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NEW HOLOTHYRINA (ARACHNIDA, ANACTINOTRICHTHIDA) 
FROM NEW GUINEA AND SOUTH AMERICA

BY Pekka T. LEHTINEN *

NEOTROPICAL AND INDO-PACIFIC HOLOTHYRINA

ABSTRACT: Families and genera of Holothyrina are redefined and redescribed. A new family, Neothyridae, is created for the first Neotropical species, Neothyrus ana, n. gen., n. sp., from Iquitos area, Peru.

Holothyrina is regarded as a suborder of Anactinotrichida, together with Gamasina and Ixodina. All similarities between Holothyrina and the order Opilioacarida are regarded as plesiomorphic.

Holothyridae is regarded to consist of three genera: Holothyrus Gervais, 1842 (type-species H. coccinella Gervais, 1842), Hammenius n. gen. (type-species H. fujuge n. sp.), and Thonius n. gen. (type-species Holothyrus longipes Thorell, 1882). Hammenius ingii n. sp. is also described. Both Hammenius and Thonius are distributed from Seychelle Islands to New Guinea, but Holothyrus is restricted to Mauritius.

RESUME: Les families et les genres d’Holothyrina sont redéfinis et redécrits. Une nouvelle famille, les Neothyridae est créée pour la première espèce néotropicale Neothyrus ana n. gen., n. sp., de la région d’Iquitos au Pérou.

Les Holothyrina sont considérés comme un sous-ordre des Anactinotrichida avec les Gamasina et les Ixodina. Toutes les ressemblances entre les Holothyrina et l’ordre des Opilioacarida sont considérées comme plesiomorphiques.

Les Holothyridae comprennent trois genres: Holothyrus Gervais, 1842 (espèce-type H. coccinella G.), Hammenius n. g. (espèce-type H. fujuge n. sp.), et Thonius n. gen. (espèce-type Holothyrus longipes Thorell, 1882). Hammenius ingii n. sp., est également décrit. La distribution géographique d’Hammenius et de Thonius va des Seychelles à la Nouvelle-Guinée, mais Holothyrus est limité à l’Île Maurice.

The first known species of Holothyrina was described by Gervais (1842) from Mauritius, but up till now only ten recognizable species are known and supraspecific taxonomy of this group has only shortly been discussed by Hammes (1961, 1972). Besides, Holothryid species were known from quite limited area in old world tropics, from Mauritius to New Caledonia.

During world-wide research program dealing with Arachnid fauna of tropical areas three new species of Holothyrina have been collected by me, among them the first one from Neotropical area, representing a new family.

Comparison of the new species with previously known ones undoubtedly reveals that also the old world species represent several genera, even when very wide generic criteria are applied to them. The aim of this paper is mainly to discuss some most important supraspecific characters, while no attempt is made to place exactly some poorly des-

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scribed species that may represent several additional supraspecific groups.

Representatives of Holothyridae and the new family Neothyridae have been personally studied by me, but a detailed comparison with Allothyridae has been possible through information available in papers of Womersley (1935), Domrow (1955), and especially Hammem (1968).

The diagnostic characters for these three families include a large number of structural specialities in gnathosoma, legs, respiratory, and sensory organs (table 1), and hence it seems that these families are not closely related, but rather represent the last remnants of three phylectic lines. According to standards prevailing in modern arachnology, they could be grouped to more than a single superfamily. However, I suppose that only a minority of recent Holothyrid species are known, and a more accurate phylogenetic analysis of this group is best carried out, when much more information has been accumulated.

The structural characters of Holothyrida have been compared with Opilioacarida, Gamasina, Ixodina, and partly with some other Arachnida.

The adaptive radiation in Anactinotrichida is wider than in most Arachnid groups that are either predators or saprophagous. It is only exceeded by Actinotrichida, the only Arachnid order in which adaptation strongly influences phylogenetic weighing of structural characters at high taxonomic levels.

