

An Analysis of Host-Parasite Associations Among Feather Mites (Acari:Analgoidea)

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The superfamily Analgoidea (feather mites) is a diverse assemblage of obligatory ectoparasites which form host-parasite associations with all major avian groups except penguins. Prior to 1963, there were approximately 100 analgoid mite genera which had been assigned to 6 heterogeneous families recorded from a broad range of disparate avian orders. Renewed interest in feather mites coupled with more efficient and profitable collecting techniques has led to a major re-evaluation of these mite taxa and a better understanding of bird-mite associations. Presently, 1,400 or more described species, and an equal or greater number of known new species, are tentatively assigned to 24 families, which are subdivided into 45 subfamilies, 240 named and 106 new genera.

The number of subfamilies and genera currently assigned to the 24 analgoid families is given in Table 1. Considering the suprageneric taxa, many of the assignments are recognized as provisional pending collections from critical avian species. Two families, Psoroptoididae and Pyroglyphidae, contain non-feather mite groups; numbers of subfamilies and genera are given only for the avian parasites.

Material for this study has been acquired mainly from field-collected birds and through the intensive examination of museum skins. To date, approximately 10,000 vials of mites have been obtained from field-collected birds and 60,000 museum skins and another 10,000 vials through various loans. Considering that these samples yield two or more mite species per bird species, and that there are 8,600 avian species, a fauna of a least 16,000 additional species is anticipated.

DISTRIBUTIONS AMONG HOSTS

Feather mites probably evolved from nidicolous Acaridei which through evolutionary time became intimately associated with the feathers of birds. Presumably, these ancestral forms were capable of utilizing a wide variety of ancestral avian hosts. As ecological specializations of the host evolved, particularly in reference to flight ability, behavior and nesting habits, most feather parasites had to evolve morphological, physiological or behavioral specializations in which the mites became irrevocably allied to their avian hosts. In other feather mite species, the host relationships tend to be of a more general nature, which may suggest that (1) the association between mite and bird is of relatively short duration and (2) the microhabitat of a particular feather type has remained unchanged, thus providing

a mosaic of uniform physical parameters among disparate avian species in which successful mite populations can become established.

Recent studies utilizing conventional and numerical taxonomy have shown that there are at least 3 (and probably more) major suprafamilial groupings in the Analgoidea. Each of these major groups parasitizes numerous avian orders. Because of the tentative nature of these groups, they are here designated as familial complexes. They include the (1) "Analgoid complex," exemplified by the families Alloptidae and Proctophyllodidae, (2) "Freyanid complex," consisting of a new family and the established Freyanidae and (3) "Pterolichoid complex," the largest in terms of numbers of species and diversity of hosts.

The large and highly diverse Pterolichidae, with 8 subfamilies, has been recorded from 10 avian orders. Also included in the Pterolichoid complex are the Crypturoptidae (from South American tinamous); Rectijanuidae (based on a unique species recorded from an African diving duck); Thoracosathidae (from the galliform family Megapodiidae); a new family (from toucans, woodpeckers, crows, hawks, falcons, vultures, kingfishers and hornbills); Syringobiidae (from sandpipers, gulls and plovers, and the flight quills of kiwis); Falculiferidae (reported from pigeons, parrots and related avian orders); Kramerellidae (parasitic on 3 orders of birds, including herons, storks, ibises, pelicans and owls); and Eustathiidae (restricted to swifts). The latter family can be used successfully to demonstrate the zoogeographical range of mites in relation to the host species. Of the 14 genera currently assigned to the Eustathiidae, all mite species of 7 avian genera are restricted to New World swifts and 4 genera have species common to both regions, but there are no instances of a single mite species recorded from host species of the Old and New Worlds. Even if a feather mite genus is represented in both areas, each species within the genus is restricted to one hemisphere. Further conclusions of zoogeographical distribution of these mites in relation to their host's ranges are tentative pending collections from critical avian species and localities. There are, however, indications that the distributions of the mites are not the same as the distribution of their hosts.

Members of the Pterolichoid complex usually inhabit the primary feathers of a wide range of non-passeriform orders. This simple situation is compounded by the fact that infestations may occur