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On the Stoneflies from Korea (*Insecta, Plecoptera*)¹

[With 13 figures]

The stonefly fauna of Korea is only inadequately known and even the study of small collections from this country may contribute considerably to our knowledge. I am therefore much indebted to Dr. A. RIEDEL and Dr. W. MIKOŁAJCZYK who gave me the opportunity to study a number of *Plecoptera* from the Korean People's Democratic Republic, kept in the collection of the Institute of Zoology of the Polish Academy of Sciences in Warszawa.

In fact, only very few species had been recorded from Korea, and ILLIES (1966) lists the following: *Oyamia nigribasis* BANKS, *Perla coreana* OKAMOTO, *Claassenia manchuriana* (BANKS) and *Isoperla sowerbyi* WU et CLAASSEN. Most of these had been taken in the Yalu River which separates Manchuria and Korea. *Togoperla tennina* (NEEDHAM), originally named after Japanese material has also been mentioned as occurring in the Yalu River by WU (1938). *I. sowerbyi* appears to be identical with *I. lunigera* (KLAPÁLEK) but is not definitely synonymized here because the type of *I. sowerbyi* has not been studied. *I. lunigera* has been redescribed after type-material (ZWICK, LEVANIDOVA and ZHILTOVA 1971) and is known to occur in Korea (ZWICK, in press). UÉNO (1938) reported nymphs of a Pteronarcid from Korea; presumably, these were

¹ Results of the Korea Expeditions of the Institute of Zoology, Polish Academy of Sciences, Warszawa, Contribution No. 24.

of *Allonarcys sachalina* (KLAPÁLEK) (= *A. excavata* WU et CLAASSEN — compare figures in NELSON and HANSON 1971 and ZWICK, LEVANIDOVA and ZHIL-TZOVA 1971!). *Scopura longa* UÉNO is perhaps the most remarkable representative of the Korean *Plecoptera*; its Korean localities have recently been listed by KOMATSU (1971).

To this short list, 6 new species and one new subspecies were added, some other species remained unidentified, when I recently had a chance to study some material (ZWICK, in press). A few of these species are also contained in the material reported here and the number of stoneflies known from Korea is further increased by some additional new or presently unidentifiable species. Still, only a small fraction of the Korean *Plecoptera* is probably known at present.

Nemouridae

Amphinemura steinmanni ZWICK

Material: 1 ♀, Prov. Hamhyng-si: Hyngpong-ri, distr. Hamdžu (approx. 15 km W Hamhyng), 12 VI 1965, coll. M. MROCZKOWSKI and A. RIEDEL; 1 ♀, Mts. Mjohjang-san, distr. Hjangsan, Hjangam-ri, valley Hapiro, 20–21 VI 1965, coll. M. MROCZKOWSKI and A. RIEDEL.

Presently known from Korea only; subgenital plates resemble those of some other species from China, for distinctive features see ZWICK (in press).

