

DESCENDED FROM DARWIN
INSIGHTS INTO THE HISTORY OF
EVOLUTIONARY STUDIES, 1900–1970

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CHAPTER 1

THE SO-CALLED ECLIPSE OF DARWINISM

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INTRODUCTION

In discussing the emergence and development of evolutionary biology, historians of biology typically divide the nineteenth and twentieth centuries into four eras. The first, the pre-Darwinian period, came prior to publication of the *Origin of Species* in 1859, and it includes evolutionary theorizing by figures like Lamarck and Chambers. The second period focused on the reception and reaction to Darwin's work by the public, religious authorities, and natural scientists. This period lasted from 1859 to about 1880 and is best characterized by works that systematically examine the reception of Darwin's ideas across different countries (Glick, 1974). Beginning about 1880 and lasting through most of the 1930s is a period widely described as the "eclipse of Darwinism" or the "eclipse of Darwin."¹ Biologists and historians of biology alike have described this period as one during which many theories competed for status. During these years, Darwinian evolutionary theory was supposedly obscured, and ultimately discarded, as speculative and old-fashioned natural history. Finally, beginning about 1940, a collection of geneticists, organismal biologists, and statisticians produced what Julian Huxley termed the modern "evolutionary synthesis," which brought together Darwinism and Mendelism, mutationism and modern genetics.

This paper focuses on the period of so-called eclipse. Unfortunately, much of our understanding of this eclipse comes from scientists of the synthesis era and historians who have been unduly influenced by them. For example, in *Evolution: The Modern Synthesis*, Huxley (1942) explained that during the 1910s evolutionary scientists were scattered, confused, and contradictory. Huxley explained how Mendelians contradicted the neo-Lamarckians, mutationists fought with Weismannians who were also fighting with the neo-Lamarckians, experimental embryologists opposed the classical recapitulatory theories of development, and the followers of newer disciplines,

like genetics, considered the zoologists who clung to Darwinism to be antiquated naturalists rather than true scientists. Another architect of the modern evolutionary synthesis, Ernst Mayr, described the early twentieth century as rife with opposition to Darwinism. He pointed to the threat Darwinism posed to the argument from design, the lasting influence of essentialism, and the ambiguity of terms and phrases such as selection, species, and survival of the fittest. Historians of science, as we shall see, have perpetuated claims made by synthesis authors about the work done by the previous generation of biologists. Some who have written about the development of evolutionary theory after Darwin have gone as far as simply ignoring an entire generation of biologists. For example, Ruse's "really big book" (600+ pages), *Monad to Man* (1996), on the two-and-a-half-century history of evolutionary theory ignores nearly every American biologist of the early twentieth century and claims there were no American researchers "working on evolution for its own sake" during this period.² For those historians who write about the time between T. H. Huxley and Julian Huxley, the era of the eclipse of Darwin was a time of great upheaval, and Darwinism was, at best, just one of a number of competing theories of evolution. At worst, it was considered little more than speculation that had been discarded by most working biologists. The eclipse ended, the current literature claims, in the early 1940s with technical and disciplinary developments to evolutionary science that brought about the modern evolutionary synthesis.

I argue here that the phrase "eclipse of Darwinism" is inappropriately and problematically employed by historians of biology. The eclipse is a deterministic metaphor of darkness that establishes a discontinuous history of evolutionary theory. The era of the eclipse of Darwin was, according to the current literature, a time when the bright light of Darwin's theory of evolution by natural selection was obscured by competing methodologies, by the speculative nature of the work done by its adherents and by an onslaught of competing theories of evolutionary change. It was the dark age of evolutionary biology. Much like the problems associated with the term Dark Ages, the phrase "eclipse of Darwin" was employed by the succeeding generation of authors to slur their predecessors by implying that they worked in an ignorant and ineffective era.³ The era of the so-called eclipse of Darwin supposedly ended when, like the sun emerging from behind the moon, Darwinism returned to prominence in the minds of evolutionary theorists.

The phrase "eclipse of Darwinism" has specific rhetorical value. It constructs the synthesis as a natural development, a predictable solution to the problem of darkness. Just as the sun inevitably emerges from behind the moon, Darwin's theory of evolution by natural selection would eventually emerge from behind the dozens of competing and obscuring theories offered by early twentieth-century evolutionary theorists.

The eclipse metaphor also helped synthesis authors differentiate themselves from the previous generation of biologists. The architects of the modern evolutionary synthesis and the historians who followed them constructed a discontinuous history of their discipline as a way to get around some problematic social and political baggage they had accumulated during the 1910s and 1920s. This included eugenics, social Darwinism, and the connection many Americans made between evolution, imperialism, and militarism. The historiography of eclipse-then-synthesis portrays the technical developments in evolutionary science in such a way as to work around the social baggage introduced by the previous generations. In short, it allowed Julian Huxley to skip over his father's

generation of evolutionary theorists and return to Darwin, as understood and loved by his grandfather, T. H. Huxley.

ORIGIN OF THE ECLIPSE OF DARWINISM

Notably, the notions of eclipse and modern synthesis first appear simultaneously, in Huxley's (1942) *Evolution: The Modern Synthesis*. While Huxley was the first to publish the phrase "eclipse of Darwinism," he was probably not the term's originator.⁴ David Starr Jordan used it in an unpublished manuscript *circa* 1925. Under the subtitle of "The eclipse of Darwin," Jordan wrote,

There is a recent tendency with some biologists to depreciate Darwin and his method of approach in favor of more metaphysical conceptions of Evolution unconditioned by environment. The process of induction is slow and laborious, it has even been condemned as "Mid-Victorian," while that of deduction may be speeded up on demand. Discoveries connected with the physical basis of Heredity, and (subsequently) of Mendelian processes in variation and crossing have given an immense impetus to the study of Genetics. From these came the conception of "genes" or "unit characters" as transmitted through heredity, each one unchanged, but the mass forming with each generation new combinations and evoking new possibilities. Moreover, as no one man can compass and weigh all kinds of evidence that derived from field study, from species study and from classification has been overlooked and undervalued by many investigators working along other lines. But however much evolutionists have at times seemed to drift away from Darwin's conclusions, it seems to me that the broadest research, the most accurate observation and the sanest thought come nearest to the conclusions in [*On*] *the Origin of Species*. The body of fact has grown enormously year by year, but the conclusions we must accept are substantially those laid down by Darwin himself. The chief modification which appears necessary is the recognition of isolation with segregation as a separate factor in Evolution co-existent with Natural Selection itself.⁵

Jordan's use of the phrase "eclipse of Darwin" clearly emphasized a drift by some biologists away from Darwin's "method of approach" and toward an explanation of evolution that resulted from forces internal to the organisms instead of being caused by the environment. Jordan, who had long been active in defending what he called "old-fashioned natural history" against claims by the increasing number of experimental biologists, was clearly interested in preserving the reputation of inductive methods in the biological sciences against what he believed were the deductive methods of experimentalism (see Jordan, 1916). For Jordan, the metaphor of the eclipse was not that of the astronomical variety, but the second meaning of the term: to fall into disuse.⁶ Nonetheless, Jordan's employment of the term demonstrates that scientists used it prior to Huxley (1942).

