and other documents, that they were part of a "hidden economy." Examining the growing social and ideological importance of the family and family life in the 19th century, especially for the middle class, Löfgren suggests that social life in the countryside was affected by the images others had of that life: "The conception of the 'traditional house' became a powerful tool, an attempt to create an utopia, to return to a mythical past devoid of class conflicts and disobedience" (p. 457). The essay offers a profound reflection upon the intersection of four cultural worlds—the lived reality of ordinary people; the categories used by their administrators in the collection of censuses, taxes, and rents; the images of a proper domestic life held by individuals in superordinate classes; and the categories used by social scientists trying to understand the lives of ordinary people or pursue comparative analyses.

This is an important book, in part because it collects substantive essays on household formation, structure, and change at a time when such studies are growing in significance and popularity, and in part because the most pertinent disagreements among those who study households can be found in it. One gets the feeling that the conference itself was more lively than the book, that some of the papers provoked heated discussions. It is unfortunate that some of these discussions could not be reproduced in the book. Nonetheless, some of the authors explicitly direct their comments to other contributors. One comes away from the book with a good sense of what is known, what is not known, and what is at issue in the comparative study of households.

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An Ancient Lake

Lake Biwa. SHOJI HORIE, Ed. Junk, Dordrecht, Netherlands, 1984 (U.S. distributor, Kluwer, Hingham, Mass.). xii, 654 pp., illus. $145. Monographiae Biologicae, vol. 54.

Shoji Horie has devoted the last 15 years to a broadly interdisciplinary study of Lake Biwa, a large deep lake in central Japan. The book includes chapters on the stratigraphy, structure, and geomorphology of the bedrock basin, on the physical, chemical, and biological characteristics of the modern lake, and on the stratigraphy of the lake sediments. Anyone who has been stimulated (or overwhelmed) by the nine annual volumes of research papers on Lake Biwa that have been widely distributed since 1972 should welcome this summary book, which reveals the high level of Japanese geological and limnological research. In view of the increased international interest in the limnology and especially the paleolimnology of large old lakes—an interest strongly promoted by Horie's international efforts—the book provides a model for a comprehensive plan of investigation and reporting. It should be a challenge to Soviet scientists to produce in English a comparable study of the biggest prize of all—Lake Baikal.

The basin of Lake Biwa was formed at least 5 million years ago, according to fission-track dates of associated volcanic ashes now exposed in terraces around the lake. The basin was originally three times the size of the present lake, and more than 1800 meters of sediment accumulated in the paleolake. It was initially connected to the Sea of Japan, and marine organisms now endemic to Lake Biwa entered the basin at that time. Periodic subsidence of the basin maintained a great depth for the lake through most of its history. It now has a maximum depth of 104 meters.

Interest in big lakes generally focuses on two aspects—their physical limnology and their sedimentary history, especially the long record of past climatic changes. The limnology of the lake is described in the book in chapters dealing with the water budget, currents, and seiches. Other chapters are concerned with the inorganic and organic chemistry, the plankton, macrophytes, fishes, and other organisms, and the sedimentary processes and chemical interchanges at the sediment surface. Analysis of the nitrogen budget in the lake indicates that most of the organic matter produced in the photic zone is decomposed within that zone, and almost all the rest is decomposed in the deeper water or on the sediment surface; only 1 percent of the total organic production is permanently buried in the sediment.

The lake history was determined from diversified analysis of a core 200 meters long obtained where water depth was 65 meters. The sediment consists largely of clay, in which 30 layers of volcanic ash are intercalated. The uppermost sediment was dated by the ^{210}Pb and ^{14}C methods, and the remainder by fission-track analysis of the zircon in six layers of volcanic ash, indicating that the entire section spans about 500,000 years. A comparable total age was estimated by stratigraphic analysis of the bulk density of the sediment and by calculation of the compression as a function of depth. The resulting chronology is used to date paleomagnetic reversals at about 100,000 years ago (Blake event) and 160,000, 310,000, and 380,000 years ago (Biwa I, II, and III events). A correlation was noted between reversals and minima in the curves for organic carbon, and it is postulated that low magnetic fields at the time of reversals (and at some other times) affected the climate, which in turn controlled the synthesis (or the decomposition) of organic matter in the lake.

A high proportion of organic carbon in the sediments is also closely correlated with high ratios of ^{12}C to ^{13}C. This relation is explained by the fact that phytoplankton, as compared with other lake organisms, is enriched in ^{12}C and that warmer climates (as indicated by pollen studies) result in increased phytoplankton production, represented by increased organic carbon and increased content of diatom remains. The very lowest values for ^{12}C (cool climatic intervals) correlate with the magnetic reversals and deep excursions, leading to the further speculation that the isotopic composition of atmospheric CO_2 (and thus of phytoplankton) was controlled by the geomagnetic field. It is acknowledged that correlation of these postulated cool phases with the conventional late Pleistocene climatic chronology is not particularly satisfactory—for example, a modest excursion is correlated with the Late Wisconsin glaciation, but the full Blake reversal event occurs within the Sangamon interglaciation.

Measurements of bulk density and particle size in the clayey sediment show certain systematic variations that lead to complex paleoenvironmental reconstructions. The correlation of lower density with larger particle size is attributed to the transport of coarser particles to deep water by turbidity currents, which result from increased runoff and erosion in the catchment and thus from rainy phases in the regional climatic history. The efforts to relate bulk density to aspects of particle size, volcanic-ash content, paleomagnetic reversals, carbon isotopes, carbon-nitrogen ratios, pollen stratigraphy, and Milankovich cycles are ingenious, especially when supported by suggestions for mechanisms, but the curve-matching on which the correlations are based is not always convincing, despite smoothing techniques that attempt to reduce the noise in the curves.

