Book Reviews

Social Insects

Biosystematics of Social Insects. Proceedings of a symposium, Paris, 1980. P. E. HOWSE and J.-L. CLÉMENT, Eds. Published for the Systematics Association by Academic Press, New York, 1981. xiv, 346 pp., illus. $68.

It is hard, at first sight, to see how the biosystematics of social insects can form a unified subject. After all, the social insects certainly do not form a monophyletic group, including as they do termites, diverse hymenopterons, and a scattering of other insects such as locusts, certain aphids, and perhaps some beetles and bugs. Nor can the phenomenon of multiple phenotypes for the same genotype be regarded as unifying, because such diversity also occurs in organisms with complex life cycles, such as many parasites.

The unity of social insect biosystematics does not, then, arise because of the systematic problems per se, but rather because of those biological similarities of the creatures that were acquired convergently through their development of sociality. Such biosystematics is a servant, and an outgrowth, of general biological studies on the groups concerned. The resulting fuzziness of the line separating biosystematics from general biology is reflected in this volume, in which "biosystematics" seems to mean any study of systematic significance not concerned wholly with museum specimens studied according to classical intuitive methods. The resulting field is wide indeed, but of great interest to investigators of the biology of sociality.

The 26 papers in this volume concentrate on the "traditional" social insects, with 15 dealing with hymenopterons, eight with termites, and only one with locusts. The emphasis is strongly on empirical studies of real situations; aficionados of the theory of systematics will search in vain for polemical discussions of the virtues of cladistics as against phenetics (in fact, the term "cladistics" does not rate a mention), although there is one paper reviewing multivariate statistics and another discussing the cybernetic aspects of colony function. This empirical stress is, on the whole, a strength of the book, as the result is a wealth of information on social insect biology, bringing out parallels between divergent groups. Thus, the chaotic systematics of the *Formica rufa* group suggests that some of the "species" may be ecological races, distinct in sympatry only when the requisite ecological niches are present, and an apparently similar situation occurs in bumble bees.

There is in fact a strong emphasis on species-level problems. Two papers discuss evidence that sympatric mound types in termites represent sibling species. Others study intra- and interspecific variation in ants and termites, with one morph in an ant turning out to be due to a recessive gene. The techniques involved include biometry and gross chemical analysis, as well as karyotype and allozyme analysis. The latest wave of the future, mitochondrial DNA, is not mentioned, but then very little work on insects has yet been done with it.

Higher-level hypotheses are also tackled. Many species of social insects are known that live in the nests of others, stealing food and even larvae from their hosts. Long ago, the myrmecologist Emery suggested that such species are always close relatives, even derivatives, of their hosts. Allozyme analysis here shows Emery to be right for social wasps, but shows that parasitic bumble bees are monophyletic. Other papers provide syntheses of diverse types of data bearing on the systematics of key groups or consider the evolution of particular organ systems.

Although the wealth of biological detail is a strength, the lack of theoretical rigor and broader treatment does occasionally jar. One exception is a contribution by Claudine Petit, naturally mostly on that honorary social insect (and honorary most other things) *Drosophila*, in which she reviews the neutralist-selectionist debate over allozyme variation, coming down heavily on the selectionist side. But her contribution is only sketchily tied to social insects. Elsewhere, there seems to be confusion between "heterozygous" and "polymorphic," and a solid attempt to compare allozyme variation in termites with that in other organisms is marred by the inclusion of interspecific variation in the heterozygosity estimate presented; such estimates usually refer only to intraspecific or even intrapopulation variation.

Although there has been a long and active tradition of social insect study in Europe, the inclusion of 38 European authors as against only two from elsewhere (India and the United States) does perhaps indicate a geographical bias. Not that this is the fault of the organizers—I know that other non-Europeans were invited, but funds for foreign travel are more restricted now than previously. For U.S. readers, then, *Biosystematics of Social Insects* provides a view of different traditions of approach to, in many cases, genera they are familiar with. In fact, the relative insularity of students of social insects working in certain countries, and on certain groups, has been a hindrance to the field; symposiums and books such as this one should help to build the necessary bridges. At $68 not everyone will want to buy this work, even today, but those who do not should certainly see that their libraries do.

ROSS H. CROZIER
School of Zoology,
University of New South Wales,
Kensington, Australia 2033

Forams

Foraminifera. JOHN R. HAYNES. Halsted (Wiley), New York, 1981. xii, 434 pp., illus. $79.95.

The Foraminifera are a class of heterotrophic protists that are ubiquitous in the marine environment. By virtue of the shells they make, which are preserved in the geologic record, they tag marine sediments with time markers and with environmental information. The extraction of this information is the business of biostratigraphy, paleoecology, and paleoceanography. No other group of organisms has proved quite so useful as Foraminifera for these purposes. The chief reason is their great geologic age as a group, their remarkable diversity, their fast rate of evolution, and their abundance, especially in calcareous rocks. The most widespread surface sediment type on earth, for example, is foraminiferal ooze, which covers one-half of the sea floor, or about one-third of the planet.

Haynes has perceived, rightly, "a real need for a general textbook on Foraminifera which lays stress on their stratigraphic application." He has brought together, from a substantial body of literature, the principal aspects of foraminiferal classification and stratigraphic use.

The initial chapters treat laboratory methods, generalities about life cycles, test morphology and composition, and