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RESEARCH ARTICLE

Contribution to the systematics of the subgenus *Tipula* (*Schummelia*) (Diptera: Tipulidae), with the description of a new species from South Korea

К систематике комаров-долгоножек подрода *Tipula* (*Schummelia*) (Diptera: Tipulidae) с описанием нового вида из Южной Кореи

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Abstract. The article contains the expanded and clarified diagnoses of the subgenus *Schummelia* Edwards, 1931 of the genus *Tipula* Linnaeus, 1758 (Diptera: Tipulidae) and the type species of *Schummelia*, *T.* (*Sch.*) *variicornis* Schummel, 1833, which includes two subspecies. The diagnostic characters distinguishing *Schummelia* from the closely related subgenus *Platytipula* Matsumura, 1916 are discussed. The external and internal structures of the male terminalia of *T.* (*Sch.*) *variicornis variicornis* and *T.* (*P.*) *insulicola fuscicauda* Alexander, 1924 are illustrated and discussed. A new species of *Schummelia* from South Korea, *T.* (*Sch.*) *baei* **sp. nov.**, is described and illustrated. Two species, *Tipula* (*Sch.*) *crastina* Alexander, 1941 and *T.* (*Sch.*) *quiris* Alexander, 1940, are transferred from *Schummelia* to *Platytipula*. The identification keys to males and females of *Schummelia* species of the Palaearctic Region are provided.

Резюме. В статье приводится расширенный и уточненный диагноз подрода *Schummelia* Edwards, 1931 рода *Tipula* Linnaeus, 1758 (Diptera: Tipulidae) и типового вида *Schummelia* – *T.* (*Sch.*) *variicornis* Schummel, 1833 с двумя подвидами. Обсуждаются диагностические отличия *Schummelia* от близкородственного подрода *Platytipula* Matsumura, 1916. Рассмотрено и проиллюстрировано внешнее и внутреннее строение терминалий самцов *T.* (*Sch.*) *variicornis variicornis* и *T.* (*P.*) *insulicola fuscicauda* Alexander, 1924. Дано иллюстрированное описание нового вида *Schummelia* из Южной Кореи, *T.* (*Sch.*) *baei* **sp. nov.** Два вида – *Tipula* (*Sch.*) *crastina* Alexander, 1941 и *T.* (*Sch.*) *quiris* Alexander, 1940 – перенесены из подрода *Schummelia* в подрод *Platytipula*. Составлены определительные ключи для видов подрода *Schummelia* Палеарктики по самцам и самкам.

Key words: hypopygium, ovipositor, taxonomy, South Korea, Nematocera, Tipulidae, Tipulinae, *Platytipula*, *Schummelia*, new species

Ключевые слова: гипопигий, яйцеклад, таксономия, Южная Корея, Nematocera, Tipulidae, Tipulinae, *Platytipula*, *Schummelia*, новый вид

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Introduction

Edwards (1931) proposed the subgenus *Schummelia* Edwards, 1931 of the genus *Tipula* Linnaeus, 1758, with the type species *Tipula variicornis* Schummel, 1833. *Schummelia* currently contains 71 recent species and subspecies (Oosterbroek, 2024). Alexander (1933, 1935a, 1935b) placed

in *Schummelia* a large number of new species described from various regions. Then, Savchenko (1961) narrowed this subgenus to include 14 species and subspecies distributed only in the Holarctic and the remaining species from the East Palaearctic were transferred to the subgenus *Platytipula* Matsumura, 1916. The males of the subgenus *Schummelia* are distinguished by the presence of a median process on tergite 9 and by abdominal sternite 8 being largely or entirely concealed under sternite 7 but bearing a conspicuous median outgrowth. Several species with a median process on tergite 9 but without a conspicuous median outgrowth on sternite 8 have been combined into the *T. insulicola* group and transferred to the subgenus *Platytipula* (Savchenko, 1961). This concept of the subgenus has been accepted for the Palaearctic and Nearctic faunas (Alexander & Byers, 1981; Oosterbroek & Theowald, 1992), but many species described by Alexander from the Oriental and the Afrotropical regions, which apparently can be assigned to the subgenus *Platytipula*, remain in the subgenus *Schummelia*.

For a more complete understanding of the taxonomic status of these two subgenera, our article provides an expanded and clarified diagnosis of the subgenus *Schummelia* and its type species, *Tipula* (*Sch.*) *variicornis*, with two subspecies. In addition, the external and internal structures of the male terminalia of *T.* (*P.*) *insulicola fuscicauda* Alexander, 1924, which, according to many characters, occupies an intermediate position between these two subgenera, are examined and illustrated.

Currently, the subgenus *Schummelia* includes eleven species and subspecies in the Palaearctic and seven in the Nearctic (Oosterbroek, 2024). Six species and subspecies [*Tipula* (*Sch.*) *crastina* Alexander, 1941; *T.* (*Sch.*) *ishizuchiana* Alexander, 1954; *T.* (*Sch.*) *quiris* Alexander, 1940; *T.* (*Sch.*) *spectata* Alexander, 1940; *T.* (*Sch.*) *variicornis incisicauda* Savchenko, 1961; *T.* (*Sch.*) *variicornis variicornis*] are listed from the East Palaearctic (Oosterbroek, 2024). In our opinion, two species from China, *T.* (*Sch.*) *crastina* and *T.* (*Sch.*) *quiris*, should be moved to the *T. insulicola* species-group of the subgenus *Platytipula* based on the structure of their male terminalia.

The recent studies of Tipulidae in Korea (Baek & Bae, 2016a, 2016b, 2017; Han, 2021; Starkevich et al., 2021; Yi & Pilipenko, 2023) did not record *Schummelia*. The subspecies *T.* (*Sch.*) *variicornis variicornis* is known from Europe, West and East Siberia, the Far East of Russia (Sakhalin and the Kuril Islands), and Japan (Honshu) (Oosterbroek, 2024). It has also been recorded in the south of the Primorskiy Territory of Russia, so, in the future, it may be found in the adjacent territories of northern China and North Korea. The first author has collected in South Korea a new species of this subgenus; its description and a comparison of its internal and external structures with the subspecies *T.* (*Sch.*) *variicornis variicornis* are given below. Additionally, a key to the species and subspecies of *Schummelia* occurring in the Palaearctic Region is included.

Material and methods

Most specimens were collected by a sweep net. Pinned specimens and specimens kept in ethanol were studied using an Olympus SZ61 stereomicroscope. Inner structures of terminalia were examined after boiling in 10% solution of NaOH for 10 minutes. The cleared terminalia were preserved in microvials filled with glycerol and pinned together with the corresponding specimens. A Nikon d7000 digital camera equipped with a Tamron 70–300/4–5.6 and a Raynox DCR-250 macro conversion lenses or an EL-Nikkor 50/2.8 enlarger lens were used to capture stacked images, which were then combined using the Helicon Focus software (www.heliconsoft.com/heliconsoft-products/helicon-focus). All images were adjusted and assembled into plates using Adobe Photoshop CS2.

The distribution of species is given according to Oosterbroek (2024). The coordinates of the geographical points mentioned on the labels were obtained using Google Earth (https://earth.google.com/web/search) and are given in brackets.

Morphological terminology generally follows that of Cumming & Wood (2017) and Alexander & Byers (1981). For wing venation, we follow de Jong (2017). The term "gonocoxal fragment" for the inner structure is adopted from Brodo (2017) as modified by Starkevich et al. (2020); this term corresponds to "sclerites *sp1* and *sp2*" by Neumann (1958) and "genital bridge" by Dobrotworsky (1968).

The abbreviations for collections and institutions used herein are as follows: NIBR, National Institute of Biological Resources, Incheon, Republic of Korea; VPC, private collection of Valentin E. Pilipenko, Moscow State University, Moscow, Russia; YIM, Yeongwol Insect Museum, Yeongwol, Gangwon-do, Republic of Korea; ZISP, Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia.

Taxonomic part

Order **Diptera**

Family **Tipulidae**

Subfamily **Tipulinae**

Genus ***Tipula*** Linnaeus, 1758

Subgenus ***Schummelia*** Edwards, 1931

Schummelia Edwards, 1931: 80. Type species by original designation: *Tipula variicornis* Schummel, 1833.

Composition. Edwards (1931) recognised two groups of species within the subgenus *Schummelia*: the *variicornis*-group, with male claws simple and tergite 9 bearing a median process, and the *continuata*-group, with male claws toothed and the median process of tergite 9 reduced or bent inwards, so that the tergite appears to have a large V-shaped median notch. The species described by Alexander from the East Palaearctic and assigned by him to the *T. continuata* group of *Schummelia* (Alexander, 1933, 1935a, 1935b) have been transferred by Savchenko to the subgenus *Platytipula* (Savchenko, 1961). Several species and subspecies from the *T. variicornis* group (*Tipula insulicola insulicola* Alexander, 1914; *T. insulicola fuscicauda* Alexander, 1924; *T. acifera* Alexander, 1926; *T. esakiana* Alexander, 1933; *T. sparsiseta* Alexander, 1924; *T. pterotricha* Alexander, 1953), with a median process on male tergite 9, were combined into the *T. insulicola* group and also transferred to *Platytipula* (Savchenko, 1961). Two subspecies, *T.* (*Platytipula*) *insulicola insulicola* (Japan) and *T.* (*P.*) *insulicola fuscicauda* (Russia: Primorskiy Territory, Sakhalin and the Kuril Islands), have the outgrowth of tergite 9 compressed dorsoventrally, with the lateral margins curved downwards (Fig. 1A–C; see also Fig. 2M in Suguro & Kato, 2023). In the species of the subgenus *Schummelia*, these outgrowths are laterally compressed. The most distinctive feature of that subgenus is a highly reduced sternite 8 with a conspicuous median outgrowth. In the subgenus *Platytipula*, including the *T. insulicola* species-group, sternite 8 is without median outgrowth. Two species from China, *Tipula crastina* Alexander, 1941 and *T. quiris* Alexander, 1940, are currently placed in the subgenus *Schummelia* (Oosterbroek, 2024). In the original descriptions, Alexander has pointed out that these species are close to *T.* (*P.*) *insulicola* (Alexander, 1940b, 1941). They have a median process on tergite 9 but no median outgrowth on sternite 8. Therefore, these species should be transferred to the *T. insulicola* species-group of the subgenus *Platytipula*.