Pollen analysis was completed on the entire 200 meters of core at intervals of 5 meters, thus with a spacing of a few thousand years near the top of the core

and as much as 20,000 years near the base (because of the increased compaction). The upper 55 meters of core were analyzed separately at intervals of 25 centimeters. Paleoclimatic interpretation is based on the present geographic distribution of the 50 or so trees represented in the diagram, ranging from boreal conifers to subtropical types, with the climatic ranges expressed as a warmth index, calculated as the sum of the mean monthly temperatures. Interpretation is complicated by the fact that Lake Biwa is very large and is in a mountainous region that contributes pollen from various vegetation types up and down the mountains. Pollen diagrams for the entire 200 meters are subdivided into 19 pollen zones, but the individual pollen profiles zig-zag strongly, and some zones are represented by only a single count. Twelve cold intervals and ten temperate intervals are recognized, and a correlation is attempted with the ocean-sediment oxygen-isotope curve covering the last 500,000 years. The more detailed pollen diagram for the top 55 meters, with about 200 pollen counts subdivided into six zones, is more convincing, and a creditable correlation is made with the main paleoclimatic trends in other temperate regions. A mid-Holocene temperature maximum is recorded, as well as the last glacial maximum and the last interglacial.

The book closes with separate chapters on the stratigraphic distribution of diatoms, animal microfossils, organic geochemistry (hydrocarbons, aliphatic carboxylic acids, sterols, lipids, and humic compounds and kerogen), inorganic chemistry, and biochemical organic compounds (carbohydrates, protein and amino acids, and pigments). The strong correlation of organic carbon with diatom abundance and with chlorophyll derivatives and carotenoids suggests that diatoms are a principal contributor to organic carbon in the lake and that the trophic state has fluctuated over the 500,000-year history. The correlation of animal microfossils and green algae with the paleoclimatic phases inferred from the pollen diagrams is only suggestive. The diatom stratigraphy is clearly marked by five zones; correlation with climatic phases is not possible, but some of the zone boundaries are coincident with the levels of paleomagnetic events, for unknown reasons.

The Lake Biwa project is by far the most diversified and best-integrated paleolimnological project undertaken and fully published. The volumes that have appeared prior to the preparation of this summary book must have served the authors well, for the amount of cross-referencing from one type of investigation to another is impressive. Stratigraphic profiles of different microfossil or chemical components are interpreted with reference to the paleoclimatic sequence inferred from the pollen diagrams, or to the sedimentation history based on granulometry, or to the paleomagnetic stratigraphy. And most of the interpretations go back to the background information provided by studies of the modern physical, chemical, and biological characteristics of the lake and to the geology and biota of the area. Horie must be congratulated on the design and execution of such a massive interdisciplinary investigation, which should serve as a model for other comprehensive big-lake studies. The book itself is clearly written, with only a few quirks that go back to the Japanese language. The diagrams and maps are almost all clearly designed and drafted, and the book is easy to handle. Japanese work in limnology and paleolimnology is clearly to be followed with interest.

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Marine Ecology

Marine Ecological Processes. IVAN VALIELA. Springer-Verlag, New York, 1984. x, 547 pp., illus. $34. Springer Advanced Texts in Life Sciences.

Marine ecology, like other areas of ecology, is a diverse discipline that considers topics ranging from the molecular mechanisms of nutrient regeneration and the genetic diversity of populations to global geochemical cycles, adaptive radiation, and organic diversity. As such, it draws on disciplines as disparate as geochemistry, microbiology, genetics, and paleontology. It is not particularly surprising, then, that the worldviews of marine ecologists differ dramatically. This diversity of perspectives makes the objectives of this volume challenging and elusive. It is intended to serve as a beginning graduate or advanced undergraduate textbook and as a synthesis of current marine ecology. The author has brought together a vast body of information into a digestible whole, and considering the scope of the undertaking the result is fairly well balanced and up-to-date. The book reviews topics ranging from ecosystem-level processes, such as nutrient cycles and primary productivity patterns, to consumer and competitive effects on organism abundance and devotes attention to planktonic and fish populations as well as to a variety of benthic assemblages. In general, the volume succeeds as a textbook owing to its breadth and its summary of the literature but falls short as an innovative synthesis because its scope dictates a rather superficial treatment of most topics.

The subject is presented in five major sections based on functional levels of food-web organization. The first four sections deal with primary production, consumers, consumer interactions (competition), and decomposition processes, and the last examines the structure of marine communities. These topics are given approximately equal coverage, but the depth of coverage is uneven and the tone of the work as a whole conveys a systems view of marine ecology. In addition, though some efforts are made to tie divergent perspectives and topics together, these efforts are, in large part, unsuccessful.

The discussions of ecosystem-level processes dictating patterns of primary productivity, decompositional processes, and nutrient cycling, subjects close to the author's research interests, are particularly well done. The reviews of these subjects point out gaps in our current knowledge and highlight potential avenues for productive future research.

The sections on consumers and competitive interactions are more conservative and less satisfying. Each of these topics is given a traditional mathematical treatment followed by discussions of the applicability of the models and selected empirical examples. In general, parts of the book dealing with pelagic interactions are quite well done and are much more complete than those dealing with benthic systems. An almost total lack of an evolutionary perspective in interpreting pattern in marine populations is a major shortcoming of the book and is very evident in the consideration of consumer and competitive interactions. As a result of the book's focus on proximate causes, the exciting body of current literature dealing with predator-prey coevolution is hardly considered. Similarly, new developments regarding the morphological correlates of competitive dominance among sessile organisms are missing, and the controversy over the importance of competition in natural systems is largely ignored. The role of mutualistic interactions in marine systems is mentioned only in passing.

The section dealing with the structure of marine communities covers a rich variety of topics including species diver-