"Max Delbrück conducting an informal lunchtime seminar in virology, ca. 1948." On moving to Caltech in 1947 Delbrück "after nearly a decade and a half of freelancing in biology . . . could at last set up a permanent phage center for research and training." He wrote to his mentor Niels Bohr, "I am very happy about this because it signals the completion of my metamorphosis into a biologist, and because I believe that Caltech in the coming years will be to biology what Manchester was to physics in the 1910s." [From *The Molecular Vision of Life*; courtesy of the Rockefeller Archive Center]

J. D. Bernal, and Dorothy Hodgkin (née Crowfoot) discussed diketopiperazine-like ring structures in proteins, but Astbury's alpha-keratin structure was a folded chain, not a ring structure (the hexagonal folds were not closed by covalent bonds). Indeed, one feels that European scientists get short shrift in the book even when they find a mention. But Kay has her eye on more serious issues. Her analysis will provide a welcome resource for debates on the future development and application of the human genome project. There are those who feel that in our enthusiasm for genetic manipulation we are losing sight of the simple ways in which the quality of life of humanity can be improved. The publication of this book at a time when America is overhauling its health-care policy is opportune.

Robert Olby
Department of Philosophy,
University of Leeds,
Leeds L52 9JT, United Kingdom

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Efforts at Internationalism

Denationalizing Science. The Contexts of International Scientific Practice. ELISABETH CRAWFORD, TERRY SHINN, and SVERKER SÖRLIN, Eds. Kluwer, Norwell, MA, 1993. viii, 301 pp., illus. $149. Sociology of the Sciences, vol. 16. From a conference, Abisko, Sweden, May 1991.

In this volume the authors set out to explore the "new" world of denationalized science, one different from the familiar one organized by and in nation-states. Defining "transnational science" as science involving persons, funds, or equipment from more than one country, they examine its dimensions in nine case studies.

In only one of the case studies does the author successfully make the case that internationalization has had substantial and definitive cognitive results in a given field. Abir-Am demonstrates not only that molecular biology was a field that emerged in "international space" but that inhibiting factors were present in national scientific cultures that would have made its emergence difficult otherwise. Thus, to take one example, Watson and Crick were able to achieve a breakthrough only by escaping the ideological limitations of their own national schools: one school was limited to empirical x-ray work on protein structure and had no genetic input, whereas the other was limited to phage genetics, with no molecular input.

Thus, according to Abir-Am, international space was required for suspending the conceptual control exercised by local or national traditions, locally sustained cultural bias, or institutionally induced prejudice (as in the case of the deprecation of biochemistry by phage geneticists). "International space," she concludes, "thus enables the process of construction, validation and authority formation of transnational objectives by creating social conditions which unlimit [*sic*] the range of human and material resources available within the subculture of a given national research tradition and practice."

If molecular biology may be reckoned a proof of the positive action of internationalism on scientific ideas, the other cases present a less clear profile. Elzinga's study of science in Antarctica shows that research agendas in that continent organized "by and for science" are more politically than scientifically dictated and that, in spite of an international bureaucratic superstructure to keep the research moving, what has resulted is less of an international effort rather than an example of "transnational collectivism."

Fischedick and Shinn examine the early history of the International Phytogeographic Excursions for evidence of denationalization. What they find is that the participants in these studiously international events all strove to push their national research programs and personal methodologies, although a certain amount of terminological and conceptual standardization was achieved. Jamison, examining the emergence of systems ecology after World War II, finds a British cognitive stream (the ecosystem concept) merging with German (systems theory) and Russian (economic planning) streams to produce a distinctive form of "scientific praxis" in the United States. The field was then diffused to Sweden, where a climate receptive to environmental management favored its successful introduction. I am not convinced that the case has been made for a new world of science here; the diffusion of ideas has, after all, been a motor of cognitive change in science from antiquity on.

Palló studies the way in which Hungary was implanted in the Soviet system of "World-Science" in an account that is a succinct and illuminating introduction to the Soviet scientific system. Here the problem is that the institutional constraints were so great on Soviet bloc science, which lost its spontaneity and was run "along enforced lines," that one might well admit internationalism but wonder to what extent "science" was being done. That is, is science that has lost such basic structural features as peer review and most conventional modes of scientific communication and is embedded in a society that condemns "organized scepticism" really science? In any case, as Palló shows, the internationalism of the Soviet system was of a limited and quirky nature.

Krige's study of multinational physics at CERN gives a fascinating look at the way in which the conventional practice of physics has been altered to fit the technical specifications of high-energy physics. Here too, however, although it is clear that in social and institutional terms this is indeed a new world of international science, no case is made for any unusual cognitive dimension of this structure.

