

Reconsidering the *Sonderweg* of German Science: Biology and Culture in the Nineteenth Century

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SANDER GLIBOFF. *H. G. Bronn, Ernst Haeckel, and the Origins of German Darwinism: A Study in Translation and Transformation*. Cambridge: MIT Press, 2008. xii + 259 pp., index. ISBN: 978-0-262-07293-9. \$35.00 (cloth).

JONATHAN HARWOOD. *Technology's Dilemma: Agricultural Colleges between Science and Practice in Germany, 1860–1934*. Frankfurt a. M.: Peter Lang, 2005. 288 pp., illus., index. ISBN: 978-3-039-10299-0. \$68.95 (paper).

LYNN K. NYHART. *Modern Nature: The Rise of the Biological Perspective in Germany*. Chicago: University of Chicago Press, 2009. xiv + 423 pp., illus., index. ISBN: 978-0-226-61089-4. \$45.00 (cloth).

RICHARD G. OLSON. *Science and Scientism in Nineteenth-Century Europe*. Urbana: University of Illinois Press, 2008. 349 pp., index. ISBN: 978-0-252-07433-2. \$27 (paper).

ROBERT J. RICHARDS. *The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought*. Chicago: University of Chicago Press, 2008. xx + 551 pp., illus., index. ISBN: 978-0-226-71216-1. \$25.00 (paper).

NICOLAAS A. RUPKE. *Alexander von Humboldt: A Metabiography*. Chicago: University of Chicago Press, 2008. 316 pp., illus., index. ISBN: 978-0-226-73149-0. \$21.00 (paper).

German historians spent the 1980s and 1990s embroiled in a debate over whether Germany had taken a *Sonderweg* (a special path) into modernity. An older historiographical tradition had answered this question with an unqualified yes. The German middle classes had not played their assigned historical role; unlike their French and British cousins, they were supposedly weak, disengaged

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from public life, and enthralled with their nation's traditional feudal elite. As a result they failed to lay the proper foundations for a modern liberal democracy, and instead prepared the ground for the horrors of National Socialism. Over the last several decades, almost every aspect of this story has been challenged, from the assumed inept inwardness of the German middle classes to the feudal character of German political culture. Nineteenth-century German history, though still distinctive in any number of ways, now seems less radically different from that of France and Britain than it did a generation ago.¹

The history of the life sciences in Germany, along with the history of science more generally, has had an interesting if tangential relationship to the *Sonderweg* tradition. On the one hand, National Socialism has cast a long shadow back onto the history of nineteenth-century German science, particularly the history of German Darwinism.² On the other hand, science was one arena in which certain aspects of Germany's special path were seen to have been more blessing than curse. The strength of German science, the sociologist Joseph Ben-David argued in an influential early study, could be traced to the peculiarities of German social and political history—a weak middle class juxtaposed with a strong state. Unable to count on the middle-class public support enjoyed by their peers in France and Britain, German scientists sought out state patronage instead, and the modern research university, with its palatial and productive institutes, was born. Fueled by competition among Germany's many different educational centers, this powerful new kind of institution became the source of German scientific preeminence.³

Until recently, the growth of German science within the universities (and a handful of allied research institutes) continued to receive the lion's share of historical attention. This has left us with a picture of German science quite

1. For the initial outlines of this historiographical debate, see David Blackbourn and Geoff Eley, *The Peculiarities of German History: Bourgeois Society and Politics in Nineteenth-Century Germany* (Oxford: Oxford University Press, 1984).

2. For a simplistic and vehement condemnation of German Darwinism along these lines, see Daniel Gasman, *The Scientific Origins of National Socialism: Social Darwinism in Ernst Haeckel and the German Monist League* (London: MacDonald and American Elsevier, Inc., 1971).

3. Joseph Ben-David, *The Scientist's Role in Society: A Comparative Study* (Englewood Cliffs, NJ: Prentice-Hall, 1971). For overviews of later literature, see Arleen Marcia Tuchman, "Institutions and Disciplines: Recent Work in the History of German Science," *Journal of Modern History* 69, no. 2 (1997): 298–319; Gert Schubring, ed. "Einsamkeit und Freiheit" neu besichtigt: *Universitätsreformen und Disziplinenbildung in Preußen als Modell für Wissenschaftspolitik im Europa des 19. Jahrhunderts* (Stuttgart: F. Steiner, 1991); Kathryn M. Olesko, ed. *Science in Germany: The Intersection of Institutional and Intellectual Issues*, *Osiris* 5 (1989).

