

Investigations into *Discourella modesta* (Leonardi, 1899) (Acari: Mesostigmata: Uropodina), a new species for Turkey

Durmuş Ali BAL

Erzincan Education Faculty, Atatürk University, Erzincan - TURKEY

Muhlis ÖZKAN

Science and Arts Faculty, Biology Department, Atatürk University, Erzurum - TURKEY

Received: 10.12.2001

Abstract: In this study, developmental stages of *D. modesta* (Leonardi, 1899) females collected from Erzincan province and its surroundings by Bal in 1997-2001 were evaluated. The specimens were examined in the light of previous studies. Earlier definitions, the structural features of females and nymphs, and the localities of the species were reviewed. Original drawings were also made of our specimens.

Key Words: Acari, Mesostigmata, Uropodina, Uropodidae, *Discourella*, Turkey

Türkiye Faunası İçin Yeni Kayıt Olan *Discourella modesta* (Leonardi, 1899) (Acari: Mesostigmata: Uropodina) Üzerine Araştırmalar

Özet: Bu çalışmada, dişi bireyleri daha önce 1997-2001 döneminde Bal tarafından Erzincan ve çevresinden yakalanan *D. modesta* (Leonardi, 1899)'nın yaşam evreleri üzerinde durulmaktadır. Daha önceki çalışmalar göz önünde tutularak, yeni toplanan örnekler değerlendirildi. Daha önce verilen tanımlar, dişi ve nimflerinin yapısal özellikleri, ve yaşama alanları gözden geçirildi ve örneklerimiz üzerinden orijinal çizimleri yapıldı.

Anahtar Sözcükler: Acari, Mesostigmata, Uropodina, Uropodidae, *Discourella*, Türkiye

Introduction

Berlese created the genus *Discourella* in 1910. This genus represented 70 species worldwide (1). The species is known to live regularly in tillage, field and woodland soils, decayed and decaying litter, herb and straw remnants, and Talpidae nests (2,3). *Discourella modesta* (Leonardi, 1899) has been recorded from Austria, Czechoslovakia, France, Hungary, Italy, Lithuania, Poland, Romania and Ukraine (2). The purpose of this study is to review the morphological features of *Discourella modesta* (Leonardi, 1899) of our specimens and to present opportunities for comparison with *Discourella modesta* (Leonardi, 1899) populations in other countries. The materials used in this study originated from field studies in Erzincan province. Morphological observations of specimens mounted in Hoyer's medium on microslides were made using compound microscopes equipped with differential interference contrasts and phase contrast

systems, under a Nikon E-600 type microscope. Terminology for the chaetotaxy follows that of Hirschmann and Karg (2,3). Collection, extraction, preservation and preparation methods are as described by Bal and Özkan (4). The materials are deposited in the Zoological Museum of Atatürk University, Erzurum, Turkey, and Bal's mite collection, Education Faculty, Erzincan, Turkey.

Genus: *Discourella* Berlese, 1910

Chelicera without nodus, hyalin appendage finger-shaped and circular-ended, and sometimes sharpened; sensillum distale occurs at proximal and moved ventrally; a shield of denticle and cavícula present; ratio of movable digit to fixed digit 1.15-3.5; ratio of middle part to movable digit 3-6.8; movable digit with sensillar process; condilus medium-sized and stick-shaped; corniculi horn-shaped; hypostomal lacinae long and two-branched, sometimes multi-branched distally; protosternum smooth

or far from each other positioned through end, and its sides or surfaces denticled; denticles rarely connected with each other with transverse elevations.

C₁ and C₂ arise on tubercles; deutosternum fused, and bearing 2-5 rowed denticles; C₁ long, simple or branched; C₂-C₄ denticled at both sides; C₄ reaches base of C₃; epistome one or two sharp-ended, occasionally branched like a bunch, its base smooth or denticled, apically dispersed or forked in moderate deep; lacinae of tritosternum with 2-6 branches, bearing minute denticles; corniculi horn-shaped.

Species: *Discourella modesta* (Leonardi, 1899)

Female

Idiosoma egg-like, average 467 µm in length and 333 µm in width; pygidial shield short and widened, by bordering dorsal plate posteriorly; dorsal setae long, needle-like and reach following second setae; dorsal marginal shield bears 24 pairs of setae, each arising from a chitinous shield; a considerable part of dorsal shield and anterior cape with squamous ornament, these also found around medial setae sparsely; I4, Z5 setae occur on a single shield; other pygidial shields with single seta, all pygidial setae denticulate and curved through the posterior end (Figs. 1,2).

