Supplementary material to:

The oribatid mite (Acari: Oribatida) community of a high-Andean cushion peatland in southern Peru

Notes on the identification and variation in morphological characters of certain species:

Nanhermannia cf. *elegantissima* (see Hammer, 1958) (Supplementary Figure 1 e-f)

Specimens of this species showed a wide variation of key features, e.g. in the general shape and the number of teeth of the posterior protuberance of the prodorsum or the shape and density of ornamentation of the notogaster. However, the morphology of the notogastral setae was very distinct, showed only minor variations and corresponds to the drawings provided by Hammer (1958). *Nanhermannia elegantissima* closely resembles the Palaearctic species *N. elegantula* Berlese, 1913, but due to their different distributions, we assume the species sampled here is *N. elegantissima*.

Neoamerioppia notata (Hammer, 1958) (Supplementary Figure 1 g-i)

The lanceolate shape of the bothridial setae, the close-set rostral setae, a small incision at the tip of the rostrum and a lateral spinose process of the coxisternum between epimera III and IV indicated *Neoamerioppia notata* rather than *N. pectigera*.

Aquanothrus sp. (Supplementary Figure 1 j)

Only one specimen was found in the samples and an accurate determination was not possible. The cerotegument was detached from the cuticle. The characteristic coalesced prodorsum, resembled the family Ameronothridae (Schubart 1975). An incomplete dorso-sejugal suture, extremely small bothridia, lamellar ridges on the lateral sides of the prodorsum and a faint translamellar ridge are reminiscent of the genus *Aquanothrus* (Engelbrecht 1975; Wallwork 1981). An obvious lenticulus, bothridial setae or notogastral setation could not be found in the investigated individual.

Tectocepheus sp. (Supplementary Figure 1 k)

Most taxonomical surveys discussing the genus *Tectocepheus* in the Neotropic describe the occurrence of all possible combinations of morphological characters which currently prevents a separation of species (Hammer 1958, 1961, 1962a, 1962b; Balogh and Balogh 1988). However, all examined specimens of this study showed a high morphological similarity to *Tectocepheus velatus* s.l. Michael, 1880 (Weigmann 2006).

Ceratozetes (Magellozetes) sp.

The tutorium of the found specimen projected far anteriorward and was shaped like a blade, which refers to the *Ceratozetes (Magellozetes)* genus group (Woas 2002). The description was based on only one ventral plate of a single specimen allowing the determination of the *Ceratozetes (Magellozetes)* to subgenus level.

Edwardzetes armatus (Hammer, 1958) (Supplementary Figure 2 a-d)

Since some characteristics for distinguishing between the genera *Edwardzetes* and *Trichoribates*, were missing from the specimens, the location of the area porosa *A1* was used to separate *Edwardzetes armatus* from *Trichoribates hammerae.* Area porosa A1is situated in its entirety medial of an imaginary line from *Aa* to *A2*. This feature was recorded in all examined specimens of this taxon. Additionally, *Aa* and *A3* are equal in size (Balogh and Balogh 1990; Hammer 1961).

Sphaerozetes chavinensis (Hammer, 1961) (Supplementary Figure 2 e-j)

Efficient morphological characters are the teeth on both sides of the rostrum and the specific shape of the cuspids, with a long and pointed outer tooth and a shorter and pointed inner tooth. The shape of the bothridial setae is rather variable and could not be reconciled with the descriptions given by Hammer (1961) and Balogh and Balogh (1990).

Trichoribates hammerae (Subías, 2010) (Supplementary Figure 2 k-n)

One of the most prominent morphological characteristics listed by Balogh and Balogh (1990) for *Jugatala armata* (synonymized as *Trichoribates hammerae* Subías, 2010) appeared very variable within all the examined specimens of this taxon: the space between the cusps was not U-shaped with parallel sides in almost all cases. This feature was very similar to the morphology of *Sphaerozetes chavinensis* and was therefore inappropriate for species separation. However, the shape of the cuspid's tip provided a distinct feature as it is not or only very weakly incised in contrast to *Sphaerozetes chavinensis.*

Scheloribates confundatus (see Hammer 1961) (Supplementary Figure 3 a-c)

All examined specimens in this investigation showed two rows of maculae on the anterior part of the notogaster and undulating sublamellae. These morphological features correspond to the drawings by Hammer (1961) on "*Scheloribates confundatus"* sensu Hammer (1961).