different than the one we have, for example, of British science. Richard Olson's recent comparative work, *Science and Scientism in Nineteenth-Century Europe*, offers a useful snapshot of the state of the English-language literature up to the last few years, and illustrates this point nicely. British science, in Olson's synthesis, looks much more institutionally and socially diverse than its German counterpart. It was a civic affair of Mechanics Institutes and natural history societies, an enterprise discussed in general review journals and populated by a wide range of people, from artisans to gentlemen-philosophers, with only the occasional appearance of a university professor. German science, in contrast, was specialized, university-centered, and professionalized from an early stage. Civic clubs, artisan botanists, gentleman-naturalists in country houses—individuals and groups such as these, one could have easily assumed until a few years ago, were alien to the German context. While the scholarly literature on Germany has been far from blind to interactions among science, economics, and politics, in most cases historians have focused primarily on how state and economic interests helped to secure the status and resources needed by modern specialized disciplines.⁴

If recent work in social and political history has made nineteenth-century Germany appear less peculiar than was once the case, the works under review here perform an analogous service for the history of the German life sciences. This is true in two different ways. First of all, Sander Giliboff and Robert Richards reconnect the German evolutionary tradition to its British counterpart, not only disproving the oft-repeated but ill-founded assertion that German Darwinism was one of the primary wellsprings of Nazi ideology, but also arguing against an older picture of the Germans as unreliable disciples whose version of Darwinism departed radically from the initial vision of Darwin himself. Secondly, Nicolaas Rupke, Lynn Nyhart, and Jonathan Harwood all shed light on new corners of German scientific life, venturing out beyond universities and research institutes to explore museums, schools, civic organizations, and public memorial culture.⁵ They also trace out new connections between science and

4. Examples include: Timothy Lenoir, *Instituting Science: The Cultural Production of Scientific Disciplines* (Palo Alto, CA: Stanford University Press, 1997); Arleen Marcia Tuchman, *Science, Medicine, and the State in Germany: The Case of Baden, 1815–1871* (Oxford: Oxford University Press, 1993); David Cahan, *An Institute for an Empire: The Physikalische-Technische Reichsanstalt, 1871–1918* (Cambridge: Cambridge University Press, 1989).

5. Kathryn Olesko's work on the history of German physics has also explored connections among high science, civic culture, and the secondary school system. See Kathryn M. Olesko, "Civic Culture and Calling in the Königsberg Period," in *Universalgenie Helmholtz: Rückblick*

German political life. Building on earlier work by scholars such as Glenn Penny, Andrew Zimmermann, and, most importantly, Andreas Daum, these books paint the history of German science on a much broader canvas than was once standard issue.⁶ Far from displacing past work on the German university tradition, however, this new literature builds on it in productive ways, helping to clarify what was unique about the German university setting, and also, by extension, allowing more robust comparisons between Germany and other national contexts.

DARWIN IN GERMANY

Sander Gliboff's succinct and insightful new book offers a good starting point for a discussion about German science in comparative perspective. In this study of the German translation of Darwin's *Origin*, Gliboff compares German and English evolutionary biology and illustrates what was undeniably special about the German case—a particular vision of *Wissenschaft* that found its highest embodiment in the university. The first German translator of Darwin, H. G. Bronn, was a university professor par excellence. Typical of his clade, Bronn's primary intellectual goal was to see his own specialty of paleontology placed within a unified natural science characterized by universal laws. In contrast, Darwin, a country squire of independent means, was steeped in the gentlemanly world of British animal breeding and William Paley's natural theology. The dog and pigeon breeds Darwin described were largely foreign to Bronn, and so were the Englishman's Paleyan strategies of argumentation. But Gliboff also points out that these two men shared more than previous historians have assumed. A strong link between evolutionary thought and embryology has long been seen as a particularity of the German tradition, and according to an older literature, the analogies the Germans drew between the way individual organisms developed and the process through which new species emerged kept them from fully understanding Darwin's theory, which relied so heavily on individual variation and adaptation.

nach 100 Jahren, ed. Lorenz Krüger (Berlin: Akademie, 1994), 22–42; Kathryn M. Olesko, *Physics as a Calling: Discipline and Practice in the Königsberg Seminar for Physics* (Ithaca: Cornell University Press, 1991).