Based on the structure of the male terminalia, Savchenko (1961) divided the Palaearctic species of the subgenus *Schummelia* into two species groups. The *T. variicornis* group is characterised by well-defined lateral corners of tergite 9 and the median outgrowth of sternite 8 appearing in lateral view triangular or wedge-shaped and directed downward. The *T. zonaria* group has smoothed lateral corners of tergite 9 and a posteriorly directed tongue-shaped median outgrowth of sternite 8.

Characteristics of Palaearctic *Tipula* (*Schummelia*)

Detailed diagnosis. Male small to medium-sized; body length 10–16 mm; wing length 11–18 mm. Body coloration varying from yellow to grey. Male antennae usually reaching base of wings if bent backwards. Flagellomeres simple cylindrical, with small basal enlargement; verticils equal to respective segments. Coloration of thorax varying from yellow to grey; presutural area of mesonotum with four brownish stripes; katepisternum glabrous or with several pale setae [in *T.* (*Sch.*) *zernyi* Mannheims, 1952]. Tibial spur formula 1–2–2; male claws without basal tooth. Wing with squama setose; *Rs* relatively short, subequal to long *m-cu*; cell m_4 deep and markedly wider at base than at margin; M_{1+2} (petiole) relatively short or absent; wing often with darkening ("seam") around veins *Cu* and *m-cu*. Abdomen yellow or brownish yellow, without dorsal stripe,

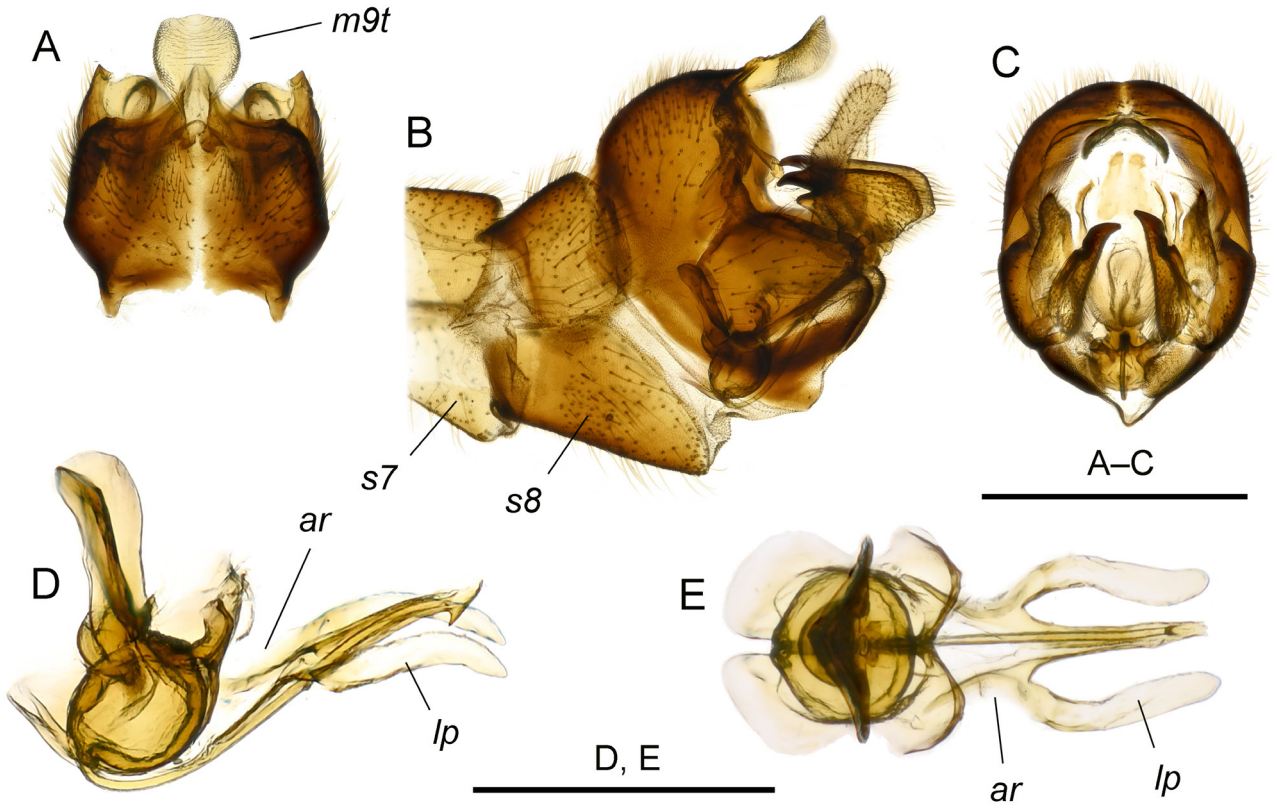

Fig. 1. Male terminalia (in glycerol) of *Tipula* (*Platytipula*) *insulicola fuscicauda* Alexander, 1924, specimens from Russia, Shikotan Island, Tserkovnaya Bay, 28–29.VII.2012, Yu. Sundukov leg. **A**, tergite 9 with median process; **B**, hypopygium, lateral view; **C**, hypopygium, caudal view; **D**, **E**, sperm pump, aedeagus and aedeagal guide (D, lateral view; E, dorsal view). Abbreviations: *ar* – anterior rods of aedeagal guide, *lp* – lateral plates of aedeagal guide, *m9t* – median process of tergite 9, *s7*, *s8* – sternites 7 and 8. Scale bars: 1 mm (A–C), 0.5 mm (D, E).

lateral stripes narrow and indistinct, segments 6 and 7 from brown to black; in some species, segments 2–5 additionally each with a dark transverse band on anterior part.

Hypopygium. Sternite 8 (Figs 3E, I, 7C, D, G) strongly reduced and largely or entirely concealed under sternite 7 but with conspicuous median outgrowth (*m8S*). In lateral view, this outgrowth large, triangular or wedge-shaped, directed downward, or narrow, tongue-shaped, directed posteriorly; in *Tipula* (*Sch.*) *butzi* Edwards, 1928 and some Nearctic species, this outgrowth deeply divided into two lobes and directed posteriorly (Alexander, 1967). Tergite 9 and sternite 9 fused. Tergite 9 (Figs 3A–D, 7B, F) with laterally compressed median process (*m9t*) and with lateral corners (*lc*) well-defined (Fig. 3A) or absent (Fig. 7B). Sternite 9 with paired appendages (*A9S*) covered with long setae (Fig. 7D) or bearing 1–4 thick spine-like setae directed medially (Fig. 3H). Additionally, in many species, lower membranous part of sternite 9 with a small mediosternal outgrowth (*m9o*) covered with setae and projecting posteriorly (Fig. 7C, D). Gonocoxite fused with sternite 9. Outer gonostylus (*og*) usually elongate, straight (Fig. 4B) or boomerang-shaped (Fig. 4A), with or without tuft of dusky setae at tip; sometimes outer gonostylus widened apically. Main body (Fig. 4A) of inner gonostylus (*ig*) long and narrow, with small upper beak (*u bk*) and wide lower beak (*l bk*); dorsal crest (*d ct*) and outer basal lobe well-developed or reduced. Aedeagal guide with narrow, long, rounded lateral plates (*lp*) directed posteriorly (Fig. 3G).

Female generally similar to male, but with antenna short, ovipositor with long, slender cerci, and spermatheca light brown, translucent (Figs 5F, 8G).

