ration has been able to draw its attorneys from elite as well as local law schools, from upper- and middle- as well as working-class families. In meeting a commonly perceived need, divergent predispositions may be overcome.

Can the legal profession contribute in other ways to its own unity and to the integration of the society? In Chicago, blacks have been underrepresented as lawyers in a ratio of about 1 to 10. But the first black mayor in Chicago, as in many other cities, is a lawyer. If the profession provides an avenue to political power, it may help to control divisive tendencies within the society. How newfound black political power might affect the legal profession itself—as well as the distribution of economic power, prestige, and knowledge—remains to be seen. The result is not intuitively obvious.

In a divided society, a correspondingly divided legal profession—fully informed of its own divisions—might yet create significant paths toward social integration. That it is divided to begin with may even prove a necessary, though not sufficient, condition for optimizing the interests of those it represents. To integrate, something more is needed. Taken seriously, self-study of the kind provided in this monograph can shatter smugness and raise the consciousness of the conscientious.

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A Career in Genetics

A Feeling for the Organism. The Life and Work of Barbara McClintock. EVELYN FOX KELLER. Freeman, San Francisco, 1983. xx, 236 pp., illus. $17.95.

This biography is about one scientist's always lonely but highly productive love affair with the corn plant. By the time of its publication, Barbara McClintock, whose career has been singularly devoted to genetic studies of maize, had received no fewer than ten prestigious awards and citations, most within the past several years, for her outstanding contributions to science. Among these are the MacArthur Laureate Award, the Lasker Award, Israel's Wolf Foundation Award, and Columbia University's Horwitz prize. Before that, in 1978, she was the recipient of Brandeis University's Rosenstiel Award. In 1967 she received the Kimber Award from the National Academy of Sciences, and in this flurry of more recent recognition it has almost been lost sight of that the first major recognition of her outstanding contributions to biological science came almost 40 years ago with her election to the National Academy of Sciences; she was just 42 at the time. By the time of this writing, McClintock has received the most prestigious of all awards in science, the Nobel Prize (see *Science* **222**, 402–405 [28 Oct. 1983]). Even the novice science reporter would conclude there has to be a story here.

The story is told by Evelyn Fox Keller, a professor of mathematics and humanities whose work has been in mathematical biology and in the history, philosophy, and psychology of science. She has also published articles on women in science. The biography is based on a succession of interviews with McClintock and on interviews with more than a dozen fellow scientists, most notable among whom are Marcus Rhoades and George Beadle, who were scientific contemporaries of McClintock's from the start of their careers. More personal accounts and information, along with photographs, were afforded by McClintock's sister and niece.

Five of the chapters in this book are principally biographical. One of these, "The capacity to be alone," takes its title from a quotation from McClintock about her youth; it is an account of her early years, from cradle to Cornell, so to speak. The author stresses the trait of contentment with solitude, and in a later chapter draws on the arguments of psychoanalyst Phyllis Greenacre to support the notion that such a substitution for a "more conventional child's personal relationships" may be the necessary condition "for the flowering of great talent or genius." Another of the biographical chapters, "Becoming a scientist," describes the beginning of the lifelong romance McClintock has had with her science. The others trace her early disappointing years in search of a position that fit her determination to make a career of research, her years of "interlude" at the University of Missouri, and the first years at Cold Spring Harbor after Demerec had secured a permanent appointment for her at that laboratory.

There are several chapters that deal mainly with the science of genetics and with its implications for developmental and evolutionary processes. These provide an understanding of the state of the science during the period when McClintock was working and reporting on controlling elements and transposition for the first time. The chapter "Molecular biology" gives an excellent account of the revolution in biology that commenced in the early 1950's and provides a backdrop for the author's analysis of McClintock's later work.

The author's descriptions of McClintock's contributions in the field of cytogenetics of maize prior to 1950 are spotty and certainly inadequate to inform the general reader of the real beauty and significance of these earlier experiments. As Marcus Rhoades notes (quoted in *Science*, 28 October 1983, p. 403), these were 'the golden days of cytogenetics," and most geneticists would agree that McClintock's contributions in cytogenetics during this period were, on their own, worthy of Nobel Prize recognition.

The central theme of the biographer, and one referred to in almost every chapter, is that McClintock's work on the *Ds-Ac* controlling elements and on the associated phenomenon of transposition (mobile genetic elements), commenced in 1944 and first formally published in 1950 and 1951, was not accepted by the community of her fellow scientists. In this interpretation the author is not alone; it is evident from statements made by McClintock in the interview sessions that she felt at the time that she was rebuffed and that her work in this area was not understood and not appreciated. As the author puts it, the initial response of the scientific community was that she was "incomprehensible," "mystical," even "mad." In an interview reported in *Time* (24 Oct. 1983, p. 54) under the subheading "Geneticist Barb McClintock, ignored for years, wins a Nobel," McClintock herself is quoted as saying: "They thought I was crazy, absolutely mad."

Accepting the premise that McClintock's work was rejected by her colleagues in genetics, the author offers two explanations: that the idea that genetic elements could move about in what was regarded as a spatially fixed genome was too revolutionary at the time, and that McClintock's presentations were made in a language so special to maize, and to McClintock herself, that fellow geneticists could not understand the significance of her discovery; an entire chapter, "A different language," is devoted to this argument.

