Acta Biologica Turcica 30 (4) 116-120, 2017 Received 3 Aug. 2017; Accepted 23 Oct.. 2017

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.info

# Systematic studies on genus *Hypocepheus* (Acari: Oribatida) with redescription of a firstly recorded species

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**Abstract**: The genus *Hypocepheus* Krivolutsky, 1971 is recorded for the first time from Turkey with *H. helveticus* Mahunka and Mahunka-Papp, 2002. Redescription of the firstly recorded species is provided in this paper. *Hypocepheus helveticus* differs from the other two of species the genus by short sensillus, well-developed *ta* and *te* and notogastal heterotrichy. Taxonomically important morphological features of the genus *Hypocepheus* is also discussed. The genus *Hypocepheus* is transferred from the family Compactozetidae to the Caleremaeidae.
**Keywords:** First record, *Hypocepheus*, Oribatid mites, Turkey.

## Introduction

The genus *Hypocepheus* comprises three species, including *H. helveticus* Mahunka and Mahunka-Papp, 2002*; H. krivolutskyi* Călugăr and Vasiliu, 1976; *H. mirabilis* Krivolutsky, 1971 (Subías 2004, updated 2016). The characteristics of this genus were stated by Krivolutsky (1971) as follows: presence of well-developed lamellar setae originating from the lamellar cuspides; presence of ten pairs of notogastral setae, eight of them thick and in four longitudinal rows; existence of tubercles in the basal part of prodorsum; monodactyl legs. Redescription of a newly recorded species *H. helveticus* is provided in this paper. Previously there was no record belonging to genus *Hypocepheus* from Turkey. The newly recorded species is only known from Switzerland with holotype (Mahunka and Mahunka-Papp, 2002). In this study identification key for the known species of the genus is also provided. SEM images of the genus are firstly presented by this study.

## Materials and Methods

Mites were extracted by a Tullgren funnel apparatus form the soil and litter samples collected from Sakarya province. They were fixed and stored in 70% ethanol. Mites were sorted from the samples under a stereomicroscope (Olympus SZX51) and mounted on slides in modified. Hoyer's medium or 35% lactic acid. All measurements are given in micrometers (μm). SEM photographs were taken by JEOL JSM 6060 LV and Vega Tescan II. Examined materials are deposited in the Acarological Collection of the author, Sakarya University, Sakarya, Turkey.

## Results

***Hypocepheus helveticus*** Mahunka and Mahunka-Papp, 2002
(Figs. 1-9)

**Material Examined:** The examined material collected from Sakarya province of Turkey. Two adult specimens (females) were collected from soil under *Corylus* sp. Altındere, Akyazı, 40°40'53.69"N 30°42'08.90"E, 140 m, 17 June 2014; Nine adult specimens were collected from grassy soil, Yazılı village, 40°41'27.44"N 30°28'54.10"E, 43 m, 23 November 2015; Two adult specimens were collected from soil under *Corylus* sp. Kırcaali village, 40°44'52.30"N 30°19'17.72"E, 176 m, 15 May 2014; Four specimens mounted on aluminum stubs and gold-coated for scanning electron microscopy. Nine specimens stored in 70% ethanol and deposited in the Acarological Collection of the second author, Sakarya University, Sakarya, Turkey.

**Measurements and colour:** Adult (n=13). Length of body 520-621 μm, width of body 380-451 μm, length of notogaster 382-439 μm, setae *ro* 40–43 μm, *le* 94–136 μm,

