BOOK REVIEWS

Arrangements for Advanced Training

The Research Foundations of Graduate Education. Germany, Britain, France, United States, Japan. BURTON R. CLARK, Ed. University of California Press, Berkeley, 1993. xxii, 390 pp. $45 or £35.

When the first American graduate schools were established at the end of the 19th century, they were supposed to embody the ideals of the Humboldtian unity of research and education. German universities, with their growing number of institutes, laboratories, and seminars, provided the American reformers with a model to emulate. Given the cultural and social differences between the United States and Europe, the different organization and mode of support of the university system, and the different internal structures of American colleges, however, the American graduate schools hardly resembled their German prototypes.

Since World War II, the American system of graduate education has become the world standard, and the American example often served as a reference point as reforms in research training were being introduced in the various countries. In the best of the American graduate schools, so it seemed, the unity of teaching and research resulted in excellence both in research training and in the pursuit of new knowledge. And yet, just as the American graduate school did not replicate the German university institute, so the more recent attempts to imitate American models have not resulted in the creation of typically American graduate schools elsewhere in the world.

As the essays collected in Burton Clark's volume remind us, systems of graduate research training in the highly developed countries under discussion differ profoundly both from the American system and from each other. The form that graduate education takes is highly dependent on the form of university education leading to the first degree, on modes of organization and funding of both education and research, and on cultural and educational traditions in the given country. Accordingly, the attempt in this volume to describe and compare graduate education in the United States, France, Germany, Great Britain, and Japan involves also comparisons of university and research systems, research policies, and funding arrangements, as well as culturally specific educational ideals.

In light of such comparison, the American system of graduate schools functioning within a diversified and competitive university system providing a setting for both structured instruction and advanced research appears to be unique. In Great Britain, by contrast, the small size of graduate programs in most universities means that doctoral training takes place largely on an individual basis and, to be successful, requires close collaboration between professors and research students. And, as the essays by Tony Becher and by Mary Henkel and Maurice Kogan demonstrate, recent decades have witnessed increasing efforts on the part of governmental bodies to supervise and steer university research, without sufficient attention to the consequences of the changes in research policy for the system of graduate education. In France, graduate education, described here in the papers by Guy Neave and Richard Edelstein, has been shaped by the complex relations between the research system organized through the Centre National de la Recherche Scientifique and the differentiated system of higher education in which the *grandes écoles* are expected to train the professional elite while the universities are to provide both mass higher education and research training. In Japan, as Morikazu Ushiogi, Tatsuo Kawashima, and Fumihiro Maruyama argue, despite the strong tradition of undergraduate studies, graduate education is marginalized and underdeveloped.

Only if we appreciate the significance of these historical and organizational differences can we gain a better understanding of the varying responses of national graduate education systems to the pressures generated in each of these countries by the transition from elite to mass education and by the attempts of governmental patrons to gain more control over the national research and educational effort. As the individual essays on the structure of graduate education included in *The Research Foundations of Graduate Education* illustrate, even when some of the pressures are the same the responses of organizations are likely to differ. For example, in Germany, as Claudius Gellert shows, despite the fact that the traditional Humboldtian ideal of the unity of research and education has come under increasing strain in the face of the transition from elite to mass education, it has persisted as an almost unchallenged article of faith and has resulted in relatively little differentiation between graduate and undergraduate studies. Given this ideal, undergraduate students are supposed to receive research training; and although, given their numbers, they rarely do so, the assumption that those who complete their first degrees are prepared for research has meant that there are few separate provisions for training at the graduate level. The expansion of mass university education in the United States has not led to such difficulties, both because the university system itself is more differentiated and because the Humboldtian ideal was seen as a model more for graduate schools than for undergraduate education (or for education in the professions). On the other hand, as Patricia Gumperts argues, in the United States as well this ideal is being threatened by the ever more intense competition for scarce research funds and expectations of greater research productivity and efficiency.

