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***Onychiurinae (Onychiuridae, Collembola) of North Korea:*
species of the *Paronychiurus flavescens* (KINOSHITA, 1916) group**

[With 9 text-figs.]

**Północnokoreańskie *Onychiurinae (Onychiuridae, Collembola):*
gatunki z grupy *Paronychiurus flavescens* (KINOSHITA, 1916)**

Abstract. New localities of three species of the *Paronychiurus* "flavescens-group" are presented. The respective descriptions of those species are supplemented with new details. *Paronychiurus jongaksanensis* sp. n., belonging to this group is described.

The following is another of a series of studies the material provided by the expeditions of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, to North Korea in 1971, 1974 and 1981.

BAGNALL (1948) submitted a generic division of so-called *Onychiurus* (s. str.) section, which, according to HANDSCHIN (1920) included the "fimetarius-" and "ramosus-groups". He distinguished, among others, the genus *Paronychiurus* BAGN. with the type species *Onychiurus ramosus* FOLSOM, 1917. The genus was to include species of small size with PAO of *Onychiurus* — type, with a small (12—18) number of pseudocelli. Its other characters are: anterodorsal head pseudocelli situated outside the antennal basal area, head postero-marginal and lateral thoracic pseudocelli absent, presence of anal spines.

STACH (1954), in his proposed identification key to the genera of *Onychiurinae*, gives two names: *Ramonychiurus*, or *Paronychiurus* (BAGN.), in the sense of "ramosus-group" (p. 26). *Ramonychiurus* STACH, 1954 is thus a junior objective synonym (ELLIS and BELLINGER, 1973). STACH (1954) enumerates key features of *Paronychiurus* BAGN.: vesicles in the PAO "compound" and sensory clubs in ant. III-organ more or less distinctly granulated.

YOSHII (1956) uses the term *Paronychiurus* BAGN. (as a subgenus name) in agreement with STACH'S diagnosis. SALMON (1959, 1964) does the same in his generic identification keys, adding that sense rods in ant. III-organ are smooth.

It is my opinion that the broad meaning of the genus *Paronychiurus* BAGNALL, 1948 should be maintained in the present state of knowledge. The "fla-

vescens-group" can be distinguished from the thus-understood genus *Paronychiurus* BAGN.

Among North Korean specimens of the genus *Paronychiurus* BAGN. I have found four species belonging to the "*flavescens*-group". There are three species originally described from the Korean Peninsula: *Paronychiurus kimi* (LEE, 1973), *P. shinbugensis* (LEE, 1974) and *P. mediaseta* (LEE, 1974). Several samples yielded a new species, similar to the above. So far I have not found *Paronychiurus flavescens* (KINOSHITA, 1916) in our material, though this species, originally described from Japan, is also recorded from Korean caves (YOSHII, 1966, YOSHII and LEE, 1963).

The species of the "*flavescens*-group" are very similar in dimension, habitus and type of chaetotaxy. Those species, 1.5 to 2.3 mm in size, are similar in habitus to species of the *Protaphorura* the "*group-armata*", with abdominal spines fairly distinct. The setae distribution on the body is fairly dense. They differ in a combination of the other characteristics, e. g. the pseudocellar formula, the number of setae between subcoxae of a given pair of legs, the presence of altered pseudocelli on the subcoxae.

It should be emphasized that the present hypothesis suggests those species, similarity in more than just morphological characteristics, namely in their preference of particular biotope. *P. kimi* (LEE, 1973) occurs in pine forest, in the litter containing dead leaves and herbs. *P. shinbugensis* (LEE, 1974) has been found in mixed forests, invariably in litter covering granite rock in the vicinity of water-courses. *P. mediaseta* (LEE, 1974) occurs in the forests, in the litter with pine needles, near streams and little lakes. *Paronychiurus jongaksanensis* sp. n. has been found in samples taken from under stones in meadows and willow thicket. *P. flavescens* (KINOSHITA, 1916), on the other hand occurs in caves.

Paronychiurus kimi (LEE, 1973)

Originally described from the region of Seoul (Kyeonggi-do province), recorded also from the provinces of Kyeonggoangong-do and Kyeongsangnam-do (LEE, 1973, 1974).