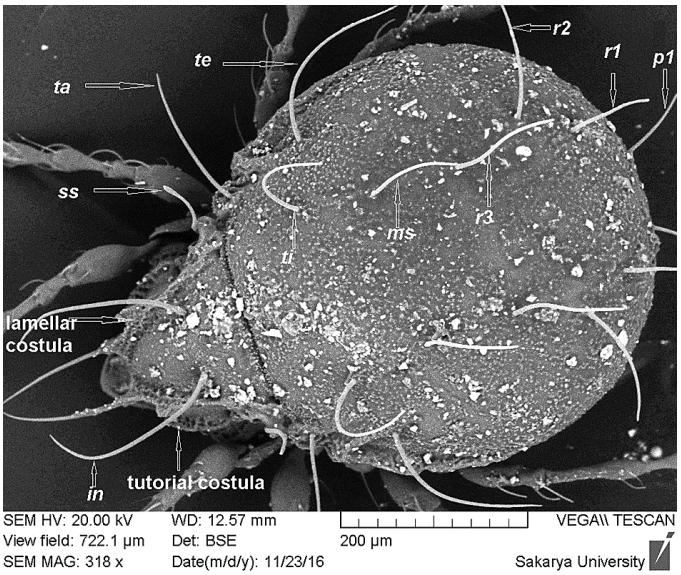


**Figure 1.** *Hypocepheus helveticus*, SEM image of dorsal view.

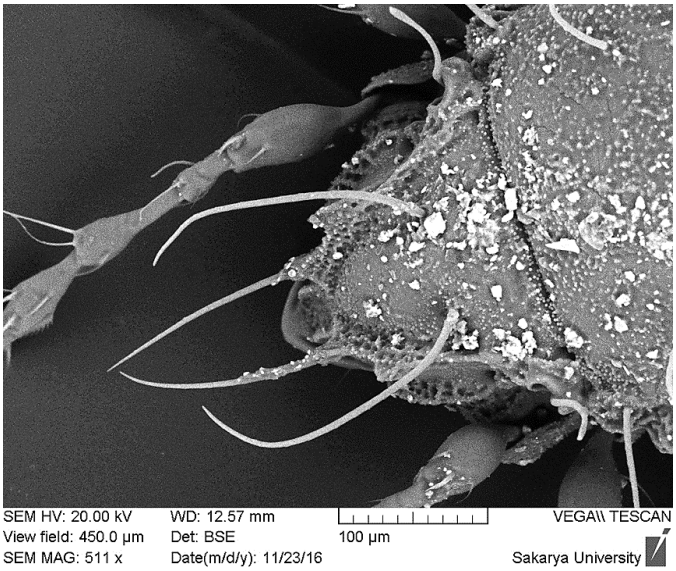


**Figure 2.** *Hypocepheus helveticus*, SEM image of prodorsum.

*in* 174–180 µm, *ss* 70-111 µm, *ta* 157-175 µm, *te* 200-209 µm, *g1-g6* 20-30 µm, $ad_1$ and $ad_2$ 28-34 µm, $ad_3$ 35-45 µm, *ag* 14-25 µm, *an* 17-19 µm, length of genital plate 70-89 µm, width of genital plate 78-86 µm length of anal plate 92-132 µm, width of anal plate 108-140 µm. Colour yellowish to dark brown.

***Prodorsum*** (Figs. 1, 2)**:** Rostrum rounded, rostral setae short thin, setiform and located ventrally. Lamellar costulae and one pairs of subcostular ridges present. Interlamellar setae and lamellar setae long and thick. Interlamellar setae is the longest on prodorsum. Lamellar setae originated from apophysis. Sensillus bacilliform, slightly dilated distally.