Scheloribates cf. *elegantulus* (see Hammer 1961) (Supplementary Figure 3 d-e)

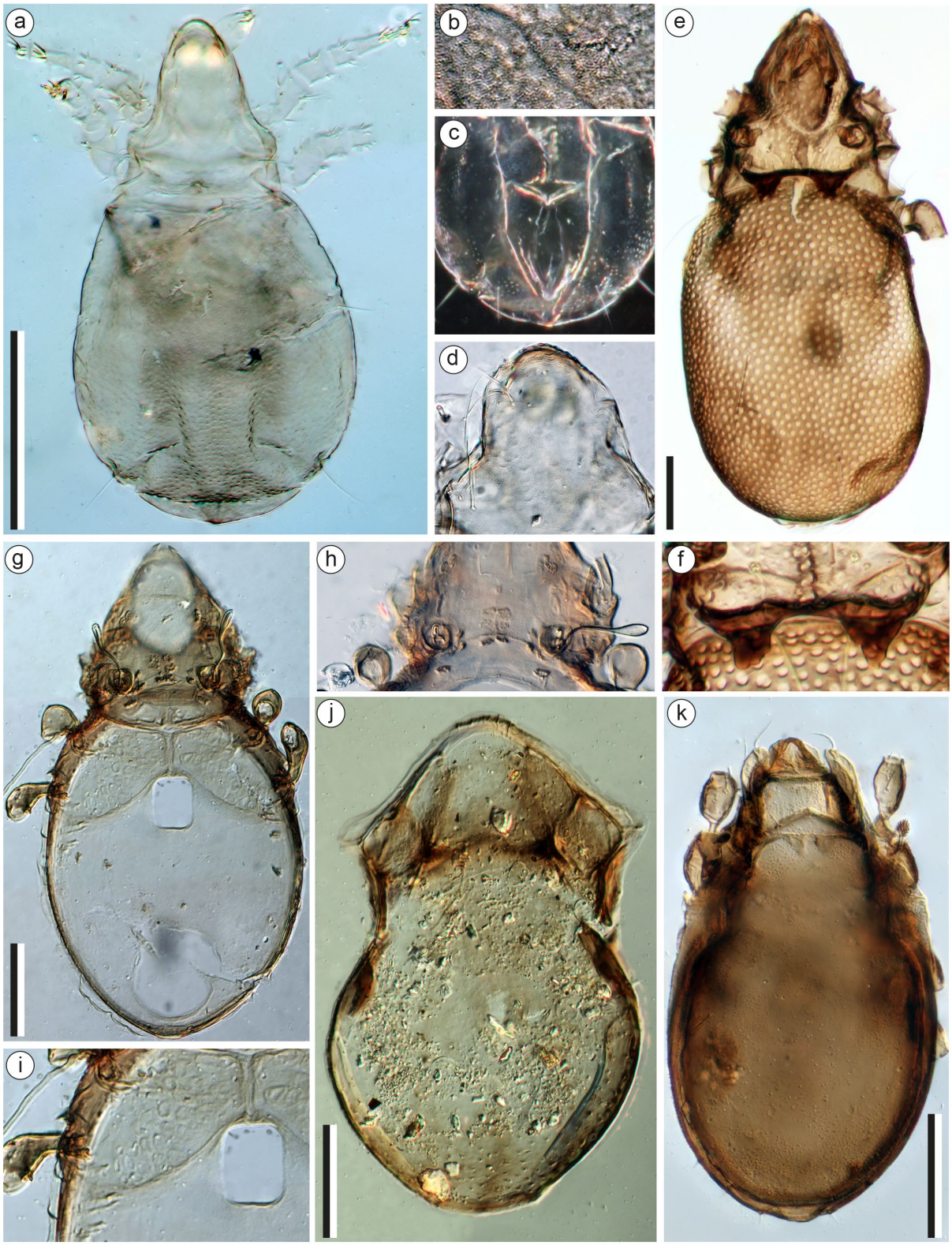
Equivalent to the description given by Hammer (1961), the bothridial setae reached beyond the edge of the pteromorphae and showed a very distinct shape with a thickening at the distal half and a thin prolonged tip. A sublamella was also indicated in the taxonomic drawings, though all eight investigated specimens showed maculae on the notogaster.

