

Far Eastern Entomologist

Дальневосточный энтомолог

Journal published by Far East Branch
of the Russian Entomological Society
and Laboratory of Entomology,
Institute of Biology and Soil Science,
Vladivostok

Number 325: 1-12

ISSN 1026-051X

November 2016

<http://urn:lsid:zoobank.org:pub:1FFF011B-9ABA-45CB-82E2-35B2DC2EDC1B>

CHIRONOMIDS OF SUBFAMILIES TANYPODINAE, DIAMESINAE AND ORTHOCLADIINAE (DIPTERA: CHIRONOMIDAE) FROM NORTH KOREA

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An annotated list of 32 chironomid species from 22 genera of subfamilies Tanypodinae (7 species), Diamesinae (3 species) and Orthoclaadiinae (22 species) of North Korea is provided. *Antillocladius koreanus* Makarchenko et Makarchenko, **sp. n.**, *Bryophaenocladus reei* Makarchenko et Makarchenko, **sp. n.** and *B. inappendiculatus* Makarchenko et Makarchenko, **sp. n.** are described. Fourteen species are recorded for the first time from the Korean Peninsula.

KEY WORDS: Diptera, Chironomidae, taxonomy, new species, fauna, new records, Democratic People's Republic of Korea.

Е. А. Макаренко*, М. А. Макаренко, Х. Ниитсума. Хирономиды подсемейств Тануподинае, Диамесинае и Орточладиинае (Diptera: Chironomidae) Северной Кореи // Дальневосточный энтомолог. 2016. N 325. С. 1-12.

Приведен аннотированный список 32 видов хирономид из 22 родов подсемейств Тануподинае (7 видов), Диамесинае (3 вида) и Орточладиинае (22 вида).

Описаны новые для науки виды: *Antillocladius koreanus* Makarchenko et Makarchenko, **sp. n.**, *Bryophaenocladus reei* Makarchenko et Makarchenko, **sp. n.** и *B. inappendiculatus* Makarchenko et Makarchenko, **sp. n.** Впервые для Корейского полуострова указываются 14 видов хирономид.

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INTRODUCTION

Chironomid fauna of North Korea is studied extremely insufficiently. A list of 70 species from 34 genera and 3 subfamilies of Chironomidae were published, but majority of the species names has not been given (Reiss, 1980). The redescription of two species of the tribe Tanytarsini, *Neozavrelia fengchengensis* Wang et Wang, 1996 and *N. tamanona* (Sasa, 1980), were given based on the material from North Korea (Gilka, 2012). Recently a new species *Dicrotendipes koreanus* Orel, 2016 is described from North Korea (Orel & Makarchenko, 2016).

Present paper is based on the material collected in Democratic People's Republic of Korea by the Polish Professor Wiesław Krzemiński in 1981. Material was fixed in 70% ethanol and mounted in Foral-Berlese solution. Morphological terminology and abbreviations follow Sæther (1980).

A list of 32 species from 22 genera of subfamilies Tanypodinae (7 species), Diamesinae (3 species) and Orthoclaadiinae (22 species) as well as the illustrated descriptions of three new species are given below. Holotypes of the new species are deposited in the National Institute of Biological Resources, Incheon, Republic of Korea (NIBR). New for Korean Peninsula species are asterisked (*).

LIST OF CHIRONOMIDAE FROM NORTH KOREA

Subfamily Tanypodinae

Ablabesmyia (Ablabesmyia) monilis (Linnaeus, 1758)

MATERIAL. Phjōngjang (Phenian), botanic garden, 11.VI 1981, 1 ♂; the same locality, 18.VII 1981, 8 ♂; Sarivōn, 18.VI 1981, 6 ♂.

DISTRIBUTION. Widespread Holarctic species.

Clinotanypus decempunctatus Tokunaga, 1937

MATERIAL. Soham Lake near Phenian, 8.VII 1981, 1 ♀; Phjōngjang (Phenian), river near botanic garden, 18.VII 1981, 1 ♂.