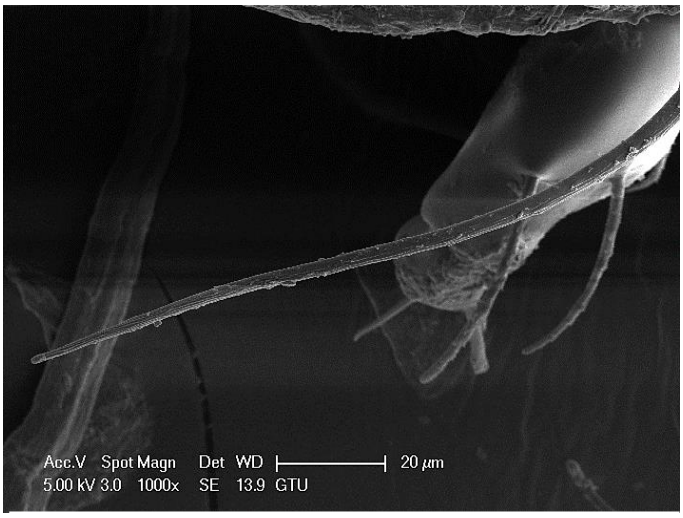


**Figure 3.** *Hypocepheus helveticus*, SEM image of satae *te*.

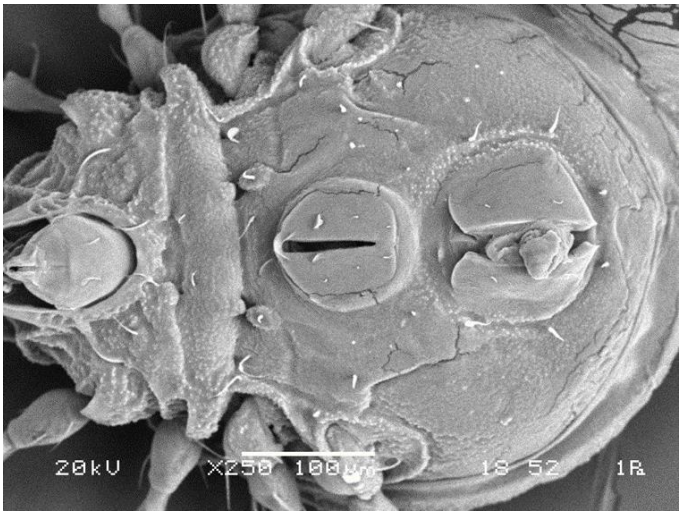


**Figure 4.** *Hypocepheus helveticus*, SEM image of ventral view.

***Notogaster*** (Figs. 1, 3)**:** Notogaster with irregularly granulated cerotegument. Anterior margin of notogaster almost straight, antero-lateral corners of notogaster with two pairs of rounded humeral appendages. Length of notogaster as long as width. Ten pairs of notogastral setae, eight pairs of extremely long, thick and bacilliform; two pairs thin and short. Setae *te* is the longest one, setae $p_2$ and $p_3$ very small and thin originated ventrally.

***Venter*** (Figs. 4, 6)**:** Genital and anal plates large, close to each other and quadrate. 6 pairs of genital, 1 pairs of aggenital, 2 pairs of anal and 3 pairs of adanal setae present. Genital setae short. Adanal setae thicker and longer than aggenital one. Epimeral setae *3b* originated on tubercules. A pair of aggenital condyla present.

