BOOK REVIEWS

An Americanization

The Expansion of American Biology. KEITH R. BENSON, JANE MAIENSCHEIN, and RONALD RAINGER, Eds. Rutgers University Press, New Brunswick, NJ, 1991. xiv, 357 pp., illus. $42; paper, $17.

By the First World War the United States had begun to challenge Germany's leadership in the international scientific community, at least in some disciplines. Biology was a case in point. Although experimental embryology had emerged in Germany in the late 19th century, German embryologists were soon complaining that their specialty was developing more rapidly in the United States. And in the new field of genetics, launched by the rediscovery of Mendel's work in 1900, the importance of American work was widely acknowledged by the 1920s. While European science suffered from postwar economic stagnation, the scale of academic research in the United States continued to expand, and American scientists in some disciplines began to collect international prizes. Those who wish to understand the reasons for America's continued rise during the period between the two world wars will welcome this new book.

Like its predecessor, *The American Development of Biology* [reviewed by Daniel Kevles in *Science* **242**, 1314 (1988)], this collection of historical essays was commissioned by the American Society of Zoologists on the occasion of its centennial in 1989. Focusing on the period 1920 to 1950, the current volume includes essays on the disciplines of cytology, paleontology, reproductive sciences, developmental psychology, ethology, human behavioral biology, eugenics and population control, behavior genetics, and human genetics, as well as a brief epilogue on the history of the ASZ itself. Among the general themes that emerge from the essays, as Ronald Rainger notes in his introduction, is the massive expansion in the scale of biological research, due in large part to private philanthropy. With growth came intellectual fragmentation as new specialties proliferated and diverged, despite occasional attempts at integration. And the research agendas of many of these new fields—human behavioral biology, population control, behavior genetics, human genetics, developmental psychology—were shaped to a considerable degree by a concern with solving social problems.

As the epilogue by Keith R. Benson makes clear, this volume (like its predecessor) aims to identify the distinctive character of American biology. Although the essays comprising it are, for the most part, interesting and well argued, whether the editors' hope that "the whole of these collaborative efforts will prove to be greater than the sum of its parts" is fulfilled is another matter. The editors are undoubtedly aware that demonstrating what is distinctive about the science in one context necessarily requires comparative analysis, just as drawing conclusions from an experiment requires controls. Nevertheless, as with the predecessor volume, very few of the essays make even a cursory attempt to relate American developments in a given field to those in other countries. Once placed against the backdrop of developments in European biology during this period, however, these essays begin to suggest what might have been unique about American biology.

Take, for example, Jane Maienschein's study of the growing fragmentation in cytology, reflected in the tendency for single-authored and relatively integrated textbooks to be supplanted by multiauthored compilations that presented a variety of (sometimes conflicting) points of view. The cause of this process, she argues—echoing the cytologists whom she studies—was the expansion of knowledge: by the 1920s "there was simply too much to know" for any single author to cover the whole field. If specialization was, in fact, driven simply by the growth of knowledge, it should have proceeded at much the same pace in various countries. A comparative perspective, however, indicates otherwise. In German zoology, for example, specialization appears to have proceeded relatively slowly; the domination of the American Society of Zoologists by new experimental specialties (described in Benson's epilogue) occurred 20 years before comparable developments in the German Zoological Society. And zoology is hardly unique in this respect. Several years ago John Higham argued that by 1920 scholarly specialization was rather more pronounced in the United States than elsewhere, a claim readily confirmed by the memoirs of Central European scholars who emigrated to the United States after 1933. However terrifying the growth of the journal literature, there are good career reasons why scholars have sometimes declined to specialize; the demands placed upon them by their universities or the state of the job market may make it advisable to remain "broad." There is little doubt that the rapid growth of universities in the United States before the Second World War, along with their relatively fluid structure, made specialization rather easier for American academics than for their European counterparts. The expansion of knowledge may be necessary for specialization, but it is hardly a sufficient cause.

To say this, of course, is not to claim that all American universities were indifferent to the costs of unbridled specialization. Indeed, several essays in this collection identify particular institutions that actively fostered cooperation across specialty boundaries. For example, at the American Museum of Natural History, as the essay by Léo F. Laporte demonstrates, George Gaylord Simpson's attempt to bring ecological and genetic concepts into paleontology was strongly endorsed by several of his senior colleagues. And as the essay by Gregg Mitman and Richard Burkhardt shows, it was also at the American Museum that G. K. Noble developed an approach to the study of animal behavior that combined methods from natural history and experimental biology. Elsewhere, the University of Chicago's well-known support for interdisciplinarity is illustrated by Sharon E. Kingsland's essay on the collaboration between Charles Manning Child and Charles Judson Herrick, who drew upon ecological and physiological perspectives in order to construct a new approach to human behavior.

