"Offices of the Department of Ethnology at the National Museum, c. 1890." [National Anthropological Archives, National Museum of Natural History; reproduced in *Savages and Scientists*]

ing and James Mooney. Powell is shown as Western explorer, follower of Morgan's theories, energetic surveyor of Indian languages and tribes, and doctrinaire and autocratic director of BAE research. Cushing and Mooney are presented first of all as prototypical anthropologists who fit the modern ideal type of "homeless hero" or heroic assimilator of an exotic culture at cost of an alienating objectivity about one's own culture. One can see why many anthropologists are rather taken with Susan Sontag's notion of the anthropologist as homeless hero, but why should not Hinsley, a historian, have examined it more coolly? Cushing worked under daunting circumstances in Zuñi, and his own poor health was perhaps his greatest trial of all, but, notwithstanding the wholehearted admiration due to him for his courage and accomplishment and to Mooney and many other anthropologists early and recent, they do not seem to have been any more alienated from their culture than all sorts of other Americans of their day and since. The Zuñi and Kiowa are not required. American society has itself stimulated much critical thought and disaffection. In fact Cushing and Mooney seem best of all to represent the personal and unprofessional fashion in which most men and women got to be anthropologists in the days when the government was the center of anthropological activity, jobs, and status and Powell was the government's arbiter. Both men began as kids interested in Indians and neither had much formal education. Cushing was to be taken up by the Smithsonian in his teens and to soon work himself into favor and a permanent job. Mooney laid siege to a job at the Bureau in his early 20's and was eventually supported in his ethnographic work with first the Cherokee and later the Plains Indians. There are differences of opinion about the value of Cushing's work but not about Mooney's nor that of a number of other BAE "anthropologists," mostly amateurs or with amateur beginnings who published under Powell—Dorsey, Gatschet, Fewkes, Stevenson, Swanton, and Boas. The list of Powell anthropologists is, however, far longer, about 30, and many of the names on it are of such little distinction that it makes the end of the Powell era seem long overdue.

Hinsley has added much detailed information to the institutional history of early American anthropology and his account of the Smithsonian from 1846 to 1910 has unity, yet there should be enough on its subsequent history to indicate its continuing importance. Anthropology became professionalized and the university became its institutional center, but the Smithsonian and BAE were to go on playing a splendid role in anthropological research and publication as it too became professionalized. Hinsley closes his account in 1910, but after that date 11 more monographs were published with the Annual Reports of the Bureau and between that date and 1971 about 160 more Bulletins. Since 1971 we have the series called the Smithsonian Contributions to Anthropology. Many of these publications over the years are of extraordinary value, and in addition to this the Smithsonian has contributed to ethnographic and archeological research and has built one of the great anthropology museums.

HELEN CODERE
Department of Anthropology,
Brandeis University,
Waltham, Massachusetts 02254

Crustaceans

The Biology and Management of Lobsters. J. STANLEY COBB and BRUCE F. PHILLIPS, Eds. Academic Press, New York, 1980. In two volumes. Vol. 1, Physiology and Behavior. xvi, 462 pp., illus. $55. Vol. 2, Ecology and Management. xiv, 390 pp., illus. $45.

Lobster has a special place in any list of culinary delights. It has been a favorite of the European aristocracy for many centuries, and today's consumers are willing to pay more per kilogram for it than for almost any other major foodstuff. World consumption is at present around 130 million kilograms, but all the signs indicate overexploitation and the probability of future declines in world stocks. The ten-year averages of landings of the clawed lobster *Homarus gammarus* in Europe declined from over 3 million kilograms per annum in the 1950's to under 1.9 million kilograms per annum in the 1970's. The eastern North American catch of clawed lobsters was between 30 and 35 million kilograms per annum in the 1950's but was consistently below 28 million kilograms per annum in the 1970's; during this interval the number of traps fished increased 60 to 70 percent. Decline in catch per unit effort is a strong indicator of decline in stocks. In South Africa, Australia, New Zealand, and countries adjacent to the Caribbean area, there are major fisheries for clawless, so-called spiny lobsters. Here again there are indications of overexploitation, for example falling catches in New Zealand and stable catches with increasing effort in Australia.

An international group of specialists in lobster biology met in Perth, Australia, in 1977, and this book is a revised and enlarged version of the proceedings. Lobster anatomy, physiology, and behavior are relatively well understood, for lobsters are excellent experimental ani-

mals, and workers in comparative physiology will find authoritative chapters on the various organ systems. The life history involves planktonic larvae, with a relatively short planktonic stage (a few weeks) in clawed lobsters, but a long, complex planktonic larval development (3 to 22 months) in spiny lobsters. Clawed lobsters tend to live in solitary shelters that they defend against all comers, but spiny lobsters occupy communal shelters. Clawed lobsters may migrate offshore and inshore on a seasonal basis, but certain spiny lobsters make spectacular migrations, the best-known being the appearance of as many as 100,000 in the waters west of Bimini, moving in a southerly direction, single file, day and night.

