

New Mesostigmata records and species from the Korean Peninsula*

J. KONTSCHÁN¹, S. J. PARK², J. W. LIM², J. M. HWANG³ and H. Y. SEO²

¹Dr. Jenő Kontschán, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, H-1525 Budapest, P.O. Box 102, Hungary and Department of Zoology and Animal Ecology, Szent István University, Gödöllő, Péter Károly str. 1, H-2100, Hungary.

E-mail: kontschan.jeno@agrar.mta.hu

²Dr. Sun Jae Park, Dr. Jae Won Lim and Dr. Hong Yul Seo, Animal Research Division, National Institute of Biological Resources, Gyoungseo-dong, Seo-gu, Inchoen 404-708, Republic of Korea.

³Dr. Jeong Mi Hwang, Korean Entomological Institute, Korea University, Anam-dong, Seongbuk-gu, Seoul 136-701, Republic of Korea.

Abstract. A total of 20 Mesostigmata species are recorded from the Korean Peninsula, of which 15 (*Asca nubes* Ishikawa, 1969, *Lasioseius tomokoae* Ishikawa, 1969, *Evimirus uropodinus* (Berlese, 1903), *Macrocheles glaber* (Müller, 1860), *Macrocheles punctatus* Ishikawa, 1967, *Pachylaelaps ishizuchiensis* Ishikawa, 1977, *Gamasiphis pulchellus* (Berlese, 1887), *Ololaelaps ussurinensis* Bregetova & Koroleva, 1964, *Gamasellus humosus* Ishikawa, 1969, *Gamasholaspis variabilis* Petrova, 1967, *Parholaspulus hiasmaticus* Petrova, 1967, *Podocinum tsushimanum* Ishikawa, 1970, *Neoparasitus scleoides* Ishikawa, 1969, *Veigaia ochracea* Bregetova, 1961, *Uropoda similiamulifera* Hiramatsu, 1979) are presented as first occurrences from this peninsula. *Asca aphidioides* (Linnaeus, 1758) is already reported from the southern part of the peninsula, but we present the first occurrence in the Democratic People's Republic of Korea. One species (*Trachytes koreana* Kontschán & Lim, sp. nov.) is described and illustrated in this paper. Seventeen of the recovered species were collected in the Democratic People's Republic of Korea; the others were collected in the area of Republic of Korea.

Keywords. Acari, Mesostigmata, new species, new records, Korean Peninsula

INTRODUCTION

The Soil Zoology Collection of the Hungarian Natural History Museum is rich in unsorted soil samples collected in both countries of the Korean Peninsula. More than 200 soil samples comprise this collection, but up to now only a few papers have been presented on their contents. Sándor Mahunka, the noted Hungarian mite researcher studied the collected soil samples and published four papers on mites from these materials. Mahunka (1971) presented new results on tarsonemid mites collected in the Democratic People's Republic of Korea, and two years later (1973) he described two new oribatid mites from the same location. Subsequently, Mahunka (1980) described a new tarsonemid species from the North Korean soil samples and afterwards described numerous new ptychoid oribatid species from the same material (Mahunka 1982). The Polish zerconid specialist, Czesław Błaszak, elab-

orated the zerconid fauna from the Korean collection of the Hungarian Natural History Museum and published two papers based on his results (Błaszak 1976a, 1976b). More than 30 years later, Jenő Kontschán started his work on the mites of these previously collected materials, and he and his co-authors summarized their results in two consecutive papers (Kontschán *et al.* 2012, 2013).

The present work contains new results on Korean Mesostigmata mites selected from the above mentioned unsorted soil samples of the Hungarian Natural History Museum.

MATERIAL AND METHODS

Newly sorted specimens were taken from the Soil Zoology collection of the Hungarian Natural History Museum (Budapest, Hungary) (HNHM). They were cleared in lactic acid and observed in

urn:lsid:zoobank.org:pub:012E3423-5885-4820-A11A-F8A33B3DA549

HU ISSN 2063-1588 (online), HU ISSN 0237-5419 (print)

*Zoological Collectings by the Hungarian Natural History Museum in Korea No. 206

deep, half covered slides under a microscope, or prepared on slides with Kaiser Fluid or lactic acid and gelatin mixture. Other specimens were stored in alcohol. Illustrations were made with a drawing tube. Measurements are given in micrometers (μm), and the width of the idiosoma was measured at the level of coxae IV.

