The Fremont of west-central Utah apparently received the largest number of these traits (Ambler, 1966a; Anderson, 1963; and Gunnerson, 1960).

Of course, more datable material needs to be collected to date the archaeological evidence. Internal evidence will allow comparison of Barrier Canyon and Pecos River types (pp. 132–34).

Schaafsma has to be commended for this gigantic task of reviewing a large mass of diverse data. Her site maps are very useful, and her tables of elements and attributes for the different styles and sites, the abstract elements, and some comparisons may serve as a basis for future explorations. Obviously, more research is needed to fill in all the gaps.

Ruth-Inge Heinze
University of California, Berkeley

Skeletal Biology in the Great Plains: Migration, Warfare, Health, and Subsistence. Edited by Douglas W. Owsley and Richard L. Jantz. Washington, D.C.: Smithsonian Institution Press, 1994. 415 pages. $45.00 cloth.

The editors and contributors to this large, impressive volume present thirty-two chapters that deal with Great Plains skeletal biology. The goal of these diverse investigations was to derive critical information from human skeletal remains about past inhabitants of the Plains, including prehistoric and historic Indians, as well as Euro-Americans. These contributions are organized topically into five parts: (1) archaeology; (2) demography and paleopathology; (3) biological distance measures and skeletal morphology; (4) diet and subsistence strategies; and (5) warfare. The studies represent the collaborative efforts of archaeologists, physical anthropologists, ethnologists, ethnohistorians, and physical scientists. A major impetus for these analyses was the pending reinterment in 1986 of Plains Indian remains belonging to the W.H. Over Museum collection in South Dakota.

Some of the most far-reaching contributions of the volume deal with Plains Indian diet and health. Archaeologists and anthropologists have long assumed that prehistoric and historic Plains Indians were either nomadic bison hunters or sedentary corn, bean, and squash farmers. Investigators viewed certain archaeological remains, e.g., meager plant samples, bison bone hoes,

pottery vessels, and clusters of earthlodge floors as unequivocal evidence for a significant commitment by prehistoric Plains Indians to the production, storage, and consumption of domesticated plants. If horticulture played a more limited role in prehistory, then major portions of the archaeologists' reconstructions of Plains Indian life—including population estimates, ceramic technology, settlement patterns, mobility and range sizes, character of food storage, importance of bison hunting, intervillage competition, kinship systems, and social organization—are fatally flawed. The ethnographic present may, in fact, have less to tell us about the archaeological past than we have assumed.

Recent studies in nutritional physiology, ecology, and anthropology have revealed a less than idyllic view of the transition from hunting and gathering to horticulture. Unlike the remains of prehistoric populations of the Midwest, Southeast, and Southwest, osteological remains from the Plains exhibit limited evidence for nutritional and physiological stresses associated with a specialized maize diet. For example, high maize and low animal protein diets are frequently associated with protein deficiency, iron deficiency anemia, weanling diarrhea, high infant mortality, poor dental health, crop failure and famine, and increased workload. Physical manifestations include reductions in stature, sexual dimorphism, facial robustness, tooth size, and increases in porotic hyperostosis, cribra orbitalia, infant deaths at weaning, caries, tooth loss, growth arrest lines, enamel hypoplasias, osteoarthritis, and robusticity in limb bones. Although the researchers in this volume generally assume that late prehistoric and historic Plains Indians were maize horticulturalists, the osteological evidence emits mixed, if not contradictory, signals.

For example, M.S. Cole and T.M. Cole conduct a multivariate analysis of long-term change in the character of the supraorbital (brow ridge) portion of the face. Given a shift from hunting and gathering to maize horticulture, they predict that craniofacial features will become less robust, since cooked and starchy foods will require less forceful mastication. Such craniofacial changes have been observed elsewhere among prehistoric populations that have become horticulturalists. Their sample of 113 Plains Indians from a twelve-hundred-year period (A.D. 610–A.D. 1832) appears to reflect craniofacial variation that is more related to differences within and between adult males and females than to changes in diet. The study's results are further confounded by the fact that preagricultural groups (A.D. 610–1033) appear statisti-

cally to be more similar to later agricultural groups (A.D. 1600–1832) than to transitional populations (A.D. 900–1675).

Two chapters by T.M. Cole and Ruff both deal with biomechanical changes in lower limb structure (femur/tibia and femur, respectively) related to mobility and economic activities. Cole assumes that a sample of 534 adult males and females will reflect the transition from hunting and gathering to maize horticulture between A.D. 610 and A.D. 1817. This economic transition would be reflected by a reduction in stature and sexual dimorphism (size difference between adult males and females), as well as a change in the cross-sectional shape of leg long bones associated with a shift in diet and activity patterns. Cole's expectations are not met; later Northern Plains peoples do not exhibit a decrease in stature or a reduction in sexual dimorphism. He does not observe "significant changes in bone geometry" in adult females through the twelve-hundred-year time span that would indicate increased involvement in horticultural activities. Why did Cole not see the trends that he had expected? He argues that Northern Plains horticulturalists, unlike other prehistoric North American populations, did not experience these anatomical changes because they produced abundant crops and they also continued to hunt wild game.

