Suborder Oribatida van der Hammen, 1968

In the classic sense of the group, oribatid mites (also called beetle mites, armored mites, or moss mites) comprise more than 9,000 named species.

Although many are arboreal and a few are aquatic, most oribatid mites inhabit the soil-litter system. They are often the dominant arthropod group in highly organic soils of temperate forests, where 100–150 species may have collective densities exceeding 100,000 m2. Oribatid mites are mostly known as particle-feeding saprophages and mycophages, but opportunistic predation on nematodes and other microfauna and scavenging on small dead arthropods (necrophagy) are probably underestimated (Schuster 1956; Luxton 1972; Schneider et al. 2004). As adults, most are medium to dark brown as a result of melanization, but they may be colorless or have yellow to red pigment. Adult body length is typically 300–700 μm, but collectively they span an order of magnitude in size, from about 150 to 2,000 μm. In all known instances, oribatid mites have a plesiotypic acariform life cycle including a calyptostatic prelarva, mobile hexapod larva, three nymphs, and adult.

Sexual dimorphism is minimal and usually restricted to slightly smaller size and proportionally smaller genital plates in males. Fertilization is usually indirect, by stalked spermatophore, without direct association of male and female, but several exceptions are known (see also chapters 3 and 4).

Oviposition is the rule, but embryogenesis is sometimes completed internally prior to oviposition; in some species (particularly aquatic or semiaquatic forms), the second instar may be reached (larviposition) (Norton 1994). The Oribatida displays the greatest known concentration of female parthenogenesis (thelytoky) in the Acari, and much of it exists in taxonomic clusters (Norton and Palmer 1991; Norton et al. 1993).

Infraorder Palaeosomatides Grandjean, 1969 (3 sf)

This group (also called Palaeosomata, Bifemorata, and Bifemoratina) usually is assumed to comprise the most primitive Oribatida, although some Enarthronotides are also rich in ancestral traits (Grandjean 1969a). They are small to relatively large (150–700 μm), pale, and lack the strong cuticular sclerotization that characterizes most oribatid mites. However, all have inconspicuous, weak sclerites that are small to extensive, according to group, and these create several recognizable body forms. For example, members of the Acaronychoidea lack large plates and have an endeostigmatid-like body.

All palaeosomatid setae are unusual in being birefringent birefringent only at their base.

The prodorsum is astegasime, although there is a narrow rostral tectum, and a naso may also be present. The bothridial seta is simple, never with barbs or other ornamentation, and is straight at its base, like the bothridium.

Lyrifissures assume the form of cupules; <i>ian</i> and <i>iad</i> are always absent, and others may also be absent. If a notogaster seems to be present (rarely), it is transversely divided.

With rare exception, there are at least 17 pairs of opisthonotal setae (<i>p4<>/i present, pygidial neotrichy may occur), with some often much larger than others and conspicuously darkened.

Setae <i>d2</i> and <i>e1</i> are erectile in some groups and, unlike those of enarthronotid mites (see below), are individuallymovable (Norton 2001). The coxisternum has a richer setation than that of any other group (except for neotrichous taxa), with three pairs occurring on epimere II. Ventral plates

are poorly defined or absent, and there is no preanal plate.

Legs have six free segments beyond the coxisternum, and all femora are divided, at least in the adult. Most species have a rich complement of solenidia, but these are never flagelliform or coupled to normal setae. Opisthonotal glands are never present. Th e subcapitulum may be stenarthric or anarthric and may have a ventral lip under the mouth, an ancestral state unknown in other oribatid mite groups.

The chelicerae are always chelate-dentate, and sometimes have elongated digits. Chelicerae are oriented vertically or obliquely, they have no Trägårdh’s organ, and their bases are not inserted into the body as apodemes. Palpi may be relatively large.

Infraorder Enarthronota Grandjean, 1969 (5 sf)

This group of early-derivative oribatid mites (= Enarthronota, Arthronota, Arthronotina) is arguably the most morphologically diverse supercohort of oribatid mites, by virtue of extensive plasticity in body form (Norton 2001).

Enarthronotid mites range widely in size (100–1,000 μm), but most are small. Although some are pale, many are tanned to various degrees, and various forms of mineralization are known. The supercohort includes the only oribatid mites with strong yellow, orange, or red pigmentation. Enarthronotids usually are recognized by having a multipartite notogaster that is subdivided by transverse scissures (Grandjean 1947<i>b</i>, 1969<i>a</i>).