Finally, Sörlin provides some prehistory of modern internationalism by looking at scientific travel in the Enlightenment, the age of Cook and La Pérouse. This travel was global, but—Sörlin asks—was it international? His hypothesis is that national interest, both military and mercantile, formed a synergetic combination with science to stimulate the great expeditions; but their internationalism was only a patina covering the dark ambitions of imperial and commercial rivalry, particularly between France and England. I think a somewhat different case can be made, to the effect that the cumulative results of successive expeditions produced an outcome whose whole was greater than its parts. One only has to observe Malaspina studying La Pérouse, La Pérouse perusing Cook, Cook puzzling over Bougainville's charts, and Bougainville reprising Wallis and Dampier to get the picture of a cognitively interrelated international enterprise that transcended national agendas even against the will of the participants and that was more than "circumstantially transnational."

Part of the problem with this otherwise

interesting volume is that there is not much agreement over what constitutes a national versus an international scientific program. Hoch and Platt in a study of migration of scientists get all tangled up in overdefining the terms. They conclude that distinctive migrants (that is, highly original scientists) bring their own ideas, whereas lesser lights bring "national" science. Thus (to introduce an example of my own) Einstein would not have represented German "national" science in the United States, but his assistant Walther Meyer would have. Einstein, of course, was as much a bearer of German science, not to mention its professional culture and the disciplinary culture of German theoretical physics, as was Meyer. Internationalization in the context of this chapter simply means "diffusion," and the new term adds nothing to our understanding of this process.

Although a case is certainly made here for an intensification of international and transnational scientific activity, it is not at all clear that it is, in the editors' words, "gaining the upper hand," particularly as regards the cognitive structure of science. Although the latter has had (putatively, at least) an international dimension since the Scientific Revolution, distinctive national and disciplinary cultures seem likely to structure scientific activity for a good time to come.

Thomas F. Glick
Department of History,
Boston University,
Boston, MA 02215–1403

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Vignettes: Design and Intervention

Concentration on causation can resolve old misgivings about the term "natural selection" . . . . A student today who objected that the term implicitly ascribes intentions to nature would likely be told that it is not the intentions alone of the human breeder that make her selective breeding causally efficacious in changing a herd or flock. If the farmer merely looks over the gate and intends then nothing happens; it is what she does physically, in separating certain animals or killing or castrating them or whatever, that makes the difference causally. The appropriateness of the term selection as applied to nature is, therefore, due not to any mimicking by nature of the farmer's intentions but to the occurrence in the wild of causal interventions that are equivalent in their consequences to the physical interventions the farmer makes in a physical course of events on the farm.

—*M. J. S. Hodge*, in *Keywords in Evolutionary Biology* (Evelyn Fox Keller and Elisabeth A. Lloyd, Eds.; Harvard University Press)

One afternoon, having landed far down the river with a companion and walked about through a quantity of *Desmodium* (*marylandicum* or *rigidum*, which have roundish joints) by the shore there, we found our pantaloons covered with its seeds to a remarkable and amusing degree. These green scale-like seeds densely covering and greening our legs . . . amounted to a kind of coat of mail. It was the event of our walk, and we were proud to wear this badge, regarding each other with a little envy from time to time, as if he were the most distinguished who had the most of them on his clothes. My companion betrayed a certain religion about it, for he said, reproving me, that he thought it would not be right to walk intentionally amid the *Desmodium* in order to get more of the ticks on us, nor yet to pick them off, but they must be carried about till they were rubbed off accidentally. The consequence was that when he reappeared for a walk a day or two after, his clothes were nearly as well covered as at first. I saw that Nature's design was furthered even by his superstition.

—*Henry D. Thoreau*, in *Faith in a Seed: The Dispersion of Seeds and Other Late Natural History Writings* (Bradley P. Dunn, Ed.; Island Press/Shearwater Books)

Books Received

Achievement and Motivation. A Social-Developmental Perspective. Ann K. Boggiano and Thane S. Pittman, Eds. Cambridge University Press, New York, 1992. x, 291 pp., illus. $44.95. Cambridge Studies in Social and Emotional Development.

Basic Biochemical Methods. Renee R. Alexander and Joan M. Griffiths. 2nd ed. Wiley-Liss, New York, 1993. xiv, 353 pp., illus. Spiral bound, $39.95.

Centuries of Darkness. A Challenge to the Conventional Chronology of Old World Archaeology. Peter James with I. J. Thorpe *et al.* Rutgers University Press, New Brunswick, NJ, 1993. xxii, 434 pp., illus. $45; paper, $16.95.

