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On the Trichoptera of Korea with Eastern Palaearctic relatives

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Abstract. The caddisfly materials collected by Hungarian zoologists during 25 collecting trips between the years of 1970 and 2016 in the Korean Peninsula was identified and compared when required with Eastern Palaearctic relatives. The appendicular genital terminology was adopted and applied to several representatives of Polyphorae taxa. We identified 95 caddisfly species, including 5 new records for the Korean Peninsula: *Tinodes higashiyamanus* Tsuda, 1942, *Apatania yenchingensis* Ulmer, 1932, *Neophylax relictus* (Martynov, 1935), *Limnephilus quadratus* Martynov, 1914, and *Hydatophylax soldatovi* (Martynov, 1914). We have described the following 12 species new to science: *Plectrocnemia ussurica* Oláh & Johanson sp. nov. (Russia); *Psychomyia tompa* Oláh & Johanson sp. nov. (Russia); *Psychomyia vandor* Oláh & Johanson sp. nov. (Russia); *Agapetus vastag* Oláh & Johanson sp. nov. (Russia); *Agapetus vekon* Oláh & Johanson sp. nov. (Russia); *Neophylax goguriensis* Oláh & Park sp. nov. (North Korea); *Neophylax sillensis* Park & Oláh sp. nov. (South Korea); *Dicosmoecus coreanus* Oláh & Park sp. nov. (South Korea); *Dicosmoecus juliarum* Oláh sp. nov. (Russia); *Dicosmoecus mongolicus* Oláh sp. nov. (Mongolia); *Asynarchus mongolicus* Oláh sp. nov. (Mongolia); *Psilotreta kerka* Oláh sp. nov. (North Korea).

Keywords. Trichoptera, new species, new records, Korean Peninsula, Russia, Mongolia.

INTRODUCTION

Between 1970 and 2016 during 25 collecting trips a significant caddisfly material was collected by Hungarian zoologists from various aquatic habitats in the Korean Peninsula. This collection was stored unidentified in the the Hungarian Natural History Museum. In this paper we present the results of the elaboration and identification of this valuable material.

The northern part of the Korean Peninsula was explored by zoologist from Bulgaria, Czechoslovakia, East Germany and Poland. Most of the material has been examined and several new species have been described (Botosaneanu 1970, Oláh 1985, Mey 1989, Kumanski 1990, 1991a, b, 1992, Kumanski & Weaver 1992).

During our study of the Korean material we faced taxonomical problems of several species described by Martynov from regions of cross-border Russia and recorded from Korea and even from Japan. To be able to exactly identify these specimens we compared our material with material from Russia (Amurland, Ussuriland), Japan, from the southern part of the Korean Peninsula as well as Mongolia. This was possible due to successful cooperation with researchers from majority of these countries. A significant material collected by Swedish colleagues in Ussuriland was available for our comparative study as well.

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MORPHOLOGY

Male appendicular genital terminology applied to limnophiloid Polyphorae

Getting first intimately aquainted with the genital structure of several representatives of the Polyphorae, here we adopt our appendicular genital terminology (Oláh & Johanson 2008) to males of limnophiloid Polyphorae (Schmid 1955). We suggest to replace the widely applied neutral, directional terms of preanal (before proct or rectum), superior (upper), external (outer), internal (inner)/intermediate (in-between) and inferior (lower) branches on the segment X(XI) as well as of the inferior (lower) appendages on segment IX with the appendicular terminology. It seems that Polyphorae has the most plesiomorphic state of the superanal complex in the Limnephiloidea superfamily (Vshivkova, 2007). Segment X (XI) is most produced and the genitalia primitively comprise 7 pairs of appendages: (1) dorsomesal lobes of segment IX; branches on segment X (XI): (2) preanal appendages; (3) external branches; (4) internal or intermediate branches; (5) inferior branches; (6) subanal plate; (7) inferior appendages on segment IX. These structures are variously present or absent in different genera; some of them often lost through specialization by simplification that could be an inherent complexity increase (Oláh *et al*. 2017). Complexity could arise, not only by incremental addition but by incremental subtraction in the Apataniidae, Uenoidae families and in the Dicosmoecinae subfamily of the limnophiloid Polyphorae.

At Oligophorae taxa the number of branches on segment X (XI) is reduced/fused and consistently comprised only 4 pairs of appendages: (1) cerci, one or the fused forms of setose cercal appendages (praeanal appendages and external branches of segment X (XI); (2) paraproct appendages (the fused internal and inferior branches of segment X); (3) membranous or less pigmented subanal plate as well as (4) the subphallic complex of inferior appendages on segment IX with its basal plate. In Oligophorae limnephilids the *paraproct complex* is formed by the fusion of internal and inferior branches of segment X (XI) due to the further reduced body of segment X (XI). The paraproct complex is represented by variously produced remnants of these branches and named in four different directional terminologies: (1) internal and inferior branches of Schmid (1955), (2) apparent dorsal and ventral branches of Vshivkova (2007), (3) apical and basal branches or (4) horizontal and vertical branches. Dorsal branches are produced caudad and more or less horizontal, ventral branches oriented more or less dorsoventrad. Combining the four directional nomenclatures of the paraproct branches we may summarize that the dorsal branch is internal (bilobate in plesiomorphy: external and internal), apical and horizontal; the ventral branch is inferior, basal and vertical. Branches may be partially or completely fused in various shape and forming a completely or partially sclerotized ring around anus. This paraproct complex could be fused with dorsum IX, segment X and with cerci forming together the *superanal genitalic complex* of Vshivkova (2007).

Vaginal sclerite complex of limnophiloid Polyphorae

Here we present the structure and phenomic potential of the vaginal sclerite complex as we have developed and discussed for other than limnophiloid Polyphorae taxa (Oláh *et al*. 2013, 2014, 2015). The basic structural pattern of the vaginal sclerite complex composing of nine structural units seems to suit well to the primitive limnophiloid taxa of Polyphorae. However, some well discernible differences appear very pronounced compared to Oligophorae. Both (1) the dorsal articulation structures connecting the vaginal complex to dorsal vulvar lip and (2) the ventral articulation structures connecting the vaginal complex to the ventral vulvar lip are very produced and particularly structured at the primitive Polyphorae, offering probably high species-level diagnostic value.

As we have discussed in our first study (Oláh *et al.* 2013) the diversity potential of the sclero-

tized structure functioning in the female genital chamber and named as vaginal sclerite complex is underutilized in distinguishing among the closely related caddisfly species. Female internal apparatus cleared in caustic potash was first recognised and applied by Morton (1902), later by Nielsen (1943) to separate *Apatania* females. In limnephilids the vulval opening formed and surrounded by the lower lip (*vulvar scale* of McLachlan (1874-1880), the *gonopods of segments* VIII and IX by Nielsen (1980)) and by the upper lip (*supragenital plate*, part of segment X) is the vestibule to vagina. The vaginal chamber is formed by fusion of the distal parts of the common oviduct and the duct of the accessory or collateral glands. These glands usually are very large filling most part of the female abdomen and their ducts are rather wide at their section opening to the vaginal chamber. This may divide the vaginal chamber into a ventral and dorsal branch. The *vaginal sclerite complex* (*internal sclerite* of Morton (1902), *spermathecal sclerite* of Nielsen (1980)) developed along the junction of oviduct and the duct of the accessory glands and receiving also the spermathecal duct plus the duct of bursa copulatrix. It is a rather diverse and complex organ, but this potential was not yet explored to differentiate among caddisfly species.

Species specificity of female genitalia, higher than at male, was demonstrated only recently in families of dipteran Sepsidae (Puniamoorthy *et al*. 2010) and mecopteran Panorpidae (Ma *et al.* 2012). Its complex nature as well as difficulties in understanding and drawing, have limited its use in taxonomy. The vaginal sclerite complex evolved with flexing, bracing, holding and stretching functions for the structural organisation of the four ducts entering and forming the vaginal chamber. Its dorsal position to oviduct and anterad position to the duct of accessory gland as well as the variously developed sclerotized substructures to receive duct of bursa copulatrix and the duct of spermatheca explain this basic function. Starting from Morton's original terminology we have differentiated 6 substructures in the vaginal sclerite complex for our taxonomic purposes. (1) Morton's *paired lateral blades* are the *vaginal sclerite plate* itself on the dorsum of the vagina. The vaginal sclerite plate may form variously sclerotized lateral folds, flanks and subdivided structures in different groups. We have separated two additional substructures of the plate with particular functions. (2) The substructure of mostly sclerotic articulation to the internal continuation of the lateral processes of the vulval scales, the paired gonopods of segment IX, is usually a double layered *folding plica* ensuring a firm flexible attachment or suspension of the membranous genital chamber and its tubing complex to the exoskeleton of the vulvar scale. (3) The vaginal sclerite plate has a pair of sclerotized wing-shaped substructure laterad serving stretch function to the vagina and apodemic function anterad to receive vaginal muscles. (4) Morton's *central triangular piece* is the usually hood-shaped *junction sclerite* holding and stretching the junction where the ducts of ovarium and accessory gland meet. (5) Morton's *central foot-shaped piece* is the *spermathecal process* (*processus spermathecae* of Nielsen 1980) receiving the ductus spermathecae and forming frequently a longitudinal keel on the ventrum of the vaginal sclerite. The opening of the spermathecal duct forms variously sclerotized window on the spermathecal process. (6) This small sclerite was not specified by Morton. The ductus bursae open between the spermathecal process and the common oviduct at the anterior margin of the vaginal sclerite. The mesoanterior margin of the vaginal sclerite plate is bulking and bending upwards elevating the position of the duct opening. These substructures and functions constitute the vaginal sclerite complex, but their development and sclerotization are highly varying in the different groups.

As we have examined more limnephilid genera and species we have separated three more substructures for practical taxonomic purposes in addition to the six substructures distinguished in our first study (Oláh *et al.* 2013) and listed them together with the previously distinguished ones (Oláh *et al.* 2014, 2015). (1) *Vaginal sclerite plate* itself on the dorsum of the membranous vagina and ventrum of the membranous accessory gland duct; this basal plate integrates all the substruc-

tural components of the vaginal sclerite complex. (2) *Dorsal articulation sclerites*, a variously sclerotized internal continuation of the supragenital plate (upper vulvar lip). The internal dorsal articulation sclerites and external supragenital plate together participate to receive the stimulating or harm effect of the male parameres in the processes of sexual selection. Much developed if accessory duct enlarged laterad or elongated anterad and gives additional support to help the function of the junction sclerite. Heavily sclerotized if male parameres function as harm device in the sexually antagonistic coevolution. (3) *Ventral articulation sclerites* attach the sclerite complex to the internal continuation of the lateral processes of the vulvar scales (lower vulvar lip), that is to the paired gonopods of segment IX. (4) *Lateral joints* of the upper and lower lips. Usually not, or less sclerotized, but sometimes enlarged and bloated by proliferation of hard tissue. (5) *Wing sclerites* with stretch function for vagina and with apodemic function anterad to receive vaginal muscles, variously combined with ventral articulation sclerites. (6) Hood-shaped *junction sclerite* holding and stretching the junction where the ducts of accessory gland and ovarium meet as well as separating accessory duct from spermathecal duct. (7) *Spermathecal process* receiving ductus spermathecae and forming frequently a longitudinal keel on the ventrum of the vaginal sclerite. (8) *Bursal sclerite* receiving ductus bursae that opens between the spermathecal process and the common oviduct at the anteriomesal margin of the vaginal sclerite. These substructures and functions constitute the vaginal sclerite complex, but their development and sclerotization are highly varying in the different groups. (9) *Anterior apodemes* appear as the anteriomost lateral extension of the vaginal plate separated by the mesal bursal sclerite. Receive muscles and frames the space for the bursal sclerite ensuring to receive ductus bursae.

MATERIALS AND METHODS

On the basis and in the frame of the signed agreement between Hungary and the Democratic People's Republic of Korea, the Hungarian Natural History Museum has realised 16 zoological collecting trips between 1970 and 1994 in different regions of the northern part of the Korean Peninsula at various seasons (Mahunka & Steinmann 1971, Mészáros & Zombori 1995). In 1990 cooperation was initiated by direct contact between the Center for Insect Systematics in Chuncheon, the Republic of Korea and the Hungarian Natural History Museum. This cooperation, producing another 9 Korean zoological collecting trips, was part of the bilateral Agreement signed between the Korea Science and Engineering Foundation and the Hungarian Academy of Sciences in the general framework of the interstate agreement between Hungary and the Republic of Korea (Ronkay & Vojnits 1992, Zombori 1992).

During these Korean trips there was no collectings conducted by Trichoptera specialist. Most of the Trichoptera material collected was by-catches of light collections organised and carried out by lepidopterologists. Caddisfly collection requires specialised daytime sweeping procedures in particular roosting habitats both in low and high canopies as well as night-time light collections nearby of particularly selected aquatic habitats. Over the years significant and rich caddisfly materials was collected by nonspecialists but, mostly larger-sized taxa were selected. For instance, there is no single microcaddisfly present, and other small sized taxa are also underrepresented. Other reason of the lower diversity than expected in the material is due to the fact that almost the same area and habitats have been visited repeatedly year by year.

Depositories. Department of Plant Protection, Henan Institute of Science and Technology, China (DPP-HIST).
Hungarian Natural History Museum, Budapest, Hungary (HNHM).
Kyonggi University, Suwon, Korea (KGU).
Natural Institute of Biological Resources, Incheon, Korea (NIBR).
Oláh Private Collection, Debrecen, Hungary, under national protection of the Hungarian Natural History Museum (OPC).
Swedish Museum of Natural History, Stockholm, Sweden (SMNH)

TAXONOMY

Suborder Annulipalpia

Superfamily Philopotamoidea Stephens, 1829

Family Stenopsychidae Martynov, 1924

Stenopsyche bergeri Martynov, 1926

Material examined. **North Korea**, South Hwanghae Province, Haeju, Mt Suyong-san, 16.X.1987. Material collected in a deciduous forest of the SE slope, leg. Z. Korsós & L. Ronkay (3 males, 1 female; HNHM). North Korea, Gang-won Province, district On-dzong, Kumgang-san, near Hotel Go-song, 250 m, 6.VIII.1975, collected at Mv lamp in a coniferour-locust tree wood, leg. J. Papp & A. Vojnits (6 males, OPC).

Stenopsyche coreana Kuwayama, 1930

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, Kuryong valley, 14.VI.1991, collected by light trap in the lower part of the valley, leg. L. Ronkay & A. Vojnits (1 male, HNHM). Nort Korea, Kangwon Province, Mt. Kumgang-san, 13.VI.1991, collected at light in the side valley near to Hotel Kumgang, leg. L. Ronkay & A. Vojnits (1 male, OPC). North Korea, Kumgang-san (Diamond Mountains), Hotel Kum-gang at village Ontsong, 9.VII.1977, canopied coniferous forest, collecting at Mv lamp in the forest, about 150–200 m S from the hotel leg. O.Gy. Dely & Á. Dely-Draskovits (3 males, OPC). North Korea, Kumgang-san (Diamond Mountains), Rükhaam, about 7 km W fom Hotel Kum-gang, 11.VII.1977, cauth in Malaise-trap erected on a clearing in the forest leg. O. Gy. Dely & Á. Dely-Draskovits (1 male, OPC). North Korea, Kangwon Province, Mts. Kumgang san, Hotel Kumgang, 9. VI.1991, collected at light on balcony of the hotel leg. L. Ronkay & A. Vojnits (1 male, OPC). North Korea, Province Gang-won, district On-dzong, Kum-gang san, near Hotel Go-song, 250 m, 6.VIII.1975, collected at Mv lamp in a coniferour-locust tree wood, leg. J. Papp & A. Vojnits (1 male, OPC). North Korea, Gang-won Province, Kum-gang san, 10. VI. 1991, collected by light trap, leg. L. Ronkay & A. Vojnits (1 male, OPC).

Stenopsyche marmorata Navás, 1920

Material examined. **North Korea**, Gang-won Province, Mt. Kumgang-san, 28.V.1985. Night collecting at blended light, fed by a Honda generator on the serpentine to Kwinyon-am Rock, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, 20.V.1985, cool evening, night collecting at blended light (250 W) on the balcony of the hotel, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Isonnam valley, 23.V.1991. Singled insects in the valley, leg. L. Ronkay & A. Vojnits (1 male, HNHM).). North Korea, North Khamgen, Chondjin, 3.VI.1991. at light in the O-sang-li valley, about 20 km SW of Chondjin, leg. L. Ronkay & A. Vojnits (14 males, HNHM). **South Korea**, Gyeongsangnam-do, Hadong-gun, Mt. Jirisan, Ssanggyesa valley, parking lot beneath Daesung camp, 270 m, N35°16.523' E127°39.131', 14.IX.2010, leg D. Murányi *et al.* (1 male, OPC).

Stenopsyche variabilis Kumanski, 1992

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, 20.V. 1985, cool evening, night collecting at blended light (250 W) on the balcony of the hotel, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 15.IX.1994, light trap, leg. F. Mészáros & L. Zombori (1 male, HNHM).

Family Philopotamidae Stephens, 1829

Dolophilodes mroczkowskii Botosaneanu, 1970

Material examined. **North Korea**, North Pyongan Province, Mt Myohyang-san, Hotel Myohyang-san, 21.V.1985, light, leg. L. Forró & L. Ronkay (1 male, OPC). North Korea, North

Pyongan Province, Mt Myohyang-san, Hyangsan valley, near Hwajangam cloister, 21.V.1985, light, leg. L. Ronkay & A. Vojnits (1 male, OPC).

***Kisaura hapirensis* Botosaneanui, 1970**

Material examined. **North Korea**, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled at lamps standing around the hotel, leg. L. Forró & Gy. Topál (1 male, HN HM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 18.VII. 1982, light, leg. L. Forró & L. Ronkay (1 male, OPC). North Korea, North Pyongan Province, Mt Myohyang-san, Hotel Myohyang-san, 14.VII. 1982, light, leg. L. Forró & L. Ronkay (1 male, HNHM).

***Wormaldia niiensis* Kobayashi, 1985**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 17.IX.1994, light, trap, leg. F. Mészáros & L. Zombori (1 male, OPC). **South Korea**, Cheju Province, Andok valley, 300 m, 126° 22'E 33° 15'N, 28.IV.1994, light. leg. L. Peregovits, L. Ronkay & A. Vojnits (1 male, HNHM).