C₁, C₂ and C₃ hypostomal setae needle-shaped; C₂-C₄ thorn-like; C₁ twice as long as lacinae; C₄ bearing minute denticles; C₄ do not reach base of C₃, in contrast, C₂ reach base of C₁; C₃ very long and lies up to base of C₁; lacinae feather-like, with denticles laterally, its base widened and without denticles; hypostomal constriction occurs between C₃-C₄ (Fig. 3A); epistome with denticles that gradually shorten from base to tip, middle part slightly thicker than tip and base part (Fig. 3B); tritosternum dome-like, but slightly widened close to tip, extended part branched at tip, middle part longer than others and bearing thin denticles (Fig. 3C); chelicerae without nodus; movable digit with one small denticle and 23.3 µm in length, distance between jointed part and articulation point 90 µm (Fig. 3D).

Coxae I separated; epigynial shield missile-shaped, occurs coxae II and IV, and its lateral and posterior sides bearing small pits; st1 located in front of genital shield. However, second, third and fourth sternal setae present at both side of shield laterally, and the fifth found back of the shield; peritremae located coxae II-IV, its anterior

prolongation slightly twisted, stigmatal opening widened, and not bearing posterior extension; ventral shield possess seven pairs of needle-like setae, three of them small and alike sternal setae, the other four pairs of setae resembling dorsal setae; each marginal setae arises from a unique shield (Fig. 2).

Legs short, thick and strong; all legs bear a pair of powerful claws apically; leg chaetotaxy normal, setae smooth and thorn-like; leg femora possess a chitinous squamosal trotter, whip setae of leg I extremely long, and the same length as tarsi (Figs. 4A,B,C,D).

Deutonymph

Idiosoma 385 µm in length and 290 mm in width; dorsal plate entire, ornamented with shallow pits, moreover separation line of lateral and pygidial plate distinct; dorsal setae needle-like, distally spatulate, each setae arising on chitinous bulges (Fig. 5). Sternal plate with saw denticled anteriorly, bearing superficial pits; sternal setae short, straight and thorn-like; a pair of short, smooth and thorn-like setae occurs posterior end of sternal plate; anal plate circular, posterior end saw-denticled, pitted superficially; unchitinous area that encircles anal plate possesses three pairs of long, straight and thorn-like setae arising on small shields; setae on anal plate of different size; endopodal plate with distinct pores; peritrema straight and less twisted (Fig. 6). Other features as in females.

Protonymph

Idiosoma 370/250 mm in size; dorsal plate resembles tip of a spear, with big superficial pitted; dorsal plates possess long, five needle-like pairs of setae; lateral plates without setae; pygidial plate widened laterally; J1, J2 and Z1 setae short and arise on small shields; Z1, J2 and J4 seta denticled; other setae occur on chitinous bulges; tip of setae not widened (Fig. 7).

Larvae

Idiosoma 210-225/145-180 mm in size; shield ornamentation as in protonymphs; corniculi horn-like and with minute denticles apically; antero-lateral side of hypostomal band limited with sharp denticles; fused back part of hypostome with three bands, carrying denticles of different size; C₁ straight and needle-shaped; C₃ setae equal to half of C₁ and carrying few lateral denticles (Figs. 8,9). Figures and features were taken from Kaczmarek (5), since larvae were not caught in our study.