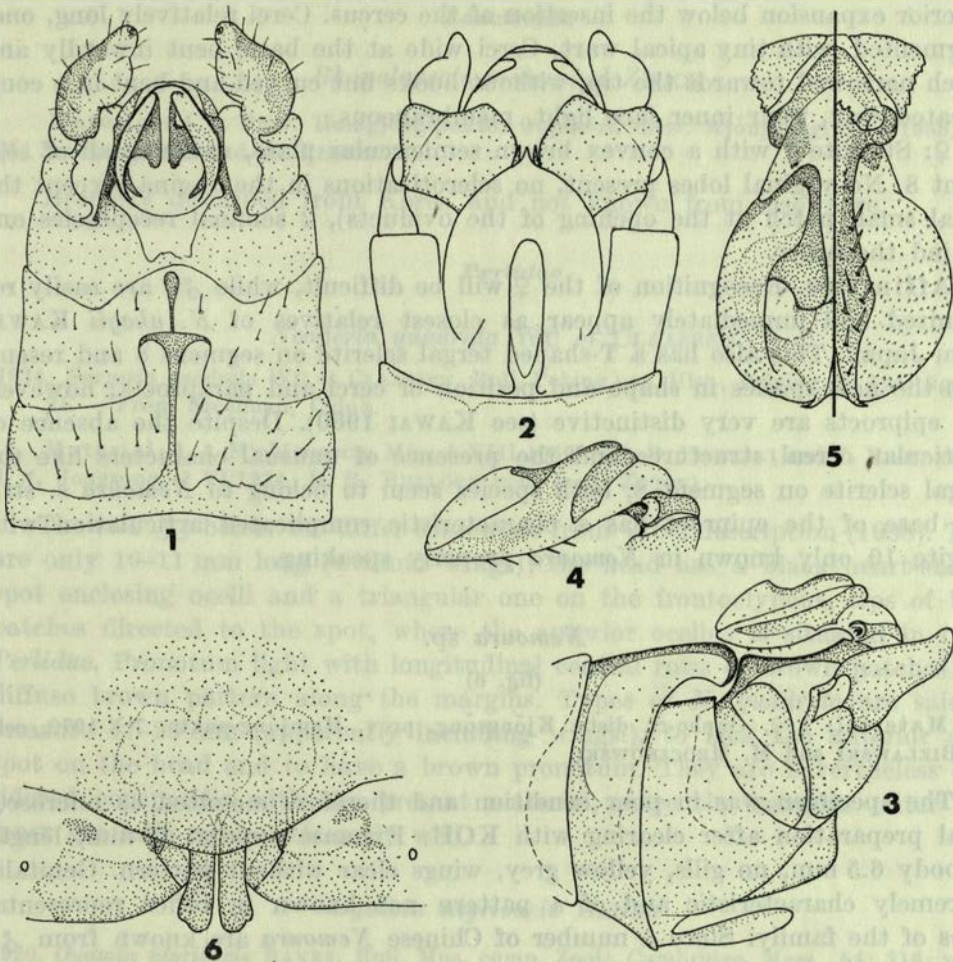
Nemoura tau sp. n.

(figs. 1-5)

Material: Holotype ♂, Korea, Hamhyng-si: Hyngpong-ri, distr. Hamdžu (approx. 15 km W Hamhyng, 12 VI 1965, coll. M. MROCZKOWSKI and A. RIEDEL. Additional material from Korea (ZWICK, in press) contained also ♀♀ which served for the description below.

Tiny gill-less species, yellowish brown. Length to tip of wings 6.5–7.5 mm only. Recognition will be possible only after study of the very characteristic genitalia.

♂: Tergite 8 sclerotized only near the anterior margin and along a median keel which is expanded posteriorly to form a T which supports a membranous process of the 8th tergite. This process extends over half of tergite 9. Tergite 9 also membranous, with a smaller sclerotized keel expanded only little at the tip hardly produced over tergite 10. Tergite 10 with a membranous field below the epiproct; the lateral margins of this field are sclerotized and bent up to form crests bordering the epiproct laterally. Epiproct pear-shaped, narrow at the base, tip emarginate with two tiny outwardly directed hooks. On the ventral side of the epiproct, the usual paramedian sclerites beset with a few yellowish spicules are present. The dorsal sclerite of the epiproct is connected to the ventral one near the tip, curves outwardly (and is then partly hidden



Figs. 1-6.

1-5. *Nemoura tau* sp. n. 1 - abdominal tip of ♂, dorsal view; 2 - abdominal tip of ♂, ventral view; 3 - the same, lateral aspect; 4 - ♂ epiproct, lateral aspect; 5 - ♂ epiproct, on left side of median line in dorsal view, on right side of this line ventral view.

6. *Nemoura* sp. - genital region of ♀.

below a membranous fold) and then to the middle again, where it is forming a dark plate. Basally, the dorsal sclerite is narrowed and abruptly bent outwards and anteriorly from its paramedian position, finally ending at the side of the epiproct.

