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& WON YOUNG CHOI

*Uropodina mites from the Korean Peninsula*  
(*Acari: Mesostigmata*)

Zoological Collectings by the Hungarian Natural  
History Museum in Korea No. 204.

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& Won Young Choi**

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## INTRODUCTION

Uropodina mites (= turtle mites) are small or medium sized (300-1200  $\mu\text{m}$ ), yellow or reddish-brown members of the soil fauna, inhabiting soil, leaf litter, moss, lichens and bark of tree. Several species live in association with other arthropods and vertebrates. These mites can be found on the whole world, we know species from the cold Antarctic region to the warm and wet tropical rain forests. The Uropodina is one of the most diverse groups of the mesostigmatid mites, till this time more than 2000 species have been described from all regions of the world (Wiśniewski & Hirschmann 1993).

Uropodina is a widely distributed group of the soil inhabiting mesostigmatid mites which has large diversity in the tropical areas, especially in the tropical rain forests (Lindquist et al. 2009). However the Uropodina fauna of countries situated in the Northern temperate zone is also rich; more than 100 species are presented in several extensively-studied countries (Poland, Slovakia, Romania, Hungary, Germany [Wiśniewski 1993, Mašán 2001, Kontschán 2008]). But, most areas of the northern hemisphere are poorly studied; especially Uropodina fauna of eastern part of temperate 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). 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.

## **AIMS**

*This work has three main aims:*

Investigation of the fauna of Korean Peninsula

Description of new taxa

Summarizing all knowledge about the mites found to facilitate further research on Korean Uropodina.

## **MATERIAL AND METHODS**

The collected specimens 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. Scanning micrographs were taken in the Hungarian Natural History Museum, Budapest, with a HITACHI SN 2600 scanning electron microscope; specimens investigated were spotter coated by golden-palladium. Photographs were taken with a Nikon CoolPix900 digital camera. Measurements are given **in** micrometers ( $\mu\text{m}$ ), width of idiosoma was taken at the level of coxae IV.

The specimens examined are deposited in the mentioned collections.

## MORPHOLOGY OF THE UROPODINA MITES

Uropodina mites are small or medium sized (300-1200  $\mu\text{m}$ ), mostly strongly sclerotised Mesostigmatid mites, which belong to the order Mesostigmata, superorder Parasitiformes. Synapomorph character stages are the short legs; the fusion of sternal shield with ventral shield; variable shape of tritosternal laciniae, epistome, hypostomal setae and peritremes; hypostomal setae situated in a longitudinal row and stigmata placed between coxae II and III.

The body of Uropodina mites consists of the idiosoma and gnathosoma.

Idiosoma. The shape of idiosoma is usually oval, circular, subtriangular or oblong; its posterior margin is rounded.

Dorsal side of idiosoma is covered by a large dorsal shield and a marginal shield (sometimes marginal shield is divided into more or less parts), in several groups of these mites the pygidial shield (or postdorsal shield) may be present. Dorsal and marginal shields are ornamented by several types of sculptural patterns (Fig. 1). Strongly sclerotised prolongation and humps can be found in the family Trachyuropodidae. These shields bear dorsal and marginal setae, the number of setae of dorsal idiosoma is variable, and several unpaired and supplementary setae can be observed on them. The dorsal and marginal setae are very variable in shape and length; most frequent types are illustrated in Fig. 2.

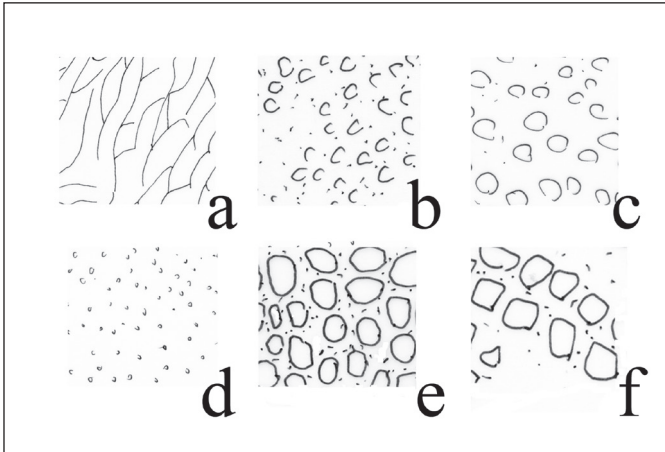


Fig. 1. Sculptural pattern of Uropodina mites (a: reticulate, b and c: oval pits, d: small oval pits, e and f: irregular pits).



Fig 2. Idiosoma setae of Uropodina (a: needle-like, b: phylliform, c: pilose, d: blade-like, e: serrate).

Shields of the ventral side are mostly fused to each other, but in the primitive groups, the sternal and ventral shields are often separated. Sternal and genital shields are situated in intercoxal region. The sternal shield is usually ornamented, but smooth in some species. This shield bears the sternal setae (usually 1-5 pairs or in some cases 6-8 pairs). Genital shield of female



without setae; placed between coxae II and IV (in the family Metagynuridae basal part of female genital shield is situated posteriorly to coxae IV). The shape of female genital shield is oval, linguliform, scutiform etc. (Fig. 3), anterior margin has a short or long process, and surface of genital shield can be ornamented by several types of sculptural pattern (Fig. 1).

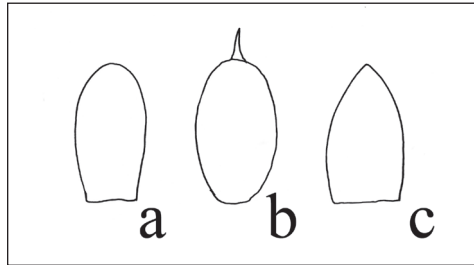


Fig. 3. Shape of female genital shield (a: linguliform, b: oval with anterior process, c: scutiform).

Genital shield of male is oval or circular, rarely covered by ornamentation and in some cases bears two smooth setae. Ventral shield bears numerous setae of different length and shape, usually two pairs of adanal (ad) setae and a single postanal (ps) seta are present near the anal platelet, but in some cases the number of these setae is reduced. The surface of ventral shield is smooth or ornamented by several types of sculptural pattern. The metapodal line, pedofossae and scabbellum may be present. The base of tritosternum is wide or narrow, tritosternal laciniae area divided into several branches.

Gnathosoma. The corniculi and the internal malae are situated on the anterior margin of gnathosoma. The corniculi are horn-like or sword-shaped, internal malae (or gnathosomal laciniae) are long or short, and sometimes are divided apically into branches. The surface of corniculi is smooth or pilose. Labrum is usually hidden or poorly investigated, it bears short hairs apically. There are four hypostomal setae on ventral side

of gnathosoma (usually in a longitudinal row), shape and the length of them are very diverse. Fixed digit of chelicerae bear a sensillus and it is usually longer than movable digit. Internal sclerotised node associated with levantor tendon can also be seen in several groups of Uropodina mites. Basal part of epistome is serrated, apical part is usually pilose, but it is very diverse in the genera of Uropodina mites.

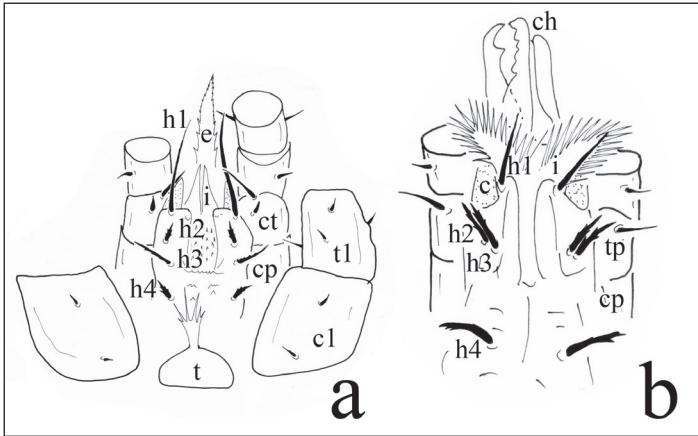


Fig. 4. Ventral view of gnathosoma in a *Discourella* (a) and a *Leonardiella* (b) species (e: epistome, t: tritosternum, i: internal malae, h1-h4: hypostomal setae, c1: coxae I, t1: trochanter I, cp: coxa of palp, tp: palp trochanter, ch: chelicerae).

## A BRIEF HISTORY OF UROPODINA STUDIES

The history of the Uropodina mites can be divided into three large parts. The first period can be characterized by the works of the famous acarologists, namely Antonio Berlese, Carl Ludwig Koch, Giovanni Canestrini, and later Anthonie Cornelis Oudemans, Ivan Trägårdh, Josef Schweitzer, János Balogh and Max Sellnick. This period was finished with Edward William Baker and George W. Wharton's work. Several new species

and genera were described, and many systematic studies were presented as well. But the most species rich regions of the world were scarcely investigated, especially the tropical regions were poorly known. The second period was related to Werner Hirschmann, who, with his co-workers (Irene Zirngiebl-Nicol, Nabu Hiramatsu, Jerzy Wiśniewski, Mariane Huřu) described more than 1500 new species, mainly from the tropical regions. Hirschmann established a new system called "Gangsystematik", which contains ca. 40 genera, but the generic division of these mites was based on very few (primarily gnathosomal) characters. Hirschmann (1979) revised his system followed the recommendation of ICZN and established several new genera and families, but later, unfortunately, neither Hirschmann, nor other acarologists used this new, revised system. Wolfgang Karg, specialist of the Mesostigmata mites, prepared the first comprehensive book about the Uropodina mites of Germany, accompanied with several figures and a key to the European species. In meantime G. Owen Evans, Francoise Athias-Binche and Gerald W. Krantz studied these mites as well and they presented several new species and new observations. It is important to note that Evans divided the Uropodina mites into the two main groups (lower and higher Uropodina). This period closed with the last catalog (1993) of Wiśniewski and Hirschmann. One year later Hirschmann died and the intensive studies on these mites ended. The third period is the current research, now only a few acarologists work with the turtle mites. Jerzy Błoszyk with his colleagues and students studied the ecology of these mites and they have been working on the fauna of Tasmania and Australia (with the Australian mite specialist, Bruce Halliday). Peter Mařán elaborated the Slovakian fauna and described several new species from this country as well. Durmus Ali Bal has been working on the Turkish fauna and his work resulted in several interesting new species. Besides these researchers one of the authors (J. K.) of this book is also working on taxonomy and zoogeography of the Uropodina mites.

## HISTORY OF UROPODINA RESEARCH IN KOREAN PENINSULA

By now, only three species are listed from the whole Korean Peninsula. The first two species [*Discourella koreae* Hirschmann, 1981 (Fig. 5) and *Nenteria koreae* Hirschmann, 1981 (Fig. 6)] were presented from the unsorted soil samples of the Hungarian Natural History Museum. It is not clear, why Hirschmann (1981a, b) described only two species from the Korean Peninsula, because the collection possesses more than one hundred soil samples from this region. Hirschmann deposited the types of these two new species in the mentioned collection, they can be found on slides with registration number HNHM Meso-1229 and HNHM Meso-2612 (Figs 7-8). The third species, *Trichouropoda rafalskii* Wiśniewski & Hirschmann, 1984 was described by Wiśniewski & Hirschmann (1984) on the basis of proto- and deutonymphs (Fig. 9), and two years later Hirschmann & Wiśniewski (1986) found this species in Poland and contributing to the knowledge of this species with description of the adults (Fig. 10). Last paper (Kontschán et al. 2012) is presented as a short faunistic study about the Korean Uropodina mites with the description of two new species.