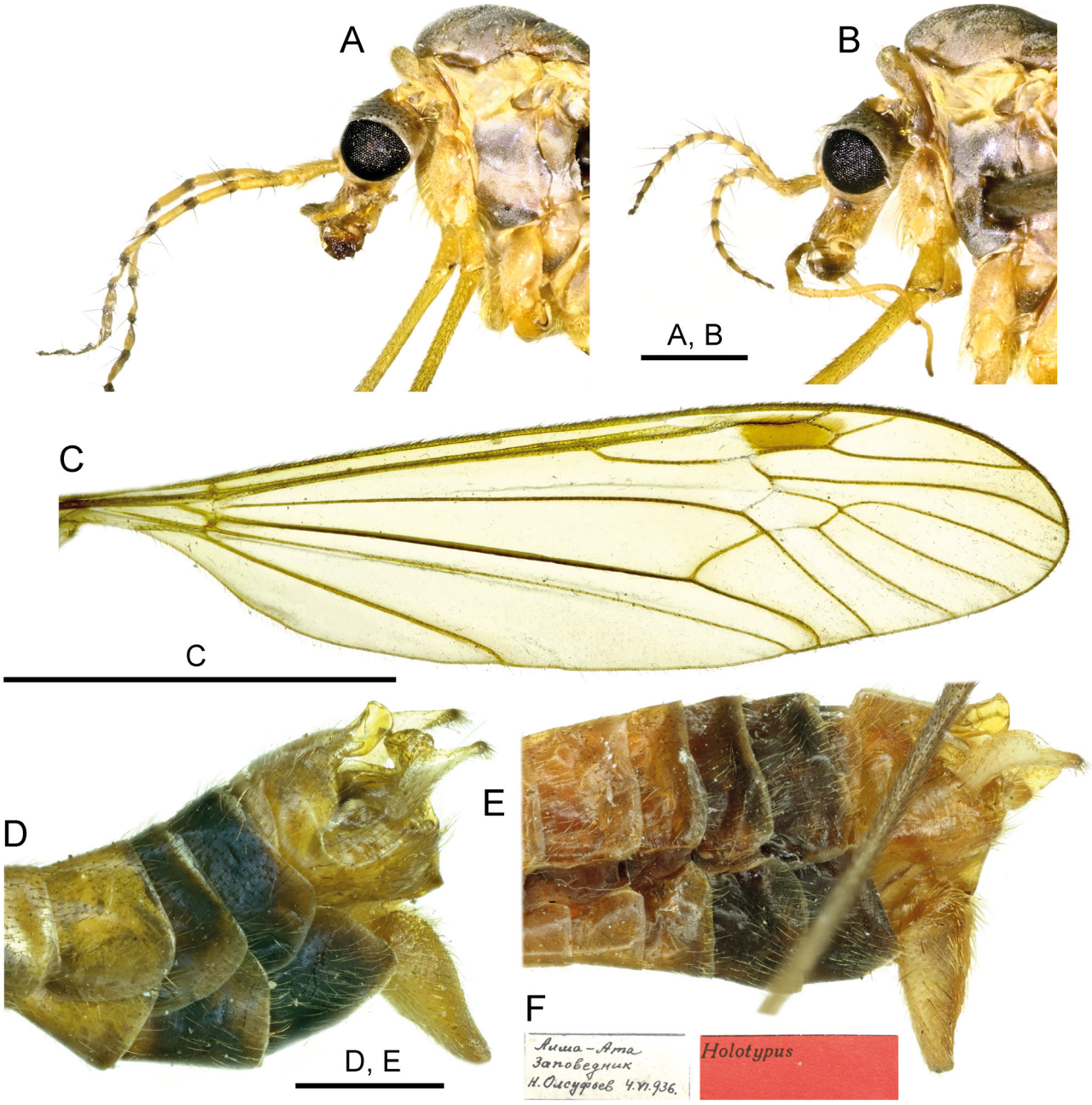

Fig. 2. Males (dry specimens) of *Tipula* (*Schummelia*) *variicornis variicornis* Schummel, 1833, specimens from Moscow Province, Chashnikovo, 30.VI.1992 (A–D) and *T.* (*Sch.*) *variicornis incisicauda* Savchenko, 1961, holotype (E, F). **A**, **B**, head and thorax, left lateral view (A, male; B, female); **C**, male wing; **D**, **E**, male terminalia, left lateral view; **F**, labels. Scale bars: 1 mm (A, B, D, E), 5 mm (C).

Notes on the internal structure of the hypopygium. The internal structure of the hypopygium of the subgenus *Schummelia* is very peculiar. The gonocoxal fragment (sclerites *sp1* and *sp2*, following Neumann, 1958) is unusual. The lateral sclerite of the gonocoxal fragment (*ls*) (= sclerite *sp2*) is large, well sclerotised (Figs 3H, 7D). The V-shaped medial sclerite (*ms*) of the gonocoxal fragment (Starkevich et al., 2020) (= sclerite *sp1*), common in many *Tipula* (Brodo, 2017), is absent. However, there is a narrow long sclerite attached with its anterior end to the posterior immobile apodeme of the sperm pump, and with its posterior end to the membrane of

the genital chamber (Figs 3F, J, K, 7E). It can be assumed that this sclerite is the anterior apodeme (*aa*) of the medial sclerite of the gonocoxal fragment (Starkevich et al., 2020) or part of *sp1*, as suggested by Oosterbroek (1980). The sperm pump is displaced from the ninth to the seventh abdominal segment (Figs 3E, 7C) and is rotated about 270 degrees (in some species up to over 360 degrees) in the sagittal plane (Oosterbroek, 1980). Its posterior immovable apodeme (*pia*) is very large (Fig. 3J, K), elongated into a wide curved plate covering the compressor apodeme. The compressor apodeme (*ca*) of the sperm pump has a shallow median incision. The anterior immovable apodeme (*aia*) is small, narrowly triangular. The aedeagus (*aed*) is very long and thin, often complicated by a spiral lateral twist (Figs 3F, 7E). It arises at the sperm pump, extends posteriorly, then curves dorsally, anteriorly, and then ventrally to exit through the aedeagal guide. The aedeagal guide (Figs 3F, 7E) has very long, narrow anterior rods (*ar*), directed forward and embracing the sperm pump anteriorly.

Check list of Palaearctic *Tipula* (*Schummelia*)

Tipula (*Schummelia*) *ahrensi* Savchenko, 1957 [Russia (North Caucasus), Georgia, Turkey].

Tipula (*Schummelia*) *butzi* Edwards, 1928 [France (Corsica)].

Tipula (*Schummelia*) *ishizuchiana* Alexander, 1954 [Japan (Shikoku)].

Tipula (*Schummelia*) *baei* **sp. nov.** (South Korea).

Tipula (*Schummelia*) *spectata* Alexander, 1940 [China (Zhejiang)].

Tipula (*Schummelia*) *variicornis incisicauda* Savchenko, 1961 (southeastern Kazakhstan, Turkmenistan).

Tipula (*Schummelia*) *variicornis variicornis* Schummel, 1833 (East and West Palaearctic).

Tipula (*Schummelia*) *yerburyi* Edwards, 1924 (western and southwestern Europe).

Tipula (*Schummelia*) *zernyi* Mannheims, 1952 (western, central and southern Europe).

Tipula (*Schummelia*) *zonaria* Goetghebuer, 1921 (northern, western, central and southern Europe).

Key to the Palaearctic species of *Tipula* (*Schummelia*)

*Males**

1. Median outgrowth of sternite 8 in lateral view triangular, gradually tapering from base to apex, directed downward 2
– Median outgrowth of sternite 8 narrow, directed posteriorly 6
2. Thoracic pleura with longitudinal black velvet stripe. Abdominal segments 2–5 banded. Tergite 9 in dorsal view with smoothed lateral corners ..... ***T.* (*Sch.*) *baei* sp. nov.**
– Thoracic pleura without longitudinal black velvet stripe. Abdomen not banded, segments 6 and 7 dark brown to black. Tergite 9 with well-defined lateral corners..... 3
3. Apex of median process of tergite 9 in lateral view extending downward. Outer gonostylus straight, apically without tuft of dark setae. Katepisternum with several pale setae..... ***T.* (*Sch.*) *zernyi***
– Apex of median process of tergite 9 extending upward. Outer gonostylus apically with tuft of stiff setae. Katepisternum glabrous, without setae.... 4
4. Median outgrowth of sternite 8 in lateral view wide proximally and abruptly narrowed distally. Inner gonostylus with reduced outer basal lobe..... ***T.* (*Sch.*) *ahrensi***
– Median outgrowth of sternite 8 obtusely triangular, gradually tapering from base to apex. Inner gonostylus with well-developed outer basal lobe..... 5
5. Median process of tergite 9 in lateral view without ventral notch, not widened..... ***T.* (*Sch.*) *variicornis variicornis***
– Median process of tergite 9 with more or less large ventral notch, slightly widened apically..... ***T.* (*Sch.*) *variicornis incisicauda***
6. Abdominal segments 2–5 banded, segments 6 and 7 dark brown to black. Antennae light, proximal flagellomeres clearly bicolorous.... ***T.* (*Sch.*) *zonaria***
– Abdomen not banded, only segments 6 and 7 dark brown to black. Flagellomeres uniformly dark brown, only two most proximal segments indistinctly bicolorous 7
7. Outer gonostylus boomerang-shaped, slightly widened towards apex, with tuft of dark setae. Median outgrowth of sternite 8 in ventral view undivided, gradually tapering towards apex ..... ***T.* (*Sch.*) *yerburyi***
– Outer gonostylus strongly goblet-shaped, widened, with obliquely cut apex, only slightly longer than

* For *T.* (*Sch.*) *ishizuchiana* and *T.* (*Sch.*) *spectata*, males are unknown.

its greatest width, with yellow setae at apex. Median outgrowth of sternite 8 in ventral view deeply divided ..... ***T.* (*Sch.*) *butzi***