***Legs*** (Fig. 7)**:** All legs monodactyle. Each tarsus carries one claw and pad-like empodium.

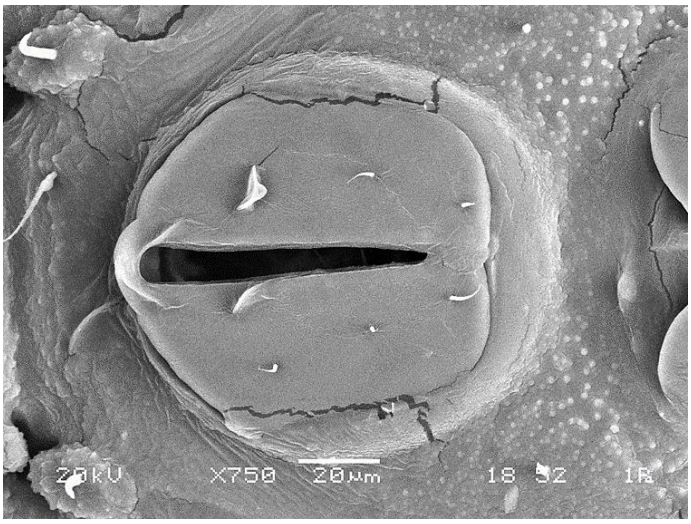


**Figure 5.** *Hypocepheus helveticus*, SEM image of genital plate.

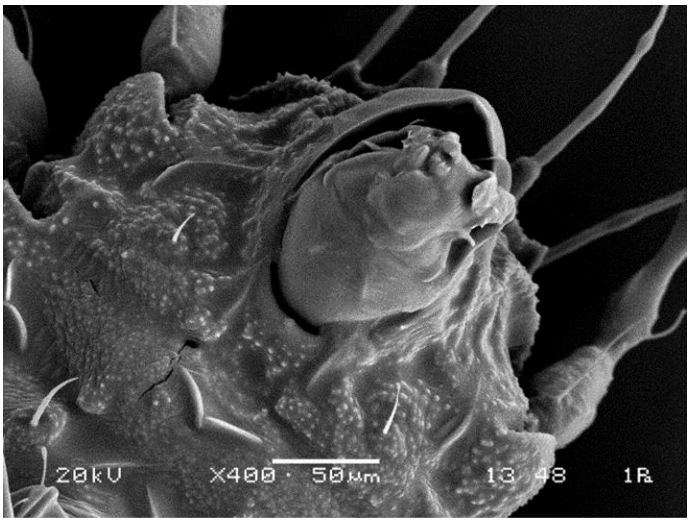


**Figure 6.** *Hypocepheus helveticus*, SEM image of epimeral region.

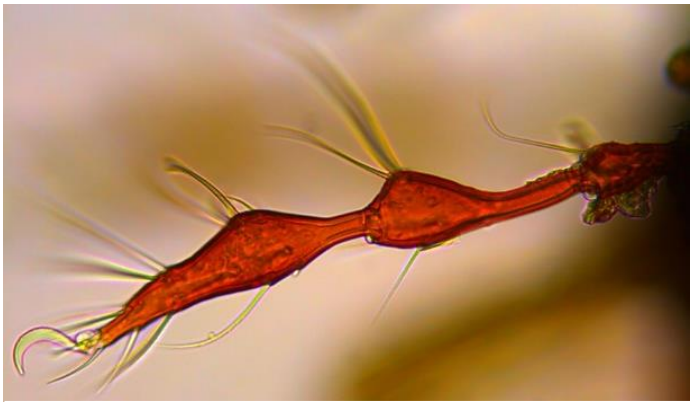

**Figure 7.** *Hypocepheus helveticus*, Light microscopy image of leg I.

## Discussion

Identification key for the genus *Hypocepheus* has been presented by Mahunka and Mahunka-Papp (2002) and the distinctive morphological features of the species given as number of basal tubecles on prodorsum, form and lengths of sensillus and notogastral setae and their relative ratios. But in our light and scanning electron microscopy investigations we saw that the shape of notogastral setae could be in different appearances due to the secretion on the setae (Fig. 8) so using the shape of notogastral setae as a distinctive feature can be misleading. Moreover, the as number of basal tubecles on prodorsum is varies between seven and nine in our specimens (Fig. 9), so the number of basal tubecles is also a precarious morphological feature. Based on this information, the key for the species of this genus is reorganized in this paper.

Another complicacy is the similarity of the genus *Hypocepheus* to some genera of family Caleremaeidae Granjean in 1965, especially the genus *Luxtoneremaeus* J. and P. Balogh, 1992. Although the genus *Hypocepheus* has been placed by Krivolutsky (1971) in the family Compactozetidae Luxton, 1988 by presence of well-developed lamellar costulae, having long and strong prodorsal and notogastral setae and some of ventral morphological features like large genital and anal plates close to each other, presence of epimer III and enantiophysis it shows more similarity to some of genera (Anderemaeidae) placed within Caleremaeidae Granjean in 1965. Because of this reason, the genus *Hypocepheus* is transferred from the family Compactozetidae to the Caleremaeidae.