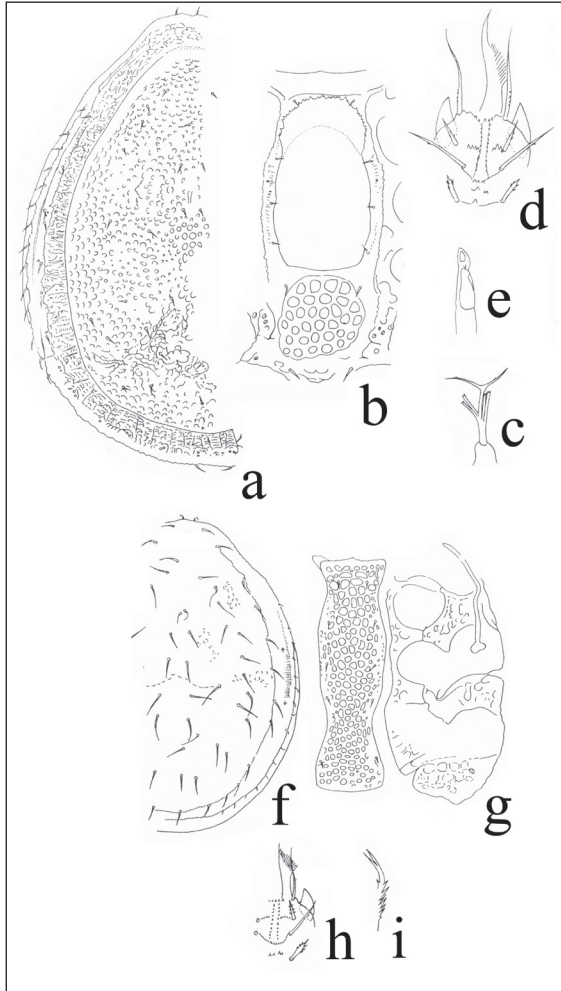


Fig. 5. Original illustration of *Discourella koreae* Hirschmann, 1981 [after Hirschmann 1981, modified, a-e: adults, f-i: deutonymph] (a: dorsal view, b: intercoxal view, c: tritosternum, d: ventral view of gnathosoma, e: chelicerae, f: dorsal view, g: ventral view, h: ventral view of gnathosoma, i: epistome)

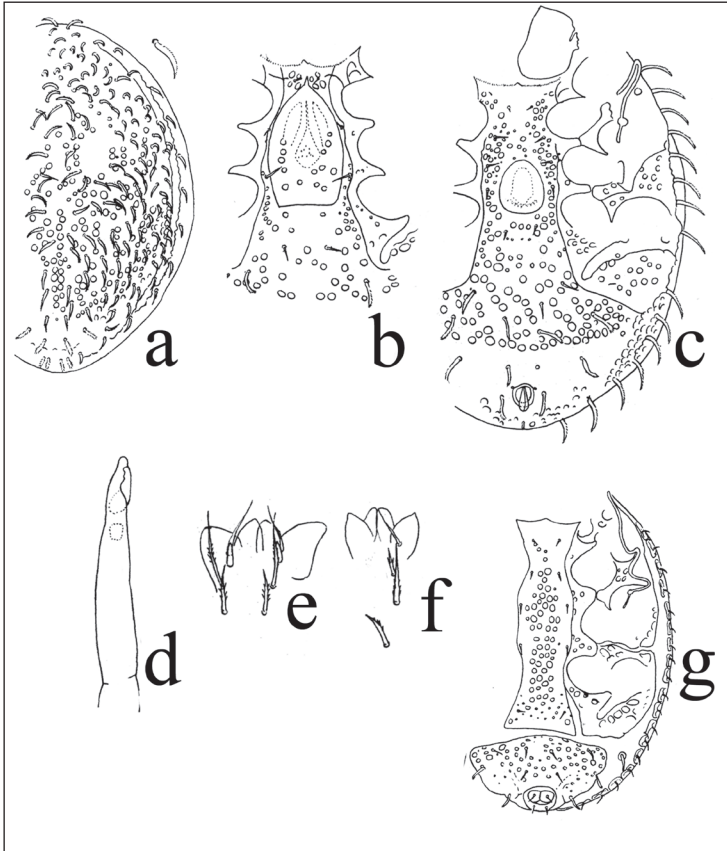


Fig. 6. Original illustration of *Nenteria koreae* Hirschmann, 1981 [after Hirschmann 1981, modified, a-e: adults, f-g: deutonymph] (a: dorsal view, b: intercoxal view of female, c: ventral view of male, d: chelicera, e: ventral view of gnathosoma, f: ventral view of gnathosoma g: ventral view).

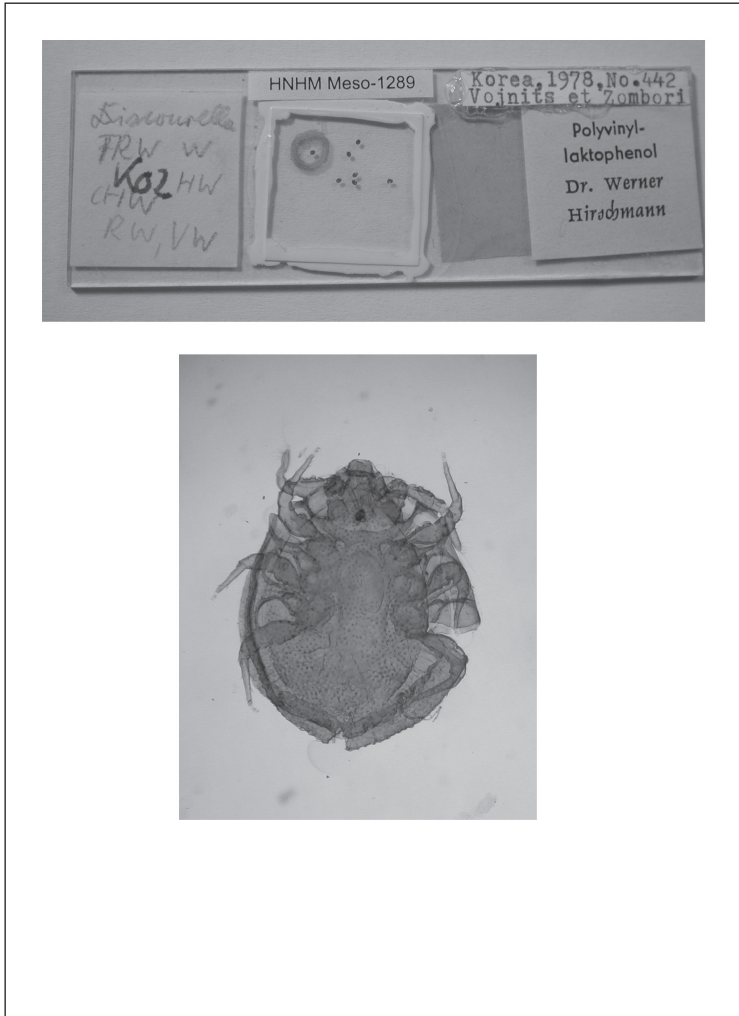


Fig. 7: Photos of the type specimen of *Discourella koreae*.

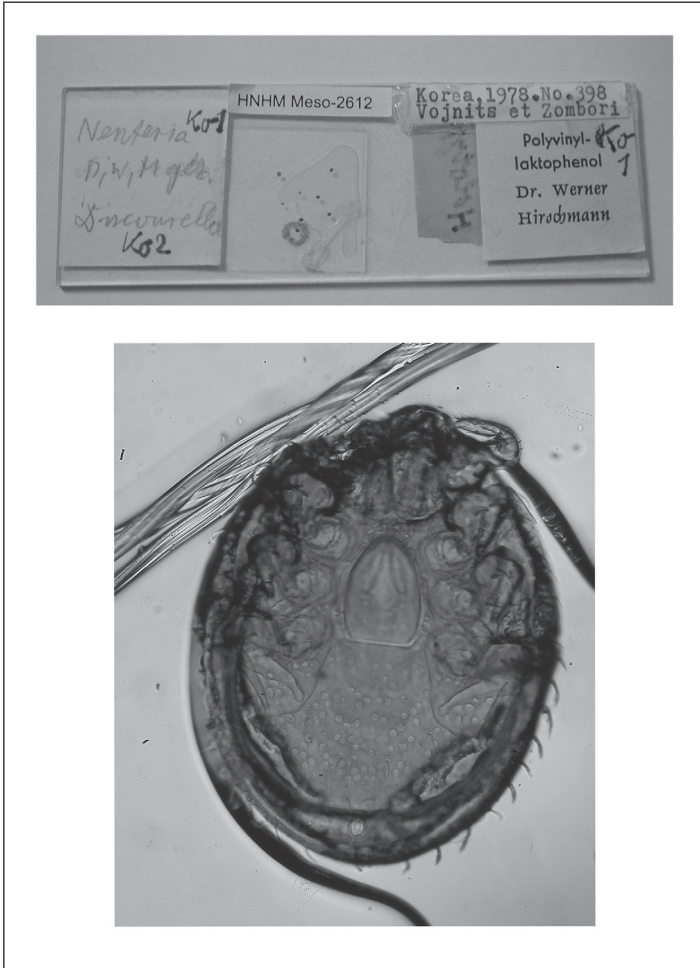


Fig. 8: Photos of the type specimen of *Nenteria koreae*.



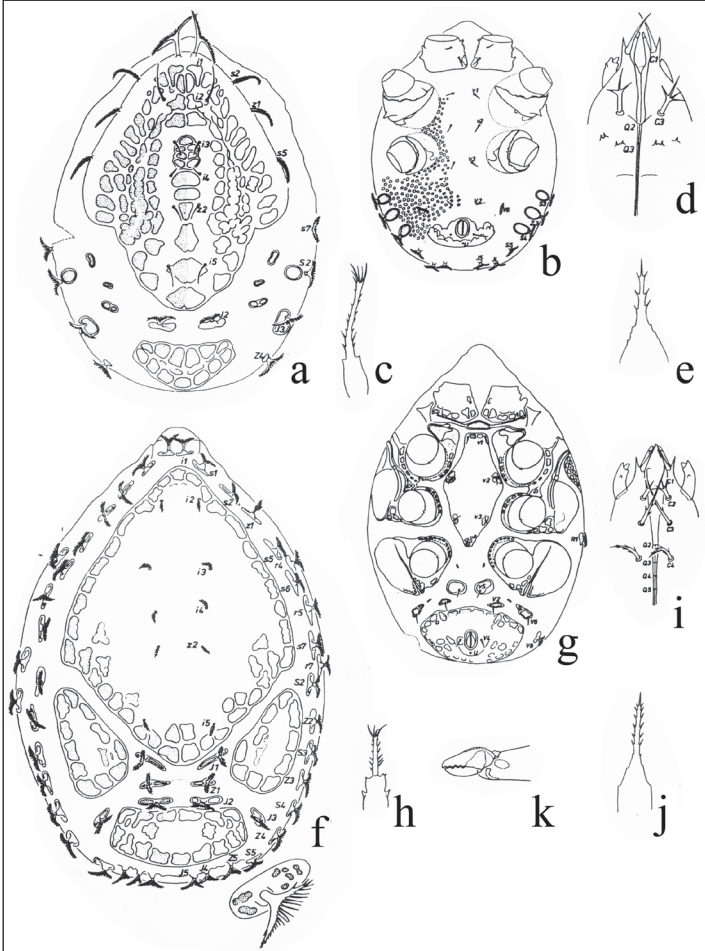


Fig. 9. Original illustration of *Trichouropoda rafalskii* Wiśniewski & Hirschmann, 1984 (after Hirschmann 1984, modified, a-e: protonymph, f-j: deutonymph) (a: dorsal view, b: ventral view, c: tritosternum, d: ventral view of gnathosoma, e: epistome, f: dorsal view, g: ventral view, h: tritosternum, i: ventral view of gnathosoma, j: epistome, k: chelicerae).

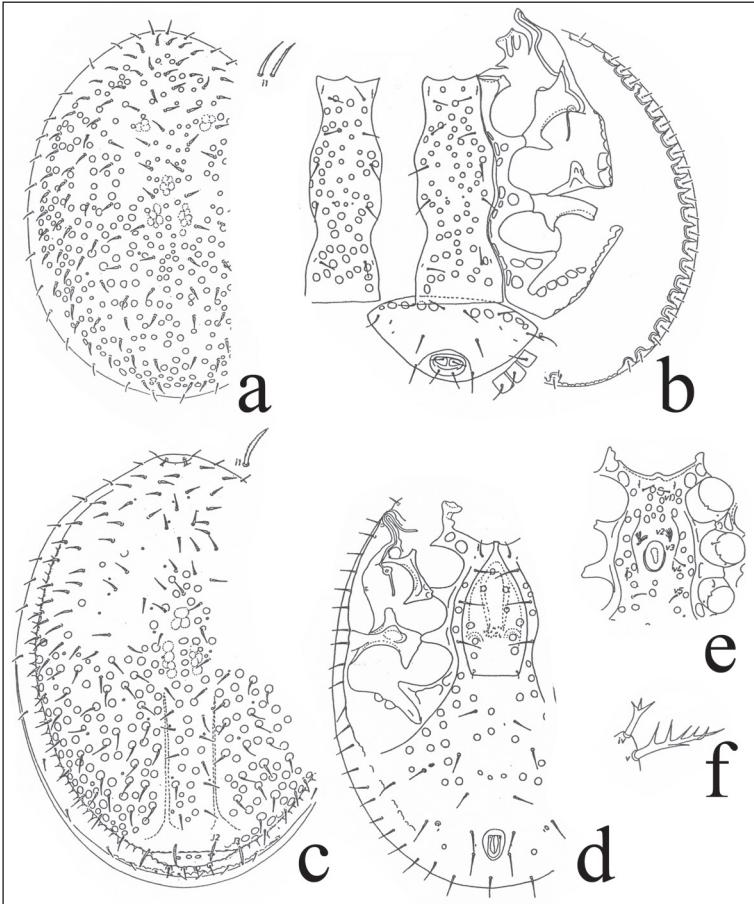


Fig. 10. Original illustration of *Trichouropoda rafalskii* Wiśniewski & Hirschmann, 1984 (after Hirschmann 1986, modified, a-b: deutonymph, c-f: adult) (a: dorsal view, b: ventral view, c: dorsal view, d: dorsal view of female, e: intercoxal region of male, f: setae on palp trochanter).