Females

1. Flagellomeres bicolorous, light with darkened bases 2
– Flagellomeres dark 4
2. Abdominal segments 2–5 banded ..... ***T.* (*Sch.*) *zonaria***
– Abdomen not banded, segments 6 and 7 dark brown to black 3
3. Katepisternum glabrous, without setae. Wings with vein M_{1+2} (petiole) very short or absent ..... ***T.* (*Sch.*) *variicornis***
– Katepisternum with several pale setae. Wings with vein M_{1+2} (petiole) relatively long, at least half as long as cell m_1 ..... ***T.* (*Sch.*) *zernyi***
4. Wing with heavy and conspicuous brown pattern at cord 5
– Wing without conspicuous brown pattern at cord. .7
5. Tibiae black. Wings with yellowish tint ..... ***T.* (*Sch.*) *spectata***
– Tibiae yellow or brown. Wings with greyish tint .. 6
6. Thoracic pleura with longitudinal black velvet stripe ..... ***T.* (*Sch.*) *baei* sp. nov.**
– Thoracic pleura without longitudinal black velvet stripe ..... ***T.* (*Sch.*) *yerburyi***
7. Tibiae black ..... ***T.* (*Sch.*) *ishizuchiana***
– Tibiae yellowish brown 8
8. First two flagellomeres more or less pale apically. Thorax yellowish grey ..... ***T.* (*Sch.*) *butzi***
– First flagellomere red-brown. Thorax grey ..... ***T.* (*Sch.*) *ahrensi***

Tipula (*Schummelia*) *variicornis variicornis* Schummel, 1833

(Figs 2A–D, 3A–C, E–K, 4A, 5)

Material examined. **Russia**: *Moscow Prov.*, Solnechnogorsk Distr., Chashnikovo Vill. [56°02′15″N 37°11′15″E], 4.VI.1992, 30.VI.1992, 4.VI.1993, 27.VI.1993, V.E. Pilipenko leg., 6 males, 2 females (VPC); *Altai Terr.*: Choi Distr., Karakoksha Vill. [51°46′10″N 86°42′11″E], 2.VI.1990, 14.VI.1991, V.E. Pilipenko leg., 4 males, 1 female (VPC); Turochak Distr., Artybash Vill. [51°47′35″N 87°15′55″E], 17.VI.1990, 7.VI.1991, V.E. Pilipenko leg., 2 males (VPC); *Primorskiy Terr.*, Vladivostok env.: Bol'shaya Pionerskaya River [43°10′37″N 132°00′21″E], 26.VI.2022, I. Solodkii leg., 1 male (VPC); Botanical Garden [43°13′12″N 131°58′17″E], 19.VI.2023, I. Solodkii leg., 1 male (VPC); *Sakhalin Prov.*: Sakhalin I., Dolinsk Distr., Ostromysovka Vill. [47°15′4″N 143°0′53″E], 19.VII.2011, V.E. Pilipenko leg., 1 male, 2 females (VPC); Shikotan I., Tserkovnaya Bay [43°44′46″N 146°41′42″E], 21–22.VII.2012, 26–27.VII.2012, 28–29.VII.2012, Yu. Sundukov leg., 4 males, 1 female (VPC); Kunashir I.: Tyatina River [44°16′32″N 146°09′36″E], 21.VII.2014, Yu. Sundukov leg., 2 males (VPC); Saratovka River [44°15′55″N 146°06′05″E], 14–15.VII.2014, Yu. Sundukov leg., 1 male (VPC).

Diagnostic features. *Male*. General coloration yellow or greyish yellow. Body length of male 11–13 mm, of female 12–18 mm. Wing length of male 11–14 mm, of female 14–17 mm. Head coloration mainly grey; nasus short, yellow. Antenna, if bent backwards, reaching base of wing. Scape, pedicel and first flagellomere yellow, other flagellomeres bicolorous, light with darkened bases; apex of flagellum darkened. Thorax (Fig. 2A) yellowish grey; mesonotal prescutum greyish yellow with four brownish stripes; intermediate pair narrowly separated by grey line, pleura yellow with vague brownish grey spots. Wing (Fig. 2C) greyish yellow with dark brown stigma, often with darkening ("seam") around veins *Cu* and *m-cu*. Venation: discal medial cell (*dm*) narrow, pentagonal; M_{1+2} (petiole) relatively short or absent. Abdomen (Fig. 2D) yellow or brownish yellow, with narrow lateral stripes and segments 6 and 7 distinctly dark brown. Sternite 8 (Fig. 3E, I) with yellow triangular median outgrowth (*m8S*) directed almost downward. Tergite 9 (Fig. 3B–C) with median process thin and lateral corners well-defined in dorsal view. Sternite 9 with paired appendages (*A9S*) bearing 2–3 thick spine-like setae directed medially (Fig. 3H); mediosternal outgrowth (*m9o*) absent. Gonostylus as in Fig. 4A: outer gonostylus boomerang-shaped, bearing tuft of dusky setae at tip; inner gonostylus with outer basal lobe (*obl*) rounded triangular and dorsal crest (*dc*) shaped as narrow, flat, parallel-sided plate directed anteriorly and covered with short hairs. Sperm pump, aedeagus and aedeagal guide as in Fig. 3F–G, J–K.

Female (Fig. 2B) similar to male, except antenna short, reaching pronotum if bent backward.

Female terminalia (Fig. 5A–F): Tergites 8–10 yellow; cercus brown, very narrow and straight or slightly curved down, its tip rounded. Sternite 8 yellow; hypogynial valve reaching to half-length of cercus, brown at base, light brown apically (Fig. 5A, C). Sternite 9 with posterior part elongate, narrowed, pointed (Fig. 5B). Furca (Fig. 5E) widened in anterior part, weakly sclerotised;

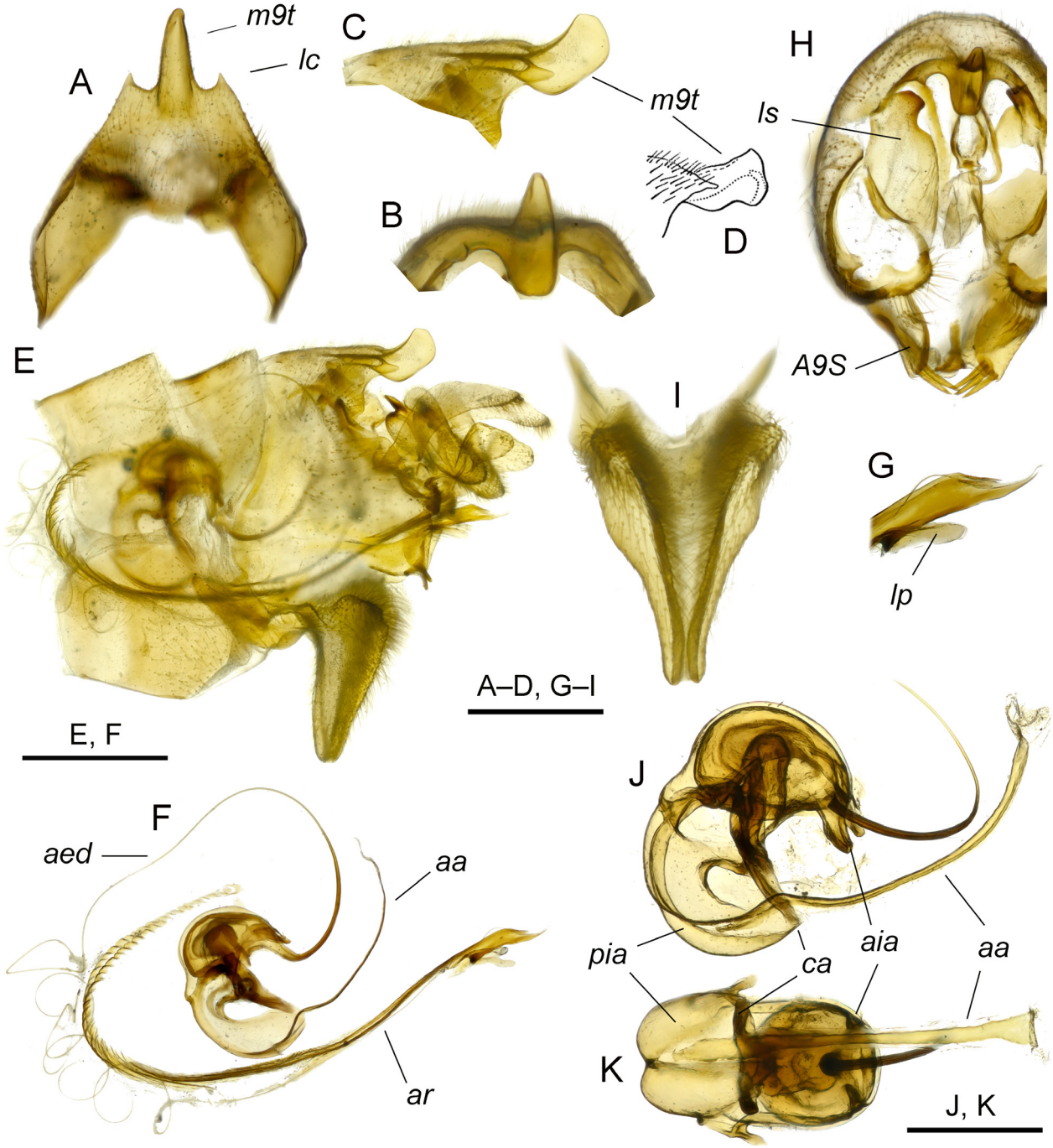

Fig. 3. Male terminalia (in glycerol) of *Tipula* (*Schummelia*) *variicornis variicornis* Schummel, 1833, specimens from Moscow Province, Chashnikovo, 30.VI.1992 (A–C, E–K) and *T.* (*Sch.*) *variicornis incisicauda* Savchenko, 1961 (from Savchenko, 1961: p. 107, fig. 48, 2) (D). **A–D**, tergite 9 with median process (A, dorsal view; B, caudal view; C, D, lateral view); **E**, hypopygium, lateral view; **F**, sperm pump, aedeagus and aedeagal guide, lateral view; **G**, distal part of aedeagal guide, lateral view; **H**, tergite and sternite 9 (without outer and inner gonostylus), caudal view; **I**, median outgrowth of sternite 8, caudal view; **J–K**, sperm pump (J, lateral view, K, ventral view). Abbreviations: *A9S* – paired appendages of sternite 9, *aa* – anterior apodeme of medial sclerite of gonocoxal fragment, *aed* – aedeagus, *aia* – anterior immovable apodeme of sperm pump, *ar* – anterior rods of aedeagal guide, *ca* – compressor apodeme of sperm pump, *lc* – lateral corners of tergite 9, *lp* – lateral plates of aedeagal guide, *ls* – lateral sclerite of gonocoxal fragment, *m8S* – median outgrowth of sternite 8, *m9t* – median process of tergite 9, *pia* – posterior immovable apodeme of sperm pump. Scale bars: 0.75 mm (A–D, G, I), 1 mm (E, F), 0.5 mm (J, K).

