

## Historical Essay

# Ernst Haeckel's Alleged Anti-Semitism and Contributions to Nazi Biology

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Ernst Haeckel's popular book *Natürliche Schöpfungsgeschichte* (Natural history of creation, 1868) represents human species in a hierarchy, from lowest (Papuan and Hottentot) to highest (Caucasian, including the Indo-German and Semitic races). His stem-tree (see Figure 1) of human descent and the racial theories that accompany it have been the focus of several recent books—histories arguing that Haeckel had a unique position in the rise of Nazi biology during the first part of the 20th century. In 1971, Daniel Gasman brought the initial bill of particulars; he portrayed Haeckel as having specific responsibility for Nazi racial programs. He argued that Darwin's champion had a distinctive authority at the end of the 19th century, throwing into the shadows the myriads of others with similar racial attitudes.<sup>1</sup> But it was not simply a general racism that Haeckel expressed; he was, according to Gasman (1971: 157–159), a virulent anti-Semite. Since its original publication, Gasman's thesis has caught on with a large number of historians, so that in the present period it is usually taken as a truism, an obvious fact of the sordid history of biological thought in the first half of the 20th century.<sup>2</sup>

Perhaps the most prominent scholar—at least among historians of biology—to adopt and advance Gasman's contention was Stephen Jay Gould. In his first book, *Ontogeny and Phylogeny* (1977), Gould took as his subject Haeckel's principle of recapitulation, the proposal that during ontogeny the developing embryo went through the same morphological stages as the phylum passed through in its evolutionary descent. So according to this conception, the human embryo begins as a one-celled creature, then takes on the form of an ancient invertebrate (e.g., a gastraea), then of a primitive vertebrate, then of an early mammal, then of a primate, and finally of a distinct

human being. Gould wished to assess both the principle's historical fortunes and its then-contemporary status. He admitted that Haeckel's concept of heterochrony (i.e., differential temporal regulation of the several phases of development) remained an important feature of our understanding of embryogenesis; but he expended considerable energy to show that his predecessor never coherently analyzed or pursued the concept. Moreover, Haeckel's principle of recapitulation, in Gould's estimate, ran counter to Darwin's own theories of embryonic development.<sup>3</sup> The hardened wedge that Gould used to pry Darwin away from Haeckel came from Gasman, to whose thesis the young scientist unhesitatingly subscribed:

But as Gasman argues, Haeckel's greatest influence was, ultimately, in another tragic direction—national socialism. His evolutionary racism; his call to the German people for racial purity and unflinching devotion to a “just” state; his belief that harsh, inexorable laws of evolution ruled human civilization and nature alike, conferring upon favored races the right to dominate others; the irrational mysticism that had always stood in strange communion with his grave words about objective science—all contributed to the rise of Nazism. (Gould 1977: 77–78)

In a more recent book, *Haeckel's Monism and the Birth of Fascist Ideology* (1998), Gasman has pumped new life into his earlier charge and expanded its scope. He continues to maintain that Haeckel, dead a decade and a half before Hitler came to power, had virtually begun the work of the Nazis: “For Haeckel, the Jews were the original source of the decadence and morbidity of the modern world and he sought their immediate exclusion from contemporary life and society” (Gasman 1998: 26). Gasman further argues that Haeckel's malign influence did not stop with the Nazis: this German's ideas became, in Gasman's estimation, the primary source of fascism throughout Europe in the first part of the 20th century.<sup>4</sup>

If with somewhat less inflationary rhetoric, Richard Weikart presses similar claims in his tellingly titled book *From Darwin to Hitler* (2004). Weikart's thesis is that “no matter how crooked the road was from Darwin to Hitler, clearly Darwinism and eugenics smoothed the path for Nazi ideology,

