



## AN ABSTRACT OF THE THESIS OF

Katharine Zimmerman for the degree of Master of Arts in History of Science on November 7, 2006

Title: Disciplining the Reception of Darwin: the Botanical and Sociological Work of Lester Frank Ward.

Abstract approved:

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The publication of Charles Darwin's *On the Origin of Species*, truly a synthesized work of natural history, coincided with the emergence of specialized disciplines in the 19<sup>th</sup> century. This thesis aims to explore the relationship between the specialization of knowledge, in the form of disciplinization, and the reception of new theories in emerging disciplines. To investigate how the development of new disciplines can affect theory reception I will focus on the work of Lester Frank Ward, a prominent paleobotanist who worked jointly for the U.S. National Museum and the U.S. Geologic Survey in Washington, DC. Ward was not only central to Gilded Age paleobotany, but he was also devoted to establishing an American sociological tradition, for which he is better remembered.

By analyzing the ways in which Ward interpreted and integrated Darwinian evolution into his dual-discipline career, the social and intellectual relationship between the processes of disciplinization and theory reception can be better understood. Comparing and contrasting Ward's approach towards Darwin in his botanical and sociological work allows for an evaluation of how two very singular

and distinct disciplines, each with specialized disciplinary topographies, affected one scientist's interpretation and application of a new theory.

Using evidence found in the Lester Frank Ward Papers at the Smithsonian Institution Archives and at Brown University, the collections of the Library of Congress, and the National Museum of Natural History, I will demonstrate how disciplinization as a process in both the historical and social sciences affected the interpretation and application of Darwin's theory of evolution not only in Ward's work, but more broadly as well. As a central figure in both disciplines, Ward's dual-career can provide much insight for accomplishing such a general task. This thesis aims to fill a gap in the current scholarship of Darwin studies and to contribute to work done by historians on the issue of disciplinarity.

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Disciplining the Reception of Darwin:  
The Botanical and Sociological Work of Lester Frank Ward

by  
Katharine Zimmerman

A THESIS

submitted to

Oregon State University

in partial fulfillment of  
the requirements for the  
degree of

Master of Arts

Presented November 7, 2006  
Commencement June 2007

Master of Arts thesis of Katharine Zimmerman  
Presented on November 7, 2006.

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Katharine Zimmerman, Author

## ACKNOWLEDGEMENTS

I wish to thank the Department of History at Oregon State University for financial, administrative and moral support.

To Jane Nichols and the staff of the Valley Library at OSU, the patient people at the Library of Congress, Timothy Engels and his staff at the Special Collections Division at Brown University, the National Museum of Natural History Library staff, and at the Smithsonian Institution Archives: Ellen Alers and especially Pam Henson (who was always ready to help despite being in the midst of a location-move, a collapsing building and Congressional hearings) – Thank you for everything!

Deborah J. Warner lent her mentorship, support and insight, and kept me on track with all the right questions. Also, recognition is due to the D.C. History and Philosophy of Science Group for their input on the first chapter.

To my fellow graduate students at Oregon State, I owe my sanity. Kristin Johnson, Erik Ellis, Melinda Gormley, Tulley Long, Cpt. Terry Christensen and Dutton, Dog-Prince of Lake Oswego, all offered their friendship and assistance to a new colleague. Rachel Koroloff, Leandra Swanner, Steve Taylor and Erica Jensen – I will always cherish you and the journey we embarked on together.<sup>1</sup> Corvallis was home because of you all.

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<sup>1</sup> Rachel, I wasn't kidding about the footnote. Rachel has done much more than ever should have been required of her in helping me write this thesis. From hauling and shipping about 100 pounds of library books across the country and globe to tracking down obscure texts on-line and for more than one vital pep talk – thank you!

No end of thanks would be sufficient enough to account for the encouragement, mentorship, and support of Ron Doel, Paul Farber and Mary Jo Nye. The extent to which their guidance has shaped my academic life is immeasurable. Special thanks to my advisor, Paul Farber, whose door is always open, whose phone is always answered, whose e-mails are promptly responded to, and whose words in any medium are always of abundant comfort and use.

To my parents, Jerry and Rachell Morris – history majors both. I've learned more of importance from you than any other place on Earth.

Finally, to my husband Dave, there's nothing I would have rather been doing than starting my life with you while finishing this degree. For keeping a smile on your face as I moved 3,000 miles away, for rescuing my Brown notes after a thunderstorm destroyed my laptop, for always being the light at the end of the tunnel...thank you.

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## LOCATION OF ARCHIVAL SOURCES AND ABBREVIATIONS

LOC	Library of Congress, "Collected Miscellaneous Papers, Lester Frank Ward." Washington, DC
LOCMRR	Library of Congress, Manuscript Reading Room, "Papers of Lester Frank Ward." Madison Building, Washington, DC
BUSC	Brown University, Special Collections, "Lester Frank Ward Papers." John Hay Library, Providence, RI
SIA	Smithsonian Institutional Archives, Personal Papers and Special Collections, "Lester Frank Ward Papers." Arts and Industries Building, Washington, DC

For Davis

Disciplining the Reception of Darwin:  
The Botanical and Sociological Work of Lester Frank Ward

## Chapter One: Emerging Disciplines and the Reception of Darwin

On December 26, 1869 a twenty-eight year old Lester Frank Ward wrote excitedly in his journal, “I have finished my scholastic studies and begun my professional ones. But really there is no profession I should like well enough to practice it.” “What I need now,” he continued “is to read the great authors and make many scientific experiments. If I could cover the other professions of medicine and theology and learn two more languages, Hebrew and Spanish, it would help me a great deal. But perhaps that is too much.”<sup>2</sup> This ambitious note was characteristic of Ward, whose life and work he devoted to a Gilded-Age faith in the uplifting power of knowledge. Throughout his formal and self-education he fed his wide-ranging interests, making sure to learn as much of the major subjects as he could. Soon Ward found not one, but two professions worth practicing: paleobotany and sociology. Throughout both careers he warned colleagues of the dangers of over-specialization but was himself submitted to the focusing effects of the emergence of new professions and disciplines.

The emergence of specialized disciplines was a dominant feature of the scientific enterprise in postbellum America. Narrowed branches stemming from more comprehensive traditions and topics formalized into independent disciplines, often paralleled by the development of accompanying professions recognized as specialized aggregates of authority and expertise. Indicators of the process of disciplinization, resulting from specialization and anticipating professionalization,

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<sup>2</sup>*Ibid.*, p. 317.

were the countless societies and journals dedicated to more and more narrow scientific pursuits. Similarly, the professorships and academic departments created within the growing college and university systems reflected the departmentalization of knowledge occurring throughout 19<sup>th</sup> century America. In this environment, trained specialists often supplanted amateur scientists, formed new communities and networks, and pursued more particular knowledge. This process of disciplinization, an enduring phenomenon, has been an important aspect of modern science and has influenced its cognitive and social environment with consequence – as an analysis of Lester Frank Ward’s dual-discipline career will demonstrate.<sup>3</sup>

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<sup>3</sup> Historians have discussed issues of disciplinarity in many specific and general contexts. General treatments of the emergence of disciplines as a process can be found in the following: Robert V. Bruce, *The Launching of Modern American Science, 1846-1876* (Ithaca: Cornell University Press, 1988), George Daniels, "The Process of Professionalization in American Science: The Emergent Period, 1820-1860," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. and Charles E. Rosenberg Numbers (Chicago and London: The University of Chicago Press, 1996), Paul Lawrence Farber, "Discussion Paper: The Transformation of Natural History in the Nineteenth Century," *Journal of the History of Biology* 15, no. 1 (1982), Roy Macleod Gerard Lemaine, Michael Mulkay, and Peter Weingart, ed., *Perspectives on the Emergence of Scientific Disciplines* (Paris: Mouton & Co., The Hague, and Maison des Sciences de l'Homme, 1976), Nathan Reingold, *Science, American Style* (New Brunswick: Rutgers University Press, 1991). For less general investigations on the emergence of specific disciplines see: Janet Browne, *The Secular Ark: Studies in the History of Biogeography* (New Haven and London: Yale University Press, 1983), Paul Lawrence Farber, *Discovering Birds: The Emergence of Ornithology as a Scientific Discipline: 1760-1850* (Baltimore and London: The Johns Hopkins University Press, 1997), Thomas L. Haskell, *The Emergence of Professional Social Science: The American Social Science Association and the Nineteenth-Century Crisis of Authority* (Baltimore and London: The Johns Hopkins University Press, 2000), Elizabeth B. Keeney, *The Botanizers: Amateur Scientists in Nineteenth-Century America* (Chapel Hill & London: The University of North Carolina Press, 1992), Robert E. Kohler, *From Medical Chemistry to Biochemistry: The Making of a Biomedical Discipline* (Cambridge, London and New York: Cambridge University Press, 1982), Mary Jo Nye, *Before Big Science: The Pursuit of Modern Chemistry and Physics, 1800-1940* (Cambridge, Massachusetts and London: Harvard University Press, 1996). This material is discussed in more detail in Chapter Two.

The emergence of increasingly specialized disciplines such as paleobotany and sociology coincided with the publication and reception of Charles Darwin's *On the Origin of Species by Means of Natural Selection*. Did this work of general natural history, with implications for both the historical and social sciences, receive equal attention across relevant disciplinary boundaries? The relationship between disciplinization and the reception of Darwin is not yet clear, although some historians have suggested that the disciplined scientific atmosphere to which the *Origin* was submitted had a significant role in shaping the overall reception of Darwin. The significance of disciplinarity, such as its impact on Darwin's reception, has attracted the attention of historians as an independent topic, but more can be assessed about both the reception and the nature of disciplinization when they are investigated as interrelated processes. While natural history remains an academic tradition to this day, Darwin's scientific audience consisted mainly of men with allegiance to some specific discipline. How this fact shaped the scientific response to Darwinism is not fully understood. A review of past accounts of the reception reveals gaps in the narrative, showing at least one aspect in need of further elaboration.

The reception of Darwin's theory has remained a staple trope in the so-called "Darwin Industry," and Darwin studies has itself been a dominant topic in the history and philosophy of science. In 1982 Darwin scholar Janet Browne was prompted to comment, "From H.M.S. *Beagle* to the notebook years, from the 'Essay' to the *Origin*, no career could have seemed more thoroughly documented, more clear cut,

than Darwin's."<sup>4</sup> Yet, Browne also stresses that despite the abundance of work already done by historians on the topic, new interpretations of Darwin and his career gained through "historiographic invention" can continue to add valuable insight to the literature.

Using a discipline-centric perspective, historians, philosophers and sociologists of science can gather much more from a seemingly tired topic. Historians have approached the development and reception of Darwin's *Origin of Species* from many different perspectives and have emphasized different aspects towards different ends. Numerous perspectives are necessary for understanding any historical problem, and a fuller comprehension of the reception of Darwin's *Origin* will be achieved as historians take more approaches. Historians focused on the development of the *Origin of Species* have included disciplines and specialists among the social and intellectual factors that influenced Darwin. Such studies, while not addressing the role of disciplinization in the reception of Darwin, nevertheless provide precedents for such an investigation.

Among the previous work that has dealt with the role of disciplines in the reception of Darwin's *Origin* is the scholarship of Dov Ospovat, whose 1981 book *The Development of Darwin's Theory* masterfully detailed the development of Darwin's ideas.<sup>5</sup> Ospovat demonstrated how developments in the ever-specializing biological sciences forced Darwin to readjust his conception of natural selection.

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<sup>4</sup> Janet Browne, "Essay Review: New Developments in Darwin Studies?," *Journal of the History of Biology* 15, no. 2 (1982). p. 275.

<sup>5</sup> Dov Ospovat, *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838-1859* (Cambridge and New York: Cambridge University Press, 1981).

Ospovat revealed not only how the theory changed between its inception and its publication, but how that change “correlated with a parallel development taking place in the general biology of the time, showing that Darwin was anything but a scientific recluse.”<sup>6</sup> Other studies that noted the contributions of specialized experts in various fields<sup>7</sup> to Darwin’s ideas and evidence synthesized in the *Origin* include Joel S. Schwartz’s “Charles Darwin’s Debt to Malthus and Edward Blyth,” and Peter Vorzimmer’s “Darwin, Malthus, and the Theory of Natural Selection.”<sup>8</sup>

Such studies not only illustrate the synthetic nature of the *Origin*, but also provide examples of how specific disciplines were essential to the development of Darwin’s theory. The particular knowledge and data controlled and produced by scientists specializing in specific disciplines, like ornithologist John Gould, stimulated Darwin and provided him with the raw evidence necessary to test and buttress his theory of evolution by means of natural selection.<sup>9</sup>

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<sup>6</sup> Peter J. Bowler, "Darwin's Thinking Reexamined," *Science, New Series* 215, no. 4538 (1982).

<sup>7</sup> Philosophers of science have distinguished the difference between a “discipline” and a “field.” For the purposes of this paper, they will be treated as synonyms, but for a more detailed treatment of the terminology, see Lindley Darden and Nancy Maull, "Interfield Theories," *Philosophy of Science* 44, no. 1 (1977). A discussion of the subtleties between such terminology can also be found in Mitchell G. Ash and Alfons Söllner, ed., *Forced Migrations and Scientific Change: Émigré German-Speaking Scientists and Scholars after 1933* (Washington, DC: Cambridge University Press, 1996). p. 37.

<sup>8</sup> See Joel S. Schwartz, "Charles Darwin's Debt to Malthus and Edward Blyth," *Journal of the History of Biology* 7, no. 2 (1974)., and Peter J. Vorzimmer, "Darwin, Malthus, and the Theory of Natural Selection," *Journal of the History of Ideas* 30, no. 4 (1969).

<sup>9</sup> For more on Gould’s role in the formation of Darwin’s theory, see Sandra Herbert, "The Place of Man in Darwin's Theory of Transmutation," *Journal of the History of Biology* 7, no. 2 (1974).

The connection between theory-reception and the emergence of specialized disciplines has not been as readily emphasized. A deeper appreciation of the relationship between disciplinization and theory-reception is available through a comparative analysis of the reception of Darwin among differentiated disciplines. Some historians have already suggested as much: the question was posed by Paul Farber in the concluding chapter of his 1982 monograph and case study, *Discovering Birds: The Emergence of Ornithology as a Scientific Discipline, 1760-1850*. Farber's final chapter, "The Significance of the Emergence of Ornithology as a Scientific Discipline," illustrated how the emergence of ornithology was part of a general "transformation of natural history," which "did not result in its dissolution and replacement by an entirely new subject, but rather in its extension, specialization, and growth into separate scientific disciplines."<sup>10</sup> Farber not only demonstrated the role of ornithology (as a discipline) and ornithologists (as specialists) in influencing the development of Darwin's theory, but also implied that the theory's reception would have been equally influenced by disciplinization.

Specifically, Farber argued that a deeper assessment of "the impact of specialization on the reception of Darwin's theory" is necessary for a complete narrative of the reception of Darwin, and could lead to one of the "most interesting and illuminating" aspects of that story.<sup>11</sup> Furthermore, Farber discussed one of the key facets of the issue of disciplinization, i.e. its tendency to result in increased specialization. He wrote,

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<sup>10</sup> Farber, *Discovering Birds: The Emergence of Ornithology as a Scientific Discipline: 1760-1850*. p. 127. Italicized in original.

<sup>11</sup> *Ibid.*, p. 145.

By contrast with the majority of work being done, Darwin formulated a general theory that potentially encompassed all of natural history and held implications for the rest of the life sciences. Who was able to comment with *authority* on such an intellectual construct? The very specialization that helped make the theory possible inhibited any meaningful discussion of it.<sup>12</sup>

Here is articulated the crucial point for the larger issue – that disciplinization is a product of specialization and that specialization leads to the intellectual alienation of disciplines from each other. Can disciplines, specialized and divergent in terms of their knowledge, methods and goals, be expected to approach general and synthetic theories such as Darwin’s in similar ways?

Only a comparative analysis of the reception of Darwin among disciplines can answer this question. In addition to Farber’s addressing this question in his 1982 monograph, it became a matter of discussion a decade prior at the Conference on the Comparative Reception of Darwin held in Austin, Texas, on April 22 and 23, 1972. Thomas F. Glick, Alex Vucinich and Jon Hodge planned the conference, jointly sponsored by the American Council of Learned Societies and the University of Texas at Austin.<sup>13</sup> The session topics and paper guidelines reflected contemporary concerns regarding the reception of Darwin, which included interest in the role of disciplines as intellectual and social institutions capable of shaping responses to Darwinian evolution.

The aim of the conference was to “fulfill the double task of presenting a series of case studies on the reception of Darwinism in various European and non-European

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<sup>12</sup> *Ibid.*

<sup>13</sup> Thomas F. Glick, ed., *The Comparative Reception of Darwinism* (Austin and London: University of Texas Press, 1973). p. ix.

countries and of subjecting such data to comparative analysis.”<sup>14</sup> As part of an effort to generate comparison points for case studies of national receptions of Darwinism, a provisional framework outlining specific areas for discussion was drawn up and circulated prior to the conference. Seven general categories of discussion were listed in this framework and were suggested, though not mandated, as guidelines for papers to be given.<sup>15</sup> The fifth guideline suggested looking at the “variable institutional, disciplinary, and regional penetration of Darwinism,” and attempting to answer the question, “Was Darwinism received more favorably in some institutions (educational levels, disciplines, regions, cities) than into others?”<sup>16</sup>

The fifth category, aimed at encouraging participants of the conference to consider Darwin’s impact at institutional levels, directly addressed the issue of disciplinization. The 1972 conference and the subsequently published edited volume were primarily organized to bring individual narratives of the reception of Darwin into comparison so that general conclusions of the overall reception could be drawn.