6. H. Glenn Penny, *Objects of Culture: Ethnology and Ethnographic Museums in Imperial Germany* (Chapel Hill: University of North Carolina Press, 2002); Andrew Zimmerman, *Anthropology and Antihumanism in Imperial Germany* (Chicago: University of Chicago Press, 2001); Andreas Daum, *Wissenschaftspopularisierung im 19. Jahrhundert* (Munich: Oldenbourg, 1998).

The Germans were also seen as wedded to the idea of transcendental or ideal types, nonmaterial blueprints that guided the development of living organisms.⁷ Gliboff argues instead that early nineteenth-century German evolutionists (or transformationists, in the terminology of the time) were, in fact, not particularly indebted to embryological comparisons for their convictions, and their use of the type concept, far from being a straightjacket, was both highly differentiated and empirically useful. German scholars, like their British counterparts, also cared about adaptation and variation. Indeed, explaining nature's variety was one of Bronn's own scientific goals, and it was in this spirit that he welcomed Darwin's book, although not without qualifications.

Bronn's attempts to square the persistence of organic types with nature's equally obvious variety was a cause carried forward in the second half of the nineteenth century by the man who became Darwin's greatest German champion, Ernst Haeckel (1834–1919). Together with Robert Richards's spirited new biography, Gliboff's book offers a defense of Haeckel, a figure surrounded by controversy in his own day and under heavy censure ever since. Previous historians have argued that Haeckel's commitment to the "biogenetic law," which stated that the evolutionary history of an animal can be seen in the course of its embryological development, distorted the reception of Darwin's theory in Germany. Though Gliboff and Richards differ on several key issues, both scholars portray Haeckel as an accomplished researcher whose thought was in many ways very close to that of his master Charles Darwin. Haeckel had a much greater appreciation for the intricacies of adaptation and individual variation than past historians have recognized, while Darwin granted more importance to embryological evidence than often assumed.

Perhaps the greatest stain on Haeckel's reputation, however, has been the claim that his work provided a major source for Nazi ideology. In fact, the Jena professor was a philosemite whose nationalism was of the middle-class liberal variety common in the period, and he supported a number of progressive causes. The

7. E. S. Russell first advanced this view in his influential study of the history of morphology. E. S. Russell, *Form and Function: A Contribution to the History of Animal Morphology* (London: John Murray, 1916). A number of more recent historians of evolution have taken on Russell's picture of the Germans; see, for example, Peter J. Bowler, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth* (Baltimore: Johns Hopkins Press, 1988), 82–90; Stephen J. Gould, *Ontogeny and Phylogeny* (Cambridge: Belknap Press, 1977), 77–78. Gliboff's more differentiated view of German morphology builds on earlier work by Timothy Lenoir and Lynn Nyhart. See Lynn K. Nyhart, *Biology Takes Form: Animal Morphology and the German Universities, 1800–1900* (Chicago: University of Chicago Press, 1995); Timothy Lenoir, *The Strategy of Life: Teleology and Mechanics in Nineteenth-Century German Biology* (Chicago: University of Chicago Press, 1982).

evidence that his thought was an important reference point for the Nazis has never been particularly strong, and Gliboff and Richards's books should hopefully put to bed the idea that Haeckel is best understood as a proto-Nazi.

Richards and Gliboff both agree that German Darwinism, previously much maligned, was not a pathological version of its English counterpart. But they also part ways on several central interpretive points. They disagree about whether or not theories of embryological recapitulation informed theories of evolution in the early nineteenth century (Richards sees the latter emerging out of the former; Gliboff does not).⁸ They also come down differently on the role of the idealist and Romantic tradition in Haeckel's thought. Gliboff posits a much stronger break. According to him, while German biologists may have continued to use idealist terminology, these concepts had lost their idealist content by mid-century and were being used for new ends. Richards, in contrast, sees Romantic science as part of the generative force that flowed through Haeckel's life.

Their difference of opinion on Haeckel's lineage stems partly from the different parameters they set for evaluating what counts as idealist or Romantic influence. Gliboff offers a careful genealogy of Haeckel's central intellectual categories to make his case, showing that Haeckel was interested in a mechanical and nonteleological account of nature very different from the one sought by early nineteenth-century idealist thinkers. Richards's Romantic portrait of Haeckel draws on a wider variety of materials. Haeckel's private life and his adventures as a fiery public intellectual are major foci of Richards's study. Though he agrees with Gliboff that Haeckel's thought was not teleological, Richards describes the Romantic legacy as a spirit animating Haeckel's life, a force that pulsed through his hometown of Jena, giving shape to the most private yearnings of his soul. Haeckel infused his work with aesthetic and moral concerns; he read his own personal trials, triumphs, and ambitions through the pages of Goethe and Alexander von Humboldt, and it is first and foremost on this evidence that Richards sees Haeckel as a man cast from a Romantic mold.⁹