DISTRIBUTION. East Palaearctic. Known from Japan, Korean Peninsula and Russian Far East.

Conchapelopia japonica (Tokunaga, 1937)

MATERIAL. Kwailgun, 18–19.VI 1981, 1 ♂.

DISTRIBUTION. East Palaearctic species. Known from Japan and Korean Peninsula.

Procladius (Holotanypus) choreus (Meigen, 1804)

MATERIAL. Phjǽngjang (Phenian), 13.VI 1981, 7 ♂; Soham Lake near Phenian, 8.VII 1981, 15 ♂, 5 ♀; Phjǽngjang (Phenian), river near botanic garden, 18.VII 1981, 5 ♂; Sarivǽn, 18.VI 1981, 5 ♂; Mjohjang-san near Hyiǽhǽn, 22–25.VI 1981, 2 ♂; Kesǽng, 16.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species.

Tanypus nakazatoi Kobayashi, 2010

MATERIAL. Phjǽngjang (Phenian), 13.VI 1981, 16 ♂, 1 ♀; Sarivǽn, 18.VI 1981, 8 ♂; Mjohjang-san near Hyiǽhǽn, 22–25.VI 1981, 1 ♂; Kesǽng, 16.VI 1981, 1 ♂.

REMARKES. Tentatively we assign the name *Tanypus nakazatoi* to these specimens because of the marking pattern of the wing and the relatively low values of the LR_{1-3} (LR_1 0.75–0.81, LR_2 0.74–0.76, LR_3 0.85–0.88). However, it is necessary to examine the immature forms of the species for the correct identification. *Tanypus punctipennis* Meigen, 1818 and *T. chinensis* Wang, 1994 have been recorded from some regions in China. *Tanypus nakazatoi* is similar to these species in the wings, especially in the markings on the cell r_{4+5} . *Tanypus nakazatoi* may be a junior synonym of *T. chinensis*.

DISTRIBUTION. East Palaearctic. Known from Japan and Korean Peninsula.

Trissopelopia longimana (Staeger, 1839)

MATERIAL. Kwailgun, 18–19.VI 1981, 2 ♂.

DISTRIBUTION. Palaearctic species. In East Asia known from Japan and Korean Peninsula.

***Zavrelimyia* sp.**

MATERIAL. Kwailgun, 18–19.VI 1981, 4 ♂.

REMARKES. Males of this species are similar to *Zavrelimyia kyotoensis* Tokunaga, 1937 from Japan, but for detail identification we need additional material, namely pupae and larvae.

Subfamily Diamesinae

Potthastia gaedii (Meigen, 1838)

MATERIAL. Kwailgun, 18–19.VI 1981, 1 ♂; Mjahjang, 22–25.VI 1981, 1 ♂; Kesǽng, 16.VII 1981, 1 ♂.

DISTRIBUTION. Palaearctic species. In East Asia known from Korean Peninsula, Japan, China, and Russian Far East.

***Potthastia montium* (Edwards, 1929)**

MATERIAL. Phjǒngjang (Phenian), botanic garden, 11.VI 1981, 1 ♂.

DISTRIBUTION. Palaearctic species. In East Asia known from Korean Peninsula, Japan, China, and Russian Far East.

***Sympotthastia repentina* Makarchenko, 1984**

MATERIAL. Mjohjang-san near Hyiǒhǒn, 22–25.VI 1981, 1 ♂.

DISTRIBUTION. East Palaearctic species. Known from Russian Far East (Primorskii krai) and Korean Peninsula.

Subfamily Orthocladiinae

****Allocladius nanseni* (Kieffer, 1926)**

MATERIAL. Phjǒngjang (Phenian), river near botanic garden, 11.VI 1981, 1 ♂; the same locality, 13.VI 1981, 1 ♂; the same locality, 18.VII 1981, 1 ♂.

DISTRIBUTION. Holarctic species. In East Asia this species was known from China and Russian Far East; here firstly recorded from Korean Peninsula.