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<sup>14</sup> *Ibid.*, p. vii.

<sup>15</sup> The first two categories encouraged listing the basic facts surrounding the publication of Darwin’s work and any published responses, for example the dates of editions, reviews and translations. Attention, it was hoped, would be focused on “the sequence and circumstances of the primary diffusion of the Darwinian corpus...and the works of major Darwinian biologists and apologists,” as well as to the “sequence of pro- and anti-Darwin arguments.” The third guideline was written in four parts and asked participants to consider generally, “Those factors in the society that encouraged or inhibited the reception of evolutionary ideas.” General intellectual and philosophical trends in a nation, the organizers hoped, would be noted in addition to “the role of national scientific traditions; quality and methodological orientation of national scientists,” the “attitude of scientific institutions,” and the religious and political pressures of nations. Linked closely with this latter guideline is the fourth, which simply asks that attention be placed on the question, “What were the social and political backgrounds and linkages of pro- and anti-Darwinian forces?” The sixth and seventh categories deal with the impact Darwinism had on science and society in terms of directing research and leading to new social theories.

<sup>16</sup> *Ibid.*

It was recognized that this synthetic approach was needed for a broader and deeper understanding of national receptions of Darwin and should include multiple perspectives as outlined in the guideline. Part of this synthetic approach, the organizers agreed, should devote itself to investigating the reception of Darwin among disciplines.

However, the papers published in the edited volume focus mainly on national, cultural, and social factors, for example, the role of Catholicism in Spain and a rise of “middling classes” in England. Some of the papers did briefly address the fifth discussion point; however, an overall account of the impact of disciplinization on the reception of Darwin, through a comparison of how different disciplines differently responded to Darwinism, did not emerge from the conference. The discussions that did emerge from the conference regarding disciplinarity are useful. M.J.S. Hodge, for example, addressed disciplinary responses to Darwin in his analysis of the reception in England. Building on the work of David Hull, Hodge argued that judging Darwin’s theories as true or false, or his argument as strong or weak, could be of little value. Rather, Hodge and Hull suggested: “We must indeed invoke some estimate of the strength of Darwin’s proposals relative to his generation’s empirical information and theoretical presuppositions.”<sup>17</sup>

These presuppositions, Hodge claimed, were necessarily different among different disciplines, and thus are vital to understanding the nature of the reception of Darwin. Rather than analyzing how convincing the *Origin* was on its own, Hodge

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<sup>17</sup> M. J. S. Hodge, "England: Bibliographical Essay," in *The Comparative Reception of Darwinism*, ed. Thomas F. Glick (Austin and London: University of Texas Press, 1972). p. 6.

called for historians studying the reception to begin with an understanding of what contemporary readers brought to their readings of the *Origin*. More generally, Hodge suggested a need to reevaluate questions concerning why some found Darwin convincing, asking, “For what, after all, did the *Origin* have to offer? And what would a professional geologist have brought to his reading of it?”<sup>18</sup> Thus, an analysis of disciplinization would be extremely useful for understanding what scientists from different disciplinary backgrounds brought to their reading of Darwin. If investigated through the lens of disciplinization, and in view of Hodge and Hull’s insight, we can achieve a richer account of the reception of Darwin.

David Hull chaired the session on Darwinism and the Natural Sciences, and he wrote a summary chapter for the edited volume which commented on the papers given and synthesized individual case studies into a comparative review. After he acknowledged the participants’ efforts to address institutional factors in the reception of Darwin in different nations, Hull summarized:

A detailed study of the effect that the particular organization of universities and systems of education in the various countries had on the reception of evolutionary theory would prove to be extremely valuable, not because evolutionary theory is more important than any other scientific theory, but because it is an excellent example of a startling new theory with broad ramifications. It would help to know what sorts of educational structures are most receptive to new ideas...What effects do these and other factors have on the growth of knowledge?<sup>19</sup>

Here, Hull demonstrated the relevance of Darwin’s reception to broader topics in the history and philosophy of science. A deeper understanding of how scientific theories

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<sup>18</sup> *Ibid.*

<sup>19</sup> David L. Hull, "Darwinism and Historiography," in *The Comparative Reception of Darwinism*, ed. Thomas F. Glick (Austin and London: University of Texas Press, 1972). p. 399.

come to be accepted or rejected, Hull suggested, could be derived from a detailed study of the impact of institutional systems on the reception of Darwin. Although Hull emphasized systems of education such as universities rather than scientific disciplines, the argument can and should be extended.

Approaches to the reception of Darwin taken by the contributors to the 1972 conference are similar to those that have been taken since, though generally the issue of disciplinization seems to have last been addressed by Farber in 1982. The 1972 conference was specifically focused on national responses to the *Origin*, an important topic that has dominated the literature since 1859. Darwin and his supporters, chiefly T. H. Huxley and J. D. Hooker, were themselves concerned with comparing national responses to the *Origin*. Edward Caudill's study of the publicity campaign pioneered collectively by Darwin, Huxley, and Hooker in the wake of the publication of the *Origin* showed that these men monitored and concerned themselves with national responses.<sup>20</sup> Also, for his investigation of these scientists' "battle" to establish Darwin's theory among scientific and educated circles, Caudill uncovered other factors that Darwin worried would affect the reception of his theory. It is important to note these concerns before embarking on an investigation of how disciplinization affected the reception of Darwin since, as with any historical event, many factors worked simultaneously to achieve the perceived end, and as many that can be – should be – noted.

In a March 3, 1860 letter from Darwin to Hooker cited by Caudill, Darwin discussed his fear that "naturalists" would not be easily persuaded of the truth or

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<sup>20</sup> Edward Caudill, "The Bishop Eaters: The Publicity Campaign for Darwin and *on the Origin of Species*," *Journal of the History of Ideas* 55, no. 3 (1994). p. 445.

usefulness of his theory. Older naturalists particularly concerned Darwin, Huxley, and Hooker, as they were considered more likely to remain stubbornly attached to established opinions and views. Historians have noted this aspect of the reception before and are generally in consensus that older scientists were more likely to reject the theory than younger scientists. Louis Agassiz is perhaps the most documented example. This generational factor is employed often in historical accounts of the reception of Darwin, as in reception histories in other fields, and is a valid and important aspect to the narrative. Wrote Darwin:

One large class of men, more especially I suspect of naturalists, never will care about *any* general question...; and secondly nearly all men past a moderate age, either in actual years or in mind, are, I am fully convinced, physically incapable of looking at facts under a new point of view.<sup>21</sup>

In terms of viewing the reception from the perspective of disciplinization, this provides an interesting paradox. Naturalists, those in the best disciplinary position to grasp the full meaning of Darwin's *Origin*, tended to be older than the younger generation of specialists.

As previously mentioned, natural history continued as a scientific tradition after it began generating new and specialized fields.<sup>22</sup> Thus far it has been assumed that the discipline most capable of grasping the full meaning of the *Origin* would have been that from which it emerged: natural history. However, in view of Darwin's concern, cited above, and the facts regarding generational responses to Darwinism confirmed by historians, we cannot assume that natural historians were readily

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<sup>21</sup> Darwin to Hooker, March 3, 1860, from by Caudill, p. 447.

<sup>22</sup> For more on this subject see Farber, "Discussion Paper: The Transformation of Natural History in the Nineteenth Century."

appreciative and receptive of the theory of evolution by means of natural selection. In fact, the opposite appears to be true; older generations, as Darwin feared, tended to be natural historians who, despite their shared discipline, rejected or ignored his theory.<sup>23</sup>

Another aspect of the reception noted by Huxley, and that has since been agreed upon by historians was the difference between the *initial* and *eventual* reception of Darwin. In March of 1880 Huxley delivered a speech to the Royal Institution entitled, “The Coming of Age of the Origin of Species.” In his talk, Huxley discussed how the response to Darwinism in the years immediately following the publication of the *Origin* was likened to a fierce war, during which the ‘infant’ theory fought for life despite the “very pretty turmoil about its cradle.”<sup>24</sup> This initial reception, Huxley noted, was markedly different than the environment which existed during the second decade following the publication. “In fact,” he spoke,

Those who have watched the progress of science within the last ten years [1870-1880] will bear me out to the full when I assert that there is no field of biological inquiry in which the influence of the ‘Origin of Species’ is not traceable; the foremost men of science in every country are either avowed champions of its leading doctrines, or at any rate abstain from opposing them; a host of young and ardent investigators seek for and find inspiration and guidance in Mr. Darwin’s great work...<sup>25</sup>

Speaking in 1880, nearly twenty years after the initial publication of the *Origin*, Huxley was able to note the distinction between the theory’s initial reception and its

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<sup>23</sup> If so, the overall generational characteristic of natural historians can in fact be considered a disciplinary characteristic responsible for influencing that discipline’s reception of Darwin.

<sup>24</sup> Thomas Henry Huxley, "The Coming of Age of the Origin of Species," *The Scientific Monthly* 21, no. 2 (1925). p. 113.

<sup>25</sup> *Ibid.*, p. 114.

eventual reception. Historians have agreed with this statement, generalizing that the controversy over Darwin's theory of evolution was quelled by 1870.

Past accounts of responses to the *Origin*, as has been shown, have generally focused on at least one of the above-mentioned factors influencing its reception. John Farley's 1974, "The Initial Reactions of French Biologists to Darwin's *Origin of Species*," as the title suggests, synthesized several of these factors by concerning itself with the *initial* reception, in *France*, among *Biologists*. Farley thus considered the reception of the *Origin of Species* in a specific period, country, and discipline – (though classifying 'biology' as a distinct discipline is somewhat vague). Farley's investigation emphasized above all else the *Frenchness* of French biology more than the significance of the discipline itself. Included among the reasons why Darwin was initially 'rejected' in France were its "retention[s] of the old outlook [the empiricism of Cuvier]," the "age distribution of French Biologists," and the "the political and religious background of the Second Empire."<sup>26</sup> This latter category demonstrates how social and political factors cannot be divorced from the concept of disciplines. For this reason, an investigation of the reception of Darwin among different disciplines must consider the social, political and economic environment of the nation from which disciplinary evidence is drawn.

Farley showed quite convincingly that the legacy of Cuvier in France predisposed French biologists to dismiss Darwin based on "a biological outlook which the Germans had rejected and the British had never had."<sup>27</sup> In addition, social

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<sup>26</sup> John Farley, "The Initial Reactions of French Biologists to Darwin's *Origin of Species*," *Journal of the History of Biology* 7, no. 2 (1974).

<sup>27</sup> *Ibid.*, p. 282.

and political factors, such as the prevalence of Catholicism and a lack of young biologists, were rightly invoked as factors that made biology in France especially French. These arguments suggest that an investigation of the reception of Darwin among different disciplines would only succeed in recapitulating work done on national receptions of the *Origin*. This is not necessarily the case and should not obstruct efforts to interpret the impact of disciplinization on the reception of Darwin. For example, Farley's analysis of the initial reception of the *Origin* among French biologists is generalized and does not address specific disciplines within biology that might tend to be more homogeneous across national borders. Certainly, disciplines need to be interpreted in the context to which they belong since many factors color and contort disciplines into national styles. The dependence of a discipline on its cultural context should not be assumed, but instead investigated more deeply.

Indeed, Gerald Geison's book, *Michael Foster and the Cambridge School of Physiology: The Scientific Enterprise in Late Victorian Society*, questioned the extent to which physiology was fundamentally different among nations due to national styles. In the case of French and German physiology, Geison was critical of the common explanation that French physiology was loyal to vitalism while German physiologists touted mechanistic explanations in their respective philosophies. He wrote:

In terms of these institutional factors, the differences between French and German physiology during the mid-nineteenth century seem to be differences of degree rather than differences of kind. One may wonder, therefore, whether the distinction between the French and

German approaches to physiology has not been somewhat exaggerated.<sup>28</sup>

Geison went on to provide examples of some “lesser known” German vitalists and French mechanists, and showed that more attention paid to the issue could result in dissolving established beliefs about national styles of physiology. Geison’s work provides at least a preliminary response to the problem posed by Farley’s article, as it anticipated that disciplines can be analyzed as independent factors influencing theory reception.

Still, the engineering of an approach to the reception of Darwin from the perspective of disciplinization must minimize variables. For example, a comparative study of the reception of Darwin among French physiologists and American botanists is possible, but not recommended. Data for the specific subjects exists, including correspondences between Darwin and French physiologists and American botanists. A scissors-and-paste approach could potentially lead to a seemingly well-supported discussion of the reception of Darwin among these two disciplines in these two nations, but such a study would be in serious danger of confounding its variables. What might appear to be a difference of reception due to disciplinary singularities might in fact be due to differences between the cultural and social environments of France and America. Thus, a more reliable approach to investigating the impact of disciplinization on the reception of Darwin might start with a comparison of the response of one discipline in two different nations. This allows for a comparison that

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<sup>28</sup> Gerald Geison, *Michael Foster and the Cambridge School of Physiology: The Scientific Enterprise in Late Victorian Society* (Princeton: Princeton University Press, 1978). p. 16.

could reveal national differences, but more important for the disciplinization perspective, might reveal some of the similarities attributable to the discipline.

There is yet another approach, however, that promises to yield better evidence regarding the role of disciplinization in theory reception. By analyzing the reception of Darwin among two strong and independent disciplines within a single region, at a specific time, one could circumvent the problem of confounding nationally-induced variables. Because both disciplines should presumably be stylized in the same national manner, a comparison of the reception on solely disciplinary levels can result.

We may then inquire what it means if different disciplines responded differently to Darwin's theory. Does a theory's usefulness as a tool get acknowledged by some disciplines earlier than others and thus become more readily incorporated into those fields as historian Richard Bellon has suggested?<sup>29</sup> Is it true, as Paul Farber has stated, that specialization prevented meaningful discussion of the theory of evolution, or were specialized disciplines better able individually to address Darwin's theory and evidence? An historical account of the impact of disciplinization on the reception of the *Origin of Species* would not only enhance our understanding of the reception of Darwinian evolution, but would help to illuminate the intersection between scientific specialization and theory reception.

It is the aim of this thesis to use the discipline perspective for an elaboration of the narrative of the reception of Darwin. Through an investigation of the impact of

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<sup>29</sup> Richard Bellon, "On *Origin* and *Orchids*: The Making of a Scientific Revolution," in *The Columbia History of Science Group Annual Meeting* (Friday Harbor Labs: 2005).

disciplinization on the reception of the *Origin*, I will explore the relationship between the emergence of new disciplines and the reception of scientific theories. To examine how the emergence of new disciplines affected theory reception I will focus on the work of Lester Frank Ward (1882-1913), a prominent paleobotanist who worked jointly for the U.S. National Museum and the U.S. Geologic Survey in Gilded-Age Washington, DC. In addition to his role in paleobotany, Ward was also central to the development of American sociology, and he is in fact better known for this work. Through Ward, a representative of both disciplines, the receptions of Darwin by American sociology and paleobotany can be compared. The focus on Ward in this faculty allows for the engineering of an historical experiment that isolates many of the variables previously discussed and assures a more accurate measurement of discipline-related differences in the reception of Darwin in America.

A better approach might not rely on a single individual to represent entire disciplines, since as an individual Ward's personal idiosyncrasies surely contributed to his particular interpretation and use of Darwin. Also, disciplines do not have an equal impact on their members. Thus the very best estimate of a discipline's response to Darwin would base its conclusion on as many of its constituents as possible. The scope of this study, however, is limited to Ward not only out of expediency, but because his dual-discipline career provides a unique opportunity to measure the impact of disciplinization on one man's interpretation and integration of Darwin. Were a scientist's response to new ideas shaped solely by their personality, we could expect to find that Ward's use of Darwinism in his paleobotany mirrored its use in his sociology. It will be shown that this was not the case.

Ward's dual-discipline career, while not uncommon in the Gilded Age, provides a unique opportunity for historians interested in understanding the role of specialization in theory-reception. Ward was a prolific figure in each of his chosen professions, and the scope and content of his efforts have been preserved in his many publications and in his notes and correspondence archived at the Smithsonian Institution, the Library of Congress and at Brown University (where Ward's personal library and marginalia are also housed). Historians have produced a sizable literature on the life and work of Lester Frank Ward which, though focused almost entirely upon his sociology, records and examines his personal experiences, religious beliefs, and the other many factors that must be incorporated into any understanding of his response to and use of Darwinian evolution.

Historians have long studied the impact of Darwin's theory on society. Darwin synthesized a broad array of evidence in the development of his theory, and thus the implications of his book *On the Origin of Species by Means of Natural Selection* affected a broad array of disciplines. Darwin was a naturalist working on a general theory of natural history, but by the time his ideas regarding the mutability of species were published in 1859, the scientific world had become much more specialized than it had been even two decades prior when he began his transmutation notebooks. Darwin's book had implications for many of these disciplines, and his theory would influence them greatly. But the question of interest is this: How did a disciplined scientific environment influence the reception of Darwin, specifically in the botany and sociology of Lester Frank Ward, and what might we infer more generally from his responses?

