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RESEARCH ARTICLE

Two new records for the mite (Acariformes, Oribatida) fauna of Türkiye from Kayseri and Osmaniye provinces

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ASBTRACT: The oribatid mite taxa, *Carabodes* (*Carabodes*) *coriaceus* Koch, 1835 and *Scutovertex alpinus* Willmann, 1953 collected from the Olukbaşı Plateau (Osmaniye) and the Derevenk Valley (Kayseri), were determined as new records for the Turkish acarofauna. The morphological features of the related species were reviewed on the basis of the collected specimens, and their known distributions were also given.

Keywords: Acari, distribution, morphology, *Carabodes*, *Scutovertex*
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INTRODUCTION

Soil invertebrates that affect nutrient cycling by feeding directly on plant materials and organic substrates are a valuable component of biodiversity (Manu et al., 2021). Oribatid mites (Acari, Oribatida) are one of the most dominant groups of soil invertebrates. They mostly consume living or dead plant parts or fungi. They indwell a wide variety of microhabitats, including litter, humus layers, lichens, moss, algae, and fungal cushions, most mate 1-3 times a year, laying 1-6 eggs each time (Norton, 1994, Toluk et al., 2010; Padinhare Kaithayil and Neravathu, 2020; Arabuli and Gogshelidze, 2023). Their densities reach up to 400,000 individuals per square meter in acidic boreal forests (Lu et al., 2024). There are 11,628 species of oribatid mites in 1,328 genera belonging to 166 families that have been described so far (Subías 2004, updated 2024).

Carabodes (*C.*) *coriaceus* belongs to the genus *Carabodes* Koch, 1835 (Acari: Oribatida: Carabodidae) which includes about one subspecies and 74 described species (Subías 2004, updated 2024). Members of *Carabodes* are easily recognizable by ten pairs of notogastral setae, seta c_2 positioned laterally on notogaster in line with seta *la*, or positioned medially in line with seta *lm*, four to seven pairs of genital setae; none, one, or two pairs of aggenital setae, epimeral setation 3-1-3-3, epimeral depression(s) present or absent, seta ad_3 subequal in size and shape to other adanal setae, or different (Reeves and Behan-Pelletier, 1998). So far, only three species belonging to the genus *Carabodes*, *Carabodes* (*C.*) *labyrinthicus* (Michael, 1879), *Carabodes* (*C.*) *pirinensis* Kunst, 1961 and *Carabodes* (*C.*) *rugosior* Berlese, 1916, have been known from Türkiye (Toluk and Ayyıldız, 2021).

To date, 69 species within eight genera of the oribatid mite family Scutoverticidae are known worldwide. Weigmann (2006) reported that species of the genus *Scutovertex* vary in certain morphological features and therefore some specimens are difficult to classify. Later, Pfingstl et al. (2008) reported that intraspecific variation occurs only to a small extent. They are known to inhabit different types of habitats from marine littoral to alpine zone (Murvanidze and Weigmann, 2012). *Scutovertex alpinus* belongs to *Scutovertex* Michael, 1879 (Acari: Oribatida: Scutoverticidae) which includes about 30 described species (Subías 2004, updated 2024). It is the second record of *Scutovertex* from Türkiye (Özkan et al., 1988, 1994; Erman et al., 2007, 2024; Baran et al., 2018). *Scutovertex sculptus* is the first record of this genus from Türkiye, was given from the Erciyes Mountain (Kayseri) (Per and Ayyıldız, 2005).

In this study; mites collected from Olukbaşı Plateau (Osmaniye) and the Derevenk Valley (Kayseri) were evaluated and the morphological characteristics of *Carabodes* (*C.*) *coriaceus* Koch, 1835 and *Scutovertex alpinus* Willmann, 1953, which are new records for the Turkish fauna, were reviewed and it was aimed to contribute to their distribution in the world.

MATERIALS AND METHODS

The oribatid mites, which constitute the study material, were selected by using Berlese-Tullgren funnels from a total 54 specimens consisting of lichen, moss, litter and soil samples taken from Olukbaşı Plateau, Osmaniye and the Derevenk Valley, Kayseri (Türkiye). Then they were fixed and stored in 70% ethanol.

Microscopic examination of the specimens was performed in glycerine or 1:2 water-lactic acid medium on a CX21 model Olympus light microscope. All measurements are given in micrometers (µm). The FESEM (Field Emission Scanning Electron Microscope) examinations of the identified mites were conducted at Erciyes University Technology Research and Application Center (TAUM).

