it emerges it bears evidence of the geological and biological unity of the Earth 200 million years ago. Scattered around the margins of this icy wasteland are the research stations of a dozen or so nations, and in the interior a handful of human outposts occupy the South Pole, the Pole of Inaccessibility, and other awesome, remote spots.

The Antarctic conjures stories of Scott, Shackleton, Byrd, Drygalski and Borchgrevink, Mawson and Priestley, Gerlache and Bruce. But, as G. E. Fogg shows in this important new book, Antarctic science ranks equally with geographical discovery and adventure in the annals of Antarctic exploration. From the time of Edmond Halley's tentative foray south of the Antarctic Convergence in 1700 to the technologically sophisticated assaults on the continent following World War II, scientific studies in the Antarctic have given justification to exploration and, most recently, have proved to be of global significance.

Fogg does justice to the early sightings of Antarctica and to the heroic age (as he terms it) of discovery and exploration in the 19th century, following a chronological line until the International Geophysical Year of 1957–58, after which he deals with sciences such as oceanography, geology and geophysics, atmospheric sciences, biology, and medicine. He establishes a tripartite division of the development of science in Antarctica: the "heroic age," the period between about 1930 and the IGY, and the post-IGY era. Happily, the account that emerges within this framework is much more than a chronology. Fogg gives us a historically sophisticated account of how science that could only be big, requiring extensive financial, political, and logistic support, came about in remote locations with few physical or biological resources to merit the effort.

Nationalism has never been absent from the exploration and occupation of Antarctica. The names of research stations, such as Byrd's Little America, France's Dumont d'Urville, the Polish Arctowski, and Australia's Mawson, indicate that national aspirations or national heroes are being used as symbols in nominally international terrain. Long before the Antarctic Treaty of 1961, which froze Antarctic territorial aspirations in time, the British government covertly set about claiming Antarctica. The *Discovery* investigations, beginning in 1925, were part of the scheme, as, later, in a more complex political setting, was the establishment of the Falkland Islands Dependencies Survey (now the British Antarctic Survey). A virtue of Fogg's account is that he shows how Antarctic science has been part of the larger picture of global international relationships during the 20th century.

No doubt the IGY has been the most significant event in Antarctica's scientific history, but even Scott and Wilson's pathetic, tragic attempt in 1912 to return geological specimens to their base camp resulted in the revelation that the fossil plant *Glossopteris*, known from the continents to the north, had also lived in Antarctica. During the past four decades (Byrd set the pattern in 1928–1930), Antarctic science has become bigger, more expensive, and certainly safer and has expanded to investigations of the whole continent, rather than its margins and nunataks alone. Most of the earlier, sketchy accounts of Antarctic science have been preoccupied with heroism or adventure, often nationalistically oriented. Fogg's account is refreshingly, but not exclusively, Anglocentric, showing, for example, that the United States has usually concentrated on large short-term expeditions and projects, while the long-term, less glorious, and certainly less glorified British Antarctic work at its handful of bases has contributed the solid backdrop of south polar atmospheric physics and biology—and the spectacular revelation of the ozone hole over Antarctica.

"Caricature of Alister Hardy singing 'Yip-i-addy-i-ay,' drawn at South Georgia, Christmas, 1926, by J. W. Ridley. . . . He is depicted with a tow-net in one hand and waving his plankton recorder (in miniature) with the other, with a cloud of krill above his head and a small winch for working nets in the background." [From *A History of Antarctic Science*; Hardy (1967), courtesy of M. Hardy]

Fogg's book is a splendid resource for the polar scientist, historian, and political scientist. I can envision it too in the collection of many Antarctic research stations, where it deserves to become dog-eared with use, not just for the abundant information it summarizes and interprets but for its humanistic values and its warning that the sorcerer's apprentice may come to dominate the basic science of the polar regions.

The human spirit expands in wilderness and we may hope that Antarctica's remote and hostile nature will ensure that most of it will remain unsullied and a place for contemplation. . . . In the past, Antarctic science has drawn much of its strength and unique character from the attitude of mind which the wilderness engenders but perhaps scientists may be becoming overweening in their confidence to extract information from this, the most unyielding and unfriendly environment on earth. Technological arrogance in the setting of some of the world's most sublime scenery seems a portent of the loss of humility and a separation from the natural environment which could lead to the decay of Antarctic science.