## RESULTS

The Soil Zoology Collection of the Department of Zoology of the Hungarian Natural History Museum has 127 soil samples from the Democratic People's Republic of Korea and the Republic of Korea, Uropodina mites were found only in 18 soil samples.

### LIST OF LOCALITIES WHICH CONTAINED UROPODINA SPECIMENS

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.

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.

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.

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.

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.

As573: **Democratic People's Republic of Korea**, 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.

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.

As663: **Republic of Korea**, Jeju-do, Hallasan National Park, tree bark, 30.X.1993., leg. Peregovits, L. and Ronkay, L.

As664: **Republic of Korea**, Jeju-do, Hallasan National Park, leaf litter and soil, 30.X.1993., leg. Peregovits, L. and Ronkay, L.

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.

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.

## LIST OF THE SPECIES FOUND

*Polyaspinus schweitzeri* (Huţu, 1976) (Figs 11 a-e, 12)

*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).

*Short description.* Female. Length of idiosoma 800 µm, width 430 µm. Shape of idiosoma oblong, posterior margin rounded.

*Dorsal idiosoma* (Fig. 11a). Dorsal and pygidial shields present, marginal shield divided into small platelets, bearing smooth and needle-like setae. Dorsal shield with characteristic, strongly sclerotised ornamentation and several smooth and needle-like setae. Pygidial shield bearing similar ornamentation and one pair of needle-like setae.

*Ventral idiosoma* (Fig. 11b). Sternal setae short, smooth, and needle-like. St1-St4 situated on sternal shield, St5 placed on small platelets near the basal edges of genital shield. Ventral setae smooth, needle-like, five pairs of shorter ventral setae situated on central area, two pairs of longer setae placed on marginal area of ventral idiosoma. Two pairs of short and needle-like adanal setae and one bulbiform postanal seta situated near the anal opening. Surface of sternal and ventral shields smooth. Genital shield linguliform without ornamentation and anterior process, situated between coxae III and IV. Tritosternum with wide basis, tritosternal laciniae divided into three smooth branches (Fig. 11c).

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

short, marginally serrate setae. Chelicerae without internal sclerotised node, fixed digit longer than movable digit (Fig. 11e).

*Notes to the species.* *P. schweitzeri* is known as a typical Carpathian species, hence its occurrence in the Korean Peninsula is an extreme surprise. The single specimen found differs in small characters from the European specimens, but according to our assumption these differences are not enough to separate the found single specimen and the previously described species on specific or subspecific level.

*Distribution.* Romania, Slovakia, Poland, Ukraine, Hungary and Korean Peninsula (Fig. 12).

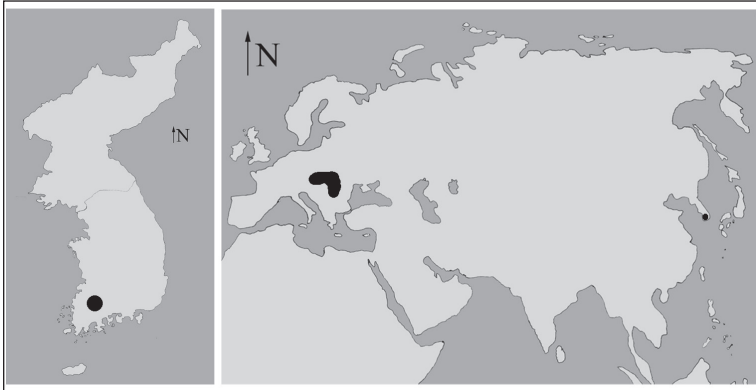


Fig. 12. Occurrences of *P. schweitzeri* in the Korean Peninsula and in the Palearctic region

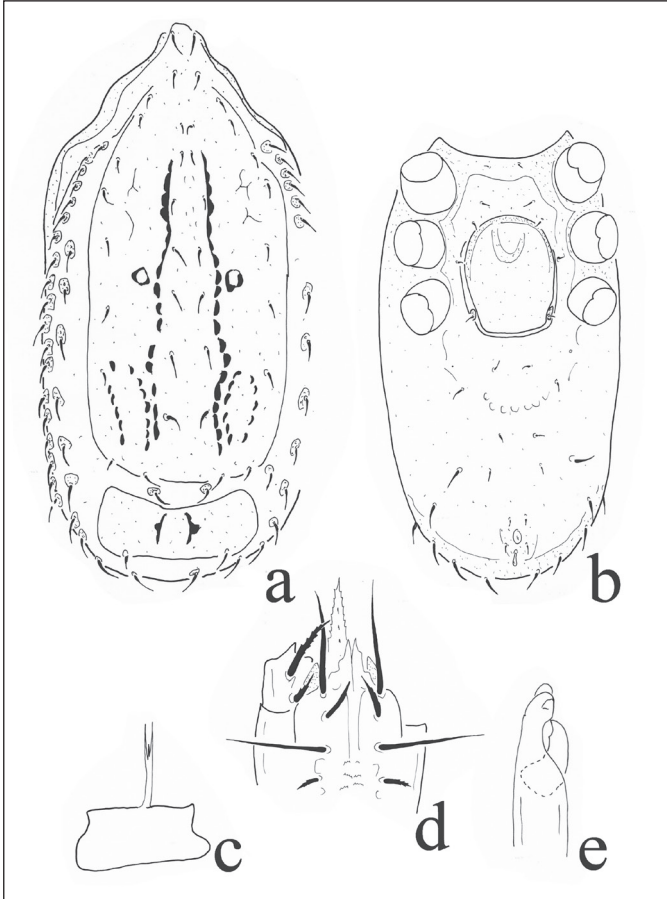


Fig. 11. *Polyaspinus schweitzeri* (Huțu, 1976), female, a = dorsal view, b = ventral view, c = tritosternum, d = ventral view of gnathosoma, e = chelicera.



*Dinychus kurosai* Hiramatsu, 1978 (Figs 13 a-c, 14)

*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).

*Short description.* Female. Length of idiosoma 570  $\mu\text{m}$ , width 300  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 13a). Dorsal and marginal shields completely separated. Both shields covered by oval pits. Dorsal shield bearing short and smooth setae except the caudal area, where four pairs of pilose setae can be found. Marginal shield divided into six small platelets on the caudal region, surface of platelets smooth and bearing pilose setae. Similar setae can be seen on the marginal shield as well.

*Ventral idiosoma* (Fig. 13b). Sternal setae short, smooth, and needle-like. St1-St2 short and situated anteriorly to genital shield, St3-St4 long and placed laterally to genital shield, St5 similar in shape and length to St3 and St4, but placed near the basal line of genital shield. Ventral setae smooth, needle-like, their position illustrated in Fig. 13b. Two pairs of adanal setae and one postanal seta similar in shape and length to ventral setae and situated near the anal opening. Surface of sternal shield ornamented by irregular pits. Ventral shield covered by oval pits. Genital shield linguliform, with short anterior processes and with oval pits in its lateral surface. Tritosternum with wide basis.

*Gnathosoma* (Fig. 13c). Corniculi horn-like, internal malae smooth, apically divided into two small branches and longer than corniculi. Hypostomal setae h1-h3 marginally serrate, h4 shorter than other hypostomal setae and apically serrate.

Epistome marginally serrate. Palp trochanter bearing one long and one short marginally serrate seta.

*Distribution.* Japan and Korean Peninsula (Fig. 14)

*Notes to the biology of the species.* The type species was described from ant nest. The newly collected specimen was found in mosses, detritus, litter and upper layers of soil; hence I think this species is not an obligate myrmecophilous species.

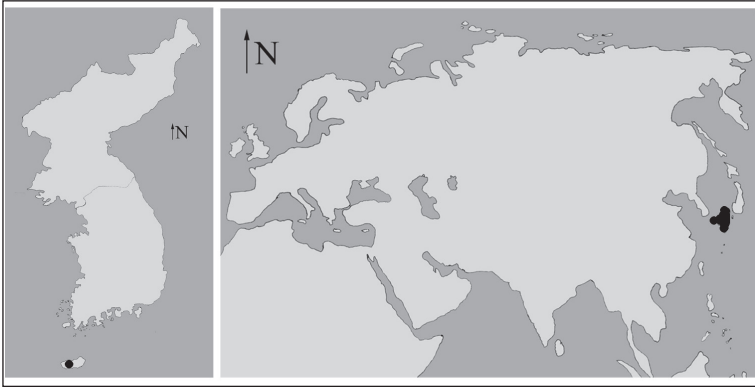


Fig. 14. Occurrences of *D. kurosai* in the Korean Peninsula and in the Palearctic region

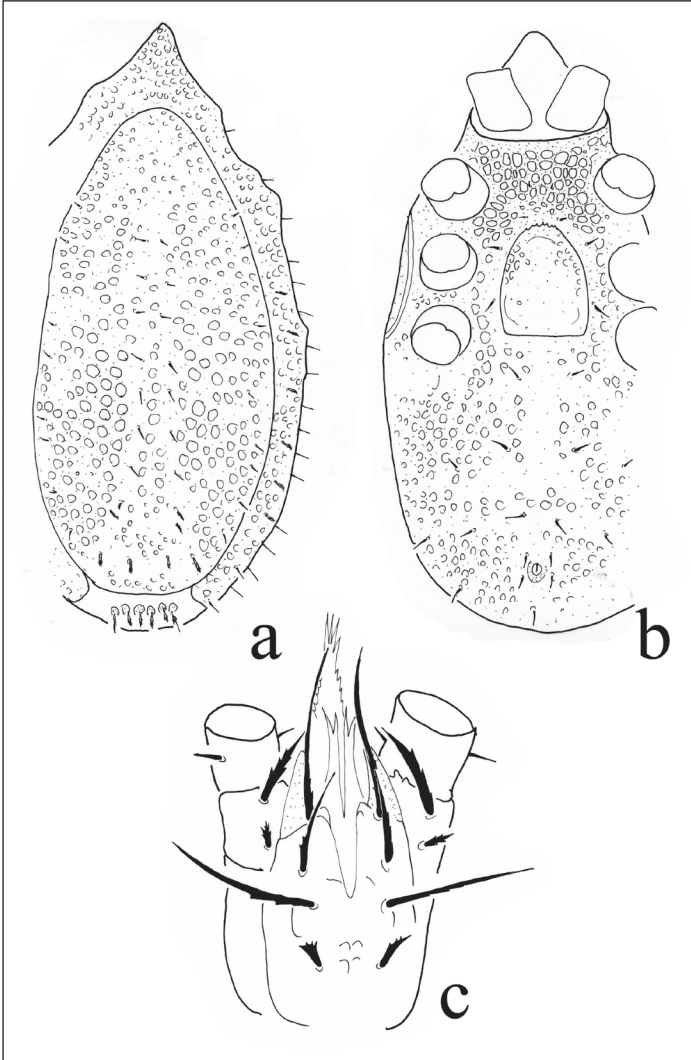


Fig. 13. *Dinychus kurosai* Hiramatsu, 1978, female, a = dorsal view, b = ventral view, c = ventral view of gnathosoma.

*Trichouropoda ovalis* (C. L. Koch, 1839) (Figs 15 a-c, 16)

*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).

*Short description.* Male. Length of idiosoma 840  $\mu\text{m}$ , width 630  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 15a). Dorsal and marginal shields fused anteriorly. Dorsal shield covered by oval pits. Dorsal shield bearing short and smooth setae except the caudal area, where four pairs of pilose setae can be found. Marginal shield with scalloped inner margin and without ornamentation, marginal setae smooth.

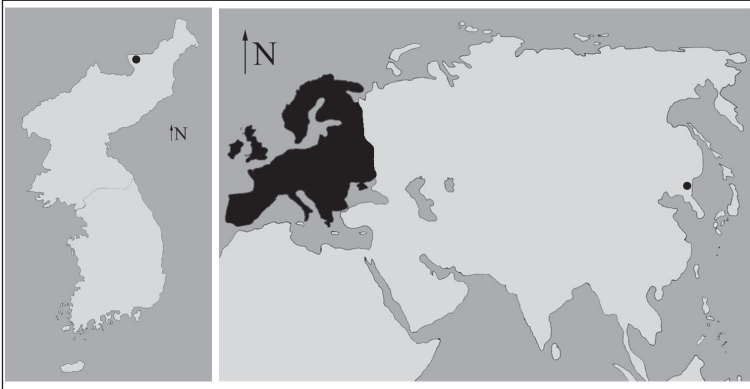
*Ventral idiosoma* (Fig. 15b). Sternal setae short, smooth and needle-like. St1-St2 short and situated on level of anterior margin of coxae II, St2-St3 short and pilose, placed in small depressions, St4-St5 near lateral margins of genital shield. Ventral setae smooth, needle-like, their position illustrated in Fig. 15b. Two pairs of adanal setae and one postanal seta similar in shape and length to ventral setae and situated near the anal opening. Surface of sternal and ventral shields ornamented by oval pits. The margins of the ventral idiosoma covered by web-like sculptural pattern at levels of coxae II and III. Peritremes m-shaped. Genital shield circular without anterior processes and with oval pits on its lateral surface. Tritosternum with narrow basis, laciniae marginally serrate (Fig. 15c).

