kian adaptation. I fully agree. However, historical analysis is not the fundamental way to understand human adaptation to the environment when populations are there to be studied in situ. Third, I have a sense that there is considerable interpretation based on limited data. Perhaps the major problem is that whether the book was to be a regional study, in which the basis is sociological and historical, or a local study, in which the data base is anthropological and it is the small population groups that are of primary interest, was not resolved. My bias is in favor of the small population unit to resolve questions of human adaptation, and it is at the local population level that this volume is deficient. On balance, however, and at the regional level of analysis, the volume is a rich source of information on the lives of Northern Algonkian hunters.

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An Organization of Engineers

75 Years of Progress. A History of the American Institute of Chemical Engineers, 1908–1983. TERRY S. REYNOLDS. American Institute of Chemical Engineers, New York, 1983. vii, 200 pp., illus. $20; paper, $15.

The American Institute of Chemical Engineers (AIChE) was organized in June 1908 at a meeting attended by 19 persons of diverse background. Chemical engineering was not yet a professional category well recognized by industry. Many chemical plants were designed by mechanical engineers, and industrial functions that demanded a knowledge of chemistry were generally handled by analytical or industrial chemists. Few universities had programs for training chemical engineers; where programs existed, they were usually loosely knit—the student was taught some mechanical engineering, some chemistry, and some practical information about production processes in particular industries. By electing to call themselves chemical engineers, the founders were expressing more an ambition than a fact; by setting up an autonomous professional organization, they were anticipating rather than responding to the emergence of a discipline.

In 1983, membership in the AIChE exceeded 50,000, and those 50,000 chemical engineers no longer faced acute problems of self-definition. The concept of unit operations, introduced by Arthur D. Little in 1915, gave chemical engineering an integrity that, despite recent challenges, has never been lost. Academic programs have proliferated and become far more rigorous and systematic. Opportunities for chemical engineers in industry have multiplied as the chemical and chemical-process industries prospered. Industry and academe have recognized chemical engineering as a profession.

Terry Reynolds's craftsmanlike and well-balanced history sets the development of the AIChE against the backdrop of these larger changes in the nature of chemical engineering. Eschewing a detailed year-by-year chronology, Reynolds focuses on a series of major events in the development of the Institute: its foundation, its efforts to develop educational standards for chemical engineers, its transition from a small and selective club to a mass-membership organization, and its efforts to strike a balance between narrowly professional programs and activities of a broader social nature. Especially valuable is his account of the 1970's, a period when unemployment intensified economic conflicts within the membership and when environmental regulation of the chemical industry became a matter of political controversy.

Reynolds fairly observes that outside of its immediate areas of professional concern, such as publications and education, the AIChE has been exceedingly cautious. When it has joined debate on political and social issues, it has generally adopted conservative positions. It lobbied for the maintenance of the Chemical Warfare Service during the 1920's and against the National Industrial Recovery Act during the 1930's. More recently, it has steadfastly opposed the unionization of chemical engineers and has refrained from condemning actions by members that violate environmental standards.

It may seem paradoxical to some readers that Reynolds should define the AIChE as a success, whatever its membership statistics, when its record on social and political issues has been so consistently timid or conservative. But to condemn the organization for its social and political stance is to imply that it was free to pursue other policies. Reynolds repeatedly stresses that a voluntary association, such as the AIChE, is constrained by its very nature to work within narrow limits. If it is to retain the loyalty of its membership, it must not adopt policies that provoke internal controversy. Consensus serves as the basis of action. Educational reform had broad support among the membership, hence the AIChE pursued a vigorous program in this area; unionization and environmental regulations, though supported by some, were anathema to other constituencies within the organization, and hence progressive action was blocked.

Readers of this book who expect more of a professional association will be disappointed by Reynolds's gentle treatment of the AIChE. But they would do well to ask themselves whether an organization that has done so much to promote excellence in the practice of engineering should have been jeopardized in the interest of pursuing social or political goals.