New localities. Prov. Kangwŏn-do, Kumgang-san, valley towards Kurjong-pho, pine forest, dead leaves and herbs, 1 ex. 1. 07. 1981; Ou-Kumgang, Onjong-ri — thickets with pine, maple and *Robinia* sp. Strongly decayed maple and *Robinia* leaves, dead herbs, 13 ex. 2. 07. 1981; leg. A. SZEPTYCKI, W. M. WEINER.

Remarks. Similarly to the other species of the "*flavescens*-group" the sensillar formula is: 2/0 1 + mi 2 + mi/22222. According to my observations, the pseudocellar formula should be 32/122/33343, and not the one proposed by LEE (1973): 32/122/33334. Such notation of this formula is a result of the fact that pseudocellus in question occurs on the borderline between abd. IV and V, and it is sometimes difficult to state the segment to which it belongs. Additional setae: *A7'* and *B11'* (according to LAWRENCE, 1978) lacking. 1 + 1 setae on the

ventral side between legs on the meso- and metathorax. No "trochanteral", altered pseudocelli (RUSEK, 1984), which occur on the subcoxae of the other "*flavescens*-group" representatives. The abd. IV contains, in place of the furca, an area of fine granulation with 4 (rarely 3) minute setae.

Paronychiurus shinbugensis (LEE, 1974)

Type locality is in Jinae-ri, Kangwon-do province (LEE, 1974).

New localities: Prov. Kangwŏn-do, Kungang-san range, region of the Kurjong-pho waterfall, mixed forests, in litter covering a granite rock, near water: 1 ex. 17. 06. 1974, leg. A. SZEPTYCKI, 21 ex. 9. 06. 1981, leg. A. SZEPTYCKI, W. M. WEINER.

Remarks. As in case of *P. kimi* (LEE, 1973), the original description must be supplemented by sensillar formula $2/0 \ 1+mi \ 2+mi/22222$. Trochanteral pseudocelli present, one per each subcoxa. No additional setae on anal lobes. The number of setae between legs on the meso- and metathorax is 1+1. No furca, the only remaining trace of this organ is the area of fine granulation, at the base of which 4 minute setae occur, as in *P. kimi* (LEE, 1973).

Paronychiurus mediaseta (LEE, 1974)

Type material is from Seolag-dong, Kangwon-do province (LEE, 1974).

New localities: Prov. Phjŏngan-namdo, Peksŏn-ri, litter near a small stream, 1 ex. 15. 06. 1981, prov. Kangwŏn-do, Kungang-san, mixed forest, litter with pine needles in the vicinity of a small creek, 4 ex. 28. 06. 1981, 12 ex. 30. 06. 1981, a slope over the Samil-pho lake, scattered pines, rich brushwood and undergrowth, 21 ex. 3. 07. 1981, leg. A. SZEPTYCKI, W. M. WEINER.

