journal for the History of Science* 26 (1993): 171-93; and Stephen Alter, *Darwinism and the Linguistic Image* (Baltimore, Md.: Johns Hopkins University Press, 1999), esp. 73-79.

20. In the English press, Schleicher's book, in the first German edition, received immediate notice through an anonymous author. See "The Darwinian Theory in Philology," *The Reader* 3 (1864): 261-62. The author agreed with Schleicher that linguistics lent support to Darwin's theory. Friedrich Max Müller discussed the English translation (see next note) of the work in a review in *Nature* ("The Science of Language," *Nature* 1 [1870]: 256-59). Müller took exception to the idea that a descent language sprang from a well-formed classical language (for example, French from Latin). Rather, he maintained that the descendant language arose from rude dialects that might trace their origin to the classical language. Frederick Farrar, feeling that Müller gave scant account of Schleicher's little book, provided a summary in a subsequent issue of *Nature* ("Philology and Darwinism," *Nature* 1 [1870]: 527-29). Darwin undoubtedly read these reviews. See the discussion of the controversy between Müller and Farrar in Alter, *Darwinism and the Linguistic Image*, 84-96 (note 19). William Dwight Whitney took grave exception to Schleicher's naturalism—that is, the supposition that languages displayed organic features and obeyed natural laws—and denied that Schleicher's notion of language descent gave any aid to Darwin's theory. See William Dwight Whitney, "Schleicher and the Physical Theory of Language" (1871), reprinted in his *Oriental and Linguistic Studies*, 2 vols. (New York: Charles Scribner's Sons, 1873), 1:298-331. Hans Arsléff details other responses to Schleicher's *Darwinsche Theorie*, of whose doctrines he thoroughly disapproves. See Hans Arsléff, *From Locke to Saussure: Essays on the Study of Language and Intellectual History* (Minneapolis: University of Minnesota Press, 1982), 293-334.

21. Darwin, *Descent of Man*, 1:56 (note 5). Darwin received a copy of *Darwinsche Theorie* (now held in the Manuscript Room of Cambridge University Library) from the author; in the *Descent* he referred to the English edition (also in the Manuscript Room of Cambridge University Library). See August Schleicher, *Darwinism Tasted by the Science of Language*, trans. Alex Bikkers (London: John Camden Horsten, 1869). Marginal scorings indicate that Darwin read both versions of the book.

22. Heinrich Bronn, "Schlusswort des Übersetzers," in Charles Darwin, *Über die Entstehung der Arten*, 525-51. Bronn brought as a chief objection to Darwin's theory that it was "in its ground-conditions of justification still a thoroughly wanting hypothesis." It remained, according to Bronn "undemonstrated," although also "un-

refuted" (532-33). Bronn did, however, lodge some considerations that militated against the hypothesis, for example, that transitional species were lacking (534-35). Bronn himself was the author of a quasi-evolutionary theory, which he formulated prior to reading Darwin. He elaborated his theory in a prizewinning essay, selections of which were translated into English as "On the Laws of Evolution of the Organic World during the Formation of the Crust of the Earth," *The Annals and Magazine of Natural History*, 3d ser., 4 (1859): 81-90, 175-84. Bronn argued for a gradual appearance of new species and an extinguishing of more primitive ones over great periods of time. Such evolution did not involve, however, the transformation of one species into another, merely the successive appearance and adaptation of progressively higher kinds of flora and fauna. This process occurred, he strongly implied but did not expressly say, through Divine Wisdom. His views were not unlike those of Louis Agassiz and Richard Owen. For a discussion of the ideas of these latter thinkers, see Robert J. Richards, *The Meaning of Evolution* (Chicago: University of Chicago Press, 1992), 116-21.

23. Schleicher, *Darwinsche Theorie*, 4-8, 23-24 (note 19).

24. *Ibid.*, 8 (note 19).

25. This is one of the general themes of my forthcoming *The Tragic Sense of Life: The Battle over Revolutionary Thought in Germany*.

26. August Schleicher, *Über die Bedeutung der Sprache für die Naturgeschichte des Menschen* (Weimar: Böhlau, 1865), 16 and 18-19.

27. *Ibid.*, 21 (note 26).

28. See the conclusion of this paper for a discussion of Darwin's knowledge of Schleicher's *Bedeutung der Sprache*.

29. For details of Schleicher's life I have relied on Johannes Schmidt, "Schleicher," *Allgemeine deutsche Biographie* 31 (1890): 402-15; Joachim Dietze, *August Schleicher als Slawist: Sein Leben und sein Werk in der Sicht der Indogermanistik* (Berlin: Akademie-Verlag, 1966); and Theodor Syllaba, *August Schleicher und Böhmen* (Prague: Karls-Universität, 1995).