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Audition

Hearing. Physiological Bases and Psychophysics. R. KLINKE and R. HARTMANN, Eds. Springer-Verlag, New York, 1983. xvi, 399 pp., illus. $27. From a symposium, Bad Nauheim, Germany, April 1983.

This book is the proceedings of the Sixth International Symposium on Hearing. This series of symposiums, held every three years since 1969, is intended to foster cross-fertilization of auditory physiology and psychoacoustics. The book contains 57 papers (circulated prior to the symposium) organized into six sections. Most of the papers are followed by discussion by symposium participants. Three of the six sections begin with invited review papers. Inasmuch as most of the authors are European, the papers tend to reflect the "European school" of auditory science.

Section 1, Inner Ear Mechanisms and Cochlear Emissions, begins with a brief review of hair-cell mechanisms (Flock). In an especially lucid paper, Lewis and Hudspeth present evidence that hair cells isolated from the bullfrog sacculus are electrically resonant and that a calcium-activated potassium channel contributes to this resonance. Other papers concern the effect on hair-cell receptor potentials of transient asphyxia (Russell and Ashmore) and efferent stimulation (Fuchs *et al.*); electrical properties of hair cells (Dallos); basilar-membrane, hair-cell, and neural responses (Johnstone *et al.*); stochastic (Bialek) and electrochemical (Konishi and Salt) properties of the cochlea; cochlear potentials in homozygous and heterozygous mice (Bock); primary neuron properties in anurans (Lewis; Narins and Hillery); and acoustic emissions (Fritze; Kemp and

Brown; Horst *et al.*; Wilson and Sutton; Zwicker).

Section 2, Auditory Nerve and Cochlear Nucleus, Central and Centrifugal Auditory Systems, contains several papers on physiological correlates of psychoacoustic phenomena such as masking by background noise (Young *et al.*); the pitch of complex stimuli (Evans; ten Kate and Bloothooft); and the critical bandwidth (Pickles). The remaining papers in the section are relatively unrelated and include studies of responses of inner hair cells and neurons in the cochlear nerve and cochlear nucleus as a function of tone level (Smith *et al.*) and of responses of cochlear neurons to two tones (Allen and Fahey); a theoretical study of adaptation (Duifhuis and Bezemer); and studies of the cortex and cochlear efferents (Merzenich and Jenkins; Schreiner *et al.*; Stopp).

Section 3, Binaural Interaction, is highlighted by an outstanding review of binaural psychoacoustic phenomena (Blauert) containing insightful comments on lateralization and image splitting, auditory spaciousness, localization in a noisy environment, signal detection and discrimination, the cocktail-party effect, inhibition of reverberance, pitch, the summation of loudness, and fusion. The other eight papers in this section describe some principles of binaural modeling (Colburn); psychoacoustic research on lateralization of transients (Henning; Hafter and Wenzel) and on time-varying interaural differences (Stern and Bachorski); and physiological research on the superior olivary complex in the cat (Caird and Klinke), the inferior colliculus in the rat (Syka *et al.*), the superior colliculus in the guinea pig (Palmer and King), and the auditory midbrain in the grassfrog (Eggermont *et al.*).

Section 4, Psychophysics, is organized awkwardly. The choice of title is curious since many other sections also contain material on psychophysics. The section begins with a review of the psychoacoustics of normal and impaired listeners (Moore) and continues with seven papers (that as a group lack coherence) concerned exclusively with normal hearing: two on loudness (Scharf *et al.*; O'Loughlin); three on modulation (Plomp; van Veen and Houtgast; Fastl); one on monaural phase (Mehrgardt and Schroeder); and one on decay of pulsation threshold patterns (Verschuure *et al.*).

