before, the war exposed the deep divisions within the ranks of strategists and demonstrated their fallibilities. In Herken's words, "the illusion of objectivity had finally been shattered" (p. 222). An "encouraging sign" in the current debate is the continuing and expanding involvement of this "very different group of nuclear gnostics" (p. 343).

Despite its readability and richness in detail and ideas, there are a few disconcerting things about Herken's book. The numerous chapter and section headings are more dramatic than informative, and too much valuable information is hidden away in lengthy footnotes (which the reader should take the time to pursue). More seriously, Herken makes a number of factual errors in his presentation that others—primarily participants themselves in the events—have chosen to stress. Though these errors (most of them minor in nature) should make the reader wary, they should not overshadow the basic contribution Herken makes in unraveling without polemics the evolution of conflicting ideas about American nuclear strategy.

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A Division in Chemistry

Science versus Practice. Chemistry in Victorian Britain. ROBERT BUD and GERRYLYNN K. ROBERTS. Manchester University Press, Dover, NH, 1984. 236 pp. $35.

This book deals, as the authors note, with what might appear to be one of the most practical of sciences in one of the most pragmatic of nations, chemistry in mid-19th-century Britain; and it deals with much more than this. For chemistry was the most popular and the most publicly visible science at the beginning of the century, and it became the major academic science and the most powerful industrial enterprise later on. Debates over the relationship between theoretical or scientific knowledge and practical or industrial performance moreover reached a critical stage during the 19th century, when both academic chemistry and the chemical industry were growing in importance and self-awareness and their sometimes conflicting views became a matter of national interest. Hence the authors quite justly assume that a study of these debates should reveal a great deal about 19th-century science in general and about the origins of many institutional and educational patterns that still continue.

In the beginning gentlemanly London, the industrial north of England, and the Scottish university cities offered rather different social and institutional conditions for chemistry. Eventually Thomas Thomson's research school, which adopted Berzelius's chemical system, established itself as the leading group in the country, took a firm stand in the "Decline Debates" of the 1830's, and exerted its power through the Chemistry Section of the British Association for the Advancement of Science. Thomson's catholic view of chemistry, embracing both theoretical and practical goals, dominated the first stage of institution-building in Britain. In 1845 the Royal College of Chemistry was founded with support from academics, manufacturing and consulting chemists, landowners, and medical men, and a professor from Germany, August Wilhelm Hofmann, a student of Liebig's, was hired to teach. Similarly the Chemical Society, founded in 1841, was meant to serve as a link between the London professional chemists and chemical manufacturers and the new generation of young academics. Since research abilities and publications soon became the decisive criterion when new teaching positions had to be filled, the research-oriented academics gradually acquired hegemony over the discipline. Institutional development and educational aims of the Royal College of Chemistry, University College London, and Owens College Manchester clearly indicate an increasing separation between the leading group of academics, devoted to increasing theoretical knowledge, and the more humble but more numerous practical men. Under these circumstances attempts, such as Lyon Playfair's, to create a first-rank Continental-style educational system for engineers and manufacturers were bound for failure. In fact, the authors argue, there was a sharp social division between academics and practical men, as an analysis of the membership of the Chemical Society and the publication patterns of chemical patents reveal. The scientific professoriate, who portrayed themselves as disinterested spokesmen for the entirety of chemistry, bridged this gap by creating a new rhetoric of pure science, according to which the principal responsibility of academia would be to create and pursue pure science, the results of which could in turn be applied to industry. The authors question the validity of this rhetorical compromise and point to the fact that in chemistry the relationship between theory and practice is far more complex. They quote a few supporting statements by 19th-century chemical manufacturers, but their far-reaching claim that "on the whole, the academic discipline of chemistry did not prove to be in itself a basis for industrial innovation, even in the chemical industries" (p. 108) should have been based upon more factual evidence. The division of labor between pure and applied chemistry, as developed by the academic elite, became a powerful argument in the late 1860's and early 1870's, when chemistry was given high priority in the reform of higher education, and this not primarily because of chemistry's potential utility but because of its contribution toward the ideal of a liberal education. Thus again the leading role of pure chemistry was reinforced. "Ironically chemistry, which had always been championed as the most universally applicable of the sciences, thrived especially as a pure science taught separately from its applications" (p. 147).

For those who are willing to struggle through the peculiarities of British and especially London institutional history, the book offers a stimulating introduction to the debates over the relationships between academic science, higher education, society, and industry, based upon sound historical scholarship. Similarities with present-day issues are obvious. Being historians of science, however, the authors have wisely avoided drawing anachronistic parallels between entirely different historical contexts.

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Blacks in Science

Black Scientists, White Society, and Colorless Science. A Study of Universalism in American Science. WILLIE PEARSON, JR. Associated Faculty Press, Millwood, NY, 1985. xii, 201 pp. $24.

The corpus of research on careers in science gives little attention to the experiences of black scientists. To correct this state of affairs, Willie Pearson conducted a study in 1978 on the background and status of blacks in the social, life, and physical sciences. The present volume summarizes the results of that study. Pearson subtitles the book "A Study of Universalism in American Science" to capture his theme that from the vantage point of black scientists universalistic principles in science have not always prevailed. The ethos of science, Pearson asserts, holds that "a given contribution should not be accepted or rejected merely on the basis of some particular trait of its contributor such as race, ethnicity, sex, religion, nationality, or social origin." But large numbers of

scientists have found themselves excluded or their contributions devalued because they were black.

