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## All genera of the world: Order †Lophioneurida—fossil out-groups of Thripida (Animalia: Arthropoda: Insecta)

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### Abstract

The present paper presents a compilation of the generic names available in the fossil insect order Lophioneurida (Insecta: Thripida). It comprises 18 accepted genera, 4 synonyms and one invalid homonym.

**Key words:** Lophioneurida, Thripida, Thysanoptera, generic names, type species

Within the insects, the Acercaria comprise a large group showing exceptional evolutionary success (Huang *et al.* 2016). They include Hemiptera (true bugs, cicadas, plant lice, whiteflies, and scale insects) as well as the smaller sister-lineages Psocodea (barklice) and Thripida (Ax 2000). Considering extant species, Thripida is commonly equated with Thysanoptera (thrips). However, Thripida, actually includes Thysanoptera *sensu stricto* and Lophioneurida, the latter discussed as an immediate, ancestral thysanopteran clade, a closely related stemgroup or an early paraphyletic lineage (Wang *et al.* 2009). The actual relationship between both has been a contentious issue (Grimaldi & Engel 2005). Following Fossilworks (2021) Lophioneurida is dealt in the present paper as an order within the superorder Thripida, and only members of this order are treated here; the genus group names of the order Thysanoptera are available from Mound & Hastenpflug-Vesmanis (2021).

Lophioneurida at present comprises 48 fossil species that had their main distribution in the Permian. During the mid-Permian one of the subgroups of Lophioneurida—most likely the lineage containing *Zoropsocus* Tillyard—gave rise to the Thysanoptera. Only a few fossils are available from the Triassic, but this period is probably a very important time in terms of evolution within Thripida, as thysanopteran forms emerged (Grimaldi *et al.* 2004). Within the Jurassic Lophioneurids were still common and widespread but their decline is evident since the Early Cretaceous—when aeolothripid Thysanoptera became more diverse (Zherikhin 2002)—and they most likely had disappeared before the dawn of the Paleogene. Fossils reveal the close relationship between Lophioneurida and

Thysanoptera *sensu stricto*: Lophioneurids provided fundamental features that constitute the head and mouthparts of modern Thysanoptera including an asymmetrical mouth cone with a stylet-like mandible and laciniae, and the reduction or loss of the right mandible (Labandeira 2019; Nel *et al.* 2014).

As mentioned above, Lophioneurida is considered paraphyletic, leading to little consensus regarding the classification of Thripida as a whole. Nel *et al.* (2012) divided Thripida into at least three unranked clades without nomenclatural validity. For a concise listing of generic names, this classification does not seem practical. Thus, in the present paper a more traditional and more restricted treatment is used. Furthermore, sub-families have not been included.

A list of the genus-group names of Lophioneurida has not been issued yet. The present compilation includes a total of 22 names, comprising 18 accepted genera, 4 synonyms and one invalid homonym. Research by Shmakov (in Kopylov *et al.* 2020, p. 1258), however, predicts further new lophioneurid taxa of generic rank, closest to the genus *Undensis* Vishnyakova. Systematic relationships between the genera can hardly be deduced, with 11 of the genera each comprising a single species, and only one genus showing any kind of diversity (*Zoropsocus*: 16 species). Most genera have been established after 1950, particularly by Vishnyakova (1981).

### Acknowledgements

This list of genus-group names is developed from data available on the web in Fossilworks (2021), a system that was created in 2013 by John Alroy. It is housed at Macquarie University (Sydney, Australia) and comprises a large relational database assembled by hundreds of palaeontologists from around the world.

Order †**Lophioneurida** Tillyard  
(4 extinct families)

Family †**Lophioneuridae** Tillyard  
(12 extinct genera)

†**Austrocypha** Tillyard, 1935 [2 species; Permian]. Type species *Austrocypha aрубta* Tillyard, 1935, by monotypy.

†**Burmacypha** Zherikhin, 2000 [1 species; Cretaceous]. Type species *Burmacypha longicornis* Zherikhin, 2000, by monotypy.