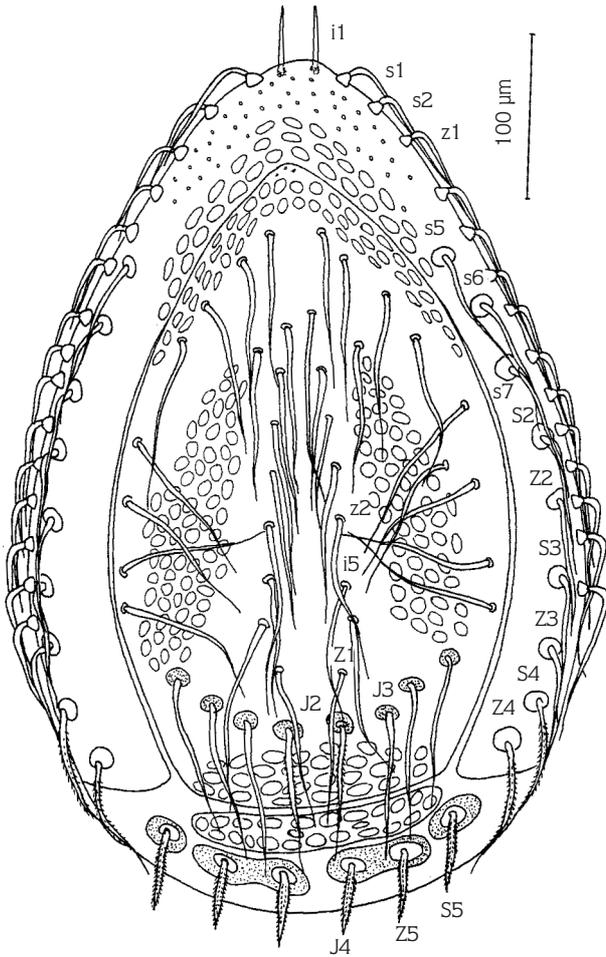


Figure 1. *Discourella modesta*: Female: Dorsal view.

Examined Specimens and Localities

Erzincan: Terzibaba cemetery, 6.7.1997, 18 ♀, 6 DN.; Armutlu village, 23.7.1997, 79 ♀, 9 DN.; Bahçe Kültürleri Enstitüsü, 23.7.1997, 41 ♀, 16 DN.; Devlet Karayolları Şantiyesi, 23.7.1997, 131 ♀, 88 DN.; Ulalar, 23.7.1997, 146 ♀, 60 DN.; Işıkpınar, 20.8.1997, 11 ♀; Geyikli village, 2.9.1997, 159 ♀, 46 DN.; Buğdaylı village, 2.9.1997, 16 ♀; Küçük Çakırman village, 2.9.1997, 6 ♀; 20.10.1997, 37 ♀; Çatalören village, 1.12.1997, 186 ♀, 61 DN., 1 PN.; Akyazı and Ekşisu, 5.12.1997, 280 ♀, 61 DN., 1 PN.; Armutlu village, 26.12.1997, 97 ♀; Terzibaba cemetery, 26.12.1997, 132 ♀, 44 DN.; Ulalar, 26.12.1997, 256 ♀, 12 DN.; Mollaköy, 3.1.1998, 179 ♀; Handere, 20.1.1998, 5 ♀; Ulalar, 02.02.1998, 89 ♀, 14 DN.; Işıkpınar, 2.2.1998, 53 ♀; Geyikli village, 15.02.1998, 9 ♀; Cevizli village, 13.3.1998, 3 ♀;

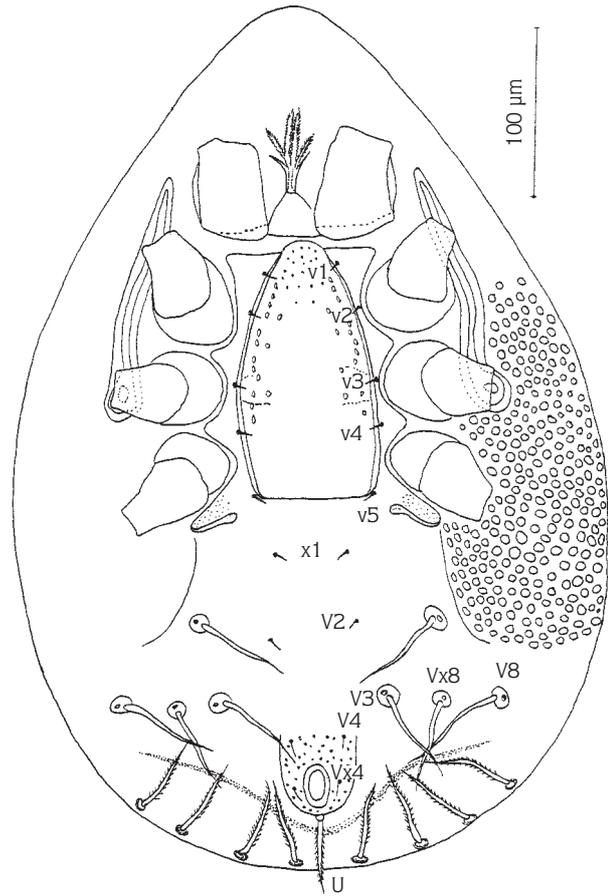


Figure 2. *Discourella modesta*: Female: Ventral view.