The specimens examined are deposited in the Soil Zoology Collection of Hungarian Natural History Museum (Budapest, Hungary) (HNHM) and in the National Institute of Biological Resources, Incheon, Republic of Korea (NIBR).

RESULTS

Order Mesostigmata

Family Ascidae

Asca aphidioides (Linnaeus, 1758)

Material examined. One female (NIBR). As4215, One female (NIBR). Democratic People's Republic of Korea, Gangwon-do, Geumgangsán, Guriong Pokpo, riverside, northern slope, mosses from soil surface and cliff-side, 01.VI.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Palearctis.

Remarks. This species has already been recorded from the Republic of Korea, but new for Democratic People's Republic of Korea (Lee 1994).

Asca nubes Ishikawa, 1969

Material examined. One female (NIBR). As4215, One female (NIBR). Democratic People's Republic of Korea, Gangwon-do, Geumgangsán, Guriong Pokpo, riverside northern slope, mosses from soil surface and cliff-side, 01.VI.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of *Asca nubes* from the Korean Peninsula.

Lasioseius tomokoae Ishikawa, 1969

Material examined. One female (NIBR). As454, Democratic People's Republic of Korea, North Pyeonganbuk-do, Mt. Myohyang-san sifted litter taken under Ryongyon waterfall to be extracted in Moczarsky-Winkler apparatus, 15.VII.1982, leg. Forró, L. & Ronkay, L.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of *L. tomokoae* from the Korean Peninsula.

Eviphididae

Evimirus uropodinus (Berlese, 1903)

Material examined. One female (NIBR). As229, Democratic People's Republic of Korea, North Hwanghaebuk-do, Bagyon san, San-chon tong, about 10 km from Gyeseong, sweet chestnut woods, sod of grass (turf) beyond margin of woods, 08.VI.1970, Mahunka, S. & Steinmann, H. (NIBR).

Distribution. Europe, Japan and Korean Peninsula. This species may have a Palearctic distribution.

Remark. This is the first record of this species from the Korean Peninsula.

Macrochelidae

Macrocheles punctatus Ishikawa, 1967

Material examined. Two females (NIBR). As462 Democratic People's Republic of Korea, North Pyeonganbuk-do, Mt. Myohyang-san soil sample from mixed forest under Hwajangam extracted in Berlese-funnel, 19.VII.1980, leg. Forró, L. & Ronkay, L.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

***Macrocheles glaber* (Müller, 1860)**

Material examined. One female (NIBR). As443, Democratic People's Republic of Korea, Gangwon-do, Mt. Kumgang-san, near Hotel Geumgang, five soil traps in them, in coniferous forest with rich undergrowth, 29.IX.1979, leg. Steinmann, H. & Vásárhelyi, T.

Distribution. Europe, Asia, North-America, and Australia. This species occurs presumably in temperate climatic zones.

Remark. This is the first record of this species from the Korean Peninsula.

Pachylaelapidae

***Pachylaelaps ishizuchiensis* Ishikawa, 1977**

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

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

Ologamasidae

***Gamasellus humosus* Ishikawa, 1969**

Material examined. One female (NIBR). As214, Democratic People's Republic of Korea, Gangwon-do, Geumgangsán, Guriong Pokpo, cliffs near waterfall basin, moss wetted by seeping water in the same site, 01.VI.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Japan and Korean Peninsula.

Remark. This species is the first recorded from the Korean Peninsula.

***Gamasiphis pulchellus* (Berlese, 1887)**

Material examined. Three females and one male (NIBR). As197, Democratic People's Republic of Korea, South Pyeongannam-do, Pyongyang, steep lakeside cliff, 27.V.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Europe and Asia.

Remark. This species is the first recorded from the Korean Peninsula.

Laelapidae

***Ololaelaps ussuriensis* Bregetova & Koroleva, 1964**

Material examined. One female (NIBR). As197, Democratic People's Republic of Korea, South Pyeongannam-do, Pyongyang, steep lakeside cliff, 27.V.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Russia and Korean Peninsula.

Remark. This species is the first recorded from the Korean Peninsula.