30. Syllaba, *August Schleicher und Böhmen*, 18 (note 29).

31. Syllaba characterizes Schleicher's work as a correspondent and provides a list of the articles in his *August Schleicher und Böhmen*, 13-27 (note 29).

32. See Dietze, *August Schleicher als Slawist*, 16 (note 29).

33. Robert Boxberger, "Prager Erinnerungen aus Jena," quoted in Dietze, *August Schleicher als Slawist*, 45 (note 29).

34. August Schleicher, *Zur vergleichenden Sprachengeschichte* (Bonn: H. B. König, 1848).

35. In distinguishing these three forms of language, Schleicher was simply following the lead of Wilhelm von Humboldt, Franz Bopp, and ultimately August Wilhelm Schlegel. Schleicher was certainly familiar with the work of these near-contemporary linguists. In his *Sprachengeschichte*, he cited Humboldt often enough, although not precisely on this distinction. See Wilhelm von Humboldt, *Über die Kawi-Sprache auf der Insel Java*, 3 vols. (Berlin: Königl. Akademie der Wissenschaften, 1836).

The introduction to this famous work on Javanese language made the threefold distinction pivotal (I:ccxxv–cxlviii). August Wilhelm Schlegel, who became professor of linguistics at Bonn, formulated the original distinction in his *Observations sur la langue et la littérature provençales* (Paris: Librairie grecque-latine-allemande, 1818), 14–16. Franz Bopp, whom Humboldt brought to Berlin as professor, canonized the distinction in his *Vergleichende Grammatik des Sanskrit, Zend, Griechischen, Lateinischen, Lithauischen, Gotischen und Deutschen* (Berlin: Königliche Akademie der Wissenschaften, 1833), 108–13.

36. Schleicher, *Zur vergleichenden Sprachengeschichte*, 8–11 (note 34).

37. Humboldt, for instance, liked to refer to the internal coherence of language by use of the term “the language-organism” [*Sprachorganismus*]. See Humboldt, *Über die Kawi-Sprache*, I:ccxxv (note 35). Bopp likewise generously employed the organic metaphor; as he expressed it in his *Vergleichende Grammatik*, iii (note 35): “I intend in this book a comparative, comprehensive description of the organism of the languages mentioned in the title, an investigation of their physical and mechanical laws, and the origin of the forms indicating grammatical relationships.” Humboldt and Bopp had, in utilizing this metaphor, adopted the conception of Friedrich Schelling, the philosophical architect of the romantic movement. See, for instance, a typical observation of Schelling, in his *Historisch-kritische Einleitung in die Philosophie der Mythologie* (1842), in *Friedrich Wilhelm Joseph von Schelling Ausgewählte Schriften*, ed. Manfred Frank, 6 vols. (Frankfurt am Main: Suhrkamp, 1985), 5:61: “Language does not arise piece-meal or atomistically, but it arises in all its parts immediately as a whole and thus organically [organisch].”

38. Although Schleicher basically advanced the same theory as in his *Sprachgeschichte*, he now felt perfectly comfortable describing language groups using biological classifications. See his *Die Sprachen Europas in systematischer Übersicht* (Bonn: König, 1850), 22–25, and 30.

39. Among his contemporaries, William Dwight Whitney dismissed Schleicher’s conception of language as a law-governed, organic phenomenon. Whitney argued that actions produced by human will escaped the rule of law. See Whitney, “Schleicher and the Physical Theory of Language,” 298–331 (note 20). This same kind of criticism has been voiced more recently. Eugen Seidel thinks Schleicher “erred” in regarding *Sprachwissenschaft* as a *Naturwissenschaft*, failing, as he supposedly did, to perceive the social character of language. See Eugen Seidel, “Die Persönlichkeit Schleichers,” *Wissenschaftliche Beiträge der Friedrich-Schiller-Universität Jena* (1972): 8–17. Arslieff expresses a similar opinion (*From Locke to Saussure*, 294–95 [note 20]). Such judgments betray a poverty of historical understanding.

40. Schleicher published two articles in 1853 that employed a graphic illustration of a *Stammbaum*. One was in Czech, the other German. See, for instance, August Schleicher, “Die ersten Spaltungen des indogermanischen Urvolkes,” *Allgemeine Zeitschrift für Wissenschaft und Literatur* (August 1853): 786–87.