Superfamily Psychomyioidea Walker, 1853

Family Ecnomidae Ulmer, 1903

***Ecnomus tenellus* (Rambur, 1842)**

Material examined. **South Korea**, Suweon, near Seoul, 9.VII.1974, leg. P. E. S. Whaley (1 male, OPC).

***Ecnomus yamashironis* Tsuda, 1942**

Material examined. **North Korea**, South Pyongan Province, Pyongan, room of Hotel Tedong on the fifth floor, 29.VII.1975, light, leg. J. Papp & A. Vojnits (27 males, HNHM).

Family Polycentropodidae Ulmer, 1903

***Neucentropus mandjuricus* Martynov, 1909**

Material examined. **Russia**, Khabarovsk Terr., Slavyanka at Amur, 17.VI.1994, light trap, leg. P. Lindskog & A. Nilsson (1 male, SMNH).

***Plectrocnemia ussurica* Oláh & Johanson, sp. nov.**

(Figures 1–3)

Material examined. Holotype: **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, 17–18.VII.1992, light-trap, leg. P. Lindskog & A. Nilsson (1 male, SMNH).

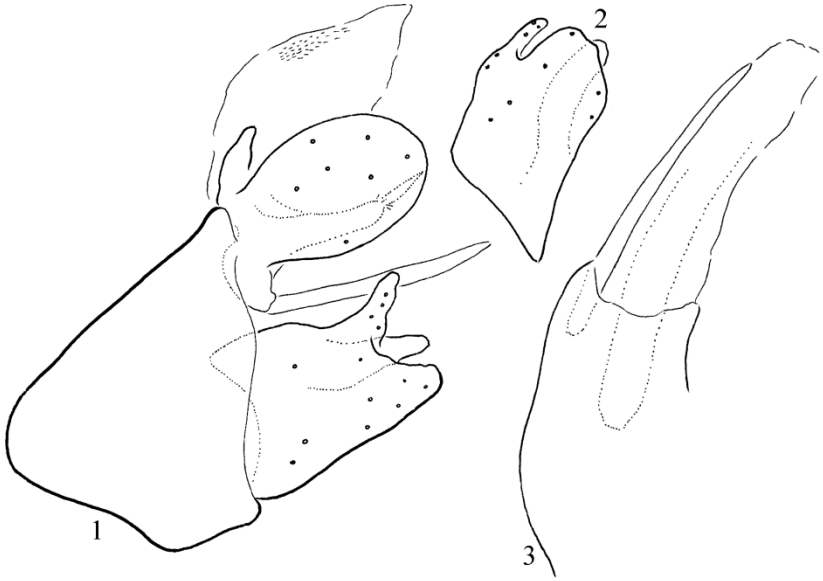
Diagnosis. According to the basic genital architecture the new species has resemblance to *P. nagayamai* Schmid and *P. tochimotoi* Schmid, but differs in all the structural details of the paraproctal complex and of the gonopods.

Description. Small polycentropodid species with forewing length of 6 mm, segment IX in lateral view subtriangular. Tergite IX and tergite X seems fused, mostly membranous with quadrangular shape in lateral view. Cerci large and ovoid covering most of the paraproctal complex. Paraproctal complex composed of the dorsal and ventral branches without well discernible ventral sclerite. Dorsal branches (lateral process of Ohkawa & Ito 2007) with stout terminal spine nested in the setose apex of the process. The ventral branches (mesoventral process of Ohkawa & Ito 2007) short with a long and stout apical spine, much longer than the apical spine of the dorsal paraproctal branch. Gonopods with well defined lobes of the dorsal and ventrall apical process as well as an inner process. The phallic organ accompanied by a pair of less sclerotized paramere-like processes.

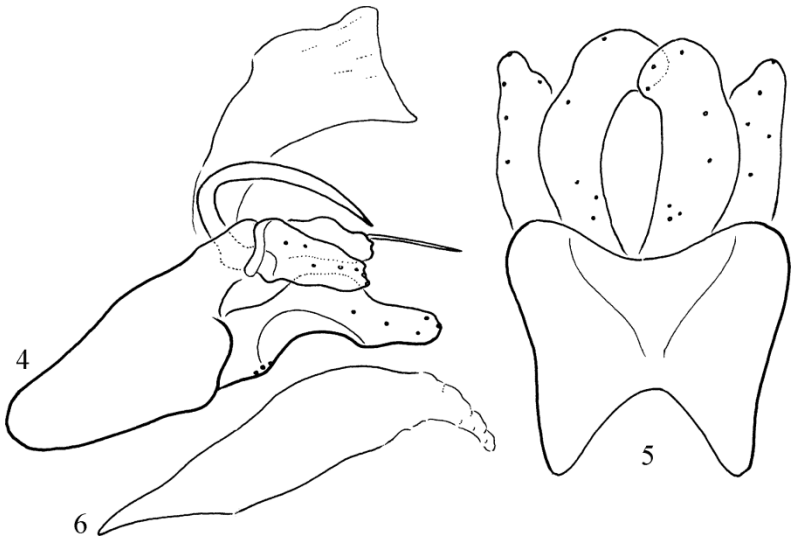
Etymology. *ussurica,* named for the region in which the holotype were collected.

***Plectrocnemia wui* (Ulmer, 1932)**

Material examined. **South Korea**, Jeju-do, Mt. Hallasan, Yongshil route, 1050 m, edge of Hallasan National Park, 126°30'E 33°21'N, 27.IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (1 male, HNHM). South Korea, Jeju-do, Andok valley, 300 m, 126°22'E 33°15'N, 28.IV.1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (4 males, HNHM)



Figures 1–3. *Plectrocnemia ussurica* Oláh & Johanson, sp. nov. Holotype male: 1 = genitalia in lateral view, 2 = left gonopod in ventral view, 3 = phallic organ in lateral view.



Figures 4–6. *Polyplectropus malickyi* Nozaki, Katsuma & Hattori, 2010. Male: 4 = genitalia in lateral view, 5 = genitalia (segment IX, gonopods, cerci) in ventral view, 6 = phallic organ in lateral view.

***Polyplectropus malickyi* Nozaki, Katsuma & Hattori, 2010**

(Figures 4–6)

Material examined. Holotype: **North Korea**, Kumgang-san (=Diamond Mountains), Lake Sam Il, singling and netting on the shore, 10.VII.1977, leg. O.Gy. Dely & Á. Dely-Draskovits (1 male, OPC).

Remarks. This small polycentropodid species with typical genital architecture has forewing with almost complete venation, but the venation of hindwing is rather reduced; only forks II and V are present and the discoidal cell is open. *P. malickyi* is an incipient sibling species of *P. unicus* (Hsu & Chen, 1996) described from Taiwan and recorded as well as redescribed from Japan (Nozaki *et al*. 2013); *P. malickyi* Nozaki,

Katsuma & Hattori, 2010 was described from Japan. Our single specimen from North Korea differs from the published drawings of both species by having (1) the dorsal hump on the gonopods flat, sharp flat, not triangular, similarly to the other known Korean specimen recorded and drawn by Park *et al*. (2017); (2) the setose cerci are subquadrangular, not triangular as in *P. malickyi*; (3) the paraproct complex (subphallic sclerite and the spine-like curving process that is the dorsal branch of the paraproct) is differently shaped, (4) the dorsal branch of the paraproct is long and robust, not short and slim. According to Nozaki (personal communication) *P. malickyi* is rather variable. First we have considered this North Korean specimen as a new sibling of the *Polyplectropus unicus* complex. But we have only a single underpigmented male. Without dissections we are unable to discern and compare structural realations. To decide which traits are neutral that is variable being exposed to random processes or adaptive that is stable under various protective mechanisms, we need more specimens from more populations.

Family Psychomyiidae Walker, 1852

Metalype uncatissima (Botosaneanu, 1970)

Material examined. **North Korea**, North Khamgen Province, Chondjin, 3.VI.1991, O-sangli valley, 20 km SW of Chondjin, ligh, leg. L. Ronkay & A. Vojnits (4 males, HNHM).

Psychomyia flavida species group

The *P. flavida* species group is characterized by the most fused dorsal complex of tergite IX, cercus and paraproct and the most reduced vestiges of coxopodite that is the first segment of gonopods (Schmid 1997).

Psychomyia flavida new species complex

In the *P. flavida* species group we distinguish the *P. flavida* species complex. In this complex the known species have variously V-shaped plate-like dorsal complex dominating on the genitalia. However, the most apomorphic derived character of the complex is the presence of a pair of filiform processes discernible as arisen and individualised from the apical ventromesal region of the IX sternite. According to Schmid (1983) this structure represents the coxopodite of the gonopods. In *P. flavida* species group he first segment of the gonopods is frequently indiscernibly fused to sternite IX, therefore the homology of this apomorphic structure remains questionable. *P. composita* Martynov, 1910; *P. coreana* Tsuda, 1942; *P. flavida* Hagen,1861; *P. tompa* sp. nov.

Psychomyia coreana (Tsuda, 1942)

(Figures 7–9)

Psychomyiella coreana Tsuda, 1942: 230. "Material: 32♂, 24♀, Keizanchin, Nord-Korea, 16.VII.1940, M. Uéno und K. Yamamoto leg.

Material examined. **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (5 males SMNH; 4 males OPC).

Remarks. This species was described from North Korea. We have examined specimens collected in Russia, Ussuriland. The holotype was not available for comparison, but the ovoid dorsal profile of the phallic head as the probable speciation trait as well as the lateral shape of the fused tergite IX and cerci and the ventral shape of the setose lobe of the gonopods are well visible on the original drawings of the holotype. The here examined eight specimens has very stable phallic head, but the setose lobe of the gonopods exhibits a range of variations.

Psychomyia flavida Hagen, 1861

Psychomyia flavida Hagen, 1861: 294. "Hab. St Lawrence River, Canada (Osten Sacken); Washington (id.)." Gross habitus description, no genital drawings.

Psychomyia pulchella Banks, 1899: 217. "Fort Collins, Colorado (Baker)." Gross habitus description, no genital drawings.

Psychomyia moesta Banks, 1907: 131. "One female from Colorado (No. 2133), probably from Ft. Collins or Denver." Gross habitus description, and gross genital drawings.

Remarks. Ross (1938) has synonymised *P. pulchella* Banks, and Schmid (1965, 1983) has synonymised *P. composita* Martynov as well as *P. moesta* Banks with *P. flavida*. Schmid has treated *P. flavida* as a widely distributed species inhabiing Siberia, Mongolia and almost the entire North-American continent. Malicky (2013) has considered even *P. coreana* Tsuda as a possible synonym of *P. flavida*. We believe that the North American *P. flavida* populations need a detailed comparative study. The published drawings (Ross 1938, Schmid 1983) may represent independent species.

Psychomyia tompa Oláh & Johanson, sp. nov.

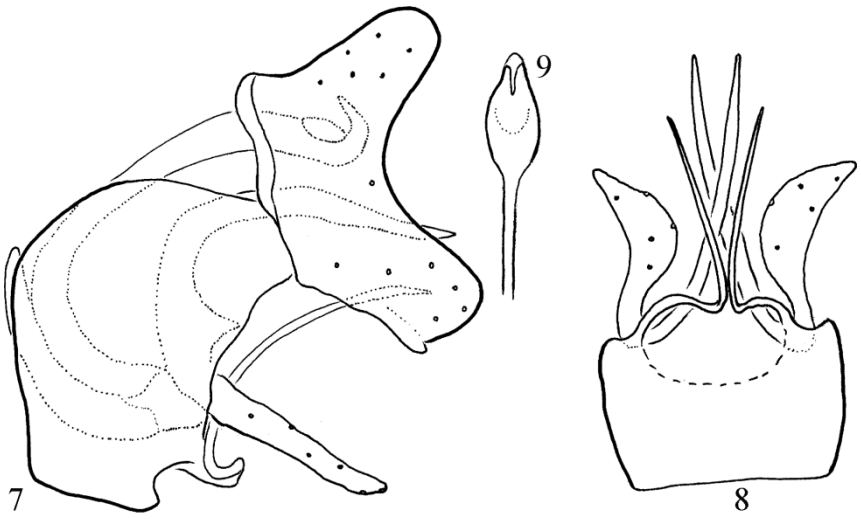
(Figures 10–12)

Material examined. Holotype, **Russia**, Khabarovsk Terr., Bolshekhekhtsirsk Reserve, on light, 21.VI.1993, leg. P. Lindskog & A. Nilsson (1 male, SMNH). *Paratype*, same as holotype (1 female SMNH, 1 male OPC).

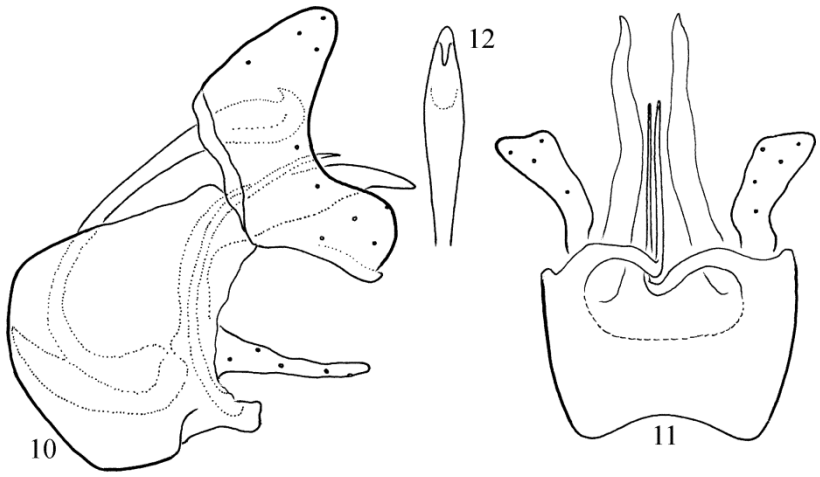
Diagnosis. This species belongs to the *P. flavida* species group and *P. flavida* species complex, but differs from all the known species by having blunt and truncate setose lobe of the gonopod and the probable speciation trait, the phallic head is differently formed.

Description. Medium-sized species. Forwing 4 mm. Sternum IX subrectangular in lateral view, tergum IX fused to cerci and paraproct forming a V-shaped large plate. Probable vestigium of tergite IX discernible anterad and the probable vestigium of paraproct discernible ventrad. Gonopods composed of the setose lobe and the heavily sclerotized unsetose spine-like process. The setose lobe horizontally flattened, digitate in lateral view with blunt truncated apex in ventral view. The heavily sclerotized spine-like process of the gonopod irregularly robust both in lateral and ventral view. The pair of filiform processes very thin. Phallic organ forms an upward and posterad curving sclerotized tube-like phallotheca with swollen apex ending in a small upward and anterad curving spine. The phallic tube supported on its ventral third by a more sclerotized elongated plate fused to the basement of the phallic organ.

Etymology. *tompa*, blunt in Hungarian with reference to the blunt and truncate apex of the setose lobe of the gonopods in ventral view.



Figures 7–9. *Psychomyia coreana* (Tsuda, 1942). Male: 7 = genitalia in lateral view, 8 = genitalia in ventral view, 9 = phallic head in dorsal view.



Figures 10–12. *Psychomyia tompa* Oláh & Johanson sp. nov. Holotype male: 10 = genitalia in lateral view, 11 = genitalia in ventral view, 12 = phallic head in dorsal view.

Psychomyia forcipata Martynov, 1934

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 15.IX.1994, light trap, leg. F. Mészáros & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan valley near Hwajangam cloister, 27.V.1991, light, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Psychomyia minima (Martynov, 1910)

Material examined. **North Korea**, South Pyongan Province, Pyongan, room of Hotel Te-dong on the fifth floor, 30.VII.1975, light, leg. J. Papp & A. Vojnits (1 male, HNHM). North Korea, South Pyongan Province, Pyongan, room of Hotel Te-dong on the fifth floor, 29.VII.1975, light, leg. J. Papp & A. Vojnits (1 male, HNHM). North Korea, Mt. Pektusan, wooded environs of the Sam-zi-yan hotel, 18.VII.1977, Malaise-trap on the road to Explosion Lake, leg. O.Gy. Dely & Á. Dely-Draskovits (1 male, OPC). North Korea, Pyongyang City, Pyongyang, light on the window of Hotel Tae Dong, 19.IX.1979, leg. H. Steinmann & T. Vásárhelyi (1 male, HNHM). North Korea, Pyongyang City, Pyongyang, Garden of Hotel Pyongyang, 21.IX.1978, light, leg. A. Vojnits & L. Zombori (3 males, HNHM).

Psychomyia myohyangsanica (Kumanski, 1992)

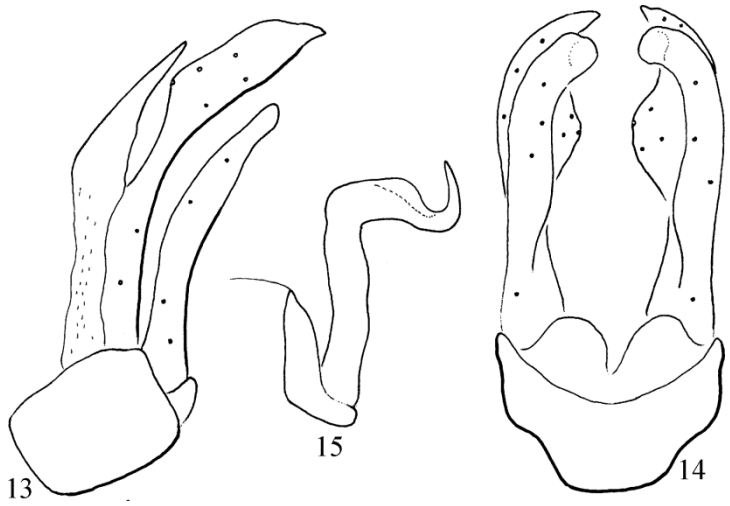
Material examined. **North Korea**, South Pyongan Province, Pyongan, room of Hotel Te-dong on the fifth floor, 29.VII.1975, light. leg. J. Papp & A. Vojnits (1 male, HNHM). North Korea, South Pyongan Province, Pyongan, room of Hotel Te-dong on the fifth floor, 30.VII.1975, light. leg. J. Papp & A. Vojnits (2 males, HNHM).

Psychomyia vandor Oláh & Johanson, sp. nov.

(Figures 13–15)

Material examined. Holotype, **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (1 male SMNH). *Paratype*, same as holotype (2 males SMNH, 3 males OPC).