Parholaspididae

***Gamasholaspis communis* Petrova, 1967**

Material examined. One female (NIBR). As964, Republic of Korea, Gangwon-do, Inje-gun, Seoraksán, Misiryeongogae, beneath the rest area, forest brook, deciduous rocky forest, open grassland and rocks, from leaf litter, 745m, N38°12.963' E128°26.189', 10.X.2010, leg. Murányi, D.

Distribution. Russia and Korean Peninsula.

Remark. This species was recorded from the Korean Peninsula by Lee & Lee (2000).

***Gamasholaspis variabilis* Petrova, 1967**

Material examined. One female (NIBR). As454, Democratic People's Republic of Korea,

North Pyonganbuk-do, Myohyangsan, sifted litter taken under Ryongyon waterfall to be extracted in Moczarsky-Winkler apparatus, 15.VII.1982, leg. Forró, L. & Ronkay, L. (NIBR).

Distribution. Russia and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

***Parholaspulus hiasmaticus* Petrova, 1967**

Material examined. One female (NIBR). As558, Democratic People's Republic of Korea, North Pyonganbuk-do, Myohyangsan, pathway Sangwon-am, sifted material from the litter of a rocky forest, to be extracted by Moczarsky-Winkler-funnel, 09.X.1987, leg. Korsós, Z. & Ronkay, L.

Distribution. East-Russia and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

***Holaspina alstoni* (Evans, 1956)**

Material examined. One female (NIBR). As956, Republic of Korea, Gyeongsangnam-do, Sancheong-gun, Jirisan, Ogeok valley, 3km NW of Daewon temple, N branch of Yup-yeong, mixed forest, forest stream, open spring and its outlet, forest edge, 675m, N35°22.926' E127°47.112', 16.09.2010, leg. Hye Woo Byeon, László Forró, Tae Woo Kim, Makranczy, Gy. & Murányi D.

Distribution. Palearctis.

Remark. This species was recorded from the Korean Peninsula by Lee & Lee (2000).

***Gamasholaspis browningi* (Bregetova & Koroleva, 1960)**

Material examined. One female (NIBR). As665, Democratic People's Republic of Korea, Cheju-do, Halla-san National Park, moss and soil

samples (four different items) were taken from mosses, detritus, litter and upper layers of soil, 30.X.1993, leg. Peregovits, L. & Ronkay, L.

Distribution. Russia and Korean Peninsula.

Remark. This species was recorded from the Korean Peninsula by Lee & Lee (2000).

Podocinidae

***Podocinum tsushmanum* Ishikawa, 1970**

Material examined. Four females (two in HNHM, two in NIBR) As452, Democratic People's Republic of Korea, North Pyeonganbuk-do, Myohyangsan, sifted litter taken from a mixed forest under Unsam waterfall to be extracted in Moczarsky-Winkler apparatus, 17.VII.1982, leg. Forró, L. & Ronkay, L.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

***Neoparasitus scleoides* Ishikawa, 1969**

Material examined. One female (NIBR). As450, Democratic People's Republic of Korea, Pyeongyang-si: Yongaksan, soil sample taken from a mixed forest to be extracted in Berlese-funnel, 12.VII.1982, leg. Forró, L. & Ronkay, L.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

Veigaiidae

***Veigaia ochracea* Bregetova, 1961**

Material examined. Two females (NIBR). As446, Democratic People's Republic of Korea, Pyeongyang-si: Daesongsan, 10 km NW of Pyongyang, soil sample taken from Pinus forest near Ingo-mot pond to be extracted in Berlese-

funnel, 08.VII.1982, leg. Forró, L. & Ronkay, L. Two females (NIBR). As454, Democratic People's Republic of Korea, North Pyeonganbuk-do, Myohyangsan sifted litter taken under Ryongyon waterfall to be extracted in Moczarsky-Winkler apparatus, 15.VII.1982, leg. Forró, L. & Ronkay, L. Four females (two in NIBR, two in HNHM). As455, Democratic People's Republic of Korea, North Pyeonganbuk-do, Myohyangsan sifted material collected in the mixed forest behind Hotel Myohyang-san to be extracted in Moczarsky-Winkler apparatus, 17.VII.1982, leg. Forró, L. & Ronkay, L.

Distribution. East-Russia and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

Uropodidae

Uropoda similiamulifera Hiramatsu, 1979

Material examined. Two females (NIBR). As224 Democratic People's Republic of Korea, Hwanghaebuk-do, Bagyeonsan, San-chon tong, about 20 km SE from Gyeseong, margin of stream bed, ant nest under stone, 08.VI.1970, leg. Mahunka, S. & Steinmann, H.

