

NEW SYNONYMS OF THE SUBFAMILY AND GENUS RANKS IN THE FAMILY CUNAXIDAE (ACARI: BDELLOIDEA)

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ABSTRACT: Based on the examination of females and males of *Armscirus taurus*, collected from Cuba, we have confirmed a complete similarity between the genera *Armscirus* Den Heyer and *Brevicaudus* Chen and Jin, as well as between subfamilies Cunaxinae Oudemans and Cunaxicaudinae Chen and Jin. Therefore, we consider the genus *Brevicaudus* and the subfamily Cunaxicaudinae as junior objective synonyms of the genus *Armscirus* and the subfamily Cunaxinae, respectively. Thus, the genus *Cunaxicaudus* is moved from the subfamily Cunaxicaudinae to Cunaxinae.

KEY WORDS: Prostigmata, Cunaxinae, Cunaxicaudinae, *Armscirus*, *Brevicaudus*

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INTRODUCTION

The family Cunaxidae (Acari: Bdelloidea) is a diverse group of predatory mites, which includes 31 genera and some 450 described species, grouped into seven subfamilies (Skvarla *et al.* 2014; Skvarla and Dowling 2019; Kalúz and Ermilov 2019; Laniecka *et al.* 2021; Chen *et al.* 2023). Chen *et al.* (2023) has recently described the subfamily Cunaxicaudinae Chen and Jin, with two new genera: *Cunaxicaudus* Chen and Jin and *Brevicaudus* Chen and Jin. All of these taxa were described based only on males, while females remained undescribed. We have studied both females and males of *Armscirus taurus*, collected from Cuba, and confirmed a complete similarity between the genera *Armscirus* Den Heyer and *Brevicaudus* Chen and Jin, as well as between the subfamilies Cunaxinae Oudemans and Cunaxicaudinae Chen and Jin. The aim of this article is to provide new synonymies of the subfamily and genus ranks in the family Cunaxidae.

MATERIALS AND METHODS

A collection of Cunaxidae, housed at the University of Tyumen (Russia), was examined. Mite morphology was studied using a Carl Zeiss Axio Imager A2 (Carl Zeiss, Germany) compound microscope with phase contrast and differential interference contrast (DIC) optical systems. Photomicrographs were taken with an Axio Cam ICc5 (Carl Zeiss, Germany) digital camera. Palpal chaetotaxy (except tibiotarsus) follows Grandjean (1946); idiosomal chaetotaxy follows Grandjean (1939) as adapted for Prostigmata by Kethley (1990).

RESULTS

Den Heyer (1980) created a classification of Cunaxidae, which comprises five subfamilies: Cu-

naxinae Oudemans, 1903; Bonzinae Den Heyer, 1978; Coleoscirinae Den Heyer, 1979; Cunaxoidinae Den Heyer, 1979; and Scirulinae Den Heyer, 1980. He mainly used the number of palpal segments, the length of palps, the length of rostrum of subcapitulum and the condition of trichobothrium on tibia IV as diagnostic characters of the subfamilies (Den Heyer 1980). Bu and Li (1987) described the subfamily Orangescirulinae. Smiley (1992) created subfamilies Denheyernaxoidinae, Paracunaxoidinae and Neobonzinae. However, Den Heyer and Castro (2009) synonymized Denheyernaxoidinae and Paracunaxoidinae under Cunaxoidinae, and Den Heyer (2011) synonymized Neobonzinae under Coleoscirinae. Skvarla *et al.* (2014) reviewed Cunaxidae and provided the keys to all taxa. Finally, Chen *et al.* (2023) surprisingly erected the subfamily Cunaxicaudinae Chen and Jin with two new genera based on males. The only diagnostic character of the subfamily Cunaxicaudinae is the presence of “cauda-like” structures in males. Chen *et al.* (2023) subdivided these structures into a basal part (or “petiole”) and a posterior process (or “xyphoid”). Females of the subfamily Cunaxicaudinae were not described. According to the key to cunaxid tava (Den Heyer 1980; Skvarla *et al.* 2014), both Cunaxicaudinae genera perfectly fit into the diagnoses of the subfamily Cunaxinae (palp telofemur with smooth dorsal seta; palps 5-segmented; palp extends beyond subcapitulum by at least the distal half of tibia), the tribe Armscirini Den Heyer, 1980 (setae *ps*2 present; palp telofemora with dorsal spine-like seta; dorsal shields always reticulated) and the genus *Armscirus* Den Heyer, 1978 (spine-like seta only on palp telofemur; famulus normal; coxisternal fields II in males with one seta).