## Chapter Two: Disciplinization and Lester Frank Ward's Dual-Discipline Career

Ward was born in Illinois in June of 1841, making him only eighteen when *The Origin of Species* was first published in 1859. It is not likely that he would have read the book at that time, since he was living near rural Towanda, Pennsylvania working for an older brother in the manufacturing of wagon-hubs. Ward received little education in his youth, but managed to attend three terms at the Susquehanna Collegiate Institute before he mustered into the Pennsylvania Volunteers in 1862. Nine months later he was wounded at the Battle of Chancellorsville and forced to complete his service managing a Union hospital near Alexandria, Virginia for the Invalid Corps. When he was discharged in 1863 Ward moved to the District of Columbia and received a clerkship in the U.S. Treasury Department, marking the beginning of a sixteen-year career in Gilded-Age bureaucracy. It was a far cry from the academic life he craved, but the move placed the twenty-four year old Ward in a city full of opportunity for social and intellectual advancement. His geographic location, his dedicated self-education, and a disciplinizing scientific atmosphere eventually ushered Ward into the ranks of Capitol City's specialized, scientific elite where the modes of Darwinism were being debated.

On May 16, 1869, Ward opened his diary and recorded the news he had long been waiting to declare, "I have conquered my studies and attained the most

cherished object of my life, a college education.”<sup>30</sup> The following month he celebrated his twenty-eighth birthday and began to write a manuscript entitled “The Great Panacea,” which would eventually be published in 1883 as his two-volume *Dynamic Sociology*. Though he was unaware of it at the time, this undertaking sparked the beginning of a long career in the emerging field of sociology. Though Ward would continue to work on “The Great Panacea” during night and weekend hours, between the years of 1865 and 1881 he remained a government clerk for the Treasury Department and later, a statistician with the Bureau of Statistics. Ward practiced both sociology and botany as an amateur scientist in these years, but in the early 1880s his professional dual-discipline career began.

Ward’s specialization in two separate disciplines provides insight into a formative period in the history of the United States, and especially of the history of American science. Ward’s career opportunities reflected the broader social experience created by a rapidly growing and specializing nation. During the latter half of the nineteenth century the United States joined the ranks of industrialized nations and demonstrated its technological and scientific advancements at World’s Fairs and at its own Centennial Exposition. Railroads spanned the continent and westward expansion and exploration yielded new knowledge and resources. Government sponsorship fueled science, as did the public’s perception of (and faith in) its ability to herald progress. Science had served in the United States achievement

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<sup>30</sup> B.J. Stern, ed., *Young Ward's Diary* (New York: G.P. Putnam's Sons, 1935). p. 292. Ward’s degree was a Bachelor of Arts from Columbian College. His education had been general, but included recitations in geology, chemistry, natural philosophy, botany, zoology, mechanical physics and physiology. Although it was not required, Ward was examined in the sciences before graduation and passed, prompting from him an excited, “Hurrah for science!”

of international autonomy and stature, and with an eye towards progress the nation supported its technocrats. The creation of new government positions and university professorships supported and propelled a professionalizing, disciplinizing American science. Ward believed in and benefited from this environment, obtaining by the end of his career two government appointments in paleobotany and a university professorship in sociology at Brown.<sup>31</sup>

Ward was 40 years old by the time he obtained permanent employment in the botanical sciences, and nearly 64 when he secured an official position as a sociologist. Yet, from the moment he arrived in Washington in 1864, Ward cultivated a reputation among Capitol City's scientific elite. He joined the local Lyceum and attended public lectures and meetings. Ward and his wife Lizzie struggled to stay out of debt as they slowly acquired the furnishings and clothing needed to project a respectable household. During his first few years in the district Ward wrote with pride on each occasion he brought home material for a new dress, a new hat, watch, cane or coat. One of their most cherished possessions was a \$678 piano, paid for in installments, which Mrs. Ward played to accompany her husband's violin.<sup>32</sup>

But the Wards desired to acquire education more than anything else, and in addition to the Bachelor of Arts he received in 1869, Ward would continue to collect a Bachelor of Laws (and be admitted to the bar) in 1871, and earn a Master of Arts in

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<sup>31</sup> Extensive literature exists on the topic of nineteenth century science and technology in America. Some particularly useful narratives are the previously mentioned works by Bruce and Reingold. Specifically focused on the history of biology in America is Philip J. Pauly, *Biologists and the Promise of American Life* (Princeton and Oxford: Princeton University Press, 2000).

<sup>32</sup> *Ibid.*, p. 317.

1872. Lizzie too studied, and graduated valedictorian in 1869 from the Union Seminary, what would later become Howard University.<sup>33</sup> Ward recorded her valedictory in his diary, perhaps because her words best defined the couple's work and moral ethos. "Remember," she told her classmates,

...that perseverance overcomes all obstacles; that only by the strong power of will can the mind be fixed upon and grasp subjects which seem too difficult to master. Conquer all inclination to put off a task because it is hard, but apply yourselves with diligence however laborious it may be, and you will be victorious. Do but one thing at a time and do that well, and you will be surprised and gratified to see how the fogs and mists that obscure the understanding will vanish, leaving the mind clear, and rendering the subject attractive... What emotions are raised within us, as we realize that one of the objects for which we have so long toiled is at last attained, - the completion of our *school* education. But with the possession of our diplomas should the efforts to improve, to develop, and expand the immortal powers entrusted to our care be relaxed? By no means! they should only be an incentive to renewed exertion... But while we are striving for unfading laurels, let us not forget to lend a helping hand to our companions in the race of life. Strengthen and cheer the weak and desponding, assist and comfort the weary and despairing, and leave behind us a world wiser and better, for us having lived.<sup>34</sup>

Lizzie's words characterized the young couple's attitude as they taught themselves French, Greek, Latin, Italian and German in addition to their regular coursework. Ward recorded their education in the same way he balanced his income and expenses, noting in his diary the hours spent in study or the hours lost when inconveniences such as illnesses and houseguests interrupted the Ward's regimented lifestyle.

When Ward lost Lizzie due to appendicitis in 1872, the pace of his self-education only quickened as the widower buried himself in work and began his first botanical excursions with the Potomac-Side Naturalists' Club, predecessor to the Biological Society of Washington. He continued working on his ever-growing

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<sup>33</sup> Stern, ed. p. 317.

<sup>34</sup> *Ibid.*, p. 297.

sociological manuscript and assumed more responsibility as chief of the Division of Navigation and Immigration in the Bureau of Statistics. But what relieved Ward's grief most was his marriage to Rose Simons Pierce, herself a widow. Together they financed the building of their new home at 1466 Rhode Island Avenue in downtown Washington in 1873-74. It included a room to serve as Lester's herbarium and science workshop.<sup>35</sup> Rose, like Lizzie, supported Ward in his studies, pressing his specimens and helping to finance the publication *Dynamic Sociology*.

Ward committed himself to local scientific clubs and societies, many of which he (alongside fellow Illinoisan Major John Wesley Powell) helped to establish. The Biological Society of Washington (1880), the Anthropological Society of Washington (1879) and the Philosophical Society of Washington (1871) all list Ward as a founding member. Ward was also a founding member of the Cosmos Club (1878), a social club aimed at providing a unifying association for Washington area societies. "There were other societies, but they tended toward specialization and formal meetings," boasts the club today. "Powell's vision was a center of good fellowship, a club that embraced the sciences and the arts, where members could meet socially and exchange ideas, where vitality would grow from the mixture of disciplines, and a library would provide a refuge for thought and learning."<sup>36</sup> Ward shared this vision, and his friendship with Powell grew close – indeed he dedicated his *Dynamic Sociology* to him, "whose generous aid, warm words of encouragement, and friendly

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<sup>35</sup> Clifford H. Scott, *Lester Frank Ward* (Boston: Twayne Publishers, 1976). p. 26.

<sup>36</sup> <http://www.cosmos-club.org/web/history1.html>, "History of the Cosmos Club." Accessed June 20, 2006.

intercourse has sustained me in my prolonged effort.”<sup>37</sup> By the time the United States Geological Survey was established under Powell in 1880, Ward had succeeded in establishing himself among the city’s intellectual elite.

Ward had entered the scientific world of Gilded-Age Washington as an amateur, but his work ethic and social maneuvering allowed him to impress not only Powell, but also Spencer F. Baird, director of the United States National Museum. Ward’s lack of obligation to any one discipline made him flexible and signaled for Powell a potential resource in Ward for manning his staff of specialists at the USGS.<sup>38</sup> Ward’s experience in this sense was not unique, and reflects the broader character of the process of discipline-formation.<sup>39</sup> In this sense, disciplinization in part enabled Ward’s paleobotanic career.

Historians of science have noted how new specialties and disciplines become populated by scientists lacking commitment to an already established field. Roy Macleod, Michael Mulkay, Gerard Lemaine and Peter Weingart, for example, concluded in their edited volume *Perspectives on the Emergence of Scientific Disciplines* that the colonization of a new discipline with specialists devoted to its study and advancement constitutes a kind of “scientific migration.” The exploration

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<sup>37</sup> Lester Frank Ward, *Dynamic Sociology*, 2 vols., vol. 1-2 (New York: D. Appleton and Company, 1883).

<sup>38</sup> Lester Frank Ward’s paleobotanic career began almost arbitrarily. When John Wesley Powell approached him in 1881 as the director of the newly established United States Geological Survey, he offered Ward his choice between geologist with the survey and linguist at the Bureau of Ethnology. Ward chose the former. From this evidence it is clear that Powell did not choose Ward for his special botanical knowledge, but for his reliability and capacity to learn and apply himself to new topics.

<sup>39</sup> For more on the formation of the USGS see A. Hunter Dupree, *Science in the Federal Government, A History of Policies and Activities to 1940* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1957), Chapter Four.

of a new field, they argued, is done by scientists abandoning less promising disciplines, who possess special skills that would have wider application in the new field, or who have “no firm commitment to an established field.”<sup>40</sup> They further concluded that such disciplinary pioneers “move into areas which appear to offer special opportunities for productive research, for the utilization of their particular skills and, consequently, for career advancement.”<sup>41</sup> This was certainly true of Ward’s own experience. Though clearly interested in the sciences, as indicated by his membership to a variety of scientific clubs and societies, Ward had still not specialized in any one scientific branch and was eager for an opportunity to begin a non-amateur career in the sciences – willing to accept any path towards that end.

Thus, when Powell chose the amateur Ward to accompany his five-month Survey of the Utah Territory in 1875 he did not hesitate to accept. This opportunity in turn led to Ward’s selection by Baird to assist with assembling the flora exhibits for the Centennial Exhibition in Philadelphia. Finally, when Powell secured funds for the formation of a unified Geological Survey in 1880 he offered Ward a position as a geologist specializing in paleobotany, and Ward promptly resigned from the Bureau of Statistics to begin a long-awaited, professional scientific career. Ward found paleobotany a small and developing discipline with few devoted specialists and recognized the prospect of committing himself and his self-attained botanical knowledge to the young science. Although a decade later Ward would recruit assistants from Cornell University and other institutions with degree-programs in

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<sup>40</sup> Gerard Lemaine, ed. p. 5.

<sup>41</sup> *Ibid.*

relevant departments, at the time of his own entry into the field, formal education in either botany or geology was not necessarily required.

It helped that Ward had experience with botany. As historian Clifford H. Scott noted, “The study of fossilized plants was only a few million years removed from the botanical studies with which Ward was familiar.” Another of Scott’s observations regarding Ward’s decision is consistent with the previously described trend:

To Ward, paleobotany promised a new field, uncrowded by men or theories, that was awaiting a new Darwin to explain in a synthetic theory the huge array of scientific facts in plant evolution that had been scarcely touched by Darwin or by his early followers.<sup>42</sup>

Indeed, Ward was able to enter the discipline immediately and successfully despite his inexperience. The field was small enough that Ward could familiarize himself with its literature quickly and fully enough to write an authoritative *Sketch of Paleobotany* for the Department of the Interior.<sup>43</sup> But as will be shown in Chapter Three, due to its disciplinary topography, Ward would not succeed in making lasting contributions to paleobotany with regard to Darwinian evolution.

Ward’s cultivation of a sociological career was similarly enabled by the process of discipline formation. In both fields Ward’s admittance derived from their emergence as new disciplines uncluttered by specialists and in need of dedicated attention.<sup>44</sup> The professional barriers that would later block amateur contributions

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<sup>42</sup> Scott, pp. 29-30.

<sup>43</sup> Lester Frank Ward, "Sketch of Paleobotany," *Fifth Annual Report of the Director, Department of the Interior, U.S. Geological Survey 1883-'84* (1885).

<sup>44</sup> For histories regarding the emergence of sociology as a discipline see Dorothy Ross *The Origins of American Social Science*, 1991; Thomas L. Haskell *The*

had not yet risen, and Ward found himself a founding father to both American paleobotany and sociology. Sociology in the latter half of the nineteenth century was even more decentralized than paleontology. The fact that Ward established himself as a foremost sociologist prior to any formal institutional affiliation demonstrates the individualistic and unprofessionalized nature of the discipline. Whereas Ward had some background experience, as well as the friendship and esteem of men like Powell to begin his paleobotanical career, in sociology all that was technically required was to find a publisher.<sup>45</sup>

Because Ward's careers in paleobotany and sociology were facilitated by the process of scientific specialization and the processes of disciplinization and professionalization, it is important to examine the nature and relationship of these interrelated phenomena. These processes are important to understand individually, and their interrelationship requires elaboration as the concepts (especially disciplinization) will be employed often in this thesis. Three aspects of disciplinization are important to note: first is the fact of disciplinization; as a process, the emergence of new disciplines is characteristic of modern science. Second, disciplinization creates not only new categories of knowledge but also produces benefits and liabilities for science and scientists. Thirdly, disciplinization is related to

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*Emergence of Professional Social Science: The American Social Science Association and the Nineteenth-Century Crisis of Authority*, 1977; and Mary O. Furner *Advocacy & Objectivity: A Crisis in the Professionalization of American Social Science, 1865-1905*, 1975.

<sup>45</sup> While Powell's influence with Edward L. Youmans helped Ward find a publisher for his *Dynamic Sociology*, the manuscript was published by the Appleton Company only after Ward sold his home to be able to provide nearly \$2,300 to guarantee publication costs. For more information about the publication of *Dynamic Sociology*, see Scott, pg. 29.

the processes of specialization and professionalization, and together these shape both the cognitive and social structure of science.

“By the middle of the [nineteenth] century,” historian George Daniels noted, “the earlier pattern of gentlemanly scientific activity was rapidly becoming obsolete. The amateur was in the process of being replaced by the trained specialist – the professional who had a single-minded dedication to the interests of science.”<sup>46</sup>

Daniels noted that the nineteenth century was marked by specialization and professionalization, and treats professionals as a type of specialist. Elizabeth B. Keeney, in her study of the decline of amateur botanizing, as botany became a profession and a discipline, came to similar conclusions about the relationship between professionalization and disciplines:

In the years following the Civil War, two changes occurred that would have a dramatic impact on amateur botanizers: the historic patterns of information flow that had kept amateurs within the botanical community eroded, and the type of science pursued by amateurs was no longer that pursued by the mainstream professionals... This development was by no means confined to botany, but rather was part of the normal process of professionalization, occurring across the disciplines: increasingly, those who saw themselves as professionals sought to set themselves apart and to establish their social position by preempting information and by claiming expertise.<sup>47</sup>

Here Keeney treated professionalization as a process that occurs within and across already established disciplines.

While the specialization of science served purposes other than feeding the so-called “Ph.D. machine,” as historian Robert Kohler has argued, the social politics of scientific specialization and professionalization has been a significant factor in the

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<sup>46</sup> Daniels. p. 21.

<sup>47</sup> Keeney. p. 123.

emergence of new disciplines. For Kohler, deriving ideas from sociologists like Joseph Ben-David and Avraham Zloczower, scientific specialization is a strategy employed by scientists competing for resources, and scientists are entrepreneurs vying for power and prestige. As described above, Lester Frank Ward's decision to become a paleobotanist was made in part because of the opportunities that the new field offered a relatively inexperienced scientist such as himself. Ward served to gain by entering the emerging fields of paleobotany and sociology, and his position within the larger scientific community was established through his particular knowledge of those topics. By becoming an expert in two fairly obscure sciences, Ward indeed secured political gains. Nevertheless, other factors led to Ward's entry into these fields, and the disciplines themselves were not only established for the political motives that Kohler attributed to scientific specialization.

Kohler defines disciplines as "political institutions that demarcate areas of academic territory, allocate the privileges and responsibilities of expertise, and structure claims on resources." Although narrowed on the politics of science, this definition provide a useful description. "[Disciplines] are the infrastructure of science," he added "embodied in university departments, professional societies, and informal market relationships between the producers and consumers of knowledge. They are creatures of history and reflect human habits and preferences, not a fixed order of nature."<sup>48</sup> Charles Rosenberg offered another treatment of disciplines as the junction between individual and collective values. He stated:

It is the discipline that ultimately shapes the scholar's vocational identity. The confraternity of his acknowledged peers defines the

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<sup>48</sup> *Kohler*. p. 1.

scholar's aspirations, sets appropriate problems, and provides the intellectual tools with which to address them; finally it is the discipline that rewards intellectual achievement. At the same time his disciplinary identity helps structure the scholar or scientist's relationship to a particular institutional context. His professional life becomes then a compromise defined by the sometimes consistent and sometimes conflicting demands of his discipline and the conditions of his employment.<sup>49</sup>

Yet another definition of discipline comes from Keeney's study of the emergence of botany as a profession, and her contribution to the discussion also helps clarify the interrelationship between specialization, disciplinization and professionalization.

