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# New Uropodina records and species from the Korean Peninsula (Acari: Mesostigmata)*

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**Abstract**. Thirteen Mesostigmata species are recorded from the Korean Peninsula. Two of them *Nenteria koreana* and *Leonardiella koreana* spp. nov. are new to science, and further eleven species are recorded for the first time from the Korean Peninsula.

**Keywords.** Acari, Uropodina, new species, new records, Korean Peninsula.

## INTRODUCTION

Uropodina is a widely distributed soil inhabiting group of the order Mesostigmata which are very diverse in the tropical areas, especially in the tropical rain forests (Lindquist *et al.* 2009). However, the Uropodina fauna of the European countries of Northern temperate zone are extensively studied; more than 100 species are listed from several countries (Poland, Slovakia, Romania, Hungary, Germany (Wiśniewski 1993, Mašán 2001, Kontschán 2008)). In contrary, the temperate region of Asia is scarcely investigated. Only the fauna of Japan, with more than 100 known species, is well known in this region (Wiśniewski 1993). Less than 25 species are listed from the Asian part of Russia, and only 5 species are recorded from China (Chen *et al.* 2008, Ma 2001, Wiśniewski 1993).

Recently two countries (Democratic People's Republic of Korea and Republic of Korea) are found on the Korean Peninsula, which is one of the hardly studied regions of temperate Asia. Wiśniewski (1993) listed only three species (*Discourella koreae* Hirschmann, 1981; *Nenteria koreae* Hirschmann, 1981 and *Trichouropoda rafalskii* Wiśniewski & Hirschmann, 1984) from the Korean Peninsula without providing exact locality data.

Our present paper contains new occurrences of eleven already known species and description of two new species from the Korean Peninsula.

## MATERIAL AND METHODS

The specimens elaborated here were found in the Collection of the Soil Zoology of Hungarian Natural History Museum (Budapest, Hungary) (HNHM) and in the National Institute of Biological Resources, Incheon, Republic of Korea (NIBR). The specimens were cleared in lactic acid and observed in deep and half covered slides, with a scientific microscope. Illustrations were made with the aid of a drawing tube. Measurements are given in micrometers (μm), width of idiosoma was taken at the level of coxae IV.

The specimens examined are deposited in the mentioned collections.

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*Zoological Collectings by the Hungarian Natural History Museum in Korea No. 203

## TAXONOMY

### Trachytidae Trägårdh, 1938

#### *Polyaspinus schweitzeri* (Huțu, 1976)

*Material examined.* One female. As960: Republic of Korea, Jeollanam-do, Gurye-gun, Jirisan, (Mt.). Nogodan, beneath Nogodan shelter, rocky stream in deciduous forest, 1280m, N35° 17.738' E127°31.430', moss from streamside rocks, 15.IX.2010., leg. Hye Woo Byeon, Tae Woo Kim and Murányi, D (NIBR).

*Distribution.* Romania, Slovakia, Poland, Ukraine, Hungary and Korean Peninsula.

### Dinychidae Berlese, 1916

#### *Dinychus kurosai* Hiramatsu, 1978

*Material examined.* One female. As659: Republic of Korea, Jeju-do, Hallasan National Park, same site, moss and soil samples (four different items) were taken from mosses, detritus, litter and upper layers of soil, 30.X.1993., leg. Peregovits, L. and Ronkay, L (NIBR).

*Distribution.* Japan and South Korea

### Trematuridae Berlese, 1917

#### *Trichouropoda ovalis* (C. L. Koch, 1839)

*Material examined.* One male. As571: Democratic People's Republic of Korea, Yanggang-do, NW of Samjiyon, 31 km on Baekdusan (Mt.) road, *Larix vologensis*-forest (not mixed with *Betula pendula*) with rather poor underwood, not far from the tree borderline, sifting decayed trunks, 28.VI.1988., leg. Merkl, O. and Szél, Gy (NIBR).

*Distribution.* Europe and Korean Peninsula.