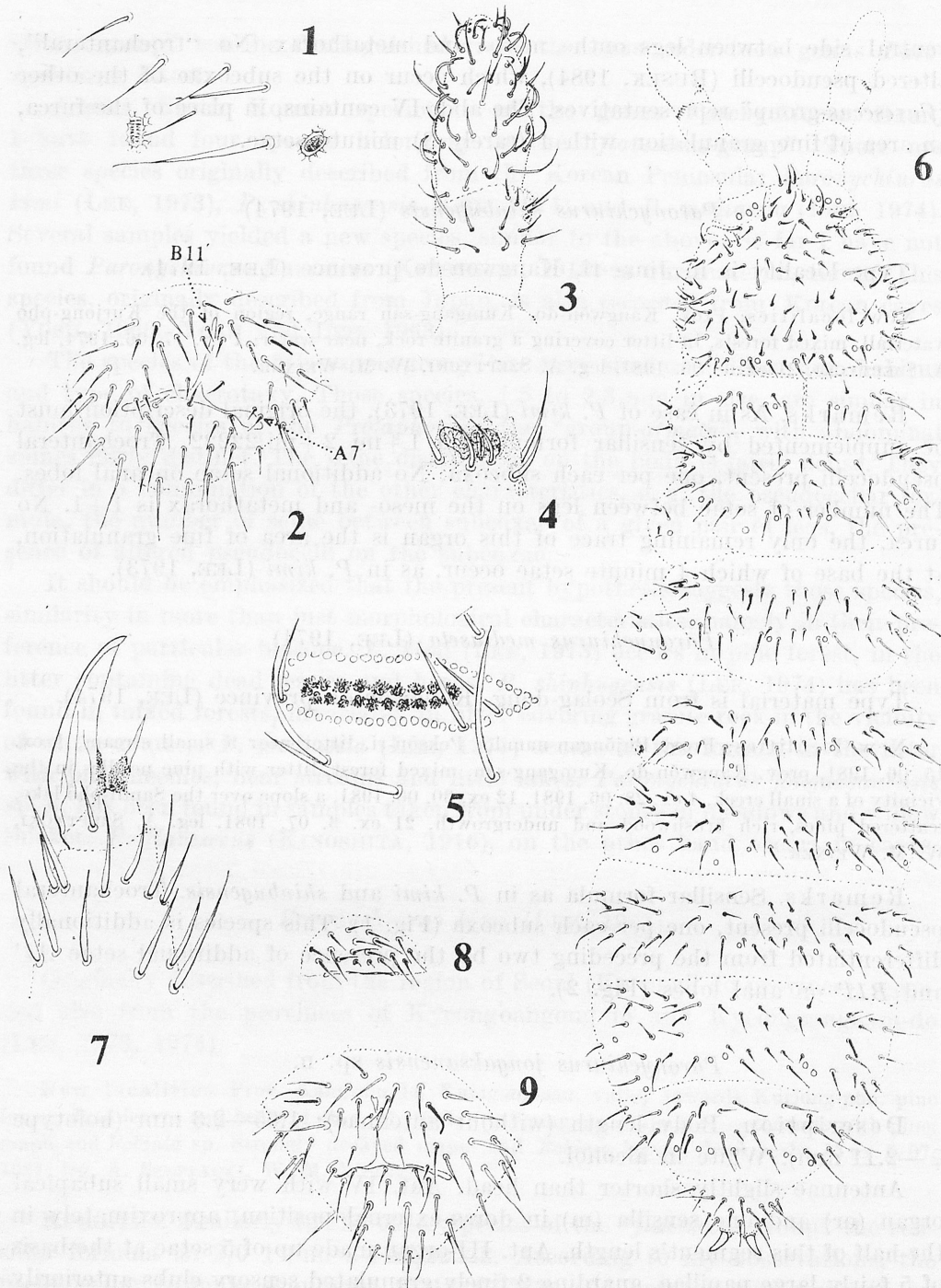
Remarks. Sensillar formula as in *P. kimi* and *shinbugensis*. Trochanteral pseudocelli present, one per each subcoxa (Fig. 1). This species is additionally differentiated from the preceding two by the presence of additional setae *A7'* and *B11'* on anal lobes (Fig. 2).

Paronychiurus jongaksanensis sp. n.

Description. Body length (without antennae): 1.65—2.3 mm (holotype ♀—2.11 mm). White in alcohol.

Antennae slightly shorter than head. Ant. IV with very small subapical organ (or) and one sensilla (m) in dorso-external position, approximately in the half of this segment's length. Ant. III-organ made up of 5 setae at the basis of 5 fairly large papillae, guarding 2 finely granulated sensory clubs anteriorly curved and 2 smooth sensory rods. A small sensilla occurs on the ventral side (Figs 3 and 4).

PAO composed of 18—20 separate vesicles (Fig. 5). Labrum with 4/342 setae.



Figs. 1—9. *Paronychiurus mediaseta* (LEE, 1974): 1 — part of subcoxa with normal and “trochanteral” pseudocelli, 2 — abd. VI ventral side. *Paronychiurus jongaksanensis* sp. n.: 3 — ant. III and IV, 4 — ant. III-organ, 5 — PAO, 6 — body shape with chaetotaxy, 7 — claw, 8 — ♀ genital papilla, 9 — abd. VI ventral side

Pseudocellar formula, dorsally: 32/132/33343, ventrally: 11/000/01010. One pseudocellus on each subcoxa. No "trochanteral", altered pseudocelli.