We have studied the females and males of *Armscirus taurus* (Kramer, 1881) sensu Smiley, 1993, collected from forest litter in Cuba (Figs. 1–4). Some of the males have the “cauda-like” structures (Figs. 1A, B, 2C, D), as described for the subfamily Cunaxicaudinae. In other males, these “cauda-like” structures were not visible because they

were drawn into the body (Figs. 1C, D, 2A, B). Therefore, the “presence” or “absence” of “cauda-like” structures varies depending on slide preparation. The “xyphoid” process sensu Chen *et al.* (2023) is undoubtedly homologous to aedeagus, which is retractable from the posterior part of the body. The type species of the genus *Armsci-*

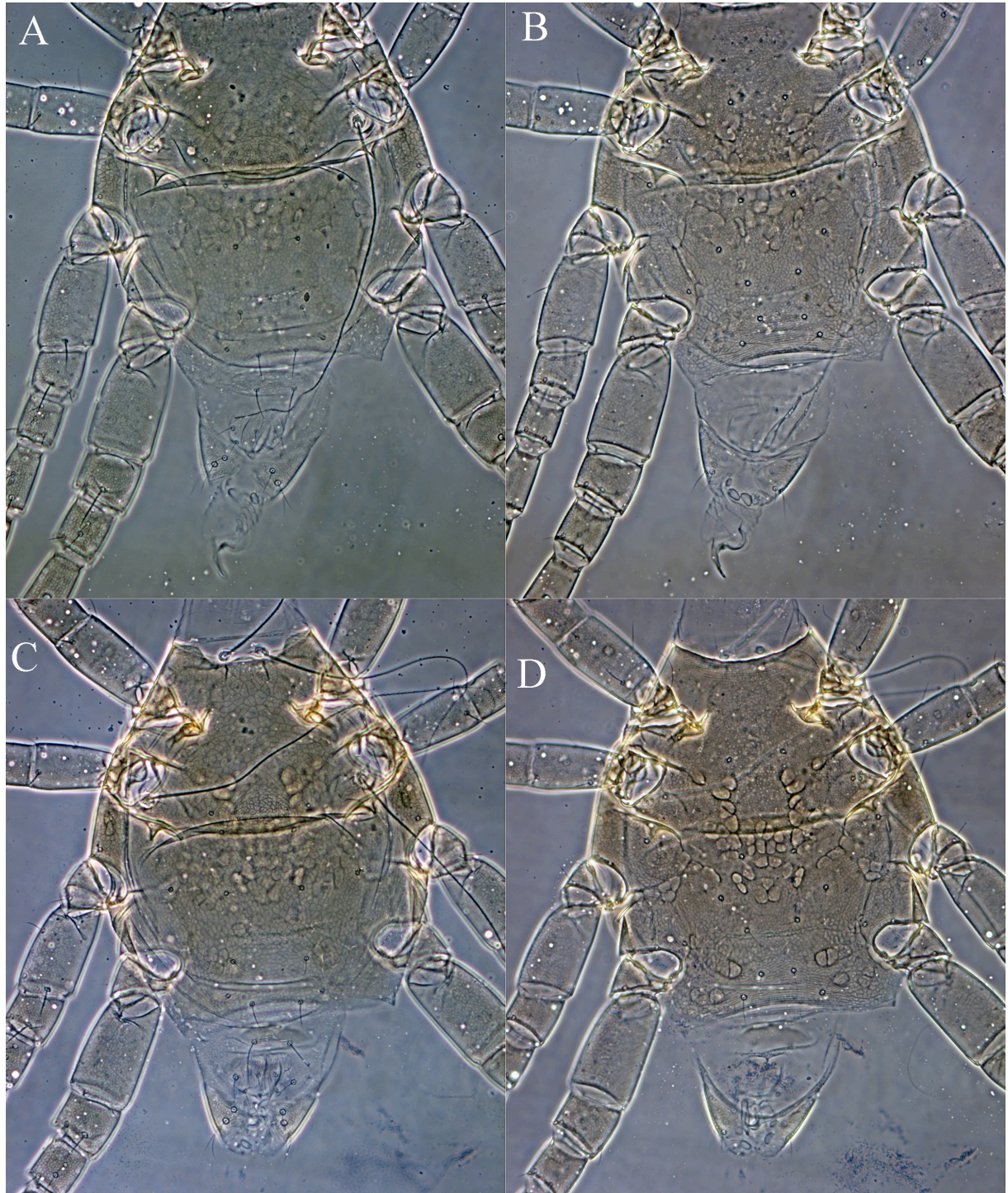


Fig. 1. Phase contrast micrographs of *Armscirus taurus* (Kramer, 1881), male: A, C—dorsum of idiosoma; B, D—venter of idiosoma.