#### *Trichouropoda shakaii* Hiramatsu, 1979

*Material examined.* One female, two males, and two deutonymphs. As663: Republic of Korea, Jeju-do, Hallasan National Park, tree bark, 30.X.1993., leg. Peregovits, L. and Ronkay, L (NIBR).

*Distribution.* Japan and Korean Peninsula.

### Nenteriidae Hirschmann, 1979

#### *Nenteria japonensis* Hiramatsu, 1979

*Material examined.* One female, two males. As461: Democratic People's Republic of Korea: Pyeonganbuk-do., Myohyangsan (Mt.), soil sample from mixed forest under Hwajangam, to be extracted in Berlese-funnel, 19.VII.1982., leg. Forró, L. and Ronkay, L (NIBR).

*Distribution.* Japan and Korean Peninsula.

#### *Nenteria koreana* sp. nov.

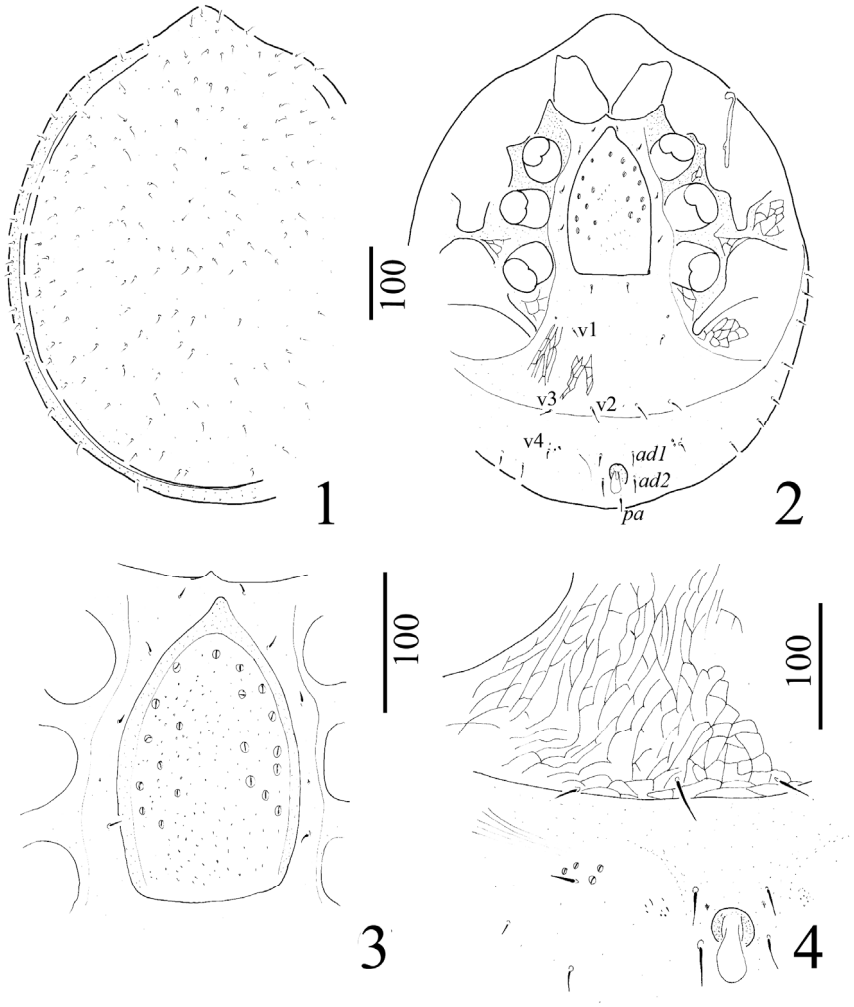
(Figures 1–11)

*Diagnosis.* All dorsal setae short and needle-like, surface of dorsal idiosoma smooth. Four sternal setae present, sternal shield without ornamentation. Ventral shield with reticulate sculptural pattern, ventral setae smooth and needle-like. Genital shield of female scutiform, covered by oval pits. Peritremes hook-shaped.

