

Evolution of Shrews

Evolution of Shrews. J. M. Wójcik and M. Wolsan (1998). Published by Mammal Research Institute, Polish Academy of Sciences, Białowieża, 1998, 458 pp., figs, index. US\$ 38.00 (hbk). ISBN 83-907521-0-7.

Shrews are an ubiquitous and important component of the small mammal fauna of most terrestrial habitats in both temperate and tropical regions. They have a long history which reveals interesting trends in their evolution and biogeography. Being amongst the smallest of mammals, with high metabolic rates and energy requirements, their physiology has long been of great interest. The pioneering work of researchers such as A. Dehnel, Z. Pucek and others in the Polish Academy of Sciences in the 1950s and 1960s drew attention to shrews as a fascinating subject of study for ecologists, physiologists and anatomists, and there has been a steady output of research ever since. More recently those interested in the taxonomy, palaeontology and genetics of shrews have begun to combine their knowledge of the evolution of shrews. Yet, compared with the wealth of publications on small rodents, shrews have a rather poor press and few symposium volumes have been devoted to them, and even fewer books reviewing, digesting and synthesising information about them.

This monograph, edited by Wójcik and Wolsan, and dedicated to Prof Zdzisław Pucek, is the first of its kind to review and summarise recent developments in the study of the evolution of shrews. Specialists drawn from the fields of shrew palaeontology and genetics form the mainstay of the book. The scene is set by reviewing the classification of fossil and recent subfamilies and genera of shrews. A new scheme of classification is presented, centred around two families, one extinct and one extant, before proceeding with four lengthy chapters on the fossil history of shrews in Europe, Asia, Africa and North America, respectively. These chapters provide a digest of the current classification and nomenclature of fossil shrews, they list the species, their chronologies and distributions. While such lists of species, locations and occurrences are useful for the specialists, they make for tedious reading when not supported by more general information on evolutionary trends. Attempts are made to summarise this disparate information and draw some conclusions about the evolution of shrews but it is clear from their brevity that trends in the geographical and habitat distributions of species, their body sizes, morphologies and community structure over geological time are far from clear. Nevertheless, we are shown that steady progress is being made with descriptions of fossil species and their localities. Despite the difficulties and frustrations of working on such small and delicate fossil remains, some 250 species have been identified in the fossil record. A current list of living species of shrews is relegated to the appendix at the end of the book.

Anatomical studies of teeth can reveal much about the ecology of species, particularly their foraging modes. A chapter on dental adaptations in shrews includes an interesting discussion about the occurrence of tooth pigmentation, a topic of frequent inquiry and debate. This precedes two chapters on chromosomal evolution in shrews. These chapters show how knowledge of the karyotypes of shrews has increased in leaps and bounds within the last ten years. They demonstrate the great range of shrew genera and species whose chromosomes have been studied, the extent of chromosomal variations which occur, and the basic trends in chromosomal evolution. This makes for interesting reading, especially for the uninitiated. A special case is made for *Sorex araneus* and its karyotypic races, hybrid zones and polymorphisms, which are all carefully explained.

An account of protein evolution in shrews demonstrates the value of protein electrophoresis as a tool in the study of genetic evolution of shrews, particularly at the population level. To date, this technique has been applied mainly to *Sorex* and *Crocidura* and has shown interesting trends in geographical variation within species populations and the occurrence of sibling species, as well as providing the basis for reconstructing the phylogenetic relationships of these genera.

Phylogenetic studies have also been greatly enhanced by the development of molecular technology, especially techniques using mitochondrial DNA which has revealed interrelationships among species and races of shrews. The *Sorex araneus* group is again taken as the example to demonstrate the lineages of populations in western Europe.

Care is taken in these chapters to explain the major principles, technical approaches and methodologies associated with modern-day phylogenetic studies, to the benefit of the uninitiated reader. Then, to increase the scope of the book, there are contributions on the evolution of energetic strategies and social systems of shrews. With their high metabolic rates and large energy requirements, shrews have long been a source of intense interest with respect to their energy budgets. The chapter on energetics provides a good up-to-date summary of research into the metabolic rates of shrew. It examines the differences in energetic strategies between soricine and crocidurine shrews, and presents hypotheses to explain the differences, including the importance of climatic influences.

Shrews are thought of as principally solitary and unsociable, so two chapters on social systems and their mating systems provide interesting insights into the variety of shrew reproductive strategies, group structures and social organisations. These range from solitary but promiscuous species with non-involvement of males in rearing offspring to species living as monogamous breeding pairs with an attendant male assisting with the rearing of young; those with stable territories and those with shifting territories. This leads to a discussion of the constraints leading to the particular spatial patterns and lack of sociality typical of most shrew species.

Perhaps a useful addition would have been a brief, concluding chapter to highlight the major gaps in our knowledge of shrew biology and point the way to future research.

This book marks an important milestone in research on shrews, providing a much-needed reference work. Research on the genetics of shrews, in particular, is proceeding at such a pace and in so many directions that the solid foundation of knowledge provided by this monograph is much welcomed at this stage. Each chapter provides a good summary of the current state of knowledge in its selected topic area and incorporates an extensive review of the literature, all carefully referenced at its conclusion. Published by the Mammal Research Institute, Polish Academy of Sciences, it is produced to a high standard. Despite the diverse nature of the contributions and their authors, a uniformity in style has been accomplished. This monograph will make a useful addition not only to the libraries of all shrew researchers but also to those interested in other aspects of vertebrate evolution.

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