Distribution. Japan and Korean Peninsula.

Remark. This is the first record of this species from the Korean Peninsula.

Trachytidae

Trachytes koreana Kontschán & Lim sp. nov.

(Figures 1–7)

Material examined. *Holotype.* female (NIBR). As212, Democratic People's Republic of Korea, Gangwon-do, Geumgangsan, Man-mul san, from ant nest, 30.V.1970, leg. Mahunka, S. & Steinmann, H. *Paratypes.* Females, 4 ex. in NIBR and 3 ex. in HNHM, locality and date same as in holotype.

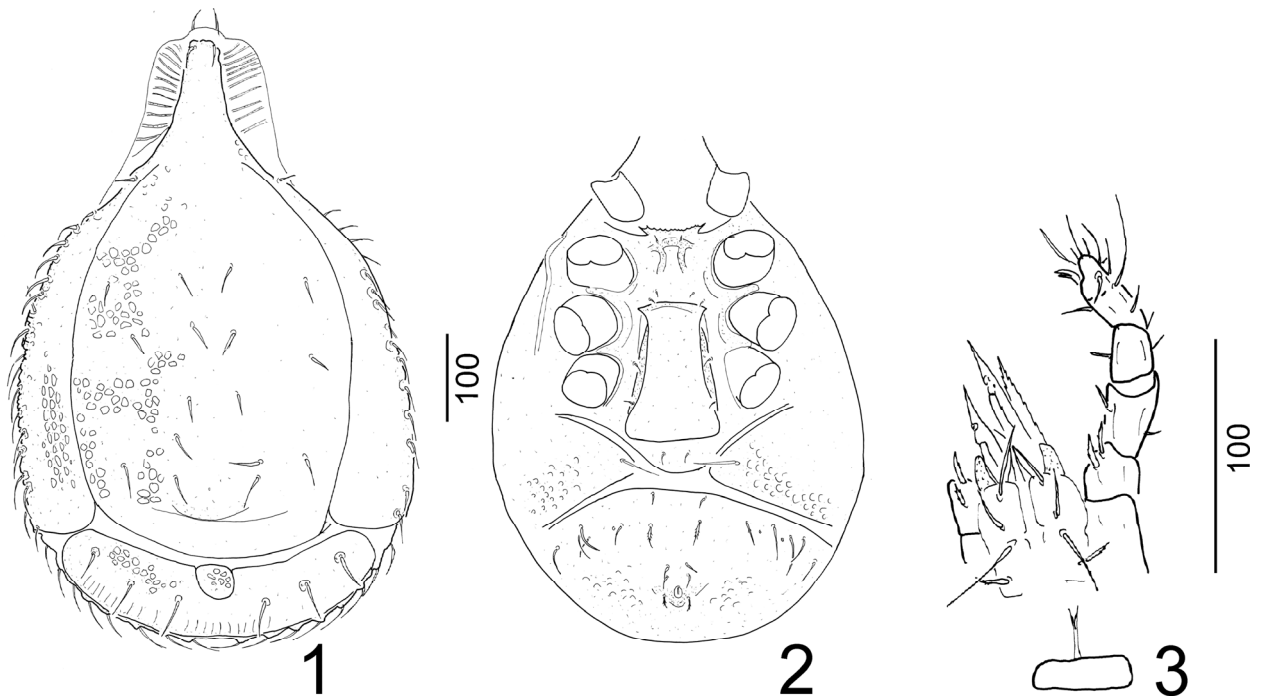
Description. Female. Length of idiosoma 650–660 μm , width 400–410 μm (n=8). Shape of idiosoma pear-like.

Dorsal idiosoma (Fig. 1). Wide and ribbed lateral sections on vertex present. Marginal and dorsal shields fused anteriorly. Pygidial shield small and rounded, placed between the posterior margin of dorsal shield and the anterior margin of postdorsal shield. All setae on dorsal and postdorsal shields smooth, needle-like and *ca.* 25–35 μm long, setae on central area of dorsal shield placed on small, strongly sclerotized platelets. Setae on marginal shield needle-like and *ca.* 30–33 μm long. Surface of dorsum covered by deep, irregular pits.