The examined specimens were labelled and preserved in the acarology collections, Laboratory Technology Program, Mustafa Çıkrıkçıoğlu Vocational School, Kayseri University, Türkiye.

RESULTS

Family Carabodidae Koch, 1843

Genus *Carabodes* Koch, 1835

***Carabodes* (*C.*) *coriaceus* Koch, 1835** (Figures 1A-H)

Measurements and colour. Body length: 580-710, body width: 390-460 (n=6). Colour dark brown to black.

Prodorsum (Fig. 1B). There are two massive, prodorsal basal protuberances and medially separated. Long, phylliform and barbed interlamellar setae curve towards the medial ridge and rise laterally to the two prodorsal basal protuberances. The sensillus is thin and long. Exobothridial setae are absent.

Notogaster (Fig. 1D). The dorsosejugal suture is wide and deep. The anterior notogastral border bears a pronounced and medial, tooth. The notogaster bears ten pairs of setae.

Ventral region (Fig. 1G). Epimeral setation 3-1-3-3. Three pairs of adanal setae, 2 pairs of anal setae, 4 pairs of genital setae and 1 pair of aggenital setae present on ano-genital region. The *iad* lyrifissures are situated laterally near the setae ad_3.

Legs (Fig. 1F). The legs are monodactylous.

Material examined. 12 adult specimens (3 of them were used for FESEM), from soil, Olukbaşı Plateau, Osmaniye, Türkiye, 36˚59.58'N 036˚17.52 E, 1260 m a.s.l., 29.VI.2023.

Remarks. *Carabodes (C.) coriaceus* has previously known from Western Palearctic (frequent) and The United States (Virginia) (Subías 2004, updated 2024). Body sizes are previously given as 475-690 (Baratti and Bernini, 1994) and 565-725 (Murvanidze, 2008). According to our data, the mean value of body size is 410-680. In this respect dimensions of the specimens found in Türkiye are in the range of those of previously known specimens. *C. coriaceus* is differentiated from *C. arduinii* by has relatively thin (thick and/or slightly phylliform) backward-directed marginal notogastral setae. In *C. arduinii*, notogastral setae curved, bigger and phylliform. Also, the adanal setae are thin in *C. coriaceus*, while they are phylliform in *C. arduinii* (Baratti and Bernini, 1994). This is the first record of this species in Türkiye.

Family Scutoverticidae Grandjean, 1954

Genus *Scutovertex* Michael, 1879

***Scutovertex alpinus* Willmann, 1953** (Figures 2A-H)

Measurements and colour. Body length: 400-470, body width: 200-290 (n=5). Colour dark brown.

Prodorsum (Fig. 2B). The rostral setae are slightly dentate. The lamellae, which are thinly connected to the translamella, are narrow. The lamellar setae spiniform, slightly dentate and bent inwards. The sensillus is thin and long. Interlamellar setae and exobothridial setae are absent.

Notogaster (Fig. 2D). The lateral edges of the lenticulus are slightly concave and the posterior part is wider. The notogaster bears ten pairs of setae. Five pairs of lyrifissures present.

Ventral region (Fig. 2E). Epimeral setation 3-1-2-2. Three pairs of adanal setae, 2 pairs of anal setae, 6 pairs of genital setae and 1 pair of aggenital setae present on ano-genital region.

Legs. Tridactyl. The median claw is noticeably larger than the side claws.

Material examined. 8 adult specimens (3 of them were used for FESEM), from litter, Derevenk Valley, Kayseri, Türkiye, 38˚43.192'N 035˚34.394'E, 1156 m a.s.l., 06.X.2023.

Remarks. *Scutovertex alpinus* has previously known from European (Austria and Caucasus) (Subías 2004, updated 2024). Body sizes are previously given as 330-630 (Willmann, 1953) and 276 (268-302) - 494 (477-527) (Pfingstl et al., 2010). Murvanidze and Weigmann (2012) only gave their length as 477-630. According to our data, the mean value of body size is 240-420. When the dimensions of the specimens found in Türkiye are compared with the dimensions of previously known specimens, it is seen that they are smaller than Willmann's (1953) specimens. However, the dimensions of our specimens are in the range of specimens in the last comprehensive redescription study by Pfingstl et al. (2010) and the dimensions of Murvanidze and Weigmann's (2012) specimens. This is the first record of this species in Türkiye. It is the second record of the genera *Scutovertex* in Türkiye.

