For the scholar endeavoring to understand the evolution of our health-care system more fully, it provides a solid foundation upon which to build.

KENNETH M. LUDMERER
Department of Medicine
and *Department of History,*
Washington University,
St. Louis, MO 63110

A Military Technology

The Poisonous Cloud. Chemical Warfare in the First World War. L. F. HABER. Clarendon (Oxford University Press), New York, 1986. xiv, 415 pp., illus. $59.

L. F. Haber, an economic historian interested in the development of the chemical industry, has in *The Poisonous Cloud* provided an excellent scholarly history of gas warfare in the First World War. Haber undertook this study not just for scholarly reasons but for intensely personal ones. His father, Fritz Haber, who directed the Kaiser-Wilhelm Institute for Physical Chemistry in Berlin, was the key figure in German chemical warfare during the conflict. Harold Hartley, a physical chemistry professor at Oxford who played a crucial role in wartime and postwar British chemical warfare, often lamented the absence of both a definitive history of chemical warfare and a biography of the elder Haber and persistently encouraged the son to write this work. Yet despite these personal motives for the study, this book is not a biography or defense of the author's father or one in which personal bias determines or intrudes upon the interpretations. It is a dispassionate and critical history of chemical warfare in the Great War.

Haber used significant newly available information, particularly Hartley's papers and documents from the British Ministry of Munitions. He supplemented the fragmentary German material in the federal archives with files from the archives of the German states, particularly Bavaria. With an array of these "new" and old sources, he has written a penetrating, analytical study of gas warfare on the western front between the Germans and the British and French, with comparative references to the United States. He devotes little space to gas warfare between other countries on other fronts, primarily because of the absence of documentation and the insignificant nature of chemical warfare elsewhere.

The author does not concentrate narrowly on the military and the front. Instead, in sophisticated fashion he links the chemical war at the front to the development of science and industry in the rear and probes the complex industrial-scientific-military relationship behind chemical warfare that previous writers have neglected. Thus his study of the only genuinely new weapon that was used in combat in the first World War but not in the second emphasizes the relationships between chemists and soldiers in the development and use of the weapon and of defenses against it and the impact of gas on the combatants.

Haber explains clearly the background of chemical warfare, ranging from the development of the capacity to mass-produce such gases as chlorine and phosgene to the science fiction fantasies that exaggerated the effect of gas warfare. A crucial point that he reiterates throughout the book is that gas as a weapon remained underdeveloped in comparison to the defenses against it. During the war the military perceived gas defense as essential to morale and gas offense as merely an adjunct to more fundamental operations. Furthermore, the defense could concentrate on clearly defined objectives such as the development of respirators, while on the offensive side inadequate communication between scientists and soldiers impeded the development of a successful chemical weapon.

Haber emphasizes that the exaggerations of the threat of gas before, during, and after the war stemmed from ignorance of the actual circumstances of gas warfare, which gave rise to and was compounded by science fiction fantasies and journalistic license. In fact, as his accounts of gas operations during the war make amply clear, gas was not that effective or reliable a weapon. Concentrations of a gas in the field were usually below the levels necessary to kill the enemy in great numbers; the inability of meteorologists to forecast wind speed and direction accurately made gas clouds as likely to incapacitate one's own troops as the enemy; and the issuance of adequate respirators enabled trained and disciplined troops to withstand the onslaught of the new weapon.

The author describes and analyzes knowledgeably such disparate topics as the development, introduction, and efficacy of the various gases, weapons, and respirators used by the combatants. He compares the state of the chemical industry and the approaches to chemical warfare in the major powers, and he does not hesitate to praise or condemn their respective achievements and failures. In general he is quite critical of the powers' approach to chemical warfare. Though he acknowledges the complexity and newness of gas warfare, the reluctance of soldiers to accept technological innovation, and the difficulties of communication between scientists and soldiers, he finds that significant avoidable human errors exacerbated these already difficult conditions. Haber characterizes developmental programs as "adaptive improvisation rather than purposive research" (p. 108). The absence of logic behind the piecemeal approach to chemical warfare pursued by all powers resulted in a lack of systematic progress in research during the war.