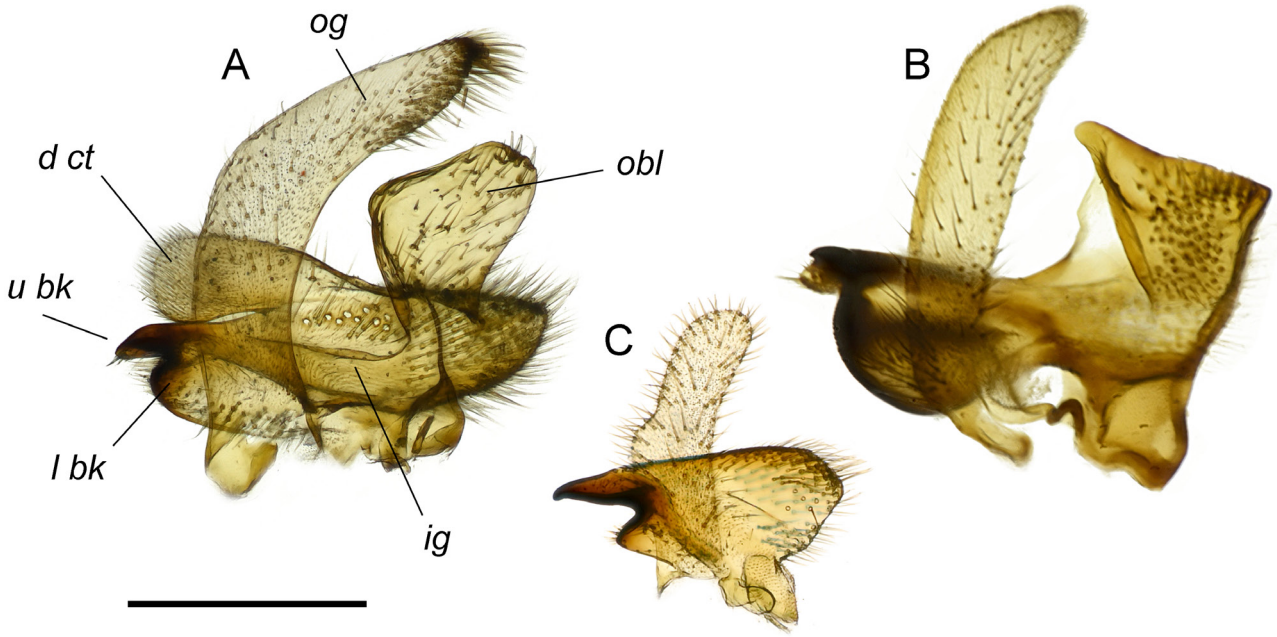

Fig. 4. *Tipula* spp., outer and inner gonostyli (lateral view, in glycerol). **A**, *T.* (*Schummelia*) *variicornis variicornis*; **B**, *T.* (*Sch.*) *baei* **sp. nov.**; **C**, *T.* (*Platytipula*) *insulicola fuscicauda*. Abbreviations: *d ct* – dorsal crest of inner gonostylus, *ig* – inner gonostylus, *l bk* – lower beak of inner gonostylus, *o bl* – outer basal lobe of inner gonostylus, *og* – outer gonostylus, *u bk* – upper beak of inner gonostylus. Scale bar: 0.5 mm.

its posterior part narrow, elongate, sclerotised. Spermatheca (Fig. 5F) light brown, translucent, almost round, with numerous small dots at base.

Distribution. The species is widely distributed in the East and West Palaearctic.

Habitats. Adults occur in different types of damp forests.

Tipula (*Schummelia*) *variicornis incisicauda* Savchenko, 1961
(Figs 2E, 3D)

Tipula (*Schummelia*) *variicornis incisicauda* Savchenko, 1961: 106; Savchenko & Kandybina, 1987: 35.

Type material examined. *Holotype*. Male (pinned), "[**Kazakhstan** (southeastern)], Alma-Ata nature reserve [ca. 43°09′N 77°02′E], 4.VI.[1]936, N. Olsufjev" (ZISP).

Paratype. Male (pinned), **Turkmenistan**, Bayram-Ali [37°37′02″N 62°07′22″E], end of VII – beginning of VIII.1932, Bogush leg. (ZISP).

Diagnostic features. The subspecies is close to the nominative one, distinguished from it by slightly smaller size and rusty-yellow overall colour (Fig. 2E). Hypopygium very similar to that of nominative subspecies, yet differing in shape of median process of tergite 9 in lateral view, with more or less large notch ventrally, slightly widened at apex (Fig. 3D).

Distribution. Middle Asia (SE Kazakhstan, Turkmenistan).

Tipula (*Schummelia*) *baei* sp. nov.
(Fig. 4B, 6, 7, 8)

Holotype. Male, **Republic of Korea**, *Gangwon-do* [= *Gangwon Prov.*], Yeongwol-gun [= Yeongwol County], THS [= Mt. Taewhasan], Heungwol-ri, 37°06′36.04″N 128°27′57.07″E, 573 m, 14.VII.2019, S.J. Kang leg. (YIM).

Paratypes. **Republic of Korea**, *Gangwon-do* [= *Gangwon Prov.*]: 1 female, same locality as for holotype, 14.VI.2019, D.A. Yi leg. (VPC); 1 male, Inje-gun, JBS [= Mt. Jeombongsan], Girin-myeon, 38°02′44.11″N 128°28′28.97″E, 578 m, 19.IX.2023, D.A. Yi leg. (NIBR); 4 males, Jeongseon-gun, HBS [= Mt. Hambaecksan], Gohan-up, 37°08′57.72″N 128°54′14.20″E, 1161 m, 30.V.2024, D.A. Yi leg. (YIM); 2 males, 1 female, *Jeollabuk-do* [= *Jeolla Prov.*], Jeongup-si, NJS [= Mt. Naejangsan], Naejang-dong, 35°29′35.41″N 126°53′50.34″E, 259 m, 11.V.2022, D.A. Yi leg. (YIM); 1 male, *Chungcheongbuk-do* [= *Chungcheong Prov.*],