Işıkpınar village, 13.03.1998, 1 ♀; Saztepe, 19.3.1998, 135 ♀; Terzibaba cemetery, 26.3.1998, 56 ♀; Çatalören village, 29.4.1998, 86 ♀; Altıntepe, 29.4.1998, 56 ♀; Ulalar, 29.4.1998, 803 ♀, 166 DN.; Akyazı village, 9.5.2001, 16 ♀; 30.5.2001, 24 ♀; Armutlu village, 07.06.1998, 47 ♀; Akyazı village, 9.6.1998, 3 ♀; Ulalar, 09.06.1998, 4 ♀; Buğdaylı village, 13.6.1998, 61 ♀; 62 DN., Bahçe Kültürleri Enstitüsü, 13.6.1998, 138 ♀.

Çayırılı: Esendoruk village, 8.12.1999, 16 ♀, 4 DN.; Yaylakent, 26.11.2000, 166 ♀, 45 DN., 1 PN.

İliç: 22.4.2000, 25 ♀, 22 DN.

Kemah: 22.4.2000, 17 ♀.

Kemaliye: Dutluca village, 21.11.2000, 14 ♀, 9 DN.; Başpınar village, 4.4.2001, 16 ♀, 5 DN.; Dutluca village, 30.4.2001, 61 ♀, 22 DN., 1 PN.; Yeşilyurt village, 21.5.2001, 9 ♀; Çaldağı, 5.6.2001, 44 ♀, 16 DN., 1 PN.;

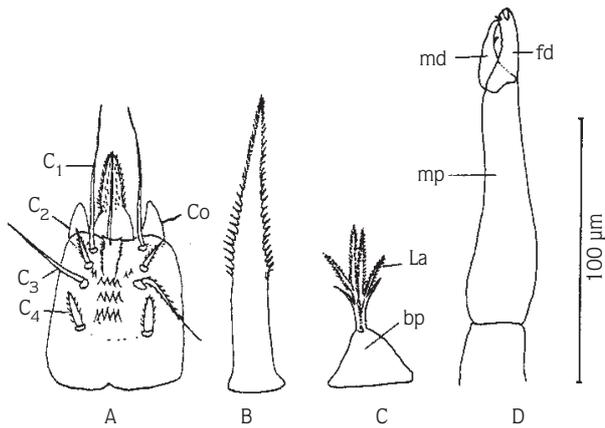


Figure 3. *Discourella modesta*: Female: A) Ventral view of gnathosoma. B) Epistome C) Tritosternum. D) Chelicera.

Otlukbeli: Karacaören village, 26.11.2000; 2 ♀, 9 DN.

Tercan: Mercan district, 5.12.1999, 61 ♀, 46 DN, 1 PN.

Üzümlü: Altintepe, 16.11.2000, 68 ♀, 43 DN., 1 PN.; Karakaya village, 30.4.2001, 6 ♀.

Specimens were collected from soil and litter, evergreen, deciduous and some fruit trees, such as pine (*Pinus nigra*), (*P. sylvestris*), spruce (*Picea orientalis*), poplar (*Populus alba*), weeping willow (*Salix babylonica*), tremulous poplar (*Populus tremula*), azarole (*Crataegus orientalis*), acacia (*Robinia pseudoacacia*), ash (*Fraxinus excelsior*), oak (*Quercus robur pedunculiflora*), bamboo (*Typha shuttleworthii*), wild pear (*Pyrus eleagnifolia*), pear (*Pyrus vulgaris*), apricot (*Prunus armeniaca*), plum (*Prunus domestica*, *Prunus divericata*), and apple (*Pyrus malus*), and also under some shrubs and ornamental plants, such as dropwort (*Spirea x vanhouttei*) and firethorn (*Pyracantha coccinea*), from gardens, orchards and cemeteries; from soil, litter, decaying wood and grass under shrubs, from the surroundings of pools and both sides, of drainage canals in gardens, and from soil, litter and decaying feces from dungy areas and meadows. Samples were extremely wet.