While Huxley did not create the phrase, his use in 1942 is the first in print, and his particular use set the tone for all later scientists and historians of science. The first chapter of *Evolution* concluded with a section titled "The eclipse of Darwinism," which traced the rise of Mendelian mutationism as a challenge to Darwinian natural selection during the early twentieth century. Throughout the 1920s and 1930s, Huxley explained, a number of new disciplines that had previously worked in comparative isolation had "become a more unified science," and with their synthesis "there has

been a rebirth of Darwinism.” However, the Darwinism of Julian Huxley’s day was not that of his grandfather’s: “The Darwinism thus reborn is a modified Darwinism, since it must operate with facts unknown to Darwin; but it is still Darwinism in the sense that it aims at giving a naturalistic interpretation of evolution, and that its upholders, while constantly striving for more facts and more experimental results, do not, like some cautious spirits, reject the method of deduction.” Finally, the section, which began with the metaphor of the eclipse, ended with a similarly deterministic metaphor: “It is with this reborn Darwinism, this mutated phoenix risen from the ashes of the pyre kindled by men so unlike as Bateson and Bergson, that I propose to deal in succeeding chapters of this book” (Huxley, 1942, pp. 22–28). Like the moon’s shadow passing over the earth or the phoenix rising from the ashes, Huxley’s metaphor suggested the inevitability of the return to prominence of Darwin’s theory of evolution by natural selection, as well as his inductive methodology.

Much more recently, the phrase “eclipse of Darwinism” was employed as the title of Peter Bowler’s (1983) book on anti-Darwinian theories in circulation around 1900. Bowler accepted Huxley’s notion of the astronomical metaphor of an eclipse by demonstrating how Darwin’s work, once widely accepted by biological scientists, came under increasing attack beginning in the 1890s. From T. H. Huxley’s defense of the Darwinian theory of evolution against claims made by the Marquis of Salisbury at the 1894 meeting of the British Association for the Advancement of Science to doubts raised by self-described Darwinists, including Alfred Russel Wallace and E. Ray Lankester, Bowler asserted that Darwinian natural selection appeared on the decline at the turn of the century. Orthogenesis, mutationism, and especially Lamarckianism directly attacked the primacy of the selection mechanism in evolutionary theory. With the coming of the synthesis, Bowler explained, Darwin emerged victorious. While Bowler’s use of the term “eclipse” mirrored Huxley’s, Bowler’s goals in applying it were quite different. His exploration of evolutionary theories that challenged Darwinian natural selection was motivated by claims from late twentieth-century opponents of Darwinism, including Arthur Koestler and the Creation Research Society—both portrayed “themselves as fighting against a theory that the scientific community has never allowed to be challenged.” Bowler hoped a better understanding of evolutionary biology during the early twentieth century, in particular a better understanding of the theories of evolutionary change competing with Darwinism, would “alter the way in which some people perceive modern Darwinism by showing that the theory has indeed faced and survived major scientific opposition within this century.” (Bowler, 1983, p. 5) In contrast to the claim of creation scientists that evolutionary biologists religiously adhered to Darwinism and refused to challenge it openly, Bowler’s exploration of the variety of evolutionary theories at the beginning of the twentieth century was a demonstration of how Darwinists successfully defended natural selection against competing theories of evolutionary change.

Employment of the phrase “eclipse of Darwinism” has served particular purposes in the hands of various scientists and historians of science. For D. S. Jordan, it was a rallying cry to preserve Darwin’s inductive methodology against challenges by experimental biologists. For J. Huxley, it allowed for a sharp differentiation between his work and that of the previous generations’ research and writings, as well as a return to what he believed was the true essence of Darwinism, albeit mutated to include Mendelism. For Bowler, the term was a recognition of the vigorous debates in the

early twentieth century that challenged Darwinian natural selection and from which Darwinism emerged generally victorious. The term has served their needs quite well, but it did so at the expense of our understanding of the research, conclusions, and worldviews of early twentieth-century American evolutionists. What was the status of Darwin's theory of evolution by natural selection among American biologists during the era of the so-called eclipse of Darwinism?

THE ICONIC TEXT OF THE ERA OF THE ECLIPSE OF DARWINISM

Historians of biology point to one book as particularly characteristic of the era of the supposed eclipse of Darwinism: Vernon Lyman Kellogg's *Darwinism To-Day: A Discussion of Present-Day Scientific Criticism of the Darwinian Selection Theory, Together with a Brief Account of the Principal Other Proposed Auxiliary and Alternative Theories of Species-Forming* (1907). The book, as its absurdly long subtitle suggested, is a survey of evolutionary thought as it existed in the early twentieth century. According to the current literature, it is proof of the eclipse of Darwinism, evidence that Darwinism was in retreat at the turn of the century.

Several examples illustrate the point. Cravens (1978, pp. 41–42) used *Darwinism To-Day* to demonstrate his claim that “probably most American biologists opposed Darwinian natural selection, even before de Vries publicized the mutation theory in European and American scientific forums.” Kellogg was quite probably correct, Cravens judged, “in estimating that most biologists did not accept” Darwinism. Degler (1991, p. 23) claimed that “during the first fifteen years of the twentieth century, objections from natural scientists to Darwinianism were common,” and he carved out a quote from *Darwinism To-Day* to make Kellogg offer the unqualified claim, “The fair truth is that Darwinian selection theories . . . stand to-day seriously discredited in the biological world.” (As we shall see, the excised portion of the quote offered a significant qualification to Kellogg's claim about the status of Darwinism.) Provine (1986, pp. 24–25) explained that despite the “confusion of theories” presented in *Darwinism To-Day*, “Wright was not shaken from his basically Darwinian viewpoint by reading Kellogg.” Farber (2000, pp. 84–85) identified Kellogg as “an American naturalist sympathetic to the Darwinian tradition” and asserted that his *Darwinism To-Day* demonstrated how in the early twentieth century “Darwin's reliance on natural selection found few supporters.” Perhaps the most accurate, albeit very brief, assessment of *Darwinism To-Day* came in Bowler's *The Eclipse of Darwinism*. Bowler (1983, p. 4) called the book “invaluable” and said Kellogg was “well disposed toward the selection mechanism” but was nonetheless “fair enough to admit that some of the objections [to it] appeared to be valid and that some of the alternative mechanism would have to be taken seriously, at least as additions to Darwinism.”