Drug Resistance in Oncology. Beverly A. Teicher, Ed. Dekker, New York, 1993. xiv, 654 pp., illus. $195.

Early Deprivation of Empathic Care. John Leopold Weil. International Universities Press, Madison, CT, 1992. xiv, 217 pp., illus. $30.

Fifty Years of Personality Psychology. Kenneth H. Craik, Robert Hogan, and Raymond N. Wolfe, Eds. Plenum, New York, 1993. xx, 313 pp. $47.50. Perspectives on Individual Differences. Based on a symposium, Aug. 1987.

Getting Here. The Story of Human Evolution. William Howells. Compass, Washington, DC, 1993. xiv, 261 pp., illus. $36; paper, $19.95.

Hands. John Napier. Revised by Russell H. Tuttle. Princeton University Press, Princeton, NJ, 1993. xii, 180 pp., illus. Paper, $10.95. Princeton Science Library.

Invention. The Care and Feeding of Ideas. Norbert Wiener. MIT Press, Cambridge, MA, 1993. xvi, 159 pp. $19.95.

Kevlar Aramid Fiber. H. H. Yang. Wiley, New York, 1993. x, 200 pp., illus. $82.95.

Laboratory Exercises in Human Anatomy with Cat Dissections. Gerard J. Tortora. 3rd ed. Macmillan, New York, 1993. xvi, 496 pp., illus. Paper, $34.

Lu Gwei-Djen. A Commemoration. Pentland, Durham, United Kingdom, 1993. x, 32 pp., illus. Paper, P9.50.

The Macmillan Illustrated Encyclopedia of Dinosaurs and Prehistoric Animals. A Visual Who's Who of Prehistoric Life. Dougal Dixon *et al.* Collier (Macmillan), New York, 1992. 312 pp. Paper, $25. Reprint, 1988 ed.

Numerical/Chronological/Author Index 1986–1992. An Index of Publications of the American Astronautical Society. Horace Jacobs and Robert H. Jacobs. Univelt, San Diego, CA, 1993. x, 317 pp. $70; paper, $50. Advances in the Astronautical Sciences Science and Technology Series.

O.R.. The True Story of 24 Hours in a Hospital Operating Room. B. D. Colen. Dutton, New York, 1993. viii, 214 pp. $20.

P. P. Ewald and his Dynamical Theory of X-Ray Diffraction. A Memorial Volume for Paul P. Ewald, 23 January 1888–22 August 1985. D. W. J. Cruickshank, H. J. Juretschke, and N. Kato, Eds. Oxford University Press, New York, 1992. xii, 161 pp., illus. $65. International Union of Crystallography Monographs on Crystallography, 2.

Parascript. Parasites and the Language of Evolution. Daniel R. Brooks and Deborah A. McLennan. Smithsonian Institution Press, Washington, DC, 1993. x, 429 pp., illus. $69; paper, $25. Smithsonian Series in Comparative Evolutionary Biology.

Preparatory Chemistry. H. Stephen Stoker. 4th ed. Macmillan, New York, 1993. Variously paged, illus. Paper, $34.50.

Recursion Theory for Metamathematics. Raymond M. Smullyan. Oxford University Press, New York, 1993. xvi, 163 pp. $29.95. Oxford Logic Guides, 22.

Regulation and Control Mechanisms in Biological Systems. Vishnampet S. Vaidhyanathan. Prentice Hall, Englewood Cliffs, NJ, 1993. x, 294 pp., illus. $56. Prentice Hall Biophysics and Bioengineering Series.

Sex and Russian Society. Igor Kon and James Riordan, Eds. Indiana University Press, Bloomington, 1993. viii, 168 pp., illus. $29.95; paper, $10.95.

Sexual Behaviour and AIDS in Britain. E. G. Knox, C. MacArthur, and K. J. Simons. HMSO, London, 1993. xii, 246 pp., illus. P20.

Targeted. The Anatomy of an Animal Rights Attack. Lorenz Otto Lutherer and Margaret Sheffield Simon. University of Oklahoma Press, Norman, 1992. xx, 170 pp., illus. $22.95.

Targeting of Drugs 3. The Challenge of Peptides and Proteins. Gregory Gregoriadis, Alexander T. Florence, and George Poste, Eds. Plenum, New York, 1992. viii, 129 pp., illus. $59.50. NATO Advanced Science Institutes Series A, vol. 238. From an institute, Cape Sounion Beach, Greece, June 1991.

Wasting the Rain. Rivers, People, and Planning in Africa. W. M. Adams. University of Minnesota Press, Minneapolis, 1992. 256 pp., illus. Paper, $17.95.