The national differences resulting from varying organizational arrangements for graduate studies within the systems of higher education, and from their relations to the research system and the governmental research policies, are moderated by similarities in patterns of work organization within specific disciplines. Training for a Ph.D. in physics or molecular biology is very different from training for a Ph.D. in history, literature, sociology, or economics, and these differences seem to be reproduced independently of whether such training takes place in Great Britain, France, or the United States. Despite all the differences in the manner in which graduate research training is organized in the countries examined in this collection, it appears that graduate training in experimental physics, which almost invariably takes place in a laboratory as an integral part of a research program of the group of researchers, is a very different experience from—and a much more satisfactory one than—the lonely pursuit of a Ph.D. in history, often involving individual work in archives. It is difficult to take such disciplinary differences into account in policy contexts, yet these disciplinary styles and traditions of research are crucial for an understanding of the workings of graduate education, which, as this book amply illustrates, is not only a process of transmitting knowledge but also a process of professional socialization through apprenticeship. One considerable merit of this book is that it does not stop with the analysis of the formal provisions and organizational arrangements in each of the countries examined but includes a series of disciplinary comparisons. Descriptions of large-scale structures are complemented with analyses of the experiences of both students and professors working in physics,

economics, and history in specific universities in the five countries. These "views from below" not only illustrate how the organizational arrangements and pressures affect the working of professors and students in local settings but also bring to the fore the importance of interpersonal arrangements, cooperation, and support within such local groups.

The juxtaposition of the "macro" and "micro" analyses presented in the individual essays allows the editor in his conclusions to identify what he sees as the central problem facing graduate education: How can apprenticeship in research embodying the Humboldtian ideal of the unity of teaching, learning, and research be pursued effectively in the face of the increasing size, formalization, and bureaucratization of research and education and the increasing external pressures on the universities to become more efficient, relevant, and accountable?

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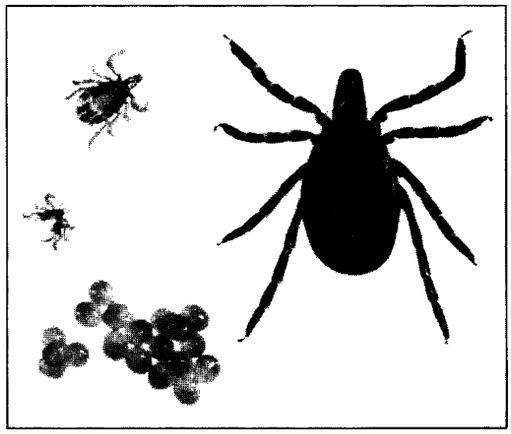
Acaropathology

Ecology and Environmental Management of Lyme Disease. HOWARD S. GINSBERG, Ed. Rutgers University Press, New Brunswick, NJ, 1993. viii, 224 pp., illus. $37.

Just when it seemed that infectious diseases in the United States had been nearly conquered, along came AIDS, Lyme disease, and Legionnaires' disease. Even that old nemesis tuberculosis came roaring back. Infectious and parasitic diseases continue to wreak havoc on humans globally. Indeed, today malaria is estimated to affect approximately 300 million people and accounts for 1.5 million deaths annually. Fortunately, mosquito-transmitted malaria is rare in the United States, but tick-borne Lyme disease is prevalent both here and abroad, affecting western and central Europe, the former Soviet Union, and China and Japan as well as the rest of North America. It accounts for more than 90 percent of all reported vector-borne illnesses in the United States. More than 9600 cases of Lyme disease from 45 states were reported to the Centers for Disease Control and Prevention in 1992. This represents a 19-fold increase over the 497 cases reported from 11 states in 1982. Most cases were reported from the northeastern, mid-Atlantic, north central, and northern Pacific coastal regions.