Authors' contributions

Sedat Per: Investigation, analysis, conceptualization, data curation methodology, visualization, software, writing - original draft. **Zişan Yiğit:** Investigation, analysis, formal analysis, visualization. **Melike Sude Akkaya:** Investigation, analysis, formal analysis, visualization.

Statement of ethics approval

Not applicable.

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Conflict of interest

None.

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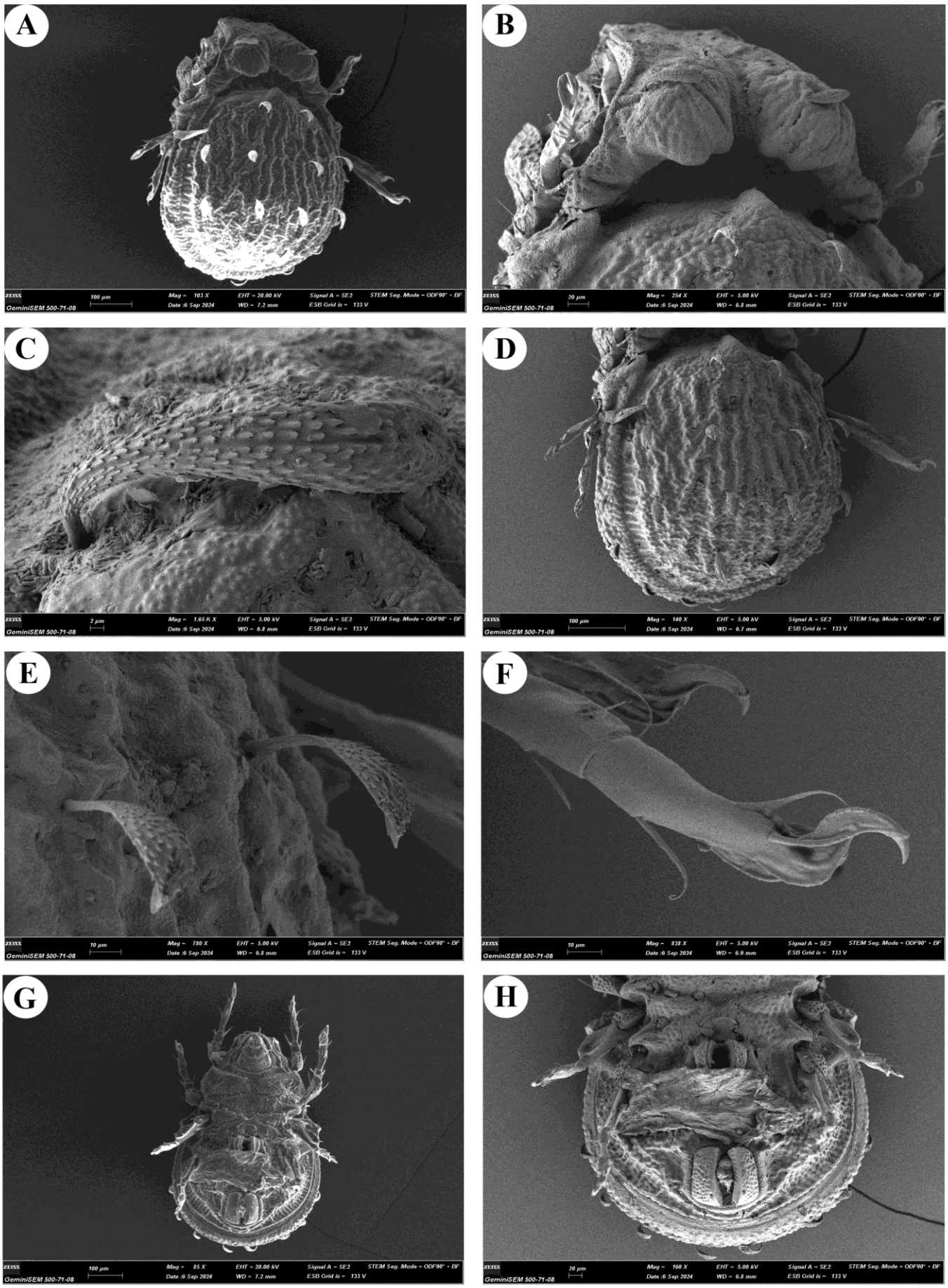

Figure 1. *Carabodes* (*C.*) *coriaceus* Koch, 1835. **A.** Dorsal view, **B.** Prodorsum, **C.** Interlamellar setae, **D.** Notogaster, **E.** Setae *lm* and *la*, **F.** Tarsal claw of leg III, **G.** Ventral view, **H.** Ventral view of hysterosoma.

