Despite its limitations, this book is a helpful introduction for the non-mathematical novice. There is an accompanying simple simulator (see footnote) which, though much less extensive than the simulator that accompanies McClelland and Rumelhart's *Explorations in Parallel Distributed Processing* (MIT Press, 1989), is still useful in providing hands-on experience. □

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Digestive clues

J.-J. Jaeger

Owls, Caves And Fossils. By Peter Andrews. *Natural History Museum Publications: 1990. Pp. 231. £27.50.*

Barred owl — the remains of its prey could turn out to be useful palaeoclimate indicators.

WHEN palaeontologists or archaeologists discover a rich microvertebrate fauna, they are so concerned with its biochronological and palaeoenvironmental information content that they forget to ask questions about the origin of these small vertebrates' assemblages, the causes of their death and concentration, and alteration and/or transport. All these questions are the concern of a small but important field of palaeobiology called taphonomy. Peter Andrews in his new book draws attention to these fundamental points, which seem to be critical when information from microvertebrate faunas is used for palaeoenvironmental reconstructions. Of special interest are the numerous pictures taken with the scanning electron microscope of recent small bones showing different types of alterations resulting from processes such as weathering and digestion.

The book is organized into seven chapters, each concluding with a summary. The first three are devoted to the taphonomy of extant microvertebrates, principally represented here by rodents which have been eaten by owls. Diurnal birds of prey and mammalian predators of microvertebrates are much less important in this context as their diets are more diverse than that of owls and their digestion of bones and teeth more efficient; they therefore play only a minor role in the accumulation of microvertebrates in extant or fossil concentration sites.

Using information from original experiments performed over several years, detailed scanning electron microscope studies of bone and teeth surfaces, and precise calculation of proportions and indices, Andrews discusses in detail the science of owl pellets and its contribution to the fossil record. The results allow one to distinguish between, for instance, alteration of bone and teeth caused by soil-forming processes or by digestive etching: each has a characteristic pattern of surface destruction. Also, detailed study of the relative proportions of different bones and the degrees of breakage and digestion in specific accumulations indicates the possibility of distinguishing concentrations due to diurnal birds of prey and mammalian predators from those of owls, and even to identify the species of owl involved in the bone accumulation.

Nevertheless, the method is still at a descriptive stage and, with so many data, I wonder whether multivariate statistical analysis would not have been a more efficient tool than single ratios or indices. Moreover, it is stated that predators in the fossil assemblage are least likely to have been involved in its accumulation, but this is true only in the case of short-duration accumulations. When the duration increases, then the probability of finding some predator's bones mixed with the bones of its prey increases. For instance, in Italy, fossil giant rodents have been found in fissure fillings in association with bones of a giant owl of Pliocene age, an example of co-evolution of size increase between predator and prey. Because of the interest of the proposed method, it is a little unfortunate that no mention is made of the karst fissure filling or cave fillings older than the Pleistocene. Some have a surprising antiquity, such as the oldest European Palaeocene mammal locality of Walbeck in eastern Germany.

The second part of the book is devoted to a case study; the small mammalian fauna of the Westbury-Sub-Mendip cave in Somerset, southwest England. Andrews applies his method to several levels containing microvertebrate concentrations of middle Pleistocene age, and demonstrates that the identification of predators is possible only when there has been almost no large-scale transport or post-accumulation trampling. Andrews also demonstrates that severe breakage and alteration can occur during transport, thus making it almost impossible, in most cases, to identify the initial predator. Nevertheless, a precise identification can be proposed for most concentrations, and Andrews discusses the palaeoecological significance of these microfaunas. He shows that the most accurate method for palaeoecological analysis is provided by the use of the taxonomic habitat index, a semi-quantitative method.

This book has therefore to be considered as the state of the art for work in the field of small-mammal taphonomy. Very few detailed papers have been devoted to this subject, although many palaeontologists and archaeologists have individually accumulated empirical experience in the field. These people will therefore welcome this book because not only has Andrews collected and discussed all the available evidence but he has also tried to elaborate a semi-quantitative method for identification of predators based on detailed qualitative and quantitative study of the bones of prey species.

This method could be of particular use in the quantitative reconstruction of past climates. Microvertebrates could turn out to be even more precise palaeoclimate indicators than pollen or land snails, as their taphonomy relies on more detailed analyses such as those discussed here. □

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