*Material examined. Holotype.* Female. As571: Democratic People's Republic of Korea, Yanggang-do, NW of Samjiyon, 31 km on Backdusan (Mt.) road, *Larix volgensis*-forest (not mixed with *Betula pendula*) with rather poor underwood, not far from the tree borderline, sifting decayed trunks of *Larix volgensis*, 28.VI.1988., leg. Merkl, O. and Szél, Gy. *Paratypes*. One female and two deutonymphs; with same data as for holotype. Holotype with a deutonymph paratype deposited in HNHM, female and one deutonymph paratype in NIBR.

*Description*. *Female:* length of idiosoma 670–680 μm, width 530–540 μm (n=2). Shape oval, posterior margin rounded.

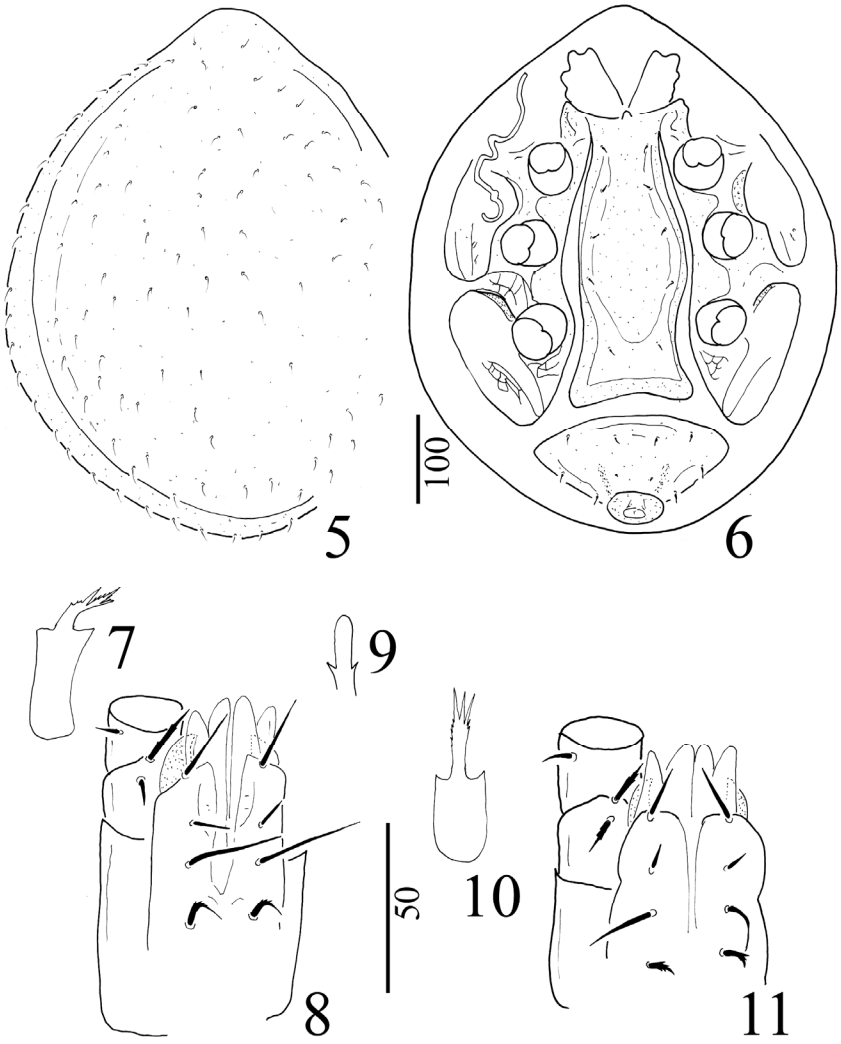
*Dorsal aspect of idiosoma* (Fig. 1). Dorsal and marginal shields fused anteriorly, all dorsal setae




**Figures 1–4.** *Nenteria koreana* sp. nov., female. 1 = dorsal view, 2 = ventral view, 3 = genital shield, 4 = ventrianal region.

short (*ca.* 15–17 µm), smooth and need-like. Marginal setae similar in shape and length to dorsal setae. Dorsal and marginal shields without sculptural pattern.