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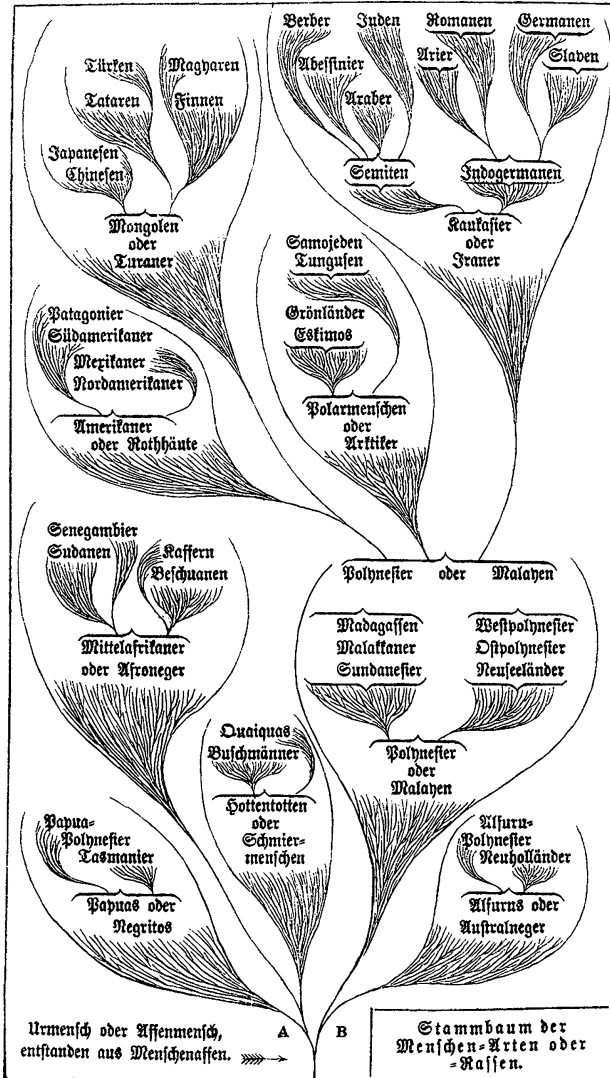


Figure 1. Stem-tree of the nine species of men, rooted in the ape-man; from Ernst Haeckel, *Die Natürliche Schöpfungsgeschichte* (1868).

especially for the Nazi stress on expansion, war, racial struggle, and racial extermination” (Weikart 2004: 6). In Weikart’s account, Haeckel simply packed Darwin’s evolutionary materialism and racism into his sidecar and delivered their toxic message to Berchtesgaden. In this essay, I will assess the character of Haeckel’s ideas about race, especially his alleged anti-Semitic doctrine, and the role of those ideas in the Nazi program. First, however, I would like to place his conceptions in the context of 19th-century racial thinking.

### A Brief Survey of European Racial Theories before Haeckel

Haeckel, of course, was hardly alone in calibrating human beings using an intellectual and aesthetic scale. Darwin also aligned the human groups on a developmental trajectory, from

the “savage” races to the “civilized.” Darwin thought it comported better with common usage to speak of one human species with many varieties or races—but the distinction between species and race, he had long since argued, was arbitrary (Darwin 1871, 1: 235). The significant differences among the human groups, however, were clear. He believed, for instance, that the degenerate human variety inhabiting the Emerald Isle certainly fell well below the mark set by the more civilized groups clustered in England and Scotland.<sup>5</sup> As a typical representative of his class and times, Darwin also regarded women as intellectually inferior to men (Darwin 1871, 1: 188–189). Sexual selection, he maintained, largely accounted for the superiority of the male mind, as well as for the hierarchical distribution of traits throughout the human groups. The very structure of evolutionary theory, as Darwin formulated it and Haeckel advanced it, virtually required that animal species be regarded as sluggishly less developed or progressively more developed and that the varieties within a species be arranged along a comparable scale.<sup>6</sup> There is, then, little question that both Haeckel and Darwin depicted the human races as forming a hierarchy, with some varieties displaying more progressive traits than others. But, of course, neither of these thinkers was original in this respect. Prominent biologists, writing before the advent of Darwinism, proposed schemes of racial classification that reflected prevailing conceptions, namely, assumptions that affirmed the high status of Europeans in the world.