Perhaps the most assertive claim that Kellogg's *Darwinism To-Day* exhibited the rejection of Darwinism by early twentieth-century biologists was put forward by Smocovitis (1996). She described how Kellogg wrote “about the sad state of Darwinism at the turn of the century” when he “explicitly stated that Darwinism was undergoing methodological scrutiny and was coming under fire from ‘German biologists’ and experimental biology itself.” For her, *Darwinism To-Day* demonstrated the struggle by emerging experimental biologists to overcome the speculative nature of evolutionary theory in the early twentieth century. In so doing, she asserted, they threw

the popular and professional standing of Darwin's theory of evolution by natural selection into doubt, and Kellogg's book exhibited the growing doubts about Darwinism in its introductory discussion of the "Death-Bed of Darwinism." Smocovitis quoted from the first two pages of Kellogg's book the claim that "there is going on a most careful re-examination or scrutiny of the theory connected with organic evolution, resulting in much destructive criticism of certain long-cherished and widely held beliefs, and at the same time there are being developed and almost feverishly driven forward certain fascinating and fundamentally important new lines, employing new methods of biological investigation. Conspicuous among these new kinds of work are the statistical or quantitative study of variations and that most alluring work variously called developmental mechanics, experimental morphology, experimental physiology of development, or most suitably of all because most comprehensively, experimental biology." Darwinism, Kellogg concluded, was under "the white light of scientific scrutiny."⁷ As with the carefully edited quotation from Kellogg offered by Degler, we shall see that Smocovitis's claims about Kellogg's assertions are problematic when viewed in the context of Kellogg's statements throughout the book and his intentions in writing it.

Historians of biology, in particular those historians who have carefully explored the emergence of the modern evolutionary synthesis, have fundamentally mischaracterized Kellogg's *Darwinism To-Day* and with it the era of the so-called eclipse of Darwin. By unquestionably interpreting early twentieth-century evolutionary biology through the lenses of the triumphalist synthesizers, they distort our understanding of Kellogg's generation of biologists and commit a historiographical blunder.⁸ These historians are, in effect, not being very historical. We need to go back to the generation prior to synthesis, read their claims carefully and within the context of their time, and free ourselves from the propagandistic claims made by mid-twentieth century synthesizers. To fully appreciate precisely what Kellogg intended to do in his 1907 *Darwinism To-Day* and therefore to understand the context for his claims, his argument in the book, and ultimately the activities of many prominent American biologists during the early twentieth century, we need to investigate Kellogg's career and examine the book carefully.

RECONSIDERING *DARWINISM TO-DAY*

Kellogg was born in 1867 in Emporia, Kansas. Like so many other late nineteenth-century American scientists, Kellogg was a midwesterner and the child of a middle-class family (Kohlstedt, 1976). At sixteen, he moved to the university town of Lawrence and attended the University of Kansas, where he worked with Francis Huntington Snow, one of the earliest and most ardent American supporters of Darwin. Kellogg's education put him in a unique position; because his advisor was such an early proponent of Darwinism, he was among the first biological students trained after the widespread acceptance of Darwin's work. He was among the first students who never really had to face the question of whether or not to accept evolution as a natural phenomenon, so Kellogg and his colleagues focused on the mechanisms of evolution. In 1890 he moved to Cornell University to study with John Henry Comstock, then spent one year in Leipzig, Germany, working in the laboratory of Rudolf Leuckart. In 1893, Kellogg took a position as professor of entomology at the newly

formed Stanford University in California, where he came to know and work closely with David Starr Jordan.

It was at Stanford that Kellogg did the bulk of his scientific research, continuing the morphological and taxonomic work that he had done while at Kansas, Cornell, and Leipzig. After the turn of the century, Kellogg was the first American biologist to conduct long-term breeding experiments to investigate Mendelian inheritance through detailed breeding experiments with silkworms to test for the inheritance of anatomical structures, life span, and susceptibility to starvation. He also studied heliotropism in honeybees and inchworms, helped area farmers and breeders in pest-eradication efforts, and taught entomology and evolution courses. Among the most popular of his courses was his course titled “Bionomics,” which included sections on evolution, eugenics, and nature study and seems to have been taken by nearly every student at Stanford from 1895 until about 1912.

At the start of World War I, Kellogg left Stanford to join his former student, Herbert Hoover, in the humanitarian effort to feed the civilians trapped in German-occupied Belgium and northern France. When he returned to the United States in 1917, Kellogg took the job as the first permanent secretary of the National Research Council, a position he held until the end of his life.⁹

Kellogg’s *Darwinism To-Day* was written at the height of his career as a scientific researcher. After having studied in Germany under Leuckart in 1892, Kellogg came to believe that his German colleagues were at the cutting edge of evolutionary research, and he returned once in 1898 and again from 1904 to 1906 to study with them. Kellogg later wrote, “As a teacher Leuckart has been for years the best known and most besought zoologist of the world,” and his students included many notable American and European scientists, including Carl Friedrich Wilhelm Claus, Otto Bütschli, Karl Chun, Charles Whitman, Erwin Baur, William Patten, Henry Sherring Pratt, and George Howard Parker.¹⁰ During his third trip to Leipzig, Kellogg wrote *Darwinism To-Day*. He had traveled to Europe in preparation for writing his portion of *Evolution and Animal Life*, a book he and Jordan were preparing. Kellogg spent a year and a half, from 1904 to 1906, in and around Leipzig. Originally he hoped to include in the textbook a comprehensive analysis of the status of Darwinism, but under pressure from the book’s publisher he decided to simplify his analysis in *Evolution and Animal Life* and write an entirely different book that would survey the status of various evolutionary theories. In a letter to Jordan, Kellogg explained that his other book would be an amplified discussion of “certain parts or phases” of evolution. He eventually titled it *Darwinism To-Day* and considered it “a second step in the ‘Stanford Evolution Series.’”¹¹