*Ventral aspect of idiosoma* (Fig. 2). Surface of sternal shield smooth. Four pairs of smooth sternal setae present (ca. 8–10 µm), St1 placed near to anterior margin of sternal shield, St2 at level of anterior margin of coxae II, St3 at level of anterior margin of coxae III, St4 at level of posterior margin of coxae III, St5 situated near the basal line of genital shield. Ventral setae smooth and needle-like, v1 placed at level of pedofossae IV (*ca.* 8–10 µm), v2 (*ca.* 15–16 µm) and v3 (*ca.* 30–32 µm) situated near the metapodal line, v4 (*ca.* 8–10 µm) associated with oval pits and situated at level of *ad1*. Adanal (ad1 *ca.* 20–22 µm; ad2 *ca.* 28–30 µm) and postanal (pa *ca.* 20 µm) setae smooth and needle-like, situated near the anal opening. Ventral shield covered by reticulate sculptural pattern between basis of genital shield and metapodal line, surface of ventral shield smooth (or nymphal skin can be seen) posteriorly to metapodal line (Fig. 4). Genital shield scutiform acuminously pulled out on the anterior edge, its surface ornamented by several oval pits (Fig. 3). Stigmata situated between coxae II and III, peri




**Figures 5–11.** *Nenteria koreana* sp. nov., deutonymph. 5 = dorsal view, 6 = ventral view, 7 = tritosternum of female, 8 = ventral view of gnathosoma of female, 9 = apical part of epistome of female, 10 = tritosternum of deutonymph, 11 = ventral view of gnathosoma of deutonymph.

tremes hook-shaped. Tritosternum with narrow basis, laciniae marginally serrate, apically divided into three branches (Fig. 7).

*Gnathosoma* (Fig. 8). Hypostomal setae h1, h2 and h3 smooth and needle-like, h4 marginally serrate. Setae h2 short, h1 and h4 two times longer than h2, h3 2.5 times longer than h2. Palp trochanter with one long, serrate and one short, smooth seta. Corniculi short and horn-like, internal malae smooth, and longer than corniculi, paralaciniae present. Epistome marginally serrate, apical part smooth and rounded (Fig. 9).

*Deutonymph.* Length of idiosoma 540–610 µm, width 470–500 µm (n=2). *Dorsal idiosoma* (Fig. 4). Dorsal shield without sculptural pattern. Dorsal setae smooth and needle-like (*ca.* 10–12 µm).

*Ventral idiosoma* (Fig. 5). Sternal setae short (*ca.* 8–9 µm), smooth, and needle-like. St1 placed

on level of anterior margin of coxae II, St2 at level of posterior margin of coxae II, St3 at level of central area of coxae III, St4 at level of posterior margin of coxae III, St5 at level of posterior margin of coxae IV. Sternal shield without sculptural pattern, reticulate ornamentation can be found around coxae IV on endopodal shield. Surface of ventrianal shield smooth. Ventral setae smooth, needle-like (*ca.* 8–9 μm), their position illustrated on Fig. 5. Anal opening large, oval, its surroundings without adanal setae. Peritremes long, with several bends. Tritosternum with narrow basis, laciniae marginally serrate and apically divided into three branches (Fig. 10).

*Gnathosoma* (Fig. 11). Corniculi horn-like, with one apical tooth, internal malae smooth and longer than corniculi, paralaciniae present. Hypostomal setae h1 and h3 smooth, h2 and h4 marginally serrate. Epistome marginally serrate. Palp trochanter bearing one long and one short, marginally serrate seta.

Larva, protonymph and male unknown.

*Etymology*. The name of the new species refers to the country where it was collected.

*Remarks*. The reticulate sculptural pattern, which is present in the new species, is a rarely observed character in the genus *Nenteria*. The most of *Nenteria* species have smooth surface or oval pits on ventral shield. Reticulate sculptural pattern can be found in the species *N. chihuahuaensis* Hirschmann, 1978, *N. eutamiasae* Hirschmann, 1978 and *N. microti* Hirschmann, 1978, but the peritremes of these species are S-shaped, in contrary the new species, which has hook-shaped peritremes.