The feeding habits of Opilioacarida, Holothyrida, and less specialized Gamasina are fundamentally similar and a comparison of their gnathosoma reveals surprising similarity. On the other hand, most idiosomal characters of Ixodina are easily homologized with those of Holothyrida and Gamasina (cf. also opinions by Hammem, 1961, 1965, 1966 & 1972). Haller’s organ of Holothyridae is more similar to this organ in Ixodina than in other families of Holothyrida.

I cannot agree with Hammem (1968), who regards the peridium of Allothyridae as homologous with the genital verrucae of Opilioacarida. The similarities in gnathosomal structures between Holothyrida and Opilioacarida are due to plesiomorphy only.

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**Table 1: Diagnostic characters of Holothyrid families.**

<table>
<thead>
<tr>
<th>Character</th>
<th>Neothyridae</th>
<th>Allothyridae</th>
<th>Holothyridae</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td>2.3 mm</td>
<td>2.3 mm</td>
<td>3.7 mm</td>
</tr>
<tr>
<td>leg I/idiosoma</td>
<td>0.8-0.9</td>
<td>0.7-0.9</td>
<td>1.0-2.5</td>
</tr>
<tr>
<td>leg IV/idiosoma</td>
<td>0.9-1.0</td>
<td>0.8-1.1</td>
<td>1.1-2.4</td>
</tr>
<tr>
<td>dorsum of idiosoma</td>
<td>hairy</td>
<td>hairy</td>
<td>± hairless</td>
</tr>
<tr>
<td>position of II sigma</td>
<td>laterodorsal</td>
<td>marginal</td>
<td>submarginal</td>
</tr>
<tr>
<td>Q : sternum</td>
<td>undivided</td>
<td>weakly divided</td>
<td>divided</td>
</tr>
<tr>
<td>Q : genital plate I peridium</td>
<td>absent</td>
<td>constricted</td>
<td>present</td>
</tr>
<tr>
<td>infracapitular setae</td>
<td>numerous (&gt; 10 pairs)</td>
<td>numerous (&gt; 10 pairs)</td>
<td>6 pairs</td>
</tr>
<tr>
<td>laciniae</td>
<td>rounded with pointed median extension</td>
<td>pointed</td>
<td>rounded</td>
</tr>
<tr>
<td>laciniar papillae</td>
<td>short</td>
<td>long</td>
<td>short</td>
</tr>
<tr>
<td>labrum</td>
<td>bulbous with radula</td>
<td>pointed with papillae</td>
<td>with tooth</td>
</tr>
<tr>
<td>corniculus</td>
<td>simple</td>
<td>simple</td>
<td>absent</td>
</tr>
<tr>
<td>tritosternum</td>
<td>absent</td>
<td>2 simple setae</td>
<td>1</td>
</tr>
<tr>
<td>dorsal cheliceral setae</td>
<td>1 central 1 distal</td>
<td>2 subcentral</td>
<td>variable subdistal</td>
</tr>
<tr>
<td>main cheliceral teeth</td>
<td>sparse longitudinal row erect hairs</td>
<td>absent</td>
<td>dense oblique</td>
</tr>
<tr>
<td>palpal comb</td>
<td>tripartite</td>
<td>tripartite</td>
<td>simple with basal knobs</td>
</tr>
<tr>
<td>palpal apotelic claw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I leg :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tarsal segmentation</td>
<td>absent</td>
<td>apicatarsus present</td>
<td>absent</td>
</tr>
<tr>
<td>terminal spines</td>
<td>absent</td>
<td>absent</td>
<td>2 or 4</td>
</tr>
<tr>
<td>Haller’s organ</td>
<td>terminal, solenidia strongly curved</td>
<td>terminal in basithorax, single solenidium clavate</td>
<td>within Haller’s organ</td>
</tr>
<tr>
<td>terminal sensory hairs</td>
<td>around Haller’s organ</td>
<td>around and basal of Haller’s organ</td>
<td></td>
</tr>
<tr>
<td>Q : basal modifications</td>
<td>absent</td>
<td>absent</td>
<td>absent or long spur on genae</td>
</tr>
<tr>
<td>II leg :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ventral spines</td>
<td>absent</td>
<td>absent</td>
<td>tarsi-genue or absent</td>
</tr>
<tr>
<td>terminal spines</td>
<td>absent</td>
<td>absent</td>
<td>3</td>
</tr>
<tr>
<td>O : basal modifications</td>
<td>absent</td>
<td>femur-genue : spur</td>
<td>absent</td>
</tr>
<tr>
<td>distribution</td>
<td>Neotropical</td>
<td>Australian</td>
<td>Island of Indian Ocean-New Caledonia</td>
</tr>
</tbody>
</table>
NEOTHYRIDAE, new fam.