Diagnosis. This small species belongs to species complex having comparably similar sized cercus and gonopod and phallic organ with similar lateral profile: *P. anakdelapan* Malicky, 1995 from China (Sichuan), and *P. kumara* Schmid, 1997, *P. levanidovae* Schmid, 1997, *P. schefterae* Schmid, 1997, *P. scottae* Schmid, 1997 from India. Most close to *P. kumara*, but differs by having long tergite IX, gonopod apex rounded, not bilobed, phallobase small.



Figures 13–15. *Psychomyia vandor* Oláh & Johanson, sp. nov. Holotype male: 13 = genitalia in lateral view, 14 = genitalia in ventral view, 15 = phallic organ in lateral view.

Description. Small species. Forwing 3 mm. Sternum IX small rectangular in lateral view, tergum elongated tapering apicad and partially sculptured laterad with microtrichiae. Cerci elongated, mesad humping and tipped with dark pigmented terminal spine. Gonopod with short coxopodite and elongated harpago with blunt rounded mesad turning apex.

Etymology. *vandor*, wanderer/migrant in Hungarian with reference to the distribution of the species far from its known relatives those are populating India and China (Sichuan).

Tinodes furcatus Li & Morse, 1997

Material examined. **South Korea**, Jeju-do, Andok valley, 300 m, 126°22'E, 33°15'N, 28.IV. 1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (7 males, HNHM).

Tinodes higashiyamanus Tsuda, 1942

Material examined. **North Korea**, Kumgang-san (=Diamond Mountains), Lake Sam Il, singling and netting on the shore, 10.VII.1977, leg. O.Gy. Dely & Á. Dely-Draskovits (1 male OPC).

Remark. This species is new to the Korean Peninsula.

Superfamily Hydropsychoidea Curtis, 1835

Family Hydropsychidae Curtis, 1835

Subfamily Arctopsychinae Martynov, 1924

Arctopsyche palpata Martynov, 1934

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (8 males, HNHM; 5 males, OPC). **Russia**, Primorye, Khasan District, 3 km W Ryazanovka, ligh trap, 15.VII.1992, leg. P. Lindskog & A. Nilsson (12 males, 3 females; SMNH). Russia, Primorye, Khasan District, 3 km W Ryazanovka, ligh trap, 11-12.VII.1992, leg. P. Lindskog & A. Nilsson (15 males, SMNH; 6 males, OPC).

Subfamily Hydropsychinae Curtis, 1835

Cheumatopsyche infascia Martynov, 1934

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (1 male, HNHM). North Korea, North Pyongan Province: Mt. Myohyang-san, Hotel Myohyang-san, 18.

VII.1982, light, leg. A. Vojnits & L. Zombori (4 males, HNHM).

***Cheumatopsyche tanidai* Oláh & Johanson, 2008**

Material examined. **South Korea**, Jeju-do, Andok valley, 300 m, 126°22'E, 33°15'N, 28.IV. 1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (2 males HNHM).

***Hydropsyche kozhantschikovi* Martynov, 1924**

Material examined. **North Korea**, Chagang Province, Mt. Myohyang-san, River Chongchon-gang valley, netting, 12.IX.1980, leg. L. Forró & Gy. Topál (1 male, OPC). **South Korea**, Gang-won-do, Inje, Mt. Daeamsan 574 m, 10.IX.2013, leg. Li Xuankun (5 males DPP-HIST, 5 males, OPC).

***Hydropsyche orientalis* Martynov, 1934**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 24.IX.1979. At light on the terrace of Hotel Kumgang, leg. H. Steinmann & T. Vásárhelyi (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myo-hyang-san, Hyangsan, 16.IX.1994, light, trap, leg. F. Mészáros & L. Zombori (1 male, OPC).

***Hydropsyche valvata* Martynov, 1927**

Material examined. **South Korea**, Gangwon-do, Inje, Mt. Daeamsan 574 m, 10.IX.2013, leg. Li Xuankun (6 males, DPP-HIST; 5 males, OPC).

***Potamyia chinensis* (Ulmer, 1915)**

Material examined. **North Korea**, Province South Pyongan, Pyongan, Pyongan Hotel garden at lamp, 3.VIII.1971, light, leg. J. Papp & S. Hor-vatovich (1 male, HNHM). North Korea, Mt. Pektusan, wooded environs of the Sam-zi-yan hotel, 18.VII.1977, Malaise-trap on the road to Explosion Lake, leg. O.Gy. Dely & Á. Dely-Draskovits (6 males HNHM, 3 males OPC). North Korea, Chagang Province, Mt. Myohyang-san, River Chongchon-gang valley, netting, 12.IX. 1980, leg. L. Forró & Gy. Topál (4 males, OPC). North Korea, Pyongyong City, Garden of Hotel Pyongyang, 21.IX.1978, singled, leg. A. Vojnits & L. Zombori (49 males, 9 females HNHM). **South Korea**, Jeollanam-do, Gurye, Mt. Baekun-san 620 m, 7.IX.2013, leg. Li Xuankun (3 males OPC). South Korea, Gangwon-do, Inje, Mt. Daeamsan 574 m, 10.IX.2013, leg. Li Xuankun (6 males OPC).

***Potamyia czekanovskii* (Martynov, 1910)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 11.X.1978, light, leg. A. Vojnits & L. Zombori (1 male, HNHM).

Subfamily Macronematinae Ulmer, 1905

***Amphipsyche proluta* McLachlan, 1872**

Material examined. **Russia**, Khabarovsk Terr., Slavyanka, 5 km E of Troitskoye, bog margin in dec. forest, 18-19.VI.1993, light trap, leg. P. Lindskog & A. Nilsson (1 male, 1 female, SMNH; 1 male, OPC). **Russia**, Khabarovsk Terr., Slavyanka at Amur, 17.VI.1994, light trap, leg. P. Lindskog & A. Nilsson (5 males, SMNH; 2 male, OPC).

***Macrostemum radiatum* (McLachlan, 1872)**

Material examined. **North Korea**, North Pyongan Province: Mt. Myohyang-san, 22.V. 1985, collected by light on the balcony of the hotel, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Pyongyong City, Pyongyang, Garden of Hotel Pyongyang, 21.IX.1978, singled, leg. A. Vojnits & L. Zombori (1male, HNHM). North Korea, Mt. Pektusan, wooden environs of the Sam-zi-yan hotel, 19.VII.1977, light, leg. O. Gy. Dely & Á. Dely-Draskovits (2 males, HNHM). **Russia**, West Altai, River Charish Sentelek, 22-23.VII.1993, light, leg. Z. Varga, (4 males, 4 females; OPC). Russia, Khabarovsk Terr., Slavyanka at Amur, 17. VI. 1994, ligh trap, leg. P. Lindskog & A. Nilsson (1 male, SMNH; 2 males, OPC). Russia, Khabarovsk Terr. Slavyanka, 5 km E Troitskoye Boat to Khabarovsk, 19.VI.1993, leg. B. Viklund (2 males, SMNH). Russia, Primorye, Khasau Distri., 5 km W Zanadvoronka, Amba R. light trap, 10. VII. 1992, light trap, leg. P. Lindskog & A. Nilsson (1 male, SMNH).

Suborder Spicipalpia

Superfamily Rhyacophiloidea Stephens, 1836

Family Rhyacophilidae Stephens, 1836

***Rhyacophila angulata* Martynov, 1910**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, 22.V. 1985, warm, sunny afternoon, collecting along the bank of the River Hyangsan-chon, mostly singling, leg. A. Vojnits & L. Zombori (3 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, 27.V.1985, very cool evening, night collecting at blended light, fed by a Honda generator at Kumgang-mun Gate, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled in the vicinity of the hotel, mainly at lamps standing around the hotel, leg. L. Forró & Gy. Topál (3 males, HNHM). North Korea, Kangwon Province: Mt. Kumgang-san, Kuryong valley 14.VI.1991, collected by light trap in the lower part of the valley, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, North Khangem Province: Chondjin, 4.VI.1991, collected by light trap in a brook valley SE of Puryong, about 40 km NE of Chondjin, leg. L. Ronkay & A. Vojnits (1 male, OPC). North Korea, North Pyongan Province: Mt. Myohyang-san, Issonam valley, 23.V.1991, collected by light trap, leg. A. Vojnits & L. Zombori (3 males, OPC). **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH).

***Rhyacophila confissa* Botosaneanu, 1970**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, 21.V. 1985, blue sky with some white clouds, warm afternoon. Swept along road-side by the River Hyangsan-chon, leg. A. Vojnits & L. Zombori (2 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, 21.V.1985, cool evening. Night collecting at blended light in the balcony of the hotel, leg. A. Vojnits & L. Zombori (14 males 3 females, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, 22.V.1985, warm, sunny afternoon, collecting along the bank of the River Hyangsan-chon, mostly singling, leg. A. Vojnits & L. Zombori (3 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, 22.V.1985, night collecting at blended light in the balcony of the hotel, leg. A. Vojnits & L. Zombori (1 male, OPC).

***Rhyacophila coreana* Tsuda, 1940**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, Orjong-li, 22.X. 1987, collected at light around the Hotel Kumgang-san, leg. Z. Korsós & L. Ronkay (1 male, OPC). North Korea, Kangwon Province, Mt. Kumgang-san, 18.IX.1980, singled along the foot-path to Kuryong Falls, leg. L. Forró & Gy. Topál (1 male, HNHM).

***Rhyacophila impar* Martynov, 1914**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, 21.V. 1985, night collecting at blended light (250 W) on the balcony of the hotel, leg. A. Vojnits & L. Zombori (8 males, 2 females; HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 24.V.1991, collected by light trap at the hotel, leg. A. Vojnits & L. Zombori (2 males, OPC).

***Rhyacophila kumgangsanica* Kumanski, 1990**

Material examined. **South Korea**, Kangwon, Yangyang, Jeombong Mt. 495 m, 11.IX.2013, leg. Li Xuankun (3 males, OPC).

***Rhyacophila lata* Martynov, 1917**

Material examined. **North Korea**, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled in the vicinity of the hotel, mainly at lamps standing around the hotel, leg. L. Forró & Gy. Topál (1 male, HNHM, 1 male, OPC). North Korea, North Pyongan Province: Mt.

Myohyang-san, Hyangsan, 15.IX.1994, light trap, leg. F. Mészáros & L. Zombori (3 males, 5 females; HNHM). **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (5 males, SMNH, 3 males, OPC). Russia, Primorye, Khasan District, 3 km W Ryazanovka, ligh trap, 11–12.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH). Russia, Primorye, Khasan District, 3 km W Ryazanovka, ligh trap, 15.VII.1992, leg. P. Lindskog & A. Nilsson (2 males, 1 female, SMNH).

Rhyacophila manuleata Martynov, 1934

Material examined. **North Korea**, North Khangem Province, Chondjin, 3.VI.1991. Singled at daytime and at light in the O-sang-li valley, about 20 km SW of Chondjin, leg. L. Ronkay & A. Vojnits (1 male, OPC).

Rhyacophila maritima Levanidova, 1977

Material examined. **South Korea**, Kangwon, Yangyang, Jeombong Mt. 495 m, 11.IX.2013, leg. Li Xuankun (2 males, OPC). South Korea, Kangwon, Inje. Daeam Mt. 494 m, 10.IX 2013, leg. Li Xuankun (3 males, OPC).

Rhyacophila mjohjangsanica Botosaneanu, 1970

Material examined. **North Korea**, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled in the vicinity of the hotel, mainly at lamps standing around the hotel, leg. L. Forró & Gy. Topál (7 males, HNHM, 2 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 17.IX.1994, light, trap, leg. F. Mészáros & L. Zombori (1 male, OPC).

Rhyacophila narvae Navás, 1926

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, 20.V. 1985, Night collecting at blended light in the balcony of the hotel, leg. A. Vojnits & L. Zombori (5 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, 21.V. 1985, night collecting at blended light in the balcony of the hotel, leg. A. Vojnits & L. Zombori (3 males, 9 females, OPC). North Korea, Kangwon Province, Mt. Kumgang-san, 26.V. 985, collecting at blended light fed by Honda generator some 100 m from the rest house Oe-Kumgan, in a mixed forest, leg. A. Vojnits & L. Zombori (1 male, 1 female, HNHM).

Rhyacophila retracta Martynov, 1914

Material examined. **North Korea**, North Khamgen Province, Chondjin, 3.VI.1991, singled in daytime and at light in the O-sang-li valley, about 20 km SW of Chondjin, leg. L. Ronkay & A. Vojnits (5 males, HNHM, 2 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, Isonnam valley, 23.V.1991, collected by light trap in the valley, leg. L. Ronkay & A. Vojnits (1 male, OPC). North Korea, Pyongang City, 30.VI.1991, beating the flowers of an ornamental labiate plant in a small park near the Potonggang Hotel, leg. F. Mészáros & L. Zombori (2 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 23.V.1991, collected by light around the hotel, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Rhyacophila riedeliana Botosaneanu, 1970

Material examined. **North Korea**, North Khangem Province, Chondjin, 4.VI.1991, collected by light trap in a brook valley SE of Puryong, about 40 km NE of Chondjin, leg. L. Ronkay & A. Vojnits (1 male, OPC).

Rhyacophila soldani Mey, 1989

Material examined. **South Korea**, Gangwon-do, Inje-gun, Inje, sidebrook of Naerincheon river, 38°04.021'N, 128°11.468'E, 200 m, 8.IX.2010, leg. D. Murányi *et al*. (1 male, OPC).

Rhyacophila vicina Botosaneanu, 1970

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 28.V.1985, night

collecting at blended on the serpentine to Kwinyon-am Rock, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, 22.V.1985, pathway to Bulyongdae temple (about 1000 m), collecting by sweeping net, night collecting at blended light (250 W) on the balcony of the hotel, leg. A. Vojnits & L. Zombori (1male, HNHM). North Korea, North Khangem Province, Chondjin, 4.VI.1991, collected by light trap in a brook valley SE of Puryong, about 40 km NE of Chondjin, leg. L. Ronkay & A. Vojnits (2 males, HNHM). North Korea, Pyongang City, Pyongang, 30.VI.1991, beating the flowers of an ornamental labiate plant in a small park near the Potonggang Hotel, leg. F. Mészáros & L. Zombori (2 males, HNHM).

Family Hydrobiosidae Ulmer, 1905

***Apsilochorema sutshanum* Martynov, 1934**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, Onjong-ri, 23.X. 1987, light, leg. Z. Korsós & L. Ronkay (1 male, HNHM). **Russia**, Ussuriysk District, Anisimovka, ligh trap, 20.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH, 1 male, OPC).

Superfamily Glossosomatoidea Wallengren, 1891

Family Glossosomatidae Wallengren, 1891

Subfamily Agapetinae Martynov, 1913

***Agapetus sibiricus* Martynov, 1918**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 8.X.1988, singled along stream Hyangsan, leg. Z. Korsós & L. Ronkay (3 males, HNHM). **Russia**, Ussuriysk District, Anisimovka, ligh trap, 20.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH). Russia, Khabarovsk Terr., Bolshekhekhtsirsk Reserve, on light, 21–25.VI.1993, leg. P. Lindskog & A. Nilsson (1 male, SMNH).

***Agapetus hieianus* new species complex**

This species complex is characterized by the elongated fused complex of segment X and paraproct and also by the extremely elongated and usually laterad turning long cerci. In *Agapetus* genus the paraproct or its vestige is always present and represented by some form of sclerite located usually on the ventrum of the complex (Nielsen 1957). The paraproct component of this complex is present just as a completely fused more slerotized ventrolateral structure on both sides, an independent ventral pair of processes, most frequently in the form of bi- or tripartite anterad turning whip-like structure. In the *hieianus* species complex the paraproct vestiges are shifted to terminal position of segment X in the form of various spines of different shapes present in different numbers. Terminally shifted remnants of paraproct are present in several other species, but they have lost or very abbreviated cerci: *adejensis*, *armatus*, *beredensis*, *delicatulus*, *fuscipes*, and *hadimensis*. In the *A. hieianus* new species complex all members have very characteristic long and laterad arching cerci: *budoens*, *excisus*, *inaequispinosus*, *hamatus*, *hieianus*, *vastag* sp. nov. and *vekon* sp. nov.

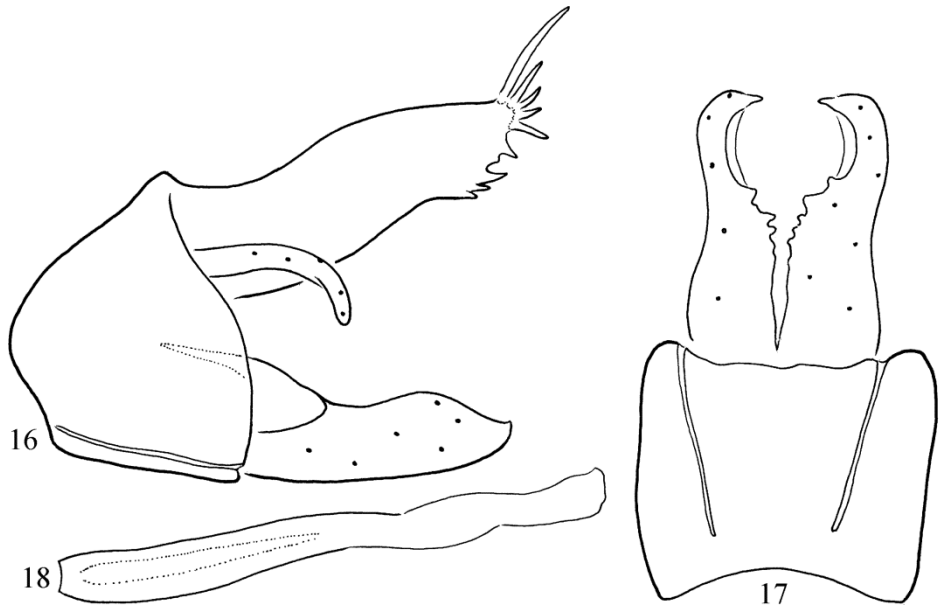
***Agapetus vastag* Oláh & Johanson, sp. nov.**

(Figures 16–18)

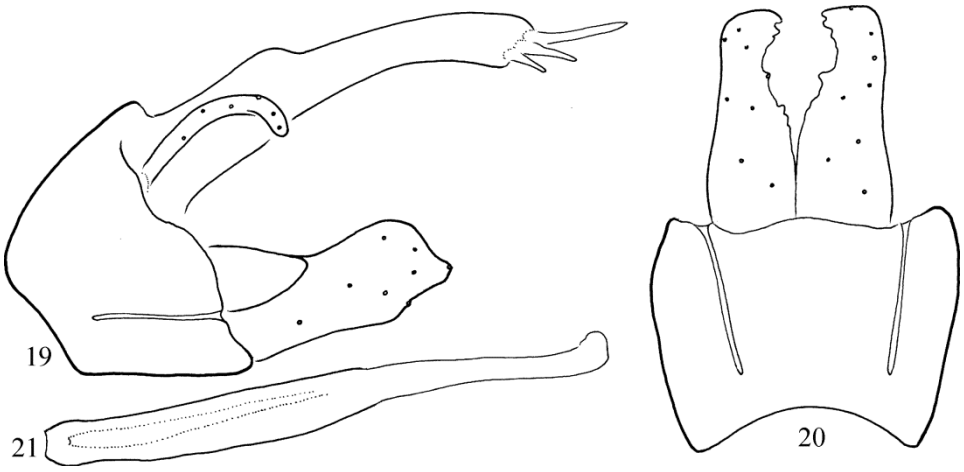
Material examined. Holotype, **Russia**, Ussuriysk District, Anisimovka, ligh trap, 20.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH). *Paratypes*, same as holotype (2 males, 2 females, SMNH, 1 male, 1 female, OPC).