**Urodinychidae Berlese, 1917**

***Uroobovella varians* Hirschmann & Zirngiebl-Nicol, 1962**

*Material examined.* One female and one male. As466: Democratic People's Republic of Korea, Gangwon-do., Geumgangsan (Mt.), sifted material from strongly decayed, moist litter, extracted in Moczarsky-Winkler apparatus, 23.VII.1982., leg. Forró, L. and Ronkay, L (NIBR).

*Distribution.* Central-Europe and Korean Peninsula.

**Uropodidae Kramer, 1881**

***Uropoda spiculata* Hirschmann, 1972**

*Material examined.* Two females. As664: Republic of Korea, Jeju-do Hallasan National Park, leaf litter and soil, 30.X.1993., leg. Peregovits, L. and Ronkay, L (NIBR).

*Distribution.* Japan, Vietnam, and South Korea (Fig. 29).

***Uropoda setata* Kontschán & Starý, 2011**

*Material examined.* One female. As664: Republic of Korea, Jeju-do Hallasan National Park, leaf litter and soil, 30.X.1993., leg. Peregovits, L. and Ronkay, L (NIBR).

*Distribution.* Vietnam and South-Korea.

***Oplitidae Johnston, 1968***

***Oplitis conspicua* (Berlese, 1903)**

*Material examined.* One female. As573: Democratic People's Republic of Korea, Gangwon-do, Geumgangsan (Mt.), Onjong-ri, sifting forest litter and rotten trunks of *Pinus densiflora,* 19.VI.1988., leg. Merkl, O. and Szél, Gy (NIBR).

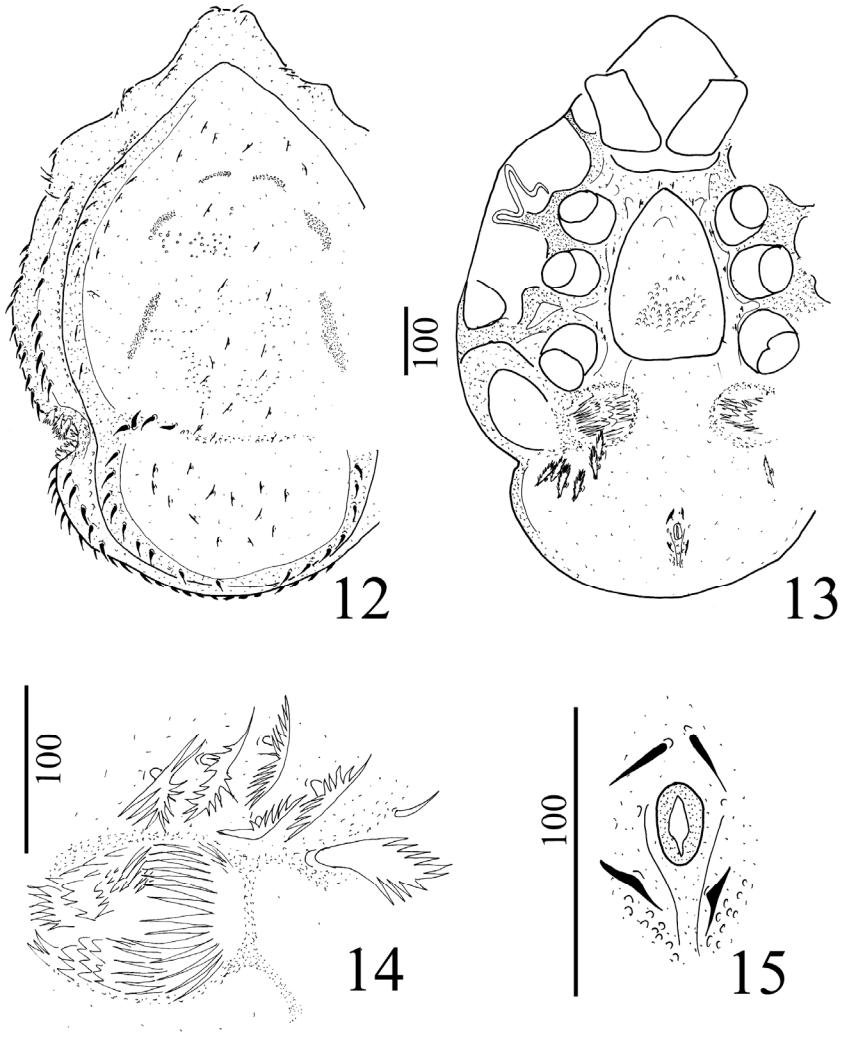
*Distribution.* Europe and Korean Peninsula.