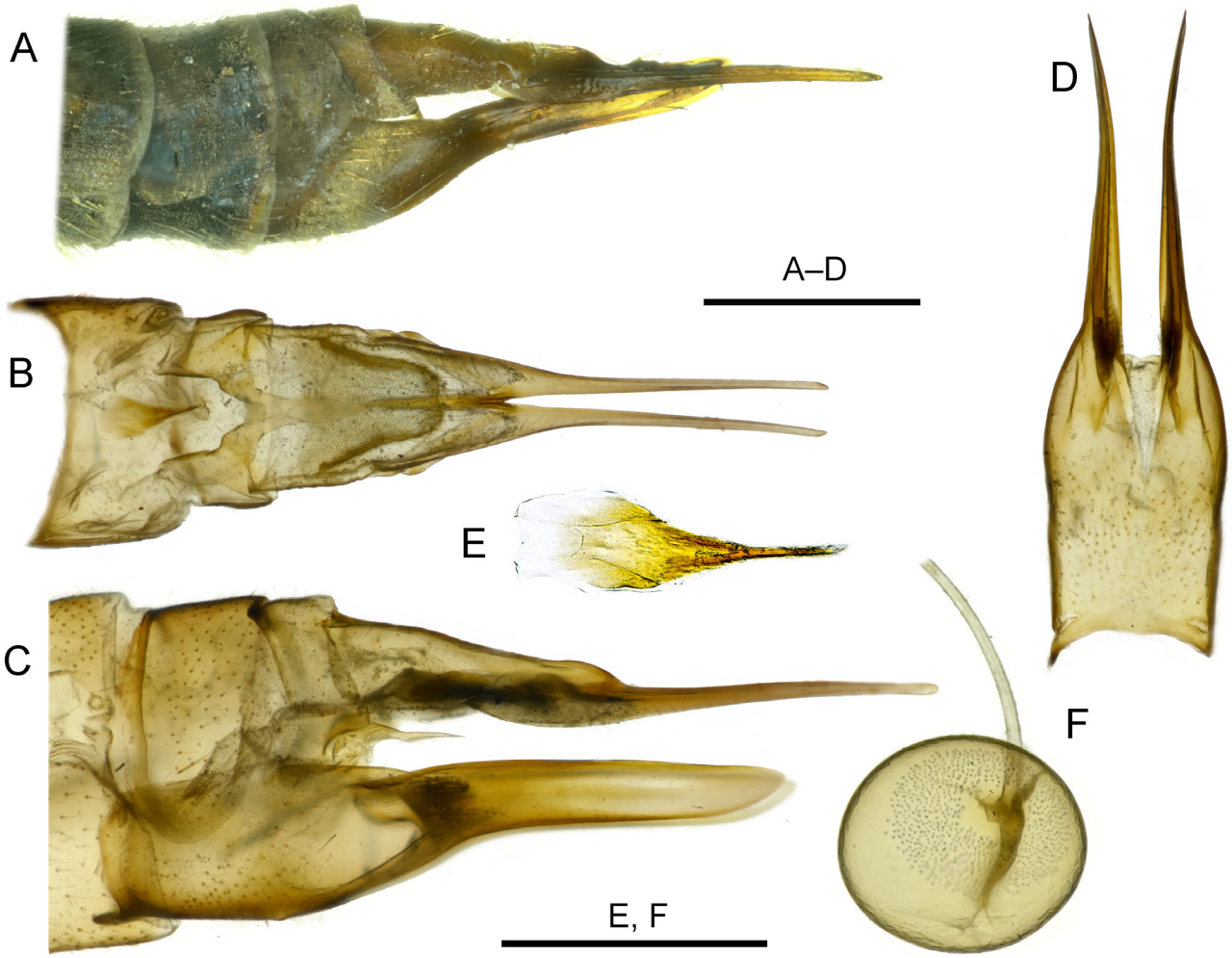

Fig. 5. Female terminalia of *Tipula* (*Schummelia*) *variicornis variicornis* Schummel, 1833, specimens from Sakhalin Island, Dolinsk District, 19.VII.2011, dry (A) and in glycerol (B–F). **A**, general habitus, lateral view; **B**, upper part of ovipositor, ventral view; **C**, ovipositor, lateral view; **D**, sternite 8 with hypogynial valve, ventral view; **E**, furca, dorsal view; **F**, spermatheca. Scale bars: 1 mm (A–D), 0.25 mm (E, F).

Danyang-gun, WJS [= Mt. Whangjungsan], Daegang-myeon, 36°50′12.18″N 128°20′47.04″E, 575 m, 16.V.2022, D.A. Yi leg. (VPC).

Diagnosis. General coloration yellowish grey; head and thorax grey. Antenna, if bent backwards, reaching base of wing. Scape, pedicel, and base of first flagellomere yellow; other flagellomeres black. Pleura grey pruinose, with strong black velvet stripe from neck to anepimeron. Wings tinged greyish, extensively patterned with white and brownish grey areas; *m-cu* and M_4 situated at fork of vein *M*; discal medial cell (*dm*) narrow, quadrangular; vein M_{1+2} (petiole) long. Abdomen with segments 2–5 bicolorous: yellow with dark brown bases and narrow brown lateral stripes; segments 6–7 dark brown to black. Median outgrowth of sternite 8 triangular, dark brown, directed almost vertically. Tergite 9 with median process and smoothed lateral corners. Outer gonostylus straight, without tuft of dusky setae at tip. Dorsal crest of inner gonostylus poorly visible; outer basal lobe well-developed, quadrangular. Female with darker abdomen.

Description. *Male* (Fig. 6A). Body length about 10–12 mm; wing length 11–13 mm; antenna length about 4 mm. General body coloration grey.

Head (Fig. 6C). Mainly grey pruinose; rostrum grey pruinose at base, otherwise dark brown. Nasus distinct, brown. Labellum greyish brown; palpus greyish yellow, with setae. Antenna

13-segmented, reaching base of wing if bent backward. Scape, pedicel and base of first flagellomere yellow, other flagellomeres black. Scape cylindrical; pedicel globular. Flagellomeres with basal enlargements poorly developed; longest verticils shorter than respective flagellomere; last flagellomere small.

Thorax (Fig. 6A, C). Coloration mainly grey pruinose. Pronotum grey with median line darker. Prescutum and presutural scutum grey pruinose with four brownish stripes; intermediate pair narrowly separated by line of ground colour; lateral stripes with anterior ends curved inward. Postsutural scutum grey with two brownish stripes. Scutellum and mediotergite brown, grey pruinose, with narrow medial line. Paratergite and narrow stripe of prescutum and scutum above it black. Pleura grey pruinose with very strong black velvet stripe from neck to upper part of anepimeron and with dark stripe from lower part of katepisternum to base of halter; dorsopleural membrane chiefly pale yellow. Halter with stem obscure yellow, knob infuscated, its extreme tip whitened. Coxae greyish yellow; trochanters yellow; femora yellow, their tips rather narrowly but conspicuously blackened. Tibiae yellowish brown; tarsal segments dark brown. Tarsal claws without tooth. Wing (Fig. 6E) chiefly infuscate, tinged greyish, extensively patterned with white and brownish grey areas, and with heavy and conspicuous brown pattern at cord. Venation: M_{1+2} (petiole) long, slightly smaller than cell m_1; *m-cu* and M_4 situated at fork of vein *M*; discal medial cell (*dm*) narrow, quadrangular.

Abdomen (Figs 6A, 7A). First abdominal segment greyish pruinose; segments 2–5 bicolorous: yellow with dark brown bases and narrow lateral stripes; segments 6–7 dark brown to black.

Hypopygium (Fig. 4B, 7) mainly yellow. Sternite 8 very narrow, reduced (Fig. 7C, G), entirely concealed under sternite 7, median outgrowth (*m8S*) triangular, dark brown, directed almost downward. Tergite 9 (Fig. 7B, F) yellow, with median process (*m9t*) parallel-sided in lateral view, with smoothed lateral corners in dorsal view. Sternite 9 with paired appendages (*A9S*) covered with long setae (Fig. 7D) and with mediosternal outgrowth (*m9o*) covered with setae and protruding upward or backward (Fig. 7C, D). Outer gonostylus (Fig. 4D) pale, straight, without bend at middle, bearing only moderately long setae, without tuft of dusky setae at tip. Inner gonostylus with lower beak wide, rounded, with short dense setae; upper beak poorly visible in lateral view; dorsal crest very narrow and poorly visible, provided with bristles; outer basal lobe of inner gonostylus well-developed, with short thick setae on outer surface. Sperm pump, aedeagus and aedeagal guide typical of subgenus *Schummelia* (Fig. 6C, E), but sperm pump smaller and anterior apodeme (*aa*) of medial sclerite of gonocoxal fragment longer than in *T.* (*Sch.*) *variicornis variicornis*.

Female (Figs 6B, D, F, 8). Female generally similar to male, except antenna short, wings more intensely coloured, and abdomen darker, with wider brown lateral stripes, displacing vague yellow rings.

Female terminalia (Fig. 8). Tergite 8 dark brown; tergites 9–10 yellow; cercus yellow, narrow and straight. Sternite 8 dark brown in anterior half, yellow-brown in posterior half. Hypogynial valve reaching to half-length of cercus, light yellow, with brown spot at base and narrow black upper margin (Fig. 8C). Furca elongate, pointed at both anterior and posterior ends (Fig. 8E), anteriorly with additional rounded plate directed downward (Fig. 8F). Spermatheca oval, light brown, translucent.

Comparison. The males of the new species are clearly distinguished from the other members of *Schummelia* by the coloration of the antennae, wings, thorax, and abdomen, as well as by the structure of the hypopygium. The differences between the new species and the widespread Palaearctic species *T.* (*Sch.*) *variicornis* are given in Table 1.

Tipula (*Sch.*) *baei* **sp. nov.** also differs from the West Palaearctic species of the subgenus *Schummelia*. The colour of the abdomen in males of the new species is similar to *T.* (*Sch.*) *zonaria*, and the colour of antennae and wings is similar to *T.* (*Sch.*) *yerburyi*, but the males are well distinguished by the median outgrowth of sternite 8: triangular, directed downwards in the new species and narrow, directed posteriorly in *T.* (*Sch.*) *zonaria* and *T.* (*Sch.*) *yerburyi*. The two East Palaearctic species, *T.* (*Sch.*) *ishizuchiana* (Japan) and *T.* (*Sch.*) *spectata* (China), have been described based on single females (Alexander, 1940a, 1954), which differ from females of the new species in the

