associated with bladder cancer. A paper by Kueppers focuses on the effect of cigarette smoking on the development of emphysema in individuals who are homozygous for α_1-antitrypsin deficiency and adds to the documentation that smoking accelerates the deterioration of lung function in these individuals. The latter paper, and what it is and is not able to report, are of considerable interest to this reviewer, because in 1971, in an editorial in the *American Journal of Human Genetics*, I introduced the term "ecogenetics" using just this example. I proposed that air pollution as well as cigarette smoke could very well be leading to emphysema, not only in homozygous but in the much more common heterozygous carriers of the α_1-antitrypsin deficiency gene. However, specific studies of the effects of heavy air pollution on the development and acceleration of emphysema in individuals homozygous or heterozygous for α_1-antitrypsin deficiency have not yet been carried out. In fact, progress on general population and industrial risks has been so slow that King, in her paper in this section, states that the requirements necessary to justify large-scale occupational monitoring programs do not yet exist for any genetic polymorphism. This statement is probably valid. The situations that come closest, in this reviewer's opinion, are those that concern the relationship of α_1-antitrypsin deficiency and emphysema, acetylation phenotype and bladder cancer, and AHH induction and lung cancer.

Those general readers who wish a review of the field of pharmacogenetics and ecogenetics will be disappointed in this book. Most of the papers are short and do not provide adequate reviews of fundamental knowledge concerning the various systems. Further, some notable pharmacogenetic examples are given rather short shrift. These include the acetylation system, in which a great deal of work with animal models has added greatly to the understanding of the system and its effect. The interesting interactions between three pharmacogenetic systems (G6PD deficiency, acetylation, and hydroxylation), which determine the hemolytic potential of certain drugs such as the sulfones, are not discussed. This type of interaction is surely quite common, and this example serves as a prototype. Those researchers who wish an in-depth probing of up-to-date information on their own special interests will also not find it in the book. Most of the papers are summaries of published work for the most part. However, the book should be of considerable value to those scientists who are already introduced to the general field and wish a broad update on newer research findings. Most of the papers have very nice, succinct summaries that place the current work in the context of the broader field.

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Paleoclimatology

Late Quaternary Environments of the Soviet Union. A. A. VELICHKO, Ed. H. E. Wright, JR., and C. W. Barnosky, English-edition Eds. University of Minnesota Press, Minneapolis, 1984. xxviii, 327 pp., illus. $45. Translated from the Russian.

The climatic oscillations that characterize the Quaternary era are among the most dramatic that have ever affected our planet. The combined changes in temperature and precipitation and the growth of continental ice sheets and corresponding regression of eustatic sea level caused alterations in the dynamics of the biosphere rivaled only by mass extinctions of the distant past. An understanding of the causal mechanism for these changes and the construction of an adequate circulation model to predict future climate change require proxy data on a global scale. Quaternary environmental change was more dramatic at middle and high latitudes than in the tropics. The Soviet Union contains the largest land area at middle and high latitudes of any country in the world, yet proxy data from the Soviet Union are often inaccessible to the English-speaking world. This monograph, translated from the Russian, attempts to remedy the situation by summarizing current thought about and the status of research on late Quaternary (the last 130,000 years) environmental change in the Soviet Union. It is the third in a series coordinated by the Paleoclimate group of the US-USSR Bilateral Agreement on Cooperation in the Field of Environmental Protection. The first two volumes cover the same time period for the United States.

The late Quaternary of the Soviet Union can be broadly subdivided into the relatively brief last (Mikulino-Kazantzevo) interglacial, the following Valdai glaciation, which is further subdivided into early and late glacial phases separated by a complex nonglacial interval, and the present (Holocene) interglacial. Proxy data of use in paleoclimatic reconstruction include the records of continental, shelf, and mountain glaciation (seven chapters), permafrost and loess (nine chapters), biosphere changes (three chapters on vegetation, three on vertebrates and insects, and one on human populations), and the complex interaction of the inland seas, particularly the Caspian Sea-Black Sea connection to the Mediterranean (one chapter). The system connecting the two seas, governed by the interaction of eustatic sea-level fluctuations, influxes of isotopically light glacial meltwater, and the diversion of north-flowing rivers by the continental ice sheet, typifies the complexities of Quaternary environmental change. A proposal that a high–sea-level event took place in the Black Sea between 30,000 and 45,000 years ago is sure to stir controversy, as is the relatively warm mid-Valdai marine transgression against the Arctic coast. Five chapters use the proxy data presented in earlier chapters to reconstruct the regional climate.

The evidence is most complete for the Holocene, for which changes in pollen assemblages from continuously accumulated deposits are available across most of the country. These changes document the dramatic amelioration following late Valdai glaciation, the subsequent climatic optimum attained in mid-Holocene time, and a deterioration that began shortly before 3,000 years ago. Some authors suggest that the deterioration marks the onset of the next glaciation. These reconstructions require the correlation of individual pollen diagrams. Except for a few diagrams, however, the radiocarbon control is not of sufficient density to provide an independent chronology for each site, and the standard European Blytt-Sernander sequence is relied on for correlation. Although the reconstructions are undoubtedly correct in overall form, reliance on a climatically defined sequence for correlation forces synchrony, possibly obscuring important leads and lags in the vegetational changes that could in turn provide some of the best clues for the global circulation models.

The correlation of pre-Holocene sites depends even more on an independent geochronology, and the potential for miscorrelation is frequently mentioned by contributing authors. Radiocarbon dating provides control back to about 30,000 years ago, and in some instances to perhaps 50,000 years ago. Absolute ages beyond about 40,000 years ago are primarily controlled by uranium-thorium mollusk dates and thermoluminescence dates. The Soviet Union and other Eastern Bloc countries have been largely

responsible for the resurgent interest in thermoluminescence dating; only in the last few years has the technique been picked up again in the West. A chapter dealing with the method would have been a welcome addition to the book.

In keeping with its complexity, the story is still developing. Major differences of interpretation remain, particularly on the extent of Arctic-shelf glaciation and the nature of the mid-Valdai nonglacial interval. The paleobiological evidence is essentially restricted to the last interglaciation and the last 15,000 to 20,000 years; even there only the last 12,000 years or so are adequately dated. Climatic change may have been more extreme in the U.S.S.R. than in most extra-glacial areas of North America, but the quantification of full-glacial climates is hampered by there having been floral assemblages that lack modern analogues. A circulation regime fundamentally different from that of the Holocene must have dominated the Soviet Union during glacial maxima.

An overview volume of this nature can only hope to convey the general concepts currently favored by the host country. In this regard, the book serves its purpose admirably. Those wishing to pursue a selected topic may wish that the editors had indicated the original language of each reference (Russian titles are translated). The English-language editors provide a helpful ten-page introduction that encapsulates the ideas presented in the individual chapters. All Quaternary scientists should at least read those few pages to learn how their Soviet counterparts have reconstructed the events that so altered their vast country in the recent geological past.

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