Discussion

Discourella modesta (Leonardi, 1899) is known in various European countries, as mentioned before (2,3). The fact that the species has also been collected in Turkey shows that the zoogeographical distribution of *D. modesta* (Leonardi, 1899) is wider than previously

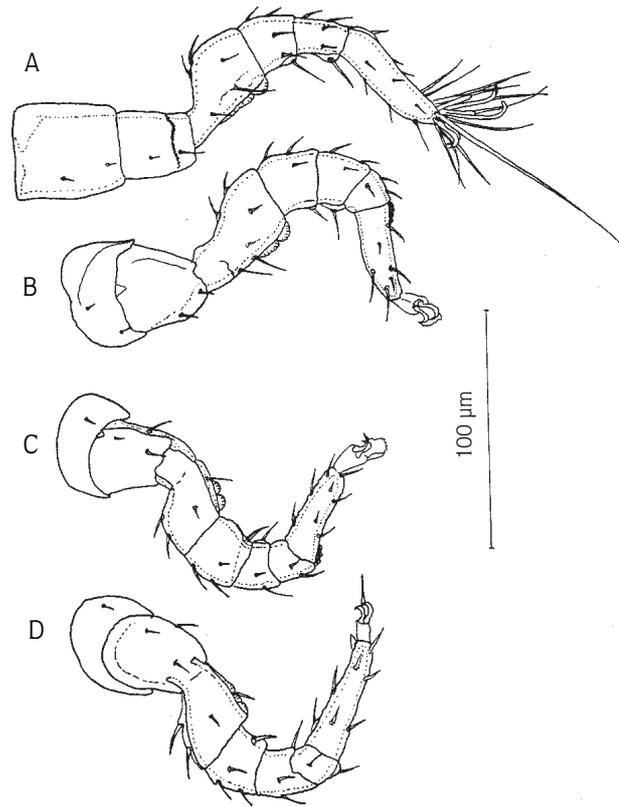


Figure 4. *Discourella modesta*: Female: A) Leg I. B) Leg II. C) Leg III. D) Leg IV.

believed and that it is not a continent-endemic species (6,7), (Fig. 10).

Only a few *Discourella* larvae have been recorded, such as *D. gracilis* Hirschmann 1973, *D. modesta* (Leonardi, 1899), *D. dubiosa* (Schweizer, 1961) and *D. cordieri* (Berlese, 1916), although more than 70 species are known (2,3,5).

In order to simplify classification of the genus species groups have been established by Hirschmann and Wisniewski (2). In such groupings, *D. modesta* (Leonardi, 1899) has been situated in the same group as *D. dubiosa* (Schweizer, 1961), *D. eucoma* (Willmann, 1951), *D. ishikawai* Hiramatsu 1979, *D. modestasimilis* Hiramatsu et Hirschmann 1979 and *D. woelkei* Hirschmann 1975. The species close to *D. dubiosa* (Schweizer, 1961), especially from the dorsal view, *D. modesta* (Leonardi, 1899), has been distinguished from the very similar species *D. dubiosa* (Schweizer, 1961) by I4 and Z5 setae arising on a single shield. The other important feature is