8. In previous publications, Richards has identified a Romantic tradition within German biology that he sees as central to the development of nineteenth-century evolutionary thought; the early chapters of Gliboff's book contest both the coherence of this supposed tradition and its importance in the emergence of evolutionary thinking. See Robert J. Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago: University of Chicago Press, 2002); Robert J. Richards, *The Meaning of Evolution: The Morphological Construction and Ideological Reconstruction of Darwin's Theory* (Chicago: University of Chicago Press, 1992).

9. The label "Romantic" is itself used in inconsistent ways in the scholarship on Germany, with literary scholars applying it much more narrowly than historians of science. On the difficulties of period labels for this particular era of German cultural history, see Joachim Whaley, "The

Both of these approaches have value, and are perhaps less irreconcilable than they appear at first glance. Gliboff rightly points out that Haeckel used words like “type” and “perfection” very differently than his idealist antecedents, yet Richards is equally persuasive when he argues that there was an important strain within late nineteenth-century biological thought that continued the Romantic era’s interest in the aesthetic and moral dimensions of both science and nature.¹⁰

By casting a brighter light on unexplored aspects of German Darwinism, these two authors throw into relief another area about which we still need to know much more, namely the relationship between science and religion in nineteenth-century Germany. Haeckel’s crisis of religious belief is a crucial turning point in Richards’s narrative of the biologist’s life, and Haeckel’s battles with the Darwinian Jesuit Erich Wasmann make for one of the most entertaining chapters of Richards’s story. We have only the sketchiest of backgrounds against which to place these dramatic events, however. Gliboff asserts that there simply was no German analogue to Britain’s prominent natural theological tradition, but this view seems to be more an artifact of a current gap in the secondary literature than an accurate image of nineteenth-century German culture. While there are a few excellent older works relevant to this general topic, as well as a few recent studies, we still have nothing on Germany to equal the extensive literature on science and religion in nineteenth-century Britain. This is not because there is no story to be told.¹¹ This topic seems all the more

Transformation of the *Aufklärung*: From the Idea of Power to the Power of Ideas,” in *Cultures of Power in Europe during the Long Eighteenth Century*, ed. Hamish Scott and Brendan Simms (Cambridge: Cambridge University Press, 2007), 172–79. For an example of how the term has been used as a period label within the history of science, see Andrew Cunningham and Nicholas Jardine, eds. *Romanticism and the Sciences* (Cambridge: Cambridge University Press, 1990).

10. Given the central concerns of his study, Richards’s lack of engagement with Andreas Daum’s important recent work on scientific popularization is unfortunate (he does not cite any of Daum’s articles or his book). This omission leaves Haeckel’s popular efforts, views on religion, and debts to figures like Humboldt significantly less contextualized than they might have been.

11. For example, Frederick Gregory, *Nature Lost? Natural Science and the German Theological Tradition of the Nineteenth Century* (Cambridge, MA: Harvard University Press, 1992); Frederick Gregory, *Scientific Materialism in Nineteenth Century Germany* (Dordrecht: D. Reidel, 1977). Andreas Daum has pointed out the prominence of religious themes in popular scientific writing: “Science, Politics, and Religion: Humboldtian Thinking and the Transformations of Civil Society in Germany, 1830–1870,” *Osiris* 17 (2002): 107–40. Bernhard Kleeborg’s recent work on Haeckel’s connections to the liberal Protestant tradition offers one example of the new directions research might take. Bernhard Kleeborg, *Theophysis: Ernst Haeckels Philosophie des Naturganzen* (Cologne: Böhlau, 2005). For another example of the intersection of the scientific and religious projects in nineteenth-century Germany, see Denise Phillips, “Science, Myth and Eastern Souls: J. S. C.

timely because the history of religion has been one of the most innovative areas of nineteenth-century German history for the past two decades.¹² An older picture of the nineteenth century as predominantly secular has largely crumbled, and this area is one where historians of science could make valuable contributions to an evolving debate.