Small, hairy holothyrids with posterior stigmata situated laterodorsally and furnished with membranous funnels. All legs without subterminal spines, terminal Haller’s organ with two curved solenidia. For detailed description and differential diagnosis, see table 1.

Neothyridae and Allothyridae share most plesiomorphic characters (size, dorsal hairs, structure of laciniae and labrum, lack of terminal spines in legs). In my opinion, also the presence of numerous irregular infracapitular setae is plesiomorphic (cf. LEHTINEN, 1980). Altogether, the gnathosoma of Neothyridae and Allothyridae very much resemble each other, and it also resembles that of Gamasina (cf. HAMMEN, 1968 : 269). The presence of a tritosternum in Allothyridae proves that this family cannot be directly derived from recent Neothyridae, although Allothyridae on an average seems to be more specialized than Neothyridae. Another primitive character of Allothyridae seems to be the lack of pedipalpal comb.

Most similarities between Neothyridae and Holothyridae (shape of female genital plates, absence of peridium, lack of dimorphism in II leg, lack of apicotarsus) certainly also are plesiomorphic characters, while the reduction of tritosternum seemingly has taken place independently in ancestors of recent Neothyridae and Holothyridae. The straight sparse palpal comb of Neothyridae probably is not homologous with the dense, obliquely placed comb of Holothyridae (not present in Holothyrus !).

Summarizing the above facts, Neothyridae most probably includes the most primitive recent Holothyrina, while both Allothyridae and Holothyridae are much more advanced groups, but not phylogenetically related with each other.

Neothyrus n. gen.

Types-species N. ana n. sp. from Peru, Loreto.

Small hairy Holothyrid mites with membranous funnel protruding from posterior stigmata. Sternum with lateral depressions in both sexes, but dissimilar in shape. All legs shorter than idiosoma.

Neothyrus ana n. sp., figs. 1-10

Holotype ♂ from Peru, Loreto, Iquitos district, Quistococha, in low fern meadow, 20.XI.1977, leg. P. T. LEHTINEN, in Zoological Museum, University of Turku; paratype ♂ from Quistococha, in litter of dark jungle 20.XI.1977 (PTL); alloparytype ♀ from Iquitos district, Momon River, in vicinity of “Amazon Camp”, in litter of rain forest, 23.XI.1977 (PTL).

■ MALE : 2.2 × 1.4 mm ; I leg 1.9 mm (0.20 + 0.50 + 0.30 + 0.38 + 0.52 mm) ; I leg/idiosoma 0.86 ; IV leg 2.1 mm (0.28 + 0.52 + 0.34 + 0.40 + 0.56 mm) ; IV leg/idiosoma 0.95.

Light brown, legs unicolourous light brown. Dorsum densely pitted, each pit bearing a rather long, curved hair — at least in lateral part eccentrically. Sublateral rugose bands in idiosoma as well as minor areas subdorsally (fig. 1 a).

First legs with long, undivided tarsi. II-IV legs with incompletely divided tarsi, basitarsus shorter than telotarsus.

This is the first Holothyrine species from the Neotropical region and naturally also from the whole western hemisphere. Intensive sieving was carried out during several days in the area where the type material was collected — evidently this species occurs in rather low numbers within the Iquitos district.

ALLOTHYRIDAE Hammen, 1972

Described in detail by HAMMEN (1972). Up till now, representatives of Allothyridae have been found only in Australia, but there is a possibility that some of the small, poorly described species from neighbouring areas could belong here.