41. Taub thinks that Friedrich Ritschl (1806–76), Schleicher’s teacher at Bonn, may have suggested the tree-method of representation by his work in the establish-

ment of manuscript pedigrees. See Taub, “Evolutionary Ideas and ‘Empirical’ Methods,” 185–86 (note 19).

42. See, for example, August Schleicher, *Die Deutsche Sprache* (Stuttgart: Cotta’scher Verlag, 1860), 58–59.

43. *Ibid.*, 29 (note 42). From the beginning of his theorizing, Schleicher believed that common *Lautgesetze* (laws of oral expression) governed consonant and vowel changes of language families. In *Deutsche Sprache*, he began formulating macrolaws of language descent, such as the one mentioned earlier.

44. *Ibid.*, 38 (note 42). William Dwight Whitney, commenting on such passages in *Deutsche Sprache* and comparable ones in *Bedeutung der Sprache*, vigorously dissented: “The rise of language had nothing to do with the growth of man out of an apish stock, but only with his rise out of savagery and barbarism. . . . Man was man before the development of speech began; he did not become man through and by means of it.” See Whitney, “Schleicher and the Physical Theory of Language,” 324–25 (note 20).

45. Whitney, “Schleicher and the Physical Theory of Language,” 5 (note 20): “Speech is thus the expression of thought in sound, audible thought, just as, on the other hand, thought is inaudible speech.”

46. See Richards, *Meaning of Evolution*, 42–55 (note 22).

47. Johann Gottfried Herder, *Abhandlung über den Ursprung der Sprache*, in *Sprachphilosophische Schriften*, ed. Erich Heintel (Hamburg: Felix Meiner, 1975), 3–90; quotations from pages 28 and 32.

48. *Thought*, according to Schleicher, has material elements—that is, representations (of phenomena) and concepts (when reflexive)—and formal structure—that is, the relationships among the elements. “Language thus has as its task to provide through sound an image of representations and concepts, and their relationships.” *Meaning (Bedeutung)* then is the concept or representation as expressed in sound, while a word *root* is the sound complex that expresses meaning. The word itself is the meaning plus the grammatical relationships in sound. See Schleicher, *Die Deutsche Sprache*, 6 (note 42).

49. Humboldt, *Kawi-Sprache*, I:lxixv (note 35).

50. *Ibid.*, I:lxixiii (note 35).

51. Schleicher, *Zur vergleichenden Sprachengeschichte*, 11 (note 34).

52. *Ibid.*, 16 (note 34). Schleicher quoted extensively from Hegel’s *Introduction to the Philosophy of History*. This was part of the compilation of student notes published in 1840, after Hegel’s death. Hegel maintained, for instance: “It is a fact shown by literary remains, that the languages spoken by peoples in uncultured conditions have been well-formed in the highest degree, and that human understanding has developed through having this theoretical foundation. . . . It is further a fact that with the progressive civilizing of society and the state that the systematic activity of the understanding has eroded and language has become less well-formed and poorer.” See Georg Wilhelm Friedrich Hegel, *Vorlesungen über die Philosophie der Geschichte*, vol. 12: *Werke*, 4th ed. (Frankfurt am Main: Suhrkamp, 1995), 85.