***Antillocladius koreanus* Makarchenko et Makarchenko, sp. n.**

Fig. 1

TYPE MATERIAL. Holotype – adult male, Democratic People's Republic of Korea: Kymgan-san, near Kymgan Town, 28.VI–2.VII 1981, coll. W. Krzemiński (NIBR).

DESCRIPTION. ADULT MALE (n=1). Total length 2.5 mm. Wing length 1.6 mm. Total length/wing length 1.56.

Head. Eyes bare, without dorsomedian prolongations. Temporal setae 4, including 2 outer verticals and 2 postorbitals ones. Antenna with 13 flagellomeres and well developed plume, 864 µm length; apex of 13th flagellomere with light hairs. Length of 2–5 palpomeres (in µm): 40, 120, 120, 144.

Thorax. Brown. Anteprepronotum with 0–1 lateral setae. Acrostichals 16 (beginning from anteprepronotum border), dorsocentrals 8, prealars 3, scutellars ca. 7 in one row.

Wing. Transparent, without setae. R, R₁ and R₄₊₅ without setae. Costa extension 64 µm. Squama with 4–7 setae.

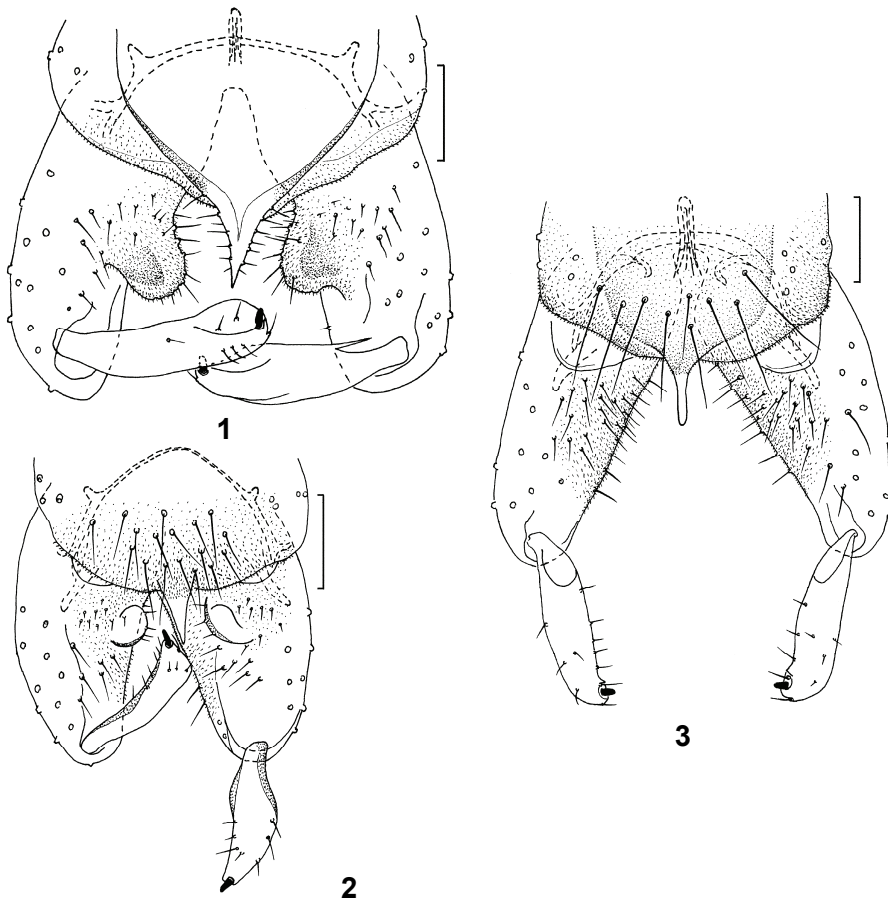
Legs. Spur of fore tibia 64 µm long. Spurs of mid tibia 32 µm and 40 µm long. Spurs of hind tibia 72 µm and 20 µm long. Hind tibial comb with 10 setae. Length (in µm) and proportions of legs segments are as follow (n=1):