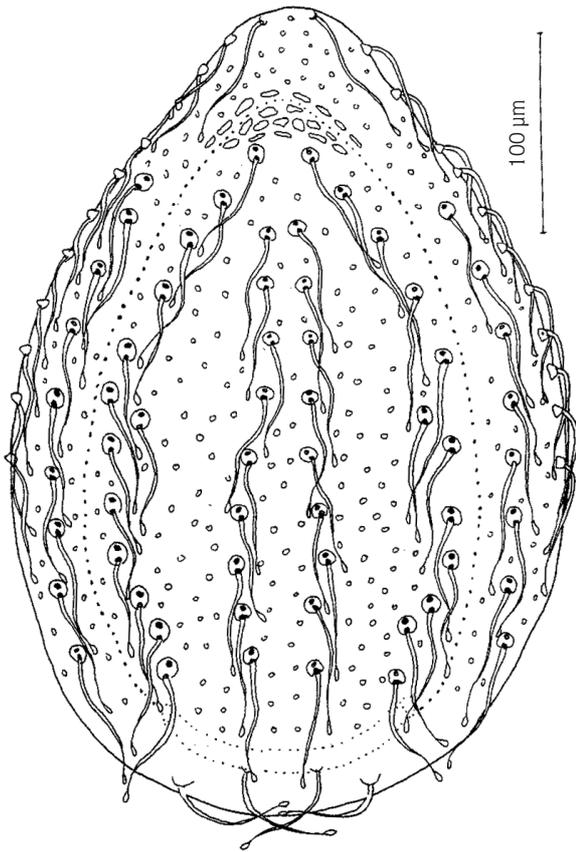


Figure 5. *Discourella modesta*: Deutonymph; Dorsal view.

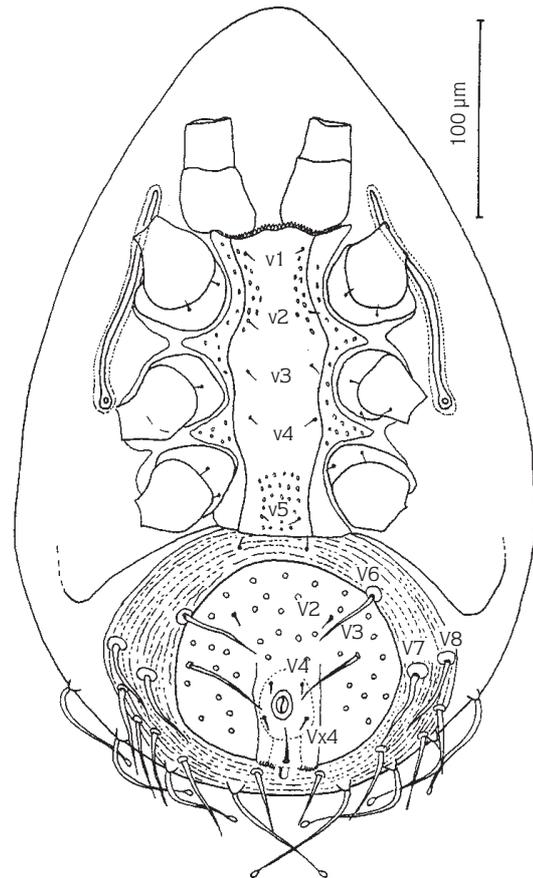


Figure 6. *Discourella modesta*: Deutonymph; Ventral view.

seen in the epigynial shield that is bullet-shaped and occurs among coxae, its surface containing small pits laterally. Sometimes the shape of the epigynial shield was considered very important and was used in the differentiation of uropodids. In such an approach, a table was drawn up for 258 uropodid species, including *D. modesta* (Leonardi, 1899). In this table, the ratio of length to width of the epigynial shield was 1.92 for the species (2,8,9,10).

Although the features of our specimens have shown agreement those given before, some characteristics illustrated by Hirschmann and Zirngiebl-Nicol are considerably differentiated in ours, such as, the coxal area having large pits and superficial, deep cavities, and deutonymphs with 19-20 pairs of lateral setae (10).

Zirngiebl-Nicol re described six known *Discourella* species, including nymphs and females of *D. modesta*

(Leonardi, 1899). In the last study, the genus was reviewed again, and the variation intervals of characters, developmental stages, chaetotaxy, synonyms, localities, size and morphological features given (8,10,11).

Kaczmarek (5) emphasized that the epistome of the deutonymph and larva was dagger-like, with strong lateral denticles posteriorly and short denticles anteriorly, split into two branches apically but branches not separated; base part widened, size and number of denticles variable, hyaline appendage of chelicerae long, the tip of the epistome has three pair of denticles that longer than the others, the epigynial shield of females egg-shaped and rounded anteriorly (8).

Consequently, detailed knowledge of the larvae is not going to be possible in the near future. This may become fact with long-term studies on the ecology, developmental biology and localities of the species.