Chaetotaxy as in Fig. 6, with sensual setae more blunt and less distinct. Sensillar formula: 2/0 1 + mi 2 + mi/22222. Lateral sensual setae on abd. IV displaced towards the edge of pleurite. 1 + 1 and 2 + 2 setae on meso- and metathorax sternites, respectively.

Claw as in Fig. 7. Empodial appendage slightly flattened at its basis, forming a small lamella, from the half of its length needle-shaped. Length of the empodial appendage is equal to 2/3 of the inner edge of the claw.

Anal spines slightly curved, equalling 2/3 length of the outer edge of claw III. Spine length/width ratio approximates 2. Spines situated on distinct papillae (Fig. 6).

No traces of male ventral organ in preadult ♂♂. ♀ genital plate as in Fig. 8. Setae *A7'* and *B11'* on anal lobes absent (Fig. 9).

Type locality: holotype ♀, paratypes 5 ♀♀, 1 pread, ♂, 3 juvenile specimens — Jongak-san (38°50' N and 125°20' E, Phjôngjan-si province), pasture at a stream near plough-land, from under stones and slightly rotten hay, 13.06.1981, leg. A. SZEPTYCKI, W. M. WEINER.

Other localities: Hakhjön-čhôn, river vally (Hwagnhe-namdo province), under stones, among willow brakes, 2. 06. 1974, 3 ex., leg. A. SZEPTYCKI, 11 ex. leg. J. PAWŁOWSKI. Ou-Kum-gang, Onjong-ri (Kangwôn-do province), rotting grass on granite gravel in the vicinity of a stream in a forest, 2 ex. 28. 06. 1981, leg. A. SZEPTYCKI, W. M. WEINER.

The holotype and the paratypes are in collection of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, Kraków, Poland.

Discussion. *Paronychiurus jongaksanensis* sp. n., together with previously mentioned species, forms a fairly uniform "flavescens-group" within the genus *Paronychiurus* BAGN. All these species are very similar in chaetotaxy, differing in such details as the presence or lack of seta *B6* on the head, seta *p1* on the prothorax, or seta *A7'* and *B11'* on anal lobes (Tab. I). It is only *P. jongaksanensis* sp. n. that increased number of setae were observed on metathorax sternite. Other differences concern the pseudocellar formula. It seems that this feature is particularly significant in relation to the ventral pseudocellar formula. Another of those is presence, in *P. mediaseta* (LEE, 1974) and *P. shinbugensis* (LEE, 1974), of the so-called trochanteral pseudocelli described by RUSEK (1984), here present on subcoxae.

Table I does not include *Paronychiurus flavescens* (KINESHITA, 1916), in spite of the fact that the whole group is named after this species. In my research, I had access to redescriptions by YOSHII (YOSHII, 1954, 1956), and the possibility to study specimens from Daeya-gul Cave, Korea (13. VI. 1966, leg. UÉNO; YOSHII, 1966) and from Iriomote Is., Japan (23. III. 1961, leg. HIGOSHI) of YOSHII's collection in Natural History Museum in Geneva (Switzerland). Both Korean and Japanese specimens were not very good preserved, making difficult to compare them with specimens of the other four species. In the specimens from Iriomote Is. (Japan) there are no setae *A7'* and *B11'* on anal lobes, 1 + 1 setae are present on meso- and metathorax sternites between

Table I

Comparison of the Korean species of *Paronychiurus* Bagn. "flavescens-group"