18th-century naturalists were the first to develop systematic and comprehensive categories to classify human beings and to locate their place in relation to the lower animals. For instance, in the tenth edition (1758) of his *Systema naturae*, Linnaeus (1707–1778) placed the genus *Homo* within the order *Primates* (which included monkeys, bats, and sloths) and distinguished two species: *Homo sapiens* and *Homo troglodytes* (anthropoid apes). He divided *Homo sapiens* (wise man) into four varieties: American (copper-colored, choleric, upright [*rectus*], regulated by custom), Asiatic (sooty, melancholic, stiff, and governed by opinions), African (black, phlegmatic, languid [*laxus*], and governed by caprice), and European (fair, sanguine, muscular, and governed by laws). Linnaeus (1760–1770, 1: 20–24) conceived such differences as expressive of divine intent.

Johann Friedrich Blumenbach (1752–1840), the most influential theorist on this question at the turn of the 19th century, argued that human beings constituted one species, with several varieties merging into one another. His *De generis humani varietate native liber* (3rd ed., 1795) distinguished five races of the human species: the Caucasian (originating in Georgia), the Mongolian (including Greenlanders and Eskimos), the Ethiopian (Africans), the American (Indians of North and South America), and the Malayan (including the islanders of the South Pacific). These groups differed in skin

color, facial traits, hair texture, stature, and skull-shape. Blumenbach speculated that the large penis of his Ethiopian specimen would support tales of sexual prowess, but he did not venture whether the trait generally characterized the variety (Blumenbach 1795: 240–241). He thought the Caucasian race the most beautiful and inferred that it might constitute the original people, whence the others had altered and declined through the effects of climate.

During the early 19th century, the clear delineation of distinct races, each with special characteristics, held firm. Georges Cuvier (1769–1832), who wielded extraordinary influence on such questions, distinguished three “races” of the human species: the white race, or Caucasians; the yellow race, or Mongolians; and the black race, or Ethiopians. Not surprisingly, he regarded the Caucasians as the most beautiful and the most cultured. The Mongolian race—the Chinese and Japanese—had founded great civilizations, which, however, stalled in an unprogressive mode and stagnated. Members of the Ethiopian race had a “reduced skull” (*crâne comprimé*) with facial features that “approach those of monkeys”; and these peoples had “remained barbarians” (Cuvier 1829–1830, 1: 80).

The singular exception to such common racial judgments during the early 19th century were the conclusions drawn by Friedrich Tiedemann (1781–1861). Stimulated by debates in the British Parliament over slavery, he made numerous experimental measurements, both absolute and relative to body size, of the brains and skulls of the several human groups. In his *Das Hirn des Negers* (The brain of the Negro, 1837), he found no significant differences among Caucasians, Mongolians, Malays, American Indians, and Negros (Tiedemann 1837). He completed his study with accounts of Negroes who had received an education and had made important contributions to the sciences and literature (Tiedemann 1837: 79–82).

The anthropological treatises of the 19th century, both the evolutionary and the non-evolutionary, carried forward the earlier assumptions that human beings formed distinct groupings and that these stood in hierarchical relationships. James Hunt (1833–1869), founder of the Anthropological Society of London in the early 1860s and no friend of the Darwinians, continued the older polygenist tradition of regarding the races as separate creations. In his presidential address to the Society (1863), Hunt declared the Negro a distinct species, much closer to the apes than to Europeans.<sup>7</sup> Right through the early part of the 20th century—and beyond—most naturalists and anthropologists simply took racial hierarchy as empirically given. What the evolutionists attempted to do was to explain the phenomenon of racial differences in a comprehensive theory. Haeckel, likewise, took this as part of his task. He called himself “utterly and completely a child of the nineteenth century” (Haeckel 1899: vii). In his racial thought, he was certainly that

but hardly uniquely that, despite the suggestions of Gasman and Weikart. These historians have simply unveiled to a startled world that the founders of evolutionary theory lived in the 19th century.