The genus is most similar to the genus *Luxtoneremaeus* J. and P. Balogh, 1985 by general apperance but differs from it by monodactyle legs, well developed setae *te* and dentate lamellar costula (see Balogh and Balogh, 1985). The genus *Hypocepheus* has three species viz. *H. helveticus* Mahunka and Mahunka-Papp, 2002, *H. krivolutskyi* Călugăr and Vasiliu, 1976 and *H. mirabilis* Krivolutsky, 1971. These species highly resemble to each other but *H. helveticus* differs from the other two species of the genus by short sensillus, well-developed *ta* and *te*.

The body dimensions of *Hypocepheus helveticus* have been given as 592 in length, 437 in width based only on holotypes by Mahunka and Mahunka-Papp (2002). According to our data body length is in between 520-621, width is in between 380-451. In this respect, the dimensions of the specimens found in Turkey are in accordance with previously known specimen. This species previously only recorded from Switzerland (Subías, 2004, online version 2016). The genus

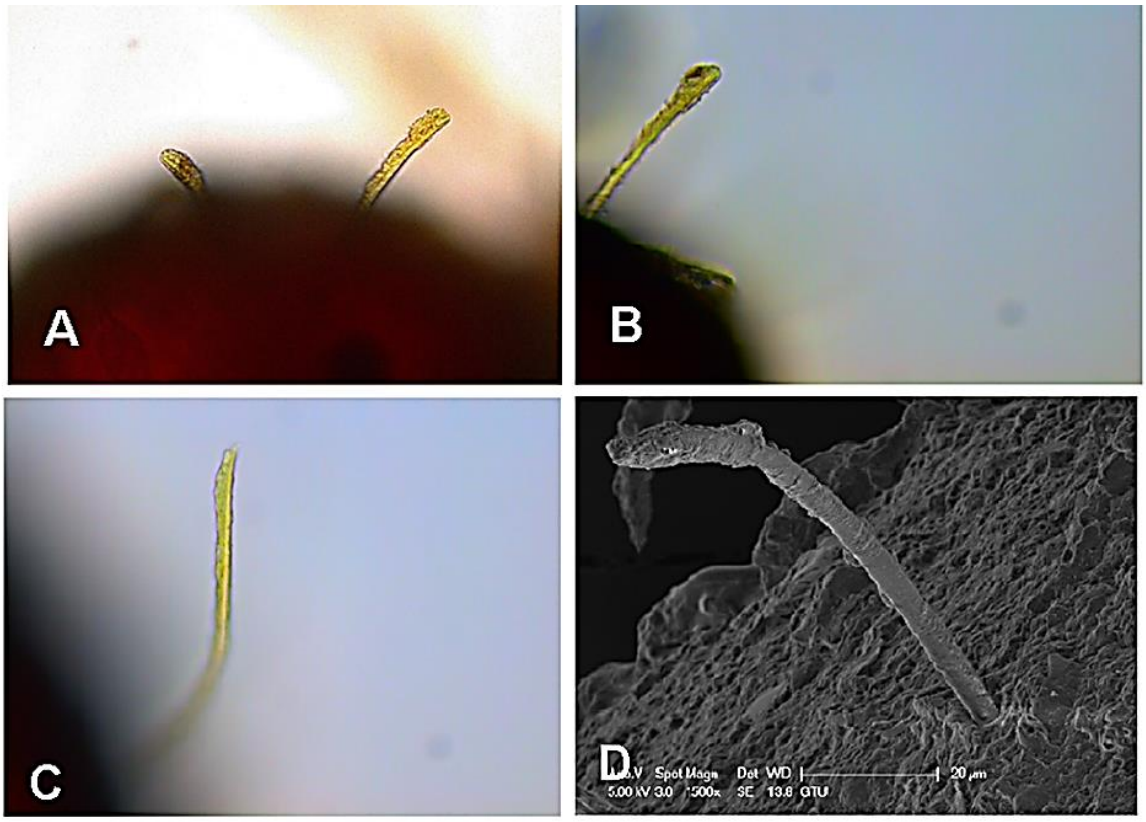


**Figure 8.** *Hypocepheus helveticus*, A- Light microscopy image of notogastral setae *r1*, B- Light microscopy image of notogastral setae *ms*, C- Light microscopy image of notogastral setae *te*, D- SEM image of notogastral setae *r3* with secretion.