*Gnathosoma* (Fig. 15d). Corniculi horn-like, with three apical teeth, internal malae smooth and longer than corniculi. Hypostomal

setae h1 smooth, h2-h4 marginally serrate. Epistome marginally serrate. Palp trochanter bearing one long and one short marginally serrate seta.

*Distribution.* Europe and Korean Peninsula (Fig. 16)

*Notes to the biology of this species.* This species is a very common species in the European forest's leaf litters and soils.



*Fig. 16. Occurrences of T. ovalis in the Korean Peninsula and in the Palearctic region*

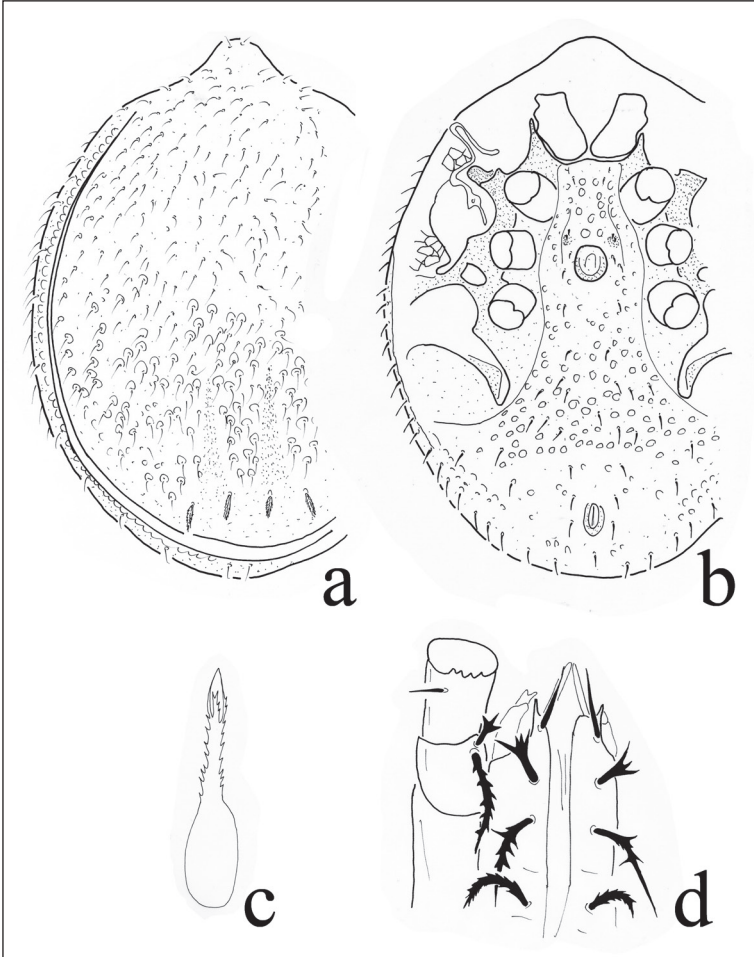


Fig. 15. *Trichouropoda ovalis* (C. L. Koch, 1839), male, a = dorsal view, b = ventral view, c = tritosternum, d = ventral view of gnathosoma.

*Trichouropoda shakaii* Hiramatsu, 1979 (Figs 17 a-c, 18 a-c, 19 a-d, 20)

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

*Short description.* Female. Length of idiosoma 600  $\mu\text{m}$ , width 450  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 17a). Dorsal and marginal shields fused anteriorly. Dorsal shield covered by oval pits. Dorsal shield bearing short and smooth setae. Marginal shield with scalloped inner margin and without ornamented surface, marginal setae smooth.

*Ventral idiosoma* (Fig. 17b). Sternal setae short, smooth and needle-like. St1 situated near anterior peak of genital shield, St2 at level of anterior margin of coxae II, St3 at level of posterior margin of coxae II, St4 at level of anterior margin of coxae III. Ventral setae smooth, needle-like, their positions illustrated in Fig. 17b. Two pairs of adanal setae similar in shape and length to ventral setae and situated near the anal opening, postanal seta absent. Surface of sternal and ventral shields ornamented by web-like sculptural pattern. Genital shield scutiform, without ornamentation and with pointed anterior margin. Peritremes with several bends. Tritosternum with narrow basis, laciniae marginally serrate (Fig. 17c).

*Gnathosoma* (Fig. 17c). Corniculi horn-like, with two apical teeth, internal malae smooth and longer than corniculi. Hypostomal setae h1-h3 smooth, h4 marginally serrate, h3 longer than other hypostomal setae. Epistome marginally serrate. Palp trochanter bearing one long and one short marginally serrate seta.

*Notes to the species.* This species was described on the basis of a single female specimen. This present work is the first contribution to the morphology of the male and the deutonymph.

### *Description of the male and the deutonymph*

*Male.* Length of idiosoma 680-690  $\mu\text{m}$ , width 470-480  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma.* Dorsal and marginal shields fused anteriorly. Dorsal shield covered by oval pits. Dorsal shield bearing short and smooth setae. Marginal shield with scalloped inner margin and without ornamentation, marginal setae smooth.

*Ventral idiosoma* (Fig. 18a). Sternal setae short, smooth and needle-like. St1 absent, St2 placed in a small depression, one pair of lyrifiform fissures situated near anterior margin of sternal shield. Positions of other sternal and several ventral setae are illustrated on Fig. 17a. Ventral setae smooth, needle-like, their shape and length similar to that of in female. Sternal shield with smooth surface, ventral shield with web-like sculptural pattern. Genital shield scutiform, without ornamentation and with pointed anterior margin. Peritremes with several bends (Fig. 18b). Tritosternum with narrow basis, laciniae marginally serrate (Fig. 18c).

*Gnathosoma* (Fig. 18d). Corniculi horn-like, with one apical tooth, internal malae smooth and longer than corniculi. Hypostomal setae h1 marginally serrate, h2 absent, h3 longer than other hypostomal setae and smooth, h4 marginally serrate. Epistome marginally serrate. Palp trochanter bearing one long and one short, marginally serrate seta.

*Deutonymph.* Length of idiosoma 540-550  $\mu\text{m}$ , width 370-400  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.



*Dorsal idiosoma* (Fig. 19a). Dorsal and marginal shields fused anteriorly. Dorsal shield covered by oval pits. Dorsal shield bearing short and smooth setae. Marginal shield with smooth inner margin, marginal setae smooth and associated with oval pits.

*Ventral idiosoma* (Fig. 19b). Sternal setae short, 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 anterior margin of coxae III, St4 at level of anterior margin of coxae IV, St5 at level of posterior margin of coxae IV. Sternal shield covered by small oval pits, reticulate ornamentation can be seen posteriorly to coxae IV, on endopodal and ventrianal shields. Ventral setae smooth, needle-like, their position illustrated on Fig. 19b. One pair of ventral setae situated on small platelets near margin of ventrianal shield. Anal opening large, oval, with one pair of adanal setae. Peritremes long, with several bends (Fig. 19b). Tritosternum with narrow basis, laciniae marginally serrate (Fig. 19c).

*Gnathosoma* (Fig. 19c). Corniculi horn-like, with one apical tooth, internal malae smooth and longer than corniculi. 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.

*Distribution.* Japan and Korean Peninsula (Fig. 20).

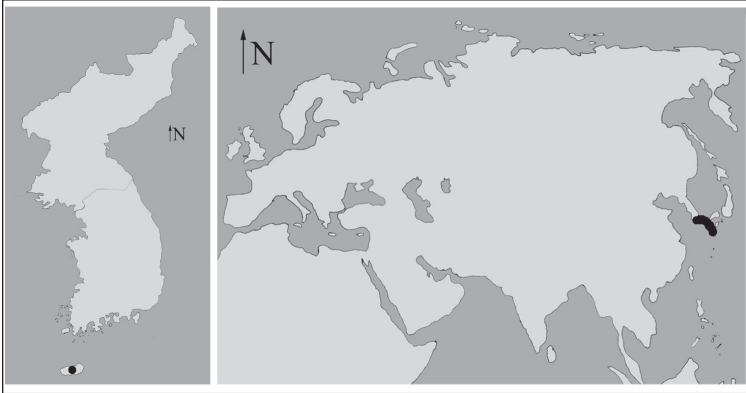


Fig. 20. Occurrences of *T. shakaii* in the Korean Peninsula and in the Palearctic region

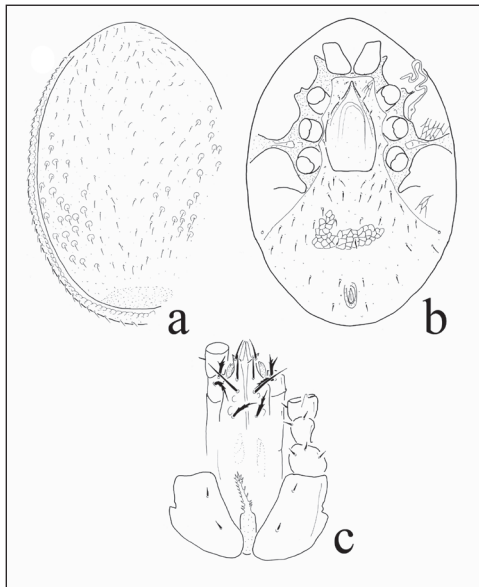


Fig. 17. *Trichouropoda shakaii* Hiramatsu, 1979, female, a = dorsal view, b = ventral view, c = tritosternum and ventral view of gnathosoma.

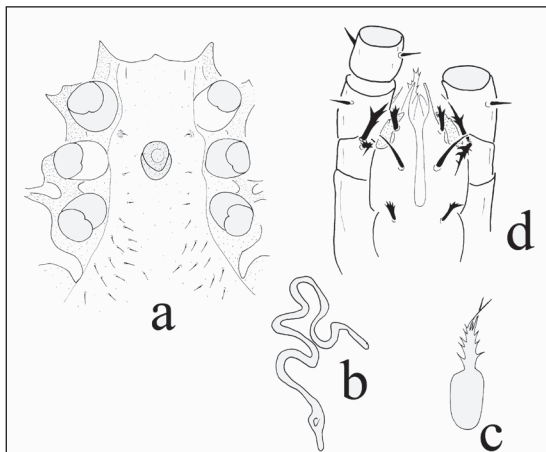


Fig. 18. *Trichouropoda shakaii* Hiramatsu, 1979, male, a = intercoxal region, b = peritreme, c = tritosternum, d = ventral view of gnathosoma.

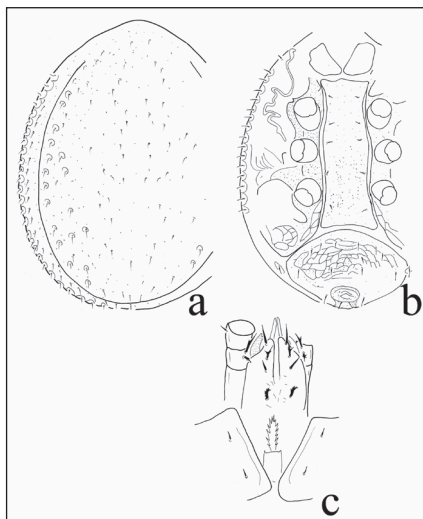


Fig. 19. *Trichouropoda shakaii* Hiramatsu, 1979, deutonymph, a = dorsal view, b = ventral view, c = tritosternum and ventral view of gnathosoma.

*Nenteria japonensis* Hiramatsu, 1979 (Figs 21 a-f, 22)

*Material examined.* One female, two males. 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. (NIBR).

*Short description.* Female. Length of idiosoma 500  $\mu\text{m}$ , width 370  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 21a). Dorsal and marginal shields fused anteriorly. Dorsal and marginal shields covered by oval pits and bearing marginally pilose setae (21c).