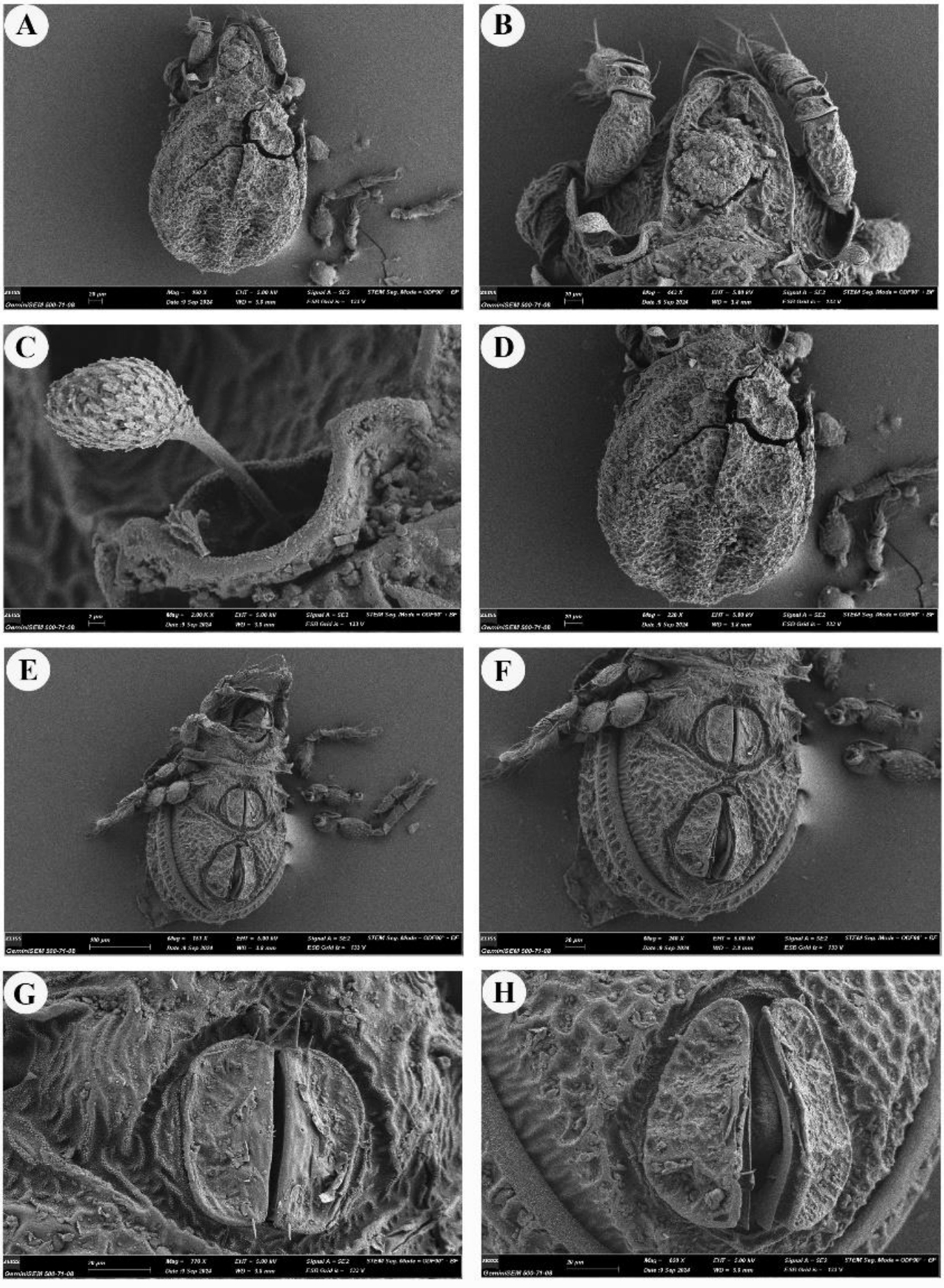

Figure 2. *Scutovertex alpinus* Willmann, 1953. **A.** Dorsal view, **B.** Prodorsum, **C.** Sensillus, **D.** Notogaster, **E.** Ventral view, **F.** Ventral view of hysterosoma, **G.** Genital plates, **H.** Anal plates.

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