In *Darwinism To-Day* Kellogg concluded that Darwinian natural selection was the final arbiter in evolutionary change, and the book demonstrated the shortcomings of claims made by Darwinists, neo-Darwinists, and anti-Darwinists, as well as the role of natural selection in evolutionary change. Understanding the state of Darwinian evolutionary thought in the early twentieth century requires an awareness of precisely what these terms meant to Kellogg and his colleagues. Broadly speaking, biologists who studied evolution accepted the theory of descent, the belief that “the various living as well as the now extinct species of organisms are descended from one another and from common ancestors.” Acceptance of evolution as a natural phenomenon summarily dismisses the theories of spontaneous generation of species and divine creation, replacing them with a mechanism for evolutionary

change, but not with an explanation for the ultimate origin of life. The theory of descent, Kellogg explained, existed long before Darwin in the work of Goethe, Erasmus Darwin (Charles Darwin's grandfather), Lamarck, and Chambers. Darwin's work gave the theory of descent widespread acceptance among biologists as it offered a "certain rational, causo-mechanical (hence, non-teleologic) explanation of the origin of new species." It rested, Kellogg explained, on the observed facts of the geometrical increase in the number of individuals, the apparent variation that existed among all individuals, and the transmission of these variations from parents to offspring.

Central to Darwinism was the theory of natural selection, which predicted that slight variations would allow for a greater chance of survival and reproduction and therefore be passed to successive offspring. In his writings, Kellogg used the terms and phrases Darwinism, the theory of natural selection, and the selection theory somewhat interchangeably. By the end of *Darwinism To-Day* it became clear that Kellogg believed that the mechanisms of selection were undoubtedly involved in evolutionary change, while recognizing several shortcomings in Darwin's work. These shortcomings centered on Darwin's inability to explain the origin of new variations or the precise mechanisms involved in the inheritance of selected traits (Kellogg, 1907, p. 11). Kellogg's goal in writing the book was to identify these shortcomings and to offer a research plan that would address them.

Throughout *Darwinism To-Day* Kellogg described a spectrum of beliefs about the engine of evolutionary change, with Darwinians standing in the middle of the spectrum, flanked on either side by neo-Darwinians and anti-Darwinians. Kellogg described how European debates over evolution were dominated by the polemics of neo-Darwinians, who believed that selection alone accounted for evolutionary change and attacked those who claimed that acquired characteristics could in any way affect successive generations of offspring. He also described the response by anti-Darwinists, who attacked selection theories of all stripes and generally emphasized the role of the environment in evolutionary change. Kellogg posited a moderate position for Darwinists interested in defending themselves against both extreme selectionists and aggressive anti-Darwinians, asserting that Weismann's followers took Darwin's work too far by claiming that selection alone accounted for all aspects of evolution. This was, Kellogg was quick to point out, a position that even Darwin did not hold. Specifically, Kellogg attacked Weismann and his followers, who "proposed the doctrine of the *Allmacht* [omnipotence] of natural selection; that is, that natural selection alone is capable of explaining all the phenomena and facts of species-forming and descent." In another passage, Kellogg wrote, "It is strange, but wholly true, that the modern reaction and revolt against Darwinism is chiefly due to the activity and attitude taken by certain of its over-ardent friends." He referred to Weismann and his followers as "neo-Darwinians" or "ultra-Darwinians" and concluded, "Darwin himself claimed no *Allmacht* for selection. Darwin may well cry to be saved from his friends." In letters to Jordan, Kellogg made it clear that, while he believed neo-Darwinians pushed natural selection too far, he still accepted the validity of Darwin's work, and he explained, "I believe N[atural] S[election] to be the controlling factor influence in determining descent."¹² Clearly, Kellogg was a Darwinian, but in no way an advocate of Weismann's claims about the potency of selection alone.

In addition to demonstrating Kellogg's loyalty to Darwinism, *Darwinism To-Day* illustrated national differences among evolutionary theorists. Kellogg claimed that

Europeans, especially the Germans and the French, were responsible for both the irrational transformation of Darwinism into neo-Darwinism and the corresponding rash of anti-Darwinian claims. Luckily, the neo-Darwinian and anti-Darwinian “philosophic turmoil and wordy strife” had not yet found its way across the Atlantic and into American bookstores. However, he warned, “just as certainly as the many material things ‘made in Germany’ have found their way to us so will come soon the echoes and phrases of the present intellectual activity in evolutionary affairs.” The real danger, Kellogg explained, would be realized if “the first of these echoes to come across the water to us prove to be, as wholly likely, those from the more violent and louder debaters, they may lead to undue dismay and panic on our part. Things are really in no such desperate way with Darwinism as the polemic vigour [*sic*] of the German and French anti-Darwinians leads them to suggest.” Chief among Darwin’s detractors was the Russian botanist Korschinsky and the Germans Hans Driesch and Gustov Wolff, who asserted that natural selection was nonexistent, was a vagary, a form of speech, or a negligible influence in descent. In his correspondence to Jordan, Kellogg bluntly expressed his view on the French and German anti-Darwinists and his frustration over their attacks on natural selection, calling them “pesky flies that are sucking the blood of natural selection theory.”¹³

In the book’s introduction, Kellogg presented several examples of “absurdity of expression” regarding the status of Darwinism. The book began with the title of a recent German pamphlet “*Vom Sterbelager Des Darwinismus*” [The Deathbed of Darwinism], which he dismissed with the explanation that “ever since there has been Darwinism there have been occasional death beds of Darwinism on title pages of pamphlets, addresses and sermons.”¹⁴ He quoted Driesch’s statement, “Darwinism now belongs to history, like that other curiosity of our century, the Hegelian philosophy; both are variations on the theme: how one manages to lead a whole generation by the nose” along with his comments about “the softening of the brain of Darwinians.” He translated another anti-Darwinian, Eberhard Dennert, as, “We [anti-Darwinians] are now standing by the death-bed of Darwinism, and making ready to send the friends of the patient a little money to insure a decent burial of the remains.” Kellogg claimed that Wolff was “no less intemperate and indecent” when he referred to the “episode of Darwinism” and suggested that biologists should remember Darwin “as if he had never existed.” These quotations have served as the basis for some historians to assert mistakenly that Kellogg himself was an anti-Darwinian, when in reality Kellogg believed these statements were absurd, and one of his primary motivations in writing *Darwinism To-Day* was to dispute them.¹⁵

One might counter that the mere fact that these claims existed and that Kellogg defended against them is evidence enough that Darwinism was on the ropes in the early twentieth century; but these claims were rare and Kellogg repeated them only to support his ultimate claim that any panic about the status of Darwinism was unwarranted, because the critiques were “injudicious and intemperate” and “the whole anti-Darwinian movement will be discredited and given no attention” (Kellogg, 1907, p. 6).