53. Hegel, *Vorlesungen*, 78 (note 52).
54. Ernst Haeckel, *Die Radiolarien*, 2 vols. (Berlin: Reimer, 1862).
55. I elaborate the history of Haeckel's development and the impact of romantic thought on his science in my forthcoming *The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought in Germany*.
56. See Ernst Haeckel, *Der Monismus als Band zwischen Religion und Wissenschaft* (Stuttgart: A. Köner, 1905). Haeckel first explicitly endorsed Schleicher's conception of monism in his *Generelle Morphologie der Organismen*, 2 vols. (Berlin: Reimer, 1866), 1:105–108.
57. Ernst Haeckel, *Die Natürliche Schöpfungsgeschichte* (Berlin: Reimer, 1868), 550.
58. *Ibid.*, 546 (note 57).
59. *Ibid.*, 549 (note 57).
60. See Eugene Dubois, *Pithecanthropus erectus: Eine Menschenaehnliche Uebergangsform aus Java* (Batavia: Landesdruckerei, 1894).
61. Haeckel, *Natürliche Schöpfungsgeschichte*, 511 (note 57).
62. The debate over the monogenic or polygenic origin of man still rages, if in a slightly different key. See, for instance, Christopher Stringer and Robin McKie, *African Exodus: The Origins of Modern Humanity* (New York: Holt, 1996). See also my review of their book, "Neanderthals Need Not Apply," *New York Times Book Review* (August 17, 1997), 10.
63. Alec Panchen discusses such antecedents, for example, the "tree of Porphyry," in *Classification, Evolution, and the Nature of Biology* (Cambridge: Cambridge University Press, 1992), 10–40. He renders the obvious judgment that "the fashion for genealogical dendrograms, or phylogenetic trees, representing real taxa, started with Haeckel!" (30).
64. See Richards, *Darwin and the Emergence of Evolutionary Theories*, 176–84 (note 1).
65. Wallace first advanced his arguments in a review of new editions of Charles Lyell's works. See Alfred Russel Wallace, "Review of *Principles of Geology* by Charles Lyell; *Elements of Geology* by Charles Lyell," *Quarterly Review* 126 (1869): 359–94.
66. Charles Darwin to Alfred Wallace (January 26, 1870), in *Alfred Russel Wallace: Letters and Reminiscences*, 2 vols., James Marchant, ed. (London: Cassell, 1916), 1:251.
67. Frederick Farrar, "Philology and Darwinism," *Nature* 1 (1870): 527–29.
68. Charles Darwin to William S. Dallas (June 9, 1868), in DAR 162, held in the Manuscript Room of Cambridge University Library.
69. Darwin's copy of Haeckel's *Natürliche Schöpfungsgeschichte* is held in the Manuscript Room of Cambridge University Library.
70. In the conclusion to the *Descent of Man*, Darwin referred to an article by Chauncy Wright, which in the last moments of manuscript preparation he had just read. Wright had attacked Wallace's argument that man's big brain had to be given a nonselectionist account. See Chauncy Wright, "Limits of Natural Selection," *The*

North American Review 111 (October 1870): 282–311. Darwin suggested that Wright also endorsed the idea that language operated to produce man's increased intellectual capacity through use inheritance (*Descent of Man*, 2:390–91 [note 5]). Wright's argument is a bit convoluted, but it is clear, he made no such argument as Darwin attributed to him. Quite the contrary. Wright (294–98) maintained that Wallace had simply misjudged the character of the native's capacities. Wright rather held that language and so-called higher faculties were merely collateral features of capacities directly useful to the native and so indirectly acquired through natural selection. "Why may it not be," he asked, "that all that he [the savage] can do with his brains beyond his needs is only incidental to the powers which are directly serviceable?" (295). He further suggested that the difference between the savage and the philosopher "depends on the external inheritances of civilization, rather than on the organic inheritances of the civilized man" (296). Darwin, in his enthusiasm for the Schleicher argument, found its ghost in any text that opposed Wallace's thesis.

Chapter 3

1. Ernst Robert Curtius, *Europäische Literatur und lateinisches Mittelalter* (Bern: Francke, 1948), 323.
2. Paul Berg and Maxine Singer, *Dealing with Genes: The Language of Heredity* (Mill Valley, Calif.: University Science Books, 1992), 241.
3. Bernd-Olaf Küppers, *Information and the Origin of Life* (Cambridge, Mass.: MIT Press, 1990), xix. Originally published in German: Bernd-Olaf Küppers, *Der Ursprung biologischer Information. Zur Naturphilosophie der Lebensentstehung* (München: Piper, 1986).
4. Umberto Eco, *Semiotics and the Philosophy of Language* (Bloomington: Indiana University Press, 1984), 87.
5. Ivo Braak, *Poetik in Stichworten* (Stuttgart: Borntraeger Verlag, 1990), 30.
6. Eco, *Semiotics and Philosophy of Language*, 101 (note 4). Aristotle, *Poetics* 1459a6–8.
7. Erwin Schrödinger, *What Is Life?* (Cambridge: Cambridge University Press, 1944).
8. Lily E. Kay, "Who Wrote the Book of Life? Information and the Transformation of Molecular Biology, 1945–55," *Science in Context* 8 (1995): 609–34; Lily E. Kay, "A Book of Life? How the Genome Became an Information System and DNA a Language," *Perspectives in Biology and Medicine* 41 (1998): 504–28. See also Lily E. Kay, *Who Wrote the Book of Life? A History of the Genetic Code* (Stanford, Calif.: Stanford University Press, 2000), which appeared too late to be discussed here.
9. Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: J. Wiley, 1948), 8; Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1950), 109.