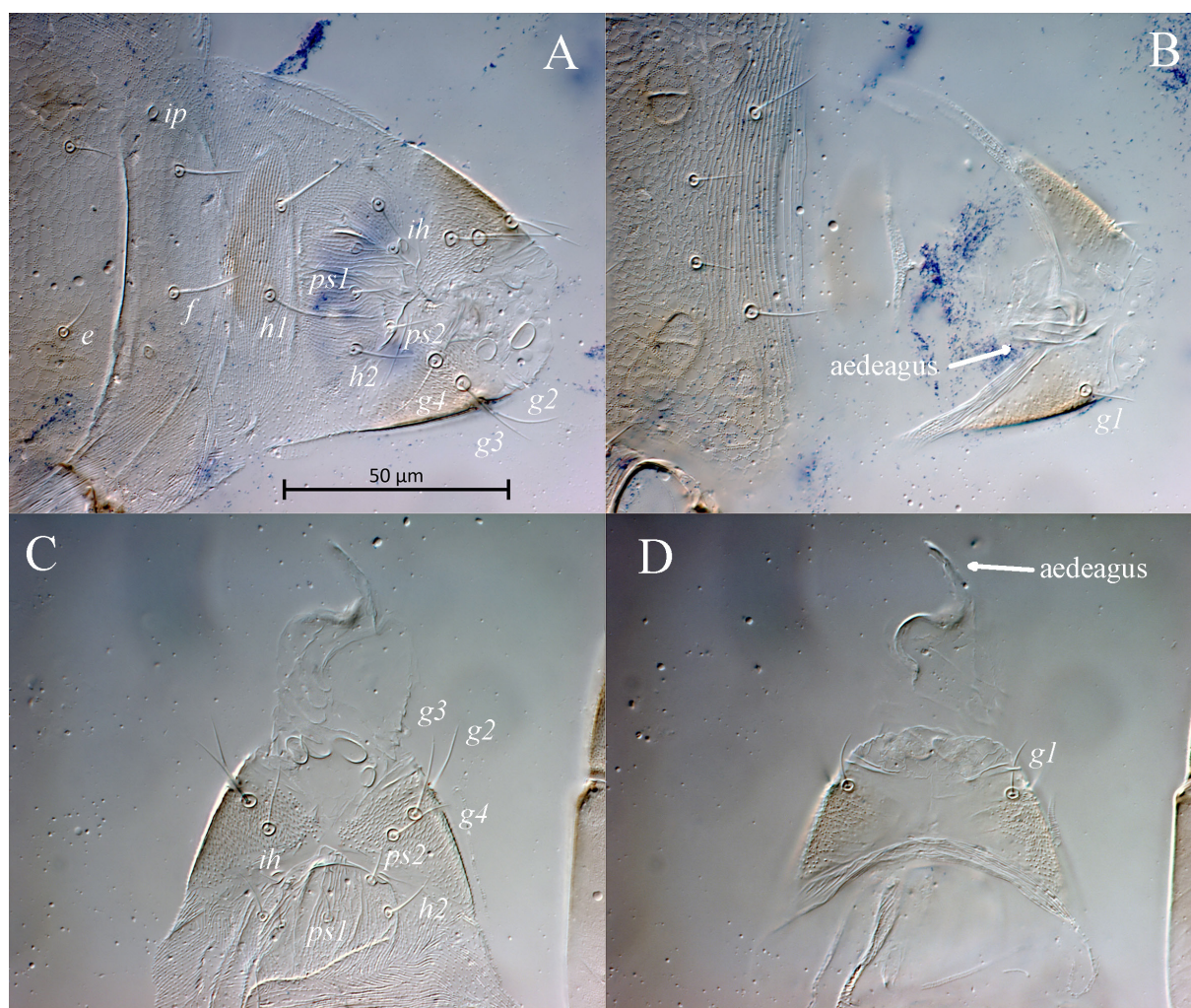


Fig. 2. DIC micrographs of *Armascirus taurus* (Kramer, 1881), male: A, C—ano-genital area, dorsal aspect; B—ano-genital area, ventral aspect.