P	f	t	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	SV	BV	BR
P ₁	640	736	560	336	216	128	112	0.76	2.46	2.44	2.5
P ₂	656	728	320	176	128	96	80	0.44	4.32	3.55	3.0
P ₃	736	832	368	272	208	112	96	0.44	4.26	2.81	2.5

Hypopygium (Fig. 1). Tergite IX with anal point 48 μm long and 16 setae which situated on anal point. Laterosternite IX with 5 setae on each side. Transverse sternapodeme 108 μm long, with rod-like oral projections. Virga 28 μm long, consists of 2 setae. Gonocoxite 224 μm long; inferior volsella rounded, covered by numerous setae. Gonostylus 108 μm long, with megaseta 10 μm long. HR 2.07.

COMPARISION. Adult male of *A. koreanus* sp. n. is close related to *A. zhengi* Wang et Sæther, 1993 from China and *A. antecalvus* Sæther, 1981 from South America but can be easy separated from both by shape of gonostylus and some features of transverse sternapodeme and wing. Namly, male of *A. antecalvus* without virga and oral projections of transverse sternapodeme and male of *A. zhengi* with low index LR_1 (0.68) and presence of 4 short setae in wing sector r_{4+5} .

DISTRIBUTION. Known only from North Korea.



Figs. 1–3. Total view of the hypopygium from above. 1 – *Antillocladius koreanus* sp. n.; 2 – *Bryophaenocladus reei* sp. n.; 3 – *B. inappendiculatus* sp. n. Scale bar 50 μm .

***Bryophaenocladus reei* Makarchenko et Makarchenko, sp. n.**

Fig. 2

TYPE MATERIAL. Holotype – adult male, Democratic People’s Republic of Korea: Kesŏng, near stream in forest, 16.VII 1981, coll. W. Krzemiński (NIBR). Paratypes: 2 males, the same data as holotype (NIBR).

DESCRIPTION. ADULT MALE (n=2). Total length 1.7–1.9 mm. Wing length 1.20–1.24 mm. Total length/wing length 1.42–1.53.

Head. Eyes bare, with dorsomedian prolongations. Temporal setae 6–8, including 3–4 verticals and 3–4 postorbitals. Clypeus with 5–6 setae. Antenna with 13 flagellomeres and well developed plume; apex of 13th flagellomere with subapical seta; AR 0.54–0.56. Length of 2–5 palpomeres (in μm): 24–28, 60–72, 52–60, 52–56.

Thorax. Anteprenotum with 2 lateral setae. Mesonotum with 3 stripes on yellow background. Acrostichals absent, dorsocentrals 5, prealars 3, scutellars 2–3.

Wing. R with 3 short setae, R_1 and R_{4+5} without setae. R_{2+3} more close to R_{4+5} . Apex of R_{4+5} distal of apex M_{3+4} . Costa extension 80–100 μm . Squama without setae. Anal lobe reduced.

Legs. Spur of fore tibia 44 μm long. Spurs of mid tibia 20 μm and 40 μm long, with tibial comb of 3 setae. Spurs of hind tibia 44–52 μm and 20–22 μm long. Hind tibial comb with 11–12 setae. Length (in μm) and proportions of legs segments are as follow (n=2):

P	f	t	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	SV	BV	BR
P ₁	504-576	592-640	400	232	176	112	80	0.67	2.74	2.49	2.2
P ₂	512-528	544-592	290-304	144	96-112	64	56-64	0.51-0.53	3.64-3.68	3.66-3.79	2.0-2.5
P ₃	644-576	592-640	368	176	160	80	64-72	0.58-0.62	3.09-3.30	3.13-3.25	2.2

Hypopygium (Fig. 2). Tergite IX with pointed and naked triangular anal point 36–40 μm long and 12–18 long setae. Laterosternite IX with 3–4 setae on each side. Transverse sternapodeme 88 μm long, with rod-like oral projections and dome-shaped middle part. Virga absent. Gonocoxite 152 μm long; inferior volsella rounded, without microtrichiae, covered by numerous setae on edge. Gonostylus 72–76 μm long, with megaseta 8 μm long. HR 2.0–2.1.