THE WIDE WORLD OF GERMAN SCIENCE

For good reasons, Gliboff and Richards chose to study university professors, German science's conventional leading men. Lynn Nyhart, Jonathan Harwood, and Nicolaas Rupke all tell tales with less familiar protagonists. In *Modern Nature*, Nyhart uncovers the roots of ecological thinking in Germany's museums, schools, and civic scientific societies. Harwood's *Technology's Dilemma* examines the forces that shaped Germany's little-studied institutions for agricultural education. Nicolaas Rupke's metabiography of Alexander von Humboldt explores not the famous man's own life, but the various agendas of the people who memorialized him from the mid-nineteenth century until today. Taken together, these three books open up exciting new horizons for the history of the German life sciences.

Nyhart's first book on German morphology was an exemplary study of the rise of a new discipline within a university context.¹³ *Modern Nature*, her second book, makes a convincing case that high academic culture was not the only site of scientific innovation in nineteenth-century Germany. Her study opens with the career of taxidermist Philipp Martin, a self-educated and enterprising man of modest origins who cobbled together a living through his love of natural history and his skill at taxidermy. Throughout his varied career, Martin castigated the academic establishment for its failure to attend to what

Schweigger and the Society for the Spread of Natural Knowledge and Higher Truth," *East Asian Science, Technology and Medicine*, special issue, 26 (2007): 40–67. For a sense of the richness that characterizes the large British literature on this subject, see e.g., James Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (Chicago: University of Chicago Press, 2000).

12. For an overview of recent work on the history of religion in Germany, see the essays in *Protestants, Catholics and Jews in Germany, 1800–1914*, ed. Helmut Walser Smith (Oxford: Berg, 2001); Margaret Lavinia Anderson, "Piety and Politics: Recent Work on German Catholicism," *Journal of Modern History* 63 (1991): 681–716.

13. Nyhart, *Biology Takes Form* (ref. 7).

he considered the lifeblood of natural history—the study of animals’ living interactions with each other and with the world around them. From these humble beginnings, Nyhart traces the development of a “biological perspective” within German science (in the late nineteenth century, *Biologie* referred to the field we now call ecology). This biological approach first appeared in the projects of taxidermists, zoo directors, and schoolteachers, and it spread through museum exhibits and school curricula out to many segments of German society before finally giving birth to a professional scientific field. Many of Nyhart’s characters were at the margins of Germany’s high academic culture (or at least started out there), but she shows that these men nonetheless belong squarely at the center of the history of modern ecology. Famous figures like Humboldt and Darwin are, to use her words, ghosts and shadows in her story, but not central actors.

In his history of German agricultural education, Jonathan Harwood also introduces us to a wide range of historical actors who had a vested interest in understanding living organisms. He opens one section of his introduction with the question, “Whatever happened to the history of agriculture?” and his book makes a strong case that it is high time for a revival of interest in this field. A few of the agricultural programs he examines were housed in universities, but most were not, and in all cases the agricultural sciences’ relationship to the high academic tradition was ambivalent. Furthermore, Harwood shows how agricultural institutes developed within a complex field of educational, governmental, and economic pressures, perpetually steering a course between two visions of what an agricultural education ought to be, either “scientific” or “practical” (terms whose ambiguity Harwood recognizes by placing them in quotation marks throughout much of the text).

These two books uncover a rich institutional and cultural landscape ripe for further exploration. The wide-angle view that Nyhart has brought to the history of ecology would likely be illuminating in other areas of nineteenth-century biology as well. The science of animal behavior offers perhaps the most obvious example. Animal psychology was a favorite topic for popular scientific writing in the second half of the nineteenth century, and one wonders if the prehistory of ethology might not look much like the history of Nyhart’s biological perspective.¹⁴ The agricultural settings that Harwood discusses should also provide promising ground for further research. Questions about mechanisms

14. For example, the wildly successful A. E. Brehm, *Illustriertes Tierleben*, 6 vols. (Hildesheim: Bibliographisches Institut, 1864–69).

of inheritance and the causes of individual variation were central issues in evolutionary theory and genetics; they were also, of course, of great practical concern to animal and plant breeders. In a previous article Harwood has shown that plant breeding provided an important context for the rediscovery of Mendel around 1900.¹⁵ He revisits this issue briefly in the book, and one wonders if there is not more to be said about the interplay between agricultural practice and biological thought, particularly earlier in the century.¹⁶