Diagnosis. Most close to *A. inaequispinosus* described from Mongolia, but differs by having more complex apical spine pattern of the vestigial paraproct as well as the gonopods are completely differently shaped both in lateral and ventral views. More elongated in lateral view, not triangular and with more elaborated teeth pattern in ventral view.

Description. Small light brown animal with forewing length of 3 mm. Large involuted cuti-



Figures 16–18. *Agapetus vastag* Oláh & Johanson, sp. nov. Holotype male: 16 = genitalia in lateral view, 17 = genitalia in ventral view, 18 = phallic organ in lateral view.



Figures 19–21. *Agapetus vekon* Oláh & Johanson, sp. nov. Holotype male: 19 = genitalia in lateral view, 20 = genitalia in ventral view, 21 = phallic organ in lateral view.

cular sacculous gland in sternite V present and blister-like protuberance on the dorsal margin of sternite V discernible detached from the sternal ridge. Ventral mesoapical process on sternite VI long with rounded apex. Segment IX subtriangular in lateral and quadrangular in ventral view. The complex of segment X and paraproct stout elongated, slightly S-shaped with particular patterned apical spines. Cluster of apicodorsal spines longer, apicoventral spines smaller. Cerci long and laterad turning. Gonopods with mesad turning pointed apex in ventral view. Phallic organ simple rod-shaped without any pronounced structural modification.

Etymology. *vastag*, thick in Hungarian with reference to the stout complex of the fused segment X and paraproct.

***Agapetus vekon* Olah & Johanson, sp. nov.**

(Figures 19–21)

Material examined. Holotype, **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, SMNH). *Paratypes*, same as holotype: (9 males, 35 females, SNHM, 3 males, 9 females, OPC).

Diagnosis. Close to *A. vastag* sp. nov. but differs by having the body of segment X and paraproct complex low and slender, not high and robust; the spine pattern of the apicad shifted paraproct reduced, less developed comprising only a few spines; the shape of the gonopods differently formed both in lateral and ventral view.

Description. Small light brown animal with forewing length of 3 mm. Large involuted cuticular sacculous gland in sternite V present and blister-like protuberance on the dorsal margin of sternite V discernible detached from the sternal ridge. Ventral mesoapical process on sternite VI long with rounded apex. Segment IX trapesoid in lateral and subquadrangular in ventral view. The complex of segment X and paraproct slender elongated, with a slightly higher basal half and with particular patterned apical spines. Three apical spines present and unequal in lenght. Cerci long and laterad turning. Gonopods characterized with mesad turning apex with irregulat teeth in ventral view. Phallic organ simple rod-shaped without any pronounced structural modification.

The much elongated slender complex of segment X and paraproct differs from all the known members of the species complex.

Etymology. *vekon*, thin in Hungarian with reference to the elongated slender and slim complex of the fused segment X and paraproct.

Subfamily Glossosomatinae Wallengren, 1891

***Glossosoma altaicum* (Martynov, 1914)**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (2 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 17.IX. 1994, light trap, leg. F. Mészáros & L. Zombori (1 male, OPC). **Russia**, Central Altai, 20 km S of Ongoday, 3.VIII.1993, light, leg. Z. Varga (1 male, 1 female, OPC). Russia, Ussuriysk District, Anisimovka, 20.VII.1992, ligh trap, leg. P. Lindskog & A. Nilsson (1 male, 1 female, SMNH).

***Glossosoma intermedium* (Klapálek, 1892)**

Material examined. **Russia**, Khabarovsk Terr., Bolshekhekhtsirsk Reserve, on light, 24.VI.1993, leg. P. Lindskog & A. Nilsson (1 male, 3 females, SMNH).

***Glossosoma ussuricum* (Martynov, 1914)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 11.X.1978, 50 m from the rest-house in the forest, light, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, 12.X.1978, light, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, Oe-Kumgang, 25.IX.1994, light trap, leg. F. Mészáros & L. Zombori (1 male, 1 female, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, 12.X.1978, light, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, Onjong-ri, 24.X.1987, light, leg. Z. Korsós & L. Ronkay (6 males, HNHM). **Russia**, Primorye, Ussurijsk Reserve, 40 km ENE Ussurijsk, light-trap, 17–18.VII.1992, leg. P. Lindskog & A. Nilsson (1 male, 20 females, SMNH).

Suborder Integripalpia

Infraorder Plenitentoria

Superfamily Phryganeoidea Leach, 1815

Family Phryganeidae Leach, 1815

***Semblis atrata* (Gmelin, 1789)**

Material examined. **North Korea**, North Khamgen Province, Chondjin, brook valley SE of

Puryong, 40 km NE of Chondjin, 4.VI.1991, ligh trap, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Family Phryganopsychidae Wiggins, 1959

***Phryganopsyche latipennis* (Banks, 1906)**

Material examined. **South Korea**, Gangwon-do, vicinity of Chuncheon, Chuncheon-Dam, 400 m, steep rocky slope with mixed forest, 24.X. 1993, ligt, leg. L. Peregovits & L. Ronkay (1 male, HNHM). South Korea, Jeju-do, Mt. Hallasan, Yongshil route, 1050 m, edge of Mt. Hallasan National Park, 126°30'E, 33°21'N, 27. IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (4 males, HNHM). South Korea, Jeju-do, Mt. Hallasan, Yongshil route, 1050 m, edge of Mt. Hallasan National Park, 126°30'E, 33°21'N, 30.IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (3 males, 1 female; HNHM).

Superfamily Limnephiloidea Kolenati, 1848

Family Lepidostomatidae Ulmer, 1903

***Lepidostoma albardanum* (Ulmer, 1906)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, side valley near Hotel Kumgang, 13.VI.1991, light, leg. L. Ronkay & A. Vojnits (3 males, HNHM, 2 males, OPC). North Korea, Kangwon Province, Mt. Kumgang-san, 19.IX.1980, at light on the terrace of Hotel Kumgang, leg. L. Forró & Gy. Topál (1 male, HNHM). **South Korea**, Gangwon-do, Yangyang, Mt. Jeombongsan 495 m, 11.IX.2013, leg. Li Xuankun (3 males, DPP-HIST, 2 males, OPC).

***Lepidostoma elongatum* (Martynov, 1935)**

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 10.X.1987, light, leg. Z. Korsós & L. Ronkay (1 male, 1 female, HNHM). North Korea, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled in the vicinity of the hotel, mainly at lamps standing around the hotel, leg. L. Forró & Gy. Topál (15 males, HNHM, 4 males, OPC). North Korea, Kangwon Province, Mt. Kumgang-san, 19.IX. 1980, at light on the terrace of Hotel Kumgang, leg. L. Forró & Gy. Topál (2 males, HNHM). **South Korea**, Gangwon-do, Inje, Mt. Daeamsan 574 m, 10.IX.2013, leg. Li Xuankun (5 males, DPP-HIST, 9 males, OPC).

***Lepidostoma hirtum* (Fabricius, 1775)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 12.X.1978, light, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, 17.IX.1994. light trap, leg. F. Mészáros & L. Zombori (1 male, OPC).

***Lepidostoma orientale* (Tsuda, 1942)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 19.IX.1980, at light on the terrace of Hotel Kumgang, leg. L. Forró & Gy. Topál (1 male, OPC).

***Lepidostoma sinuatum* (Martynov, 1935)**

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 24.IX.1979, at light on the terrace of Hotel Kumgang, leg. H. Steinmann & T. Vásárhelyi (1 male, OPC). North Korea, Kangwon Province, Mt. Kumgang-san, 12.X.1978, light, leg. A. Vojnits & L. Zombori (1 male, HNHM).

Family Goeridae Ulmer, 1903

***Goera japonica* Banks, 1906**

Material examined. **Kazakhstan**, Province Almaty, valley of River Ili, 20 km NNW of Kapchugay, 77°00'E, 44°00'N, 550 m, 31.VIII.1997, leg. A. Orosz (5 males, HNHM). **South Korea**, Jeju-do, Andok valley, 300 m, 126°22'E, 33°15' N, 28.IV.1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (16 males, 11 females, HNHM).

Remarks. The ventrolateral processes of segment X are branched, phallic organ without setal lines, dorsal profile of the phallic organ parallel-sided. We have examined specimens of the nominate species of the *G. japonica* species complex from extreme peripheries (Kazakhstan, South Korea) and found the speciation traits of the ventrolateral process of segment X and the phallic organ very stable. The neutral, non-adaptive traits, like the ventromesal process of sternite IX are highly variable in the examined populations of Kazakhstan and South Korea.

Goera horni Navás, 1926

Material examined. **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 18.VII.1982, light, leg. L. Forró & L. Ronkay (1 male, OPC). North Korea, Chagang Province, Mt. Myohyang-san, Hotel Myohyang, 13.IX.1980, singled from lamps standing around hotel, leg. L. Forró & Gy. Topal (9 males, HNHM).

Remarks. The ventrolateral processes of segment X are unbranched, its lateral profile is rather robust, the phallic organ with setal lines, the dorsal profile of the phallic organ parallel-sided.

Goera parvula Martynov, 1935

Material examined. **North Korea**, North Khamgen Province, Chondjin, brook valley SE of Puryong, 40 km NE of Chondjin, 4.VI.1991, ligh trap, leg. L. Ronkay & A. Vojnits (6 males, HNHM; 4 males, OPC). North Korea, Pyongang City, 30.VI.1991, beating the flowers of an ornamental labiate plant in a small park near the Potonggang Hotel, leg. F. Mészáros & L. Zombori (6 males, HNHM).

Goera squamifera Martynov, 1909

Material examined. **North Korea**, North Hwanghae Province, Lake Sohung-ho, 31.VII. 1982, light, leg. L. Forró & L. Ronkay (4 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, 11.X.1978, 50 m from the rest-house in the forest, light, leg. Z. Korsós & L. Ronkay (1 male, HNHM).

Remarks. The ventrolateral processes of segment X are unbranched, its lateral profile is less robust, the phallic organ without setal lines, the dorsal profile of the phallic organ with subapical broadening.

Goera tungusensis Martynov, 1909

Material examined. **Mongolia,** Ulan Bator, 16.VII.1987, light, leg. L. Ronkay (6 males, 3 females, HNHM). **North Korea**, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (2 males, HNHM, 2 males, OPC).

Polyphorae group

Family Apataniidae Wallengren, 1886

Apatania aberrans (Martynov, 1933)

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, 12.X.1978, light, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, 11.X.1978, light, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, Onjong-ri, 22.X. 1987, light, leg. Z. Korsós & L. Ronkay (4 males, HNHM). **South Korea**, Jeju-do, Mt. Hallasan, Yongshil route, 1050 m, edge of Mt. Hallasan National Park, 126°30'E, 33°21'N, 27.IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (2 males, 1 female; HNHM, 1 male OPC). South Korea, Jeju-do, Andok valley, 300 m, 126°22'E, 33°15'N, 28.IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (1 male, HNHM). South Korea, Jeju-do, Mt. Hallasan, Yongshil route, 1050 m, edge of Mt. Hallasan National Park, 126°30'E, 33°21'N, 30.IV.1994, ligt, leg. L. Peregovits, L. Ronkay & A. Vojnits (2 males, HNHM).

Apatania maritima Ivanov & Levanidova, 1993

Material examined. **North Korea**, Pyongyang City, Mt. Daesong-san, 17.V.1985, light, leg. A.

Vojnits & L. Zombori (4 males, HNHM). **South Korea**, Gangwon-do, vicinity of Chuncheon, Soyang-Dam, 127°50'E, 37°55'N 700 m, 20.X.1993, rocky gorge valley with small brooks, light, leg. L. Peregovits & L. Ronkay (1 male, 1 female, HNHM; 1 male, KGU).

Apatania sinensis (Martynov, 1914)

Material examined. **North Korea**, Kangwon Province, Wonsan, Botanical Garden, 15.VII. 1991, singled, leg. F. Mészáros & L. Zombori (2 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, Onjong-ri, 23.X.1987, in the vicinity of the hotel, light leg. Z. Korsós & L. Ronkay (1 male, 1 female, HNHM). North Korea, Pyongyang City, Hotel Potonggang, 13.X.1987, at the hotel, light, leg. Z. Korsós & L. Ronkay (6 males, 2 females; HNHM). North Korea, South Hwanghae Province, Haeju, Mt.Suyong-san, deciduous forest on SE slope, 16.VII.1991, singled, leg. F. Mészáros & L. Zombori (4 males, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, Onjong-ri, 22.X.1987, along river Kumgang, singled, leg. Z. Korsós & L. Ronkay (1 female, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 12.X.1987, along pathway, singled, leg. Z. Korsós & L. Ronkay (1 male, HNHM). North Korea, Pyongyang City, Pyongyang, Hotel Potonggang, 14.X.1987, at the hotel, light, leg. Z. Korsós & L. Ronkay (1 male, 1 female, HNHM). **South Korea**, Gangwon-do, vicinity of Chuncheon, Soyang-Dam, 127°50'E, 37°55'N, 700 m, 20.X.1993, rocky gorge valley with small brooks, light, leg. L. Peregovits & L. Ronkay (2 males, 2 females; HNHM).

Apatania yenchingensis Ulmer, 1932

Material examined. **South Korea**, Jeju-do, Andok valley, 300 m, 126°22'E, 33°15'N, 28.IV. 1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (2 males, HNHM, 1 male, KGU).

Remark. This species is new to the Korean Peninsula.

Family Uenoidae Iwata, 1927

Subfamily Thremmatinae Martynov, 1935

Neophylax ussuriensis species group

Based on phylogenetic analysis of both larval and adult characters Vineyard *et al.* (2005) established 10 species groups including the *N. ussuriensis* species group with the single nominate species. The males of *N. ussuriensis* species group are easily distinguished from all the other species of *Neophylax* by the slightly elongated quadrate shaped posteromedial plate-like projection on sternite IX. The species group is further characterised by the amalgamated and elongated complex of segment X with its internal and inferior branches fused together along their entire length and functions as a dorsal phallic shield during copulation. In most of the *Neophylax* species the internal and inferior branches of segment X is not fused; they are rather well separated; similar fused complex structure occurs at the Nearctic *N. consimilis*. In *N. ussuriensis* species group the plate-like projection on sternite IX and the fused, long horizontal structure of segment X with its branches are combined with the characteristically shaped gonopods; the lateral lobes of the gonopods are vertically directed, slightly arching falcate shaped.

Segment X (XI) deeply inset into the dorsum of segment IX and partially fused with it. The main body of segment X is inconspicuous and fused imperceptibly with segment IX. Moreover, the basic body region of segment X is also poorly discernible from the segmental branches: (1) external branches (cerci); (2) internal branches (internal, dorsal, apical, horizontal branches of paraproct) (3) inferior branches (inferior, ventral, basal, vertical branches of paraproct).

In this species group the fused and elongated complex of segment X is comprised of the following structures: (1) basodorsal membranous region with unregular apical margin, according to Vineyard *et al.* (2005) this is the internal brach of

segment X; the pair of elongated horizontal blade-like structure, the functional dorsal phallic shield formed according to Vineyard *et al.* (2005) by (2) the caudal lobe of cerci (external branches) and (3) the inferior branches.

However, the setose cerci (external branches) are regularly covered with long and dense vestitural setae armed with papillate alveoli. The setaless ventroapical continuation of segment X is rather itself the body of segment X and not the continuation of cerci. We suppose that the elongated fused structure is the fused paraproct formed by the interior and inferior branches. This is indicated by the usual phallic shield function of paraproct and also by the presence of a few modified setae. The composing components of the paraproct are not discernible clearly, but we suppose that the horizontal line of lateral ridge may delineate the fused region of internal and inferior branches. The modified setae are present only on the dorsal half above the line; the ventral region below the line has no setae.

The pattern of this horizontal line, the byproduct of the amalgamation of the internal and inferior branches, has high diagnostic value in combination with the lateral profile of the fused elongated structure. It seems, this is a speciation trait complex in this species group. The elongated structure may have an intimate function in post-mating/prezygotic reproductive isolation by mechanical isolation due to the incompatibility of sexual organs or by cryptic female choice during copulation. In our practice of the traditional gross morphology this subtle shape divergences are usually considered and treated as variation of widely distributed species. However, if these divergences are non-neutral, non-random product of adaptive processes in sexual selection even their subtle shape differences are steady and stable. Their stability is due to the underlying very complex adaptive genomic processes organised and maintained by several integrative as well as protective mechanisms like reduced recombination, linkage disequilibrium, selective sweeps and genetic hitchhiking (Oláh & Oláh 2017). At incipient *Drosophila* species well differntiated by genetic markers, the empirically almost indiscernible slight divergences in aedeagus curvatures are detectable only by geometric morphometrics. These subtle or tiny divergences are robust enough in sexual signals to produce reproductive isolation. They are not randomly produced in neutral mechanisms. They are produced by a huge network of many quantitative trait loci, by thousand of candidate genes under multiplied organising effects in the cooperative, integrative and protective mechanisms of the epistasis and the pleiotropy (Franco *et al*. 2006, Masly *et al*. 2011, McNeil *et al*. 2011, Schafer *et al*. 2011).

