

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 Bloothoof); 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), monotonic and dich-

otic 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

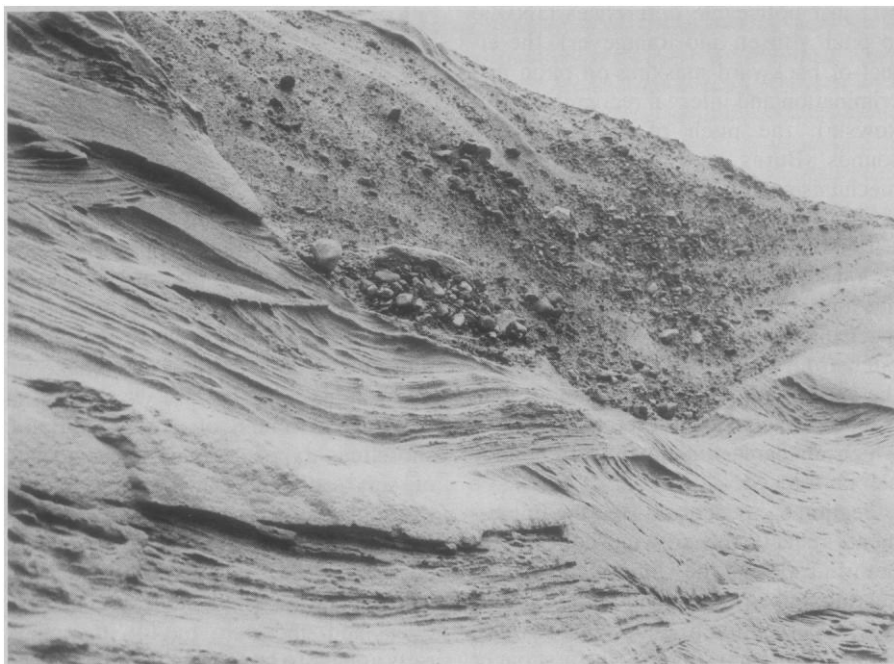
Glacial Deposits in North-West Europe.
JURGEN EHLERS, Ed. Balkema, Rotterdam,
1983 (U.S. distributor, MBS, Salem, N.H.).
x, 470 pp., illus. \$48.50.

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,



"Cross-bedded Middle Saalian meltwater sands of the channel-fill type in an exposure south-west of Neu Wolmstorf, Lower Saxony. . . . In the large channel, on the left, a floe of fine sand, which must have been transported in a frozen state, is seen." [Photo by J. Ehlers; from J. Ehlers and F. Grube's chapter in *Glacial Deposits in North-West Europe*]

Denmark, Germany, and the Netherlands. This geographic framework serves adequately for organizational purposes. Although correlations and mapped boundaries tend to be left hanging at international borders, overlap and conflicts of interpretation are minimized. This reviewer shares the editor's regret that coverage could not be extended to include the whole of glaciated northern Europe. True, the British Isles as local centers of glacier outflow call for treatment in a separate volume. True, too, that "certain well-known difficulties" militate against similar treatment of Eastern and Western bloc nations. Nevertheless, one wonders why Finland was not included in this review of Scandinavian glaciation.

The chapters range from systematic summaries of the glacial history of Norway (J. Mangerud), Sweden (Lundqvist), Denmark (Sjørring), Germany (Ehlers), and the Netherlands (J. D. de Jong and G. C. Maarleveld) to brief status reports on research in progress. This reviewer particularly welcomes the study by Vorren *et al.* of glaciomarine sedimentation and stratigraphy on Norway's continental shelf west of Tromsø; welcome too is B. Strömberg's review of the current status of the Swedish varve chronology.

The publisher has not stinted on space or crowded the 409 figures in this generously illustrated volume. Ninety-five color plates splendidly illustrate features discussed in the text, but many are phys-

ically separated from the relevant pages and no list of plates is provided.

The volume affords a broad-ranging and rather well-balanced introduction to the Quaternary geology of a large area of northwestern Europe. For the scientist with an interest either in the European Quaternary or in Quaternary stratigraphy, sedimentation, and geomorphology, this volume will prove a stimulating and valuable acquisition.

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Books Received

- Advances and Challenges in Insect Rearing.** E. G. King and N. C. Leppla, Eds. USDA Agricultural Research Service, New Orleans, 1984 (available from the Superintendent of Documents, Washington, D.C.). xvi, 306 pp., illus. Paper, \$8. Stock No. 001-000-04393-5.
- Advances in Biotechnological Processes.** Vol. 2. Avshalom Mizrahi and Antonius L. van Wezel, Eds. Liss, New York, 1984. xx, 302 pp., illus. \$56.
- Advances in Diagnostic Visual Optics.** G. M. Breinin and I. M. Siegel, Eds. Springer-Verlag, New York, 1983. x, 247 pp., illus. \$26. Springer Series in Optical Sciences, 41. From a symposium, Tucson, Oct. 1982.
- Advances in Enzymology and Related Areas of Molecular Biology.** Vol. 56. Alton Meister, Ed. Interscience (Wiley), New York, 1984. viii, 520 pp., illus. \$50.
- Advances in Microbial Ecology.** Vol. 7. K. C. Marshall, Ed. Plenum, New York, 1984. xii, 223 pp., illus. \$39.50.
- Advances in Nuclear Physics.** Vol. 13. J. W. Negele and Erich Vogt, Eds. Plenum, New York, 1984. xiv, 320 pp., illus. \$49.50.
- Advances in Nuclear Science and Technology.** Vol. 16. Jeffery Lewins and Martin Becker, Eds. Plenum, New York, 1984. xiv, 572 pp., illus. \$89.50.
- Agricultural Sustainability in a Changing World Order.** Gordon K. Douglass, Ed. Westview, Boul-

der, Colo., 1984. xiv, 282 pp., illus. \$25. Westview Special Studies in Agriculture Science and Policy. From a conference, Claremont, Calif., April 1982.