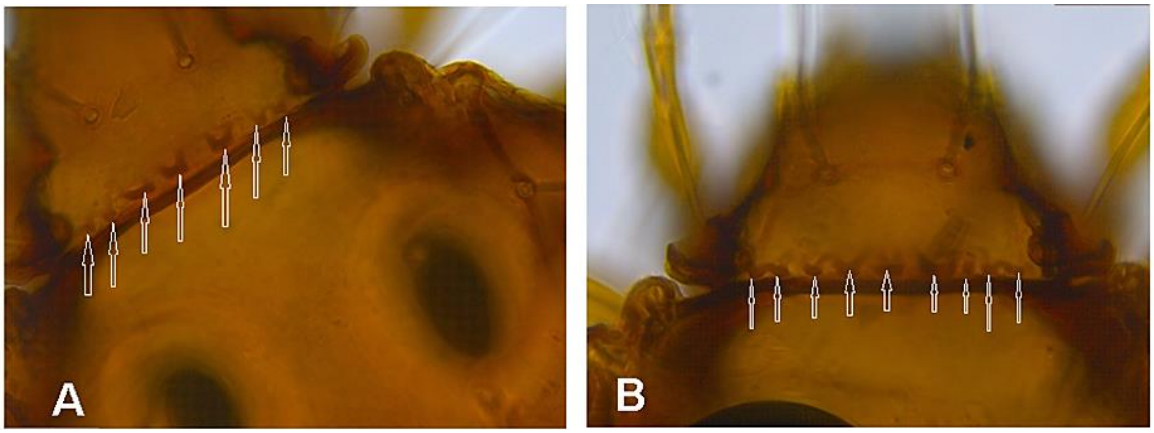


**Figure 9.** *Hypocepheus helveticus*, basal part of prodorsum A- seven tubercles, B- nine tubercles.

*Hypocepheus* secondly recorded all over the World.

## Key to the known species of *Hypocepheus*

1- Setae *ta* and *te* much longer than median setae and sensillus……*H. helveticus*
- Setae *ta* and *te* as long as median setae and shorter than sensillus……2
2- Sensillus spatulate with barbed ends, lamella anteriorly not connected……..…*H. krivolutskyi*
- Sensillus spatulate without barbed ends, lamellae anteriorly connected……...*H. mirabilis*

## Acknowledgments

This study is produced from MSc thesis of the first author and supported by Sakarya University.

## References

Balogh J., Balogh P. 1985. Studies on the Anderemaeidae J.***Balogh***, 1972 (Acari, Oribatei). Opuscula Zoologica (Budapest), 19-20: 41-48.

Călugăr M., Vasiliu N. 1976. Nouvelles espèces d'Oribates (Acari: Oribatei) Revue Roumaine de Biologie (Serie de Biologie Animale), 21: 13-17.

Mahunka S., Mahunka-Papp L. 2002. Oribatids from Switzerland XI (Acari, Oribatida, Cepheidae and Niphocepheidae) (Acarologia Genavensia CIII). Archives des Sciences (Geneva), 55: 97-105.

Krivolutsky D.A., Tarba Z.M. 1971. On the fauna of oribatid mites of Abkhazia. Zoologichesky Zhurnal, 50: 1408–1411. (In Russian)

Subías L.S. 2004. Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). *Graellsia*, 60 (número extraordinario), pp. 3–305. Online version; http://escalera.bio.ucm.es/usuarios/bba/cont/docs/RO_1.pdf (15 Feb 2016).