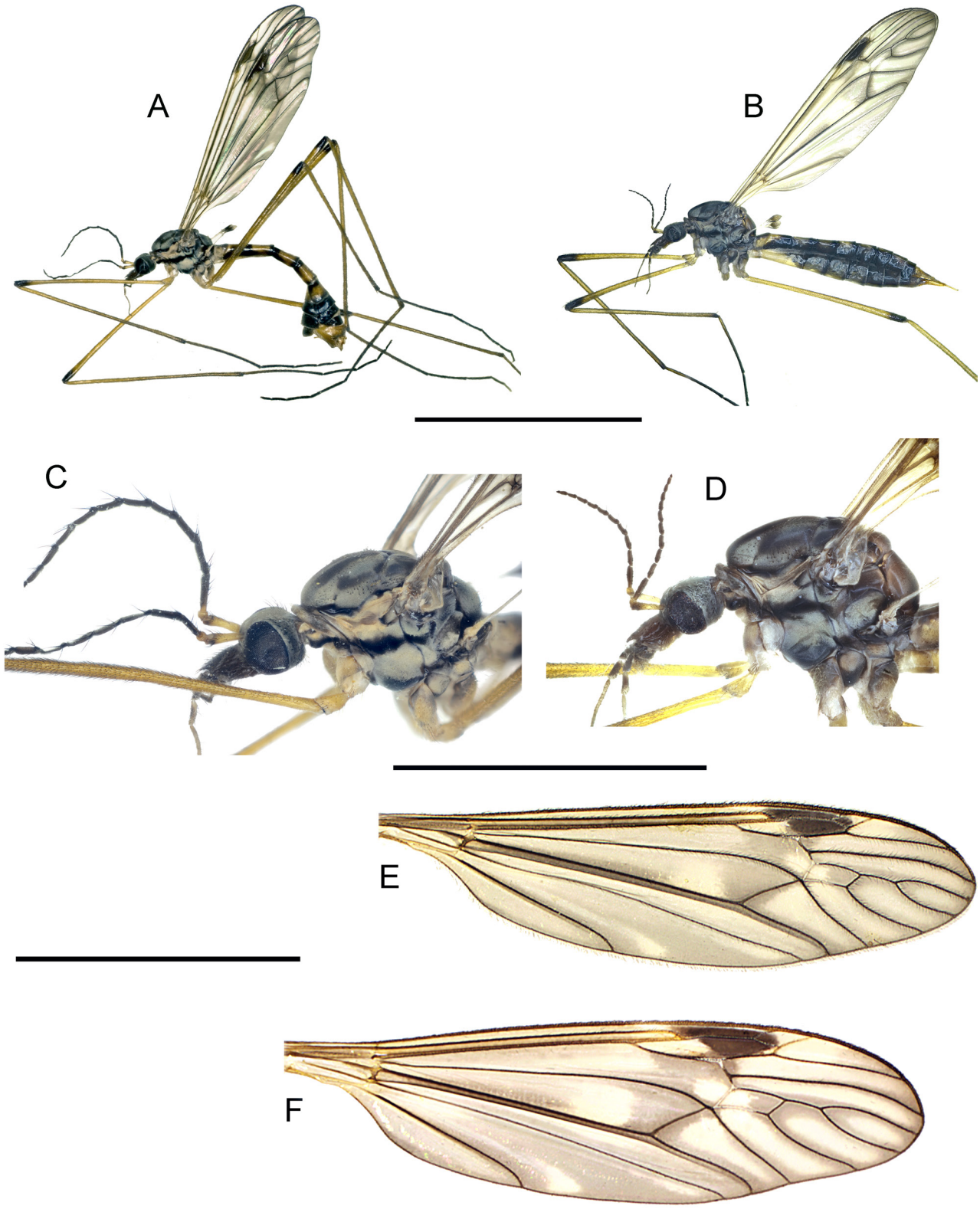

Fig. 6. Dry specimens of *Tipula* (*Schummelia*) *baei* **sp. nov.**: male, paratype from Mt. Whangjungsan, 16.V.2022 (A, C, E) and female, paratype from Mt. Taewhasan, 14.VI.2019 (B, D, F). **A**, **B**, habitus, left lateral view; **C**, **D**, head and thorax, left lateral view; **E**, **F**, wing. Scale bars: 10 mm (A, B), 5 mm (C–F).

Table 1. Comparison of male characters between *Tipula* (*Schummelia*) *baei* **sp. nov.** and *T.* (*Sch.*) *variicornis* Schummel, 1833.

***Tipula* (*Schummelia*) *baei* sp. nov.**	***Tipula* (*Schummelia*) *variicornis***
Thoracic pleura (Fig. 6C, D) grey pruinose with strong black velvet stripe from neck to anepimeron.	Thoracic pleura (Fig. 2A, B) yellowish grey with vague brownish grey spots.
Antenna with flagellomeres black (Fig. 6C, D).	Antenna with flagellomeres bicolorous, light with darkened bases; apex of flagellum darkened (Fig. 2A, B).
Wing (Fig. 6E, F) tinged greyish, extensively patterned with white and brownish grey areas.	Wing (Fig. 2C) greyish yellow, often with darkening ("seam") around veins *Cu* and *m-cu*.
Wing (Fig. 6E, F) with discal medial cell (*dm*) narrow, quadrangular; *m-cu* and M_4 situated at fork of vein *M*; M_{1+2} (petiole) relatively long, slightly smaller than *m*.	Wing (Fig. 2C) with discal medial cell (*dm*) usual, pentagonal; *m-cu* and M_4 situated at first third of *dm*; M_{1+2} (petiole) short or absent.
Abdomen with segments 2–5 bicolorous, yellow with dark brown bases and narrow lateral stripes; segments 6 and 7 dark brown to black (Figs 6A, 7A).	Abdomen yellow or brownish yellow, with narrow lateral stripes; segments 6 and 7 distinctly dark brown (Fig. 2D).
Tergite 9 with smoothed lateral corners in dorsal view; sternite 9 with paired appendages (*A9S*) covered with long setae and with mediosternal outgrowth (*m9o*) protruding upward or backward.	Tergite 9 with well-defined lateral corners in dorsal view; sternite 9 with paired appendages (*A9S*) bearing 2–3 thick spine-like setae directed medially; mediosternal outgrowth (*m9o*) absent.
Outer gonostylus straight, without bend at middle, without tuft of dusky setae at tip. Inner gonostylus (Fig. 3B, C) with dorsal crest very narrow and poorly visible; its outer basal lobe quadrangular.	Outer gonostylus boomerang-shaped, bearing tuft of dusky setae at tip. Inner gonostylus with dorsal crest plate-like, narrow, flat, parallel-sided, directed anteriorly; its outer basal lobe rounded triangular.

coloration of the wing, thorax and legs. In particular, the females of two species lack the longitudinal velvety black stripe on the pleura and have black tibiae (*vs.* brownish yellow tibiae in the new species). The wings of the female of *T.* (*Sch.*) *spectata* have the same intense pattern of coloration but are tinged yellow, instead of grey in the new species. The shape of the discal medial cell (*dm*) is also different: short pentagonal in *T.* (*Sch.*) *spectata* and narrow, elongate quadrangular in the new species. Savchenko (1961) admitted that *T.* (*Sch.*) *ishizuchiana* may actually belong to the subgenus *Platytipula*.

Etymology. The new species is named in honour of Professor Yeonjae Bae, a leading entomologist in Korea. He has taught entomology at Korea University and Seoul Women's University for thirty-five years. He was a former Director of NIBR (National Institute of Biological Resources, Korea) and the President of the Entomological Society of Korea. He is currently the President of the Asian Society for Hydrobiology.

Distribution. South Korea (Republic of Korea: Gangwon, Chungcheong and Julla provinces).

Habitat and bionomics. The males and females were collected in low to high mountains covered with mixed forest formed by deciduous and conifer trees at altitudes of approximately 250 to 1200 m above the sea level. Adults occurred between May and September.

Discussion

The subgenus *Schummelia* is very close to the subgenus *Platytipula*. Both subgenera have similar wing venation: *Rs* relatively short, subequal to long *m-cu*. The *T. insulicola* species-group of *Platytipula* has intermediate characteristics and occupies an isolated position, distinguished from other species of *Platytipula* by the structure of tergite 9 and the aedeagal guide. Species of this group have tergite 9 with a well-developed median process, unlike other *Platytipula* species, in which the median process of tergite 9 is reduced or bent