Air Pollution Modeling and Its Application III. C. De Wispelaere, Ed. Plenum, New York, 1984. xii, 727 pp., illus. \$95. NATO—Challenges of Modern Society, vol. 5. From a meeting, Ile des Embiez, France, Sept. 1982.

Alcoholism in the Elderly. Social and Biomedical Issues. James T. Hartford and T. Samorajski, Eds. Raven, New York, 1983. xvi, 288 pp., illus. \$49. Aging Series, vol. 25.

The American Darters. Robert A. Kuehne and Roger W. Barbour. University Press of Kentucky, Lexington, 1984. vi, 177 pp., illus., + plates. \$45.

Animal Behavior. An Evolutionary Approach. John Alcock. 3rd ed. Sinauer, Sunderland, Mass., 1984. xx, 596 pp., illus. \$25.

Animal Behavior. Neurophysiological and Ethological Approaches. Kiyoshi Aoki, Susumu Ishii, and Hiromichi Morita, Eds. Japan Scientific Societies Press, Tokyo, and Springer-Verlag, New York, 1984. xx, 274 pp., illus. \$39.50. From five symposia, 1979–1982.

Biological and Environmental Effects of Arsenic. Bruce A. Fowler, Ed. Elsevier, New York, 1983. x, 281 pp., illus. \$89.50. Topics in Environmental Health, vol. 6.

Biology and Chemistry of Plant Trichomes. Eloy Rodriguez, Patrick L. Healey, and Indira Mehta, Eds. Plenum, New York, 1984. viii, 255 pp., illus. \$39.50. From a symposium, Vancouver, Canada, July 1980.

The Biology of Immunologic Disease. Frank J. Dixon and David W. Fisher. Sinauer, Sunderland, Mass., 1984. xvi, 399 pp., illus. \$27.95. A Hospital Practice Book.

Biomembranes and Cell Function. Fred A. Kummerow, Gheorghe Benga, and Ross P. Holmes, Eds. New York Academy of Sciences, New York, 1983. viii, 195 pp., illus. Cloth or paper, \$40. Annals of the New York Academy of Sciences, vol. 414. From a workshop, New York, Aug. 1982.

Biotechnology. A New Industrial Revolution. Steve Prentis. Braziller, New York, 1984. 192 pp., illus., + plates. \$18.50.

Cardiac Metabolism. Angela J. Drake-Holland and Mark I. M. Noble, Eds. Wiley-Interscience, New York, 1983. x, 552 pp., illus. \$75.

Cardiovascular Pharmacology. Michael J. Antonaccio, Ed. 2nd ed. Raven, New York, 1984. xiv, 592 pp., illus. \$39.50.

Cell and Muscle Motility. Vol. 5. The Cytoskeleton. Jerry W. Shay, Ed. Plenum, New York, 1984. xvi, 417 pp., illus. \$49.50.

Cell Fusion. Gene Transfer and Transformation. Roland F. Beers, Jr., and Edward G. Bassett, Eds. Raven, New York, 1984. xvi, 421 pp., illus. \$49.50. Miles International Symposium Series, No. 14. From a symposium, Baltimore.

Cell Fusion. Pitman, London, 1984 (U.S. distributor, CIBA Pharmaceutical Company, West Caldwell, N.J.). x, 291 pp., illus. \$35. Ciba Foundation symposium 103. From a symposium, London, May 1983.

Chemical Taxonomy, Molecular Biology, and Functions of Plant Lectins. Irwin J. Goldstein and Marilyn E. Etzler, Eds. Liss, New York, 1983. xii, 302 pp., illus. \$38. Progress in Clinical and Biological Research, vol. 136. From a symposium, Asilomar, Calif., May 1983.

Contemporary Topics in Polymer Science. Vol. 4. William J. Bailey and Teiji Tsuruta, Eds. Plenum, New York, 1984. xvi, 1013 pp., illus. \$125. From a symposium, Palm Springs, Calif., Nov. 1980.

The Contribution of Genetics to the Study of Parasitic Protozoa. David Walliker, Research Studies Press, Letchworth, England, and Wiley, New York, 1984. x, 218 pp., illus. \$59.95. Tropical Medicine Series, 4.

Controlled Atmospheres for Heat Treatment. R. Nemenyi. G. H. J. Bennett, Ed. Pergamon, New York, 1983. xvi, 240 pp., illus. \$40; paper, \$17. Pergamon Materials Engineering Practice Series. Translated from the Hungarian.

Controversies in Obesity. Barbara C. Hansen, Ed. Praeger, New York, 1983. xiv, 325 pp., illus. \$37.50. Endocrinology and Metabolism Series, vol. 5. From a symposium, Ann Arbor, Mich.

CRC Handbook of Coastal Processes and Erosion. Paul D. Komar, Ed. CRC Press, Boca Raton, Fla., 1983. xii, 305 p., illus. \$70. CRC Series in Marine Science.

The Crisis in Higher Education. Joseph Froomkin, Ed. Academy of Political Science, New York, 1984. x, 177 pp. Paper, \$7.95. Proceedings of the Academy of Political Science, vol. 35, No. 2.

Current Issues in Toxicology. H. C. Grice, Ed. Springer-Verlag, New York, 1984. 114 pp., illus. Paper, \$14.50.

Developmental Processes in Normal and Diseased Muscle. Hans M. Eppenberger and Jean-Claude

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