"Part of what was involved in the emergence of botany as a discipline," Keeney began "was a change in the organization of knowledge, which resulted in categories being rearranged and relabeled to fit new understandings of scientific thought." She continued:

Like professionalization, this specialization involved the drawing of intellectual lines, certification, training, involvement in research, and the like. The profession and its subject matter are by no means unrelated, and just as historians have confused the two meanings of professional – expert and worker – we have also confused the processes of professionalization and discipline formation. Changes in categories of knowledge and attempts to create autonomy and authority often go hand in hand. Distinguishing between the effects of professionalization and discipline formation, and discerning how the two are related, is often no easy feat, and the case of botany is no exception.<sup>50</sup>

Here Keeney depicted disciplinization as a re-categorization of knowledge, and described the process in solely cognitive terms yet noted its relationship to the process of professionalization. Other historians have treated disciplines, and their emergence, as both cognitive and social phenomena. Like Keeney, they have

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<sup>49</sup> Quoted in *Ibid.*, p. 2.

<sup>50</sup> Keeney. p. 147.

acknowledged disciplines as compartmentalizations of knowledge and specialists. The terms profession and professionalization for Keeney, as with Kohler and Daniels, suggested the more social and political aspects of scientific specialization.

As suggested by these historians, disciplinization and professionalization (though often confused as synonyms) are distinct processes. A discipline can exist without the presence of a profession devoted to that discipline, though often the end result of disciplinization is the achievement of professional authority.<sup>51</sup> Specialization and disciplinization, however, are much more closely related processes than disciplinization and professionalization. This is because the emergence of new disciplines is *a form of* specialization, as Keeney suggested in her distinction between professionalization and disciplinization. The difference between a discipline and a specialty for the purposes of this study is that a discipline is both a category of knowledge and an institutionalized unit whereas a specialty, in addition to being descriptive for that which has become specialized (like a discipline or profession), is simply a narrowed focus.

These three processes, specialization, disciplinization and professionalization are characteristics of modern science and influence both the social and cognitive structures upon which the enterprise is built. For Ward, disciplinization not only provided him with new categories of knowledge to study, but created the opportunities required to establish a dual-discipline career in paleobotany and sociology. In this way, Ward's experience was tethered to the development of

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<sup>51</sup> This is not always the case, as historian Janet Browne has shown with her study of biogeography – a discipline that failed to legitimize itself into an autonomous profession. See Browne, *The Secular Ark: Studies in the History of Biogeography*.

science itself. From his amateur contributions to his official positions with the National Museum, the Geological Survey and Brown University, his personal experience echoed the broader scientific experience of Gilded-Age America. The emergence of paleobotany and sociology as disciplines created an opening for Ward, and led to a noteworthy and prolific dual-discipline career.

While there are some shared features between Ward's paleobotany and sociology, in general he conducted two separate careers. In each discipline Ward maintained wide correspondence networks, attended national and international conferences, taught university courses, published books, articles and reviews, lectured to public audiences, and was an active member of professional societies. Ward was a respected member of each discipline, and his contributions were well-received by his colleagues. At times the work of one discipline distracted him from the work of the other, but in both paleobotany and sociology, Ward maintained a central and active role.<sup>52</sup> Ward's sociological interests had been initiated early upon his arrival to Washington, and he worked independently in his extra hours to publish on the subject. The two disciplines, while clashing for Ward's time and attention were conducted simultaneously in his life until his resignation from the USGS in 1905 allowed him to devote himself entirely to sociology at Brown University.<sup>53</sup>

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<sup>52</sup> For example, when he taught a night courses in botany at the Corcoran Scientific School at Columbian College for two years in the mid-1880s, Ward lamented before resigning that the chore had, "threatened to absorb all those precious hours that I had consecrated to social science." Excerpt of an 1887 letter to Columbian President James Welling quoted in Scott, p. 31.

<sup>53</sup> For example, Ward would often scribble sociological notes and manuscripts on the back of paleobotanical lists scrapped from his office at the Smithsonian. Indeed, much of the manuscript for his 1903 *Pure Sociology* was drafted on the reverse side

Ward's dual-discipline career placed him at the center of both paleobotany and sociology, and engaged him in the important discussions of those sciences. The implication of Darwinian evolution for these disciplines was tacitly understood by the time Ward's career began, but the subsequent integration of Darwin into these sciences was a process in which he had a role. Although it was not uncommon for professionals at this time to spread their efforts across the span of several different disciplines, Ward's success in his two chosen professions remains remarkable. In an atmosphere of specialization, of which he was all too aware, Ward devoted himself to two very different disciplines and made lasting contributions to both. He encountered Darwinism in both paleobotany and sociology, and with his colleagues integrated Darwinian elements into these disciplines. By comparing the approaches Ward took towards Darwin in his botanical and sociological work, an evaluation can be made of how disciplinary topographies mold the reception and integration of new theories.



Figure 1.1  
Lester Frank Ward in his office at the Smithsonian

### Chapter Three: Ward, Darwin and Paleobotany

On May 12, 1882, one year into his appointment, Ward participated (at the bequest of the planning committee) in the Darwin Memorial Meeting of the Biological Society of Washington. There he made clear his admiration for the “great genius” and trumpeted the demonstrated truth of natural selection. “I need not labor to convince you,” Ward spoke, “that any modification which is an advantage to the plant will be secured by the process of natural selection.” “The law of natural selection,” he continued, “as a fundamental process, has long since passed the stage of discussion.”<sup>54</sup> Ward’s presentation was also directed at restoring to botany “its share of the dignity and the luster which Darwin’s investigations have reflected upon biology in general” and pointed to Darwin’s affiliation with the plant sciences.<sup>55</sup> Ward argued that Darwin’s *Power of Movement in Plants* was a great contribution to the evolution theory he initiated and clearly admired Darwin’s ability to “state the profoundest of all biological problems” from a botanical background.<sup>56</sup> But despite Ward’s esteem for Darwin and his achievements, he himself was never to contribute likewise from his seat in paleobotany.

From the onset of his paleobotanical career, Ward was forced to narrow the scope of his previously broad botanical interests. To immerse himself in his new

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<sup>54</sup> Lester Frank Ward, "Darwin as Botanist: Address Delivered on the Occasion of the Darwin Memorial Meeting, Held in the Lecture-Room of the U.S. National Museum, May 12, 1882," *Proceedings of the Biological Society of Washington* 1 (1882). p. 84.

<sup>55</sup> *Ibid.*, p. 81.

<sup>56</sup> *Ibid.*, p. 86.

discipline, Ward built a “sub-library” of paleobotanical works at the Smithsonian Castle to familiarize himself with the discipline, and collated the information into a seventy-six page synopsis. In it, Ward dealt with topics such as past disciplinary discoveries, contemporary problems, future disciplinary prospects, the interrelationship between geology and botany, and the interdependence of botany and paleobotany. The report also included biographical sketches of the discipline’s early contributors. This work, published by the Department of the Interior as Ward’s *Sketch of Paleobotany* in 1885 was itself only a portion of a greater “Compendium of Paleobotany” which Ward compiled throughout his career.<sup>57</sup> By the time he left the USGS for Brown University in 1906 it included 12,000 bibliographic titles and nearly 80,000 references to descriptions and illustrations of fossil plants. It is still used today by paleobotanists interested in the history of their discipline, and remains a useful source for historians of fossil botany.<sup>58</sup>

Ward’s work in paleobotany was on the whole more descriptive than conceptual in nature. As will be shown, this was due in part to Ward’s perception of, and duty to, the immediate needs of his discipline. His administrative and custodial contributions to paleobotany were significant, and his professional obligations resulted in his earnest commitment to cataloguing data and improving the status and reputation of paleobotany. While he did write several articles and delivered a handful of lectures on the subject of Darwinian evolution as it related to fossil botany, Ward’s over-all paleobotanic career was distracted by less exciting issues – including

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<sup>58</sup> For example, Ward’s *Sketch* is referenced in Henry N. Andrews, *The Fossil Hunters: In Search of Ancient Plants* (Ithaca and London: Cornell University Press, 1980).

membership on a committee devoted to lobbying the U.S. Postal Service for discounted prices on the shipment of specimens and equipment. It will be shown in this chapter that Ward's interpretation of Darwinian evolution, in addition to his lack of any real incorporation of that interpretation into an active methodology or research program, was due in part to the cognitive and social topography of late nineteenth-century paleobotany in America.<sup>59</sup>

Ward's *Sketch* not only exemplifies the meticulous nature of his work, but also captures his perception of the emerging discipline, thus providing an excellent source for understanding Ward's reckoning of the science. Further, the development of this discipline and Ward's account of it in his *Sketch*, demonstrate the origins of Ward's interpretation of natural selection as a progressive process. Ward's esteem for his discipline's founder, Adolph Brongniart, in addition to Ward's understanding of the discipline's ties to paleontology proper with its tradition of interpreting the fossil record as progressive, led to his notion of natural selection as a process of improvement.<sup>60</sup> Unlike many other American paleontologists Ward did not apply Lamarckian teleology to his interpretation of evolution, but instead limited his use of Lamarck. Ward's pragmatic evaluation of paleobotany shaped his disciplinary assumptions and goals, which in turn prohibited the working-use of Darwin's theory

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<sup>59</sup> Histories of paleobotany are far and few between, and possibly no single account has been written on American paleobotany itself. The topic is growing in its popularity among historians of science and recent practitioner histories are available. For general histories of the discipline two books in particular are useful, that by Andrews, previously mentioned, and C.V. Burek and R. Wilding A.J. Bowden, ed., *Histories of Palaeobotany: Selected Essays*, vol. 241 (The Geological Society, London, Special Publications, 2005).

<sup>60</sup> For more on Brongniart's role in early paleobotany see Henry N. Andrews, *The Fossil Hunters: In Search of Ancient Plants* (Ithaca and London: Cornell University Press, 1980), Chapter Four.

and instead committed his career to the geological, custodial and administrative aspects of the discipline.

One of Ward's first observations regarding paleobotany was its youth as a discipline. He admitted the specialty was a "science of the nineteenth century," but recognized the field's roots in eighteenth-century botany, geology, and paleontology.<sup>61</sup> Ward identified twenty-two men whose work had paved the way for the science, all of whom came to their study of fossil plants through other disciplines and traditions in the late eighteenth and early nineteenth centuries, ranging from naturalistic collecting, entomology, paleontology, histology, botany, fungology, geology and bryology to more applied sciences like mineralogy and metallurgy, medicine, and the geological pursuits focused on fossil fuel formation, preservation and procurement.<sup>62</sup>

The work of British botanists in Canada, the wide influence and precedence of European pioneers in paleobotany, and the immigration of Leo Lesquereux from Switzerland, "of that little band, which also included Agassiz and Guyot," all aided in the emergence of an American tradition of paleobotany.<sup>63</sup> By the 1860s American contributions to paleobotany were steady, and prominent among them stood Ward and his closest colleagues.<sup>64</sup> In the United States the raw data of paleobotany, i.e. fossils, were collected by surveys of western states and territories and by professional

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<sup>61</sup> Ward, "Sketch of Paleobotany." p. 368.

<sup>62</sup> The migration of these "early cultivators" to the study of fossil plants is again characteristic of discipline formation as discussed in Chapter Two.

<sup>63</sup> Ward, "Sketch of Paleobotany." p. 376.

<sup>64</sup> J. Reynolds Green, *A History of Botany, 1860-1900: Being a Continuation of Sachs' History of Botany, 1530-1860'* (New York: Russell & Russell, 1967). pp. 139 and 151.

collectors who made their livings finding and selling fossils and other specimens to curators and specialists at museums, botanic gardens, universities and other institutions. Further encouraging and enabling the collection of fossil plants were the expanding railways and railroad towns networking the country. Throughout this network, scientists traveled to distant cities for conferences, expeditions, and to consult colleagues and their collections. The railway network also made the shipment of specimens and equipment a relatively uncomplicated proposition.

In the discipline's early formation, approaches to the subject were diverse and uncoordinated. Specialists with backgrounds in geology and paleontology used fossil plants to date and correlate geologic horizons and to determine and differentiate strata. Others approached paleobotany with industrial interests in peat bogs and coal formations. Some were devoted to collecting specimens and publishing descriptions, and a few worked to identify and classify specimens according to different "natural" systems. Scientists with backgrounds in histology examined the insides of petrified and fossilized plants rather than simply examining and describing their outer appearance. Even as the discipline was developing, new specialties within paleobotany were emerging and focused on specific subjects pertaining to the larger discipline, for example, fossil fruits, cycads, flora, and petrified wood.

During the eighteenth century a few unifying questions led to the coalescence of paleobotany by focusing research and theory-building on discipline-specific problems. Ward noted in his historical sketch of the discipline that paleobotany was built on two questions: "Are [fossil plants] the remains of the same kind of plants that are now found growing upon the earth? and, second, When did the originals live that

have been preserved in this remarkable manner by turning into stone?”<sup>65</sup> As was the case with paleontology proper, theories incorporating the Deluge (or Noachian Flood) provided several ways to interpret the occurrence and placement of fossilized plants. The diluvian hypothesis dominated eighteenth century studies of fossil plants, as it explained both their origin and distribution. Later in that century stratigraphical geology was established, and William Smith proposed determining the age of rock layers by examining the fossils contained within, ushering into paleontology the attempts to verify the age of plant remains and their subsequent treatment as “extinct species of forms once indigenous [to the region].” By 1828, Adolph Brongniart (1801-1876) became *the* authority on paleobotany through the publication of his *Prodromus*, a work of “theory and interpretation” accompanied by a classification scheme.<sup>66</sup>

A follower of Cuvier, Brongniart approached paleobotany from the position of an apocalyptist and believed in multiple creations followed by catastrophic extinctions. This subscription to the “catastrophist synthesis” was common as the theory was widely defended by geologists, paleontologists and comparative anatomists in the first few decades of the nineteenth century. Brongniart’s father, Alexander, had worked with Cuvier on the structure of the Paris Basin, a collaboration which in part led to Cuvier’s development of his *Recherches sur les ossements fossiles* (1812), a theory of the earth based on catastrophist ideas. Not until the 1830s, after Charles Lyell published his three-volume *Principles of Geology*

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<sup>65</sup> Ward, "Sketch of Paleobotany." p. 395.

<sup>66</sup> Duane Isely, *One Hundred and One Botanists* (Ames, Iowa: Iowa State University Press, 1994). p.168.

(1830-1833), would uniformitarianism challenge diluvial geology and pave a path for the Darwinian theory of evolution.

During the peak of Adolph Brongniart's productivity in paleobotany, the uniformitarian-catastrophist debate was raging in Europe. Lyell and other anti-diluvialists steadily stacked evidence against catastrophism and argued instead for a uniformitarian geology in which current processes were assumed identical to those throughout the earth's history. The gradual acceptance of uniformitarianism had wide implications for theories of evolution, including Lamarckist transformationism and Darwin's theory of the mutability of species by means of natural selection. Although Lyell himself discounted Lamarck's theories and even denied a progressive trend in the geologic record, *Principles of Geology* was crucial to Darwin's theory of evolution. Darwin carried *Principles* with him on the *Beagle* at the suggestion of his mentor John Stevens Henslow, and used it to guide his researches as he voyaged. Later, *Principles* would be important for the development of Darwin's ideas of the transmutation of species, as he extended Lyell's views to the living world.<sup>67</sup>

Many, including Ward, attribute the founding of paleobotany to Adolph Brongniart above all others.<sup>68</sup> In addition to providing descriptions and a classification scheme, Brongniart "developed the basic concepts of interpretation," including the incorporation of methods developed by Smith and paleontology proper. Brongniart, unlike Lyell, admitted that "in passing up through the geologic series higher and higher forms of vegetable life presented themselves," and reconciled this

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<sup>67</sup> Janet Browne, *Charles Darwin: Voyaging*, 2 vols., vol. 1 (Princeton: Princeton University Press, 1995). p. 186.

<sup>68</sup> Isely and Ward, "Sketch of Paleobotany." p. 372.

observation with his Cuvierian commitment by making the then common argument that each successive creation “was superior to the one it had replaced, and that there had thus been, as it were, a steady progress from the lowest to the highest forms of vegetation.”<sup>69</sup> Brongniart helped to establish paleobotany as a discipline in Europe based on methods derived from paleontology and geology with applications in those fields, as well as for botany.

Paleontology had provided large amounts of evidence supporting catastrophism and also supported claims of progressive development as defended by Brongniart. By the time Ward became a paleobotanist in the 1880s, explanations referencing the Deluge had been surrendered to evolutionary ones. But while catastrophism no longer retained the unquestioned explanatory powers it had enjoyed in 18<sup>th</sup> and early 19<sup>th</sup> century earth and biological sciences, a progressive view of development had been retained and was widely accepted by scientists of the fossil sciences, including Lester Frank Ward.<sup>70</sup> In fact in his *Sketch of Paleobotany*, Ward relegated the diluvian theory to a section of his book entitled “The pre-scientific period.”<sup>71</sup>

With the aid of hindsight, Ward praised the “almost prophetic accuracy” of Brongniart’s defense of overall progress, but criticized him for being “unable to understand the complete continuity in the [geologic] series, as modern evolution requires,” and for being “affected by the Cuvierian idea of successive destructions and

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<sup>69</sup> Ward, "Sketch of Paleobotany." p. 407.

<sup>70</sup> Ward’s interpretation of the evolutionary record as progressive is reflective of the American paleontological reading of Darwin. This is not surprising as paleobotany as a discipline is a specialty derived from paleontology proper, and would have inherited its parent’s progressive view of evolution.