Ruff, like T.M. Cole, conducts a biomechanical analysis of the upper leg in a sample of 147 individuals from the Middle Missouri region and the Southern Plains between A.D. 400 and A.D. 1850. Interestingly, the Plains individuals were taller than individuals in horticulturally based Pecos Pueblo and Georgian coast groups. Unlike Cole, Ruff finds that sexual dimorphism with respect to the structure of the upper leg decreased through time in the Northern Plains. The robustness of the upper leg in the combined Plains Indian sample appears more similar to the preagricultural Georgian coast group; however, the Middle Missouri group exhibits types of mechanical loading more like the Pecos Pueblo and agricultural Georgian coast groups. Ruff observed little, if any, change in biomechanical properties of the upper leg accompanying adoption of the horse. This lack of anatomical change in Middle Missouri groups probably reflects their horse-poor status and limited use of this animal.

Such biomechanical research potentially may offer interesting and significant insights about Plains Indian workload, activity patterns, and the sexual division of labor. These two studies offer mixed and somewhat confusing conclusions. Robust interpreta-

tion of these biomechanical measures must be carried out in conjunction with more rigorous use of cross-cultural studies and greater reliance on actualistic studies. Workloads and activity patterns of horticulturalists will, no doubt, vary with respect to type of crops, e.g., cereals versus tubers; transport distances between fields, villages, and storage facilities; male versus female involvement in clearing, planting, and weeding; and variation in food processing methods, e.g., grinding, shredding, and pounding. Furthermore, bioarchaeologists and paleoanthropologists cannot simply assume that female mobility and workload will decrease with the adoption of horticulture. Settled village life might, in fact, mean that women continue to travel considerable distances transporting heavy loads, e.g., firewood, drinking water, crops, and children.

Some of the most provocative evidence about the nature of Plains Indian food-getting to emerge in this volume is presented by Tuross and Fogel. Chemical analyses (stable carbon and nitrogen isotopes) of individuals from the Sully village site (39SL4) does not support the traditional archaeological interpretation of maize-based diets for village peoples along the Missouri River. It is suggested that the Arikara at Sully would have experienced harsher climatic conditions during the Little Ice Age (A.D. 1550–1850), including colder winters and drier summers. As a consequence, the Arikara in this area relied heavily on bison hunting.

Contributors also presented additional insights into the effects of disease, warfare, and social disruption on Plains Indian life. The study by Kelley, Murphy, Levesque, and Sledzik examines the impact of respiratory disease, especially pulmonary tuberculosis, on four Arikara village populations in South Dakota dating between A.D. 1600 and A.D. 1832. Lesions on ribs are very similar to recent comparative specimens representing populations that were subjected to the stresses of war, malnutrition, social disruption, and crowding. Such adverse living conditions were created and exacerbated by interaction with Euro-Americans. Trimble outlines the extremely devastating effects of infectious disease, i.e., smallpox, on villages of Mandan, Hidatsa, and Arikara, as well as affiliated groups of Assiniboine and Blackfeet along the Missouri River. Trimble delineates the complex interrelationships between sedentism, demography, nutrition, domestic habitat, and social interactions that amplify the destructive power of infectious disease in subsistence-level societies.

The strengths of the Owsley and Jantz volume include the diversity of empirical evidence that is used in order to obtain glimpses of past Plains Indian life. Contributors document a range of biological factors that posed major adaptive problems for prehistoric and historic Plains peoples. Their scientific observations are particularly valuable, since the W.H. Over collection will never be available for further investigation.

This volume demonstrates, however, that the facts do not speak for themselves. The scientific contributions of this book would be more apparent if an introductory chapter had summarized current understanding of the dynamic links between human osteology, diet, nutrition, activity patterns, health, and disease in subsistence societies. Many of these general trends and systemic relationships are examined in works like R.L. Blakely's *Biocultural Adaptation in Prehistoric America* (1977); M.N. Cohen's and G.J. Armelagos's *Paleopathology at the Origins of Agriculture* (1984); M.N. Cohen's *Health and the Rise of Civilization* (1989); M.L. Powell's, P.S. Bridges's, and A.M. Wagner Mires's *What Mean These Bones? Studies in Southeastern Bioarchaeology* (1991); and, most recently, in K.D. Sobolik's *Paleonutrition: The Diet and Health of Prehistoric Americans* (1994). In addition, if Native Americans and the general public are to benefit from scientific research, there should be a clear, concise discussion of the results of these paleoanthropological studies. Readers need to understand the relevance and utility of this research for reshaping our understanding of the past and for dealing with nutritional, medical, and social problems in the present.

Alan J. Osborn
University of Nebraska–Lincoln

Walleye Warriors: An Effective Alliance against Racism and for the Earth. By Rick Whaley and Walter Bresette. Philadelphia: New Society Publishers, 1994. 272 pages. $44.95 cloth; $17.95 paper.

Racism, fear, and violence occurred in northern Wisconsin during April 1989 in a manner approaching and, in some cases exceeding, that in Alabama and Mississippi in the late 1950s. So goes Whaley's and Bresette's vivid and detailed account of the turmoil surrounding the white backlash over the usufructuary rights of the Lake Superior Chippewa.