*Ventral idiosoma* (Fig. 21b). Sternal setae St1 and St2 short and smooth, St3 and St4 long and marginally pilose. St1 situated near anterior margin of sterna shield, St2 at level of anterior margin of coxae II, St3 at level of posterior margin of coxae II, St4 at level of anterior margin of coxae IV. Ventral setae marginally pilose, their position illustrated in Fig. 21b. Two pairs of adanal setae and one postanal seta similar in shape and length to ventral setae and situated near the anal opening. Surface of sternal and ventral shields ornamented by oval pits. Genital shield scutiform, with some oval pits and a long anterior process. Peritremes hook-shaped. Tritosternum with narrow basis, laciniae marginally serrate and apically divided into three short branches (Fig. 21d).

*Gnathosoma* (Fig. 21e). Corniculi horn-like, internal malae smooth and shorter than corniculi. Hypostomal setae h1-h2 smooth, h3 and h4 marginally serrate, h1 longer than other hypostomal setae. Palp trochanter bearing one smooth and one marginally serrate seta.

*Description of male:* Length of idiosoma 500  $\mu\text{m}$ , width 370  $\mu\text{m}$ . Shape, dorsal aspect of idiosoma similar to that of female.

*Ventral aspect of idiosoma* (Fig. 21f). Sternal setae marginally pilose, St1 placed near anterior margin of genital shield, St2 at level of central region of genital shield, St3-St5 situated posteriorly to genital shield. Surface of sternal shield covered by oval pits. Genital shield circular, without sculptural pattern and situated between coxae III.

Ventral setation, processes of gnathosoma and legs similar to that of female.

*Distribution.* Japan and Korean Peninsula (Fig. 22)

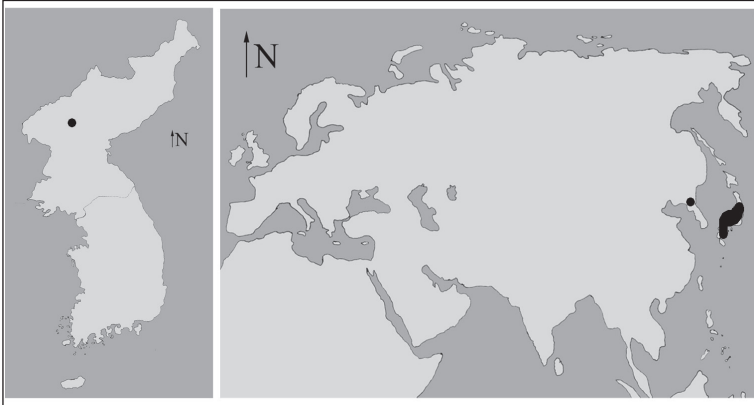


Fig. 22. Occurrences of *N. japonensis* in the Korean Peninsula and in the Palearctic region

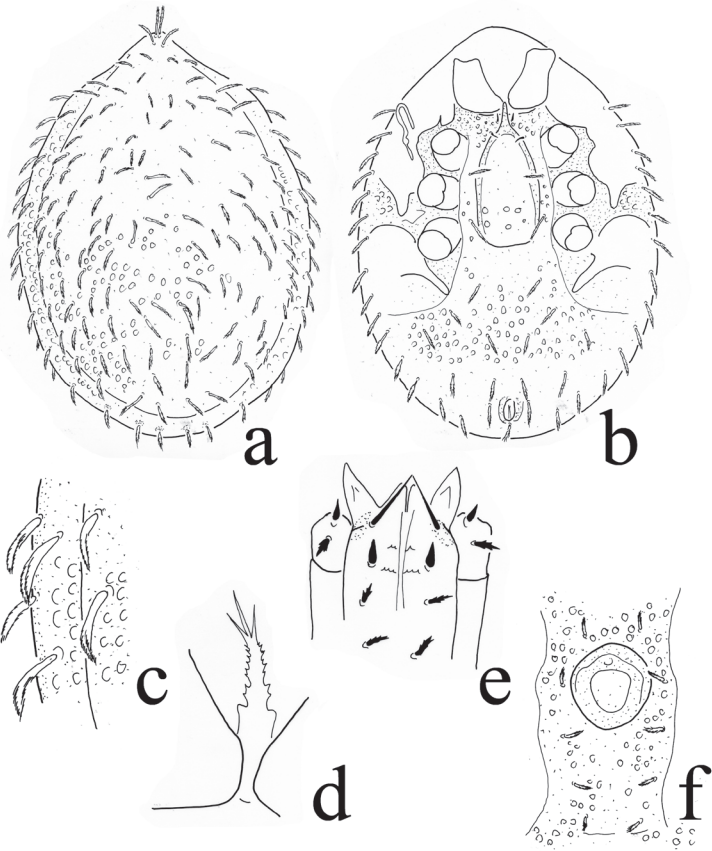


Fig. 21. *Nenteria japonensis* Hiramatsu, 1979, female, a = dorsal view, b = ventral view, c = dorsal setae and ornamentation, d = tritosternum, e = ventral view of gnathosoma, f = male, intercoxal area.

*Nenteria koreana* Kontschán, Park, Yoon & Choi, 2012  
(Figs 23-24, 25)

*Material examined.* Two females (holo- and paratype) and two deutonymphs (paratypes); 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. (HNHM and NIBR).

*Description.* *Female:* length of idiosoma 670-680  $\mu\text{m}$ , width 530-540  $\mu\text{m}$ . Shape oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 23a): Dorsal and marginal shields fused anteriorly, all dorsal and marginal setae short, smooth and needle-like. Dorsal and marginal shields without sculptural pattern.

*Ventral idiosoma* (Fig. 23b): Surface of sternal shield smooth. Four pairs of smooth sternal setae present. Ventral setae smooth and needle-like, v1 placed at level of pedofossae IV, v2 and v3 situated near the metapodal line, v4 associated with oval pits and situated at level of *ad1*. Adanal and postanal 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. 23d). Genital shield scutiform acuminously pulled out on the anterior edge, its surface ornamented by several oval pits (Fig. 23c). Stigmata situated between coxae II and III, peritremes hook-shaped. Tritosternum with narrow basis, laciniae marginally serrate, apically divided into three branches (Fig. 24c).

*Gnathosoma* (Fig. 24d): 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. 24e).

*Deutonymph*: Length of idiosoma 540-610  $\mu\text{m}$ , width 470-500  $\mu\text{m}$ .

*Dorsal idiosoma* (Fig. 24a). Dorsal shield without sculptural pattern. Dorsal setae smooth and needle-like.

*Ventral idiosoma* (Fig. 24b). Sternal setae short, smooth, and needle-like. 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, their position illustrated on Fig. 24b. 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. 24f).

*Gnathosoma* (Fig. 24g). Corniculi horn-like, with one apical teeth, 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.



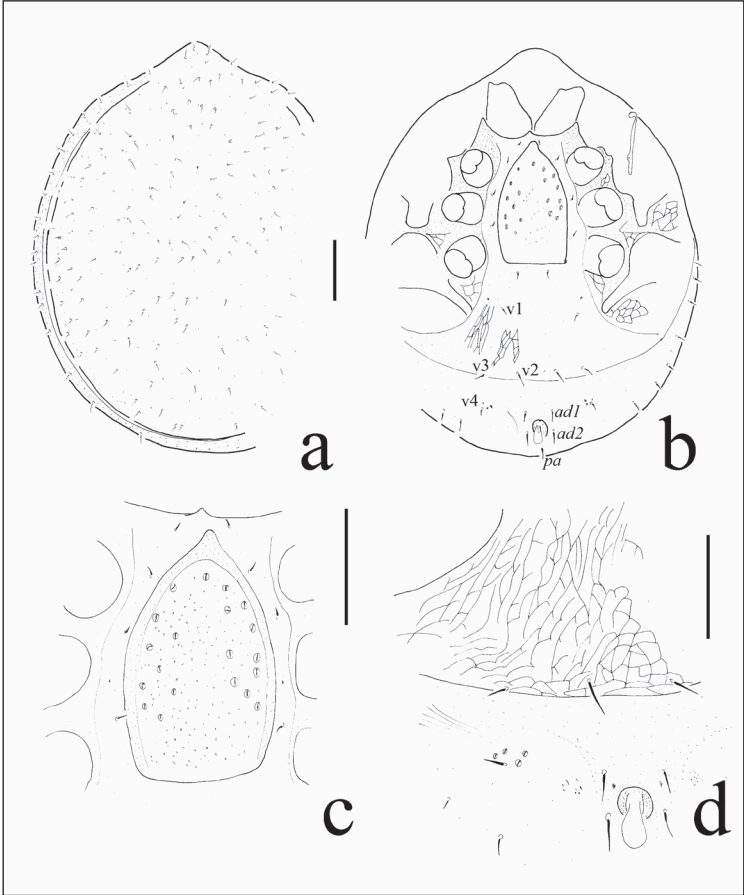


Fig. 23. *Nenteria koreana* Kontschán, Park, Yoon & Choi, 2012; female, a = dorsal view, b = ventral view, c = genital shield, d = ventrianal region (scale: 100  $\mu$ m) (after Kontschán et al., 2012).

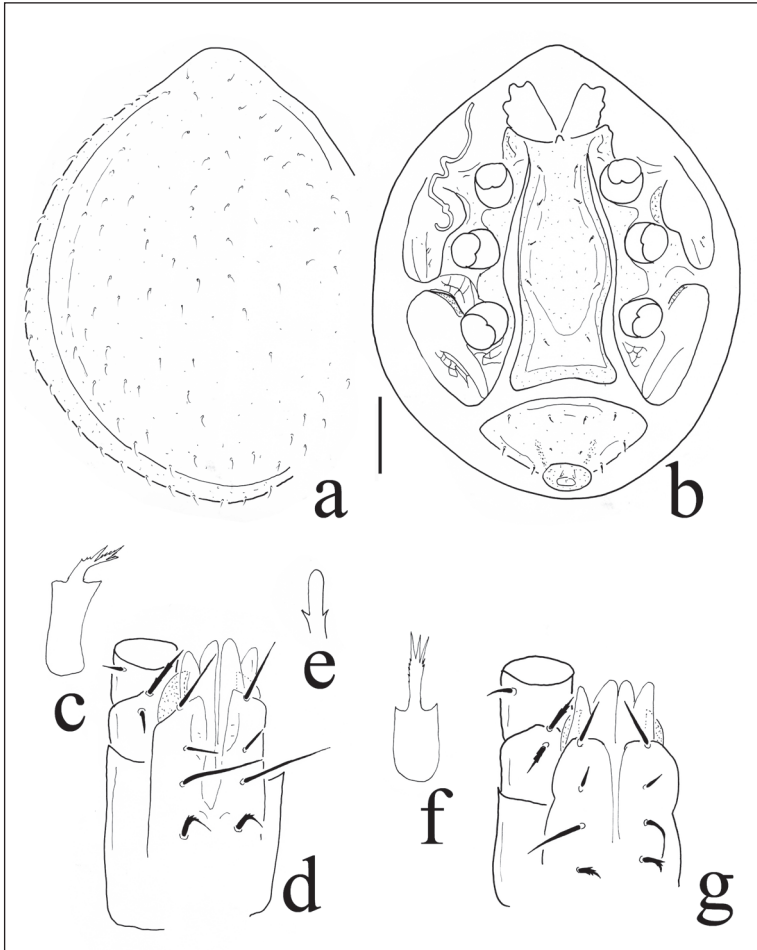


Fig. 24. *Nenteria koreana* Kontschán, Park, Yoon & Choi, 2012; deutonymph, a = dorsal view, b = ventral view, c = tritosternum of female, d = ventral view of gnathosoma of female, e = apical part of epistome of female, f = tritosternum of deutonymph, g = ventral view of gnathosoma of deutonymph (scale: 100  $\mu$ m) (after Kontschán et al., 2012).