They have fully capitalized on the adaptive potential of such a serial arrangement in a way reminiscent of early arthropod tagmosis. Plates have variously regressed, hypertrophied, or fused in different ways, and the articulations have been functionally modified (Norton 2001).

Infraorder Parhyposomata Grandjean, 1969 (1 sf)

This group (also called Parhyposomata, Parhypochthonata, or Monofissurae) comprises the single superfamily Parhypochthonioidea, which in some classifications is included with superficially similar enarthronotid mites under the name Arthronota (or variants thereof). Due to the absence of males, all members are presumed to be parthenogenetic (Norton and Palmer 1991; Norton et al. 1993). Immatures

exhibit prodehiscence in molting, although slight variations occur (Norton and Kethley 1994).

Infraorder Mixonomata Grandjean, 1969 (7 sf)

This supercohort (= Mixonomata) includes dichoid and ptychoid mites in seven superfamilies.

Most are stegasime, all have paired bothridial setae and bothridia with a sharp proximal bend and an undivided notogaster, and most have opisthonotal glands.

Lyrifissure <i>iad</i> is generally present (<i>ian</i> present or absent), the peranal segment never forms, and the cheliceral base does not insert noticeably into the body as an apodeme. In its present configuration, the Mixonomatides are paraphyletic in that the closest relatives of the supercohort Desmonomatides almost certainly lie within this group (Haumann 1991). However, precise relationships remain uncertain (Norton 1998). Species in the Phthiracaroidea and Euphthiracaroidea are ptychoid; these are sometimes grouped under the name Euptyctima.

The residual set of superfamilies (Dichosomata) is given equivalent rank (Balogh and Mahunka 1979). In some classifi cations, the Euptyctima is removed from Mixonomatides and given equal rank (Johnston 1982; Evans 1992).

Infraorder Desmonomata Woolley, 1973 (3 ho)

The Desmonomatides encompasses most of the diversity in Oribatida, focused in two of its three cohorts. As previously indicated, one of these cohorts, the Astigmatina, is dealt with separately in this treatment (chapter 16) because of its different evolutionary trajectory and historical and traditional separation. The cohort Brachypylina comprises the bulk of species and family-group taxa of traditional oribatid mites. An assemblage of seven early-derivative families, with as-yet uncertain interrelationships, are included here in the cohort Nothrina. Because the monophyletic taxa Astigmatina

and Brachypylina probably both originated among these families, the Nothrina may be considered doubly paraphyletic.

Hyporder Nothrina van der Hammen, 1982 (1 sf)

The Nothrina is a paraphyletic assemblage that is also known as Nothronata (Johnston 1982), Desmonomata (Woolley 1973), Holosomata (Balogh and Mahunka 1979, 1983; Fujikawa 1991), and Nothroidea <i>s. lat.</i> (Grandjean 1954<i>b</i>; Travé et al. 1996; Woas 2002). The seven relevant families are sufficiently well defined, but their arrangement in superfamilies has varied and has sometimes been contradictory. As with the cohort itself, these superfamilies have little justifi cation other than temporary convenience, pending further study.

Hyporder Brachypylina Hull, 1918 (25 sf)

The Brachypylina (= Circumdehiscentiae) is the largest, most taxonomically rich group of traditional oribatid mites. This monophyletic lineage is defined by the combination of a holoid body type, brachypyline venter, distinct acetabula with trochanters I–II almost totally contained within them, and genua of legs I–III (and usually IV) shorter than tibiae and lacking intrinsic musculature. Most have a typical apodematoacetabular system of tracheae, but all have some type of internalized respiratory surface (Norton et al. 1997).

Lyrifissure <i>ian</i> is usually absent or reduced in size. The basic chelate-dentate chelicerae seen in many Oribatida has evolved into elongated or filtering forms in many families of Polypterozetoidea, Ameroidea, Gustavioidea, and Oppioidea, and the subcapitulum is often modifi ed accordingly. Two special traits relate to immature brachypyline instars. As noted above, there usually is a striking metamorphosis between tritonymph and adult that is otherwise found only in ptychoid taxa. This prevents easy association of adult with immature specimens based on morphology alone. Also, brachypyline mites are circumdehiscent when molting (with minor variations); posteriorly, δ passes just above the anal region and is directed toward the dorsosejugal region anteriorly.

Reference

Behan-Pelletier, V. & Norton, R. A. (2009): Suborder Oribatida. - in Krantz, G.W. & Walter, D. E. (Eds) (2009) A Manual of Acarology 3rd Edition. Texas Tech University Press, Lubbock, 430-564.