It is in misunderstanding or misrepresenting Kellogg’s position relative to the occasional European anti-Darwinians that historians have erroneously concluded that *Darwinism To-Day* represented the “sad state of Darwinism at the turn of the century” (Smocovitis, 1996, p. 117). Take for example, Degler’s selective quotation that made Kellogg appear to have claimed that Darwinian selection theories had lost all standing

among biologists. In full, Kellogg wrote, “The fair truth is that the Darwinian selection theories, considered with regard to their claimed capacity to be an independently sufficient mechanical explanation of descent, stand to-day seriously discredited in the biological world” (Degler, 1991, p. 23; Kellogg, 1907, p. 5). Throughout the book, Kellogg argued that Darwinian natural selection alone could not account for evolutionary change as Weismann and his followers argued; but he also insisted that “Darwin himself claimed no *Allmacht* for selection,” so Kellogg’s explanation that selection was not “an independently sufficient mechanical explanation of descent” is hardly tantamount to claiming the demise of Darwinism.

Likewise, Smocovitis’s assertion that Kellogg’s book demonstrated the corrosive effects of experimental biologists’ methodological scrutiny of the work done by natural historians proves problematic. The growing doubts about Darwinism that she saw in the claims found in the introduction of *Darwinism To-Day* were merely Kellogg’s mocking of zealous anti-Darwinists, and they must be considered alongside his claim that “ever since there has been Darwinism there have been occasional deathbeds of Darwinism” (Kellogg, 1907, p. 1). A glance at the book’s final chapter, titled “Darwinism’s Present Standing,” clearly reflected Kellogg’s beliefs about the actual state of Darwinism in the early twentieth century: “Darwinism, then, as the natural selection of the fit, the final arbiter in descent control, stands unscathed, clear and high above the obscuring cloud of battle” (Kellogg, 1907, p. 374).

Among the extreme neo-Darwinians and their equally intemperate opponents, Kellogg was happy to discover Ludwig Plate’s (1903) book, *Über die Bedeutung der Darwin’schen Selectionsprinzip und Probleme der Artbildung* [Concerning the Meaning of the Darwinian Selection Principle and the Problem of Development], which he called “mostly quite fair and unprejudiced” (Kellogg, 1907, p. 165). In November 1906, he wrote to Jordan explaining how “Plate has—with great care and thoroughness gone over all the work and literature of the objections to Darwinism—abstracted them, analyzed and answered them, or admitted their validity.” In a single sentence Kellogg simultaneously portrayed the polemic nature of the debate in Europe and his general irritation with German biologists: “[Plate’s book] is singularly impartial for a German and he puts the natural selection theory on a footing which will be satisfactory to all but rabid Weismannians and yet is practically unassailable [*sic*] by the modern host of anti-Darwinians.”

A month later he again wrote to Jordan explaining his plan to write an American version of Plate’s book, and he wrote to his editor explaining the great need of a book that would serve as “a means of orientation for American students and general readers on the present day biological work and thought.” Kellogg intended to address *Darwinism To-Day* to laypeople and explained that it would be easily readable and written without too many technical terms, making it an “easy club and woman’s pocket guide to heterogenesis, orthogenesis, metagenesis, and other awful words.” In January 1906, Kellogg sent a draft of the preface and a detailed table of contents to Luther Burbank along with a note that described the book as “a fair and comprehensive statement of the status of the selection factors (Darwinism) in biological science today as an explanation of evolution and a clear statement and brief critical discussion of the various auxiliary and substitutionary theories that have been offered up to date to aid or to replace the selection theories.”¹⁶

The majority of *Darwinism To-Day* consisted of Kellogg’s analysis of the attacks against and defenses of Darwinism and the theories that biologists have offered to

complement or replace Darwinian natural selection. The earliest attacks on Darwin's work, Kellogg explained, came from religious opponents who opposed the idea of common descent, but the "victory came swiftly and brilliantly to the Darwinians," and by the early twentieth century there was little or no debate along these lines, as "the theory of descent was, and is, invulnerable." Current attacks on Darwinism originated from two distinctly different groups of critics, the first of which completely denied the efficacy of Darwinian natural selection in creating new species. These authors, among them Dennert, Wolff, and Pfeffer, argued that Darwinism could not account for the manner in which random variations collected in a continuous way, allowing species to evolve in a particular direction. Moreover, they claimed, even granting an organism with a particular variation a great advantage in survival, its qualities would be quickly swamped by its peers' characteristics (Kellogg, 1907, pp. 13–14, 25).

The second group of evolutionary theorists that Kellogg identified offered evolutionary mechanisms to aid Darwinian natural selection and account for some of the problems that other researchers had suggested. Among the most vocal of these theorists was August Weismann, who aggressively attacked Lamarckian notions and offered his theory of Panmixia to explain vestigial organs, and germinal selection, which "was the practical admission on his part of the impotence of [Darwinian natural] selection to initiate new lines of development or descent" (Kellogg, 1907, pp. 189, 374).

Darwinism's defenders were in an advantageous position, Kellogg believed, because the work was widely accepted and Darwin had already answered many of the claims against his work. Moreover, the position of the orthodox Darwinian, as compared to the anti-Darwinian or the neo-Darwinian, was the moderate one and therefore Kellogg and his colleagues could find refuge by pitting their more extreme critics against one another. Nonetheless, Kellogg explained, there were a number of objections that Darwinians needed to address, such as how Darwinism could create apparently directed evolutionary change from random and fluctuating variations and how highly specialized organs, especially those organs that are useful only in their fully mature state, could have originated. Plate was Kellogg's representative defender of Darwinism, and Kellogg called him "a strong Darwinian, but not one blinded by prejudice or with ears willfully closed to the calls for reason." His characterization of Plate was much like his opinion of the English biologist E. B. Poulton, whom Kellogg described elsewhere as "a good selectionist: though not a bad one; that is, that he is not a selectionist bigot." Both Plate and Poulton believed that Darwinian natural selection was a substantial explanation for descent, but not one that was entirely sufficient in itself. They, along with Kellogg, believed that "Darwin also saw other agents than selection that made for modification and descent" (Kellogg, 1907, p. 164; 1909).