rus—*A. huyssteeni* Den Heyer, 1978—is also with a well-developed aedeagus (see Fig. 3 in Den Heyer 1978). Similar shape of aedeagus is also present in a closely related genus *Dactyloscirus* Berlese, 1915 (e.g., in *D. condyles* Den Heyer, 1979 (Fig. 5)). The genus *Brevicaudus* Chen and Jin, 2023 is characterized by a short “petiole” and “xyphoid”, as well as the presence of an apophysis between genu and tibiotarsus of palps. Our specimens of *Armascirus taurus* also exhibit the same characters (Figs. 1–3) and are, undoubtedly, congeneric with *Brevicaudus*. Therefore, we consider the genus *Brevicaudis* Chen and Jin and the subfamily Cunaxicaudinae Chen and Jin as junior objective synonyms of the genus *Armascirus* Den Heyer and the subfamily Cunaxinae, respectively.

Chen *et al.* (2023) also described the genus *Cunaxicaudus* Chen and Jin, which is characterized by unusually long “petiole” and “xyphoid” and the absence of apophysis between genu and tibiotarsus

on palps in male. This genus is also very similar to some species of *Armascirus* in lacking the apophysis between genu and tibiotarsus on palps (e.g., *Armascirus apoensis* Corpuz-Raros, 2008 and *A. fuscus* (Chaudhri, 1977)). The genus *Cunaxicaudus* could also be a junior synonym of *Armascirus*. However, the absence of apophysis on palps, as well the structure of genitalia in males could be good characters for the separation of the genera *Armascirus* and *Cunaxicaudus*. Based on the above, we have retained *Cunaxicaudus* as a valid genus and moved it from the subfamily Cunaxicaudinae to Cunaxinae.

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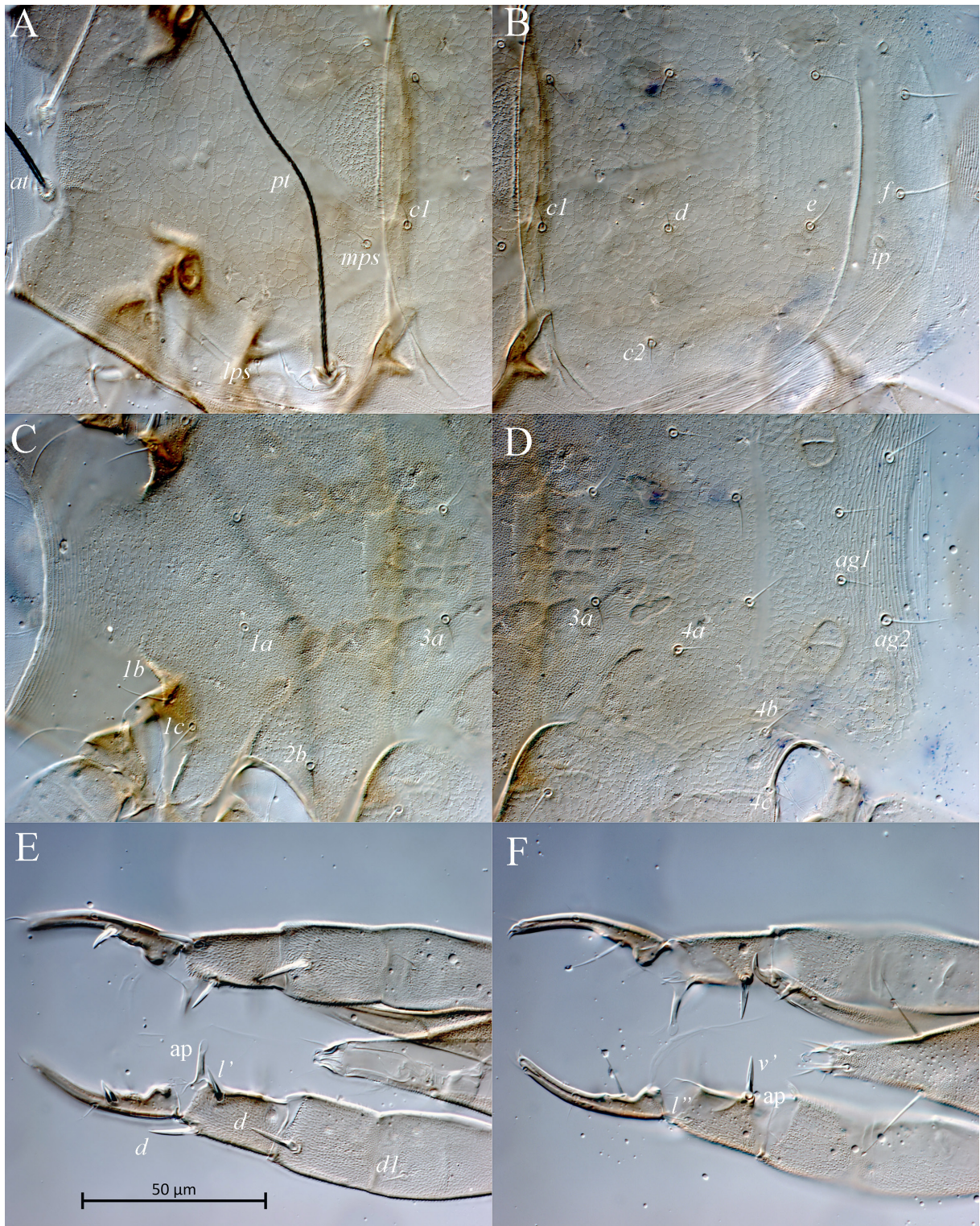