Sternite 9 with short oval subgenital plate. Ventral lobe long and slender, with parallel sides. 10th sternite reduced, paraprocts well developed. Their inner lobes small and blade-like, hardly visible at the sides of the short and sharp tip of the subgenital plate. Outer lobes bluntly pointed, with a rounded

exterior expansion below the insertion of the cercus. Cerci relatively long, one-segmented, with tiny apical wart. Cerci wide at the base, bent inwardly and much narrowed towards the tip, without hooks but curved and bent in a complicated way, their inner face light, membranous.

♀: Sternite 7 with a convex brown semicircular plate, covering all of segment 8. No vaginal lobes present, no sclerotizations in the vagina (except the usual small patch at the opening of the oviducts), 2 seminal receptacles one behind the other.

Affinities. Recognition of the ♀ will be difficult, while ♂♂ are easily recognized and immediately appear as closest relatives of *N. akagii* KAWAI from Japan. This also has a T-shaped tergal sclerite on segment 8 and resembles the new species in shape and position of cerci and paraprocts; however, the epiprocts are very distinctive (see KAWAI 1960). Despite the absence of particular cercal structures and the presence of unusual characters like the tergal sclerite on segment 8, both species seem to belong to *Nemoura* s. str.; the base of the epiproct has a characteristic complicated articulation with tergite 10 only known in *Nemoura* properly speaking.

Nemoura sp.

(fig. 6)

Material: 1 ♀, Onpho-ri, distr. Kjõngsõng, prov. Hamjõng-pukto, 7 X 1970, coll. R. BIELAWSKI and M. MROCKOWSKI.

The specimen was in poor condition and therefore mounted as microscopical preparation after clearing with KOH. Expanse approx. 16 mm, length of body 6.5 mm, no gills, yellow grey, wings clear without pattern. Genitalia extremely characteristic and of a pattern not known in other representatives of the family. Since a number of Chinese *Nemoura* are known from ♂♂ only, the single ♀ is not named.

Sternite 7 with big convex sclerotized pregenital protrusion. Below it, two finger-like processes project. They are parallel to each other, notched at the slightly widened tips. The surface of these processes which appear to be a highly modified subgenital plate, is scaly; basally they fuse and can be traced on the ventral side of the vaginal folds inside the body. Vaginal lobes on sternite 8 wide, extending almost to the spiracle, giving rise to the dorsal vaginal folds and sclerotizations.

Nemoura sp.

Material: 1 ♀, Prov. Hamhyng-si, Tõksan-ri, 12 km E Hamhyng, 14 IX 1966, coll. C. DZIADOSZ and H. SZELEGIEWICZ.

Gill-less Nemourid of uncertain identity without any characteristic trait in general appearance or genital characters.

*Leuctridae**Rhopalopsole mahunkai* ZWICK

Material: 1 ♀, Prov. Hamgjong-pukto, Onpho-ri, distr. Kjongsong, 3 VI 1965, coll. M. MROCZKOWSKI and A. RIEDEL.

Recently described from Korea and not known from elsewhere.

*Perlidae**Neoperla quadrata* WU et CLAASSEN

1934. *Neoperla quadrata* WU et CLAASSEN, Bull. Peking nat. Hist., Peiping, 9: 124; figs. 20, 21. — From Szechuan, China.

Material: 1 ♂, Mjohjang-san Mts., 5 VIII 1959, coll. B. PISARSKI and J. PROSZYŃSKI; 1 ♂, Jongsong, 1 VI 1954, H. R. BULLOCK coll. (coll. ZWICK).