Like Nyhart and Harwood's works, Nicolaas Rupke's book on Alexander von Humboldt raises a number of interesting questions about the broader standing of professional disciplinary science. Nineteenth-century Germans considered Humboldt the greatest German scientist of their age, and his public image, carefully analyzed by Rupke, is instructive in several regards. Insofar as Humboldt stood as a symbol for the power of science, such science was neither specialized nor disciplinary: it was publicly accessible, imbued with literary values, and deeply intertwined with national politics. Humboldt first won his place in the German cultural pantheon as a celebrated generalist and an elegant stylist, someone who had made the fruits of science widely available to the German people. Humboldt was also, first and foremost, a political figure, and as Rupke shows, narratives of his life shifted as Germany's political culture changed. In the mid-nineteenth century, liberals claimed Humboldt as a fellow traveler, a man who shared their desire for reform. They also praised him as a gifted artist-scientist whose masterpiece *Kosmos* belonged to the canon of great German literary works.¹⁷ In the Wilhelmine and Weimar periods, Humboldt became a Darwinian Monist à la Haeckel, and a more chauvinistically coded symbol of Germany's cultural superiority. He was an example of Aryan racial

15. Jonathan Harwood, "The Rediscovery of Mendelism in Agricultural Context: Erich von Tschermak as Plant-Breeder," *Comptes rendus de l'Académie des Sciences: Sciences de la Vie/Life Sciences* 323, no. 12 (2000): 1061–67.

16. To give but a single example, M. J. Schleiden, one of the founders of cell theory, also coauthored an agricultural handbook. M. J. Schleiden and E. E. Schmid, *Encyclopädie der gesamten theoretischen Naturwissenschaften in ihrer Anwendung auf die Landwirtschaft* (Braunschweig: Friedrich Vieweg, 1850).

17. Nyhart and Rupke offer somewhat divergent assessments of the degree to which science could take on aesthetic goals at mid-century and still command public authority. Nyhart argues that Martin's early animal displays were seen as scientifically suspect because they showed too strong a bent towards "artistry." In the same period, however, Germans celebrated Humboldt for translating science into the elegant literary style of Weimar classicism. A consideration of aesthetic hierarchies offers a solution to this apparent conflict; taxidermy as a medium ranked low (if, indeed, it ranked at all) in comparison to literary prose.

superiority for the Nazis, a miner and champion of the oppressed for the East Germans, and a cosmopolitan philosemite in the postwar West.

Despite Humboldt's abiding cultural importance, when a group of late nineteenth-century scientific specialists got together to write a comprehensive study of his accomplishments, they were left with little to show for their efforts (they all published thick volumes anyway). Carved up to fit within the narrow compartments of professional disciplinary science, Humboldt did not cut a particularly impressive figure. For his public legacy, Rupke notes, this was all rather beside the point, and this gives us an indication of the very real limits of disciplinary science as a form of cultural authority. Indeed, visible throughout these books are the perils and weaknesses of modern disciplinarity. Harwood shows that many farmers' organizations looked askance at professors whose profiles were too academic, and such concerns sometimes influenced appointments. Nyhart also reminds us that other people within German society listened only selectively to the advice of professors, particularly when they were the bearers of bad news. Karl Möbius's warning that seeding oyster beds would be a waste of time fell on deaf ears.

High academic science is a strong presence in all of these works. It was the power against which Nyhart's early band of outsiders revolted, it provided many (though not all) of the curators of Humboldt's memory, and it embodied the ideal to which many of Harwood's agriculture professors aspired. Nonetheless, taken collectively, these books suggest that the next task for historians of German science may be to spend more time exploring the failures and limits of professional, disciplinary science as a locus of cultural authority. These works depict a science whose public authority depended as much on its synthetic power and public accessibility as on its technical chops. The past several decades of research have shown us the tools and strategies that built specialized, disciplinary German science. Where within German culture did the authority of the specialized expert break down? And what models of knowledge were offered as counterproposals?

These questions take the history of science right into the central dramas of German political history. The agricultural interest groups Harwood examines ran experiment stations and meddled in professorial appointments. They were more famous, however, as political actors, part of the Coalition of Iron and Rye. It would be fascinating to know more about the interrelationship between these two sets of activities. Similarly, Nyhart argues that the "biological perspective," with its concern for place and belonging, was much more than just a scientific research program. It was a strategy Germans used to deal with the

dislocations of a modernizing society. And Humboldt, the symbol of German science, was many things, but never a lofty, apolitical Mandarin.¹⁸ Beyond the hushed halls of the university and the research institute, the outlines are emerging of a more diverse history of German science, more densely populated and socially varied than we once thought it to be, and also more directly embedded in the great social and political struggles of the nineteenth century.

18. See Fritz K. Ringer, *The Decline of the German Mandarins: The German Academic Community, 1890–1933* (Hanover, NH: Wesleyan University Press, 1969).