Kellogg concluded his book with a chapter that he had originally titled "The Great Problems" (later re-titled as "Darwinism's Present Standing"), in which he upheld the validity of the theory of natural selection while recognizing several key weaknesses. To address these, he outlined three prime needs of evolutionary study, each of which he believed could be fulfilled through experimental approaches to the problems. The first was an intensive study of variation through experimental development and pedigreed breeding. Darwinism, he argued, did not "explain the beginnings of change, the modifications in indifferent characters and in indifferent directions." Second, evolutionary scientists needed to investigate "the cumulation [*sic*] of variability along certain lines," that is, how it is that certain variations tended to "heap up" so

that natural selection could operate. The recognition of this problem originated from Fleeming Jenkin's criticisms of Darwin's theory; Jenkin argued that lone variations could not survive because they would quickly be overwhelmed and statistically annihilated as "no single variation could survive being blended back into an ocean of normal peers." Third, Kellogg explained "the great need of explaining adaptation," environmentally caused transmutations that appeared to support Lamarckian explanations of evolution. Many "apparently nonsignificant ontogenetic differences or variations appear as direct result of environmental influence or stimulus." Therefore, he argued, evolutionary scientists needed to examine the possible effects of the environment in stimulating or directing the evolution of organisms.¹⁷ Claims by some historians that *Darwinism To-Day* demonstrated the naturalist-experimentalist dichotomy overlook the fact that Kellogg saw the solution for Darwinism's shortcoming in the experimental work that was being done on variation and heredity.

Book reviews contemporary with the publication of *Darwinism To-Day* clearly indicated that Kellogg succeeded in convincing readers that Darwinism was alive and well. The anonymous review in the *Annals of the American Academy* asserted, "The final conclusion reached is, that while obviously many of Darwin's ideas were erroneous, that Darwinism is far from dead. . . . The opponents of natural selection have failed to displace it" (Anonymous, 1908). Likewise, in his review of the book in the *American Naturalist*, Frank Lutz (1908) quoted Kellogg's statement that "Darwinism, then, as the natural selection of the fit, the final arbiter in descent-control, stands unscathed, clear and high above the obscuring cloud of battle." Jordan, one man who must surely have known Kellogg's intentions in writing *Darwinism To-Day*, asserted in his review of the book that Kellogg was "even-handed" and "steady-headed" in his acceptance of Darwinism as an explanation of the origin of new species.¹⁸

While Kellogg concluded that Darwinism was not dead, he was obliged to admit that it was also not left unscathed by the attacks on it. He acknowledged that Darwin's theory of natural selection alone could not explain the beginnings of change, the source or sources of new variations on which Darwinian natural selection, sexual selection, and artificial selection could operate. With that recognition, Kellogg attempted to improve the quality of evolutionary studies by positing a research program that would "relieve Darwinism of its necessity of asking natural selection to find in the fluctuation of individual variations a handle for its action." This, he believed, demanded an intensive study of variation, what he called the experimental study of the stimuli, external and internal, and the influences, extrinsic and intrinsic, which are the factors and causes of variation. "The neglect on the part of the selectionists to pay sufficient attention to the origin and causes of the variation," he argued, "has been one of the most obvious reasons for the present strong reaction against the selection theories of Kellogg" (1907, pp. 374, 378–379).

Kellogg's concern for the status of Darwinian evolutionary theories was intricately connected with his promotion of the practical applications for evolutionary science. He explained that educated citizens, scientific laymen, sociologists, philosophers, and even theologians are "bound to be disturbed and unsettled by rumours [*sic*] from the camp of professional biologists of any weakness or mortal illness of Darwinism." He was further concerned that the supposed weaknesses of Darwinism were grossly overstated, especially by German anti-Darwinians: "We have only just got ourselves and our conceptions of nature, of sociology and philosophy, well oriented and adjusted

with regard to Darwinism. And for relentless hands now to come and clutch away our foundations is simply intolerable. *Zum Teufel* [To the devil] with these German professors!" *Darwinism To-Day* was Kellogg's attempt to wrestle control of the public's perception of evolution from what he viewed as two evolutionary extremes. It was his defense of Darwinism against neo-Darwinians, who pushed Darwin's theory of natural selection too far by claiming that it alone accounted for all evolutionary change, and the anti-Darwinists, who were equally extreme in attacking and dismissing Darwin's theory of natural selection. Far from merely claiming that Darwinism stood "seriously discredited in the biological world," Kellogg argued, "no replacing hypothesis or theory of species-forming has been offered by the opponents of selection which has met with any general or even considerable acceptance by naturalists." Darwinism, Kellogg concluded, was far from its deathbed (Kellogg, 1907, p. 5).

Darwinism To-Day heralded the primacy of Darwinian natural selection, it explored the details of alternative and additive theories of evolution and—most significantly—it presented some of the shortcomings of early twentieth-century evolutionary theory that Kellogg believed his colleagues needed to address as they continued to move their discipline forward. Hardly a cry from the dark age of evolutionary thought, the book celebrated the progress made in the field and presented a plan for even more fruitful work. Nowhere else is this view as clearly demonstrated as it was in Stephen Jay Gould's magnum opus, *The Structure of Evolutionary Theory*. In his work, Gould described how he valued Kellogg's interpretation of the relationship of Darwinian natural selection to competing and complementary theories of evolution. Kellogg's argument, he explained, "correctly represents, in my view, the relationship of modern hierarchical selection theory to classical Darwinism and to the Modern Synthesis as well." Gould (2002) intentionally used the same framework that Kellogg did in *Darwinism To-Day*. He also attacked cynicism about the state of Darwin a century after Kellogg, explaining, "the demise of Darwinism has been trumpeted more often than the guard changes at Buckingham Palace, notwithstanding the evident fact that both seem to stand firm as venerable British institutions." We should no more consider Darwin eclipsed in the minds of Kellogg and his colleagues than we would among biologists today (Gould, 2002, pp. 216–217, 353, 383, 489, 506–507, 585, 589).