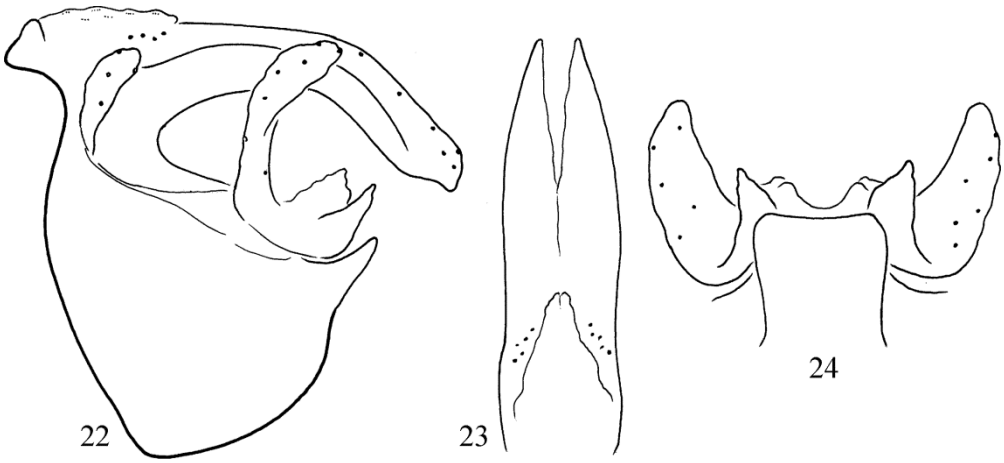
Slight shape divergences in genital arch, aedeagus curvature, and distophallus detectable only by geometric morphometrics have been applied to separate incipient siblings in various *Drosophila* species complexes. Compared to these very tiny genital shape divergences we have detected very great and complex shape divergences in the horizontally elongated blade-like complex among *N. ussuriensis* populations. We consider this highly modified paraproct as a speciation trait of reproductive isolation. Here we describe two new incipient sibling species just by the detection of the divergences in the shape of phallic shield of the fused elongated paraproct. By the description of the two new species the *N. ussuriensis* species group is comprised of three species: *N. goguriensis* sp. nov., *N. sillensis* sp. nov. and *N. ussuriensis*.

Neophylax goguriensis Oláh & Park, sp. nov.

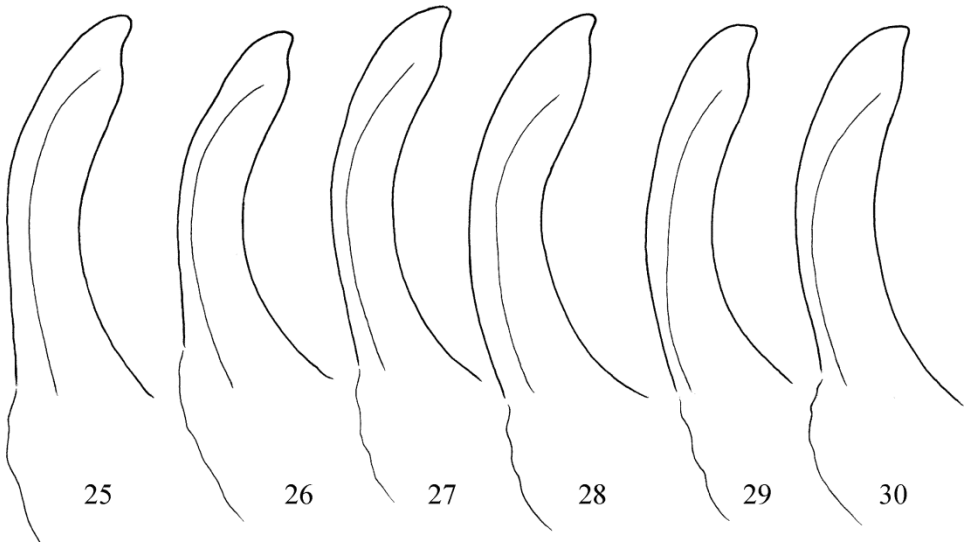
(Figures 22–30)

Material examined. Holotype, **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 9.11.X.1987, collected at light and with sugar around hotel, leg. Z. Korsós & L. Ronkay (1 male, HNHM). *Paratypes*, same as holotype (1 male, 2 females, HNHM, 2 males, 2 females, OPC, 1 male, 2 females, DPP-HIST, 1 male, 2 female, KGU).

Diagnosis. Species delineation is based on the shape divergence of the speciation trait that is the much specialised fused paraproct. The shape of



Figures 22–24. *Neophylax goguriensis* Oláh & Park, sp. nov. Holotype male: 22 = genitalia in lateral view, 23 = segment X complex in dorsal view, 24 = quadratic plate of sternite IX and gonopods in ventral view.



Figures 25–30. *Neophylax goguriensis* Oláh & Park, sp. nov. Paratypes: paraprocts in lateral view.

the speciation trait was examined and drawn at all the six member of the type series. The lateral profile of the fused paraproct is most similar to *N. ussuriensis*, but differs from the nominate species by the aviform apex, that is by the presence of small subapical excision and the pointed apices. This aviform apex seems stable in the examined population. The apical apices of the fused pair of paraproct at *N. ussuriensis* seems different, variously rounded at the single male from North Korea (near to Ussuriland), at three males from Hokkaido (Japan) and at on all of the published drawings from Russia (Ussuriland) and from Japan.

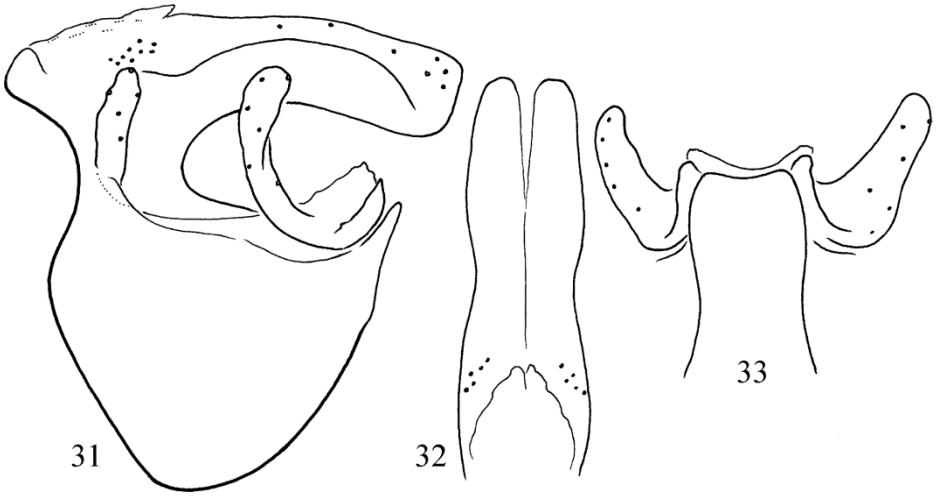
Description. Dark animal with dark brown head and thoracic sclerites. Forewing membrane brown mottled with lighter area, forewing length 12 mm. General habitus, body and genitalia look similar to *N. ussuriensis* (Martynov, 1914) distinguished only by divergences in paraproct structure.

Etymology. *goguriensis*, named for the region in which the holotype were collected from 'Goguryeo', the old Dynasty's name in North Korea.

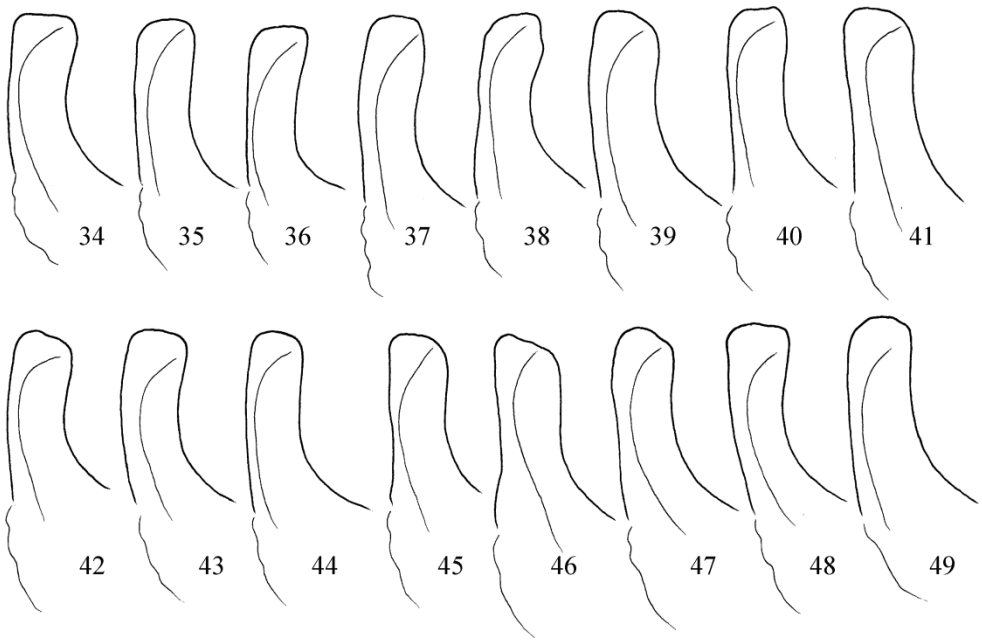
Neophylax sillensis Park & Oláh sp. nov.

(Figures 31–49)

Material examined. Holotype, **South Korea**. Gangwon-do, Yangyang, Mt. Jeombongsan 495 m, 11.IX.2013, leg. Li Xuankun (1 male, OPC). *Paratypes*, same as holotype (2 males, OPC). South Korea. Gangwon-do, Taebaek, Mt. Taebaeksan, Geomryongso 768 m, 12.IX.2013, leg. Li Xuankun (7 males, 2 females, DPP-HIST, 7 males, 3 females, OPC). South Korea, Gangwon-do, Inje, Mt. Daeamsan 574 m, 10.IX.2013, leg. Li Xuankun (3 male, OPC). South Korea, Gangwon-do, vicinity of Chuncheon, Soyang-Dam, 127°50'E, 37°55'N, 700 m, rocky gorge valley with small brooks, 20.X.1993, ligh, leg. L. Peregovits & L. Ronkay (21 males, 6 females, HNHM, 1 male, 1 female, NIBR, 7 males, 3 females, KGU). South Korea, Gangwon-do, Wonju-si, Sungnamro 194-1, Jupocheon Stream,: 37°16'42.2"N, 128°05'05.0"E, 400 m, 17.IX.2015, leg. M.S. Kang, (2 male, 1 female, OPC). South Korea, Gangwon-do, Yeongwol-gun, Sangdong-eup, Deokgu-ri, Deokgucheon Stream, 37°06' 08.8"N, 128°47'29.6"E, 450 m, 20.IX.2015, leg. M.S. Kang, (1 male, OPC). South Korea, Gyeongsangnam-do, Milyang-si, Danjang-myeon, Pyochungsa Temple, 35°35'16.53"N, 128°59' 47.70"E, 386 m, 18.X.2016, leg. S.J. Park & T Nozaki, (2 males, 2 females, OPC). South Korea, Jeollanam-do, Gwangyang-si, Daab-myeon, Geumcheon-ri, Seomjin River, 35°09'30.4"N, 127° 39'28.8"E, 50 m, 7.X.2015, leg. M.S. Kang (1 female, OPC). South Korea, Jeollanam-do, Gwangyang-si, Bonggang-myeon, Joryung-ri, Gwangyangseocheon Stream, 35°05'27.2"N, 127° 34'16.6"E, 360 m, 21.X.2015, leg. M. S. Kang, (1male, OPC). South Korea, Jeollanam-do, Suncheon-si, Juam-myeon, Daegwang-ri, Daegwangcheon Stream, 35°03'19.0"N, 127°12'30.8"E, 150 m, 29.X. 2016, leg. M.S. Kang, (1 male, 1 female; (OPC). South Korea, Gyeonggi-do, Yeoju-si, Geumsa-myeon, Jurok-ri, Geumsacheon Stream, 37°21'40.7"N, 127°27'23.5"E, 300 m, 9.X.2016, leg. M.S. Kang, (1 female, OPC). South Korea, Gyeongsangbuk-do, Yeongju-si, Punggi-eup, Samga-ri, Geumgyecheon Stream, 36°55'24.2"N, 128°30'05.2"E, 400 m, 6.X.2015, leg. M.S. Kang, (1 male, 2 females, OPC). South Korea, Gyeonggi-do, Gapyeong, Jomurakgol rd. 37°59.247' N, 127°26.760'E, 360 m, 4.XI.2016, light trap, leg. J. Babics & B. Tóth (4 males, 1 female, HNHM).



Figures 31–33. *Neophylax sillensis* Park & Oláh, sp. nov. Holotype male: 31 = genitalia in lateral view, 32 = segment X complex in dorsal view, 33 = quadratic plate of sternite IX and gonopods in ventral view.



Figures 34–49. *Neophylax sillensis* Park & Oláh, sp. nov. Paratypes: paraprocts in lateral view.

Diagnosis. Species delineation is based exclusively on the shape divergence of the speciation trait that is the much specialised fused paraproct. The shape of the speciation trait was examined and drawn at 16 members of the type series from 11 populations: the stability of the shape was remarkably high. The lateral profile of the fused paraproct is most specialised, differing from both *N. ussuriensis* and from *N. goguriensis* sp. nov. Contrary to the rounded apex of *N. ussuriensis* and to the aviform apex of *N. gogoriensis* sp. nov. the apex of the fused paraproct is truncate at *N. sillensis* sp. nov. Moreover, the fused paraproct is more robust, high and short, not low and long.

Description. Dark animal with dark brown head and thoracic sclerites. Forewing membrane brown mottled with lighter area, forewing length between 10–15 mm. General habitus, body and genitalia look similar to *N. ussuriensis* (Martynov, 1914) distinguished only by divergences in paraproct structure.

Remarks. We have recorded pronounced range of variation in the forewing length from the same populations: between 10–15 mm for males. *N. relictus* (Martynov, 1935) also exhibits rather large range of variability in body size; the forewing length ranged between 13–18 mm among specimens from the same region.

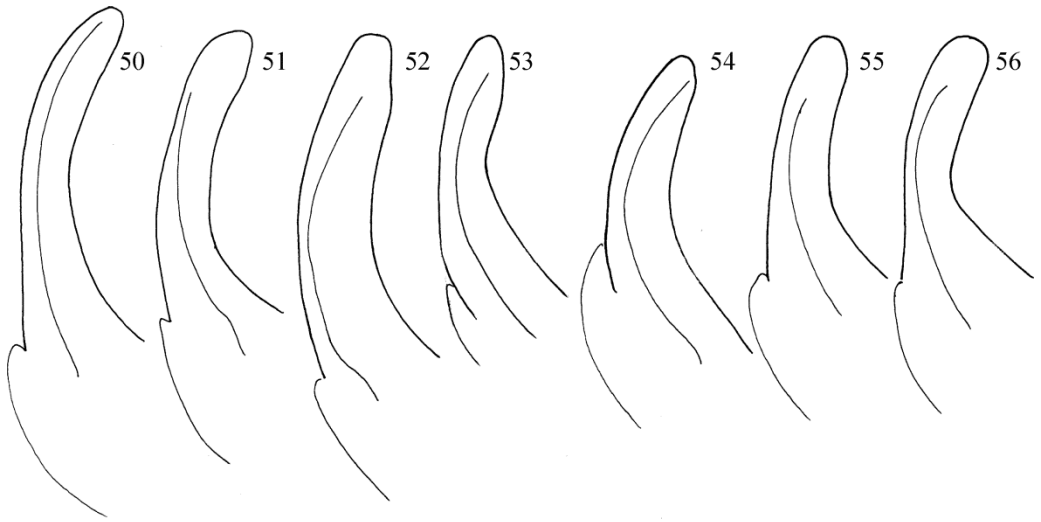
Etymology. *sillensis*, named for the region in which the holotype were collected from 'Silla', the old Dynasty's name in South Korea.

Neophylax ussuriensis (Martynov, 1914)

(Figures 50–56)

Material examined. **Japan**, Hokkaido, Shinchishine-bashi, Icyani-gawa, Shibetsu-cho, 7.X. 1995, leg. T. Ito & A. Ohkawa (2 males, OPC). Japan, Hokkaido, Kamikawa, Horokanai-cho, Shumarinai, 44°17'42"N, 142°07'35"E, 24.IX. 2015, light, leg. T. Ito (1 male, 2 females, OPC). **North Korea**, Ryanggang Province, Mupo, Tuman-gang, 1000 m, 29.VI.1988, singling from vegetation, leg. O. Merk & Gy. Szél (1 male, HNHM).

Remarks. The apical apices of the fused pair of paraproct at *N. ussuriensis* is variously rounded at the single male from North Korea (near to Ussuriland), at three males from Hokkaido (Ja



Figures 50–56. *Neophylax ussuriensis* (Martynov, 1914). Paraprocts in lateral view.

pan) and at all of the published drawings from Russia (Ussuriland) and from Japan.

Neophylax relictus (Martynov, 1935)

Material examined. **North Korea**, Ryanggang Province, Samjiyon, 4.VI.1985, night collecting at blended light (250W), fed by a Honda generator in a Picea stand at an altitude of about 2100 m, leg. A. Vojnits & L. Zombori (2 males, HNHM, 1 male, OPC; 1 male, KGU).

Remark. This species is new to the Korean Peninsula.

Family Limnephilidae Kolenati, 1848

Subfamily Dicosmoecinae Schmid, 1955

Tribe Dicosmoecini McLachlan, 1875

Dicosmoecus McLachlan, 1875

The taxonomy of *Dicosmoecus* genus remained uncertain despite significant early progresses (Flint 1966, Wiggins & Richardson 1982, Ito & Nagayasu 1991). Two species groups have been distinguished (Wiggins & Richardson 1982): *palatus* and *atripes*. The delination of these groups is based on larval as well as on male and female adult characters. Two male genital characters have been selected to distinguishe the two species group: (1) the length and shape of the dorsal branch of the paraproct (internal process of segment X) and the shape of the paramere. The *D. palatus* species group mostly with Eastern Palaearctic distribution has short and broad dorsal branch of the paraproct and the paramere slender, long and sigmoid in lateral view. The *D. atripes* species group with Western Nearctic distribution has long and slender dorsal branch of the paraproct and the paramere is short, thick and flattened.