**Trachyuropodidae Berlese, 1917**

***Leonardiella koreana* sp. nov.**

(Figures 12–18)

*Diagnosis*. Dorsal and marginal shields hypertrichous bearing robust and spine-like on marginal shield and on lateral area of dorsal shield, T-



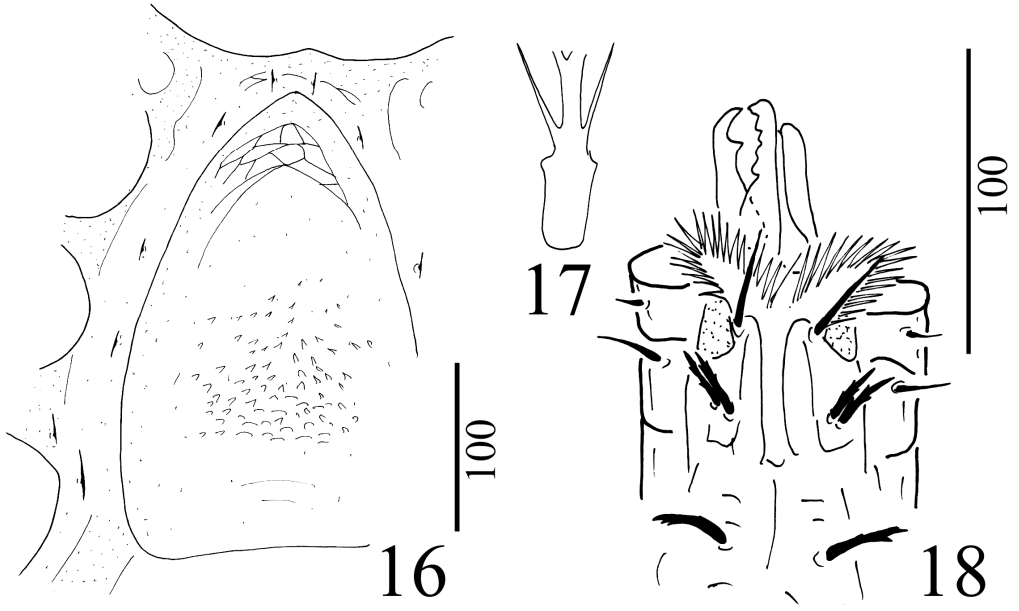

**Figures 12–15.** *Leonardiella koreana* n. sp., female. 12 = Dorsal view, 13 = ventral view, 14 = setae near transversal furrow, 15 = anal region.

shaped setae on central area of dorsal shield and marginally pilose setae near the dorsal incisions. Dorsal idiosoma covered by small, oval pits. Transversal furrows present and bearing wide, apically serrate setae near posterior margin of coxae IV, around these furrows several pilose and smooth setae situated. Surface of ventral shield smooth. Genital shield of females with reticulate sculptural pattern on anterior area and with small spines on central area. Peritremes M-shaped.

*Material examined. Holotype.* Female. As461: Democratic People's Republic of Korea, Pyeonganbuk-do, Myohyangsan (Mt.), soil sample from mixed forest under Hwajangam, extracted in Berlese-funnel, 19.VII.1982., leg. Forró, L. and Ronkay, L. *Paratypes*. One female with same data as for holotype. Holotype deposited in HNHM, paratype in NIBR.

