

Preface

Insects are not dinosaurs – and they probably pose us more strange puzzles and unexpected questions. A million extant species, that is several times more than all other living taxa together, is still a very conservative estimate, and their real number is for sure many times more. They are incomparably diverse in terms of their size, structure and way of life – and yet they are all small – by our standard at least – why? And they practically ignore the cradle of life, the sea – again, why? Of course, some survive and even reproduce in salt water, but nevertheless very few of them are specialised for marine life. Some insects have developed highly elaborate forms of sociality, far surpassing all achievements reached by vertebrates (including ourselves), at least in terms of interdependence of individuals. Once again, why have they developed this way of life? The history of insects is also full of unexpected discoveries as well as of painful gaps, though these omissions are not overwhelming nor necessarily senseless. There is a special branch of palaeontology called taphonomy whose aim is to learn about the burial pattern of the past organisms: what governs their chance of becoming fossilised, and how this chance depends on features of both the organisms themselves and on their environments. Depending on how deep the taphonomical background in a particular research field, it is even possible to glean information from the very gaps in the fossil record. For instance, lake deposits are known to be favourable for insect burial in contrast to deposits left by running waters. If a group of insect fossils has a poor record in spite of being aquatic (judging from its morphology: otherwise habits are unknown), it most likely occurred in streams, and almost certainly so in cases where the few available fossils are worn and incomplete in contrast to other aquatic fossils collected there.

Palaeontology is an important, though not the only, way to trace the history of insects: phylogenetics is another and is equally important, and it is noteworthy that it is largely independent of the fossil record in its sources and inferences. Both ways are widely used and are mutually helpful and exert controls on one another. Using the words of Willi Hennig, they provide mutual illumination. There are even quantitative tools in progress aimed at helping to assess how well the fossil record and various phylogenetic hypotheses agree with one another (e.g. the ghost range method, RASNITSYN 2000a).

Phylogenetic research is popular and widespread, mainly in the form of cladistics (particularly since its fundamentals were rediscovered by the English speaking audience in HENNIG 1966a). However, this is not the case for palaeoentomology, because palaeoentomologists were and are still few in number, and are widely scattered, except for the Moscow research group with its associates, which has been the most prolific and productive such group in the world since the 1960s. So it is not completely by chance that the present book is written mainly by those Russian scientists, but importantly it attempts to cover all the world's material and all the available information.

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