<sup>71</sup> Ward, "Sketch of Paleobotany." pp. 385-399.

re-creations.”<sup>72</sup> Ward was more critical still of Brongniart’s predecessors, many of whom argued for the opposite of progressive development – *degeneration* – as indicated by the existence of primitive vegetable forms in the more recent layers of the geologic record. Ward engaged this argument in a presidential address to the Biological Society of Washington in 1890 and maintained that while “lower or less perfect” types “persist and are found mingled with organisms of the higher types that are the dominant forms of life at subsequent epochs,” the fact of development was not disproved. Progress, Ward maintained, “takes place through the development of new and higher types of structure, embodying successively higher and higher capacity for improvement,” and while these were produced by natural selection, lower and unspecialized types (which thus do not have to compete with the higher, specialized types) could persist, and remained as only “degenerate forms.”<sup>73</sup>

Ward’s most substantial encounters with Darwin’s theory of evolution came in the form of public lectures such as that he gave at the Darwin Memorial Meeting and in his presidential address of 1890. In the latter, Ward chose as his topic nothing less than “The Course of Biological Evolution.” Using examples from his discipline, Ward demonstrated how Darwinian evolution, with its primary mechanism of natural selection, resulted in a “process of perfectionment.” As previously mentioned, Ward’s belief in the progressive tendency of Darwinian evolution had long been shared by paleontology proper. Historian of science Peter J. Bowler’s work in this

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<sup>72</sup> *Ibid.*, p. 406.

<sup>73</sup> Lester Frank Ward, "The Course of Biologic Evolution: Annual Presidential Address Delivered at the Tenth Anniversary Meeting of the Biological Society, January 25, 1890," *Proceedings of the Biological Society of Washington* 5 (1890). p. 26.

area demonstrated the relationship between the fossil sciences and the progressive view of evolution and has even suggested that disciplinary factors were responsible for the optimistic interpretation.<sup>74</sup>

Ward defended the progressive nature of evolution but did not go so far as to demand perfect adaptation or to deny the possibility of atrophy. In a paper read before the Biological Section of the AAAS in 1880 (later published as an article in *The American Naturalist*) Ward argued that perfect adaptation was impossible due to the relationship between an organism and its environment. Since conditions surrounding an organism are in constant flux, he argued “adaptation is never absolutely complete, the organism being always, as it were, behind its environment, as the tides are behind the moon.”<sup>75</sup> The relationship between an organism and its environment was commonly conceived as resulting in a condition of equilibrium, but for Ward, the “unstable state in which the sexual relations [of plants] are still found to exist” suggested that complete adaptation in flora had not been, nor would be achieved.

From the perspective of his discipline, which had long since grasped the relationship between insects and flowering plants in the evolutionary history of each, perfect adaptation was not evident. While it would seem that perfect adaptation would result in the divergence of sex in all plant forms (to prevent self-fertilization), self-fertilizing species persisted in abundance, and some species even appeared to be reverting to hermaphroditism from an ancestrally separated state when environmental

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<sup>74</sup> Examples of Bowler’s work on this topic include *Fossils and Progress* (1976); *The Eclipse of Darwinism* (1983) Ch. 6-7; and *The Earth Encompassed* (1992) Ch.8.

<sup>75</sup> Lester Frank Ward, "Incomplete Adaptation as Illustrated by the History of Sex in Plants," *The American Naturalist* XV, no. 2 (1881). p. 90.

factors like insect fertilization “is found a sufficient substitute for the distinction of sex.”<sup>76</sup> The wide range of sexuality in plants suggested to Ward and the colleagues from whose work his talk was derived, that environmental influences never ceased to produce adaptations in plant forms, and that these forms were naturally selected according to environmental opportunity regardless of the overall evolutionary direction.<sup>77</sup> To deny constant change in the adaptation of organisms, Ward analogized, was “to deny that the great trees have ever been other than they are, while admitting growth in the herb and the sapling.”<sup>78</sup>

Also, unlike many other American paleontologists such as Edward Drinker Cope, Alpheus Hyatt and Alpheus Packard, Ward did not surrender natural selection to Lamarckian mechanisms.<sup>79</sup> While he did question the adequacy of natural selection as the *only* mechanism of evolution, Ward consistently pointed to natural selection as the major evolutionary factor in the development of new types of species. Still, his interpretation of Darwinian evolution allowed for other modes of development which he characterized as “extra-normal,” in that they were not strictly

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<sup>76</sup> *Ibid.*, p. 95.

<sup>77</sup> In this sense, Ward did not treat evolution as teleological, i.e. goal-driven. His experience with the history of sex in plants demonstrated to him that no single direction, either towards or away from the separation of sex, was being pursued by Nature. This shows that Ward did not follow the Lamarckian claim that progress resulted from the striving of organisms towards a single end. Instead, Ward maintained the Darwinian perspective that natural selection was capable of progress through the improvement of types of structures, while simultaneously being capable of reverting to other characteristics.

<sup>78</sup> Ward, "Incomplete Adaptation as Illustrated by the History of Sex in Plants." p. 94.

<sup>79</sup> For more information about the American School of Lamarckism, including Cope, Hyatt and Packard, see Peter J. Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900* (Baltimore: The Johns Hopkins University Press, 1983). Ch. 6.

*natural* selection.<sup>80</sup> Included in this category was Darwin's sexual selection, co-adaptation as illustrated by the relationship between insects and flowering plants and birds and fruit-bearing species, and the influence of functional modifications (acquired characteristics) taken from Lamarckism.<sup>81</sup> Indeed, the debate over the "special nature of the evolutionary process, particularly the *modus operandi* of the laws of development," waged actively in the Biological Society of Washington.<sup>82</sup> The society had representatives in both the Neo-Darwinian and Neo-Lamarckian camps, and many like Ward stood elsewhere or in between.

Ward took his evidence, along with his diagrammatic image of evolution, from the science of paleobotany. Ward's visual conception of evolutionary phylogeny derived from plants to which he as a botanist was familiar. He suggested that (contrary to public perceptions) biologic development did not follow a strictly tree-like, dichotomous path with divergent, forking branches as in a family pedigree. Instead, Ward offered the grapevine, houseleek, and forget-me-not in order to demonstrate to the public the more indeterminate growth that he felt better characterized the process of evolution. In sympodial dichotomy "instead of the two forks being equal and divergent, one of them has to be regarded as the main trunk and the other as a branch, but in which the branch possesses the greater vigor and vitality

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<sup>80</sup> Darwin himself left room for modes of development not directly attributable to natural selection, stating "I am convinced that Natural Selection has been the main but not exclusive means of modification." Charles Darwin, *On the Origin of Species* (Cambridge, MA and London, England: Harvard University Press, 2001). p. 6.

<sup>81</sup> Darwin also accepted acquired characteristics as a mechanism of evolution, a fact Ward exploited in his attempts to bridge the divide between Neo-Lamarckism and Neo-Darwinism, which he believed should incorporate the legitimacy of functional modifications as its namesake had.

<sup>82</sup> Ward, "The Course of Biologic Evolution: Annual Presidential Address Delivered at the Tenth Anniversary Meeting of the Biological Society, January 25, 1890." p.23.

and virtually becomes the main trunk, the true stem dwindling, and either dying out entirely or continuing as a reduced and degenerate form.”<sup>83</sup>



Figure 3.1  
Sympodial dichotomy as illustrated by a Forget-me-not plant<sup>84</sup>

Ward used this concept of sympodial dichotomy to popularize an alternative to the single, continuous, ascending image he believed polluted the public’s perception of evolution. Such “crude,” “coarse and repugnant” conceptions of “so important a law as that of evolution,” Ward argued “can only react against the progress of its acceptance as a scientific truth, and there seems to be a great need that the exact nature of this law be worked out, and that all attempts to popularize it be correct and be accompanied by the necessary qualifications and an explanation of important subordinate laws.”<sup>85</sup> These subordinate laws comprised the “extra-normal” influences which Ward argued supplemented natural selection in the development and selection of new species. For Ward, natural selection was not “primarily the cause of

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<sup>83</sup> *Ibid.*, p. 24.

<sup>84</sup> Image from [www.sdnhm.org/fieldguide/plants/cryp-uta.htm](http://www.sdnhm.org/fieldguide/plants/cryp-uta.htm).

<sup>85</sup> *Ibid.*

the origin of *species*; its mission is far higher. It is the cause of the origin of *types of structure* "through which alone biologic evolution takes place."<sup>86</sup>

Natural selection, Ward argued, produced higher and higher types of structure which led to the progressive nature of evolution as evidenced by the fossil record. But the origin of *species* could be accounted for by mere chance variation which did not necessarily provide beneficial effects to be further developed into new varieties. While he admitted that any variation which was advantageous to an organism would be acted upon by natural selection, Ward maintained that variation in nature was more often simple variation, neither advantageous nor disadvantageous, and that species could develop out of varieties which had emerged by chance rather than through natural selection:

The tendency to vary is in all directions, as from the center toward the surface of a sphere, and variation will take place in every direction which does not prove so disadvantageous as to render life impossible. In by far the greater number of cases the advantage or disadvantage is slight or imperceptible, and changes go on without improvement or deterioration, causing a great number of equally vigorous forms to arise, all differing more or less from one another. This accounts chiefly for the varied and manifold in nature, and but for this law, hitherto, so far as I am aware, unobserved, nature would be monotonous and uninteresting.<sup>87</sup>

Well-formed varieties, Ward argued, could be developed "without regard to any advantage in the particular differences which they present." In this way he believed "that more species are produced by fortuitous variation than by natural selection," and declared that if "[this] amounts to a new explanation of the origin of species, I am

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<sup>86</sup> Ward, "The Course of Biologic Evolution: Annual Presidential Address Delivered at the Tenth Anniversary Meeting of the Biological Society, January 25, 1890." p. 44.

<sup>87</sup> *Ibid.*, p. 42.

ready to admit it.”<sup>88</sup> Darwin had himself maintained that variation in nature was greatly abundant and that not all was advantageous or heritable, but he was less willing than Ward to base the origin of species on accidental, non-advantageous variations capable of persisting in the same manner as the advantageous ones which fuelled natural selection.<sup>89</sup>

Ward’s interpretation of Darwin, as demonstrated by his public lectures, treated natural selection as progressively achieving higher and higher types of species (structures), allowed for modifying mechanisms other than natural selection, and insisted upon accidental variation as the more common originator of species and varieties. Ward’s progressive interpretation of evolution did not rely on Lamarckian teleology as was common among American paleontology proper, but did recognize the influence of use, disuse and the inheritance of acquired characteristics as legitimate evolutionary processes. It is difficult to tell how much of this interpretation is Ward’s alone, and how much was derived from the work of his colleagues. Either way, Ward’s impact on the actual integration of Darwinian evolution into the methods of paleobotany appears negligible.

With a paleontological origin, the paleobotanist shared a progressive view of evolution as formulated by the discipline’s earliest founder, Aldophe Brongniart, and as developed by American paleontology in the nineteenth century. Ward’s reluctance

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<sup>88</sup> *Ibid.*, p. 44.

<sup>89</sup> Peter J. Vorzimmer in his book *Charles Darwin: The Years of Controversy* discusses Darwin’s conception of variation and notes how Darwin’s “shortsightedness” in lumping together different kinds and causes of variation resulted in “considerable future difficulty,” for interpreters of his theory. pp. 14-15. Chapters Three, Four and Six most closely treat variation, but the book as a whole is a good source of clarification on the subject of nineteenth century understandings of variation, including its role in natural selection.

to surrender natural selection to strict teleological Neo-Lamarckism was indicative of his discipline's affiliation with the botanical sciences, which had integrated Darwinian evolution into its researches regarding, for example, the relationship between insects and flowering plants.<sup>90</sup> Ward's experience with the history of sex in plants focused his attention on Darwinian (rather than Lamarckian) modes of evolution, and in part led to Ward's adherence to Darwinism in its original form versus the adoption of Lamarckian teleology. Darwin, himself a botanist of high esteem, had accepted certain elements of Lamarck and thus encouraged Ward's own faith in the evolutionary role of functional adaptations and in the inheritance of acquired characteristics.

Beyond these public lectures designed to educate audiences about evolution, its mechanisms, and paleobotany, Ward does not appear to have used his paleobotanic career to contribute intellectually to Darwinism in America, nor does his work in this field reflect any real employment of Darwin's theory. Many of the practical applications of paleobotany simply did not require the use of Darwinian evolution. For example, correlating geologic strata and industry-driven investigations of coal measures were disciplinary activities that could be conducted in absence of a theory of development. Paleobotany was also useful in understanding the general physical (including climatic) conditions under which geologic formations were deposited, and for interpreting the distribution, extent, and mutual relations of land masses in past geologic ages.

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<sup>90</sup> While many of his colleagues at the Biological Society of Washington had directly studied examples of this relationship in the field or had conducted experiments to compare the effects of self vs. cross-fertilization, Ward did not.

Paleobotanists could apply their special knowledge of fossil plants without referencing Darwin through the many pragmatic applications of their field.

Paleobotany served to benefit by pursuing its functions as an applied science.<sup>91</sup> For Ward, approaching the field of paleobotany as a governmental employee and with sixteen years of experience as a civil servant, the new science promised to fit the Survey's "announced task of mapping the national domain and giving scientific assistance in a rational exploitation of the nation's mineral resources."<sup>92</sup>

Ward was diverted from the chance to apply Darwin to his paleobotanical work by many other such pragmatic undertakings. Much of his career in fact was devoted to increasing and perfecting the data of his science, a task he believed was a prerequisite for any theoretical advancement regarding the origin, development and distribution of fossil plants. Ward's paleobotanical career with the USGS and Smithsonian Institution demanded his attention in administrative faculties and his work was tied to the wants of an emerging discipline in need of order and legitimacy. For Ward this meant building and consolidating a paleobotanical library; procuring and managing funds; arranging and executing fossil-collecting expeditions; cleaning, classifying and organizing fossils; building a well-represented collection through exchanges with other museums and libraries; identifying "unknowns" sent to him by colleagues; meticulously describing fossils for publication in journals and Survey

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<sup>91</sup> An excellent account of the debate among 19<sup>th</sup> century scientists over the divide between pure and applied science can be found in Bruce.

<sup>92</sup> Scott. p. 30.

reports; as well as annual financial and progress reports for both the USGS and the Smithsonian.<sup>93</sup>

In addition to these duties, Ward managed a small staff and maintained a broad and active correspondence. He was also active in the professional apparatus of the discipline. In this latter faculty, Ward helped to establish and maintain relevant societies and clubs and served on the administrative bodies of several societies throughout his career, regularly attended annual conferences including international congresses, reviewed publications for editors and published regularly himself, and taught courses as a guest lecturer at several different universities and colleges. Ward was also active in cultivating the public's knowledge of his emerging discipline, and delivered lectures for general audiences about the science of paleobotany and managed display cases for the public. Ward was interested in larger theoretical and methodological issues as demonstrated above, but his duty as a government servant to the USGS, the Smithsonian, and to his own emerging discipline demanded more pragmatic products. In this sense, Ward's role in his discipline was more custodial than it might have been for colleagues affiliated with universities and private museums.

Also, as a science derived from paleontology proper but not yet equal in its

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<sup>93</sup> In a Letter to Ward from Leo Lesquereux, the great paleobotanist confided in and sympathized with Ward on the exhausting and tedious work of identifying fossil plants, writing "I have not yet gone over the box sent by Prof. Snow. The work of determination of the specimens is made in my room where the materials are brought as fast as needed. But the work becomes more difficult and really tedious when the number of these specimens is so large that often a single species is represented by many leaves which have to be all compared in order to fix the characters, the variations, etc., you know all about this of course." Leo Lesquereux, "Letter," ed. Lester Frank Ward (Columbus, OH: 1889). SIL, Record Unit 7321, Box 1, Folder 16.

status, productiveness or value – the goals and assumptions of paleobotany in the latter half of the 19<sup>th</sup> century were aligned with ambitions to build a reliable science capable of lending its expertise to larger geologic and biological problems. For Ward, the new discipline was capable of contributing much to scientists' understanding of biology, and even more so for geology. He wrote:

The science of paleontology has two objects, the one geologic, the other biologic. The history of the earth is to a large extent the history of its life, and the record which organic life leaves constitutes the principal index to the age of its successive strata. In paleozoölogy this record is implicitly relied upon and forms the solid foundation of geological science. In paleobotany so much cannot be said....

Paleozoölogy has already thrown a flood of light upon the true nature of animal life as it now exists, and now paleobotany is rapidly coming to the aid of those who have hitherto so long groped in darkness relative to the origin, development, and distribution of the plant life of the globe.<sup>94</sup>

But before this ideal end could be achieved, Ward noted, the science of paleobotany required many organizational changes. "First of all," wrote Ward "it must be insisted upon that...the present state of the science is far from satisfactory when regarded as a guide to the attainment of either of the ends above mentioned." The reliability of paleobotany in determining geologic successions had been long discounted in favor of paleo-zootic evidence. This was due in fact, Ward argued, to the "exceedingly fragmentary and desultory character of [paleobotany]," – and only "a proper and careful collation and systemization of the facts already in the possession of science [could] add in a high degree to their value in this respect."<sup>95</sup>

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<sup>94</sup> Ward, "Sketch of Paleobotany." pp. 363-365.

<sup>95</sup> The early contributors focused on a wide range of paleobotanical problems and published their findings without the guiding organization of a disciplinary or professional mechanism. This resulted in a dispersed but rich literature in need of accumulation and review.