*Description. Female.* Length of idiosoma 870–880 µm, width 600–610 µm (n=2). Shape oval, anterior margin with two pairs of rounded horns, and one pair of incisions below level of coxae IV, posterior margin rounded.

*Dorsal aspect of idiosoma* (Fig. 12). Marginal and dorsal shields completely separated. Dorsal




**Figures 16–18.** *Leonardiella koreana* n. sp., female. 16 = genital shield, 17 = basal part of tritosternum, 18 = ventral view of gnathosoma.

and marginal shields hypertrichous, setae on marginal shield and on lateral area of dorsal shield robust and spine-like, other setae on central area of dorsal shield T-shaped. Three pairs of strongly sclerotized lines present on dorsal shield. Marginal shield wide, its anterior margin with two pairs of rounded horns and one pair of incisions below level of coxae IV, here situated several marginally pilose setae. Dorsal and marginal shields covered by small, oval pits.

*Ventral aspect of idiosoma* (Fig. 13). Sternal shield without sculptural pattern, only its anterior edge covered by reticulate sculptures (Fig. 16). All sternal setae T-shaped, their position illustrated on Fig. 16. Ventral setae T-shaped, setae ad1 smooth, ad2 T-shaped and placed around the anal opening, postanal seta absent (Fig. 15). Transversal furrows bearing wide, apically serrate setae near posterior margin of coxae IV, around these furrows several pilose and smooth setae can be observed (Fig. 14). Ventral shield without ornamentation. Stigmata situated between coxae II and III. Peritremes M-shaped. Genital shield scutiform, without anterior process (Fig. 16). Its surface ornamented by reticulate sculptural pattern near anterior margin and several small, spines on central area. Base of tritosternum narrow, tritosternal laciniae divided into four branches, two central branches maybe apically pilose (not clearly visible), two lateral branches smooth (Fig. 17).

*Gnathosoma* (Fig. 18). Corniculi horn-like, internal malae subdivided into several smooth branches. Hypostomal setae as follows: h1 smooth and placed near the anterior margin of gnathosoma, h2, h3 and h4 marginally serrate. Epistome pilose, movable digit of chelicerae shorter than fixed digit, movable digit with one tooth, fixed digit with four teeth, internal sclerotized node present.

Male, nymphs and larvae unknown.

*Etymology*. The new species is named after the peninsula where it was collected.

*Remarks.* The marginally pilose setae around the transversal furrows and the ornamentation of genital shield of female is an unique character combination in the genus *Leonardiella*.

**Discourellidae Baker & Wharton, 1952**

***Discourella modesta* (Leonardi, 1899)**

*Material examined.* Three female. As973: Republic of Korea, Gyeonggi-do, Gapyeong-gun, Hwaaksan (Mt.), Hwaak pass, at the Hwaak tunnel, forest stream, deciduous forest and open grassland, 875m, N37°59.829' E127°31.558', moss from streamside rocks and bank, deciduous forest litter, 11.IX.2010, leg. Forró, L., Makranczy, Gy., Murányi, D., Sun Jae Park and Jung Do Yoon (HNHM).

*Distribution.* Europe and Korean Peninsula.

***Discourella koreae* Hirschmann, 1971**

*Material examined.* One female. As973: Republic of Korea, Gyeonggi-do, Gapyeong-gun, Hwaaksan (Mt.)., Hwaak pass, at the Hwaak tunnel, forest stream, deciduous forest and open grassland, 875m, N37°59.829' E127°31.558', moss from streamside rocks and bank, deciduous forest litter, 11.IX.2010., leg. Forró, L., Makranczy, Gy., Murányi, D., Sun Jae Park, Jung Do Yoon (HNHM). Four females, As561, Democratic People's Republic of Korea, Gangwon-do, Geumgangsan (Mt.), pathway Kuryong sifted litter material, extracted by Moczarsky-Winkler-funnel, 21.X.1987., leg. Korsós, Z. and Ronkay, L (NIBR). One female, As557, Democratic People's Republic of Korea, Pyeonganbuk-do, Myohyangsan (Mt.), material extracted from the litter of a mixed forest on the bank of the stream Hyangsam by Moczarsky-Winkler-funnel, 08.X. 1987., leg. Korsós, Z. and Ronkay, L (NIBR).