If rapid specialization was one feature of American biology during the period, an emphasis on laboratory methods may have been another. This is certainly the dominant theme in Rainger's overview of the changes that transformed American biology this century. But it is also prominent in Mitman and Burkhardt's fascinating survey of American animal behavior research between 1930 and 1945 (which is notable, too, as the only essay in this collection that is comparative in scope). In contrast with European work in this field, American animal behavior research placed a heavy emphasis on the laboratory. Since American amateur researchers were necessarily restricted to field studies, experimentation became the hallmark of professional work. Between the wars, therefore, it was an amateur—Margaret

Morse Nice—who played a crucial role in mediating between the European and American traditions. Only after the Second World War, by which time their field had acquired status and security, did American animal behavior researchers leave the laboratory for the field. Again, historical studies of the biological sciences in France and Germany at this time indicate that the methodological contrast that Mitman and Burkhardt have captured was quite general.

Why might American biology have been so laboratory-oriented between the wars? Although none of the individual essays addresses this question, collectively they do suggest a partial explanation that ought to be explored; namely, that laboratory methods were actively encouraged by funding organizations, and above all by the Rockefeller Foundation. The dependence of many specialties upon Rockefeller philanthropy is readily apparent from this volume. In an interesting account of the career of the geneticist and population biologist Raymond Pearl, Garland E. Allen shows how Pearl's interests shifted from eugenics to population control, observing that since the 1950s Rockefeller philanthropy has been one of the most significant funders of research on family planning and population control. Other essays comment, largely in passing, on the importance of Rockefeller funding for developmental psychology and animal behavior research. That the Foundation's enthusiasm for "modern methods" was a key factor in the emergence of molecular biology is well known; conversely, two of the essays in this collection note that Rockefeller declined to support more traditional work in such fields as taxonomy and ecology. In accounting for the emergence of the reproductive sciences in the United States after the First World War, Adele E. Clarke stresses the importance of "extraordinarily powerful discoveries," such as hormonal influences upon sexual differentiation and the development of the vaginal smear. Although European workers were presumably also aware of these discoveries, the United States nevertheless soon displaced Europe as the international leader in reproductive biology. Why? Could it have something to do with the fact that from 1921 virtually all American work in this field could draw upon Rockefeller funding?

The clearest example of Rockefeller's influence is to be found in Diane Paul's important essay on the emergence of behavior genetics after 1945. The head of the Foundation's Medical Sciences Division, Alan Gregg, tried to persuade American researchers to study behavior in various breeds of dog. Convinced that spending on education could be substantially reduced once it was realized that many pupils were incapable of benefiting from it, Gregg was confident that differences in dogs' learning capacity were largely heritable. From the 1930s the division's "psychobiology" program funded endocrinological, neurophysiological, and other biological approaches to the study of behavior, and after the war it was by far the largest sponsor of what later became known as behavior genetics. Although Gregg got his dog studies, the results offered scant support for his hereditarianism. In this respect, Paul concludes, the Rockefeller Foundation was a "helpless giant." Helpless to dictate the results of inquiry, yes; helpless to shape the research agenda, evidently not.

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Vignette: A Missing Pilgrim

Some years ago when I was at the Bodleian Library . . . doing research on the medieval poem "Winner and Waster" . . . I realized that I had stumbled across a lost fragment of the "Prologue" to Chaucer's *Canterbury Tales* . . . . The lost fragment is printed here. I have modernized the Middle English somewhat . . . . Remember to sound the final "e" unless the following word begins with a vowel.

An auditor ther came, a wiley one
From backe East to ruin alle thir fun.
Sallow he was, as spare as is a stake
And when he talked, he hissed lyk a snake.
His glasses were of wyre, perched hie on his nose.
Dressed he was in a moteley pile of clothes.
With tye so narwe, drawn up tight lyk a noose
He never, lyk those in Californie, hanged loose.
A Penneyes shirt he wore, all colored plaide
Beneath a striped sporte coat—the only one he hadde.
. . . . . .
Books he bore, enough to fill ten thousand touns
With CFR, ASPR (but no COGR) referacions,
And when he spredeth out his regulacions alle
The greatest room soon became too smalle.
He wolde not tast of cake nor sip of ale
But was ever hot upon the audit traile.
. . . . . .
All feared him, lest his slightest hunche
Wolde lead him to a disallowed lunche.
The way he wold check one cost after other
They swore this ess oh bee ne hadde no mother.
He wolde folwe columns up and down,
Grunting and snorting and making such a sound
About little thinges they hadde done wrong
They thanked God that they were not honge.
And then, he wolde—just to complete his sport—
Smile and ask to see the effort report.
"Vileynie and trecherye," he wolde shout.
"You are now ten thousand dollars out
Of funds you thought you spent so welle."
But they wolde sigh and think, "Oh, go to

And so the fragment breaks off. Unless a completed version surfaces, we will never know Chaucer's final feelings about the auditor.

—*Robert A. Lucas*, in *The Grants World Inside Out* (University of Illinois Press)