The two ♂♂ before me differ somewhat from WU's description (1938). They are only 10–11 mm long (without wings); the head has a black heart-shaped spot enclosing ocelli and a triangular one on the frontoclypeus, tips of both patches directed to the spot, where the anterior ocellus is situated in other *Perlidae*. Pronotum light with longitudinal central rows of brown patches and diffuse brown pattern along the margins. Types of *N. quadrata* are said to measure 17–23 mm (apparently including wings!), to lack the anterior dark spot on the head and to have a brown pronotum. They are nevertheless considered conspecific with the present material, since the complex outer and inner genitalia agree extremely well.

Oyamia nigribasis BANKS

1920. *Oyamia nigribasis* BANKS, Bull. Mus. comp. Zool., Cambridge, Mass., 64: 316; pl. 4, figs. 49, 50. — From the Yalu River, 150–200 miles before its mouth.

Material: 3 ♂♂, 3 ♀♀, Mjohjang-san Mts., Hjangam-ri, distr. Hjangsan, 16–22 VI 1965, coll. M. MROCZKOWSKI and A. RIEDEL.

This beautiful species appears not to have been taken since BANKS described it, because WU (1938) mentions no additional material.

Paragnetina flavotincta (MCLACHLAN)

(figs. 7–10)

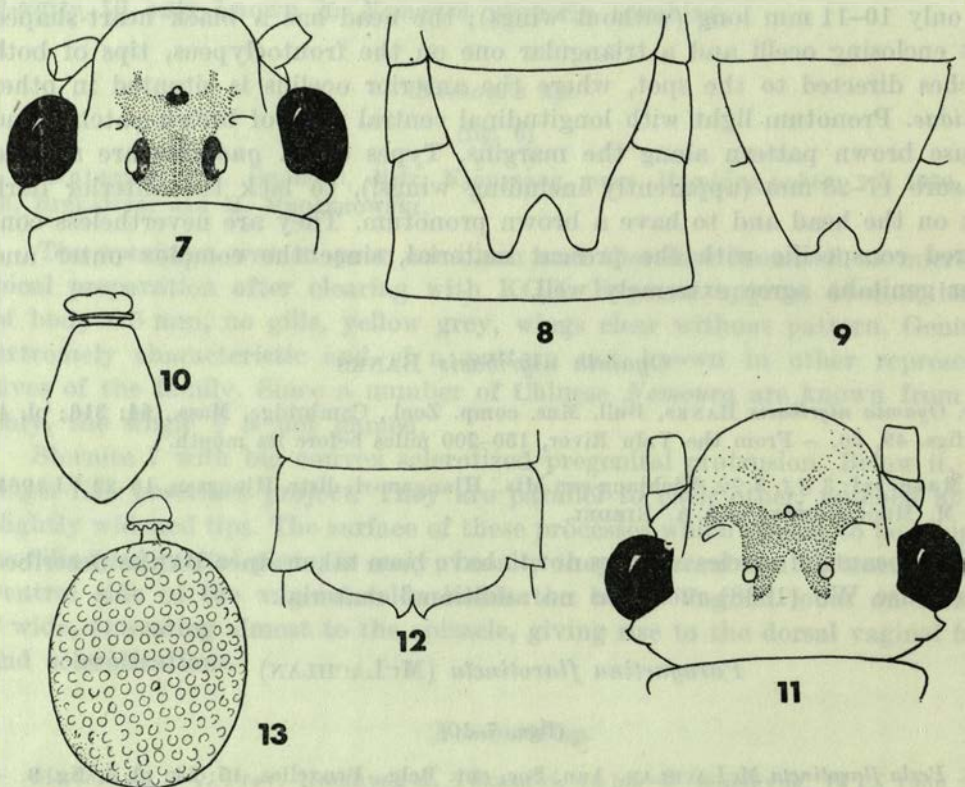
1872. *Perla flavotincta* MCLACHLAN, Ann. Soc. ent. Belg., Bruxelles, 15: 54; pl. 1, fig. 9. — From Sib. or. (fide KIMMINS 1970).