COMPARISON. Adult male of *B. reei* sp. n. is similar to *B. psilacrus* Sæther, 1982 from North America but can be separated from later by following features:

Features	<i>B. reei</i> sp. n.	<i>B. psilacrus</i> (after Sæther, 1982)
Total length, mm	1.7–1.9	2.80
Wing length, mm	1.20–1.24	1.74
AR	0.54–0.56	1.19
Number of setae on squama	0	1
Number of setae on wing veins R, R_1 , R_{4+5}	3, 0, 0	10, 6, 4
Projection of 3rd palpamere	Absent	Present
Phlagellomere 13 subapical	With seta	Without seta

ETYMOLOGY. The species is named in honor of the famous Korean dipterologist Professor Han Il Ree.

DISTRIBUTION. Endemic to North Korea.

****Bryophenocladus akiensis* (Sasa, Shimomura et Matsuo, 1991)**

MATERIAL. Kesöng, near stream in forest, 16.VII 1981, 1 ♂.

REMARKS. Male from North Korea with comb on t_2 consisting of 1 spine, while specimens of *B. akiensis* from another regions of East Asia have comb on t_2 consisting of 3–5 spines.

DISTRIBUTION. East Palaearctic species. In East Asia it was known from Japan and Russian Far East; here firstly recorded from Korean Peninsula.

***Bryophaenocladus inappendiculatus* Makarchenko et Makarchenko, sp. n.**

Fig. 3

TYPE MATERIAL. Holotype – adult male, Democratic People’s Republic of Korea: Kesöng, near stream in forest, 16.VII 1981, coll. W. Krzemiński (NIBR).

DESCRIPTION. ADULT MALE (n=1). Total length 2.5 mm. Wing length 1.48 mm. Total length/wing length 1.69.

Head. Eyes bare, with dorsomedian prolongations. Temporal setae 10, including 8 verticals and 2 postorbitals. Clypeus with 8 setae. Antenna with 13 flagellomeres and well developed plume, 864 μm length; apex of 13th flagellomere pointed, with subapical seta and some white hairs; AR 1.52. Length of 2–5 palpomeres (in μm): 40, 96, 96, 136; 3rd palpomere in apical part with 4 sensitive hairs.

Thorax. Anteprepronotum with 2 lateral setae. Mesonotum with 3 dark stripes on light background. Acrostichals 7 (long and beginning from anteprepronotum border), dorsocentrals 7, prealars 3, supraalars 2, scutellars 5.

Wing. R with 2 short setae, R_1 and R_{4+5} without setae. Apex of R_{4+5} distal of apex M_{3+4} . Cu_1 in apical part curve. Costa extension 96 μm . Squama with 2 setae. Anal lobe reduced.

Legs. Spur of fore tibia 48 μm long. Spurs of mid tibia 32 μm and 36 μm long. Spurs of hind tibia 56 μm and 28 μm long. Hind tibial comb with 10 setae. Length (in μm) and proportions of legs segments are as follow (n=1).

P	f	t	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	SV	BV	BR
P ₁	688	752	400	208	160	96	80	0.87	2.19	2.11	2.8
P ₂	688	704	320	176	128	96	80	0.57	3.48	3.29	3.0
P ₃	720	800	528	240	208	112	80	0.66	2.88	3.20	4.0

Hypopygium (Fig. 3). Tergite IX with naked anal point ca 40 μm long and 9 long setae. Laterosternite IX with 6–7 setae on each side. Transverse sternapodeme 80 μm long, without oral projections. Virga consists of 4 setae 48 μm long. Gonocoxite 196 μm long; inferior volsella absent. Gonostylus 100 μm long, approximately the same width along the entire length, with megaseta 12 μm long. HR 1.96.

COMPARISON. Adult male of a new species is close related to *B. nadezhdae* Makarchenko et Makarchenko, 2009 from Amur River basin by absence of inferior volsella of gonocoxite, but *B. inappendiculatus* sp. n. has long parallel-sided anal point and virga is long and consists of some setae. Male of *B. nadezhdae* with short triangular anal point and virga consists of more than 40 small spinules (Makarchenko & Makarchenko, 2009).