Pearson gathered information for the study from over 600 black scientists who had received doctorates before 1974; he compared this group with a set of approximately 700 white scientists in the same fields and from essentially the same doctoral institutions. Pearson found it useful to divide the black respondents into three groups according to whether they received the doctorate before 1955, between 1955 and 1964, or after 1964. Anyone familiar with the position of black Americans in the era before the civil rights movement will find few surprises in the findings on the first of the three groups. Nearly all in the group grew up in predominantly black communities, attended largely black high schools, and received their undergraduate degrees from historically black colleges. They obtained their first positions in the same set of colleges, often before they pursued the doctorate. The doors to white universities and to the world of industry stood closed to this earliest cohort. One of its members reported:

> At the time I finished my Ph.D. I thought I was great. So I sent letters to universities all over the country. All I received from white schools were "we regret that there are no vacancies." I sent more letters to white than black colleges. Many white administrators apologized for not hiring me.

Pearson does not describe an atmosphere for black scientists that is totally overcast, however. The later graduates in his study faced far broader opportunities than did their predecessors. The proportion taking positions in historically black colleges declined, and the percentage moving into industrial and governmental positions rose. Pearson attributes the change to the civil rights movement, which pushed employers to remove many of the barricades that had made universalism an operative principle only for some.

Pearson shows that for the most recent of the three cohorts—Ph.D. recipients in the 1965–1974 period—the prestige of the doctoral department bore a closer link to the character of the first position than obtained for the earlier two cohorts. But the proportion of the scientists who graduated from departments rated as prestigious or strong declined over time. The third cohort contained a larger fraction from unranked departments than did the first cohorts. If this trend persists, then we may continue to find few blacks in the nation's leading universities, not for the racially based reasons that once predominated but because of the paucity of blacks in the programs from which the elite departments recruit.

In addition to his depiction of the scientists in his study, Pearson reports in general on the position of black Americans in higher education, particularly in scientific and engineering fields. But a reader would find more recent and comprehensive information on this in reports from the National Science Foundation such as *Women and Minorities in Science and Engineering* (1984). The contribution of the present volume lies in its account of changes over time in the educational and employment experiences of a sizable population of black scientists.

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Northern Habitations

Prehistory of the Eastern Arctic. Academic Press, Orlando, FL, 1985. xiv, 327 pp., illus. $49. New World Archaeological Record.

The Eastern Arctic is one of the most inhospitable environments ever to have been occupied on a permanent basis by native cultures. Not until 4000 years ago were techniques developed that enabled humans to settle most of the 10,000 square kilometers between the Mackenzie Delta and the east coast of Greenland. Frequently mischaracterized as a homogeneous wasteland, the Eastern Arctic includes areas that are ecologically diverse and reasonably productive. Nevertheless, by the time humans learned to survive here, only parts of the Pacific remained to be settled.

Although the Eastern Arctic has been investigated archeologically for more than a century, until now it has never had a detailed overview text of its own. The treatments of the eastern regions in general works on arctic archeology convey the impression of an "outback" through comparison with the ecological richness and higher cultural profiles of the North Pacific–Bering Sea region. This viewpoint stresses the importance of Alaskan cultures as biological and cultural progenitors, citing the initial pioneering movement eastward 4000 years ago by an Alaskan Denbigh-related culture and the eastward movement around A.D. 1000 of the specialized Thule-Punuk whale-hunting culture, which became the foundation for modern Inuit life in Canada and Greenland. Migration has been the preferred instrument of change, but diffusion and change in situ also have been cited as possible factors in the shift from Pre-Dorset to Dorset culture at 500 B.C.

The appearance of this synthesis of Eastern Arctic prehistory provides an opportunity to reassess the outback and steady-state theories and to evaluate the region as a laboratory for studying cultural response to extreme environmental conditions.

Addressing the need for a basic descriptive text, Maxwell emphasizes archeological evidence and interpretations and scientific enterprise. He opens with a summary of physical and biological conditions stressing regional and temporal (seasonal and long-term) resource variability and human ecology. This section emphasizes Inuit hunting, utilizing ethnographic and personal observations. The tenuous nature of human existence is stressed because changes in climate, weather, animal distributions, currents, and driftwood can and did set limits on survival. A brief review of paleoecology and paleoclimatology establishes that Eastern Arctic environments have responded to warming and cooling in ways that must have influenced cultural development, especially in High Arctic regions.

The following sections concern prehistory. Five approaches can be traced: colonization, culture history, paleoethnology, regional studies, and methods. In a basically chronological presentation Maxwell utilizes standard nomenclature for cultural classifications. Occupation begins with early Paleoeskimo cultures known as Independence I and Pre-Dorset. In the description of this initial colonization, almost certainly from Alaska, archeological and paleoenvironmental data are woven together with analogies from Eskimo ethnography and band-level theory into a vivid reconstruction of how this and later arctic populations may have responded to new opportunities. Here and elsewhere Maxwell carefully evaluates evidence and presents contrasting interpretations, so that the work is indeed a thorough summary of the state of the field.

The ground rules for Eastern Arctic life having been established, Independence I and Pre-Dorset cultures are described with reference to McGhee's hypothesis that they represent different ethnic groups. More likely, the differences in house forms, settlement patterns, and tool styles result from a combination of regional specialization and inadequate dating of supposedly "early" Pre-Dorset sites in the High Arctic. The account of the transition from late Pre-Dorset to early Dorset features discussion of Maxwell's South Baffin sites, Independence II, and Groswater sites from Labrador, emphasizing change in situ. Underrated in my view are possible Norton influences for such elements as cooking vessels, ground burins, semi-subterranean houses, and increased maritime adaptation, but as in the early Paleoeskimo period proof of Alaskan connections has not been forthcoming from the poorly known intervening region.