### Haeckel's Supposed Anti-Semitism

Haeckel's racial theories might lead one incautiously to presume that he was also an anti-Semite. That is certainly the belief of a number of scholars, most prominently of Gasman and Weikart.<sup>8</sup> On its face, though, the indictment seems improbable, since the most rabid anti-Semites during Haeckel's time were conservative Christians, for example, the Berlin court-preacher Adolf Stöcker (1835–1909). Given Haeckel's extreme anti-religious views, it is unlikely that he would be allied with such Christian apologists; and he loathed Stöcker in particular.<sup>9</sup> Moreover, after Haeckel's death, a one time student turned opponent, Ludwig Plate (1862–1937), declared that while he (Plate) was “an idealist, free-thinking Christian, German populist, and anti-Semite,” Haeckel was “a crass materialist and atheist, and one who ridiculed Christianity in every way possible. For this reason he was celebrated at every opportunity by the Social Democrats and Jews as the world-famous light of true science” (Plate, as cited by Heinrich Schmidt 1921: 19).

One bit of alleged evidence of Haeckel's anti-Semitism can be quickly disposed of. Gasman (1971: 73) asserts that Haeckel enlisted as a member, in late 1918, of the right-wing Bavarian Thule Society, which became instrumental in the rise of Hitler's *Nationalsozialistische Deutsche Arbeiterpartei*. The society, as Gasman accurately describes it, was “a political-theosophical-astrological-anti-Semitic secret organization.” However, in late 1918, Haeckel was an invalid and could not leave the second floor of his home; thus, he was hardly in a position to join this Bavarian group. Moreover, he disdained such superstitions as theosophy and astrology—doctrines that he would have dismissed as completely antithetic to progressive modernism. Rudolf von Sebottendorff (1875–1945?), founder of the Thule Society, did list a one “Ernst Häckel” as a member of his group, but distinguished this individual from “Ernst Haeckel, Professor in Jena” (von Sebottendorff 1933: 240). The Thule Society Ernst Häckel, a painter, also lived in Jena at this time. He wrote a few letters to Ernst Haeckel, “the professor,” and these letters have been preserved in the archives of Ernst-Haeckel Haus. The designation of the professor and zoologist Haeckel as member of the Thule Society is, thus, a pure artefact.

And, of course, there is Haeckel's placement of Semites in the highest branches of his tree of human progress. In his *Natürliche Schöpfungsgeschichte*, Haeckel depicted his theory of the evolution of the human species using his new graphic device of the stem-tree. In the first edition of the book (1868), he

arranged the human groups—different species, as he regarded them—into a hierarchy of descent, with Papuans, Hottentots, and Australians (and their respective races) sitting on the bottom branches and Caucasians (with their several varieties) on the top (see Figure 1). Haeckel meant vertical position in the tree to indicate the level of progressive advance attained by the various species and races. For different reasons, perhaps, neither his 19th-century readers nor we would be surprised to see the Germans and Greco-Romans, among the Caucasian races, at the “pinnacle” (*Spitze*) of the human species (Haeckel 1868: 519). But readers, both then and now, might wonder at the placement of the Jews and Berbers. He located them at the same highly developed level as the Germans and within the same species.<sup>10</sup>

In addition to evidence of the aforementioned kind, we have direct testimony about Haeckel's attitudes concerning Jews. In the early 1890s, he discussed the phenomenon of anti-Semitism with the Austrian novelist and journalist Hermann Bahr (1863–1934), who collected almost forty interviews with European notables on the subject, such individuals as August Bebel, Theodor Mommsen, James Arthur Balfour, and Henrik Ibsen. Haeckel's bonhomie and unpretentious style dispelled Bahr's fear that he would be speaking with a “German professor.” Haeckel mentioned that he had several students who were quite anti-Semitic but that he had many good friends among Jews, “admirable and excellent men,” and that these acquaintances had rendered him without this prejudice. He believed that a certain uniformity of religion and social custom was demanded by many countries because of the growth of nationalism, with the exception of France and especially Paris, where the youth of that country had cultivated the “ideal” of cosmopolitanism. Jewish immigrants from the East, particularly Russia, did, he observed, fail to adopt the prevailing customs in Germany and thus provoked distrust and dislike; their behavior, he thought, justified protective restrictions on immigration, though not because they were Jews but because they could not be assimilated. He believed that a growing number of native German Jews held the same opinion. He then concluded his discussion with an encomium to the educated (*gebildeten*) Jews who had always been vital to German social and intellectual life:

I hold these refined and noble Jews to be important elements in German culture. One should not forget that they have always stood bravely for enlightenment and freedom against the forces of reaction, inexhaustible opponents, as often as needed, against the obscurantists [*Dunkelmänner*]. And now in the dangers of these perilous times, when Papism again rears up mightily everywhere, we cannot do without their tried and true courage. (Bahr 1894: 69)<sup>11</sup>

Any tincture of what might be thought anti-Semitism has to be placed within the scope of Haeckel's more broadly directed animus: namely, against all orthodox religions, includ-

ing Judaism, but with special disdain, as the above passage indicates, for Catholicism. His tangential reservations about Eastern-Jewish immigration were not racial or biological, certainly not of the sort favored by the Nazis, but behavioral and attitudinal, more in keeping with the distaste of the German Mandarins for the lower classes of any sort.<sup>12</sup>

Another small example might suffice to indicate that as a free-thinker, Haeckel harbored no egregious anti-Semitic attitudes, and rather expressed views that would be completely anathema to the Nazis. In his later years (from 1912 until his death in 1919), he became especially friendly with Magnus Hirshfeld (1868–1935), a Jewish physician and free-thinker who specialized in research on various sexual practices (especially transvestitism and homosexuality) that would be strictly condemned and regarded as executable crimes by the Nazis.<sup>13</sup> Hirshfeld dedicated his book *Naturgesetze der Liebe* (Natural laws of love, 1912) to Haeckel after securing the latter's permission.<sup>14</sup> The book urged that homosexuality was an innate condition and a natural form of love. Hirshfeld visited Haeckel in Jena several times between 1912 and 1917, and lectured on “Ernst Haeckel, ein deutscher Geistesheld” (Ernst Haeckel, a German spiritual hero, 1914).<sup>15</sup> Not the kind of company a proto-Nazi should keep.

The racism that dominated anthropological thinking—as well as religious and popular discourse—during the 18th and 19th centuries undoubtedly contributed to the ideology of the Nazis, but no less to the cant of American exclusionists during the period of heavy immigration to the United States in the early 20th century. In the case of the Nazis, there is no compelling evidence, however, that evolutionary ideas (as opposed to genetic and eugenic ideas) played a dominant role in forming their attitudes, especially since Hitler and his immediate circle expressed no particularly favorable disposition toward the theory. Moreover, in the case of official party policy, Haeckel's evolutionism had been explicitly rejected.

### The National Socialist Rejection of Haeckelian Science

During the early 1930s, there were many efforts to support the fortunes of the Nazi party by associating it with the attitudes and ideas of stellar German intellectuals, among whom was Ernst Haeckel. So, for example, Alfred Rosenberg, chief party propagandist, declared Alexander von Humboldt—cosmopolitan, friend of Jews, and homosexual—to be a supporter of the ideals of the Party (see Rupke 2005: 81–104). In Haeckel's case, the most visible effort to turn him to Hitler's side was made by Heinz Brücher, in his *Ernst Haeckels Bluts- und Geistes-Erbe* (Ernst Haeckel's racial and spiritual legacy, 1936). Notably, however, Brücher did not try to make Haeckel an anti-Semite, except, perhaps, by implication.<sup>16</sup>