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The Human Scenario Beclouded

Evolutionary Ecology and Human Behavior. ERIC ALDEN SMITH and BRUCE WINTERHALDER, Eds. Aldine de Gruyter, Hawthorne, NY, 1992. xvi, 470 pp., illus. $59.95; paper, $29.95. Foundations of Human Behavior.

The revolution in animal behavior studies that started in the 1960s is echoed in anthropology by two main strains of research, one in which human psychology is understood as an outcome of Darwinian evolution and another in which human social interactions are modeled as the outcome of interactions among fitness-maximizing individuals. The latter theme is addressed by this examination of the way human subsistence practices affect relations of all kinds among individuals. The editors set about to create a high-level summary of the field by recruiting authors to prepare critical reviews to a common standard. They did it right—the volume is balanced and strong.

Central topics dealt with include food acquisition, cooperation and competition within and between groups, time allocation and habitat use, and the relationship between resources and reproduction in humans. Other papers cover the ecology of primates and earlier hominids, social complexity, and long-term population dynamics.

It appears that the secure knowledge base of anthropology has been shrinking over the last several decades. Twenty years ago we had a list of cornerstones of human society that included the nuclear family, division of labor by sex, and sharing of food. These features were not present in all societies, of course, but they did characterize hunting-and-gathering societies, which, we assumed, were a purer expression of "human nature" than more complex societies in which this underlying nature was obscured by the vagaries of cultural complexity. Today all this is unclear at best, and the contributors to this book exemplify the new ways of studying human social behavior that have undermined the old understanding.

The established wisdom was based on analogy and uniformitarian assumptions, as if the social environment of human evolution must have been a kind of average of the social environments of extant foraging peoples. Though much of this represented good scholarship, generalizing from perceptions of the world to models of the world was not good science. The established wisdom was also based on assumptions, often vague and hidden, regarding group benefit. It is easy to see, for example, that sharing meat from large animal kills is a good thing for society. This obvious social benefit of sharing was taken as an adequate explanation of why the practice is so widespread, and few of us gave much thought to the issue of how it could evolve and be maintained as the outcome of individual behavioral choices.

This corpus of understanding has fallen, and the volume under review is the best available summary of current efforts to regenerate the foundations of anthropology. The authors share a scientific method in which they use theory based on Darwinian evolution to make models of human behavior that are then imperiled by consideration of whether they account for field observations of human social behavior. Most of the papers are about technologically simple societies, reflecting the notion that fundamental rules will be more apparent in the absence of the complexity and heterogeneity of larger-scale groups.

Hunting and food sharing are topics that exemplify the flavor of the new concerns. Sharing food obviously leads to group benefit, but we do not have any models of how behaviors beneficial to a group could evolve, so we think that the group benefit is epiphenomenal. What precisely are the evolved mechanisms that induce individuals to feed others in a small residential group? Kristen Hawkes discusses these in a particularly insightful paper: sharing might be part of a system of delayed reciprocity (I give you food because I know you will give me food later), it might be part of a group-imposed insurance system, or it might be tolerated theft (since I have enough, it is cheaper for me to feed you than to defend my food). These alternatives lead to testable predictions. For example, the tolerated-theft model suggests that a lot of the well-known family mobility of foraging people represents efficient producers moving to avoid scroungers. Another defense against scroungers, apparently widely practiced, is to produce a little bit less than you need. The reciprocity hypothesis, on the basis of the data available, does not look so good. The benefits provided to others by good producers are not, it seems, reciprocated.

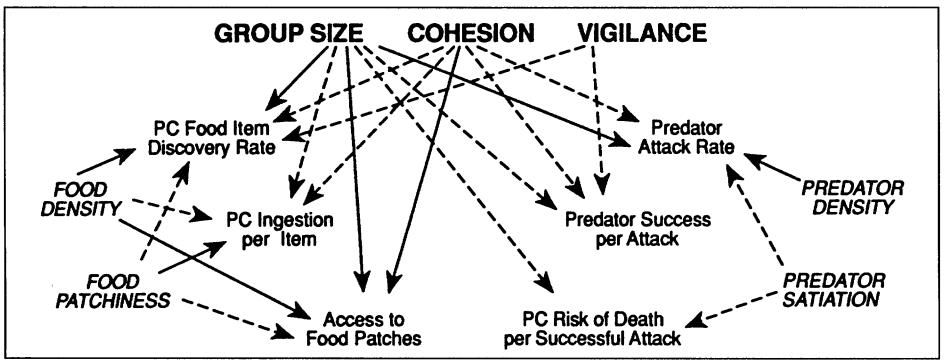
The book is full of new perspectives and refreshing insights like this. It ought to become a central source for anthropologists who want to bring modern science to their field. On the other hand, there are several storm clouds that need to be dispelled before we can claim that behavioral ecology should be the central paradigm of cultural anthropology.