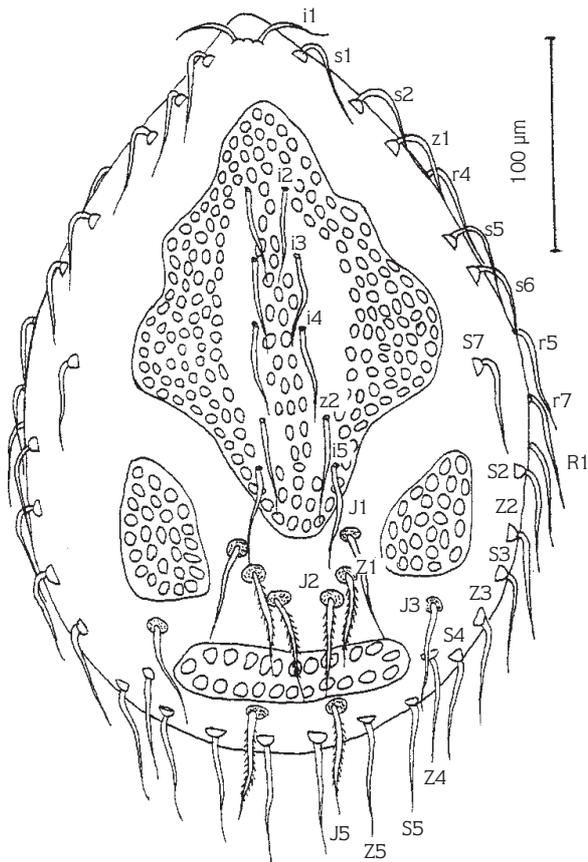


Figure 7. *Discourella modesta*: Protonymph; Dorsal view.

Acknowledgment

The authors would like to thank the Scientific and Technical Research Council of Turkey (TÜBİTAK) for financially supporting this research under Contract No: TBAG-1784.

Abbreviations

bp.: base part of chelicerae; C₁-C₄: hypostomal setae; Co.: corniculi; DN.: deutonymphe; fd.: fixed digit of chelicerae; i-J: dorsocentral setae series; La.: lacinae; md.: movable digit of chelicerae; mp.: middle part of chelicerae; s-S: lateral setae series; r-R: marginal setae series; PN.: protonymphe; U: posterioranal setae; v-V: ventral setae series; z-Z: mediolateral setae series.

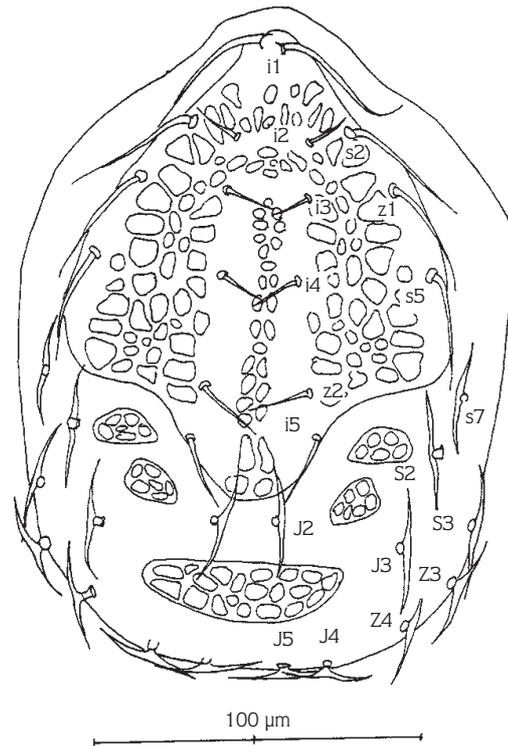


Figure 8. *Discourella modesta*: Larva; Dorsal view (after Kaczmarek, 1983).

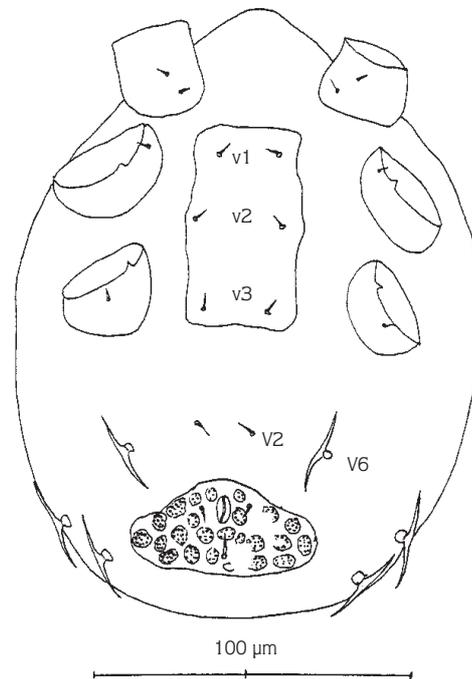


Figure 9. *Discourella modesta*: Larva; Ventral view (after Kaczmarek, 1983).