Scheloribates pallidulus (Koch, 1841) (see Hammer 1958) (Supplementary Figure 3 f-h)

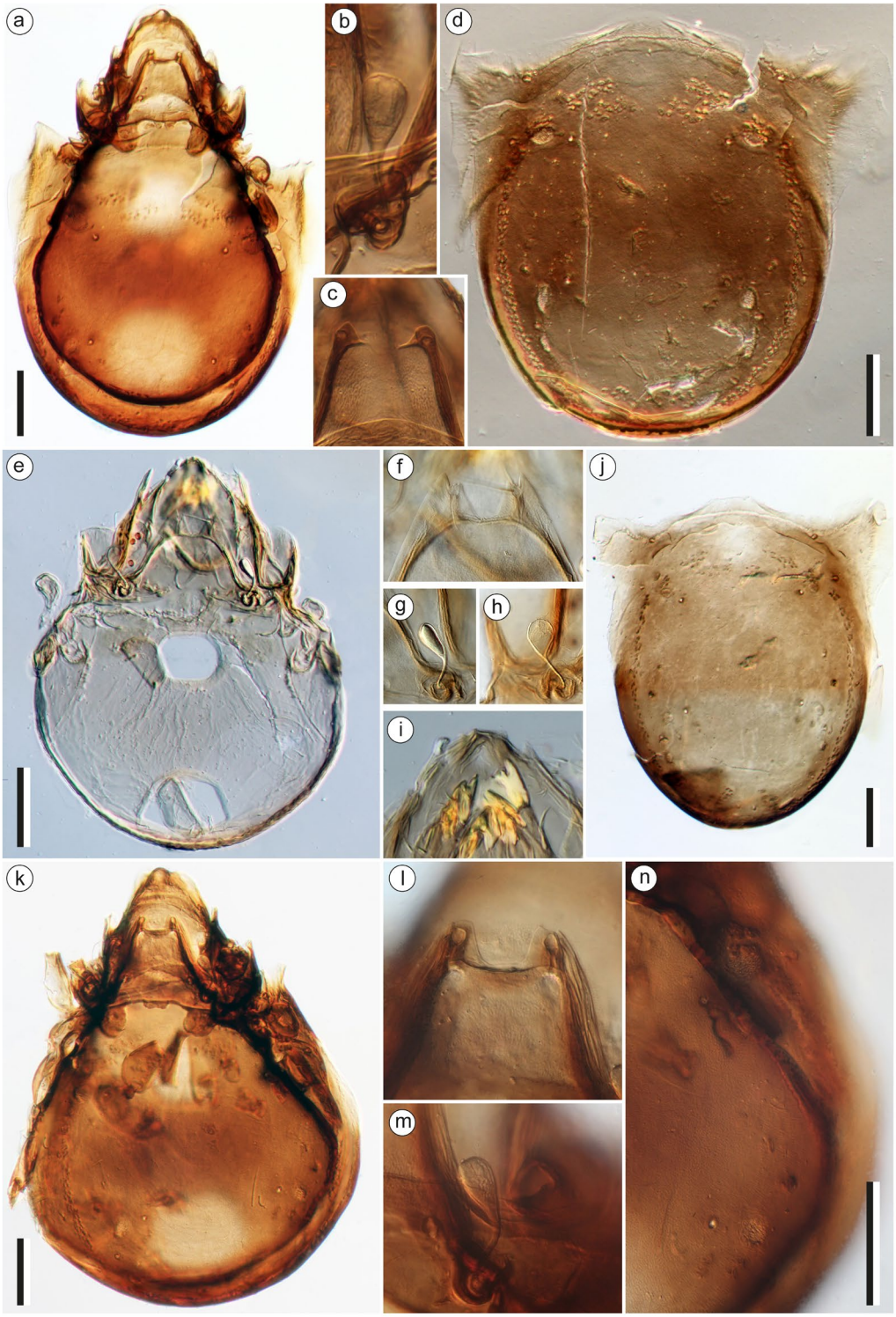
All examined mites of this taxon showed two rows of maculae on the notogaster and a fine translamellar ridge which was not found in European *Scheloribates pallidulus* (Weigmann 2006). Because of this, the classification infers Hammer (1958) to emphasise a morphological variation.