The curious hairy pit behind the insertion of fourth legs, peridium, certainly represents a synapomorphic character for all Allothyridae. On the other hand, the presence of tritosternum is ple-
siomorphic. The characters shared with Neothyridae (cf. table 1) seem to be all plesiomorphic, too.

**HOLOTHYRIDAE** Thorell, 1882

**Holothyrus** Gervais, 1842

Type-species by monotypy *H. coccinella* Gervais, 1842 from Mauritius. Diagnosis according to description of the type-species by THON (1906) and HAMMEN (1965).

Brightly red Holothyrid mites of moderate size. Palpal tibia without a regular comb, but paraxial face with an irregular group of sensory setae. Palpal coxa with a ventral rounded apophysis. First tarsi with two terminal spines. Legs shorter than in other genera of Holothyridae, I & IV only slightly longer than idiosoma. Tarsi and tibiae ventrally without spinules, male legs without sexual dimorphism.

**Hammenius** n. gen.

Type-species *H. fujuge* n. sp. from New Guinea.

Large, dark brown Holothyrid mites, I tarsi sometimes partly white. Palpal tibia with a dense, oblique comb. Palpal coxa without apophysis. First tarsi with two terminal spines. Legs shorter than in other genera of Holothyridae, I & IV only slightly longer than idiosoma. Tarsi and tibiae ventrally without spinules, male legs without sexual dimorphism.

**H. fujuge** n. sp., figs. 12-15 & 18-29

Holotype ♂ from Papua New Guinea, Central District, Goilala subdistrict, Woiatape, in litter of bamboo thicket, 1 500 m, 15.11.1974, leg. P. T. LEHTINEN, in Zoological Museum, University of Turku; alloparatype ♀ and one paratype ♂ with same data; paratypes from Woiatape: kunaigress meadow, 1 450 m, 17.11.1974, 2 ♀ (PTL), wet slope with kunaigress 17.11.-16.111.1974, 1 ♀ by pitfall trapping (PTL & John INGI), wet river valley 16.11.1974, 1 juv. (PTL).

**H. ingii** n. sp., figs. 11, 16 & 17

Holotype ♂ from Papua New Guinea, Central District, Goilala subdistrict, Mt Albert Edward, Avios, 2 650 m, in base of tree stubs in cleared area of cloud forest. 18.11.1974, leg. John INGI, in Zoological Museum, University of Turku; one paratype juvenile specimen from same locality (2 600 m), in Sphagnum, 18.11.1974 (PTL).

**MALE**: 5.1 × 3.0 mm; I leg 8.3 mm (0.68 + 2.04 + 1.40 + 2.01 + 2.16 mm); I leg/idiosoma 1.65; IV leg 8.65 mm (0.92 + 2.08 + 1.32 + 1.84 + 2.49 mm); IV leg/idiosoma 1.70.

Dorsum reddish brown, a circular area dorsally blackish brown (whole width of the dorsum), ventral side lighter brown, but protruding keels and bosses darker. Legs very dark brown except half of first tarsi white, tips of tarsi dark brown.

Genu of first leg with strong ventral apophysis, II-IV tarsi with 10-12 spinules ventrally throughout the whole segment, tibiae distally with 2-5 ventral spinules. Epiandrium posteriorly with a central boss, gradually sloping towards the anal plate, posterolateral margin raised to a distinct dark ridge.

**FEMALE**: 5.1 × 3.9 mm; I leg 6.6 mm (0.68 + 1.72 + 1.32 + 1.92 + 1.96 mm); I leg/idiosoma 1.29; IV leg 8.65 mm (0.92 + 2.16 + 1.36 + 1.76 + 2.45 mm); IV leg/idiosoma 1.69.

Coloration as in male. Genu of first leg unmodified, ventral side of leg with spinules as in male. Central epigynial plate bent, posterior third sloping down.