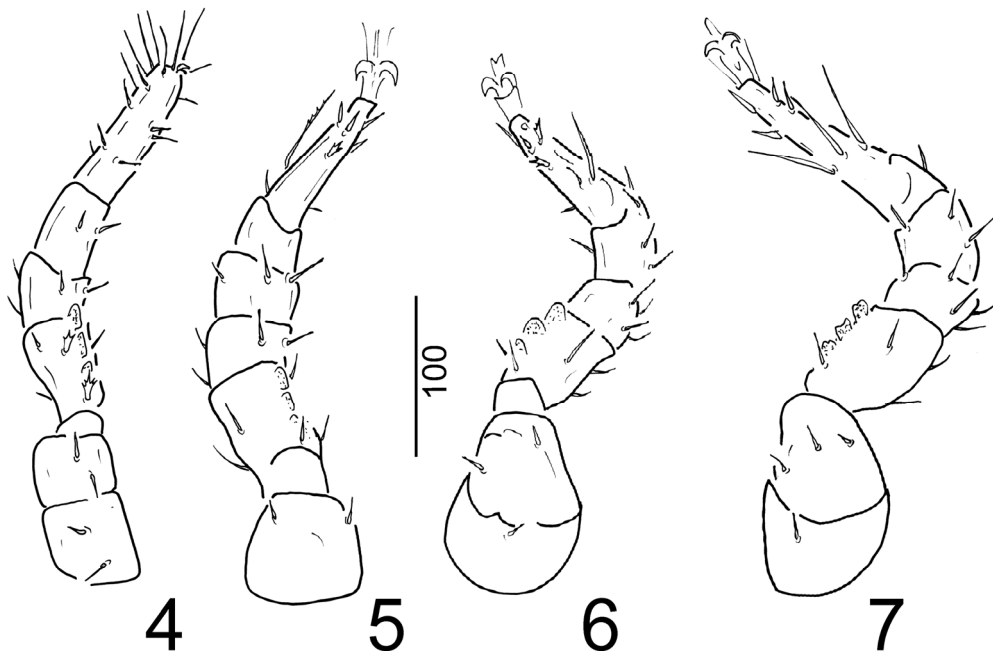
Ventral idiosoma (Fig. 2). First three pairs of sternal setae (St1–St3) short (*ca.* 7–8 μm), other three pairs longer (*ca.* 13–15 μm), all sternal setae smooth and needle-like. St1 situated near the anterior margin of sternal shield, St2 and St3 near anterior margin of genital shield. St4 placed at level of anterior margin of coxae IV, St5 on basal part of adgenital platelets, St6 placed near basal margin of genital shield. Surface of sternal shield smooth, but a II-shaped strongly sclerotized line situated near anterior margin of sterna shield. Sternal, ventral, and inguinal shields not fused. Inguinal shield with one pair long (*ca.* 49–51 μm) and needle-like setae and covered by oval pits. Surface of ventral shield ornamented by oval pits. Eight pairs of setae situated on ventral shield, two of them marginally pilose, others with smooth margins. First pairs of these setae short (*ca.* 12–13 μm), other setae on ventral shield long (*ca.* 27–45 μm) Membranous cuticle without setae. First pair of adanal setae smooth, and needle-like, second pair marginally pilose, short (*ca.* 20–22 μm) and situated near anal opening.

Genital shield ax-like anterolateral angles of genital shield pointed, points directed laterally. Surface of genital shield smooth. Genital shield situated between coxae III and IV. Peritremes long and straight, stigmata situated between coxae II and III. Tritosternum (Fig. 3) with wide base, tritosternal laciniae divided into two branches.

Gnathosoma (Fig. 3). Corniculi horn-like, internal malae longer than corniculi and smooth. Hypostomal setae h1 long (*ca.* 35 μm) and



Figures 1–3. *Trachytes koreana* sp. nov., female. 1 = dorsal view of body, 2 = ventral view of body, 3 = tritosternum, ventral view of gnathosoma and palp.



Figures 4–7. *Trachytes koreana* sp. nov., female. 4 = leg I, 5 = leg II, 6 = leg III, 7 = leg IV.

smooth, h2 short (ca. 18 µm) and smooth, h3 similar to h1 in shape, ca. 75 µm long, h4 marginally serrate and ca. 15 µm long. Chelicerae with long and sharpened apical process on fixed digit, movable digit shorter than fixed digit. Epistome marginally serrate. Palps with two serrate ventral setae, other setae on palp smooth.