Yet the efforts to recruit the author of *Die Weltrathsel* to the Nazi cause foundered almost immediately because of a quasi-official monitum issued by Günther Hecht, who represented the National Socialist Party's Department of Race-Politics (*Rassenpolitisches Amt der NSDAP*). Hecht, also a member of the Zoological Institute in Berlin, explicitly rejected the suggestion that Haeckel's materialistic conceptions should be regarded as having contributed to the doctrines of the Party:

*The common position of materialistic monism is philosophically rejected completely by the völkisch-biological view of National Socialism. Any further or continuing scientific-philosophic disputes concerning this belong exclusively to the area of scientific research. The party and its representatives must not only reject a part of the Haeckelian conception—other parts of it have occasionally been advanced—but, more generally, every internal party dispute that involves the particulars of research and the teachings of Haeckel must cease. (Hecht 1937–1938: 285)<sup>17</sup>*

Another functionary writing in the same Party organ seconded the warning issued by Hecht. Kurt Hildebrandt, a political philosopher at Kiel, maintained it was simply an “illusion” for Haeckel to have believed that “philosophy reached its pinnacle in the mechanistic solution to the world puzzles through Darwin's descent theory” (Hildebrandt 1937–1938: 17). Neither Hecht nor Hildebrandt thought compatible with Nazi doctrine a scientific-philosophical conception that had been embraced by the likes of such socialists and Marxists as August Bebel, Karl Kautsky, Eduard Bernstein—not to mention V. I. Lenin.

## Conclusion

In the contemporary period, it is easy enough to gaze back at earlier times and morally condemn individuals for attitudes that would deserve execration today. But such easy judgments are beneath the dignity of experienced scholars. Those who labor in the history of human thought recognize that moral judgments have an empirical component: they depend on knowledge of the way the world is, on the understanding of nature and human nature. We may justly expect that individuals who lived long ago display no less moral sensitivity than we do, but we cannot expect them to have the same empirical and theoretical knowledge that we do. That greater knowledge has brought us to realize that the various human groups do not substantially differ from one another in cognitive capacities and therefore that the kind of scale of human worth implied by Haeckel's stem-trees have no validity. But this does not mean that Haeckel himself and a host of biological scientists of the 19th century did not have good scientific reasons (based in notions of progressive descent) for holding the racial views they did. Their thinking was also ensconced in a matrix of cultural attitudes about race that would have been almost impossible to escape, and very few were able to. The scientific

reasons for their racial beliefs had been strongly supported by the growing power of early evolutionary theory, a theory only corrected by the advance in our empirical and critical considerations during the second half of the 20th century. As the purported reasons for deep racial distinctions have fallen away, cultural presumptions have followed in their wake, often more slowly than we would like. But even by the terms of the 19th century, the charge that Haeckel was an anti-Semite could only be grounded in tenuous assumption and uncritical judgment. And if some Nazis used Darwin's or Haeckel's ideas for their own purposes, those two individuals stand in the same line with Goethe, Humboldt, and a very large number of Christian apologists.<sup>18</sup>