Many readers of this book who are geneticists, especially those who have worked in maize genetics since the early 1950's, will want to challenge the basic assumption that McClintock's work was rejected. Her papers published in 1950 and 1951 on the *Ds-Ac* controlling elements and on associated transposition, and others published later on the same

subjects, were both understood and appreciated by the community of maize geneticists. They became immediate objects of graduate seminar presentations, and the topics of controlling elements and transposition were rapidly incorporated into graduate and undergraduate courses in genetics and cytogenetics. As the author indicates, no one today questions the existence of mobile genetic elements; whether or not transportation plays a key role in embryological development in maize and other organisms, as McClintock implies, is for most researchers still an open question.

It is only fair to indicate here that biographer and subject were not in agreement about the publication of this book. In the prefatory material to the book the author takes note of McClintock's reluctance to be the subject of such a project and thanks her for "tolerating—even while trying her best to dissuade me from—the writing of this book." In a subsequent article in the *New York Times* (Long Island section, 16 Oct. 1983, p. 23) McClintock is quoted as saying, "I want nothing to do with a book about me. I do not like publicity."

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Geologic Thought

Great Geological Controversies. A. HALLAM. Oxford University Press, New York, 1983. x, 182 pp. $35; paper, $14.95.

This compact book has two objectives, namely to examine currently popular models of the development of science within the context of geology and to transmit "some fascinating pieces of intellectual history to a wider audience." The author focuses upon five celebrated controversies as case histories spanning the development of modern geology from the late 18th century to the 1970's. Although the book does not claim to be a comprehensive history of geology, it does cover the most important shifts in geologic thought and so serves as a good introduction. The emphasis upon controversy is justified because "underlying assumptions and attitudes of the protagonists [are] often brought out into the open. Furthermore, attention is concentrated on the matters most critical to growth and development of a given subject."

Historians of science may be skeptical of Hallam's selective approach. Initially, I was suspicious that the book would be too narrow and too gimmicky to serve much purpose other than fireside entertainment for a minuscule audience of curious laypersons. Before I was halfway into the first chapter, however, I realized that this is a thoughtful and carefully crafted, adequately footnoted, scholarly work, which must have had a long period of gestation.

Hallam devotes a separate chapter to each of five major controversies. These are "Neptunists, vulcanists and plutonists"; "Catastrophists and uniformitarians"; "The Ice Age"; "The age of the earth"; and "Continental drift." Each is a coherent entity that can be comprehended separately. A sixth chapter evaluates the ideas of Popper, Kuhn, Lakatos, and others. One can hardly quarrel with the choice of controversies, and, on the whole, the treatment of all five is very good; I gained new insights from each chapter.

Hallam's final chapter presents an overview that I wish were more extensive. After questioning the trendy external approach to historiography, which emphasizes sociological climate more than factors internal to science, Hallam argues that both a "persuasive advocacy" and new techniques are most important in establishing new theories. He then assesses several models of scientific development in light of his previous chapters. He is persuasive in stressing geology's historical emphasis upon inductive empiricism as opposed to the hypothetico-deductive approach advocated by Popper. Hallam sides with those who criticize Popper as too extreme in circumscribing a preferred scientific approach in purely epistemological terms. Instead he leans more toward Ziman, Polanyi, and Kuhn, who stress the importance of how scientists actually operate. Hallam then shows that none of his five controversies fits neatly any of their models; the scheme of Lakatos is preferred over these others. A *research programme* provides a core of universally held theory surrounded by *auxiliary hypotheses* that "bear the brunt of critical tests." In assessing the future of plate tectonics, Hallam then asks, "Are we now the victims of this success?" He doubts that the central research programme—like Newton's laws of gravity—will ever be completely superseded, but many auxiliary hypotheses certainly will yield to the scalpel.

Because our present students have grown up entirely with plate tectonics, it seems to me that a historical perspective on previous geologic thought is essential. Hallam's *Great Geological Controversies* together with Porter's *The Making of Geology: Earth Science in Britain 1660–1815* (1977), Albritton's *The Abyss of Time* (1980), Greene's *Geology in the Nineteenth Century* (1982), and the Fauls' *It Began with a Stone* (1983) provides an appealing choice of new, thematic references (mostly 200 to 300 pages long) both for teaching such history to our students and for diverting self-instruction at the fireside.

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Ocean Eddies

Eddies in Marine Science. ALLAN R. ROBINSON, Ed. Springer-Verlag, New York, 1983. xxvi, 609 pp., illus. $45. Topics in Atmospheric and Oceanographic Sciences.

Eddies in Marine Science is a compilation of chapters by a variety of authors dealing with a broad spectrum of characteristics of ocean eddies. Eddies, or low-frequency fluctuations in the current/temperature field, are ubiquitous and energetic oceanic features. The book, which is the first one devoted to a survey of the status of knowledge of ocean eddies, is a good and useful point of departure for anyone interested in becoming familiar with this subject.

There are sections of the book that should be useful for investigators in allied fields who are seeking an assessment of the impact of eddy research on their specialties as well as for those active in this field who are interested in identifying aspects of the subject for future study. There is a chapter on eddies and biological processes, as well as one on eddies and acoustics. Summaries of what is known about eddy dynamics (and general circulation) in the South Pacific and South Indian oceans make it clear that this hemisphere is sharply underexplored, as are tropical and higher-latitude regions in general.

Three chapters demonstrate considerable accomplishment in the last decade. Holland *et al.* survey the nature and relevance of eddy-resolving general circulation models and make the case that instability processes are the prominent energy sources for eddies in subtropical gyres. Bryden has possibly identified the essential role of eddies in the Antarctic circumpolar current. A chapter on Gulf Stream Rings by Richardson is a summary of what is known about the best-