Section 5, Pitch Perception, continues the tradition in this series of symposiums of interest in pitch phenomena. It contains papers on sound-induced pitch shifts (van den Brink), monotic and dichotic just noticeable differences (JND's) in pitch (Bilsen and Raatgever), the effect of backward masking on pitch discrimination and interval recognition (Rakowski), the pitch of high-frequency sounds (Burns and Feth), and neural mechanisms for periodicity analysis in the time domain (Langner). A paper by Patterson *et al.* on threshold duration for melodic pitch considers the interesting question of whether the residue pitch mechanism (extraction of fundamental pitch from higher harmonics) increases the speed with which fundamental pitch can be extracted and therefore the rate at which changing fundamental frequency can be tracked.

Section 6, Speech and Hearing Impairment, reflects the growing concern (in both Europe and the United States) with hearing impairments and with relating speech perception to underlying psychoacoustics and physiology. The first paper (Miller and Sachs) considers the temporal and spectral representation of human-voice pitch in the discharges of auditory-nerve fibers in cats. The remaining papers focus on normal and impaired human listeners and are concerned with JND's for spectral envelope parameters in speech (Ghitza and Goldstein); impaired frequency-time resolution and its effect on intelligibility (Dreschler); unmasking, tuning, and thresholds in the compound action potential (Rutten); frequency and temporal resolution in impaired listeners with large losses at audiometric frequencies but small losses at higher frequencies (Long and Cullen); the relation between thresholds and tuning curves (Tyler *et al.*); and dissociation between frequency resolution and threshold (Pick and Evans). In a paper on the reception threshold of interrupted speech, de Laat and Plomp show a correlation between mean audiometric loss and the difference in speech reception threshold for continuous and interrupted noise that is remarkably high (0.85).

The book is satisfactory as the proceedings of a symposium. As a contribution to the field it is of mixed value. Although much of the material is new most of the worthwhile papers will eventually be published in refereed journals (after significant improvements). Furthermore, in addition to some organizational problems, the book suffers from great variability in clarity and quality of presentation.

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The European Quaternary

Glacial Deposits in North-West Europe. JURGEN EHLERS, Ed. Balkema, Rotterdam, 1983 (U.S. distributor, MBS, Salem, N.H.). x, 470 pp., illus. $48.50.

Glacially rafted chalk floes, tunnel valleys, hat-shaped hills, Kalix and Sveg tills, Rogen moraine, the "perfect gravel zone"—these are some of the terms to which we are introduced by the 46 authors of 52 contributions that make up this volume.

Wave-cut cliffs of southern Baltic shorelines expose remarkable evidence of soft sediment translocation by the Scandinavian ice sheet. At Kvarnby, in Skåne, southern Sweden, B. Ringberg describes a 4.5-kilometer-long belt of glacially rafted chalk floes. Being both over- and underlain by till, the chalk rafts appear to have been frozen onto the sole of the ice sheet and transported at least 25 kilometers. Their dimensions imply that permafrost extended at least 30 meters into the substrate beneath the ice sheet. Ristinge Klint on the Danish island of Langeland (S. Sjørring), for contrast, involves 30 or more floes of translocated glacial drift. The typical floe includes tills representing three Weichselian glaciations, raising the question why, after three episodes of normal till deposition, the ice sheet in its final readvance changed to a rafting mode. What conditions beneath the glacier were altered enough to cause such a radical change in behavior?

Tunnel valleys in Denmark (J. Krüger) and Germany (F. Grube), once ascribed to erosion by subglacial meltwater streams, are now recognized as having more varied and enigmatic origins. Hat-shaped hills in Denmark (Krüger) are characterized as "dislocated kames." Sveg and Kalix tills in Sweden (J. Lundqvist) involve intimate association of diamict and washed drift components. Rogen moraine, first identified in Sweden (Lundqvist), consists of ridges of crudely crescentic segments aligned transverse to former ice flow and currently interpreted as having been formed by infolding of debris-rich layers at the base of actively flowing ice. The "perfect gravel zone" is the zone of overlap on a granulometric diagram of the size grade distribution that affords maximum bearing capacity and corrugation resistance for the surfacing of gravel roads.

The volume is organized in sections by national boundaries, in the sequence of glacial flow from the Norwegian highlands to the lowlands of Holland, with subequal treatment of Norway, Sweden,