A SUITABLE REPLACEMENT FOR THE ECLIPSE OF DARWINISM

The notion of an eclipse of Darwin or eclipse of Darwinism is seriously problematic. The idea is inappropriately deterministic. It obscures the work done by two generations of biological researchers. It is metaphor that implies a dark age of evolutionary thought, and it serves as the basis for the production of a discontinuous history of evolutionary thought. Current use of it is much like the term social Darwinism: popularized by the succeeding generation, employed to denigrate and build distance, and leading to a fundamental misinterpretation of key texts. Ironically, biologists such as Kellogg and Jordan were among the American authors who used the term "social Darwinism" in the 1910s and 1920s. They are among the authors who suffer from the misnomer "eclipse of Darwinism."¹⁹

It is certainly proper to delineate Kellogg's era in the history of evolutionary thought, which stretched from about 1880 to the early 1930s. There can be no doubt the work done in evolutionary biology after the reception of Darwin's theory of

evolution by natural selection is fundamentally different than what was done in Darwin's day. Likewise, the modern evolutionary synthesis represents something both cognitively and, as Cain and Smocovitis have argued, disciplinarily different. It is not, however, appropriate to adopt a term popularized by the succeeding generation of historical actors. Doing so allows historical actors to write their own histories, something no academic historical discipline sanctions.

The era of the so-called eclipse of Darwinism was, in fact, a dynamic and exciting time in the history of evolutionary biology, far from being the dark age. American biologists who worked in the late nineteenth and early twentieth century laid the very foundation for synthesis authors, and powerfully impacted their education and early careers. Take, for example, Sewall Wright. In his biography of Wright, Provine explained that Kellogg's *Darwinism To-Day* made the "greatest impression" of all the books on evolution that Wright read as a young professional, and Provine called the book "even at this writing one of the two best accounts of the various competing theories of evolution and heredity that abounded in the late nineteenth century." Later in the biography, he stated that *Darwinism To-Day* "was assigned reading for almost every college-level course dealing with evolutionary biology in the decade after its publication" (Provine, 1986, pp. 24–25, 228).

Perhaps nowhere are the enthusiasm, energy and potential of early twentieth-century evolutionary biology as clearly evident as in the final chapter of Kellogg's *Darwinism To-Day*. In contrast to the "intemperate and indecent" claims that occasionally came from European neo-Darwinists and anti-Darwinists, Kellogg offered an optimistic call to evolutionary biologists. Asserting that "we are ignorant; terribly, immensely ignorant," and he argued that the task before evolutionary biologists was to learn "to observe, to experiment, to tabulate, to induce, to deduce" (Kellogg, 1907, pp. 6, 387). "Biology," he concluded, "was never a clearer or more inviting field for fascinating, joyful, hopeful work." These are hardly the words of a man working in the dark age of evolution biology.

By lifting the veil of the eclipse by recognizing the confining and distorting impact of the phrase "eclipse of Darwin," we can reveal all sorts of valuable historical, historiographical, and scientific issues. If Kellogg was a Darwinian during the era of the supposed eclipse, what other Darwinians are out there? David Starr Jordan, C. Hart Merriam, and William Keith Brooks, all noted early twentieth-century Darwinists, have seen some work. Who else considered themselves Darwinians, regardless of current historians' claims that "there weren't any," and how did they define Darwinism? We need to make a close examination of other early twentieth-century American biologists to see what they meant when they talked about Darwinism. Among the people who have not yet seen enough study are Charles Davenport, Leon Cole, Maurice Bigelow, Frank Lillie, and dozens of other early twentieth-century biologists. Analyzing them we may well find, as I suspect, that throughout the era of the supposed eclipse of Darwinism, Darwin's methods and claims thrived in work done on eugenics and nature study and in certain locations, like the newly formed experimental stations on both coasts and in breeding farms around the country.

A more accurate and complete picture of evolutionary biology in early twentieth-century America may also provide valuable information about later developments in evolutionary biology. The modern evolutionary synthesis certainly appears to have been a departure from previous work, both in terms of some of the technical components

of evolutionary biology and in terms of disciplinary issues, like institutions, journals, and language. How and why did synthesis biologists and their historians take up and popularize the notion of the eclipse of Darwinism? What issues, scientific or social, did the adoption of a discontinuous history—a history that imagined a series of sharp breaks between the evolutionists of Darwin’s day, Kellogg’s day, and Julian Huxley’s day—allow synthesis authors to avoid? In the conclusion of *Monad to Man*, Ruse claimed that the modern evolutionary synthesis brought with it, in addition to fundamental conceptual changes, the expulsion of the concept of progress from evolutionary theory. “The expulsion,” Ruse argued, “occurred less because the epistemic factors were overwhelming and more simply because its practitioners wanted the status of professionals” (Ruse, 1996, pp. 526, 530).

The concept of progress alone was not the only roadblock to the professionalization of evolutionary biology in the mid-twentieth century. The baggage associated with eugenics, which nearly every prominent early twentieth-century American biologist supported, weighed heavily on the professional status of mid-century evolutionary biologists. Moreover, there was significant popular and professional association between evolutionary theory and political activism in the form of social Darwinism and World War I propaganda. Throughout the first decades of the twentieth century, evolutionary theory was wielded both to support and to attack pacifism, immigration policy, birth control, military imperialism, laissez-faire social and economic policy, and unrestrained capitalism (e.g., Mitman, 1992; and Crook, 1994). Finally, evolutionary theory and its social implications took center stage throughout the 1920s in the contentious debates over the teaching of evolution in public schools, and it suffered for its involvement (Grabiner & Miller, 1974).

By inventing a discontinuous history of evolutionary biology, one that obscured the decades from the late nineteenth century through the 1930s, synthesis authors may well have been seeking to overcome the burdens acquired by the previous generation of biologists. Until we discard the metaphor of the eclipse, actually examine evolutionary theory in the early twentieth century on its own terms, and accept that the history offered by the synthesis authors was written to serve their particular purposes, these questions will necessarily remain unexplored.

CONCLUSION

I would like to offer a potential replacement for the metaphor of the eclipse; instead of calling the period from 1880 to about 1940 the eclipse, I encourage you to use the term “interphase,” which was suggested to me by Paul Farber and is borrowed from cell biology.

Through the mid-1960s, the interphase was a time in cellular division when researchers believed that very little was happening. For example, Alfred Elliott and Charles Ray, Jr., in their 1967 textbook *Biology*, explained, “The so-called ‘resting’ phase or interphase is a state when there is little or no apparent activity in the nucleus” (Elliott & Ray, 1965). Shortly thereafter, biologists came to understand the interphase as not a time of rest, but rather as a period in cell division when a great deal of vital activity is taking place, activity that is necessary for later developments. In his 1980 textbook *Biological Science*, William Keeton explained, “The nondividing cell is said to be in the interphase state. In past years, such a cell was commonly called a

resting cell, but this terminology has been abandoned as grossly inappropriate. The interphase cell is definitely not resting; it is carrying out all the innumerable activities of a living, functioning cell” (Keeton, 1980, p. 560).