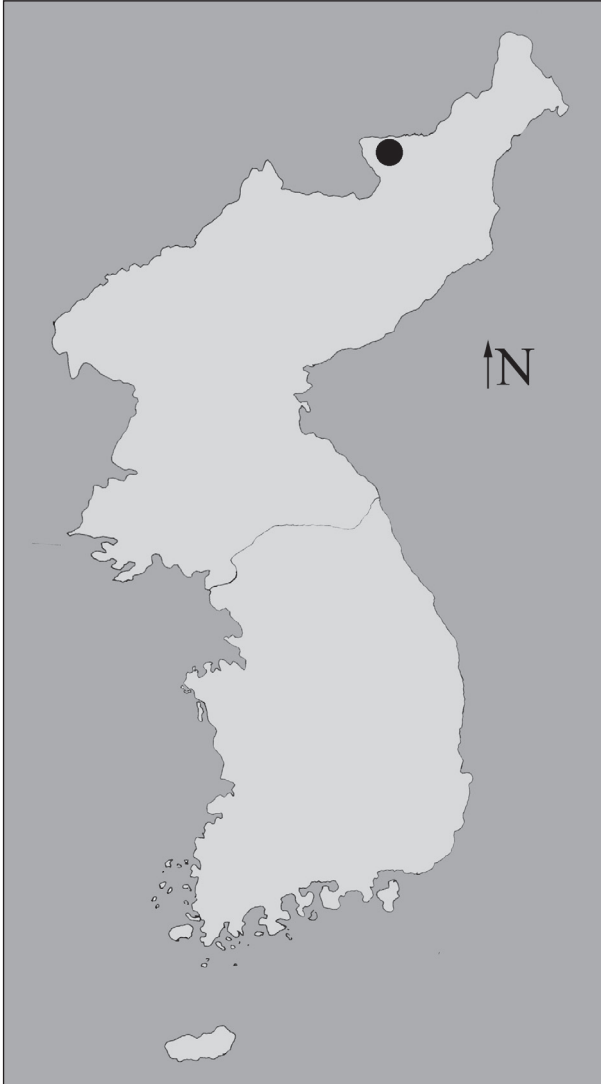


Fig. 25. Occurrences of *N. koreana* in the Korean Peninsula

***Uroobovella varians* Hirschmann & Zirngiebl-Nicol,  
1962 (Figs 26 a-e, 27)**

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

*Short description.* Female. Length of idiosoma 480  $\mu\text{m}$ , width 390  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 26a). Dorsal and marginal shields fused anteriorly. Dorsal and marginal shields without sculptural pattern and bearing short and smooth setae.

*Ventral idiosoma* (Fig. 26b). Sternal setae St1, St2 and St3 short and smooth, situated near anterior margin of genital shield, St4, St5 and St6 1.5 times longer than St1-St3 and placed near coxae II and III. St7 and St8 similar in shape and length to St1-St3 and situated near basal edges of genital shield. Ventral setae smooth and needle-like, their position illustrated in Fig. 25b. Two pairs of adanal setae and one postanal seta similar in shape and length to ventral setae and situated near the anal opening. Surface of sternal and ventral shields smooth. Genital shield linguliform, without ornamentation and anterior process. Peritremes hook-shaped.

*Gnathosoma* (Fig. 26c). Corniculi horn-like, internal malae smooth and longer than corniculi. Hypostomal setae smooth and needle-like. Palp trochanter bearing two marginally serrate setae, other setae on palp smooth. Chelicerae with long apical process on fixed digit (Fig. 26d).

Male. Length of idiosoma 470  $\mu\text{m}$ , width 390  $\mu\text{m}$ . Shape and dorsal aspect of idiosoma similar to that of female.

Ventral aspect of idiosoma (Fig. 26e). Sternal shield with nine pairs of smooth setae. Their position illustrated in Fig. 20e. One pair of lyriform fissures situated between St3 and St4, another pair placed near St9. Genital shield circular, without sculptural pattern and situated between coxae III and IV. Ventral setation, processes of gnathosoma and legs same as in female.

*Distribution.* Central-Europe and Korean Peninsula (Fig. 27).

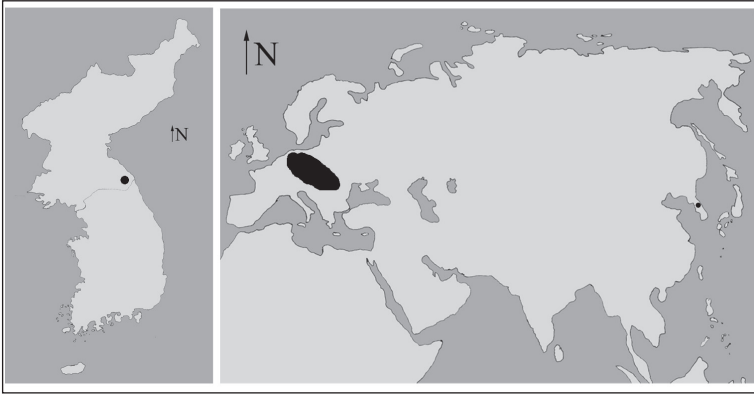


Fig. 27. Occurrences of *U. varians* in the Korean Peninsula and in the Palearctic region

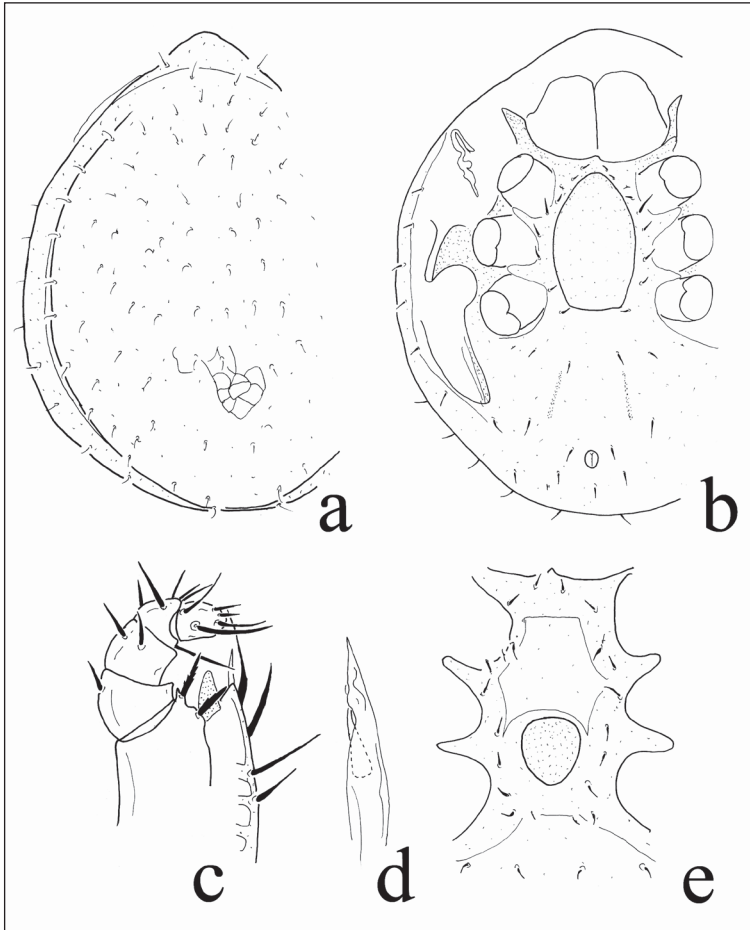


Fig. 26. *Uroobovella varians* Hirschmann & Zirngiebl-Nicol, 1962, female, a = dorsal view, b = ventral view, c = lateral view of gnathosoma and palp, d = chelicerae, e = intercoxal region of male.

***Uropoda spiculata* Hirschmann, 1972 (Figs 28 a-c, 29)**

*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).

*Short description.* Female. Length of idiosoma 640 µm, width 520 µm. Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 28a). Dorsal and marginal shields completely separated. Dorsal and marginal shields without sculptural pattern and bearing short and smooth setae. Dorsal shield caudally reduced, caudal area covered by membranous cuticle and bearing four pairs of smooth and needle-like setae.

*Ventral idiosoma* (Fig. 28b). Sternal setae short, smooth and needle-like. St1 situated at level of anterior margin of coxae II, St2 near anterior margin of genital shield, St3 at level of anterior margin of coxae III, St4 at level of central region of coxae IV, St5 near basal edges of genital shield. Ventral setae smooth and needle-like, first pair of them shorter than the others, their position illustrated in Fig. 28b. Two pairs of adanal setae shorter than ventral setae. Surface of sternal and ventral shields smooth. Genital shield linguliform, without ornamentation and with long anterior process. Peritremes long and hook-shaped.

*Gnathosoma* (Fig. 28c). Corniculi horn-like, internal malae smooth and shorter than corniculi. Hypostomal setae h1 smooth, needle-like, other hypostomal setae marginally serrate. Setae h1 two times longer than h2-h4. Palp trochanter bearing two marginally serrate setae, other setae on palp smooth. Epistome with two long, marginally serrate apical branches.

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

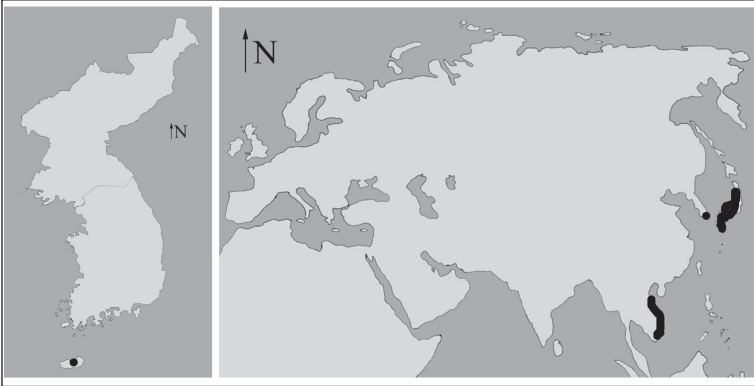


Fig. 29. Occurrences of *U. spiculata* in the Korean peninsula and in the Palearctic region

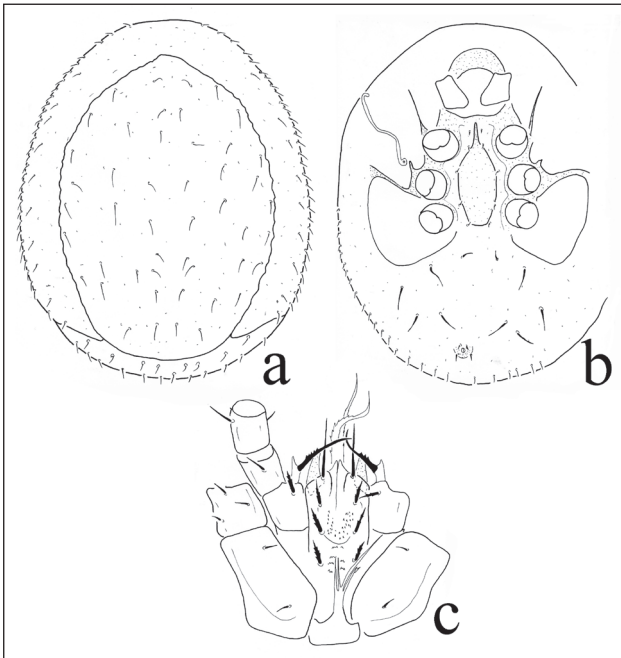


Fig. 28. *Uropoda spiculata* Hirschmann, 1972, female, a = dorsal view, b = ventral view, c = ventral view of gnathosoma and palp.



***Uropoda setata* Kontschán & Starý, 2011 (Figs 30 a-e, 31)**

*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).

*Short description.* Female. Length of idiosoma 900 µm, width 740 µm. Shape of idiosoma oval, posterior margin rounded.

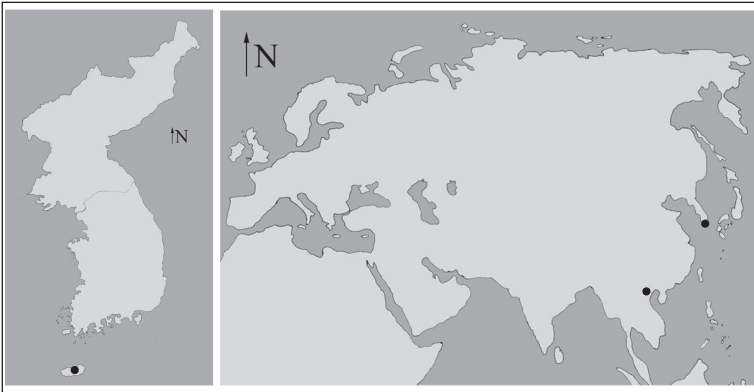
*Dorsal idiosoma* (Fig. 30a). Dorsal and marginal shields completely separated. Central region of dorsal shield elevated from the other parts of dorsum, but one deep, transverse furrow located at level of coxae IV. Dorsal shield without sculptural pattern and bearing short and smooth setae on its margin and long and smooth setae near transversal furrow. Dorsal shield caudally reduced, caudal area covered by membranous cuticle without setae. Marginal shield covered by small oval pits and bearing smooth and short setae.

*Ventral idiosoma* (Fig. 30b). Ornamentation on sternal shield absent. Sternal setae short smooth and needle-like. St1 situated near anterior margin of genital shield, St2 at level of posterior margin of coxae II, St3 at mid-level of coxae III, St4 at mid-level of coxae IV, St5 near posterior margin of genital shield. Five pairs of extremely long needle-like setae situated in central and lateral area of ventral shield; two pairs of short (10–14 µm), needle-like setae placed lateral to anal opening. Caudal margins of ventral idiosoma with numerous long, needle-like setae. Ventral shield without sculptural pattern, but tile-like ornamentation situated laterally to pedofossae of coxae IV. Genital shield linguliform, without ornamentation and with long anterior process. Peritremes long and apically hook-shaped. Tritosternum with wide basis, laciniae with two pairs of short lateral branches (Fig. 30c).

