Chloroplast Development

Chloroplast Biogenesis. R. J. ELLIS, Ed. Cambridge University Press, New York, 1985. xiv, 346 pp., illus. $70. Society for Experimental Biology Seminar Series, 21. From a symposium, Leiden, 1982.

In the past ten years much has been learned about the structure and function of the chloroplast genome. We now understand that this genome, at least in higher plants and green algae, is a molecule of around 100 to 200 kilobase pairs that usually contains a pair of large inverted repeats each of which contains a set of genes that code for the RNA's of the chloroplast ribosome. We also know that this genome codes for about half of the polypeptides of the photosynthetic lamellae, the large subunit of the CO_2-fixing enzyme ribulose-1,5-bisphosphate carboxylase, and other components of the protein-synthesizing system of the chloroplast, including a complete set of transfer RNA's and about a third of the proteins of the chloroplast ribosome. Within recent years much work has focused on how the chloroplast and nuclear genomes coordinate in the biogenesis of a functioning chloroplast.

I am writing this review from the perspective of information gained at the First International Congress of Plant Molecular Biology held in October 1985. Although we certainly know more now than we did in 1983, when the papers in these proceedings of a 1982 symposium were updated, the book remains timely, and it points to many of the directions covered in talks at the 1985 meeting. The papers in the book cover a wide variety of topics, and most of them are reviews of breadth and depth. Among the most scholarly and wide-ranging reviews, those with the most lasting impact are ones by Tilney-Bassett on the nuclear control of chloroplast biogenesis in higher plants, by Crouse *et al.* on chloroplast RNA synthesis, by Gray *et al.* on protein synthesis in chloroplasts, and by Douce *et al.* on the chloroplast envelope and the origin of chloroplast lipids. Those interested in photoregulation will find several useful papers on transcriptional controls and the role of phytochrome that herald much of the work currently being done in the field.

As a *Chlamydomonas* geneticist, I must take umbrage with the volume on one score. There is no discussion of *Chlamydomonas* as a system in which the chloroplast genome can be manipulated and studied genetically or of the use to which mutants affecting the chloroplast have been put in *Chlamydomonas*. Other studies with *Chlamydomonas*, for example, studies of the sites of synthesis of thylakoid membrane polypeptides and of the structure of the chloroplast rRNA's, are considered in these reviews, however, and the book is very well balanced overall.

NICHOLAS W. GILLHAM
Department of Zoology,
Duke University,
Durham, NC 27706

The Chinese Quaternary

Quaternary Geology and Environment of China. Quaternary Research Association of China. China Ocean Press, Beijing, and Springer-Verlag, New York, 1985. x, 301 pp., illus. $69.50. From a symposium, Beijing, Feb. 1982.

This book is a collection of short papers and abstracts resulting from a 1982 symposium of the Quaternary Research Association of China, prepared to summarize some of the research results on the Chinese Quaternary as a prelude to the International Quaternary Congress in Moscow later in that year. At that congress the Chinese presence was quite evident for the first time, and Liu Tung-sheng, who introduces this volume, presented one of the major addresses and was elected vice president of the congress. The publication of the book, although delayed, continues the exposure of the Chinese Quaternary to the Western world.

China is a vast area of the north temperate latitudes with a great diversity of landforms and climatic provinces. In many respects it resembles the United States—humid in the southeast, cool in the northeast, and dry and mountainous in the west and southwest. (It only lacks a Pacific coastal belt on the west.) Thus the developmental history of the landscape under the influence of Quaternary climatic changes is of especial interest to American scientists, who may be challenged to search for east-Asiatic counterparts for American geomorphic features and processes.

What China lacks in the stratigraphy and landforms of continental glaciation (the so-called till of the Lushan Mountains in eastern China is now demonstrated to be mudflow deposits) it makes up in massive deposits of loess: the Luochuan section, which is 130 meters thick, contains 14 paleosols formed within the last 700,000 years (according to paleomagnetic dating). Various mineralogical, geochemical, and sedimentological analyses have been made of the loess and paleosols, pointing to the Mongolian deserts as source areas. Most of the loess was deposited during cold, dry climatic episodes, and the paleosols were formed in more humid interglacial periods. Two papers describe the meteorological conditions that bring the hazy skies and "dust rain" to eastern China in the winter and spring today.

Another highlight in the Chinese Quaternary is the evolution of the Tibetan Plateau, which does have a glacial history. That history was affected not only by global climatic changes but also by tectonic factors. Early Pleistocene uplifts brought about piedmont glaciation. Further uplift, however, actually restricted the glaciers to mountain valleys—an interesting anomaly that can be explained by the increased dryness in the lee of the rising Himalaya Mountains. This moisture gradient is seen today in the rise in the snowline toward the interior, and for the Pleistocene it is seen in the greater snowline depression (1000 to 2000 meters) in the Pamir than in the dry interior (300 meters).

In the mid-Holocene the temperatures in the interior plateaus are estimated on the basis of fossils of subtropical plants and animals found far above their present range to have been as much as 5° to 6°C warmer than today. On the other hand, the uplift of the plateau in the late Pleistocene and Holocene is said to amount to about 1000 meters (3000 meters for the entire Quaternary), so some of the vegetational changes must be attributed to tectonics rather than to global climatic change.

The mid-Holocene warm period on the plateau was further characterized by expansion of lakes and peat areas, presumably as a result of increased monsoonal precipitation. During the late Holocene (Neoglacial) the climate became colder and drier: glacier expansion culminated in the Little Ice Age maxima of the last few centuries, and lakes became smaller and more saline. These latest climatic trends in the interior plateaus have been accentuated by the continued uplifts, while the southern flank of the mountain massifs remains warm and humid.

The book contains numerous other accounts of interest on subjects ranging from coral reefs of the China Sea and ostracod biogeographic provinces to the identification of the Pliocene-Pleistocene boundary and the climatostratigraphy of "Peking Man's Cave." As a small sample of Quaternary research in China, it should serve as a tempting entrée for Westerners to learn more about these other north temperate landscapes, and it encourages contacts with authors and research institutes that can lead to visits and joint research.

H. E. WRIGHT, JR.
Limnological Research Center,
University of Minnesota,
Minneapolis 55455