ETYMOLOGY. From Latin *inappendiculatus* – without appendages, this means that male of a new species without inferior volsella of gonocoxite.

DISTRIBUTION. Known only from North Korea.

****Compterosmittia lüi* (Lin, Yao, Liu et Wang, 2013)**

MATERIAL. Kesöng, unnamed stream, 16.VII 1981, 2 ♂.

DISTRIBUTION. East Palaearctic species. In East Asia known from Japan and Russian Far East (Sakhalin Island); here firstly recorded from Korean Peninsula.

****Compterosmittia togalimea* (Sasa et Okazawa, 1992)**

MATERIAL. Kesöng, unnamed stream, 16.VII 1981, 1 ♂.

DISTRIBUTION. East Palaearctic species known in East Asia from Japan and Russian Far East. Here firstly recorded from Korean Peninsula.

****Corynoneura scutellata* (Winnertz, 1846)**

MATERIAL. Phjöngjang (Phenian), river near botanic garden, 13.VI 1981, 1 ♂.

DISTRIBUTION. Holarctic; here this species firstly recorded from Korean Peninsula.

***Cricotopus* (s. str.) *bicinctus* (Meigen, 1818)**

MATERIAL. Phjöngjang (Phenian), 18.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species.

***Cricotopus* (*Isocladius*) *sylvestris* (Fabricius, 1794)**

MATERIAL. Sarivon, 18.VI 1981, 1 male; Phjöngjang (Phenian), 18.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species.

****Krenosmittia halvorseni* (Cranston et Sæther, 1986)**

MATERIAL. Kesöng, unnamed stream, 16.VII 1981, 2 ♂.

DISTRIBUTION. Holarctic species. In East Asia was known from Russian Far East. Here firstly recorded from Korean Peninsula.

****Limnophyes tamakiyoides* Sasa, 1983**

MATERIAL. Kwail-Gun, 19.VI 1981, 1 ♂.

REMARK. This rare species has been described only by one male (Sasa, 1983) and O.A. Sæther (1995) believed that this species probably as a synonym of *L. minimus* (Meigen), but is necessary for this additional material. In this regard, we have found it appropriate to make a brief redescription of *L. tamakioides* male from North Korea.

DESCRIPTION. ADULT MALE (n=1). Total length 1.23 mm.

Head. Eyes bare, without dorsomedian prolongations. Temporal setae 4, including 1 inner verticals, 1 outer verticals and 2 postorbitals. Clypeus with 10 setae. Antenna with 11 flagellomeres and well developed plume; AR 0.39. Length of 2–5 palpomeres (in μm): 16, 44, 48, 80.

Thorax. Anteprepronotum with 1–2 lateral setae and 1 median seta. Acrostichals 2 (in middle part of mesonotum), dorsocentrals 10, prealars 4, supraalars 0, scutellars 4. Humeral pit oval, inner edge more sclerotized. Pe with 4 setae in vertical row. All setae of mesonotum simple.

Wing destroyed.

Legs. Spur of fore tibia 36 μm long. Both spurs of mid tibia 12 μm long. Spurs of hind tibia 32 μm and 10 μm long. Hind tibial comb with 8–9 setae. Length (in μm) and proportions of legs segments are as follow (n=1):

P	f	t	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	SV	BV	BR
P ₁	320	384	192	112	80	48	64	0.50	3.67	2.95	2.0
P ₂	332	332	140	76	56	36	56	0.42	4.74	3.59	2.0
P ₃	336	372	192	100	96	40	56	0.52	3.69	3.08	2.2

Hypopygium. “Anal point” of tergite IX as weak triangular extension on the edge, with 9 setae. Laterosternite IX with 2 setae on each side. Transverse sternapodeme 64 μm long, with high oral projections. Virga consists of single seta 20 μm long. Gonocoxite 104 μm long; inferior volsella very weak or absent. Gonostylus 60–64 μm long, with pointed apical crista dorsalis. HR 1.62–1.73.