†**Cyphoneura** Carpenter, 1932 [1 species; Permian]. Type species *Cyphoneura permiana* Carpenter, 1932, by monotypy. Status uncertain, possibly belonging to Paraneoptera (Nel *et al.* 2012).

†**Cyphoneurodes** Becker-Migdisova, 1953 [2 species; Permian]. Type species *Cyphoneura reducta* Carpenter, 1932, by original designation.

†**Lophiocypha** Tillyard, 1935 [5 species; Permian]. Type species *Lophiocypha permiana* Tillyard, 1935, by monotypy.

†**Lophioneura** Tillyard, 1921 [3 species; Permian]. Type species *Lophioneura ustulata* Tillyard, 1921, by monotypy.

†**Lophioneurodes** Becker-Migdisova, 1953 [1 species; Permian]. Type species *Lophioneurodes sarbalensis* Becker-Migdisova, 1953, by monotypy.

†**Lophiosina** Nel, Retana-Salazar, Azar, Nel & Huang, 2014 [1 species; Jurassic]. Type species *Lophiosina lini* Nel, Retana-Salazar, Azar, Nel & Huang, 2014, by monotypy.

†**Jantardachus** Vishnyakova, 1981 [2 species; Cretaceous]. Type species *Jantardachus perfectus* Vishnyakova, 1981, by monotypy.

†**Karataocypha** Vishnyakova, 1981 [1 species; Cretaceous]. Type species *Karataocypha oculata* Vishnyakova, 1981, by monotypy.

†**Undacypha** Vishnyakova, 1981 [7 species; Jurassic]. Type species *Undacypha fumida* Vishnyakova, 1981, by monotypy.

†**Undensis** Vishniakova, 1981. Type species *Undensis longinervis* Vishniakova, 1981, by monotypy. Synonymised by Ansoerge (1996).

†**Mesopsocus** Hong, 1983. Homonym of *Mesopsocus* Kolbe, 1880 [Psocoptera, Mesopsocidae]. Type species *Mesopsocus divaricatus* Hong, 1983, by monotypy.

†**Edgarietkia** Jell & Duncan, 1986. Type species *Edgarietkia una* Jell & Duncan, 1986, by monotypy. Synonymised by Ansoerge (1996).

†**Beipiaopsocus** Hong, 1992. Type species *Mesopsocus divaricatus* Hong, 1983, by original designation [*nomen novum pro Mesopsocus* Hong, 1983]. Synonymised by Ansoerge (1996).

†**Vitriala** Becker-Migdisova, 1961 [1 species; Permian]. Type species *Vitriala nigriapex* Becker-Migdisova, 1961, by monotypy.

Family †**Moundthripidae** Nel, Azar & Nel  
(1 extinct genus)

†**Moundthrips** Nel, Azar & Nel, 2007 [1 species; Cretaceous]. Type species *Moundthrips beatificus* Nel, Azar & Nel, 2007, by monotypy.

Family †**Westphalothripidesidae** Nel, Azar, Prokop, Roques, Hodebert & Nel  
(1 extinct genus)

†**Westphalothripides** Nel, Azar, Prokop, Roques, Hodebert & Nel, 2012 [1 species; Carboniferous]. Type species *Westphalothripides oudardi* Nel, Azar, Prokop, Roques, Hodebert & Nel, 2012, by monotypy.

Family †**Zoropsocidae** Tillyard  
(4 extinct genera)

†**Mogsonus** Vishnyakova, 1981 [1 species; Jurassic]. Type species *Mogsonus cerasius* Vishnyakova, 1981, by monotypy.

†**Tschekardus** Vishnyakova, 1981 [1 species; Permian]. Type species *Tschekardus hispidus* Vishnyakova, 1981, by monotypy.

†**Zoropsocoides** Vishnyakova, 1981 [1 species; Permian]. Type species *Zoropsocoides longipennis* Vishnyakova, 1981, by monotypy.

†**Zoropsocus** Tillyard, 1935 [16 species; Permian]. Type species *Zoropsocus delicatulus* Tillyard, 1935, by monotypy.

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