Oripoda sp.

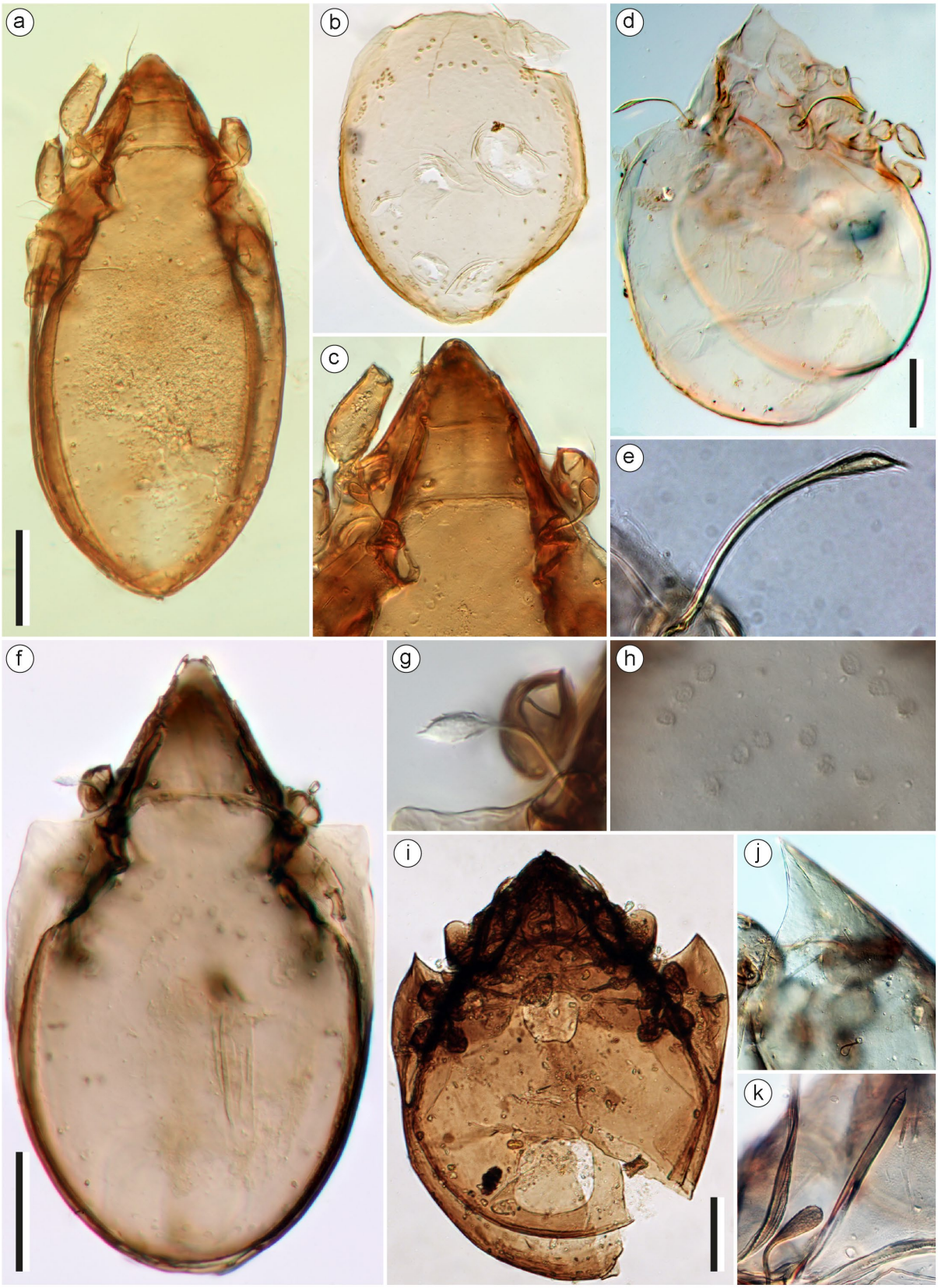
An exact determination could not be implemented, as the only found specimen was badly damaged. However, some available features referred to the genus *Oripoda*: the genital aperture is situated strikingly anterior on the ventral plate and adjoins apodema I and II. The genital aperture was about half the size of the anal aperture and the body length was approximately twice as long as the width. Bothridia and bothridial setae were completely covered by the anterior margin of the notogaster. Furthermore, the notogastral integument was very smooth (Woolley 1966; Krantz and Walter 2009). The examined specimen resembled most likely *Oripoda trilabiata* Hammer, 1961.