The first cloud is reproductive restraint in industrial societies. Animals with more resources have more successful offspring, and people in many pre-industrial societies also convert more resources into offspring. People in industrial societies do not behave in this way. Instead, those with more wealth have fewer children. Several feasible models to account for this peculiar relationship between resources and fitness have been proposed, but no one so far has derived new testable predictions and exposed them to falsification.

The second cloud is more ominous. A biologist studying the behavioral ecology of peacocks could make sense of a lot of mating, parenting, foraging, and territorial behaviors by understanding how they were the outcome of interactions among fitness-optimizing individual birds. But none of that would help her understand the outlandish gaudy tail on the males. Seemingly maladaptive structures can persist, according to one strain of evolutionary theory, because the other sex prefers them. Such social traits, those for which fitness depends not so much on the environment as on what other members of the same species do, can evolve along trajectories that depend on some arbitrary or accidental initial state in the remote past. But for a mutational accident long ago, peacocks might very well have broad red stripes today.

How much of our own behavior depends on evolved preferences that are arbitrary outcomes of social evolution? In most foraging societies men but not women hunt, and in some the caloric returns from hunting are less than those from gathering plant foods. Do men hunt because women prefer meat, the preference persisting because sons of women with the preference will in turn be preferred by other women? Or is there some unknown nutrient that makes hunting sensible in terms of simple nutritional ecology? If the former dynamics explain hunting, then no amount of detailed understanding of hunting ecology can explain why men in foraging societies do so much of it.

But these clouds are fascinating problems for those of us who think that human social behavior, like the social behavior of any other species, ought to be treated with scientific methods. The perspectives, methods, and results of behavioral ecology offer the best alternative we have to the un-



"Effects of selected social variables (in bold capitals) and external ecological variables (in italic capitals) on primate foraging success and predation risk. PC signifies per capita. Solid arrows denote positive effects, dashed arrows show negative effects." [From C. J. Janson, "Evolutionary ecology of primate social structure," in *Evolutionary Ecology and Human Behavior*]

rooted colorless tabulations and introspective narratives that make up too much of anthropology.

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Speaking Remains

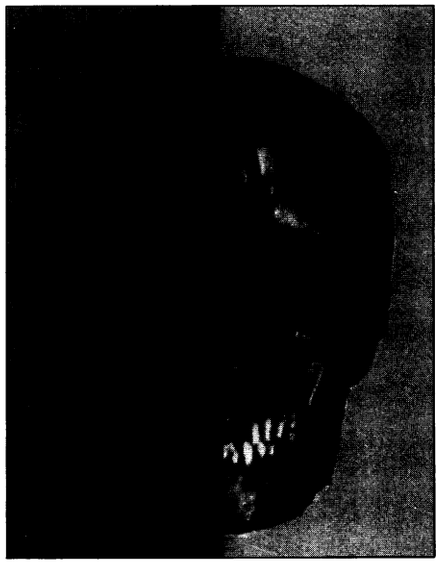
Bones. A Forensic Detective's Casebook. DOUGLAS UBELAKER and HENRY SCAMMELL. Burlingame (HarperCollins), New York, 1992. xvi, 317 pp., illus. $23.

What the Bones Tell Us. JEFFREY H. SCHWARTZ. Holt, New York, 1993. xii, 292 pp. $25. A John Macrae Book.