Yet, with all this information available there is an unfortunate lack of the data needed for good management. Lobsters, unlike finfish, leave no record in their skeletons by which age and growth rate can be calculated. The young stages often inhabit burrows on rocky ground and hence are extremely difficult to sample quantitatively, so that prediction of recruitment to the fishable stock is almost impossible. Managers do the best they can with analyses of catch data, and R. L. Dow of the State of Maine Department of Marine Resources concludes that major fluctuations in natural abundance are associated with fluctuations in sea temperature during climatic cycles. However, attempts to get fishing effort regulated to match the expected changes in stock have met with little success. Dow concludes, "Fishermen are suspicious of change and are unwilling or unable to understand why the resource, in terms of scientific management, should be given first consideration rather than the industry or the public."

Meanwhile, a hypothesis with which the present reviewer is associated is given scant attention in the volume. It focuses on the role of lobsters as key predators in their ecosystem, controlling the population densities of herbivores, notably sea urchins. When American lobster populations are drastically reduced sea urchin populations explode and overgraze the subtidal seaweeds that are both the primary producers in the food chain and the habitat in which young lobsters hide from their predators. Destruction of seaweed beds has been accompanied by a drastic decline in lobster landings on the Atlantic coast of Nova Scotia, and the same type of phenomenon has been observed in parts of Maine. There is abundant evidence from many ecological systems that predators play a major role in determining the balance between plants and herbivores, from which we may infer that gross interference with a predator stock density will have far-reaching effects.

These two volumes set out with admirable clarity the basic life history, physiology, and behavior of lobsters, catalogue numerous ecological observations on the various species, and describe the important attributes of the fisheries. After the conclusion that fisheries on the main clawed lobster stocks appear to be in biological and economic trouble, the editors offer us an account by Van Olst, Carlberg, and Hughes of attempts at lobster aquaculture, which is difficult mainly because spiny lobsters have such prolonged larval development and clawed lobsters are aggressive cannibals. What I found lacking in any of the chapters is a broad ecological perspective on the problem. How reasonable is it for humans to remove 50 to 90 percent of the lobsters in the year they become big enough to be legally caught and expect the ecosystem that supports that predator to retain its structure and function decade after decade? In a situation where numerous fishermen are exploiting a common resource, ecologically sound management strategies must be found or the exploitation of lobsters will become just one more chapter in the tragedy of the commons. These volumes are admirable source books for a description of the nature of the problem, but a radical discussion of solutions must await some future work.

KENNETH H. MANN
Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia B2Y 4A2, Canada

Energy in the Earth's Crust

Geothermal Systems. Principles and Case Histories. L. TYBACH and L. J. P. MUFFLER, Eds. Wiley-Interscience, New York, 1981. xiv, 360 pp., illus. $61.95.

Although geothermal energy utilization is not new, it has increased dramatically in the last 15 years. Because the form and temperature of geothermal resources can vary, the exploration and exploitation of geothermal energy have always been semi-experimental. Highly refined and conventional techniques have not yet been fully developed. Therefore, there is a need for understanding the principles that govern the occurrence and dynamics of geothermal systems.

This book is divided into two sections, Principles and Case Histories. The principles section is heavily weighted toward heat and mass transfer and heat extraction, as probably should be the case. However, the chapters on these subjects (three out of the seven in the section) are written at a much higher technical level than the remainder of the book, although they are not beyond the probable reader. The group of chapters on heat flow starts with the basic equations of heat and mass transfer and works its way through to more specific models and examples from different geothermal regions. A chapter by I. Donaldson and M. A. Grant on heat extraction from geothermal reservoirs is particularly enlightening. The chapter is written with consideration for those not intimately involved with fluid dynamics but still encompasses all the basic aspects of the different types of geothermal systems.

Also of note is a chapter by R. Fournier on the geochemistry of geothermal systems. Again the chapter is written for a varied audience yet is comprehensive enough to be of use to those having a need to understand the water geochemistry of geothermal systems. It covers all the well-used geothermometers and mixing model schemes, for both geothermal exploration and reservoir engineering.

A chapter on prospecting for geothermal resources is a slight disappointment. Many different methods are covered, but only in a descriptive fashion. Little attention is given to the physics of the techniques. It is true that it would be an enormous undertaking to review all prospecting methods and how they apply to geothermal exploration, but at least some elucidation of why a particular method is useful would be of benefit. The chapter's saving grace is that numerous references are given.

The section concludes with two short chapters, one on geothermal assessment and the other on environmental aspects. These chapters are brief but comprehensive. It is refreshing that the economic aspects of geothermal energy are ignored.

The case history section of the book stands in contrast with the principles section. After reading the principles section, one is left with hopes of seeing how these techniques are applied in the real world. In most of the case histories, few data are presented and most discussions are at a descriptive level. An exception is the case study of the Krafla field in Iceland. It is fairly complete in its presentation and analyses of the geothermal systems. The other case histories cover a low-temperature area (Hungary), two high-temperature liquid-dominated sys-