Supplementary Figure 1: Oribatid mites of the Cerro Llamoca peatland: *Tyrphonothrus maior*: dorsal view (a), notogastral structure (b), details of the ano-genital region (c) and of the prodorsum (d); *Nanhermannia* cf. *elegantissima*: dorsal view (e) and the posterior protuberances of the prodorsum (f); *Neoamerioppia notata*: dorsal view with removed notogaster (g), details of the prodorsum (h) and the characteristic genital aperature and the lateral spinose process (i); *Aquanothrus* sp.: dorsal view on the fused notogaster and prodosum (j); *Tectocepheus* sp.: dorsal view (k). Scale bars indicate 100µm.



Supplementary Figure 2: Oribatid mites of the Cerro Llamoca peatland: *Edwardzetes armatus*: dorsal view (a), detailed views on a bothridial seta (b) respectively the cusps (c), and view on a separated notogaster (d); *Sphaerozetes chavinensis*: dorsal view with removed notogaster (e), detailed views on the cusps (f), different bothridial setae (g,h) and on the tip of the rostrum (i) and view on a separated notogaster (j); *Trichoribates hammerae*: dorsal view (k) and details of the cusps (l), the bothridial seta (m) and the area porosae (n). Scale bars indicate 100µm.



Supplementary Figure 3: Oribatid mites of the Cerro Llamoca peatland: *Scheloribates confundatus* (sensu Hammer 1961): dorsal view (a), details of a separated notogaster (b) and of the prodorsum (c); *Scheloribates* cf. *elegantulus*: dorsal view (d) and details of a bothridial seta (e); *Scheloribates pallidulus*: dorsal view (f), details of a bothridial seta (g), and the rows of maculae on the notogaster (h); *Zetomimus furcatus*: dorsal view (i), and details of the pteromorphs (j) and the cusps and bothridial setae (k). Scale bars indicate 100µm.

References

Balogh J., Balogh P. 1990. Oribatid mites of the neotropical region II. Amsterdam: Elsevier. 334 pp.

Engelbrecht C. 1975. New Ameronothroid (Oribatei, Acari) taxa from the republic of South Africa and the islands Gough and Marion. Navorsinge van de Nasionale Museum, 3: 53-88.

Hammer M. 1958. Investigations on the Oribatid fauna of the Andes Mountains. I. The Argentine and Bolivia. Biol. Skr. Dan. Vid. Selsk., 10(1): 1-129.

Hammer M. 1961. Investigations on the Oribatid fauna of the Andes Mountains. II. Peru. Biol. Skr. Dan. Vid. Selsk., 13(1): 1-157.

Hammer M. 1962. Investigations on the Oribatid fauna of the Andes Mountains. III. Chile. Biol. Skr. Dan. Vid. Selsk., 13(2): 1- 96.

Hammer M. 1962. Investigations on the Oribatid fauna of the Andes Mountains. VI. Patagonia. Biol. Skr. Dan. Vid. Selsk., 13(3): 1-37.

Krantz G., Walter D. 2009. A manual of acarology. Lubbock: Texas Tech University Press. pp. 816.

Schubart H. 1975. Morphologische grundlagen für die klärung der verwandschaftsbeziehungen innerhalb der milbenfamilie Ameronothridae (Acari, Oribatei). Zoologica, 123: 22-93.

Wallwork J. 1981. A new aquatic Oribatid mite from Western Australia (Acari: Cryptostigmata: Ameronothridae). Acarologia, 22: 333-339.

Weigmann G. 2006. Hornmilben (Oribatida). In: Dahl F. Die tierwelt deutschlands, Teil 76. Keltern: Goecke & Evers. pp. 520.

Woas S. 2002. Acari: Oribatida. In: Adis J. (Eds). Amazonian Arachnida and Myriapoda. Sofia: Pennsoft. pp. 21-291.

Woolley T. 1966. A review of the family Oripodidae (Acarina: Oribatei). Trans. Amer. Microsc. Soc., 85: 2-29.