*Distribution.* Korean Peninsula.

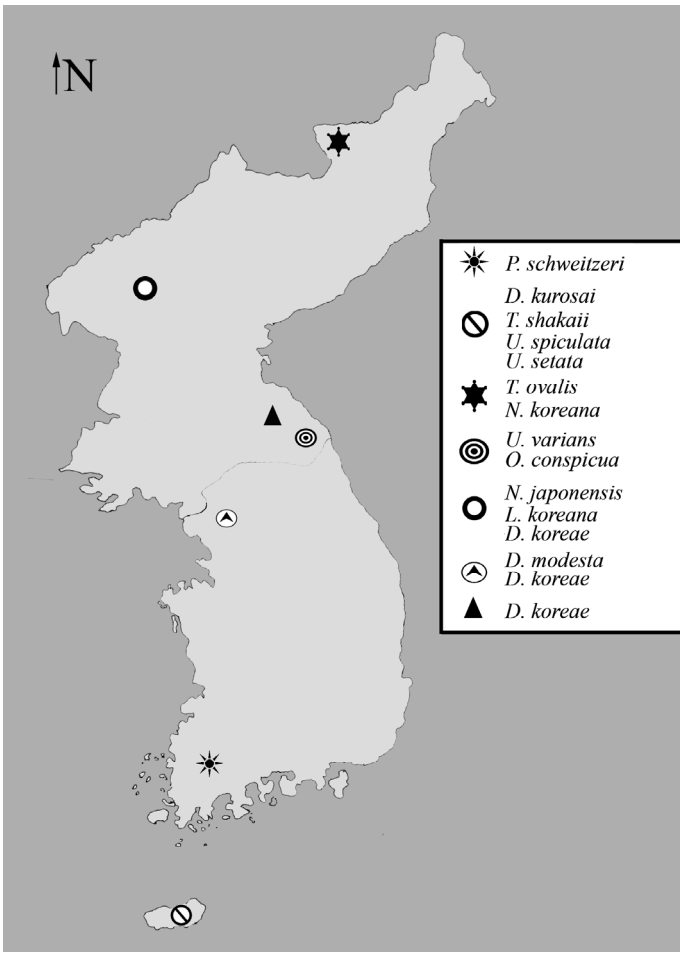



**Figure 19.** Occurrences of the Uropodina species found on the Korean Peninsula

## ZOOGEOGRAPHICAL NOTES

Previously, the Uropodina fauna of the Korean Peninsula belonged to the most scarcely known ones of the world. Three of the presented thirteen species (*Nenteria koreana, Leonardiella koreana* and *D. koreae*) seem to be endemic in the Korean Peninsula, five species (*P. schweitzeri, T. ovalis, U. varians, O. conspicua* and *D. modesta*) have Palearctic distribution, they can be found in Europe and in the Korean Peninsula as well. These species have not yet been recorded from other parts of Asia, but this can be explained by the poor investigation of this group in Asia. Three species (*D. kurosai, T. shakaii* and *U. spiculata*) are shared elements with the Japanese fauna, however *U. spiculata* is known from South-East Asia (Vietnam) as well. Maybe this species is a typical subtropical element of the fauna, similarly to *U. setata* which was described from North-Vietnam.

Regarding the fauna of the two countries of the peninsula (Democratic People's Republic of Korea and Republic of Korea), six species were collected in Republic of Korea (*P. schweitzeri, D. kurosai, T.shakaii, U. spiculata, U. setata* and *D. modesta*) and six species in Democratic People's Republic of Korea (*T. ovalis, N. japonica, N. koreana, U. varians, O. conspicua* and *L. koreana*), only one species was recorded from both countries, this was the endemic species, *D. koreae* (Fig 19.).

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