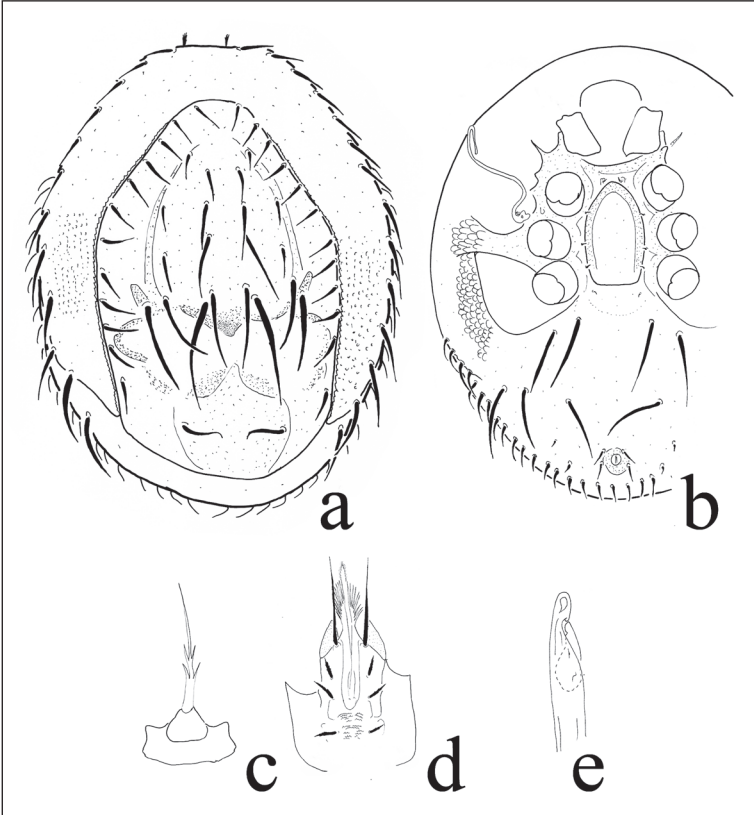
*Gnathosoma* (Fig. 30d). Corniculi horn-like, internal malae pilose and longer than corniculi. Hypostomal setae h1 smooth, needle-like, other hypostomal setae marginally serrate. Setae h1 four-five times longer than h2-h4. Epistome serrate basally and pilose apically. Chelicerae without internal sclerotized node, fixed digit longer than movable digit (Fig. 30e).

*Notes to the species.* The specimens collected in Vietnam have short adanal setae, in contrary the Korean specimen has longer adanal setae.

*Distribution.* Vietnam and South-Korea (Fig. 31).



*Fig. 31. Occurrences of U. setata in the Korean peninsula and in the Palearctic region*



*Fig. 30. Uropoda setata* Kontschán & Stary, 2011, female,  
*a = dorsal view, b = ventral view, c = tritostenum, d = ventral view*  
*of gnathosoma, e = chelicera.*

*Opilitis conspicua* (Berlese, 1903) (Figs 32 a-b, 33)

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

*Short description.* Female. Length of idiosoma 520  $\mu\text{m}$ , width 450  $\mu\text{m}$ . Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 32a). Dorsal and marginal shields fused anteriorly. Dorsal and marginal shields covered by oval pits. Dorsal shield bearing short and blade-like setae and marginal shield with needle-like setae.

*Ventral idiosoma* (Fig. 32b). Sternal setae smooth, short and needle-like. Position of visible sternal setae illustrated on Fig. 32b. Four pairs of ventral setae blade like. Preanal line present, posteriorly to preanal line two pairs of needle-like ventral and two pairs of needle-like adanal setae and one postanal seta can be observed. Surface of sternal shield covered by small oval pits, ventral shield ornamented by irregular pits posteriorly to coxae IV. Genital shield oval, ornamented by small oval pits and without anterior process. Around genital shield an undulate perigenital line can be found. Peritremes m-shaped.

*Gnathosoma.* Corniculi horn-like, internal malae divided into several pilose branches. Other parts of this region not clearly visible (covered by coxae I).

*Distribution.* Europe and Korean Peninsula (Fig. 33).

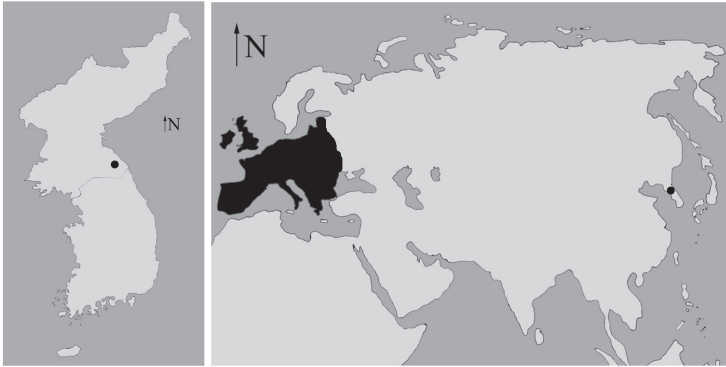


Fig. 33. Occurrences of *O. conspicua* in the Korean Peninsula and in the Palearctic region

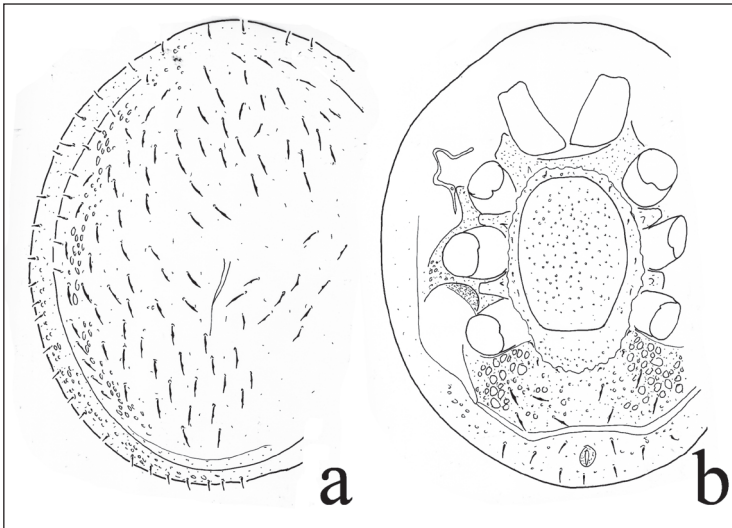


Fig. 32. *Oplitis conspicua* (Berlese, 1903), female, a = dorsal view, b = ventral view.

*Leonardiella koreana* Kontschán, Park, Yoon & Choi,  
2012 (Figs 34-36)

*Material examined.* Two females (Holo- and paratype). 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. (HNHM and NIBR).

*Description: Female:* Length of idiosoma 870-880  $\mu\text{m}$ , width 600-610  $\mu\text{m}$ . 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. 34a). Marginal and dorsal shields completely separated. Dorsal 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 sclerotised 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 with small, oval pits.

*Ventral aspect of idiosoma* (Fig. 34b). Sternal shield without sculptural pattern, only its anterior edge covered by reticulate sculptural pattern (Fig. 35a). All sternal setae T-shaped, their position illustrated on Fig. 35a. Ventral setae T-shaped, setae first adanal setae smooth, second adanal setae T-shaped and placed around anal opening, postanal seta absent (Fig. 34d). 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. 34c). Ventral shield without ornamentation. Stigmata situated between coxae II and III. Peritremes M-shaped. Genital shield scutiform, without

anterior process (Fig. 35a). 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. 35b).

*Gnathosoma* (Fig. 35c). 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 sclerotised node present.

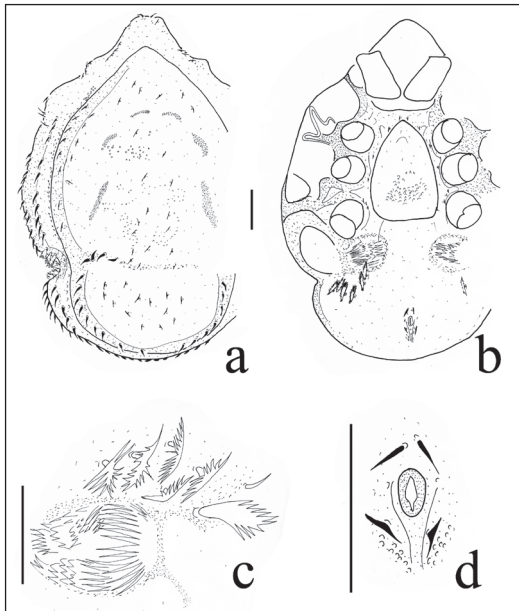


Fig. 34. *Leonardiella koreana* Kontschán, Park, Yoon & Choi, 2012; female, a = dorsal view, b = ventral view, c = setae near transverse furrow, d = anal region (scale: 100  $\mu$ m).

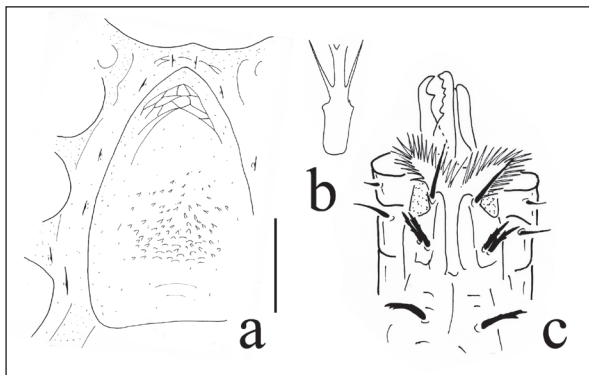


Fig. 35. *Leonardiella koreana* Kontschán, Park, Yoon & Choi, 2012; female, a = genital shield, b = basal part of tritosternum, c = ventral view of gnathosoma (scale: 100  $\mu$ m).

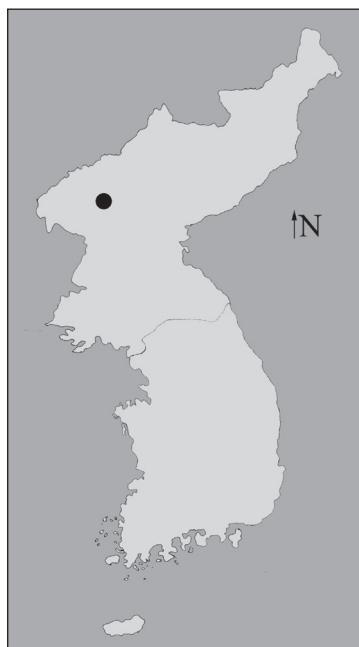


Fig. 36. Occurrences of *T. koreana* in the Korean Peninsula



*Discourella modesta* (Leonardi, 1899) (Figs 37 a-c, 38)

*Material examined.* Three females. 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-NIBR).

*Short description.* Female. Length of idiosoma 430 µm, width 330 µm. Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 37a). Dorsal and marginal shields fused anteriorly. Dorsal and marginal shields covered by irregular pits, central region of dorsal shield with strongly sclerotised, undulate lines. All dorsal and marginal setae long and smooth. Pygidial shield present, without setae and covered by irregular pits. Marginal shield divided into four pairs of platelets, lateral two pairs of them bearing 1-1 smooth and needle-like setae, third pair of platelets bearing one bulbiform setae, central pair of platelets bearing 2-2 bulbiform setae. These platelets without sculptural pattern.

*Ventral idiosoma* (Fig. 37b). Sternal setae St1, St2 and St3 short and smooth, surface of sternal shield smooth. Ventral setae smooth and needle-like, two pairs of them on central region short, other ventral setae long and smooth, their position illustrated in Fig. 37b. Two pairs of adanal setae similar in shape and length to short ventral setae and situated near the anal opening. Ventral shield laterally ornamented by oval pits. Genital shield scutiform, with several small pits near its margins. Tritosternum with wide basis, laciniae apically divided into several branches.

*Gnathosoma* (Fig. 37c). Corniculi horn-like, internal malae smooth and longer than corniculi. Hypostomal setae h1 long and smooth, h2, h3 and h4 marginally serrate and shorter than h1. Palp trochanter bearing two smooth setae . Epistome marginally serrate.

*Distribution.* Europe and Korean Peninsula (Fig. 38).