In this genus the paraproct seems to function as the typical neutral traits exposed to stochastic processes of the effective population size, gene flow, gene drift combined with recombination. Therefore, dicosmoecine paraproct seems to be an unreliable character in contemporary divergences. Our three new species are distributed in the eastern Palaearctic region, they have long, slender, digitate and sigmoid paramere, but the dorsal branches of paraproct are long and slender, not short and broad or triangular. Being neutral, non-adaptive trait the shape of dorsal branch of the paraproct seems not stable, at least the holotype of *D. jozankeanus* has short dorsal branch (Wiggins & Richardson 1982) and the holotype of *Kogurea ezoensis*, synonymised with *D. jozankeanus*, has

long dorsal branches (Ito & Nagayasu 1991). Here we rely on the finding of Flint (1966) that stable differences exist between *Dicosmoecus* species especially in the paramere spine patterns and in the structure of the basal ridge of the gonopod. However, the stability of paramere spine pattern is still uncertain. The recorded variabilities (Flint 1966, Wiggins & Richardson 1982, Ito & Nagayasu 1991) need further studies on larger series of specimens from several populations in order to detect the background machanisms of the recorded variabilities: (1) fluctuating asymmetry reflecting developmental instability caused by external and internal effects; (2) stochasticity of neutral traits exposed to random population processes; (3) reinforcement by ecological and reproductive character displacement against unfit hybrid offspring. Here we have examined larger series of *D. coreanus* sp. nov. We have found the paramere spine pattern very stable both in the North and South Korean populations. We distinguish and delineate our three new species mostly by the fine structure of the parameres and the basal ridges of gonopods. Besides, the possible speciation traits of parameres and basal ridges on gonopods we have found some noticeable divergences also in some periphallic structures.

Dicosmoecus coreanus Oláh & Park, sp. nov.

(Figures 57–64)

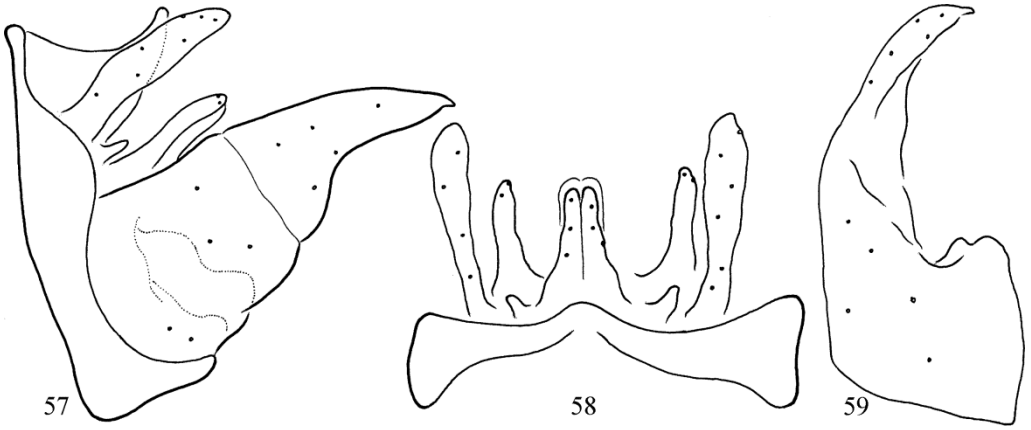
Material examined. Holotype, **South Korea**. Gangwon-do, Taebaek, Mt. Taebaeksan, Geomryongso 768 m, 12.IX.2013, leg. Li Xuankun (1 males, OPC). *Allotype*, same as holotype (1 female, OPC). *Paratypes*, same as holotype (1 male, 1 female, NIBR, 12 males, 2 females, DPP-HIST, 8 males, 2 females, OPC, 8 males, 1 female, KGU). South Korea, Gangwon-do, Pyeongchang-gun, Mitan-myeon, Chang-ri, Changricheon Stream, 37°20’44.8”N, 128°30’19.7”E, 400 m, 8.X.2017, leg. M.S. Kang, (1 male, 1 female, OPC). **North Korea**, North Pyongan Province, Mt. Myohyang-san, Hyangsan, sweeping the very sparse underwood vegetation in the forest around the hotel, 15.IX.1994, leg. F. Mészáros & L. Zombori (2 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, light trap, 16.IX.1994, leg. F. Mészáros & L. Zombori (1 male, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Hyangsan, light trap, 17.IX.1994, leg. F. Mészáros & L. Zombori (2 males, HNHM).

Diagnosis. Most close to *D. jozankeanus*, having almost the same structure of the basal ridge on the gonopods. They are contemporary diverged siblings. *D. coreanus* differ clearly by the fine structure of the parameres. Moreover, the new species has rather slim and long dorsal branches of the paraproct and the holotype of *D. jozankeanus* has very short dorsal branches. In the examined populations of the new species the long and slim dorsal branch seems stable, but seems variable in the various drawings of *D. jozankenaus*.

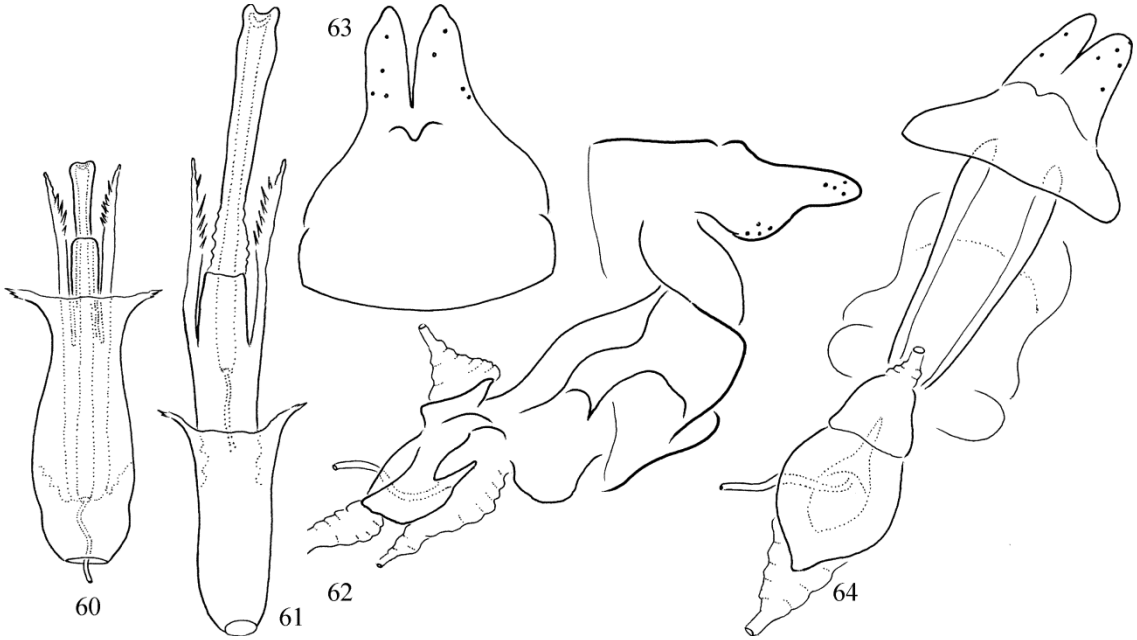
Description. Large and dark species with even darker wing neuration. Forewing length 28 mm, spur number 134.

Male genitalia. Based on the long and slender paramere shaft, this new species belongs to the *D. palatus* species group, but differs from the three known species (*jozankeanus*, *obscuripennis*, *palatus*) and from the two new species (*juliarum*, *mongolicus*) by the particular apical spine pattern of the parameres: a single setal organising centre resulted in the gradual pectinate apical cluster of spines. Fluctuating asymmetry, an indication of developmental instability between the left and right parameres both in the number and in the position of spines present. However, the fluctual asymmetry remains in the limits of gradual pectinate pattern.

Female genitalia. The gross structure of the female genitalia similar to the female of *D. jozankeanus*, including the dorsal profile of the fused tergite IX and segment X, the setose sternite IX, supragenital plate of segment X (upper vulvar lip), median lobe of the vulvar scale (lower vulvar lip). Similarly we have found the bilobed apices of segment X variable both in dorsal and lateral view. We have examined and drawn in details the fine structure of the vaginal sclerite complex, but there is no other species with known vaginal sclerite complex to compare. Among the nine



Figures 57–59. *Dicosmoecus coreanus* Oláh & Park, sp. nov. Holotype male: 57 = genitalia in lateral view, 58 = genitalia in dorsal view, 59 = left gonopod in ventral view.



Figures 60–64. *Dicosmoecus coreanus* Oláh & Park, sp. nov. Holotype male: 60 = retracted phallic organ in dorsal view, 61 = erected phallic organ in dorsal view. Allotype female: 62 = genitalia with the vaginal sclerite complex in lateral view, 63 = tergite IX and segment X in dorsal view, 64 = tergite IX and segment X in slightly distorted dorsal view with the vaginal sclerite complex.

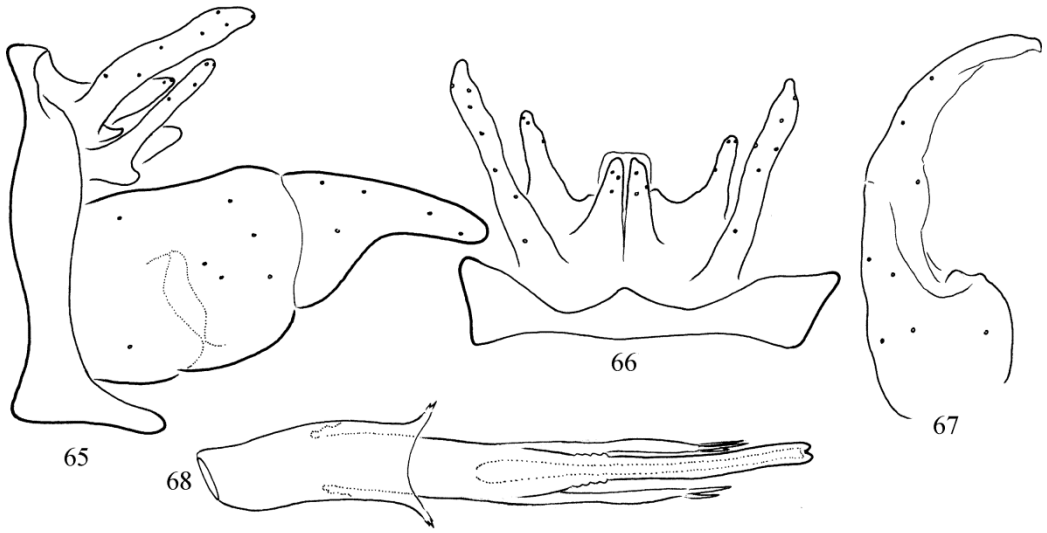
structural elements of the vaginal sclerite complex (Oláh *et al.* 2014) the dorsal and ventral articulations extremely produced, like in many of the females of the limnophiloid Polyphorae.

Etymology. *coreanus*, named for the country in which the holotype were collected.

Dicosmoecus juliarum Oláh, sp. nov.

(Figures 65–68)

Material examined. Holotype, **Russia**. Central Altai, 20 km S of Ongoday, 50°46’00.51”N 86° 09’56.86”E, 950–1000 m, 3.VIII.1993, leg. Z. Varga (1 male, OPC).



Figures 65–68. *Dicosmoecus juliarum* Oláh, sp. nov. Holotype male: 65 = genitalia in lateral view, 66 = genitalia in dorsal view, 67 = left gonopod in ventral view, 68 = erected phallic organ in dorsal view.

Diagnosis. Most close to *D. obscuripennis*, but dorsal branch of the paraproct (internal process of segment X) long digitiform, not short broad and triangular. *D. obscuripennis* has basal spine on the parameres produced by the second setal organising centre. A single, apical setal organising centre producing 2–3 apical spines on the very tip of the paramere; no basal setal organising centre producing any spines on the basal region.

Description. Forewing length 23 mm, spur number 134. Parameres sigmoid in lateral view, slightly constricted midway in dorsal view. The parameres of the holotype, the single representative of the species exhibit fluctuating asymmetry: two apical spines on the tip of the left paramere and three apical spines present on the tip of the right paramere.

Etymology. *juliarum*, named to acknowledge permanent background support provided to our studies by the wives of the collector (Julia) and the wife of the first author (Julia).

***Dicosmoecus mongolicus* Oláh, sp. nov.**

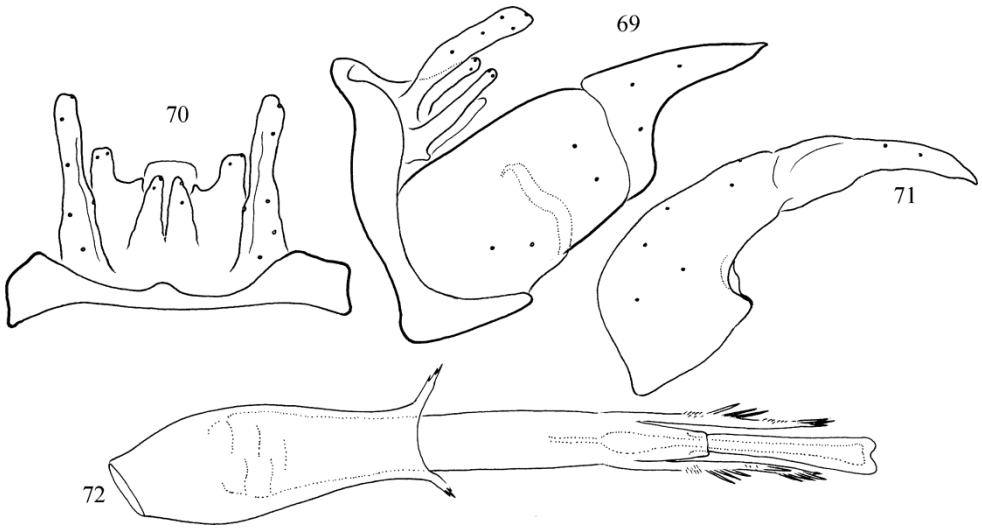
(Figures 69–72)

Material examined. Holotype, **Mongolia**. Gobi Altai, Aj Bopgd Uul, 44°34'16.83"N, 95°21' 39.21"E, 1950–2000 m, 4.VIII.1988, leg. Z. Varga (1 male, OPC).

Diagnosis. Based on the long and slender paramere shaft, this new species belongs to the *D. palatus* species group, but differs from the three known species (*jozankeanus*, *obscuripennis*, *palatus*) and from the two new species (*coreanus* sp. nov., *juliarum* sp. nov.) by the diverse spine pattern of the parameres. *D. jozankeanus* has parameres with two spine clusters, but without any microtrichia; *D. mongolicus* has very low basal ridge on the gonopods, the second possible speciation trait of the genus. This basal ridge very high at the *D. jozankeanus* holotype. Moreover, *D. mongolicus* has particularly patterened ventral branch of the paraproct (inferior process of segment X) with truncated apices and quadrangular basal region in dorsal view.

Description. Forewing length 23 mm, spur number 134. There are on the paramere an apical and a middle cluster of spines and there are two areas covered with microtrichia of innervated trichomes, microbristles without sensorial functions, just basad of the apical and middle clusters of spines. Again there is a fluctuating asymmetry between the left and right parameres in the number and position of both the spines and the microtrichia.

Etymology. *mongolicus*, named for the country in which the holotype were collected.



Figures 69–72. *Dicosmoecus mongolicus* Oláh, sp. nov. Holotype male: 69 = genitalia in lateral view, 70 = genitalia in dorsal view, 71 = left gonopod in ventral view, 72 = erected phallic organ in dorsal view.

Tribe Nothopsychini Banks, 1906

***Ecclisomyia kamtshatica* (Martynov, 1914)**

Material examined. **North Korea**. Kangwon province, Mt Kumgang-san, Oe-Kumgang, sweeping vegetation in the forest around the hotel, 24.IX.1994, leg. M. Mészáros & L. Zombori (3 females, HNHM).

***Nothopsyche bilobata* Park & Bae, 2000**

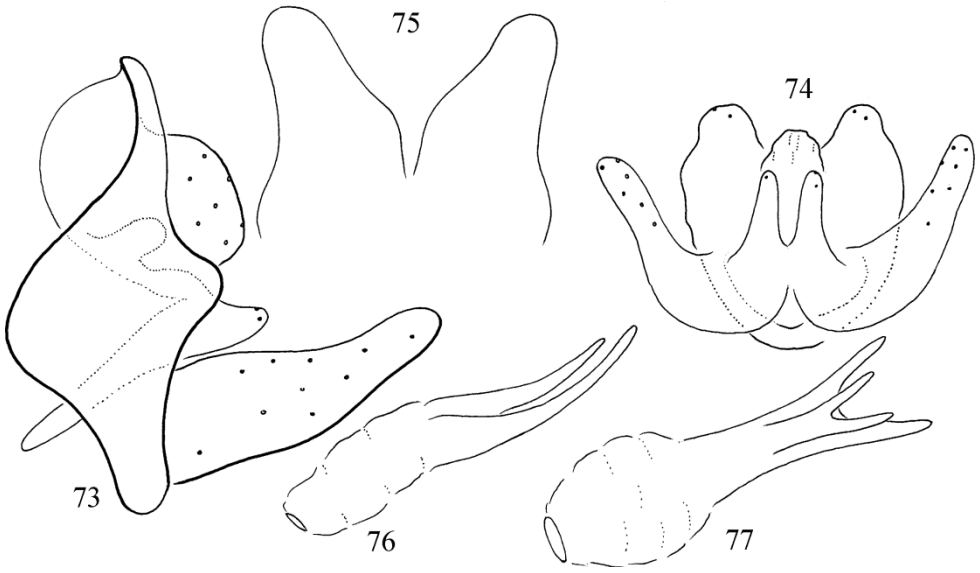
(Figures 73–80)

Nothopsyche bilobata Park & Bae, 2000: 18–129. "Male adult of *Notopsyche bilobata* is similar to that of *N. pallipes* Banks, but can be distinguish by the blunt internal branches of abdominal segment X, weakly pointed inferior appendages, and shape of phallus."