Distinguished from *H. ingii* by colour pattern of idiosoma and legs, in male by shape of epiandrium and ventral process of genu I.
boss, caudolateral margins raised, but no protruding keels.

- FEMALE unknown.

_H. niger_ (Thon, 1906) n. comb.


THON (1906 : 716-718) gave an excellent description, according to which this species can be transferred to *Hammenius*.

*H. niger* is distinctly bigger than the New Guinean species and the legs are relatively longer. The idiosoma is unicolourous blackish brown as in *H. ingii*, but first tarsi reddish brown, lighter colour distributed as white in *H. fujuge*. Ventral process of first genu very strong and furnished with secondary terminal bosses. Epiandrium caudally open as in *H. ingii*.

_Thonius_ n. gen.

Type-species *Holothyrus longipes* Thorell, 1882 from Indonesia, Irian Barat (New Guinea).

Large dark brown Holothyrid mites with extremely long legs, I leg longer than IV. First tarsi sometimes partly white. Palpal tibia with a dense, oblique comb. Palpal coxa without apophysis. First tarsi with two terminal spines. II-IV legs ventrally with spinules in tarsi, tibiae, and often also in genu. Male legs without sexual dimorphism.

_Thonius_ and _Hammenius_ are more closely related to each other than to *Holothyrus*. Following species are transferred into _Thonius_ according to detailed description of THORELL (1882), THON (1906), and HAMMEN (1961).

_Thonius longipes_ (Thorell, 1882) n. comb.

_Holothyrus longipes_ Thorell, 1882 ; Ann. Mus. Civ. Genova 18, 41 Pl. IV figs. 12-17. $\sigma\sigma$ from Indonesia, Irian Barat, Hatam, Arfak mountains. Syntypes preserved in Museo Civico di Storia Naturale, Genoa. Information and sketches supplied on request by Dr. Roberto POGGI, Genoa.

T. grandjeani (Hammen, 1961) n. comb.

_Holothyrus grandjeani_ Hammen, 1961 ; Nova Guinea, Zool. 9, 182 figs. 1-9 + Pl. VI. Holotype $\sigma$ from Indonesia, Irian Barat, Antares, Star Mountains, preserved in Rijksmuseum van Natuurlijke Historie, Leiden. Placed according to detailed original description.

T. braueri (Thon, 1906) n. comb.


_T. braueri_ is the largest known Holothyrid species with an idiosomal length of 7 mm. It has the first tarsi partly white in similar pattern as *Hammenius fujuge*, but all structural features refer to relationship with the above mentioned species.

The remaining four species are all rather small (3-4 mm), and all of them belong outside *Holothyrus*. Probably they belong to Holothyridae, although at least some of them cannot be placed into the three Holothyrid genera listed here.

"_Holothyrus nitidissimus_" Thorell, 1882 and "_H." scutifer_ Thorell, 1882 are certainly conspecific as already anticipated by the original author. The shape of female genital plate, hair covering of idiosoma and size could suggest placing into Allothyridae, but these characters are all plesiomorphic. The structure of palpal comb, number of infracapitular setae and spinulation of legs are typical of Holothyridae (Dr. R. POGGI, in litt.). Most probably this species belongs to an undescribed, primitive genus of Holothyridae.

Scanty descriptions of "_H." seychellensis_ Thon, 1906 from Seychelle Islands, "_H." armatus_ Canestrini, 1897 from New Guinea, and "_H." expolitissimus_ Berlese, 1924 from New Caledonia do not allow a more exact placing, but their small size excludes the possibility that they could be synonymous with the species described in detail in this paper.
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REFERENCES


Paru en mars 1981.
Figs. 1-5: *Neothyrsus anan.* — 1) Idiosoma laterally (a), posterior stigma and eccentric idiosomal hairs (b), exceptionally rugose areas surrounded by dotted lines; 2) Tarsus of II leg of male (hairs omitted); 3) Distal part of male pedipalpus; 4) First leg of male (hairs omitted) (a), tarsal tip with Haller's organ (b); 5) Female rostrum and pedipalpi dorsally.
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