Ward self-consciously wanted to further the status of paleobotany as a disciplinary field. The knowledge produced by his field was of more geologic than biologic use (due to the incompleteness of the paleobotanic record) in Ward's view. This assessment contributed to Ward's lack of intellectual contribution to the science of paleobotany in the use of Darwinian evolutionary biology. His assumption precluded any major effort to apply the theory of evolution by means of natural selection towards understanding the course of biologic evolution in plant forms. In Ward's words, "the knowledge we have of fossil plants would go further in explaining geologic succession and determining questions of age than it can be made to do in explaining the mode of development, distribution, and differentiation of plant forms on the earth's surface."<sup>96</sup> This pessimism (or pragmatism) led Ward to focus much of his efforts on using paleobotanic evidence towards determining geologic successions and analogies rather than working out the course of biologic evolution in plants.<sup>97</sup> Thus, as historian Clifford H. Scott has noted, though Ward entered the position "eager to embrace and to apply Darwin's conclusions," his dedication to increasing and perfecting the data of paleobotany "absorbed the greatest share of his time at the Geologic Survey."<sup>98</sup>

The confused state of nomenclature is another disciplinary characteristic of late-nineteenth century paleobotany which posed another practical problem that

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<sup>96</sup> Ward, "The Course of Biologic Evolution: Annual Presidential Address Delivered at the Tenth Anniversary Meeting of the Biological Society, January 25, 1890." p. 366

<sup>97</sup> Examples of Ward's work in this area include *The Cretaceous Formation of the Black Hills as indicated by the Fossil Plants* (1889), *The Potomac Formation* (1894), *Some Analogies in the Lower Cretaceous of Europe and America* (1896), and *The Cretaceous Formation of the Black Hills* (1899).

<sup>98</sup> Scott. p. 69.

demanded the attention of Ward and his colleagues. Ward passionately defended the need to stabilize nomenclature as quickly as possible through the use of the principle of priority in determining a plant's true name. Joked Ward in 1895, "The German who was asked why he called his boy Hans replied: 'Pecaus it vas hees name.'"<sup>99</sup> A simple but conclusive response was the point Ward hoped to make. Even though he looked idealistically to the day when botany proper would grant paleobotany its due superiority "as the only source that holds out any promise to them of even partial success in explaining the development of existing floras," Ward's work remained tethered to the immediate and functional needs of his discipline, which included the practical and immediate reform of its system of nomenclature at the expense of developing a nomenclature to reflect research being done in systematic botany.

Systematists at Harvard University circulated a pamphlet in May of 1895 which proposed the development of a nomenclature to better reflect plant phylogeny. Ward rejected the suggestion outright, favoring instead the practical and immediate solution whereby a plant's first given name be adopted as its only name regardless of whether or not it was the best description of the plant's phylogeny. "The Harvard Rules" denied the possibility of a stable nomenclature, complained Ward, and worse – suggested leaving the naming of genera to individual botanists without regard to the principle of priority. The Harvard systematists called for the suspension of "the nomenclature question" and maintained that left more or less alone, nomenclature would work itself out as systematic botany advanced. Quoting Stanford President and ichthyologist David Starr Jordan, Ward responded "There are only two ways of

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<sup>99</sup> Lester Frank Ward, "The Nomenclature Question," *Reprinted from The Bulletin of the Torrey Botanical Club* 22, no. 7 (1895). p. 308.

naming plants or animals, either to give them their oldest names or to give them any names you please.”<sup>100</sup>

Ward’s conservative commitment to standardizing nomenclature reached the detailed level of the placement of commas, capitalizations and indentations. In an 1892 letter to botanist Nathaniel Lord Britton, Ward listed such concerns in five typed pages and explained, “Excuse me for picking of flaws, but I suppose that was what you wanted, and it is best to start as near right as possible even as to minor details.”<sup>101</sup> At the same time he dealt with such minute details, Ward also worried about larger issues such as how to fix the name of a species when researchers continually transplanted it from genus to genus as new facts became known:

Are we to be lumpers or splitters, and who is to do the lumping and splitting? Unless we can get down on some solid basis here the spirit of instability will be as rife as ever. Do not understand me to mean that the discovery of new forms and new facts may not at any time make such changes necessary, but if any one is to be allowed to take the same old straw and thrash it round forward and back at will, where is our vaunted fixity? The same might be said for species.<sup>102</sup>

The most expedient solution given such difficulties in forming a nomenclature to exactly reflect the true order of nature, Ward concluded, was to simply adopt names according to priority. Thus, specific names should always remain the same, regardless of its movement by systematists to a new genus, or back again.

Ward’s initial interpretation of Darwin upon entering paleobotany was derived in part from a paleontological tradition of viewing the fossil record as evidence of progressive evolution, and a botanical interest in the implications of natural selection,

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<sup>100</sup> David Starr Jordan quoted in *Ibid.*, p. 313.

<sup>101</sup> Lester Frank Ward, "Letter," ed. Nathaniel Lord Britton (Washington, DC: 1892). SIL, Record Unit 7321, Box 1, Folder 1.

<sup>102</sup> *Ibid.*

sexual selection and variation for the course of biologic evolution in plants. Ward made this interpretation clear in several public lectures and in a few publications. However, his custodial role in paleobotany and his preoccupation with collating, systematizing, increasing and perfecting paleobotanic data, in addition to his assumptions regarding his discipline's role in geology, discouraged any real integration of Darwinian evolution in Ward's paleobotanic work. Ward's career in paleobotany thus indicates the influence of disciplines on the social and cognitive factors responsible for shaping a theory's reception and provides for better appreciation of the consequences of scientific specialization.

## Chapter Four: Ward, Darwin and Sociology

In 1898, only three years after the publication of his passionately written article regarding the nomenclature question, Ward appointed his Assistant Curator at the Division of Plants, Charles Louis Pollard, to serve as his substitute on the Nomenclature Committee at a meeting in Boston.<sup>103</sup> It is probably not a coincidence that this was the same year in which Ward published his *Outlines of Sociology* (1898), had recently received a Doctorate of Laws from Columbia College, and was acting as advisory editor to the *Journal of Sociology*. Two years later Ward spent a summer in London and Paris and was elected president of the Institut International de Sociologie, “a body to which only a very few Americans have ever been chosen.”<sup>104</sup> Within that term Ward published *Pure Sociology* (1903) and went to Graz, Austria to meet Ludwig Gumplowicz, the Polish sociologist best known for his development of the conflict model of social interaction.<sup>105</sup> At this time, noted one historian, Ward’s contributions to paleobotany were reduced to a handful of encyclopedia and dictionary entries on botany and paleobotany.<sup>106</sup>

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<sup>103</sup> Charles Louis Pollard, "Letter," ed. Frederick V. Coville (Washington, DC: 1898). SIL, Record Unit 222, Box 1, Folder "Frederick Vernon Coville."

<sup>104</sup> James Q. and Edward Alsworth Ross Dealey, Franklin H. Giddings, Ulysses G. Weatherly, Charles A. Ellwood, George Elliott Howard, Frank W. Blackmar, Albion W. Small, "Lester Frank Ward," *The American Journal of Sociology* 19, no. 1 (1913). p. 62.

<sup>105</sup> The influence of these two prominent sociologists on one another is best captured in Aleksander Gella, ed., *The Ward-Gumplowicz Correspondence: 1897-1909* (New York: Essay Press, 1971).

<sup>106</sup> Scott. p. 36.

In fact, at the end of his botanical career Ward had been put on stipend instead of salary, to compensate for his increasing shift to sociology. Ward's departure from sociology was more ceremoniously noted. The university flag hung at half-mast over Brown for three days following the unexpected death of Lester Frank Ward in 1916. Students contributed funds for flowers to be placed on his grave and during the funeral service the campus bell was rung and classes were suspended. In his first year of teaching at Brown, Ward's students presented him with a Loving Cup and later dedicated their yearbook to him. He was elected into several student societies, and his sociological courses were popularly attended.<sup>107</sup> Ward had been admired among the student body even before he was hired in 1905, as his work had been used in the teaching of undergraduate courses. He had been devoting more and more of his time to sociology, and when in conversation he mentioned to Brown's James Q. Dealey (who co-authored the *Text-book of Sociology* with Ward that same year) that he would give up his USGS position for one in sociology, Dealey approached Brown president William Faunce about inviting Ward to a professorship in sociology.

In 1906 Ward joined the faculty in the university's small social science department in its first-ever offered sociological position. The establishment of sociological professorships was becoming more and more popular among universities, and Ward's official employment as a sociologist was therefore tied to a disciplinary trend. In fact, one of the reasons for the delay of Ward's professorship (he was 65 when he joined the Brown faculty) was the delay of sociology's recognition by university presidents. In her work on the origins of American social

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<sup>107</sup> Recounted in Dealey, p. 63.

science Dorothy Ross noted, “The positivist basis of William Graham Sumner’s and Lester Frank Ward’s evolutionary theories hampered their inclusion in institutions still freeing themselves from clerical control.”<sup>108</sup> As the founders of American sociology, Sumner and Ward had rooted sociology in Darwinian evolution theory (derived in part from Spencer), which in turn delayed sociology’s institutionalization at the university level. Thus, the disciplinary freedom that allowed Ward to explore the relevance of Darwinism in sociology also postponed his ability to practice sociology at an institutional level.<sup>109</sup>

Ward’s decision to leave the USGS once a sociological position had been offered was based on several grounds and included his disenchantment with the growing bureaucracy of government work. In the days of Powell’s leadership the survey had applied a liberal work policy, but after Powell was forced out for political reasons in 1894 Ward’s affinity for government work declined.<sup>110</sup> He wrote,

The Geological Survey had fallen into the hands of small men, and was no longer the grand institution that it was in the days when Major Powell was its Director. The policy seemed to be to set up captious criticism and obstruct the scientific work of members of the staff. It was a case of bureaucracy. There was no longer any *esprit de corps*,

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<sup>108</sup> Dorothy Ross, *The Origins of American Social Science* (Cambridge and New York: Cambridge University Press, 1991). p. 122.

<sup>109</sup> On this topic Scott noted, “Surprisingly, no one seemed to recognize the irony of having religious iconoclast Ward – whose economic and social views were also less than orthodox – join one of the more conservative church-related Ivy League schools that had an uninspiring record for academic freedom.” Scott. p. 38.

<sup>110</sup> For more on the life and career of Major John Wesley Powell see Donald Worster, *A River Running West: The Life of John Wesley Powell* (Oxford; New York: Oxford University Press, 2001).; James M. Aton, *John Wesley Powell* (Boise: Boise State University, 1994)., and Wallace Earle Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (Boston: Houghton, Mifflin, 1954).

and no one was certain that his work would be approved by petty officers at headquarters.<sup>111</sup>

In this way, the growing professionalization of paleobotany and the particular character of the governmental arm of that science discouraged Ward from continuing a career in that discipline. Even at the university level, complained Ward, professional rivalries were hindering the achievement of the science as a whole.<sup>112</sup> Sociology on the other hand, remained relatively unfettered bureaucratically and attracted more and more of Ward's esteem and attention. The disciplinary topography of sociology, as compared to that of paleobotany, thus encouraged Ward's full-time move into its study.

From his seat at Brown, Ward continued the work he had begun as an independent researcher, which consistently reiterated a single theme: mankind was unique in having evolved a mind capable of controlling its environment and was hence free to direct its own progress and to increase and democratize happiness. Since developing a "psychic factor" (or mind), man was no longer subject to the will of natural and social forces, including natural selection. Ward did not subscribe to his rivals, Herbert Spencer and William Graham Sumner's interpretation of Darwin. Based on *laissez faire* social policies and rooted in biological determinism, Sumner and Spencer simultaneously admitted the progressive nature of evolution while establishing a pessimistic outlook for society. Instead Ward worked to demonstrate

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<sup>111</sup> Lester Frank Ward, quoted in Scott. p. 36.

<sup>112</sup> Wrote Ward on the hindrance of professional rivalry in the solving of the nomenclature question: "In so far as any personal rivalry or rivalry between different institutions is concerned I take no interest in it, and arguments of that nature are not only unworthy of an answer, but really admit of no answer." From Ward, "The Nomenclature Question." p. 319.

how evolution had in fact liberated humans from its grasp. This belief was the basis of Ward's reformist social policies, which culminated in his faith in the ameliorative capability of universal education. The evidence Ward employed to defend his sociological system, to attack the sociology of Spencer, Sumner and Galtonian eugenics, in addition to his defense of the validity of the inheritance of acquired characteristics all came in part from Darwin.<sup>113</sup>

It will be shown in this chapter that both prior to and during his professorship at Brown University, Ward integrated Darwinian evolution into his theory of the origin and spontaneous development of society. Ward demonstrated through speculative reasoning how mankind had evolved intelligence by means of natural selection, and how this in turn allowed man to control his environment and thus direct his own evolutionary progress. This use of Darwin enabled Ward to separate humankind from other organisms, liberate them from the mechanism of natural selection, and to defend social reform on naturalistic, rather than sentimental, grounds.<sup>114</sup> This in turn supported Ward's defense of an applied sociology against the

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<sup>113</sup> Alfred Russell Wallace, co-discover with Darwin of the mechanism of natural selection, had argued that humans transcended the process and like Ward was in favor of social reform. Ward acknowledged that Wallace did not apply natural selection to the 'mathematical and artistic faculties' of man, but criticized him for "abandon[ing] the scientific method entirely" by referring to 'spiritual' and 'supernatural' agencies of man's unique abilities. From Lester Frank Ward, "Neo-Darwinism and Neo-Lamarckism: Annual Address of the President of the Biological Society of Washington, January 24, 1891," *Proceedings of the Biological Society of Washington* 6 (1891). pp. 68-69.

<sup>114</sup> T.H. Huxley also shared the view that social and educational reforms were the responsibility of a civilized society, and Ward enlisted Huxley's authority by peppering his sociological treatises with his quotations. Ward was certainly influenced by Huxley in his social prescriptions, but appears to have disagreed with him on many points, including his apparent argument that universal education would "catch" exceptional people who might otherwise have been lost to poverty. Ward

Spencerian, *laissez faire*, sociological tradition, which although derived from the same Comtean philosophy as his own, was in direct opposition to the sociology established by Ward.<sup>115</sup>

The positivist origins of sociology, the decentralized and independent nature of Gilded-Age social science, the subject matter of the social sciences, Ward's disciplinary assumptions and goals, and the disciplinary divide marked by Ward and Spencer all encouraged Ward's use of Darwinian evolution. The limitations of strict, Neo-Darwinian evolution required Ward's augmentation of Darwin through the use of the Lamarckian mechanism of the inheritance of acquired characteristics. But even his defense of Lamarck against Neo-Darwinians like August Weismann (prompted by the latter's attack on Lamarckism based on his germ plasm theory) encouraged Ward's use of Darwin inasmuch as the naturalist lent authority to the mechanism through his own admittance of its validity.

Historians have documented the impact of Darwin's theory on the social sciences, especially in the case of sociology.<sup>116</sup> For example, Richard Hofstadter's *Social Darwinism in American Thought* and Robert C. Bannister's *Social Darwinism: Science and Myth in Anglo-American Social Thought* provided excellent

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criticized Huxley on this point, and lumped the argument with those put forth by Galton and Carnegie regarding the "exceptional man," and insisted instead that "genius of varying shades and grades permeate society." From Lester Frank Ward, *Applied Sociology* (Boston: The Athenaeum Press, 1906). p. 266.

<sup>115</sup> For more on Spencer's philosophy see Mike Hawkins, *Social Darwinism in European and American Thought, 1860-1945: Nature as Model and Nature as Threat* (Cambridge: Cambridge University Press, 1997). Chapter Four; Peter J. Bowler, *Biology and Social Thought, 1850-1914* (Berkeley: University of California, 1993). Chapter Four; and J.D.Y. Peel, *Herbert Spencer: The Evolution of a Sociologist* (London: Heinemann, 1971).

<sup>116</sup> Other social sciences include, for example, political economy, history, economics and political science.

commentaries (however contradictory) on the influence of Darwin on American social thought. Hofstadter claimed that Darwin encouraged the hardened approaches of men like William Graham Sumner towards social issues. Bannister, however, critiqued this observation and argued that Hofstadter had exaggerated the role of Darwin, and Bannister demonstrated how other influences aided Spencerian disciples' allegiance to Gilded-Age conservatism. Still, most histories of American social thought in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries do not close without a discussion of Darwinism.<sup>117</sup>

In fact, of the handful of books devoted to analyzing the emergence and establishment of American sociology, Darwin is always mentioned in some detail. This includes Dorothy Ross's *The Origins of American Social Science* and Thomas L. Haskell's *The Emergence of Professional Social Science*, two of the more comprehensive and lasting accounts of sociology's formative years as an emerging discipline. Lester Frank Ward is also prominent in these books. Both Ross and Gillis J. Harp, in his *Positivist Republic*, devoted entire chapters to Ward and demonstrated his central role in 19<sup>th</sup> and 20<sup>th</sup> century social thought. Ward wrote extensively about social issues, actively devoted himself to the establishment of an American social science, and even promoted the early use of the term 'sociology.' His strong influence in the shaping of American sociology usually categorizes him as the founder of one of two major approaches taken by early sociologists – the other being associated with Sumner.

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<sup>117</sup> For a more recent account of Darwinism's influence on social thought see Greta Jones, *Social Darwinism and English Thought: The Interaction between Biological and Social Theory*, Harvester Studies in Philosophy (Brighton, Sussex: Harvester Press, 1980).

