

PALEONTOLOGICAL SUCCESSION OF THE HYMENOPTERANS.
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The oldest hymenopterous insects known from the Upper (or, possibly, Middle) Triassic all belong to Xyelidae. Early in the Jurassic various Siricomorphs and the first parasitic family Karatavitiidae appeared. Later in the Jurassic there appeared a variety of phytophagous groups, including the ancestral Tenthredinoid family Xyelotomidae, also the parasitic groups Parorysidae, Ephialtidae, lower Evanioidea, Ceraphronoidea, Proctotrupoidea, as well as the ancestral Vespomorph family Bethyloxygidae. Early in the Cretaceous Tenthredinidae, Ichneumonidae, Cynipoidea, higher Evanioidea, Ceraphronoidea and Proctotrupoidea s.l. have appeared, as well as the aculeate wasps Bethyloxygidae, Chrysididae, Dryinidae, Sphecidae s.l., Pompilidae, Scoliididae and Vespoidea. Ants and Chalcidoids enter the paleontological record near the middle of the Cretaceous, bees during the Eocene. Ant abundance has reached its present level in two steps, the first during the Early Eocene (affecting Dolichoderinae and Formicidae), the second during the Miocene (affecting Myrmecinae and Formicidae).

HOST SPECIFICITY AND EVOLUTION OF THE TELENOMINAE (HYMENOPTERA: SCELIONIDAE). N.F. Johnson, Department of Entomology, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210, U.S.A.

The species of Telenominae are all parasitoids of the eggs of other insects. Their hosts include species in the orders Hemiptera, Homoptera, Lepidoptera, Diptera, and Neuroptera. Individual species range from being oligophagous to polyphagous; in no known case are hosts in more than one order successfully parasitized. The plesiotypic host order is Hemiptera; taxa have twice shifted to parasitize the eggs of Homoptera; once each to Lepidoptera and Diptera; and at least twice to Neuroptera. The roles of host-finding mechanisms in determining species host-ranges and in speciation are described.

A new classification of the Telenominae is proposed. The genus *Telenomus* Haliday is demonstrated to be polyphyletic; *Phanoxomyia* Dodd is characterized; the genera *Psix*, *Paratelenomus*, *Nirupama*, and an undescribed genus from Australia form a monophyletic group that is the sister-group of all other telenomines; *Trissolcus* is a paraphyletic assemblage and suggestions for subdividing it are proposed. The sister-group of Telenominae is the newly described genus *Archaeogryon* Galloway & Masner.

REPRODUCTIVE STRATEGIES IN TACHINIDAE AND THEIR EFFECTS ON HOST-PARASITOID RELATIONSHIPS. D.M. Wood, Biosystematics Research Centre, Agriculture Canada, Ottawa, K1A 0C6.

By outgroup comparison with most other calyptrate Diptera, the ancestral tachinid probably possessed a simple common oviduct, unmodified for retention of eggs during embryony. A few taxa of Tachinidae (Phasiinae, Exoristini, Winthemiini, some Blondelliini) retain this condition, ovipositing one egg at a time, on, or under, the skin of the host. Subsequent enlargement of the common oviduct as an ovilac or uterus for retention of eggs until they are ready to hatch must have been an important evolutionary event, allowing for a further modification, the broadcasting of eggs in a suitable habitat without actual contact with the host. By leaving host location to her newly hatched larvae, or to chance encounter, a female might infect a new range of hosts formerly unavailable to her.

The three remaining subfamilies of Tachinidae (Tachininae, Dexiinae, and Gonlinae) each show among their members a transformation series from host contact to broadcasting. Host shifts, to different orders, and rarely even to noninsects (centipedes, arachnids) are most dramatic among those taxa which broadcast their eggs. This suggests that broadcasting, by itself, may favour broader host transfers than might otherwise occur by female choice.

THE PHYLOGENY OF THE SUBFAMILIES OF BRACONIDAE (HYMENOPTERA) IN RELATION TO BIOLOGY. C. van Achterberg, Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden, Netherlands.

The phylogenetic relationships of the subfamilies of Braconidae are far from well-known and non-physical characters may play an important role in establishing the correct cladogram. Parallelism in these is a serious problem though, so that a large variety of other characters as well is needed. Some particular behavioral and developmental characters are described and their use in the phylogenetic analysis is discussed.

NEW INSIGHTS FOR THE PHYLOGENETIC RECONSTRUCTION OF SYMPHYTA AND THE ORIGIN OF APOCRITA (HYMENOPTERA). G.A.P. Gibson* and H. Goulet, Biosystematics Research Centre, Agriculture Canada, K.W. Neatby Bldg., Ottawa, Ontario, Canada, K1A 0C6.

An important aspect of a cladistic analysis is the study of character states in out-groups. Proper understanding of relationships between outgroups and the group under study is crucial in recognizing polarities. A goal is to reconstruct an ancestor. Such questions are discussed almost daily among hymenopterists. Because of this, most hymenopterists when discussing major lineages turn to Symphyta. Traditionally Cephidae were looked upon as the sister group of all apocrita. Our character analysis does not support this position. A study of old and new character states are bringing new insights not only on major symphytan lineages, but also about the sister group to apocrita.

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