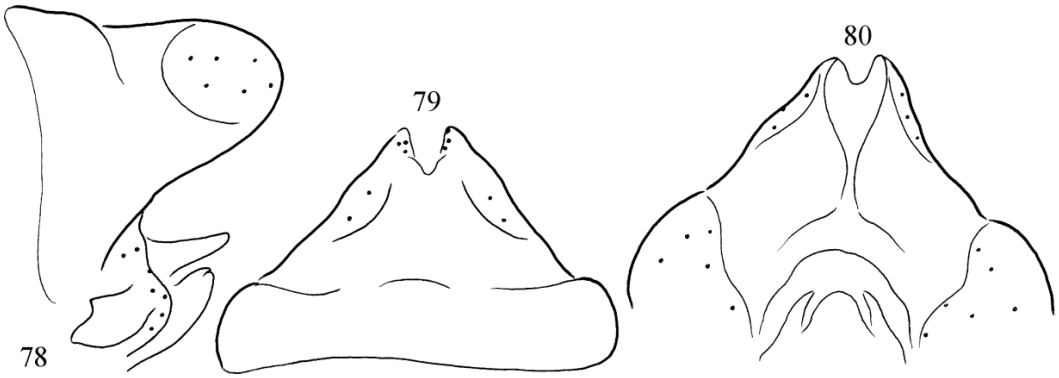
Material examined. **North Korea**. Pyongan Province, Mt Myohyang-san, 8.X.1987, collected at light at Hotel Myohyang-san, leg. Z. Korsós & L. Ronkay (1 male, HNHM). Pyongan Province, Mt. Myohyang-san, 10.X.1987, collected at light around the Hotel Myohyang-san, leg. Z. Korsós & L. Ronkay (1 female, HNHM). Pyongan Province, Mt. Myohyang-san, 11.X.1987, collected at lampshade at Hotel Myohyang-san, leg. Z. Korsós & L. Ronkay (1 male, OPC). North Hwanghae Province, Sinpyong, Pyonghwa-ri, 15.X.1978, singled around the quest-house from green vegetation, leg. A. Vojnits & L. Zombori (1 male, KGU).

Additional diagnosis. Our specimens from North Korea have resemblance to *Nothopsyche bilobata* but with some differences, at least according to comparision with the original drawings. Here we describe our specimens with drawns for a further more detailed comparison. Body colour is light brown of animals held in alcohol over 30 years. Forewing length is 10 mm without any pattern. Tibial spur number is 022 at male and 122 at female. First segment of the female maxillary palp is very short.

Male genitalia. Segment IX short ventrad, long pleurad and very short dorsad. The superanal complex is composed of segment X concave dorsad and bulging ventrad, of the vertically elongated rounded setose pair of cerci (external branches), of the short digitate dorsal branches of paraproct (internal, inner), and of the less pigmented bilobed ventral branches of paraproct (inferior, lower). The bilobed ventral branches of paraproct continuing anterad into a semi-circular sclerotized band. The gonopods (inferior appen-



Figures 73–77. *Nothopsyche bilobata* Park & Bae, 2000. Male: 73 = genitalia in lateral view; 74 = genitalia in dorsal view; 75 = gonopods in ventral view; 76 = phallic organ in lateral view; 77 = phallic organ in dorsal view.



Figures 78–80. *Nothopsyche bilobata* Park & Bae, 2000. Female: 78 = genitalia in lateral view; 79 = genitalia in dorsal view; 80 = genitalia in ventral view.

dages of segment IX) are elongated and slightly sigmoid in lateral view. Both the aedeagus and parameres sclerotized apicad and deeply excised bifid.

Female genitalia. Segment X triangular in dorsal view with deep apical excision and rounded in lateral view. Entrance of vulva that is the vaginal opening is housed on segment IX, not between segments VIII and IX. Ventral setose lobes of segment IX located laterad, besides of the vaginal opening, not above. The lower vaginal lip, the vulvar scale discernibly trilobate, forms a semi tubular cavity with the upper vaginal lip that is with the semi-circular supragenital plate. Lateral lobes of the vulvar scale thin, median lobe robust. Vaginal sclerite complex elongated rounded in dorsal view.

Nothopsyche ruficollis (Ulmer, 1905)

Material examined. **South Korea**. Jeju-do, Mt. Hallasan National Park, 126°00’E 33°15’N, 1000

m, 27.X.1993, mixed deciduous forest, light leg. L. Peregovits & L. Ronkay (3 males, 1 female; HNHM).

Family Pseudostenophylacinae Schmid, 1955

***Pseudostenophylax riedeli* Botosaneanu, 1970**

Material examined. **North Korea.** Kangwon Province, Mt. Kumgang-san, 27.V.1985, night collecting at blended light (250W), fed by a Honda generator at Kumgang-mun Gate, leg. A. Vojnits & L. Zombori (1 male, HNHM). Kangwon Province, Mt. Kumgang-san, 28.V. 1985, night collecting at blended light (250W), fed by a Honda generator on the serpentine to Kwinyon-am Rock, leg. A. Vojnits & L. Zombori (1 male, HNHM). Kangwon Province, Mt. Kumgang-san, Manmulsang Rocks, 750 m, 12.VI. 1991, collected by light trap at the beginning of the pathway to Manmulsang Rocks, leg. L. Ronkay, A. Vojnits & L. Zombori (1 male, HNHM).

***Pseudostenophylax amurensis* (McLachlan, 1880)**

Material examined. **North Korea**. North Khangem Province, Chondjin, 5.VI.1991, collected in a hilly forest clearing in the vicinity of Kumgang, 15 km NW of Chondjin, leg. L. Ronkay & A. Vojnits (3 males, HNHM; 2 males, OPC).

Subfamily Limnephilinae Kolenati, 1848

Tribe Chilostigmini Schmid, 1955

***Brachypsyche schmidi* Choe, Kumanski & Woo, 1999**

Material examined. **South Korea**. Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jomurakgol rd.: 37°59'24.7"N 127°26'76.0"E 360 m, 4.XI.2016, light trap, leg. J. Babics & B. Tóth (1 male, HNHM).

Tribe Limnephilini Kolenati, 1848

***Asynarchus iteratus* McLachlan, 1880**

Material examined. **Mongolia**. Gorkhi-Terelj National Park, 20.VII–15.VIII.1986, leg. Z. Varga (4 males, OPC).

***Asynarchus mongolicus* Oláh, sp. nov.**

(Figures 81–83)

Material examined. Holotype, **Mongolia**. Gorkhi-Terelj National Park, 47°58'58.81"N 107° 27'07.10"E, 1550–1600 m, 20.VII-15.VIII.1986, leg. Z. Varga (1 male, OPC).

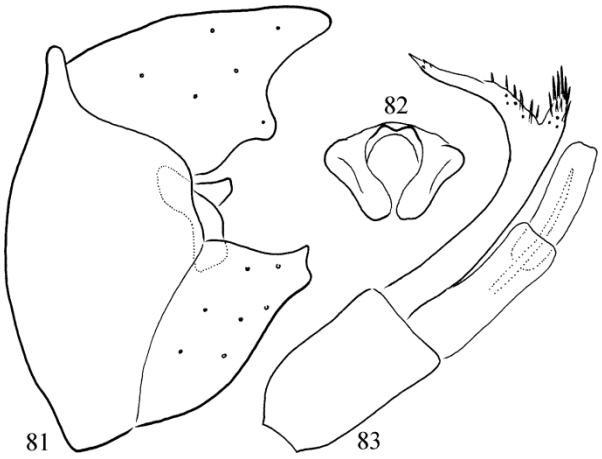
Diagnosis. The new species is most close to *A. lapponicus*, but differs by having differently shaped lateral profiles both of the cerci and gonopods as well as easily distinguished by the diversified fine structure of the parameres.

Description. The single male specimen stored in alcohol over thirty years is faded brown. The forewing length is 14 mm. Segment IX very short dorsad longer ventrad, although the demarcation line between segment IX and gonopods is just discernible. The cerci is very large, subrtiangular, its ventral lobe located middle and blunt, not pointed. Paraproct reduced in size, its dorsal arm especially small and triangular in lateral view. Gonopod lateral profile characterized with pointed dorsal and very blunt ventral apical lobe. Phallic organ composed of phallotheca (phallobase), endotheca, aedeagus, endophallus and parameres. Parameres characterized by an upward and foreward turning spine-like dorsal arm and the more setose horizontal ventral arm.

Etymology. *mongolicus*. Named for the country in which the holotype were collected.

***Limnephilus fuscovittatus* Matsumura, 1904**

Material examined. **Japan**. Tsukanoiri-ike, Itaka-cho, Neito-ku, Nagoya, Aichi, 2.IX.2010, leg. T. Nozaki (2 males, OPC). **North Korea**. Ryanggang Province, Samjiyon, 4.VI.1985, night collecting at blended light (250W), fed by a Honda generator in a Picea stand at an altitude of about 2100 m, leg. A. Vojnits & L. Zombori (2 males, HNHM, 1 male, OPC). Pyongyang City, Pyongyang, Hotel Potonggang, 13.X.1987, singled at light around the hotel, leg. Z. Korsos & L. Ronkay (2 females, HNHM, 1 female, OPC). Pyongyang City, Pyongyang, Ryongak-san, 21.



Figures 81–83. *Asynarchus mongolicus* Oláh sp. nov. Holotype male: 81 = genitalia in lateral view; 82 = paraproct in caudal view; 83 = phallic organ in lateral view.

IX.1994, singled at a lookout place, leg. Z. Mészáros & L. Zombori (1 male, HNHM). North Pyongan Province, Mt Myohyang-san, Hyangsan, 15.IX.1994, light trap, leg. Z. Mészáros & L. Zombori (2 males, HNHM). North Hwanghae Province, Sariwon, Samsal Hotel balcony, 29.IX. 1994, light trap, leg. Z. Mészáros & L. Zombori (10 males, 4 females; HNHM). Kangwon Province, Mt Kumgang-san, Oe-Kumgang, 23.IX. 1994, sweeping path-side vegetation behind Kum gangsan Hotel, leg. Z. Mészáros & L. Zombori (1 male, HNHM).

Limnephilus orientalis Martynov, 1935

Material examined. **South Korea**. Gyeongsangnam Province, Hadong-gun, Jiri Mts. Ssanggyesa valley, parking lot beneath Daesung camp, 270 m, 35°16.523'N 127°39.131'E, 14.IX.2010, leg. D. Murányi et al. (1 female, OPC).

Limnephilus quadratus Martynov, 1914

Material examined. **North Korea**. Ryanggang, Chann-Pay plateau, Sam-zí-yan, 1700 m, 27.VIII.1971, netting on lake shore, leg. J. Papp & S. Horvatovich (2 males, HNHM; 1 male, KGU).

Remark. This species is new to the Korean Peninsula.

Nemotaulius brevilinea (McLachlan, 1871)

Material examined. **North Korea**. Kangwon Province, Mt. Kumgang-san, 26.V.1985, cool night. Collecting at blended light, fed by a Honda generator, some 100 m from the rest house Oe-Kumgang, in a mixed forest, leg. A. Vojnits & L. Zombori (1 male, HNHM).

Nemotaulius coreanus Oláh, 1985

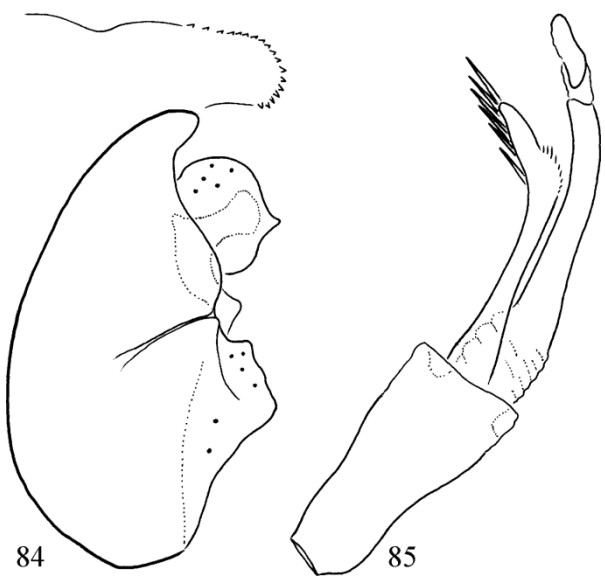
(Figures 84–88)

Nemotaulius coreanus Oláh, 1985: 137–139. "Superior appendages (cerci) clearly ovoid with a well-developed triangular projection at submiddle position on the apical margin. Other peculiar feature of the superior appendages is an enlarged circular strongly sclerotized black area occupying the larger lower half of the appendages including also the triangular projection. Intermediate appendages (paraproct) not visible in lateral view due to this heavily sclerotized black circle on the superior appendages. In lateral aspect the heavily sclerotized distal ending of intermediate appendages broad, clavate or rather with a renal configuration." "This is a distinct large and very decorative new caddisfly species allied to *N. admorsus* McLachlan, 1866 distributed in Japan, Sakhalin, Ussuri and Kurile Islands. Differs from *admorsus* in its forewing pattern with rounded apico-posterior angle which is very very pointed in *admorsus*. Second and third joints of maxillary palpi equal, second longer in *admorsus*. Superior and intermediate appendages differently formed."

Glyphotaelius admorsus McLachlan, 1866? (sp.?) Martynov 1914: 177–179. A single male specimen was described form lower Ussuriland with question mark as similar to the Japanese *Glyphotelius admorsus* McLachlan. However, Martynov listed significant differences: (1) in lateral view the appendices praeanales (cerci) without tooth at *G. admorsus*, but the specimen from Ussuriland has a tooth-like outgrowth on the apical margin, (2) in lateral view the internal branch (paraproct) is band-like with conical apex at *G. admorsus*, but with diverging, broad apex at the specimen from Ussuriland. Misidentification!

Nemotaulius admorsus (McLachlan, 1866). Kumanski 1991: 20–21: species new to Korea. Misidentification!

Nemotaulius admorsus (McLachlan, 1866). Choe *et al*. 1999: 33–35. "superior appendages (cerci) with



Figures 84–85. *Nemotaulius coreanus* Oláh, 1985. Holotype male: 84 = genitalia in lateral view; 85 = phallic organ in lateral view.

triangular projection in the middle of the apical margin and with strongly sclerotized black area on the inner surface. Upper lobe of each intermediate appendage blunt, not visible laterally, because of the sclerotized portion of superior appendages." Misidentification!

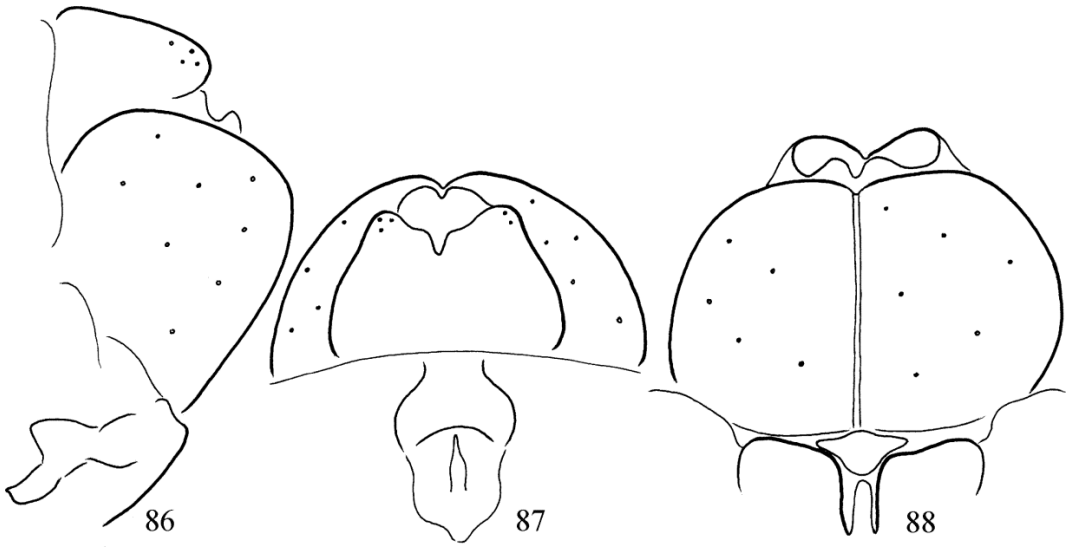
Material examined. Male holotype. **North Korea**. Mt Pektusan, before Sam-zi-yan Hotel, lakeshore, wooded environment, collecting at Mv lamp, 20.VII.1977, (1 male, HNHM). **South Korea**. Gyeongsangnam-do, Hadong-gun, Mt. Jirisan, Ssanggyesa Valley, parking lot beneath Daesung camp, 270 m, 35°16.523'N 127° 39.131'E, 14.IX.2010, leg. D. Murányi et al. (1 female, OPC). South Korea, Jeollabuk-do, Wanju-gun, Soyang-myeon, Hwasim-ri, Soyangcheon Stream, 35°49'56.3"N 127°16'53.6"E 100 m, 21. IX.2016, leg. M. S. Kang (1 male, KGU). South Korea, Gyeongsangbuk-do, Cheongdo-gun, Unmun-myeon, Ojin-ri, Ojin-1 Bridge, 35°42'13.9"N 128°58'19.3"E 170 m, 30.VIII. 2015, leg. S. J. Park, (1 male, OPC). South Korea, Gangwon-do, Yanggu-gun, Nam-myeon, Gaojak-ri, Gwangchi valley, 38°08'19.6"N: 128°04' 09.6"E 500 m, 08.IX.2016, leg. M. S. Kang, (1 female, OPC). South Korea, Gyeongsangnam-do, Danjang-myeon, Milyang-si, Pyochungsa Temple, 35°35'16.53"N 128°59'47.70"E 386 m, 29.VIII. 2015, leg. S.J. Park, (1 female, KGU).

Remarks. The Japanese species of *Nemotaulius admorsus* has cerci (preanal appendages) without dental projection on the apical margin. Contrary, all the examined specimens of *Nemotaulius coreanus* from North and South Korea as well as, at least according to Martynov's original description and drawins, specimen from Ussuriland have characteristic dental projection on the apical margin of the cerci. The other periphallic organ the paraproct (intermediate appendages) is band-like with conical apex at *N. admorsus* and capitate or rather clavate at *N. coreanus* that is with broadening apex in lateral view. The fine structure of the parameres is even more diverged in the two species. *N. admorsus* has paramere apex with long setae both on the dorsal and ventral margin in lateral view. *N. coreanus* has long setae only on the dorsum of the paramere apex; the ventral setae on the apex are located only subapicad and represent completely different type of sensory structure, they are very short and fine. Until we have no more material it seems that *N. admorsus* lives only in Japan, at least all the specimens collected and examined until now from the continent have the specific characters of *N. coreanus*.