Fig. 3. DIC micrographs of *Armascirus taurus* (Kramer, 1881), male: A—prodorsum; B—hysterosoma, dorsal aspect; C—propodosoma, ventral aspect; D—metapodosoma, ventral aspect; E—palps, dorsal aspect; F—palps, ventral aspect.

REFERENCES

Bu, G. and Li, L. 1987. A new cunaxid subfamily with a new genus and new species of Cunaxidae from Sichuan, China (Acari: Acariformes). *Acta Zootaxonomica Sinica*, 12(2): 160–164.

Chen, J., Yao, M., Guo, J., Yi, T. and Jin, D. 2023. The unique cauda-liked structure represents a new subfamily of cunaxidae: description of new taxa and discussion on functional morphology. *Animals*, 13(8): 1363. <https://doi.org/10.3390/ani13081363>

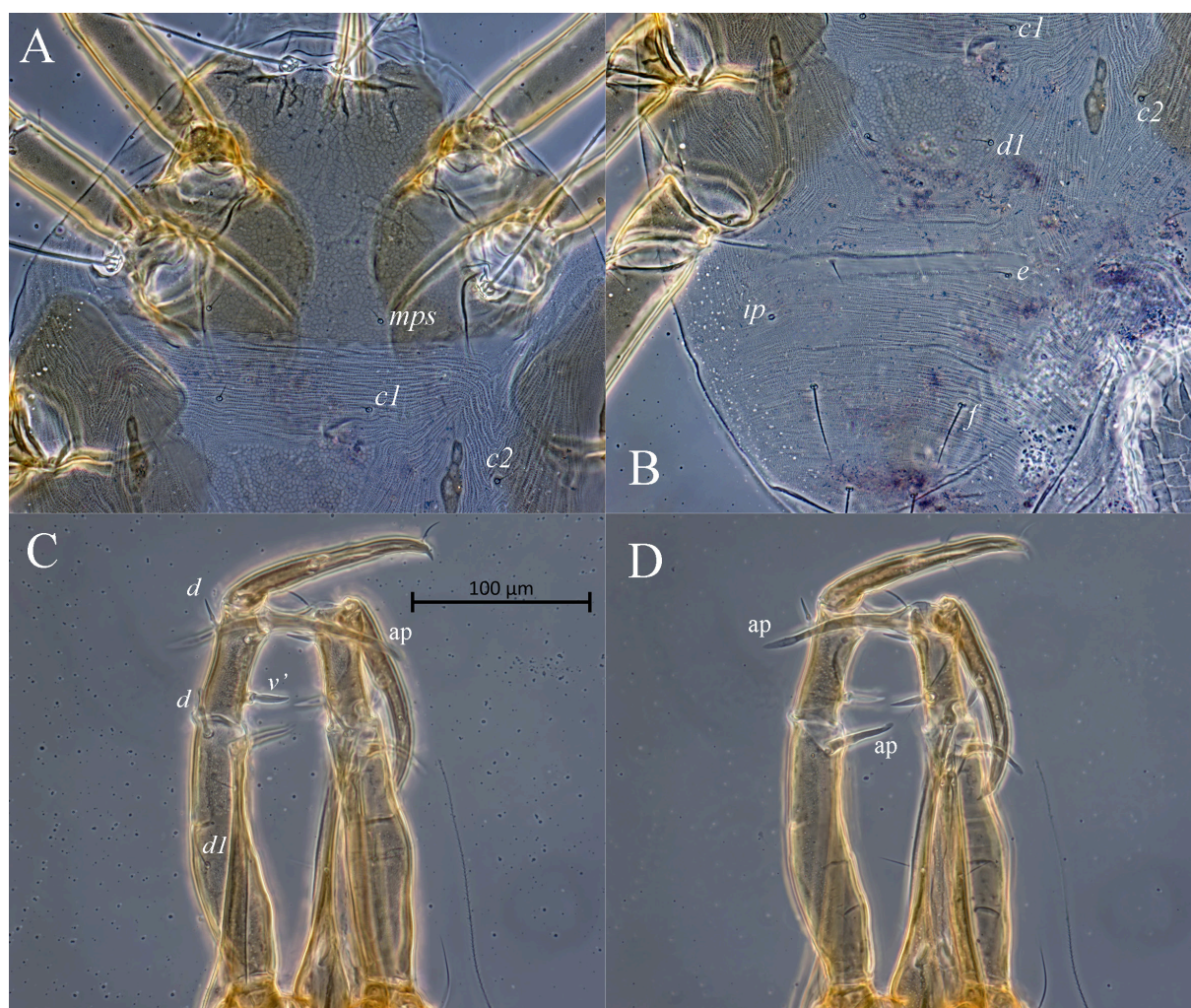


Fig. 4. Phase contrast micrographs of *Armascirus taurus* (Kramer, 1881), female: A—prodorsum; B—hysterosoma, dorsal aspect; C—palps, dorsal aspect; D—palps, ventral aspect.

- Den Heyer, J. 1978. Four new species of *Armascirus* gen. nov. (Prostigmata: Acari) from the Ethiopian Region. *Journal of the Entomological Society of South Africa*, 41 (2): 217–239.
- Den Heyer, J. 1980. A new classification system for the family Cunaxidae (Actinedida: Acarida). *Publications of the University of the North Series A*, 23: 1–12.