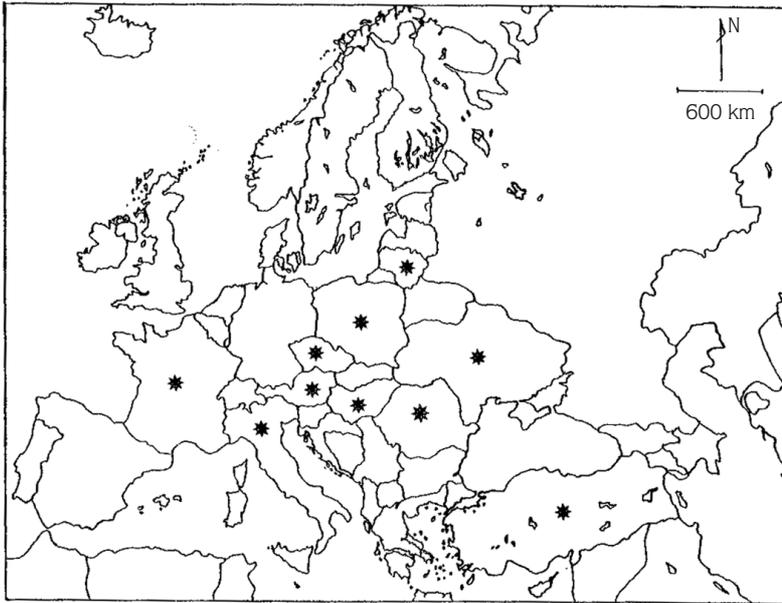


Figure 10. Distribution of *Discourella modesta* (Leonardi, 1899) on the world (★: recorded countries)

References

1. Wisniewski, J., Stand der Uropodiden-Forschung bis Ende 1993. *Acarologia*, 34 (3): 227-231, 1998.
2. Hirschmann, W., and Wisniewski, J. Die Uropodiden der Erde. *Acarologie*, 40: 1-466, 1993.
3. Karg, W., Acari (Acarina), Milben Unterordnung Parasitiformes (Anactinochaeta), Uropodina Kramer, Schildkrötenmilben. Fischer Verlag, Jena, (69): 1-203, 1989.
4. Bal, D.A., and Özkan, M., Two New Species of *Nenteria* Oudemans, 1915 (Acari: Uropoda: Trematuridae) for Turkey. *Turk. J. Zool.*, 24, 351-356, 2000.
5. Kaczmarek, S., Larve und Deutonymphe von *D. modesta* (Leonardi, 1899) aus Polen (Uropodini, Uropodinae) *Acarologie*, 30 (437): 129-132, 1983.
6. Özkan, M., Ayyıldız, N. and Erman, O., Checklist of the Acari of Turkey. First supplement. *EURAAC Newsletter*, 7, 1, 4-12, 1994.
7. Özkan, M., Ayyıldız, N. and Soysal, Z., Türkiye akar faunası. *Doğa Tu Zooloji D.*, 12 (1): 75-85, 1988.
8. Zirngiebl-Nicol, I., Gangsystematik der Parasitiformes, Wiederbeschreibung von 6 bekannten *Discourella*-Arten (Uropodini, Uropodinae). *Acarologie*, 18 : (113) 21-26, 1972.
9. Hirschmann, W., Gangsystematik der Parasitiformes, Adulten-Gruppen und Rückenflächenbestimmungstabelle von 34 *Discourella*-Arten (Uropodini, Uropodinae). *Acarologie*, 18: (114) 26-29, 1972.
10. Hirschmann, W. and Zirngiebl-Nicol, I., Gangsystematik der Parasitiformes, Sechs neue *Discourella* – Arten. *Acarologie*, 12 (40): 31-35, 1969.
11. Hirschmann, W. and Zirngiebl-Nicol, I., Gangsystematik der Parasitiformes, Die gattung *Discourella* (Berlese 1910) Hirschmann und Zirngiebl-Nicol nov. comb. 1964 (Uropodini, Uropodinae) *Acarologie*, 10 (17) 4-5, 1967.