1921. *Paragnetina ocellata* KLAPÁLEK, Ann. Soc. ent. Belg., Bruxelles, 61: 61. — From Semipalatinsk, Siberia. **Syn. nov.**

Material: 2 ♀♀, Mjohjang-san Mts., 5 VIII 1959, coll. B. PISARSKI and J. PROSZYŃSKI.

New to Korea, of wide distribution in Siberia.

The original description of this species was based on material collected by MAACK in Eastern Siberia, in the possession of Mr. HIGGINS, London (Mc LACHLAN 1872); no exact type-locality was given, the number of specimens examined was also not indicated, but only the ♀ was described. A ♀ in the British Museum (listed by KIMMINS 1970) has been labelled holotype by Mc LACHLAN himself. Apparently, the specimens in coll. SELYS-LONGCHAMPS taken for the types by KLAPÁLEK (1923) are no real syntypes. KLAPÁLEK had labelled them types and this has been completed (in another handwriting) to holotype and paratypes respectively. These specimens from the SELYS collection could be studied due to the courtesy of Dr G. DEMOULIN and were found to be conspecific with the present ♀♀ from Korea. The ♂ has been drawn by ZHILTOVA (1967); her beautiful drawing misses the anterior abdominal segments and therefore does not show the two short and wide processes of tergite 6 (thickly beset with spicules and touching in the middle).



Figs. 7-13.

7-10. *Paragnetina flavotinota* (McLACHLAN). 7 - head, dorsal view; 8, 9 - genital area of two ♀♀; 10 - egg. 11-13. *Perlidae* gen. spec. 11 - head, dorsal view; 12 - subgenital plate of ♀; 13 - egg.

Apparently, there is considerable variation concerning depth and shape of the notch of the subgenital plate in the ♀. The egg is widest beyond mid-length, strongly reduced in diameter towards both poles; cap relatively sharply pointed, collar very wide on a short base. Surface smooth.

The single ♀ named as *P. ocellata* (figured in KLAPÁLEK 1923) shows no particulars which would permit distinction from *P. flavotincta*; ILLIES (1966) calls it a "species inquirenda et incertae sedis". I have no hesitation to establish the above synonymy. The type of *P. ocellata* should be in Museum Helsinki but appears to have been lost (MEINANDER i. l.).

Perlidae gen. spec.

(figs. 11-13)

Material: 1 ♀, Vönsan, 4 IX 1966, coll. C. DZIADOSZ and H. SZELEGIEWICZ.

Length to tip of wings 38 mm, expanse 67 mm. Yellowish brown, with a dark patch on the head and with the lateral, down-folded parts of the pronotum dark brown.

The specimen cannot be identified at present, it is even impossible to decide to which of the (probably unnatural) subfamilies it belongs. The wings have no particularities — they might as well be of a *Paragnetina*, an *Acroneuria* or of a species close to *Perla orientalis* CLAASSEN (which is also of doubtful identity and position). The subgenital plate bears resemblances to some representatives of all these genera. Eggs might facilitate future recognition: they are oval, almost globular, the collar is small, stands on a relatively high stem and has a serrated margin. Surface ornated by many regularly arranged circular grooves.

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STRESZCZENIE

[Tytuł: Widelnice z Korei (*Insecta, Plecoptera*)]

Na podstawie materiałów zebranych przez ekspedycje Instytutu Zoologicznego PAN autor podaje wykaz widelnice z Koreańskiej Republiki Ludowo-Demokratycznej. Wyróżniono 9 gatunków, z których jeden, *Nemoura tau* sp. n., opisano jako nowy.

РЕЗЮМЕ

[Заглавие: Веснянки (*Insecta, Plecoptera*) из Кореи]

На основании материалов собранных экспедицией Зоологического Института ПАН, автор дает список веснянок из Корейской Народно-Демократической Республики. Выделено 9 видов, из которых один, *Nemoura tau* sp. n., описано как новый.

Redaktor pracy — prof. dr J. Nast