Douglas Ubelaker, a forensic anthropologist with over 20 years of field and laboratory experience, observes that the scientific examination of human remains evokes "an awareness that they represent the victim's last chance to be heard, to reveal a major insight into how a person lived and perhaps into how he or she died. . . . Sometimes their last words speak not just for the life of the victim but for society, and we ignore them at our peril." *Bones: A Forensic Detective's Casebook*, co-authored by the freelance journalist Henry Scammell, describes the analytical procedures used by anthropologists specializing in the identification of human skeletons or decomposed remains for medical-legal investigations. In less skillful hands, an account of procedures to determine sex, age at time of death, stature as evidenced by appendicular bones, racial ancestry, markers of individuation acquired through trauma and disease, and other components of the protocol of a forensic anthropological analysis might be arid and technically detailed reading. These authors provide an exciting approach as Ubelaker reviews his many and varied forensic cases, most of which have come to him at the Smithsonian Institution's National Museum of Natural History, where he is curator of anthropology and collaborates with the FBI. Each case illustrates the steps of forensic human identification procedures in a vivid way that allows the dead to reveal aspects of their life histories and the circumstances of their demise. Included in these accounts are Ubelaker's own significant contributions to his discipline, particularly his work on facial reproduction by computer techniques and photographic or radiographic superimpositions. Perhaps of greatest interest are the accounts of cases in which Ubelaker has been directly involved, as in his examination of the victims of Alfred Packer's cannibalistic practices in 19th-century gold-mining days in Colorado, his assessment of the fate met by the parents of Lizzie Borden, the autopsy of the remains of Carl Weiss, who was slain by Huey Long's bodyguards following his alleged attack on Louisiana's Kingfish, and the Karen Marsden case involving ritual torture and Satanism in Massachusetts in 1981 (the subject of *Mortal Remains: A True Case of Ritual Murder*, also authored by Ubelaker and Scammell).

Yes, this is gruesome reading, and along with the horrors inherent in violent crime is the requirement for the forensic anthropologist to tolerate the sights and smells of tissue decomposition, maggot infestations, and the sundering of body parts by murderers or animal predators in certain situations where human remains are encountered. Dry bones are also encountered, of course, and it is recognition of their lesions from trauma and disease, markers of occupational stress reflecting habitual activities in life, and related data signs that offer the possibility of a positive identification that enables a missing person's voice to be heard for the last time. These sobering aspects of forensic anthropology are tempered by Ubelaker's tactful and sensitive approach to his discipline combined with profound scholarship, a dry sense of humor where appropriate, and a sound balance of forensic cases with studies of skeletal remains in archeological sites in Ecuador, the Virgin Islands, and North America where he has conducted research.

Enhancing this readable text are 75 photographs and drawings, a glossary accompanying a sketch of a human skeleton with definitions of anatomical terms, a name-and-address listing of the 40 diplomates (including Ubelaker) of the American Board of Forensic Anthropologists as of 1992, and an index. There is no bibliography section, although Ubelaker is generous in acknowledging the contributions of his colleagues. Given the autobiographical nature of the book, it is understandable that Ubelaker emphasizes the role his mentor, William M. Bass III at the University of Tennessee, played in his own intellectual development as well as in the advancement of forensic anthropology in America over the past several decades. He also pays tribute to the late J. Lawrence Angel, his predecessor and colleague at the Smithsonian. Despite the broader perspective Ubelaker provides of the growth of the discipline from its roots in physical anthropology, medicine, and human anatomy, this personal approach obscures the role of other academic programs, notably those associated with the laboratories of W. M. Krogman and T. D. McCown (whose contributions otherwise are noted) in the training of forensic anthropologists. This is a minor oversight in a splendid "casebook," which includes the author's experiences in court as an expert witness.



"Computer-assisted photographic super-imposition. The skull of a black female found in Ohio matched a photograph of the suspected victim." Unsuccessful attempts were made to find another match in the Terry Collection at the Smithsonian Institution, a collection of more than 1700 skeletal remains in which "each skeleton . . . includes a full description of the living person, usually one or more photographs from life, and in some cases death masks." [From *Bones*]

Among this reviewer's favorite passages is one relating to courtroom behavior, a skill that most forensic anthropologists must learn without benefit of mentors: "Maybe in all of this there's a good rule of thumb for courtroom objectivity. Say everything you know that pertains, but not a bit more. The extent to which an expert witness allows himself to be drawn in at the start of a case can be exactly equal to the length of the limb he finds himself sitting on at the end."

Jeffrey H. Schwartz, author of *What the Bones Tell Us*, is a professor of anthropology at the University of Pittsburgh. Like Ubelaker, he intended as an undergraduate to enter medicine but became diverted to physical anthropology as a consequence of taking a course under a dynamic teacher. Other parallels are their careers in forensic anthropology, their study of skeletal remains from archeological sites, and research collaboration with Angel at the Smithsonian. However, their books are quite different, Schwartz focusing upon the hominid fossil record and the historical development of paleoanthropology. Although he gives an account of some of his forensic cases, Schwartz has much more to say about his field research at the site of ancient Carthage, where he investigated the evidence for child sacrifice, his search for the vestiges of Swanscombe Man along the banks of the Thames, and the biblical archeology at Tell Hesi in Israel. Therefore *What the Bones Tell Us* is complementary to *Bones* in that it demonstrates how the skills of the forensic