For example, Henry Elmer Barnes in a 1919 article for *The American Journal of Sociology* attributed Ward with developing one of two “representative contributions of sociology to political theory.”<sup>118</sup> In 1991, historian Dorothy Ross continued this designation in her chapter, “The Beginning of Sociology: Sumner and Ward.”<sup>119</sup> Ward’s significance in the establishment of American sociology is reiterated by historians. In their articles devoted to their “preceptor and mentor” to mark his passing, Ward’s own colleagues, sociological giants Edward Alsworth Ross, Franklin H. Giddings and Albion W. Small (to name a few), each gave the highest honors to Ward, and named him their science’s founder and highlighted his many contributions to social thought.<sup>120</sup> Professor Small even admitted, “I have often said, and it remains my estimate, that, everything considered, I would rather have written *Dynamic Sociology* than any other book that has ever appeared in America.”<sup>121</sup>

This first work of Ward’s, begun on his twenty-eighth birthday and not published until fourteen years later, did not sell well and was never as popular as his later sociological treatises, but in it were most of the ideas Ward spent the remainder of his career elaborating. Ward had written *Dynamic Sociology* as an individual

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<sup>118</sup> Harry Elmer Barnes, "Two Representative Contributions of Sociology to Political Theory: The Doctrines of William Graham Sumner and Lester Frank Ward," *The American Journal of Sociology* 25, no. 2 (1919).

<sup>119</sup> Ross, pp. 85-93.

<sup>120</sup> While it is the purpose of eulogies to heroicize the deceased, these men’s words should be noted for they do illuminate Ward’s place in sociology as viewed by his closest colleagues. For example, they wrote: “Probably no other American of our time matches Dr. Ward in scientific and philosophic productiveness,” Ross, p. 64; “...if Aristotle had chanced to be born in Illinois about the middle of the nineteenth century, his career would have resembled that of Lester F. Ward more than that of any other American of our time,” Ross, p. 66; “Professor Ward will always rank with the other two great founders of our science – Comte and Spencer,” Ellwood, p. 72; “...he was the first great sociologist,” Blackmar, p. 75; in Dealey.

<sup>121</sup> Albion W. Small, quoted in *Ibid.*, p. 77.

researcher, lacking any institutional affiliation but working tirelessly in his spare hours on the great sociological problems of Gilded-Age America. At the same time, and in this manner, Ward was able to develop a reputation as an innovative and thorough social scientist. The nature of Ward's sociological career, like his USGS career in fossil botany, was shaped by the character of the discipline itself. But whereas his paleobotanical duties had subdued Ward's use of Darwinian evolution, the freedom he found in his sociological career allowed him to make steady and significant use of Darwin.

The social and cognitive topography of sociology in the latter half of the nineteenth century was much more decentralized than paleobotany had been, with – to quote Thomas L. Haskell – “individual inquirers scattered about the country,” working on “spontaneously initiated investigations.”<sup>122</sup> The broad and speculative ideas developed in *Dynamic Sociology*, as in the majority of Ward's other publications, exemplified the individualistic nature of sociology in Gilded-Age America. With more flexibility to explore and articulate his ideas, and with initially little to no administrative obligations, Ward permitted the use of the theory of Darwinian evolution. Similarly, sociologists' attempts at legitimizing their field as a true science encouraged the incorporation of general scientific knowledge and theories which, when combined with sociology's interest in the origins of society, made the incorporation of Darwin's theoretical framework a natural inclination.

In a social science which had to defend its status as a science, the use of the agency of other scientific disciplines was a common method employed by

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<sup>122</sup> Haskell, p. 235.

sociologists to legitimize their work and ideas. Thus, the incorporation of Darwin into sociology was encouraged in part by a disciplinary necessity. Also, with its positivistic origins in the work of Auguste Comte, sociology as a discipline sought causal explanations for sociological phenomenon. Positivistic social theories popular in the latter half of the nineteenth century were thus inspired by the analogies and strategies offered by the natural sciences – and Darwin’s theory of evolution was, according to one historian, its “single most fertile source.”<sup>123</sup> Sociologists employed Darwin to legitimize ideas and arguments developed prior to 1859, but Darwin was also applied in the advancement of new conceptions of society, its origin, and its subsequent development.

For Ward, Darwinian evolution could explain man’s origins, development, attainment of rationality, and coalescence into societal structures. These social structures, Ward argued, evolved along the same pattern as organic forms. “The tendency in social, as in organic structures,” Ward analogized “is simply to conserve and reproduce; it is to copy and repeat, grow and multiply, but always to retain the same structures.”<sup>124</sup> Society, for Ward, could be explained and understood through natural processes, which made sociology a scientific discipline. Sociology was undoubtedly a science, Ward wrote, and more significantly, it was the most important and complicated science, especially where man was concerned.<sup>125</sup> As a science,

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<sup>123</sup> *Ibid.*, p. 243.

<sup>124</sup> Lester Frank Ward and James Quayle Dealey, *A Text-Book of Sociology* (New York: Macmillan, 1905). p. 219.

<sup>125</sup> From Lester Frank Ward, "Notes for First Lecture: "The Place of Sociology among the Sciences", From "Outlines of Sociology: Lectures 1-2," Delivered at School of Sociology of Harford Society for Education Extension.," (1894-1895). LOCMRR, Box 5.

Ward argued, it was necessary for the discipline to apply its knowledge towards bettering society since “The real object of science is to benefit man.” He continued:

A science which fails to do this, however agreeable its study, is lifeless. Sociology, which of all sciences should benefit man most, is in danger of falling into the class of polite amusements, or dead sciences. It is the object of this work [*Dynamic Sociology*] to point out a method by which the breath of life may be breathed into its nostrils.<sup>126</sup>

The object of Ward’s *Dynamic Sociology* was to demonstrate the naturally acquired ability of society to artificially select for progress, not simply “with a view to improve the physical quality of humanity,” but towards the improvement of the whole of “society as an organism.”<sup>127</sup>

This goal, to direct human progress by means of artificial selection, as a special instance of natural selection, was in direct opposition to Herbert Spencer’s social philosophy. From the start, Ward contested defenders of *laissez faire* and biological determinism (especially Spencer and Sumner) and promoted instead the idea that human progress could be accelerated by society itself through control of the environmental factors which prohibited the education and intellectual development of the masses. Although Ward discounted Spencer’s social theories, he was himself a disciple of Spencer in the sense that he saw biological evolution as a subset of cosmic evolution.<sup>128</sup> Both men integrated Darwin into their alternative sociological systems,

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<sup>126</sup> Ward, *Dynamic Sociology*. p. vii.

<sup>127</sup> *Ibid.*, p. 21.

<sup>128</sup> Notes Historian Philip J. Pauly: “Although Powell and Ward despised Herbert Spencer’s politics, they fully shared the vision, basic to Spencer’s *Principles of Biology*, that organisms were part of an ordered, nonmysterious cosmos and that their development, distribution, and behavior could be comprehended within a framework provided by natural science.” Philip J. Pauly, “Modernist Practice in American

one interpreting evolution as the survival of the fittest, and the other as a process which had developed the psychic factor that subsequently spared man from its influence. For Ward, Darwinian evolution explained the appearance of intelligence in mankind, which in turn provided evidence in favor of his reformist sociology and neutralized the deterministic policies of his rivals, Spencer and Sumner.<sup>129</sup>

In this capacity, Ward's integration of Darwinian evolution was tightly woven into his system of sociology. In his 1893 *Psychic Factors of Civilization*, Ward applied natural selection to man in order to demonstrate the spontaneous, i.e. natural origins of society and of man's unique attainment of rationality:

Although none of them [other authors in this vein] have shown, as has been attempted here, how the intellect of man came into existence under the laws of evolution, it is assumed that it did so, and although no one has pointed out, as has been done in this work, how the human intellect has proceeded to make civilization possible, it is also assumed that it has done this according to the normal laws of evolution. The acts of man and the laws of society are regarded as natural in the same

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Biology," in *Modernist Impulses in the Human Sciences, 1870-1930*, ed. Dorothy Ross (Baltimore and London: The Johns Hopkins University Press, 1994). p. 279.

<sup>129</sup> Ward's contempt for *laissez faire* sociology is illustrated in the following quotation: "By a knowledge of natural laws man is enabled to harmonize natural forces with human advantage. This truth, of course, must be general. It would be illogical to pretend that it applies to some kinds of natural laws and forces and not to others. What becomes, then, of *laissez faire*? Yet some who would be the first to grant the above premises, who are strongest in the conviction that society is the domain of regular laws, who are most earnest in their search for these laws, nevertheless, strangely enough, deprecate all attempts on the part of the agents of society to control the social forces and harmonize them with the social welfare.... Why cry "*Laissez faire!*" as if society would ever work out its own progress? As well say to all inventors: Cease trying to control nature, let it alone and it will control itself; it will, if left undisturbed, work out, in its own good time, all the cotton-gins, reaping-machines, printing-presses, and sand-blasts that are needed... If society is to be benefited by the establishment of a social science, pray, how is it to be done, except by the same means that have rendered other sciences so useful?" Ward, *Dynamic Sociology*. pp. 53-54.

sense that the movements of the solar system and the instincts of animals are natural.<sup>130</sup>

The “phylogenesis of mind” Ward had argued, began with mankind’s slow accumulation of mental abilities; first in controlling the movement of limbs, next in developing the ability to outwit one another and then nature itself, and finally with more leisure time derived from an ability to control (rather than submit to) the environment, humanity developed the intellects of modern men. Such a conclusion, Ward maintained, was nothing more than Darwinian principles applied to the mind.<sup>131</sup> This unique faculty, once attained, allowed society to substitute for role of natural selection that of rational selection.

“This faculty [mind] constitutes the most anomalous of all the differential attributes that have resulted from the creative synthesis of nature,” Ward argued, “and by it the car of cosmic progress has been shunted off on an entirely new track.”

Wither does the new route lead? All that we can note at present is that the new motor is a powerful one...and the train, now for the first time laden with human freight, is safely speeding on.<sup>132</sup>

Ward’s reformist position was greatly supported by his account of society’s unique origin and development, derived in part through a use of Darwin’s theory of evolution, and gave him the ammunition needed to establish an alternative to conservative Spencerianism. The debate in sociology over *laissez faire* fuelled

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<sup>130</sup> Lester Frank Ward, *The Psychic Factors of Civilization* (Boston: Ginn & Company, Publishers, 1893). p. 283.

<sup>131</sup> “Time was, and not long ago,” wrote Ward “when life was looked upon simply as an observed fact. Now, thanks to Darwin and his predecessors and successors, it is seen as a development, and there is no good reason why mind as a whole, or even the intellect, as the latest expression of the psychic law, should not also be recognized as having had a cause, an origin, and a history. *Ibid.*, p. 223.

<sup>132</sup> Lester Frank Ward, *Pure Sociology; a Treatise on the Origin and Spontaneous Development of Society* (New York: The Macmillan Company, 1903). p. 135.

Ward's motivation to locate natural explanations supporting his commitment to universal education as a sociological panacea. By integrating Darwinian natural selection into his account of the origin of man's intellectual faculty and of society itself, Ward demonstrated that evolution had enabled man to control his environment and therefore reform was nothing more than the natural extension of his mental ability.

Sociology in the late nineteenth century was a much less homogeneous discipline than paleobotany. Rifts over methodology separated sociologists and other social scientists into divided camps, some attached to strict Spencerian principles demanding a *laissez faire* perspective while others, like Ward, seeking planned reform. Sociologists were divided over such issues which led to a crisis of authority and to the creation of rival professional societies based on mutually exclusive worldviews.<sup>133</sup> This disciplinary environment required Ward to build a strong defense for his melioristic sociology, and forced him to both attack the sociology of his intellectual opponents and to defend his own against their criticisms. At the same time, Ward was deeply committed to defending their shared discipline from outside skepticism over the scientific status of sociology.

In his 1905 *Applied Sociology*, Ward again asserted the scientific nature of sociology and argued against colleagues who denied the usefulness of reform. Ward assumed intellectual equality in mankind and maintained that potential achievement and genius were common to all regardless of sex, class or race. Environmental

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<sup>133</sup> More on this topic can be found in Haskell, and in Mary O. Furner, *Advocacy & Objectivity: A Crisis in the Professionalization of American Social Science, 1865-1905* (Lexington, KY: The University Press of Kentucky, 1975).

circumstance and opportunity, argued Ward, were all that differentiated the man of genius from his less intellectually endowed counterpart. Thus, through universal education, Ward believed, society could eliminate the environmental factors which normally prohibited the emergence of intelligence and forced the lower class to accept less than happy lives. Where political economists like Edward Bellamy had argued for the need to redistribute wealth, Ward and other educational reformers demanded the redistribution of knowledge and claimed that education was no less than “the great panacea” for all societal problems.<sup>134</sup>

Called the “most elaborate and fundamental argument ever made for universal public education,” *Applied Sociology* demonstrated the value of applying the knowledge of *pure* sociology towards the betterment of society.<sup>135</sup> “The terms ‘pure’ and ‘applied’ should be used in the same sense in social science as in all other sciences,” Ward demanded, and it was the duty of all pure sciences to apply themselves towards bettering the human condition. This claim both placed sociology on the same plane as other sciences and rebutted defenders of *laissez faire* sociology. Social theorists of the Sumner camp insisted, however, that societal progress would be naturally achieved through evolution, a process to which mankind submitted, and that attempts at controlling the process would never be effectual and would more likely hinder the progress of society by interfering.

Sumner and others argued that universal education could never result in the kind of progress Ward hoped to achieve since intelligence, or lack thereof, was solely a hereditary aptitude. Either a person was born with the capacity for genius or he was

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<sup>134</sup> More

<sup>135</sup> Edward Alsworth Ross, quoted in Dealey, "Lester Frank Ward." p. 65.

not, and if not, no effort should be wasted upon attempts to assure intellectual success. For Spencer, “progress would result from letting nature take its course; individual competition, not a state-controlled school system, gave the best chance for the improvement of the human race.”<sup>136</sup> Ward, to defend the utility of universal education, enlisted Lamarckism and claimed that while knowledge itself could not be passed on genetically, the increased capacity for learning acquired by parents through their education would be inherited by offspring. Thus the capacity for learning, increased through education, was a heritable acquired characteristic.<sup>137</sup> The natural conclusion, Ward argued, was that society could direct and accelerate its progress through mandatory universal education.

This enlistment of Lamarck to supplement Darwinian evolution as it applied to sociology had also been made by Spencer, who insisted that society needed to improve its intelligence-level by struggling to survive the harsh realities of life. Spencer argued that left alone, those members of society who learned from their mistakes would adjust, survive, and impart their improvement onto their offspring. While this meant that some would not survive, a *laissez faire* social policy would result in overall progress. As Peter J. Bowler has noted, “This was an explicitly Lamarckian process: struggle spurred self-development and the evolution of society

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<sup>136</sup> Bowler, *Biology and Social Thought, 1850-1914*. p. 68.

<sup>137</sup> Due to the difficulty of proving such a claim, Ward had little direct evidence to support his faith in the heritability of increased capacities for learning. He did however draw analogies from husbandry, stating for example, “As a matter of fact training enters largely into the development of superior breeds of horses, and great care is taken that educated strains be bred together. And breeders as a rule would ridicule the idea that all their training goes for nothing, and that it is only accidental variations [as opposed to acquired] that can be bred into the new race of horses.” From Ward, “Neo-Darwinism and Neo-Lamarckism: Annual Address of the President of the Biological Society of Washington, January 24, 1891.” p. 70.

(or the species) summed generations of individually acquired characters.”<sup>138</sup>

Spencer also adhered to the other tenet of Lamarckism, i.e. the teleological nature of evolution.<sup>139</sup> Ward does not appear to have stressed this aspect, but did believe that man’s *knowledge* of the ability to direct progress resulted in a kind of goal-driven evolution which he termed *telesis*. Since once aware of the ability to control its progress, and once inculcated to insist upon an applied sociology towards universal happiness, mankind’s development would be goal-directed, and thus teleological in an artificial sense. Ward’s view differs from Lamarckian teleology, which asserted that nature was developing towards a set goal, and also differs from Spencer’s use of Lamarck’s teleological theory to defend *laissez faire* as preserving this process. Although Ward and Spencer utilized social Lamarckism towards different ends, their shared use of Lamarck’s theory of the inheritance of acquired characteristics suggests that sociology as a discipline encouraged its enlistment as a modifier of Darwinian evolution.<sup>140</sup>

When Lamarckism came under scrutiny in the 1880s and 90s in light of Weismann’s germ plasm theory, Ward employed Darwin to defend the truth of the inheritance of acquired characteristics. Ward repeatedly pointed out that true

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<sup>138</sup> Bowler, *Biology and Social Thought, 1850-1914*. p. 67.

<sup>139</sup> For more on Lamarckism see Richard W. Burkhardt, *The Spirit of System: Lamarck and Evolutionary Biology* (Cambridge: Harvard University Press, 1995).; and the introductory essays by Burkhardt and David L. Hull, “The Zoological Philosophy of J.B. Lamarck,” and “Lamarck Among the Anglos” respectively, in J.B. Lamarck, *Zoological Philosophy*, trans. Hugh Elliot (Chicago: University of Chicago Press, 1984).

<sup>140</sup> Both Ward and Spencer acknowledged Darwin’s use of Lamarck and thus considered the inheritance of acquired characteristics a legitimate element of Darwinism as opposed to the Neo-Darwinians who argued the adequacy of natural selection alone in accounting for evolution.

Darwinism must include elements of Lamarck, and indeed it appears that for Ward, to defend the inheritance of acquired characteristics was to defend Darwin:

That Darwin believed in the transmission of functionally acquired characters is attested not only by many passages in which this belief is expressly stated by the bringing together by him of more facts in support of it than have been given by all other writers combined either before or since. And although the greater part of his work was naturally directed to the establishment of the hitherto unknown, but as he believed, more important law of selection, nevertheless Darwinism proper must be made broad enough to embrace both of the great agencies of organic transformation, the functional and the selective.<sup>141</sup>

Citing Darwin's own admission of the role of the inheritance of acquired characteristics in evolution was a superficial approach to stemming his opponents' efforts at promoting sociological conservatism and Galtonian eugenics. It is an indication that Ward's use of Darwin was not always theoretical, but merely strategic to his disciplinary goals.