Species	Pseudocellar formula		"Trochanteral" pseudocelli (present or absent)	Seta E6 on head (present or absent)	Seta p1 on th. I (present or absent)	Setae A7' and B11' on anal lobes (present or absent)	Number of setae between III pair of legs
	dorsal	ventral					
<i>P. kimi</i> (LEE, 1973)	32/122/33343	10/000/01000	-	-	-	-	1+1
<i>P. shinbugensis</i> (LEE, 1974)	32/133/33343	10/000/01010	+	+	-	-	1+1
<i>P. mediaseta</i> (LEE, 1974)	32/133/33343	10/000/01110	+	-	+	+	1+1
<i>P. jongaksanenstis</i> sp. n.	32/132/33343	10/000/01010	-	-	-	-	2+2

subcoxae. On the other hand, in the specimens from Dayea-gul Cave (Korea) the setae *A7'* and *B11'* do occur on anal lobes, 2+2 setae are placed on meso- and metathoracal sternites between subcoxae and "trochanteral" pseudocelli are present. The ventral pseudocellar formula in these specimens is: 11/000/01110. Abd. V chaetotaxy of Japanese specimens at my disposal is different from that given by YOSHII (YOSHII, 1956: Fig. 193) for specimens of Dja-na Cave (Aichi district), and from chaetotaxy of *P. jongaksanensis* sp. n. Also, abd. V chaetotaxy of specimens from Shasta Co, Calif. (CHRISTIANSEN and BELLINGER, 1980: Fig. 348A) differs from those given by YOSHII and of new species.

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REFERENCES

- CHRISTIANSEN K. A., BELLINGER P. 1980. The *Collembola* of North America, North of the Rio Grande. Part 2. Families *Onychiuridae* and *Isotomidae*. Pub. Grinnell College, Grinnell, Iowa, 387—784.
- ELLIS W. N., BELLINGER P. F. 1973. An annotated list of the generic names of *Collembola* (*Insecta*) and their type species. Mon. Ned. Ent. Ver. Amsterdam, 7: I—VIII+1—74.
- HANDSCHIN E. 1920. Die Onychiurinen der Schweiz. Verhandl. Naturforsch. Ges. Basel, Basel, 32: 1—37.
- LAWRENCE P. N. 1978. The terminology of terminalia and cartography in the *Collembola*, its evolutionary significance and systematic utility. In: 1st Inter. Seminar on *Apterygota*, ed. R. Dallai, Siena, 69—80.
- LEE B. H. 1973. Etude de la faune coréenne des Collemboles. I. Liste de Collemboles de Corée et description de trois espèces nouvelles. Rev. Ecol. Biol. Sol, Paris, 10: 435—449.
- LEE B. H. 1974. Etude de la faune coréenne des Insectes Collemboles. III. Description de huit espèces nouvelles de *Neanuridae* et *Onychiuridae*. Bull. Mus. Nat. Hist. Nat., Paris, 148: 573—598.
- RUSEK J. 1984. A new location and type of pseudocelli in *Onychiurus* spp. (*Collembola*, *Onychiuridae*). Anns. r. Belg., Bruxelles, 114 (1): 3—7.
- SALMON J. T. 1959. Concerning the *Collembola Onychiuridae*. Trans. R. Ent. Soc. Lond., London, 111 (6): 119—159.
- SALMON J. T. 1964. An index to the *Collembola*, vol. I—II. Bull. roy. Soc. N. Z., Wellington, 7: 1—144, 145—644.

- STACH J. 1954. The Apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family: *Onychiuridae*. Kraków, 219 pp.
- YOSHII R. 1954. Springschwänze des Ozé-Naturschutzgebietes. Scient. Rez. Ozegahara Moor, Tokyo, 777—830.
- YOSHII R. 1956. Monographie zur Höhlencollembolen Japans. Contr. Biol. Lab. Kyoto Univ., Kyoto, 3: 1—109.
- YOSHII R. 1966. Results of the Speleological Survey in South Korea 1966 IV. Cave *Collembola* of South Korea. Bull. Nat. Sci. Mus., Tokyo, 9 (4): 541—561.
- YOSHII R., LEE C. E. 1963. On some *Collembola* of Korea, with notes on the genus *Ptenothrix*. Contr. Biol. Lab. Kyoto Univ., Kyoto, 15: 1—37.

STRESZCZENIE

Autorka daje przegląd gatunków z grupy *Paronychiurus flavescens* (KINOSHITA, 1916) podając nowe stanowiska i uzupełniając opisy. Opisuje także *Paronychiurus jongaksanensis* sp. n.

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