Legs. Leg I with small ambulacral claws (Fig. 4), than on other legs (Figs 4–7), all legs bearing smooth and needle-like and robust and serrate setae.

Male, nymphs and larvae unknown.

Etymology. The new species is named after the peninsula (Korean Peninsula) where it was collected.

Remarks. The new species is similar to *Trachytes aegrota* (C. L. Koch, 1841) on the basis of the presence of the wide and ribbed lateral sections of vertex. However, the new species do not have setae on the membranous cuticle between the ventrianal and sternal shields as in *T. aegrota*. The new species has a Π-shaped strongly sclerotized line on the anterior part of the sternal shield, which character is missing in *T. aegrota*.

ZOOGEOGRAPHICAL NOTES

Our new contribution contains new records of 20 Mesostigmata species from the Korean Peninsula, 17 of which are recorded from the Democratic People's Republic of Korea and 3 from the Republic of Korea. One species can be endemic, the herein described *Trachytes koreana* sp. nov., which was collected in the Democratic People's Republic of Korea. Eight species (*U. similihumulifera*, *N. scleoides*, *P. tsushmanum*, *G. humosus*, *P. ishizuchiensis*, *M. punctatus*, *L. tomokoae* and *A. nubes*) from the found 20 occur in Japan as well. The species *V. ochracea*, *O. ussuriensis*, *G. browni*, *P. hiasmaticus*, *G. variabilis* and *G. communis* are described from Russia, but these species are distributed mostly in eastern Asia. The other species have wider distributions and can be found on other continents (e.g. Europe) as well. According to these new records, the Mesostig-

mata fauna of the Korean Peninsula shows a mixed character with Japanese, east Asian, and Palearctic elements found in it.

Acknowledgements – This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR No. 2013-02-054). We are grateful to our colleagues, who collected the mite samples.

REFERENCES

- BLASZAK, C. (1976a): *Xenozercon glaber* gen. nov., sp. nov. (Acari, Zerconidae) from Democratic People's Republic of Korea. *Bulletin of the Polish Academy of Sciences*, 24(1): 33–36.
- BLASZAK, C. (1976b): Systematic studies on family Zerconidae II. Democratic People's Republic of Korea. Zerconidae (Acari, Mesostigmata). *Acta Zoologica Cracoviensia*, 21(16): 527–552.
- KONTSCHÁN, J., PARK, S. J., YOON, T. J. & CHOI, W. Y. (2012): New Uropodina records and species from the Korean Peninsula (Acari: Mesostigmata). *Opuscula Zoologica Budapest*, 43(2): 169–177.
- KONTSCHÁN, J., PARK, S. J., YOON, T. J. & CHOI, W. Y. (2013): *Uropodina mites from Korean Peninsula (Acari: Mesostigmata)*. AdLibrum Kiadó, Budapest, 70 p.
- LEE, S-Y. (1994): *A taxonomic studies on genus Asca (Ascidae: Mesostigmata) in Korea*. Master's Thesis, 71 p.
- LEE, W-K., & LEE, S. Y. (2000): Taxonomic Study of Parholaspid Mites (Acari: Mesostigmata) in Korea. *The Korean Journal of Systematic Zoology*, 16(1): 105–112.
- MAHUNKA, S. (1971): Tarsonemina (Acari) species from Korea. Zoological Collectings of the Hungarian Natural History Museum in Korea (Nr.3.). *Acta Zoologica Academiae Scientiarum Hungaricae*, 17(3–4): 271–294.
- MAHUNKA, S. (1973): Zwei neue Lohmanniiden-Arten aus Korea (Acari, Oribatida). *Folia Entomologica Hungarica*, 26(1): 49–56.
- MAHUNKA, S. (1980): *Parapygmephorus delyorum* sp. n., eine neue Art aus Korea (Acari: Tarsonemina). *Parasitologica Hungarica*, 13: 95–98.
- MAHUNKA, S. (1982): Ptychoide Oribatiden aus der Koreanischen Volksdemokratischen Republik (Acari). *Acta Zoologica Academiae Scientiarum Hungaricae*, 28 (1–2): 83–103.