## Notes

1. Gasman (1971: 40): “By bringing biology and anthropology to its support, in works that were widely read and credited, he [Haeckel] succeeded in investing the ideas of racial nationalism with academic respectability and scientific assurance. It was Haeckel in other words, who was largely responsible for forging the bonds between academic science and racism in Germany in the later decades of the 19th century.”
2. The number of historians that have unquestioningly adopted Gasman's thesis is quite large. Here are just a few authors who recently have: J. W. Burrow (2000: 256 and 258); Nicholas Goodrick-Clarke (2004: 13); Scott Gordon (1991: 528); Joseph L. Graves (2001: 130–131); Robert Jay Lifton (2000: 125 and 441); Richard M. Lerner (1992: 33); Daniel Pick (1989: 28); Pat Shipman (1994: 134–135); Milford Wolpoff and Rachel Caspari (1998: 136). Gasman's thesis, however, has indeed been critically scrutinized and disputed by a few—too few—historians: Robert Bannister (1979: 133) and Richard J. Evans (1997: 64). Paul Weindling (1989) offers the most balanced assessment of Haeckel and other German biologist in the context of the Nazi movement.
3. I have argued that Darwin's own theory of recapitulation does not substantially differ from that of Haeckel (Richards 1992, ch. 5).
4. Gasman (1998: 7): “It was Haeckel's Germanic National Socialism that inspired the rise of Fascist ideas throughout Europe.”
5. I discuss Darwin's consideration of the Irish in *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Richards 1987: 172–176).
6. Some have argued that Darwin's theory was not progressivist. The plain language of the text of the *Origin of Species* simply confutes that argument. See Richards (1992, ch. 5).
7. Hunt (1863). For a comprehensive discussion of Hunt and the assumptions of racial hierarchy in late 19th-century anthropology, see Stocking (1987, especially 245–254).
8. Even Weikart thinks Gasman has overemphasized Haeckel's “anti-Semitism.” Weikart is, nonetheless, convinced that Haeckel was an anti-Semite; see Weikart (2004: 216–217).
9. See Haeckel (1882: 60, n. 18). Stöcker had demanded the employment only of religiously orthodox professors at Jena.
10. Stem-trees in subsequent editions of the *Natürliche Schöpfungsgeschichte* place the Jews just a bit behind the Germans. In those later editions, Haeckel continually altered the tree; but the Jews were always neck and neck with the Germans. In the text of the first edition, he did say that it was from “the Indo-German branch that the most highly developed cultural peoples spring.” This judgment, he claimed, was based on the evidence of comparative linguistics as shown by August Schleicher. See Haeckel (1896: 520).

11. By “*Dunkelmänner*” (dark men) Haeckel meant those opposed to enlightenment, but with sly reference, perhaps, to the Roman Catholic clergy. Gasman refers to Bahr’s interview with Haeckel, but gives it a spin that makes Haeckel’s concerns “racial” and not behavioral. Gasman omits mention of the longer passage I quote in the text; see Gasman (1971: 157–159).
12. A small anecdote, stemming from Haeckel’s later years, reflects his open-minded attitude toward Jews. He had fallen in love with a woman of the minor nobility (an affair I discuss in my forthcoming book), who writes of her own anti-Semitic prejudice and contrasts her shameful attitude to that of Haeckel: “You know, the Hamburg lady is a Jew! She certainly doesn’t look like one . . . rather she looks like a French woman rather than a Jewish woman! That’s a healthy lesson for me! I have a great antipathy toward Jews—and had I known, I would not have traveled and gone with her. But now, since I am acquainted with her, and regard her as an open, free-thinking woman, I should be ashamed if I despised her on account of her nature, which she can do nothing about. Isn’t that right, my dear? Gradually I am learning to ascend to your great, open worldview.” The passage comes from a diary page (13 May 1901) that Frida von Uslar-Gleichen sent to Haeckel. See Elsner (2000, 2: 660).
13. Almost as soon as the Nazi’s came to power they burned Hirshfeld’s Institut für Sexualwissenschaft and his library in May, 1933. He had been away lecturing and never returned to Germany.
14. See the letters of Magnus Hirshfeld to Haeckel (21 February 1912 and 20 March 1912), wherein Hirshfeld asks permission for the dedication and Haeckel enthusiastically grants it after reading page-proofs for the book. The letters are in Correspondence of Ernst Haeckel, Haeckel-Haus Jena.
15. Hirschfeld mentions his lecture in a letter to Haeckel after the outbreak of the Great War (17 December 1914), in the Correspondence of Ernst Haeckel, Haeckel-Haus Jena.
16. Brücher (1936); see as well Brücher (1935). Hoßfeld (2005b) discusses the origin of Brücher’s book.
17. The journal, *Zeitschrift für die Gesamte Naturwissenschaft*, in which Hecht’s article appeared bore the subtitle: “Organ of the Reich’s Section Natural Science of the Reich’s Students Administration.” For a discussion of this journal’s role in the National Socialist Party, see Hoßfeld (2005a: 329–334).
18. This essay is based on my forthcoming book, *The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought* (Richards 2007 in press).

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