Haber concludes that gas was ultimately a failure, because the military lacked commitment to it, the organization of chemical warfare was unduly amateurish, and defense sufficed to contain the threat. Even in 1918 chemical warfare was relatively unimportant, its casualties usually overstated. He further asserts that in practice poison gas posed no serious military threat to soldiers or civilians after 1918—a circumstance that explains why it was not used in combat in the Second World War. Yet artists and writers transformed gas into a far greater threat than it actually posed, and the fantasy outweighed the facts in the public mind during the interwar period.

This exemplary monograph approaches its subject the way scholarly histories of military topics should. Any study of 20th-century weapons that have been scientific, technological, and industrial in inception and development must investigate these aspects of their history in order to be complete. As this monograph amply demonstrates, it is simply impossible to comprehend front-line military developments without knowledge of those in the rear. This thought-provoking study also has broader implications for understanding the role of science in modern warfare and the impact of war on scientific and technological progress. And its value is not the less because it deals with a development that the author himself concludes was a failure and relatively unimportant. The explanation of that failure and unimportance is as enlightening and instructive as studies of success.

JOHN H. MORROW, JR.
Department of History,
University of Tennessee,
Knoxville, TN 37996-0411

Migrationism Exemplified

Migrations in Prehistory. Inferring Population Movement from Cultural Remains. IRVING ROUSE. Yale University Press, New Haven, CT, 1986. xiv, 202 pp., illus. $20.

Thor Heyerdahl and his Kon-Tiki voyages notwithstanding, the Polynesians peopled the vast triangle in the Pacific from the west, moving out of small islands off New

Guinea around 1300 B.C. and reaching New Zealand by A.D. 1000. The Eskimo culture developed on the Siberian side of the Bering Strait around A.D. 1, and between A.D. 500 and 1100 it spread eastward across the American Arctic. The traditional interpretation postulating the arrival around 300 B.C. of the Japanese people to expand and displace the indigenous Ainu is wrong. The Tainos, the people encountered by Christopher Columbus, are one of the peoples whose cultures underwent parallel developments in the Antilles, following a population movement out of South America around the time of Christ.

These are Irving Rouse's conclusions as he examines the four examples, illustrating how prehistoric population movement should be studied and how "migrationism," which has been in disrepute for the last few decades, is still "a viable pursuit, provided it is done properly and under favorable circumstances" (p. 18).

Circumstances were favorable in the four cases mentioned above, but they were not in the case of the Bantu, which Rouse originally intended to include but abandoned because of the inadequacy of archeological data. The proper way to approach the study of prehistoric migration is to emulate the methodological rigor of hard scientists who use multiple testable hypotheses and strong inferences. Hypotheses to be considered in inferring population movements are local development, transculturation, and acculturation. In the case of the Japanese, Rouse believes that a population movement of Altai speakers through Korea did take place but that it occurred before 2500 B.C. Transculturation in the interaction sphere across the Korea Strait resulted in the local development in northwestern Kyushu of the Yayoi culture by 300 B.C. This "original Japanoid" culture then spread throughout the archipelago through acculturation and migration, processes that continued into this century.

For archeological testing of a migration hypothesis, Rouse recommends examination of patterns of change and continuity in archeological remains, aided by visual inspection of a chronological chart on which hierarchically defined archeological units are entered. The hypothesis should also be tested against other kinds of data, from linguistics and physical anthropology. As subfields of anthropology are increasingly specialized, Rouse's call for a unified anthropological approach to the old problem of migration is comfortingly familiar to my generation of anthropologists, as are the archeological unit concepts Rouse meticulously defines—horizon, tradition, style, phase, series, and cultural norm. By contrast, the question of causality and regularity (how and why prehistoric populations moved and adapted to natural and social environments), which has preoccupied anthropological archeologists in recent years, receives but a cursory treatment in this book.