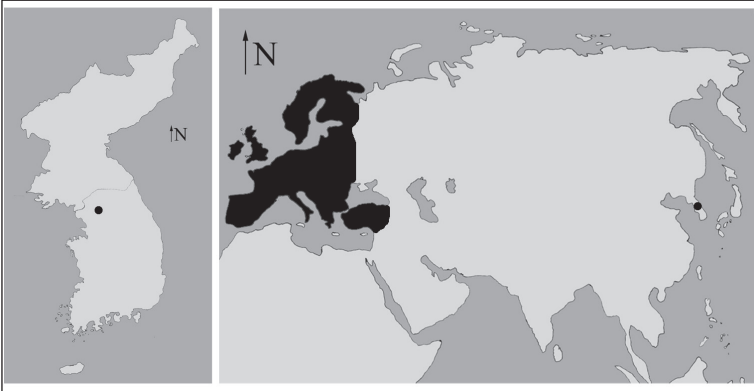


Fig. 38. Occurrences of *D. modesta* in the Korean Peninsula and in the Palearctic region

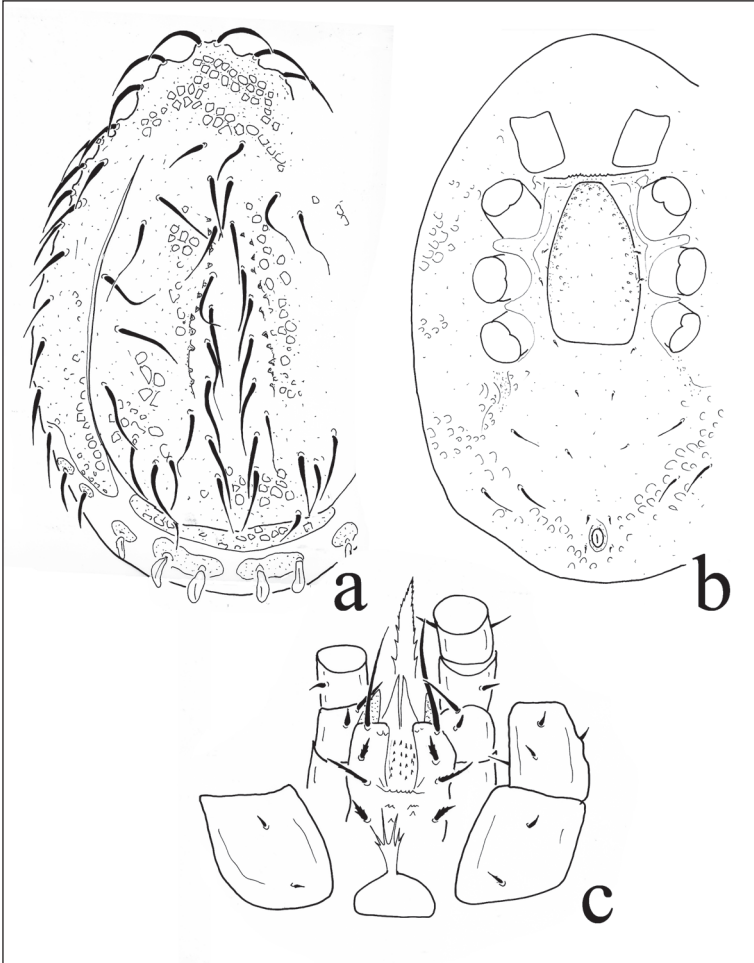


Fig. 37. *Discourella modesta* (Leonardi, 1899) (female) a = dorsal view, b = ventral view, c = ventral view of gnathosoma.

*Discourella koreae* Hirschmann, 1971 (Figs 39 a-e, 40)

*Material examined.* One female. As973: 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). Four females. As561, Democratic People's Republic of Korea Gangwon-do, Geumgangsán (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 Hyangsám by Moczarsky-Winkler-funnel, 08.X. 1987., leg. Korsós, Z. and Ronkay, L. (NIBR).

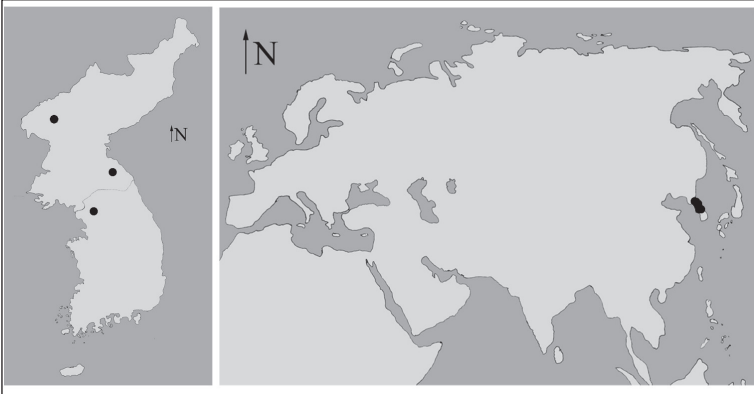
*Short description.* Female. Length of idiosoma 610 µm, width 430 µm. Shape of idiosoma oval, posterior margin rounded.

*Dorsal idiosoma* (Fig. 39a). Dorsal and marginal shields completely separated. Dorsal shield covered by oval pits, all dorsal setae smooth and needle-like. Marginal shield without sculptural pattern, marginal setae similar in shape and length to dorsal setae. Pygidial shield absent.

*Ventral idiosoma* (Fig. 39b). Sternal setae short and smooth, surface of sternal shield smooth. Ventral setae smooth and needle-like, their position illustrated in Fig. 39b. Adanal setae similar in shape and length to short ventral setae and situated near the anal opening. Ventral shield ornamented by oval pits. Genital shield linguliform, without sculptural pattern and with a crown-like anterior process. Tritosternum with wide basis, laciniae apically divided into four branches (Fig. 39c).

*Gnathosoma* (Fig. 39d). Corniculi horn-like, internal malae marginally serrate and longer than corniculi. All hypostomal setae marginally serrate, h1 long, h2, h3 and h4 shorter than h1. Palp trochanter bearing one long, smooth and one short, marginally serrate seta. Epistome marginally serrate (Fig. 39e).

*Distribution.* Korean Peninsula (Fig. 40).



*Fig. 40. Occurrences of D. koreae in the Korean Peninsula and in the Palearctic region*

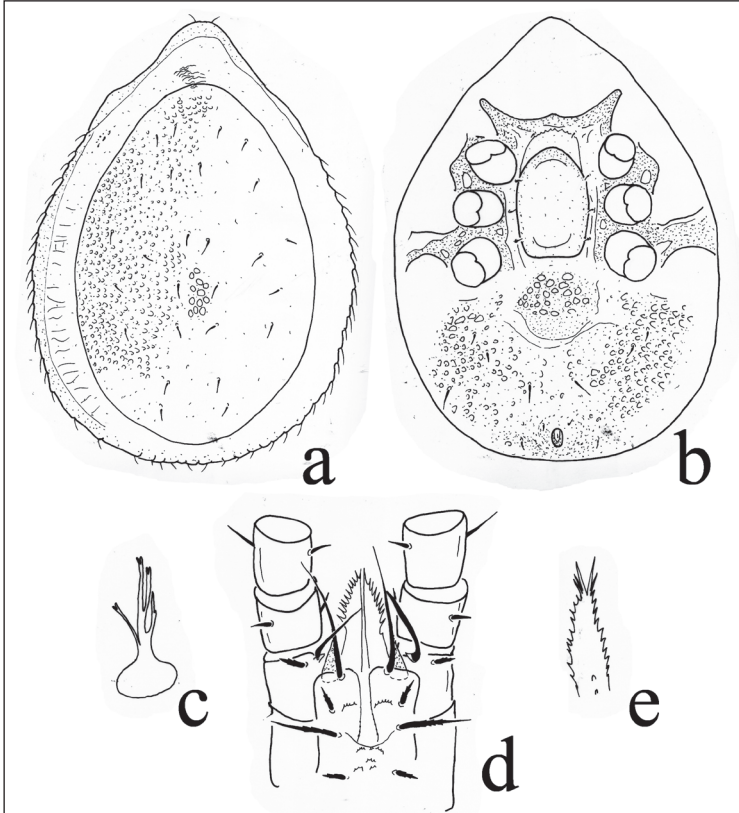


Fig. 39. *Discourella koreae* Hirschmann, 1971, female, a = dorsal view, b = ventral view, c = tritosternum, d= ventral view of gnathosoma, e = epistome.

## ZOOGEOGRAPHICAL NOTES

Previously, the Uropodina fauna of the Korean peninsula belonged to the most scarcely known ones of the world. 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. These species have not been recorded from other parts of Asia yet, but this can be explained by the poor investigation of this group in Asia. Three species (*D. kurosai*, *T. shakaii* and *U. spiculata*) are common elements with the Japanese fauna, but *U. spiculata* is known from South-East Asia (Vietnam) as well, maybe this species is a typical subtropical element of the fauna, similar to the *U. setata* species which was described from North-Vietnam. Three species, *D. koreae*, *N. koreana* and *L. koreana* are endemic in Korean Peninsula; *D. koreae* was most frequent in the studied soil samples.

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*.

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## SUMMARY

We presented thirteen Uropodina species from the Korean Peninsula; seven of them were collected in Republic of Korea (*P. schweitzeri*, *D. kurosai*, *T. shakaii*, *U. spiculata*, *U. setata*, *D. koreae* and *D. modesta*), seven of them in Democratic People's Republic of Korea (*T. ovalis*, *N. japonica*, *N. koreana*, *U. varians*, *O. conspicua*, *D. koreae* and *L. koreana*). Twelve of the species found are recorded for the first time from the Korean Peninsula. Descriptions of male and deutonymph of *T. shakaii* are presented for the first time. The fauna of the Korean Peninsula is mixed; it consists of Palearctic, Japanese and subtropical elements and the three endemic species (*D. koreae*, *L. koreana* and *N. koreana*).

## SUMMARY IN KOREAN

### 요약

한반도에 분포하는 Uropodina 13 종을 기재하였다. *P. schweitzeri*, *D. kurosai*, *T. shakaii*, *U. spiculata*, *U. setata*, *D. koreae*, *D. modesta* 7 종이 남한에서 발견되었고, *T. ovalis*, *N. japonica*, *N. koreana*, *U. varians*, *O. conspicua*, *D. koreae*, *L. koreana* 7 종이 북한에서 채집되었다. 이 중 12 종은 한반도의 신종 또는 미기록종이며, *T. shakaii* 의 제 2 약충과 성충 수컷이 처음으로 기재되었다. 한반도의 Uropodina 는 구북구, 일본 및 아열대에 분포하는 종으로 구성되며, *D. koreae*, *L. koreana*, *N. koreana* 3 종이 한반도 고유종이었다.

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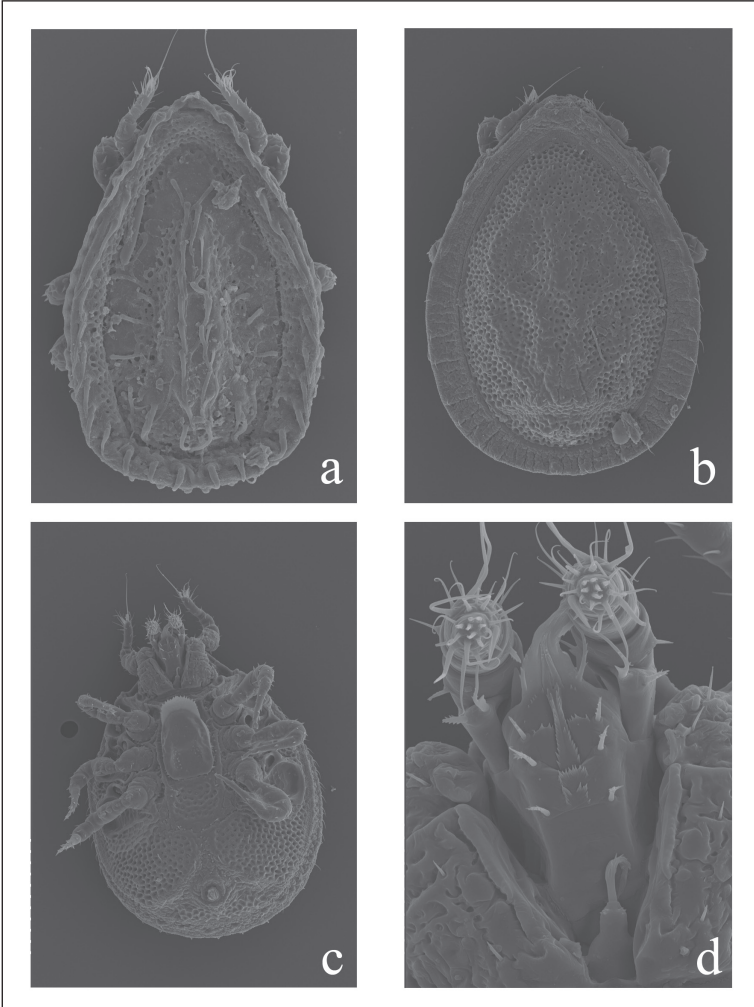


Fig. 41. Scanning micrographs of the most common Uropodina mites in Korea. a = dorsal view of *Discourella modesta* (Leonardi, 1899); b-d = *Discourella koreae* Hirschmann, 1971, b= dorsal view, c = ventral view, d = ventral view of gnathosoma