Those familiar with cell biology and with the history of cell biology will recognize that the term interphase works on two levels as a replacement for the phrase “eclipse of Darwinism.” As with the interphase, we once imagined that the era of the so-called eclipse of Darwin was a time when little productive work took place, a time when a generation of biologists made little or no progress. It was, in reality, a time of tremendous activity, all of which was vital to later developments that took place in evolutionary biology.

Like cell biologists’ previous notions of the interphase, I recommend we abandon the metaphor of eclipse as grossly inappropriate. It is a vestigial structure of the modern evolutionary synthesis, and the historians who unquestionably adopted the term from their historical subjects have not yet adequately challenged their subjects’ depictions of the research that preceded them. The term is a lingering relic that is no longer necessary and ultimately harmful to our ability accurately to depict twentieth-century evolutionary biology, so we should replace it and generate a more accurate assessment of the innumerable activities of the living, functioning careers of those who worked in the era before the synthesis. We need a new term and a new conception of the work done in evolutionary biology between 1880 and 1940, one that analyzes early twentieth-century evolutionary biology on its own terms, not merely in the context of what followed it.

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NOTES

1. For the purposes of this chapter, I will assume that the phrases “eclipse of Darwin” and “eclipse of Darwinism” are synonymous. There is, however, an argument to be made that “eclipse of Darwin” refers to the rejection of Darwin’s use of inductive methodology, while “eclipse of Darwinism” describes the rejection of natural selection as the principle species-changing agent.
2. Ruse (1996). When I asked him why he did not include in his book any American evolutionary biologists who worked during the era of the eclipse, Ruse said, “I did not write about them, because there weren’t any.”
3. For an excellent discussion of the propagandistic origins and uses of the term “Dark Ages,” see Russell (1991). My analysis of the phrase “eclipse of Darwinism” was powerfully influenced by Russell’s arguments. For him, as for me, the derogatory nature of phrases and terms like “eclipse of Darwinism” and “Dark Ages” is deeply problematic. We both are trying to resurrect the status of the eras we study by attacking problematic labels attached to them.
4. Bowler (1983, p. 5) incorrectly assumed Huxley originated the phrase “eclipse of Darwinism,” presumably because the first time the term appeared in print was in Huxley in 1942. Smocovitis (1999; 2005) made the same claim.
5. David Starr Jordan, “The Ways of Organic Evolution,” Unpublished manuscript, David Starr Jordan Papers, Stanford University Libraries Archives. The manuscript, titled “The Ways of Organic Evolution,” was discovered among Jordan’s papers at Stanford University’s archive

- and reassembled by Jane Maienschein and David Magnus. It was to have been Jordan's last statement on the subject of evolution, written ca. 1925.
6. Among the definitions of eclipse offered by the *Oxford English Dictionary* is its use in the astronomical sense: "An interception or obscuration of the light of the sun, moon, or other luminous body, by the intervention of some other body, either between it and the eye, or between the luminous body and that illuminated by it; as of the moon, by passing through the earth's shadow; of the sun, by the moon coming between it and the observer; or of a satellite, by entering the shadow of its primary"; as well as figuratively: "Obscuration, obscurity; dimness; loss of brilliance or splendour." When used as an astronomical term, as it was by Huxley, the term necessitates the eventual return of the luminous body. Jordan used the term "eclipse" in the figurative sense, which does not necessitate the eventual return to splendor of the eclipsed object; in this case, Darwinism.
 7. Smocovitis (1996, pp. 117–122). Quotes are from Kellogg (1907, pp. 1–2).
 8. The notion of a "historiographical blunder," as I use it here, is borrowed from Jackson (2000), who traced the history of arguments made against the social scientists testifying in the *Brown v. Board* case and argued that later critiques of their work are based on a fundamental misunderstanding of the earlier social scientists' claims. By ignoring the context of the original claims, Jackson asserted that historians were making "one of the worst historiographical blunders one can make" by "pointing to scientific errors of the past using present-day scientific knowledge" (Jackson, 2000, p. 47).
 9. For a broader study of Kellogg, see Largent (2000a; 2000b).
 10. Vernon Lyman Kellogg personal communication to David Starr Jordan, September 18, 1893, David Starr Jordan Papers, Stanford University Library Archives. Also Kellogg (1894; 1898).
 11. Vernon Lyman Kellogg personal communication to David Starr Jordan, March 5, 1905, David Starr Jordan Papers, Stanford University Library Archives. Vernon Lyman Kellogg personal communication to David Starr Jordan, March 9, 1905, David Starr Jordan Papers, Stanford University Library Archives.
 12. Kellogg (1907, pp. 130, 122–132, 374). Vernon Lyman Kellogg personal communication to David Starr Jordan, December 20, 1905, David Starr Jordan Papers, Stanford University Library Archives.
 13. Kellogg (1907, pp. 4–7, 375). Vernon Lyman Kellogg personal communication to David Starr Jordan, November 13, 1904, David Starr Jordan Papers, Stanford University Library Archives.
 14. Not surprisingly, Huxley's chapter "The eclipse of Darwinism" (1942, p. 22) began in precisely the same manner.
 15. Kellogg (1907, pp. 1, 5–6). Kellogg cited Dennert (1903, p. 4), but also see Dennert (1904) and Wolff (1898, p. 54).
 16. Vernon Lyman Kellogg to David Starr Jordan, November 7, 1904, David Starr Jordan Papers, Stanford University Library Archives. Vernon Lyman Kellogg to David Starr Jordan, December 12, 1905, David Starr Jordan Papers, Stanford University Library Archives. Vernon Lyman Kellogg to Luther Burbank, January 16, 1906, Luther Burbank Papers, Library of Congress.
 17. Vernon Lyman Kellogg to David Starr Jordan, December 12, 1905, David Starr Jordan Papers, Stanford University Library Archives. Kellogg (1907, pp. 376, 379, 383). Also see Desmond and Moore (1994, p. 547) and Jenkin (1867).
 18. Also, see Jordan (1907). The passage Lutz quoted is from Kellogg (1907, p. 374).
 19. The principal argument regarding the problematic nature of the term "social Darwinism" was offered by Bannister (1979). Both Kellogg and Jordan helped popularize the term as an attack on German militarists. See, for example, Kellogg (1918) and Jordan (1918).

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