COMPARISION. Most features of adult male *L. tamakiyoides* from North Korea are similar or the same as male from Japan, but Korean specimen with 11 flagellomeres, while Japanese with 10 flagellomeres. *L. tamakiyoides* is close related to *L. minimus* and *L. aagaardi* Sæther but can be distinguished from both by the structure of virga and value of AR. So, virga of *L. tamakiyoides* consists of 1 setae 20 μm long, AR 0.39. Virga of *L. minimus* consists of 2–3 setae, AR 0.48–1.01. Virga of *L. aagaardi* consists of single setae 41 μm long, AR 0.87.

DISTRIBUTION. East Palaearctic species known only from Japan. Here firstly recorded from Korean Peninsula.

****Limnophyes verpus* Wang et Sæther, 1993**

MATERIAL. Phjôngjang (Phenian), river near botanic garden, 11.VI 1981, 1 ♂; the same locality, 13.VI 1981, 3 ♂; the same locality, 18.VII 1981, 1 ♂; Kesõng, unnamed stream, 16.VII 1981, 1 ♂.

DISTRIBUTION. East Palaearctic species known from China and Russian Far East. Here firstly recorded from Korean Peninsula.

****Mesosmittia patrihortae* Sæther, 1985**

MATERIAL. Sarivõn, 18.VI 1981, 1 ♂; Soham Lake, 8.VII 1981, 1 ♂; Phjôngjang, 18.VII 1981, 1 ♂.

DISTRIBUTION. Holarctic. Here firstly recorded from Korean Peninsula.

***Nanocladius* sp.**

MATERIAL. Phjôngjang (Phenian), 11.VI 1981, 1 ♂.

REMARK. For correct identification of this species need pupa.

***Nanocladius tamabicolor* Sasa, 1981**

MATERIAL. Phjôngjang (Phenian), river near botanic garden, 11.VI 1981, 1 ♂.

REMARK. This species is very similar to *N. seoulensis* (Ree et Kim, 1981) and H. Niitsuma (1991) believed that latter species is synonym of *N. tamabicolor*. However, we are not sure of this, since the male of *N. seoulensis* has a conical inferior volsella while *N. tamabicolor* with rectangular or almost round inferior volsella.

DISTRIBUTION. East Palaearctic species distributed in Japan, Korean Peninsula and Russian Far East.

***Paratrichocladus rufiventris* (Meigen, 1830)**

MATERIAL. Kwail-Gub, 19.VI 1981, 1 ♂.

DISTRIBUTION. Widespread Palaearctic species.

***Paratrichocladus tamaater* Sasa, 1981**

MATERIAL. Kesõng, unnamed stream, 16.VII 1981, 1 ♂.

DISTRIBUTION. East Palaearctic species (Japan and Korean Peninsula).

****Pseudosmittia forcipata* (Goetghebuer, 1921)**

MATERIAL. Phjôngjang (Phenian), 18.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species. Here firstly recorded from Korean Peninsula.

****Pseudosmittia mathildae* Albu, 1968**

MATERIAL. Phjǒngjang (Phenian), 11.VI 1981, 1 ♂.

DISTRIBUTION. Holarctic species. The first record for the Korean Peninsula.

****Smittia extrema* (Holmgren, 1869)**

MATERIAL. Phjǒngjang (Phenian), 11–13.VI 1981, 3 ♂.

DISTRIBUTION. Holarctic species. Here firstly recorded from Korean Peninsula.

****Smittia leucopogon* (Meigen, 1804)**

MATERIAL. Soham Lake near Phenian, 8.VII 1981, 1 ♂.

DISTRIBUTION. Palearctic species. Here firstly recorded from Korean Peninsula.

ACKNOWLEDGEMENTS

Authors are grateful to Dr. W. Gilka from Department of Invertebrate Zoology, University of Gdańsk, Poland for the transferred material collected by Prof. W. Krzemiński in the Northern Korea. This study was performed in the frames of the state research project No. 01201361586 and was supported by the grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR201601203).

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