Sociology was not an experimental science, so unlike the Neo-Lamarckians of the 'New Biology,' Ward had few methods for attempting to support his Lamarckian leanings – perhaps one reason for his use of Darwin in this capacity. A letter from Alphonse de Candolle ("the boss" as Frederick Vernon Coville referred to him) to Ward suggests another way in which Darwin's authority defended the use of the inheritance of acquired characteristics.<sup>142</sup> "It seems to me that the Neo-Darwinians are departing a long way from the safe scientific method of the great Darwin," wrote Candolle,

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<sup>141</sup> Ward, "Neo-Darwinism and Neo-Lamarckism: Annual Address of the President of the Biological Society of Washington, January 24, 1891." p. 23.

<sup>142</sup> F.V. Coville was Assistant Botanist at the United States Department of Agriculture 1888-1893, and Botanist, 1893-1937. He was also Honorary Curator of the United States National Herbarium, 1893-1937, and was instrumental in the establishment of the National Arboretum in 1927. Quote from Pollard.

They and Prof. Weismann whom you perhaps make more important than is necessary, go off into theories and hypothesis and fall into subtleties instead of investigating facts or comprehending thoroughly those which science possesses. Darwin himself accumulated the facts observed by others and by himself, then he put forth sparingly a few theories, for example, that of pangenesis, taking care to say that it was hypothetical. He is an admirable model for all who are working in the sciences of observation.<sup>143</sup>

Ward agreed that the Neo-Darwinians were too dismissive of the inheritance of acquired characteristics as an evolutionary factor, since besides having been accepted by Darwin himself, the mechanism had not yet been disproved.<sup>144</sup>

This meant that, at minimum, the inheritance of acquired characteristics was valid as a hypothesis. And as a hypothesis with potentially vast implications for sociology, Ward resolved, “until the doctors of science shall cease to differ on this point and shall reduce the laws of heredity to a degree of exactness which shall amount to something more like a demonstration than the current speculations, it may perhaps be as well to continue for a time to hug the delusion.”<sup>145</sup> But as more and more evidence built up against Lamarckism in the biological sciences, Ward began to distinguish the difference between the inheritance of acquired characteristics in men versus in “lower forms of life,” and between the inheritance of mental faculties and physical characteristics.<sup>146</sup> Even if physical acquired characteristics were not

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<sup>143</sup> Alphonse de Candolle, "Letter," ed. Lester Frank Ward (Geneva: 1891). SIA, Record Unit 7321, Box 1, Folder 1.

<sup>144</sup> Neo-Darwinism is treated in detail in the work of Peter J. Bowler. For example, see Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900.*; also see Ronald L. Numbers, *Darwinism Comes to America* (Cambridge and London: Harvard University Press, 1998).

<sup>145</sup> Lester Frank Ward, "The Transmission of Culture," *Reprinted from The Forum* (1891). p. 319. LOC, no. 1.

<sup>146</sup> Candolle's letter applauded Ward's notice of this difference, and supported the claim, stating "An array of facts prove that moral and intellectual peculiarities as well

transmitted, Ward maintained, mental ability was.<sup>147</sup> “With the mental qualities of the human race, we are just now exclusively concerned,” Ward relented, “and we must leave the biologists to settle the question as regards animals and plants.”<sup>148</sup>

Ward’s interpretation of Darwin included room for the inheritance of acquired characteristics, necessitated by his defense of universal education. “If they [Neo-Darwinians] are right,” warned Ward, “education has no value for the future of mankind and its benefits are confined exclusively to the generation recording it.”<sup>149</sup> This interpretation of Darwin was not only prompted by Ward’s defense of education as a social panacea, or by his attempts to critique the rival *laissez faire* social philosophy established by Sumner, but to defuse the brand of social Darwinism that supported the rise of Galtonian eugenics. Like Ward’s own sociological philosophy, eugenics proposed an applied social science rooted in man’s ability to control its own evolution. But where Ward had been motivated by the opportunity to direct evolution for the social organism as a whole, proponents of eugenics insisted that, due to the

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as physical conditions are transmissible... My researches tend to show that in the development of savants nurture is more potent than nature. There are nineteen causes that favor the production of savants in a county, and heredity is only one of these causes.”

<sup>147</sup> In his copy of Henry Fairfield Osborn’s commentary on the Lamarckian Principle, given to him by the author, Ward underlined a particular quote Osborn had taken from Weismann: “My theory might be disproved in two ways, - either by actually proving that acquired characters are transmitted, or by showing that certain classes of phenomena admit of absolutely no explanation, unless such characters can be transmitted.” In the margin next to this quote Ward wrote a single word: “mental,” suggesting that he considered mental phenomenon as transmissible, thus disproving Weismann. From Henry Fairfield Osborn, “Are Acquired Variations Inherited? An Argument by Henry Fairfield Osborn. Opening a Discussion Upon the Lamarckian Principle in Evolution,” in *The American Society of Naturalists* (Boston: 1890). p. 7. BUSC, H. W211 vol. 34

<sup>148</sup> Ward, “The Transmission of Culture.” p. 312.

<sup>149</sup> *Ibid.*, p. 319.

deterministic nature of genes, individual intelligence needed to be cultivated by means of artificial selection, and more extremely, deficiencies should be selected against.

Ward's defense of the ability of the environment to cause functional adaptations in the mental qualities of man, and in the transmissibility of those acquired characteristics to offspring, enabled Ward to dismiss the efficacy of eugenics. A more practical solution to directing the development of humanity, Ward argued, would be to remove the environmental factors which commonly prohibit the exercise of intellect through the establishment of mandatory, universal education:

The central truth which I have sought to enforce is that like plants and animals, men possess latent capacities which for their development simply require opportunity. Heredity will surely do its part, and therefore need not be specially attended to, but without opportunity, however great the native powers nothing can result. I look upon existing humanity as I look upon a primitive vegetation. The whole struggling mass is held by the relentless laws of competition in a condition far below its possibilities.<sup>150</sup>

Environmental reforms, rather than the artificial selection of intelligence, Ward analogized, were what were required for the acceleration of human evolution. A favorable environment, Ward argued, was more conducive to bringing out genius than was mere genetic endowment, since genes alone could not produce genius in a person who was born without the opportunity to nurture his natural talent. Ward also argued that eugenicists were mistaken to focus on hereditary genius alone since it was clear that under natural selection other faculties had been selected for that had nothing to do with biological fitness, but rather moral and social fitness.

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<sup>150</sup> Lester Frank Ward, "Broadening the Way to Success: Condensed from a Lecture Entitled "Heredity and Opportunity," Delivered at the National Museum, Washington, D.C. May 1, 1886," *Reprinted from the New Magazine, The Forum* 2 (1886). p. 349.

In many of the sociological issues in which Ward was engaged, such theorizing was prevalent. Sociology in the Gilded Age had not formalized into a strictly defined discipline, but rather was in the process of finding its subject, methods and goals. Ward was able to formulate hypotheses more freely than would sociologists even one generation later, as he found himself a founding father to the discipline – under few obligations to past disciplinary dogmas. Still, as a social science derived from Comte and a positivistic philosophy, and with the necessity of defending its status as a science against skepticism of its disciplinary legitimacy, sociology emerged with an affinity for utilizing the authority of Darwinian evolution theory. The use of Darwin in sociology was not only decorative however, as the subject matter of sociology served to be better comprehended through an application of Darwinism. The origin and development of society, the motivations of men both as individuals and as aggregated social organisms, and the nature of physical and mental heredity were all sociological issues with which Darwinism could be easily integrated.

The disciplinary divide between the sociology established by Sumner and Ward further encouraged the buttressing of social philosophies with Darwinism. Although of the same disciplinary tradition, Sumner and Ward swerved greatly from one another in their interpretations of Spencerian social theory. The yawning divide between their camps, however, encouraged the employment of Darwin in defending their respective interpretations and in fortifying their attacks upon each other's sociological systems. Sumner, deviating less from Spencer's own reading, interpreted Darwinian evolution as evidence in favor of *laissez faire* policies.

Societal progress, for Sumner, could only be achieved through struggle, and as subject to evolution, society should not attempt to control a natural force like selection which by all indications was developing progressively of its own accord. Ward, alternatively, cited Darwinian evolution as the source of mankind's rationality – a rationality that enabled him to control his environment for the betterment of society as a whole, thus freeing him from the clutches of natural selection. This theory of the origin of society, derived from Darwinism as he interpreted it, allowed Ward to defend his reformist policies against the cry of '*laissez faire!*'

Sociologists of the Sumner tradition denied the usefulness of universal education and cited biological determinism as evidence against the need for social reform. Ward, however, ever the proponent of mandatory, universal education, interpreted Darwin more widely (or more closely depending on perspective), and augmented Darwin with Lamarck's principle of the inheritance of acquired characteristics. Ward attempted to defend the mechanism by citing Darwin. He claimed that the mechanism had been approved by the naturalist himself and that until it was disproved, science validated its status as a hypothesis. In this and the previously described ways, Ward's sociological career brought him into constant contact with Darwin's theory of evolution, which he interpreted and integrated according to his sociological assumptions and goals.

## Chapter Five: Disciplinary Topographies as Social and Cognitive Factors in Theory-Reception

Lester Frank Ward's dual-disciplinary career demonstrates a definite connection between disciplinization and the interpretation and use of Darwin's theory of evolution by means of natural selection. I have shown how disciplinary assumptions, methods, and goals shaped Ward's assimilation of Darwinism into his paleobotanical and sociological work. Cognitive features of scientific disciplines, derived from disciplinary origins, needs, and aspirations, are capable of influencing the character of the reception of a new theory. Similarly, social factors unique to a discipline can result in the emergence of specific roles for its constituents, and to rivalries and alliances that direct motivations. These are only some of the social and cognitive aspects of disciplines that are capable of having causal effects on a scientist's reading and utilization of new theories.

Ward, as an individual with his own idiosyncrasies and personal history, might have had a singular reaction to Darwinism, but evidence of this is not reflected in his sociological and paleobotanical work. Instead, Ward's application of the theory was influenced by the topographies of those disciplines. Certainly disciplinization cannot account entirely for Ward's reception of Darwin, as the many factors discussed in Chapter One must also be taken into account. Ward's religious views, his age, nationality, childhood experiences, political affiliation, and his class background for example, certainly all played a role in his actions and beliefs regarding Darwinian evolution. In fact, personality alone (as it consists of these factors) has been cited by historians in explaining a scientist's reaction to new ideas.

By this measure, Ward's use of Darwin could be expected to have been homogeneous. But it is clear that this was not the case.

Instead, Ward's reliance on the augmentation of Darwin with the Lamarckian principle of hereditary, i.e. the heredibility of functionally acquired characteristics, was much stronger in his sociology where the concept was vital to his disciplinary commitment to societal meliorism. Although Ward did defend the veracity of the mechanism of the inheritance of acquired characteristics in his paleobotanical writings, he did not execute it with the same passion and urgency as he did in his sociology. In fact, Ward's major paleobotanical speech on the issue, "Neo-Darwinism and Neo-Lamarckism," delivered to the Biological Society of Washington in 1891 as its president, while defending Lamarckism from a paleobotanical platform, was actually engineered to further his sociological system.<sup>151</sup> Ward incorporated much of his 1886 article "Broadening the Way to Success," into the speech, which had defended the role of the inheritance of acquired characteristics in universal education, and served as an attack against Neo-Darwinism as represented by August Weismann.<sup>152</sup>

This is an experience shared by Joseph LeConte, a fellow dual-disciplinarian specializing in geology and sociology, whom Peter Bowler has shown similarly amplified his use of Darwinian evolution with Lamarck in his treatment of education. Like Ward, LeConte used Lamarck to defend his social policies, but his biological

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<sup>151</sup> Ward, "Neo-Darwinism and Neo-Lamarckism: Annual Address of the President of the Biological Society of Washington, January 24, 1891."

<sup>152</sup> Ward, "Broadening the Way to Success: Condensed from a Lecture Entitled "Heredity and Opportunity," Delivered at the National Museum, Washington, D.C. May 1, 1886."

views “showed a far greater willingness to compromise with Darwinism.”<sup>153</sup> This shared experience indicates that Ward’s case was not unique, and that the role of discipline was important in shaping the reception and integration of Darwinism, and was even capable of transcending other factors more commonly identified by historians of science. Bowler’s work on the ‘American School’ of Lamarckism repeatedly cites disciplinary reasons for the employment of Lamarckian principles and other comparable theories. Of paleontologist Edward Drinker Cope, for example, Bowler noted “Cope’s background predisposed him to see evolution as a regular process, and he thus proposed a Lamarckian equivalent of the formal patterns suggested in his original theory [kinetogenesis].”<sup>154</sup>

As mentioned in Chapter Three, unlike Cope and others, Ward did not surrender Darwinian mechanisms such as sexual and natural selection in his paleobotany despite the paleontological roots of that discipline. While the discipline’s origins in paleontology and its founder’s (Adolphe Brongniart) interpretation of evolution as progressive no doubt encouraged Ward’s own acceptance of a progressive evolution, its relationship with the botanical sciences demonstrated to Ward the clear role of sexual and natural selection in the origin, development and distribution of plants. Thus the specific characteristic of paleobotany, as a hybrid between paleontology and botany, resulted in Ward’s compromise between Neo-Lamarckism and Neo-Darwinism.

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<sup>153</sup> Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900*. p. 127.

<sup>154</sup> *Ibid.*, p. 125, and Ch. 6 more generally. Bowler defines Kinetogenesis as “the direct and inherited effects of motion.”

However, as has also been demonstrated, Ward's disciplinary assumptions and his particular social role in paleobotany preempted any real integration of this interpretation into his work. As a governmental custodian and administrator for his colleagues and discipline, Ward was preoccupied by organizational and detailed work. Had he not been, he still might not have attempted to integrate Darwinism into his work as he assumed his discipline was of more geologic than biologic use, as was evidenced by his review of the field in his *Sketch of Paleobotany*. In this way, Ward's disciplinary assumptions and his social role in the "desultory" paleobotany, a young and emerging discipline in need of organization and legitimacy, were responsible for having arrested Ward's initial desire to use Darwin in uncovering the origin, development and distribution of plants.

That Ward understood the explanatory power of Darwin is clear in his sociological work where the disciplinary topography was conducive to engaging on a theory level with Darwinian evolution. As a discipline initially composed of independent researchers lacking institutional affiliations, Gilded-Age sociologists did not have the same administrative issues as paleobotanist like Ward. Also, despite its positivistic origins in Comte (which itself encouraged the use of scientific theories) sociology had much less disciplinary dogma and residual evidence to which to conform. As a founding father to the fledgling field, Ward's disciplinary goals included legitimizing the social science as a *natural* science, and establishing a strong, alternative sociological tradition to that created by Herbert Spencer and his American disciple, William Graham Sumner.

The rivalry between Spencerian sociology, based on a *laissez faire* commitment, and Ward's reformist idealism fuelled each camp to buttress its social system with Darwinian evolution theory. As a disciplinary method for building authority, such a borrowing of legitimacy was not uncommon among sociologists. However, Spencer, Sumner and Ward's use of Darwin was more than strategic. Although differing on the exact application of Darwinism, these sociologists shared in the depth to which their social philosophies employed Darwin's ideas. For Spencerians Darwin had explained why struggle was necessary in nature, and had indicated the path by which mankind would progress: by the survival of the fittest. Ward on the other hand utilized natural selection to demonstrate the origin and development of mankind's unique intellect, which enabled it to control its environment and separate itself from the process in favor of a directed progress. As was demonstrated in Chapter Four, these interpretations required the augmentation of Darwinism with elements of Lamarckism.

Again, Spencer and Ward differed in their exact use of Lamarck, but shared in their belief that the inheritance of acquired characteristics was necessary for human progress to continue. Each hoped to strengthen his sociological system against the other by demonstrating how it was natural, effectual, and evolutionary. Ward's assumption that sociology was a scientifically-based discipline also encouraged a Darwinian interpretation of the origin of man's intellect. As has been shown, Ward was led by analogy to assume that sociology's purpose as a science was to serve mankind through utilitarian application. This assumption greatly fuelled Ward's attack on Spencer and Sumner, his disciplinary rivals, helped him in his quest to

legitimize sociology among the natural sciences, encouraged his integration of natural selection as a means to remove humanity from its grip, and demanded he augment his use of Darwin with the inheritance of acquired characteristics.

The disciplinary topography of Gilded-Age sociology, including the rift dividing conservative, *laissez faire* sociology from Ward's own progressive philosophy enabled him to explore, interpret and integrate Darwinian evolution into his sociological system. Whereas the literally rocky landscape of fossil botany required Ward's vigilance to detail, the open field of sociology allowed Ward to theorize more broadly and with little attention paid to evidence. Ward's dual-discipline career demonstrates the power of disciplines, as cognitive constructs and social milieus, to shape the character of scientific receptions. One scientist, navigating a dual-discipline career in these contrasting topographies, was led to interpret and integrate Darwin's theory of evolution by means of natural selection in different ways. Ward's varied treatment of Darwin thus reveals that even in the doubtful case that his experience was unique, the power of disciplines as social and cognitive landscapes are influential factors in the reception of scientific theories.

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