Stenophylacini Schmid, 1955

Hydatophylax formosus Schmid, 1965

Material examined. **North Korea**. Kangwon Province, Mt. Kumgang-san, 22.X.1987, collected at light around the Hotel Kumgang-san, leg. Z. Korsós & L. Ronkay (1 male, OPC). Kangwon Province, Mt. Kumgang-san, Hotel Kumgang, 17.IX.1980, collected at light around the Hotel Kumgang-san, leg. L. Forró & Gy. Topál (3 males, HNHM). Kangwon Province, Mt. Kumgang-san, Hotel Kumgang, 28.IX.1979, singled and netted on and in the water of the brook Kuryong, leg. H. Steinmann & T. Vásárhelyil (1 male, HNHM). Kangwon Province, Mt. Kumgang-san, 18.IX. 1980, singled along the foot-path



Figures 86–88. *Nemotaulius coreanus* Oláh, 1985. Female: 86 = genitalia in lateral view; 87 = genitalia in dorsal view ith dorsal profila of the vaginal sclerite; 88 = genitalia in ventral view.

to Kuryong Falls, leg. L. Forró & Gy. Topál (1 male, HNHM). Pyongyang City, Pyongyang, Garden of Hotel Pyongyang, 24.IX.1978, collected by aspirator around lampshade, leg. A. Vojnits & L. Zombori (1 male, HNHM). **South Korea**. Gangwon-do, Yangyang, Mt. Jeombongsan 495 m, 11.IX.2013, leg. Li Xuankun (6 males, 1 female, DPP-HIST; 6 males, 2 females, OPC). Gangwon-do, Yangyang, Mt. Seoraksan, Hangyeryeong pass, brook in deciduous forest, 875 m, 38°05.481'N 128°24.267'E, 9.IX.2010, leg. D. Murányi *et al*. (1 male, OPC). Gangwon-do, Yangyang, Mt. Seoraksan, Osaek-Oncheon, N branch of Osaekcheon stream, 365 m, 38° 04.814'N 128°26.943'E, 9.IX.2010, leg. D. Murányi *et al*. (2 males, 1 female; OPC). South Korea, Gangwon-do, Yangyang, Mt. Seoraksan, Osaek-Oncheon, parking lot at entrance to Yongso falls, 520 m, 38°05.180'N 128°26.021'E, 8.IX.2010, leg. D. Murányi *et al*. (10 males, OPC).

Hydatophylax grammicus (McLachlan, 1880)

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, 20.V. 1985, night collecting at blended light (250W), in the balcony of the hotel, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, 21.V.1985, night collecting at blended light (250W), in the balcony of the hotel, leg. A. Vojnits & L. Zombori (3 males, HNHM). North Pyongan Province, Mt. Myohyang-san, 22.V.1985, night collecting at blended light (250W), in the balcony of the hotel, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, 22.V.1985, night collecting at blended light (250W), by using Honda generator, some three km of the hotel, by the river Hyangsan-chon, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 25.V.1991, collected by light in a mixed forest near to the hotel, leg. L. Ronkay & A. Vojnits (2 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, Isonnam valley, 23.V.1991, collected by light at a white sheet illuminated by a 160 W mixed lamp, leg. L. Ronkay & A. Vojnits (2 males, OPC). North Korea, North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 23.V.1991, collected by light around the hotel, leg. L. Ronkay & A. Vojnits (1 male, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 24. V.1991, collected by light at the hotel, leg. L. Ronkay & A. Vojnits (2 males, HNHM). North

Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 26.V.1991, singled from a mixed deciduous forest SE from the hotel, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

***Hydatophylax magnus* (Martynov, 1914)**

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, 8.X.1987, collected at light at Hotel Myohyang-san, leg. Z. Korsós & L. Ronkay (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 11.X.1987, collected at light on lampshade at the hotel, leg. Z. Korsós & L. Ronkay (1 male, OPC). North Hwanghae Province, Sinpyong, Pyonghwa-ri, 15.X.1978, singled around the quest-house from green vegetation, leg. A. Vojnits & L. Zombori (1 male, OPC). **South Korea**. Chungcheongbuk-do, Mt. Cheonwangbong 587 m, 8.IX.2013, leg. Li Xuankun (1 male, 1 female, DPP-HIST; 1 male, 1 female, OPC). South Korea, Jeollanam-do, Gurye-gun, Mt. Jiri, Nogodan, rocky stream in deciduous forest, 1280 m, 35°17.738'N 127°31.430'E, 15.IX.2010, leg. D. Murányi *et al.* (1 male, OPC). Gyeongsangnam-do, Sancheong-gun, Mt. Jiri, Ogeok valley, N branch of Yupyeong, forest edge, 655 m, 35°22.848'N 127°47.103'E, 16.IX.2010, leg. D. Murányi *et al.* (9 males, 5 females; OPC). South Korea, Jeollahbuk-do, Muju-gun, Mt. Deokyu, Sugyeongdae, clearing edge above a road, 640 m, 35°53.888'N 127°46.378'E, 16.IX.2010, leg. D. Murányi *et al.* (2 males, OPC). Gyeongsangnam-do, Hadong-gun, Mt. Jiri, Ssanggyesa valley, parking lot beneath Daesung camp, 270 m, 35°16.523'N 127°39.131'E, 14.IX.2010, leg. D. Murányi *et al.* (9 males, 5 females; OPC). Jeollanam-do, Gurye-gun, Mt. Baekun 620 m, 7.IX. 2013, leg. Li Xuankun (16 males, 5 females; OPC). South Korea, Gyeongsangnam-do, Mt. Deokyu, near Geochang, Galgye-ri, 35°47.792'N 127°49.169' , 443 m, 28.X.2016, light tr., leg. J. Babics & B. Tóth (8 males, 1 female, HNHM).

***Hydatophylax nigrovittatus* Schmid, 1950**

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, 21.V. 1985, cool night. Night collecting at blended light (250W), in the balcony of the hotel, leg. A. Vojnits & L. Zombori (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, 22.V. 1985, warm, sunny afternoon. Collecting along the bank of the river Hyangsan-chon, mostly singling, leg. A. Vojnits & L. Zombori (1 female, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang, 23.V.1991, collected by light around the hotel, leg. L. Ronkay & A. Vojnits (1 male, HNHM). **South Korea**. Gyeongsangbuk-do, Mt. Bohyonsan, Experimental Station between Wolmae and Mt. Bohyonsan, 36°09'N 129°00'E, 800 m, 23.IV.1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (4 males, HNHM).

***Hydatophylax soldatovi* (Martynov, 1914)**

Material examined. **North Korea**. Mt Pektusan, wooded environs of the Sam-zi-yan hotel, 19. VII.1977, Collecting at Mv lamp, leg. O.Gy. Dely & Á. Dely-Draskovits (2 males, HNHM). Mt Pektusan, wooded environs of the Sam-zi-yan hotel, 18.VII.1977, collecting at Mv lamp, leg. O.Gy. Dely & Á. Dely-Draskovits (2 males, HNHM; 1 male, OPC; 1 male, KGU).

Remark. This species is new to the Korean Peninsula.

Superfamily Leptoceroidea Leach in Brewster, 1815

Family Leptoceridae Leach in Brewster, 1815

***Athripsodes ceracleoides* Kumanski, 1991**

Material examined. **North Korea**. Pyongyang City, Pyongyang, Garden of the Hotel Pyongyang, 21.IX.1978, singled around lampshade, leg. A. Vojnits & L. Zombori (1 male, HNHM).

***Ceraclea albimacula* (Rambur, 1842)**

Material examined. **North Korea**. Pyongyang City, Pyongyang, Garden of the Hotel Pyongyang, 28.VII.1982, singled around lampshade, leg. L. Forró & L. Ronkay (3 males, HNHM). Ryanggang Province, Samjiyon, 5.VI.1985. mixed *Larix*

- *Betula* forest along the road Paekdu-san, 15 km from the hotel, light leg. A. Vojnits & L. Zombori (1 male, HNHM).

Ceraclea annulicornis (Stephens, 1836)

Material examined. **Russia**. Khabarovsk Terr., Slavyanka at Amur, 17.VI.1994, light trap, leg. P. Lindskog & A. Nilsson (15 males, SMNH; 8 males, OPC).

Ceraclea lobulata (Martynov, 1935)

Material examined. **North Korea.** Ryanggang Province, Samjiyon, 5.VI.1985, mixed *Larix* - *Betula* forest along the road Paekdu-san, 15 km from the hotel, light leg. A. Vojnits & L. Zombori (2 males, HNHM). **Russia**. West Altai, R. Charish Sentelak, 22–23.VII.1993, light, leg. Z. Varga (3 males, OPC).

Ceraclea mitis (Tsuda, 1942)

Material examined. **North Korea**. North Pyongan Province, Mt Myohyang-san, Hotel Myohyang-san, 22.V.1985, light, leg. A. Vojnits & L. Zombori (11 males, 41 females; OPC).

Ceraclea morsei Kumanski, 1991

Material examined. **North Korea**. Pyongyang City, Pyongyang, Hotel Tae Dong, 20.IX.1979, light, leg. H. Steinmann & T. Vásárhelyi (1 male, OPC).

Ceraclea shuotsuensis (Tsuda, 1942)

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (3 males, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 11.X.1988, collected on lampshade at the hotel, leg. Z. Korsós & L. Ronkay (2 males, HNHM). North Korea, Mt. Pektusan, wooded environs of Sam-ziyan Hotel, 18.VII.1977, at small lake, light leg. Z. Korsós & L. Ronkay (2 males, HNHM).

Ceraclea sibirica (Ulmer, 1906)

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 11.X.1988, shifted from the litter of a rocky forest, leg. Z. Korsós & L. Ronkay (2 males, HNHM). North Pyongan Province, Mt. Myohyang-san, Hotel Myohyang-san, 11.X.1988, collected on lampshade at the hotel, leg. Z. Korsós & L. Ronkay (1 male, HNHM). **Russia**. West Altai, R. Charish Sentelak, 22–23.VII.1993, light, leg. Z. Varga (4 males, OPC).

Oecetis dilata Yang & Morse, 2000

Material examined. **North Korea**, Kangwon Province, Mt. Kumgang-san, side valley near Hotel Kumgang, 13.VI.1991, light, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Oecetis kumanskii Yang & Morse, 2000 stat. nov.

Oecetis testacea orientalis Kumanski, 1991: 52–53. Holotype: "Kumgang Mts., the foothills, near the hotel Go-song and Ondzong village (ca. 50 m alt.), stony stream, the hyporhithral-epipotamon zone. 18–20.VIII.1982, (leg. Beron & Popov, at light)." "Discussion: The only information about the presence of this species in the easternmost regions of the Palearctic goes back to Kuwayama (1930), the occurrence of *Oe. testacea* in Japan been evidently not recognised by any other author. On the other hand, this species has not been established out of Europe and it was a sort of surprise to be found in Korea as well. Besides chorologically, the two subspecies are readily recognizable after the above mentioned genital features."

Oecetis testacea kumanskii Yang & Morse, 2000: 135. "Since the identity is unknown, the name *Oecetis orientalis* Navas, 1921, from "Tonking" (Vietnam), is a NOMEN DUBIUM. Nevertheless, Navas's name is an available name. Therefore, the species *Oecetis orientalis* Tsuda, 1942b, is a homonym (Fischer, 1966) that was renamed *Oecetis tsudai* Fischer, 1970. Because of the "coordinate status" of names in the species group, the subspecies *Oecetis testacea orientalis* Kumanski, 1991, also is a homonym that should be renamed. Therefore, we rename this subspecies *Oecetis testacea kumanskii* Yang and Morse, NEW NAME."

Oecetis kumanskii Yang & Morse 2000. Based on the significant divergences both in the male and female genital fine structure as well as on our theoretical considerations (Oláh *et al.* 2018) we raise the taxonomic status of this taxon to species. **Stat. nov**.

Material examined. **North Korea**. Pyongyang City, Pyongyang, 15.IX.1979, at light of a 160 W MV bulb in the window of Hotel Tae Dong, leg. H. Steinmann & T. Vásárhelyi (1 male, HNHM). North Korea, Chagang Province, Mt Myohyang-san, Hotel Myohyang, 13.IX.1980, singled at lamps standing around the hotel, leg. L. Forró & Gy. Topál (3 males, HNHM).

Oecetis nigropunctata Ulmer, 1908

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, pathway Isonnam, 8.X.1988, singled along stream Hyangsan, leg. Z. Korsós & L. Ronkay (1 male, HN HM). South Hwanghae Province, Haeju, Mt. Suyong-san, deciduous forest on SE slope, 31.VII. 1982, light, leg. L. Forró & L. Ronkay (1 male, HNHM).

Mystacides dentata Martynov, 1924

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, Hyangsan, 15.IX.1994, light trap, leg. F. Mészáros & L. Zombori (1 male, 1 female; HNHM).

Setodes pulcher Martynov, 1910

Material examined. **North Korea**. Chagang Province, Mt Myohyang-san, Hotel Myohyang-san, 14.VII.1982, light, leg. L. Forró & L. Ronkay (3 males, 3 females; HNHM).

Family Odontoceridae Wallengren, 1891

Psilotreta falcula Botosaneanu, 1970

Psilotreta falcula Botosaneanu, 1970: 314–316. "Holotype ♂ et allotype ♀ choisis parmi les exemplaires de st. 7." "Station 7. Province Hamgjŏng-pukto: rivière Poro-čhon à 2 km. environ au NO de Kjŏngsŏng. 4.VI. 965, leg. M. Mroczkowski et A. Riedel."

Psilotreta pyonga Oláh, 1985: 140–141.

Psilotreta pyonga Oláh, 1985: Parker & Wiggins 1987: 48. *Psylotreta pyonga* is closely related to *P. falcula*, if not conspecific.

Psilotreta pyonga Oláh, 1985: Oláh & Johanson 2010: 101, holotype and new material re-examined and stated formally that *P. pyonga* is a junior synonym of *P. falcula*.

Material examined. Holotype of *P. pyonga*. "Korea, Prov. North Pyongan, Mt. Myohyang-san, Hotel Myohyang-san, 14.VII.1982, leg. Forró et Ronkay." **North Korea**. Kangwon Province, Mt. Kumgang-San, 28.V.1985, light, leg. A. Vojnits & L. Zombori (1 male, 2 females; NHMB). North Korea, Kangwon Province, Mt. Kumgang-San, 13.VI.1991, light, leg. L. Ronkay & A. Vojnits (1 male, (NHMB).

Remarks. Distinguished from *P. locumtenens* by longer and robust paraproct, by the well-developed ventroapical lobe on the coxopodite of the gonopod and by the short and hooked paramere.

Psilotreta kerka Oláh, sp. nov.

(Figures 89–91)

Material examined. Holotype, **North Korea**. North Khamgen Province, Chondjin, 2.VI.1991, O-sang-li valley, 20 km SW of Chondjin, singled and netted, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Diagnosis. This species with 11 mm forewing length is most close to *P. falcula*, but differs by the shape of the paraproct and the paramere. The curving spine of the paraproct is forming a complete circle and the narrowing tip is directed vertically downward, not posterad; as a result the tip of the paraproct is not visible in dorsal view. The paraproct is more robust compared to the paraproct of the *P. falcula*. The pair of parameres is longer, more robust and its tip is not forming an apical hook.

Description. General habitus, body and genitalia characters are similar to *P. falcula* Botosaneanu, 1970 differs discernibly by the divergences of paraproct and paramere.

Etymology. *kerka*, rounded or circle in Hungarian with reference to the lateral shape of the paraproct forming an almost complete circle.

***Psilotreta locumtenens* Botosaneanu, 1970**

Material examined. **North Korea**. Pyongyang City, Ryongak-san, 8.VI.1985, leg. A. Vojnits & L. Zombori (1 male, HNHM). North Korea, Kangwon Province, Mt. Kumgang-san, side valley near Hotel Kumgang, 13.VI.1991, light, leg. L. Ronkay & A. Vojnits (1 male, HNHM).

Remarks. Distinguished from *P. falcula* by short and fine paraproct, by less developed ventroapical lobe on the coxopodite of the gonopod and by long and straight paramere.

Family Molannidae Wallengren, 1891

***Molanna moesta* Banks, 1906**

Material examined. **North Korea**. Kangwon Province, Mt. Kumgang-san, side valley near Hotel Kumgang, 13.VI.1991, light, leg. L. Ronkay & A. Vojnits (1 male, HNHM). **South Korea**. Cheju Province, Andok valley, 300 m, 126°22'E 33°15' N, 28.IV.1994, light, leg. L. Peregovits, L. Ronkay & A. Vojnits (3 males, HNHM). North Korea, Pyongyang City, Daesong-san, 31.V. 1985, light leg. A. Vojnits & L. Zombori (1 male, HNHM).

***Molanna submarginalis* McLachlan, 1872**

Material examined. **North Korea**. Ryanggang, Chann-Pay plateau, Sam-zí-yan, 1700 m, 27.VIII.1971, netting on lake shore, leg. J. Papp & S. Horvatovich (3 males, HNHM).

Superfamily Sericostomatoidea Stephens, 1836

Family Sericostomatidae Stephens, 1836

***Gumaga orientalis* (Martynov, 1935)**

Material examined. **North Korea**. North Pyongan Province, Mt. Myohyang-san, 21.V.1985, light, leg. A. Vojnits & L. Zombori (3 males, HNHM). North Korea, North Pyongan Province, Mt. Myohyang-san, 27.V.1991, light in Hyangsan valley near Hwajangam cloister, leg. L. Ronkay & A. Vojnits (4 males, HNHM; 3 males, OPC).

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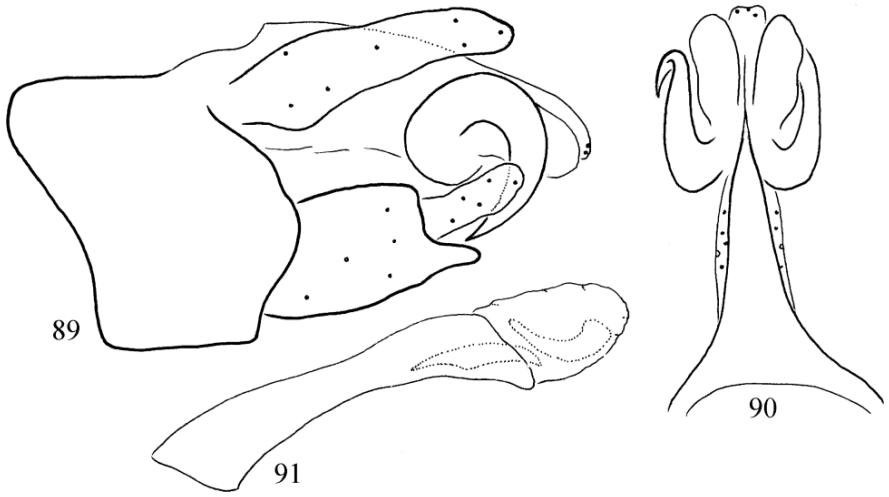

Figures 89–91. *Psilotreta kerka* Oláh, sp. nov. Holoptype male: 89 = genitalia in lateral view; 90 = genitalia in dorsal view; 91 = phallic organ in lateral view.

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