Case studies seem to show how difficult it is to be really systematic in applying the rigorous methodology advocated. For one thing, relevant data are often unavailable. In addition, judgment regarding patterns of cultural change is inevitably qualitative and subjective. I suspect that if Rouse had considered more archeological traits than Jomon-like appearance of Yayoi ceramics in northern Honshu, which he judges "superficial" (p. 93), and had compared these with northeast-southwest clines of human biology (cranial morphology, blood types, and fingerprints) and isoglosses of the Japanese language, he could have reached an entirely different conclusion regarding the inference of population movement for Jomon-Yayoi transition in northern Honshu. On the other hand, exhaustive refutation of all the alternative hypotheses at every step would have made the book excruciatingly tedious. The latest contribution by Rouse is in fact a very readable exposé of a topic to which he has devoted a great deal of thought during his eminent career.

FUMIKO IKAWA-SMITH
Department of Anthropology, McGill University, Montreal H3A 2T7, Canada

African Populations

The Peoples of Southern Africa and Their Affinities. G. T. NURSE, J. S. WEINER, and TREFOR JENKINS. Clarendon (Oxford University Press), New York, 1985. xvi, 409 pp., illus. $69. Research Monographs on Human Population Biology.

Nurse, Weiner, and Jenkins have set out to write an integrated history of human cultural and biological groups and their interactions in southern Africa. The result is a very wide-ranging monograph that touches history, politics, geography, epidemiology, and population genetics. There are gaps, and many of their assertions and suggestions are poorly supported, but nevertheless the book should become a valuable reference for historians, anthropologists, and epidemiologists and a rich source of ideas and hypotheses.

Introductory chapters review the geography of southern Africa and the record of archeology and human paleontology. These are followed by separate treatments of the major populations of the region: the Khoi and San (Hottentots and Bushmen in an older terminology), the invasions by Bantu-speaking black peoples from the north and Dutch- and English-speaking Europeans from the south. The last survey chapter describes the formation of various hybrid communities, the Cape "Coloured," the Basters, and the Griqua being the better-known of these. For each group the authors summarize what is known of its prehistory and its history, with special attention to gene movement in and out of the population and to specific patterns of disease.

Not so long after European populations started pouring into the Americas, others commenced expanding into southern Africa. Both colonist groups encountered indigenous technologically primitive populations, but the outcome of the contact was very different on the two continents. American Indian populations had been isolated from the Old World for many thousands of years, and they collapsed rapidly in the face of new pathogens. Southern African indigenes, the San and Khoi, were isolated yet reachable from the rest of the Old World. They were not so devastated by contact, and their descendants are numerous in southern Africa today, dispersed among a number of populations.

The survival of these earliest inhabitants is the more remarkable because they were invaded by black peoples, from the north, shortly before the European onslaught from the south. The southernmost of the Bantus, perhaps in response to pressure from the edge of the wave of Europeans, erupted in a grand bout of war and mass population movements in the early 19th century, so the cultural geography of Bantu-speaking southern Africa today reflects the falling out from this unstable period.

The above is all familiar, but there are numerous peoples who don't quite fit into this story. There are, for example, Khoisan-speaking hunting and gathering peoples in the Mopane belt of southern Angola, northern Botswana, and Zimbabwe whose genetic affinities are with black-skinned Bantu-speaking peoples rather than with the lighter-skinned Khoisan speakers to the south. There are hints of other older layers of racial and ethnic diversity in this part of the world, buried under its dramatic recent history.

This monograph is perhaps too ambitious. It contains many suggestions about the adaptation of these populations to local environments without adequate documentation and testing. But biological history is an interesting and worthy enterprise, and interactions among local selection, migration, and genetic drift are still poorly understood