- Den Heyer, J. 2011. The genus *Coleobonzia* declared synonymous with *Neobonzia* Smile, 1992 (Bdelloidea: Cunaxidae: Coleoscirinae). *Zootaxa*, 2817: 59–62.
- Den Heyer, J. and Castro, T.M.M.G. 2009. Four new cunaxoidine genera (Acari: Prostigmata: Cunaxidae) and the description of two new Neotropical species. *Zootaxa*, 2140: 1–15.
- Grandjean, F. 1939. Les segments postlarvaires de l'hysterosoma chez les oribates (Acarions). *Bulletin Societe Zoology France*, 64: 273–284.
- Grandjean, F. 1946. Au sujet de l'organe de Claparède, des eupathides multiples et des taenidies mandibulaires chez les Acariens actinochitineux. *Archives des Sciences Physiques et Naturelles*, 28: 63–87.
- Kalúz, S. and Ermilov, S.G. 2019. A new genus of Pulaeini (Acari: Prostigmata: Cunaxidae) from South-East Asia. *Zootaxa*, 4619(2): 382–390.
- Kethley, J. 1990. Acarina: Prostigmata (Actinedida). In: D.L. Dindal (Ed.). *Soil Biology Guide*. John Wiley & Sons, New York, pp. 667–756.
- Laniecka, I., Laniecki, R. and Kaźmierski, A. 2021. New genus and four new species of the family Cunaxidae (Acariformes: Prostigmata: Bdelloidea) from Zambia. *Systematic and Applied Acarology*, 26(5): 981–1008.
- Skvarla, M. and Dowling, A.P.G. 2019. A preliminary phylogenetic hypothesis for Cunaxidae (Acariformes: Trombidiformes: Prostigmata: Eupodina).