There is controversy regarding whether the number of reported Lyme disease cases is accurate. Moreover, it is unclear whether the 19-fold increase in reported cases since 1982 is due to heightened awareness of Lyme disease, increased use of laboratory testing for diagnosis, increased surveillance and requirements for reporting, or a true increase in the number of cases. Perhaps all of these factors are involved.



Life stages of *Ixodes scapularis*. Clockwise from bottom: eggs, larva, nymph, adult (female). [From Fish's chapter in *Ecology and Environmental Management of Lyme Disease*; courtesy M. Bechtel and D. Fish]

Lyme disease is caused by a spirochete, *Borrelia burgdorferi*, which is transmitted primarily by ticks of the genus *Ixodes*. Transmission to humans is accomplished mainly by ticks in the *I. ricinus–I. persulcatus* species complex, and the global distribution of the disease parallels that of *I. ricinus*, *I. persulcatus*, *I. scapularis*, and *I. pacificus*. In the United States, the principal vector in the West is *I. pacificus* (the western black-legged tick) and in the East is *I. scapularis* (the black-legged tick). The northern form of *I. scapularis* was for a short time (1979 to 1992) known as *I. dammini* (the "deer" tick), but recent studies have convincingly shown that *I. dammini* is actually the same species as the southern *I. scapularis*; thus the correct name for northern and southern populations of this species is *I. scapularis*. (A note added in proof to the book under review here indicates this fact and reminds readers that the name *I. scapularis* now applies to the species that is called both *I. dammini* and *I. scapularis* in the book and in scientific papers from 1979 to 1992.)

In addition to *I. scapularis* and *I. pacificus*, there are at least three other *Ixodes* species (*I. dentatus*, *I. neotomae*, *I. spinipalpis*) that transmit *B. burgdorferi* in the United States. These species usually do not bite humans but maintain the spirochete enzootically by transmitting it to cottontail rabbits and wood rats. The enzootic cycles are important because they provide a source of infected hosts for *I. pacificus* and *I. scapularis*, which in turn bite humans and other animals. However, the most common and important hosts of *B. burgdorferi* in the United States, from which most human cases are derived, are various species of *Peromyscus* mice, especially *P. leucopus* (the white-footed mouse).

The unraveling of the mysteries of Lyme disease has been and continues to be a good biomedical detective story. Initially, epidemiologic evidence suggested a tick as the vector of an arthritic disease of unknown etiology in Old Lyme, Connecticut. Associations of similar arthritic symptoms with a distinctive "bull's-eye" erythematous skin rash in the early stages of the disease and certain neurologic and cardiac sequelae were subsequently made. The discovery of a new species of spirochete in *I. scapularis* (at that time called *I. dammini*) ticks in New York that was later isolated from patients suffering from these clinical symptoms was a landmark achievement. These discoveries laid the foundation for the recognition and characterization of Lyme disease.

As new information is uncovered, concepts of Lyme disease are changing. For example, it is now clear that *B. burgdorferi* is not limited to the northeastern, north central, and northern Pacific coastal regions; it is increasingly being isolated in the southern United States, where it is cycling enzootically. These recent discoveries—many not yet published—and the realization that northern and southern populations of the primary tick vector, *I. scapularis*, occur over large geographic areas, raise the question of why larger numbers of human cases of Lyme disease are not reported from the South. Lack of adequate surveillance of the disease and misinformation among physicians concerning the distribution of *B. burgdorferi*, plus the misconception that a competent tick vector was not present in the South, are part of the answer. However, another likely contributing factor—among others that are yet to be fully investigated—is the difference in ecologic conditions between the North and the South. Realization of the importance of ecology and environmental management in reducing the number of new cases of Lyme disease prompted Howard S. Ginsberg to compile this book, which contains contributions by him and 17 other experts, all of whom have conducted original research on some aspect of Lyme disease. The book is well done, although some text is apparently missing between pages 92 and 93.

Although a considerable amount of information is available on the ecology of Lyme disease in the western United