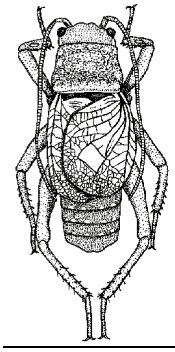

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CHIRONOMIDS OF SUBFAMILIES TANYPODINAE, DIAMESINAE AND ORTHOCLADIINAE (DIPTERA: CHIRONOMIDAE) FROM NORTH KOREA

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An annotated list of 32 chironomid species from 22 genera of subfamilies Tanypodinae (7 species), Diamesinae (3 species) and Orthocladiinae (22 species) of North Korea is provided. *Antillocladius koreanus* Makarchenko et Makarchenko, **sp. n.**, *Bryophaenocladius 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.

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Приведен аннотированный список 32 видов хирономид из 22 родов подсемейств Tanypodinae (7 видов), Diamesinae (3 вида) и Orthocladiinae (22 вида).

Описаны новые для науки виды: *Antillocladius koreanus* Makarchenko et Makarchenko, **sp. n.**, *Bryophaenocladius reei* Makarchenko et Makarchenko, **sp. n.** и *B. inappendiculatus* Makarchenko et Makarchenko, **sp. n.** Впервые для Корейского полуострова указываются14 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 redescriptions 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 (Giłka, 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 Fora-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 Orthocladiinae (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. Phjŏngjang (Phenian), botanic garden, 11.VI 1981, 1 ♂; the same locality, 18.VII 1981, 8 ♂; Sarivŏn, 18.VI 1981, 6 ♂.

DISTRIBUTION. Widespread Holarctic species.

***Clinotanypus decempunctatus* Tokunaga, 1937**

MATERIAL. Soham Lake near Phenian, 8.VII 1981, 1 ♀; Phjŏngjang (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. Phjŏngjang (Phenian), 13.VI 1981, 7 ♂; Soham Lake near Phenian, 8.VII 1981, 15 ♂, 5 ♀; Phjŏngjang (Phenian), river near botanic garden, 18.VII 1981, 5 ♂; Sarivŏn, 18.VI 1981, 5 ♂; Mjohjang-san near Hyičhŏn, 22–25.VI1981, 2 ♂; Kesŏng, 16.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species.

***Tanypus nakazatoi* Kobayashi, 2010**

MATERIAL. Phjŏngjang (Phenian), 13.VI 1981, 16 ♂, 1 ♀; Sarivŏn, 18.VI 1981, 8 ♂; Mjohjang-san near Hyičhŏn, 22–25.VI 1981, 1 ♂; Kesŏng, 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 ♂; Kesŏng, 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. Phjŏngjang (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 Hyičhŏn, 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. Phjŏngjang (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. Antepronotum with 0–1 lateral setae. Acrostichals 16 (beginning from antepronotum border), dorsocentrals 8, prealars 3, scutellars *ca*. 7 in one row.

Wing. Transparent, without setae. R, R_1 and R_{4+5} without setae. Costa extension 64 µm. Squama with 4–7 setae.