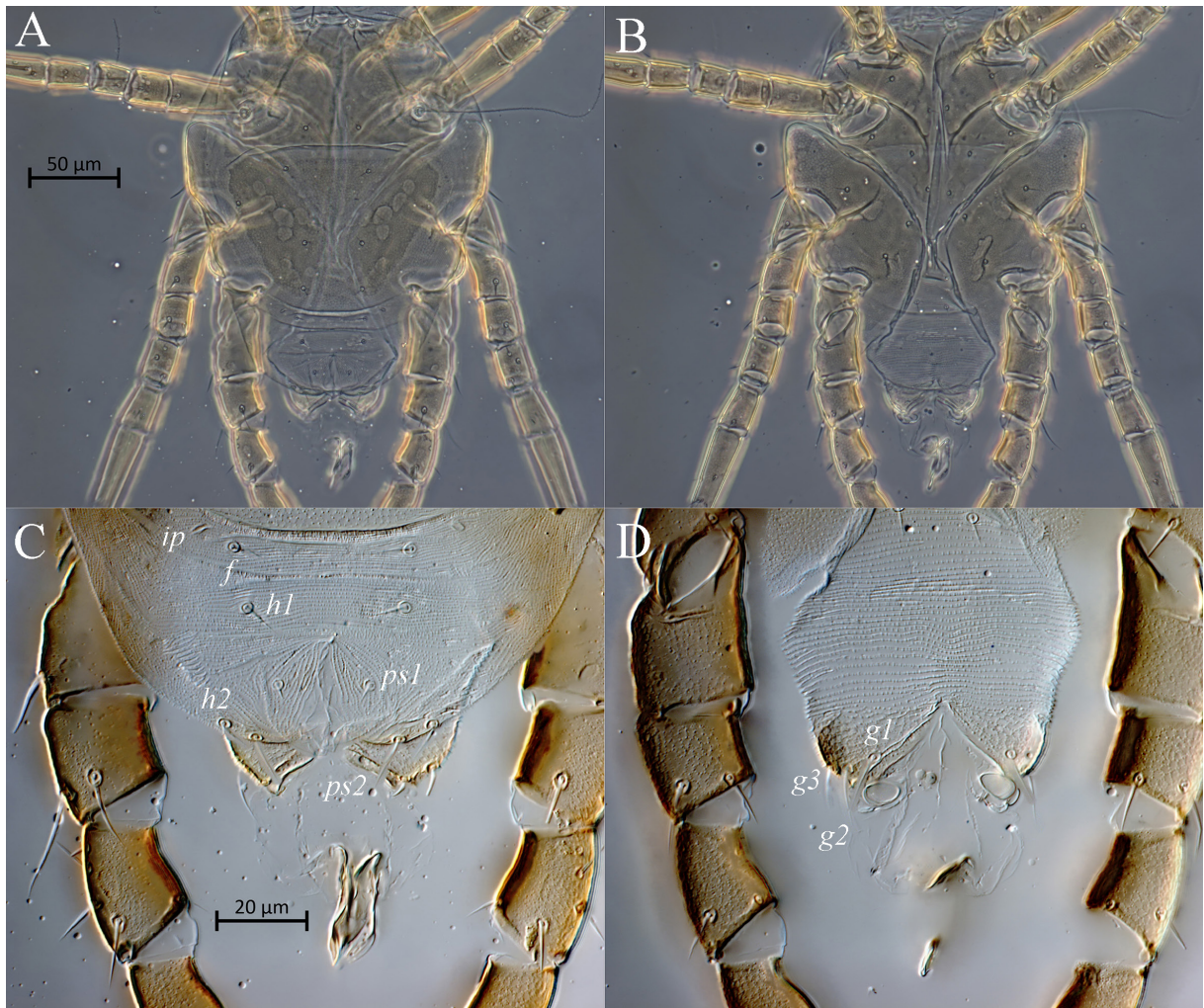


Fig. 5. Phase contrast (A, B) and DIC (C, D) micrographs of *Dactyloscirus condyles* Den Heyer, 1979, male: A—dorsum of idiosoma; B—venter of idiosoma; C—ano-genital area, dorsal aspect; D—ano-genital area, ventral aspect.

In: M. Skvarla *et al.* (Eds.). *Contemporary Acarology*. Springer Nature Switzerland, pp. 67–78.
Skvarla, M., Fisher, J.R. and Dowling, A.P.G. 2014. A review of Cunaxidae (Acariformes, Trombidiformes): histories and diagnoses of subfamilies and

genera, keys to world species, and some new locality records. *ZooKeys*, 418: 1–103.
Smiley, R.L. 1992. *The Predatory Mite Family Cunaxidae (Acari) of the World with a New Classification*. Indira Publishing House, West Bloomfield. 356 pp.