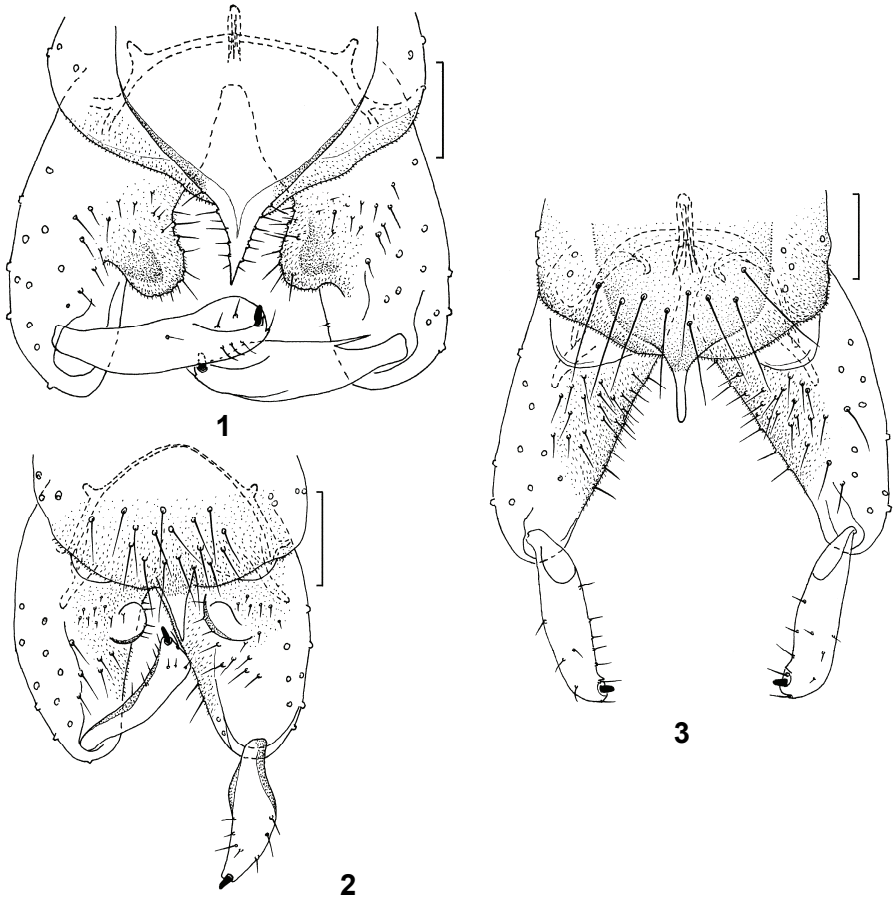
Legs. Spur of fore tibia 64 µm long. Spurs of mid tibia 32 µm and 40 µm long. Spurs of hind tibia 72 µm and 20 µm long. Hind tibial comb with 10 setae. Length (in µm) and proportions of legs segments are as follow (n=1):

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 sternapodema and wing. Namly, male of *A. antecalvus* without virga and oral projections of transverse sternapodema 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 – *Bryophaenocladius reei* sp. n.; 3 – *B. inappendiculatus* sp. n. Scale bar 50 μm.

***Bryophaenocladius 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. Antepronotum 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.

COMPARISION. 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	*B. reei* sp. n.	*B. psilacrus* (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.

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

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

REMARKES. 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.

Bryophaenocladius inappendiculatus **Makarchenko et Makarchenko, sp. n.**
Fig. 3

TYPE MATERIAL. Holotype – adult male, Democratic People's Republic of Korea: Kesŏng, 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. Antepronotum with 2 lateral setae. Mesonotum with 3 dark stripes on light background. Acrostichals 7 (long and beginning from antepronotum 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.

COMPARISION. 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 lii* **(Lin, Yao, Liu et Wang, 2013)**

MATERIAL. Kesŏng, 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. Kesŏng, 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. Phjŏngjang (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. Phjŏngjang (Phenian), 18.VII 1981, 1 ♂.

DISTRIBUTION. Widespread Holarctic species.

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

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

DISTRIBUTION. Widespread Holarctic species.

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

MATERIAL. Kesŏng, 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. Antepronotum 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. Phjŏngjang (Phenian), river near botanic garden, 11.VI 1981, 1 ♂; the same locality, 13.VI 1981, 3 ♂; the same locality, 18.VII 1981, 1 ♂; Kesŏng, 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. Sarivŏn, 18.VI 1981, 1 ♂; Soham Lake, 8.VII 1981, 1 ♂; Phjŏngjang, 18.VII 1981, 1 ♂.

DISTRIBUTION. Holarctic. Here firstly recorded from Korean Peninsula.

***Nanocladius* sp.**

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

REMARK. For correct identification of this species need pupa.

***Nanocladius tamabicolor* Sasa, 1981**

MATERIAL. Phjŏngjang (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.

***Paratrichocladius rufiventris* (Meigen, 1830)**

MATERIAL. Kwail-Gub, 19.VI 1981, 1 ♂.

DISTRIBUTION. Widespread Palaearctic species.

***Paratrichocladius tamaater* Sasa, 1981**

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

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

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

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

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

***Pseudosmittia mathildae* Albu, 1968**

MATERIAL. Phjŏngjang (Phenian), 11.VI 1981, 1 ♂.
DISTRIBUTION. Holarctic species. The first record for the Korean Peninsula.

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

MATERIAL. Phjŏngjang (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. Palaearctic species. Here firstly recorded from Korean Peninsula.

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