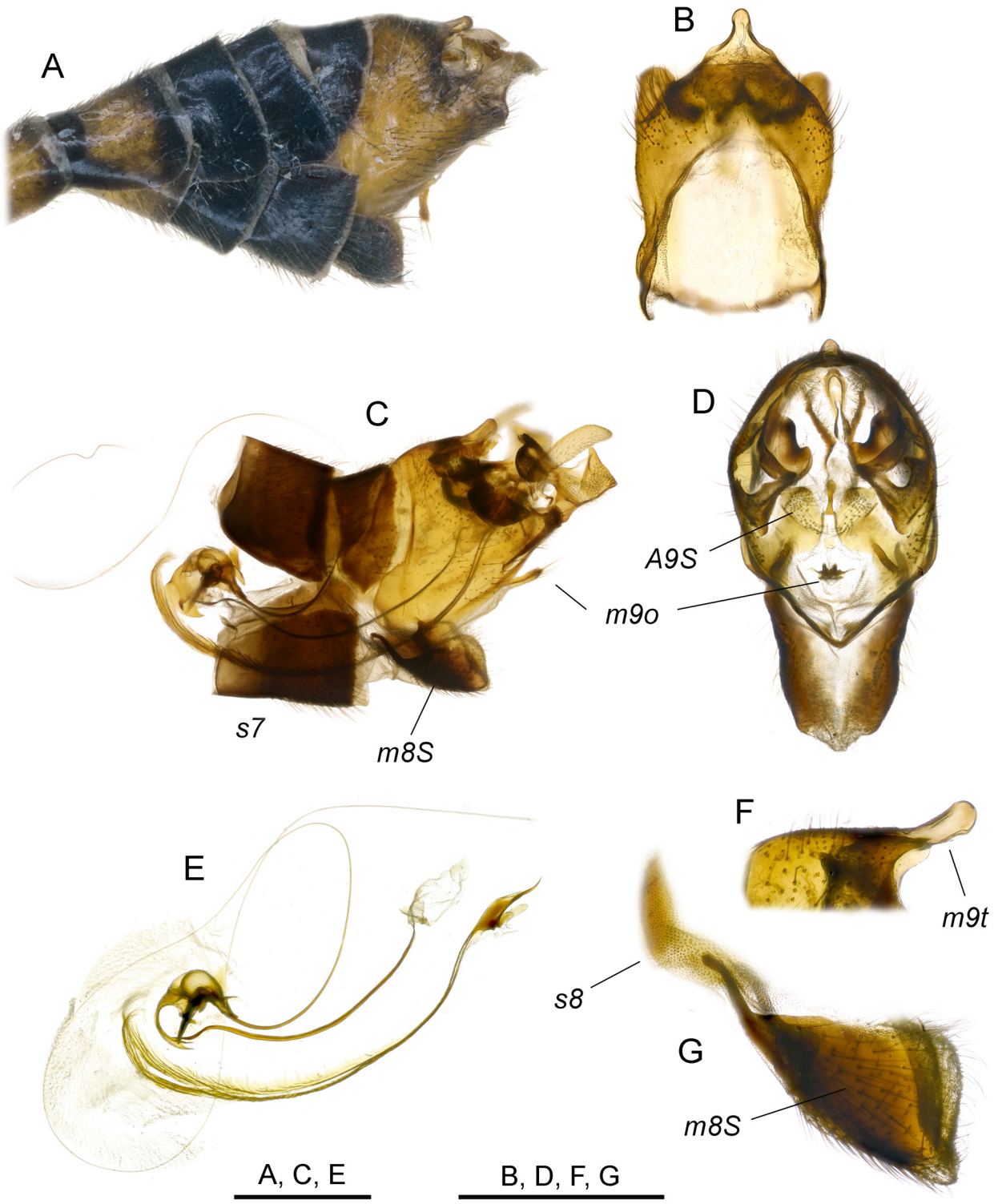

Fig. 7. Male terminalia of *Tipula* (*Schummelia*) *baei* **sp. nov.**, paratype from Mt. Whangjungsan, 16.V.2022, dry (A) and in glycerol (B–F). **A**, **C**, hypopygium, left lateral view; **B**, tergite 9 with median process, dorsal view; **D**, hypopygium (without outer and inner gonostylus), caudal view; **E**, sperm pump, aedeagus and aedeagal guide, lateral view; **F**, tergite 9 with median process, lateral view; **G**, sternite 8 and median outgrowth, lateral view. Abbreviations: *A9S* – paired appendages of sternite 9, *m8S* – median outgrowth of sternite 8, *m9o* – mediosternal outgrowth of sternite 9, *m9t* – median process of tergite 9, *s7, s8* – sternite 7 and 8. Scale bars: 1 mm (A, C, E), 0.5 mm (B, D, F, G).

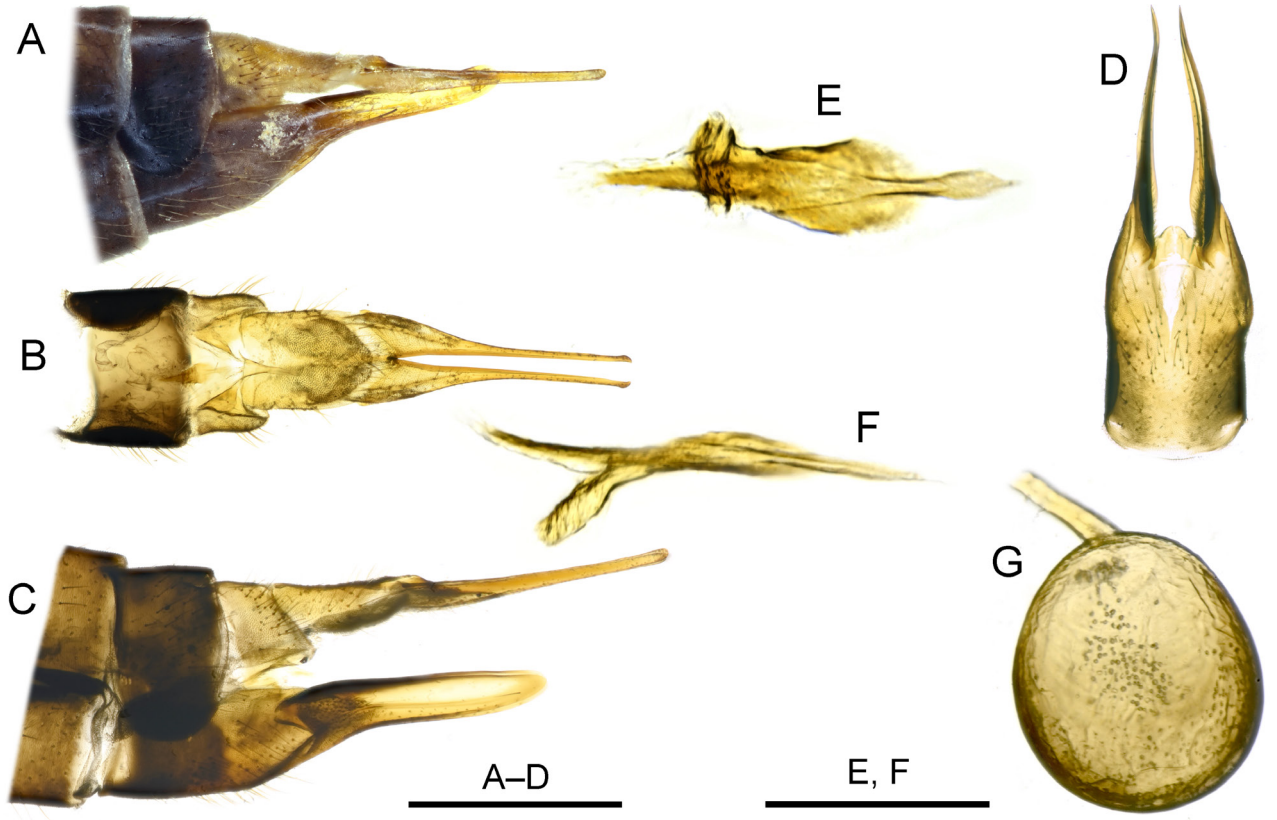

Fig. 8. Female terminalia of *Tipula* (*Schummelia*) *baei* **sp. nov.**, paratype from Mt. Taewhasan, 14.VI.2019, dry (A) and in glycerol (B–G). **A**, general habitus, lateral view; **B**, upper part of ovipositor, ventral view; **C**, ovipositor, lateral view; **D**, sternite 8 with hypogynial valve, ventral view; **E**, **F**, furca, (E, dorsal view; F, lateral view); **F**, spermatheca. Scale bars: 1 mm (A–D), 0.25 mm (E–G).

inwards, so that the tergite appears to have a large V-shaped median notch. In *T.* (*P.*) *insulicola fuscicauda*, the inner gonostylus (Fig. 4C) is simple, with a well-defined upper beak and without an outer basal lobe and a dorsal crest, as in *Platytipula*, but tergite and sternite 9 are fused, which is unusual for this subgenus. The sperm pump (Fig. 1D–E) is located in segment 9 and the aedeagus is short, i.e. both characters are more or less the same as in other species of *Platytipula*. The aedeagal guide has narrow, long, rounded lateral plates (*lp*) directed posteriorly, and short anterior rods (*ar*) directed forward and laterally embracing the sperm pump. In other species of *Platytipula*, the aedeagal guide is a narrow tube-shaped structure without lateral plates or anterior rods. The structure of the aedeagal guide in *T.* (*P.*) *insulicola* is very similar to that in the genera *Dolichopeza* Curtis, 1825 (Byers, 1961) and *Prionocera* Loew, 1844 (Brodo, 1987). Savchenko (1961) noted a similarity in the wing venation and the structure of the hypopygium between the species of the *T. insulicola* group of the subgenus *Platytipula* and species of the subgenus *Schummelia,* and noted their similarity with the genus *Dolichopeza*.

Based on the structure of male terminalia, Savchenko (1961) divided the Palaearctic species of the subgenus *Schummelia* into two species groups. The *T. variicornis* group is characterised by well-defined lateral corners of tergite 9 and the median outgrowth of sternite 8 appearing in lateral view triangular or wedge-shaped and directed downward. The *T. zonaria* group has smoothed lateral corners of tergite 9 and a posteriorly directed tongue-shaped median outgrowth of sternite 8. The new species has an intermediate structure: tergite 9 as in the *T. zonaria* group, with smoothed lateral corners (Fig. 7B), and the median outgrowth of sternite 8 as in the *T. variicornis* group, triangular, directed downward (Fig. 7A, C).

Savchenko (1983) believed that the unpaired median outgrowth of sternite 8 was secondarily unpaired, having formed by fusion of paired appendages along their inner edges. A strongly forked appendage is present in some Nearctic species [for example, *T.* (*Schummelia*) *magnifolia* Alexander, 1948 and *T.* (*Sch.*) *subtenuicornis* Doane, 1901] and in the Palaearctic species *T.* (*Sch.*) *butzi*.

Hence, the authors suggest that species of the subgenus *Schummelia* can be divided into three groups based on the structure of the median outgrowth of male sternite 8:

1. *T. variicornis* group, with a triangular or wedge-shaped appendage directed downwards [*T.* (*Sch.*) *ahrensi*, *T.* (*Sch.*) *baei* **sp. nov.**, *T.* (*Sch.*) *variicornis incisicauda*, *T.* (*Sch.*) *variicornis variicornis*, and *T.* (*Sch.*) *zernyi*].

2. *T. zonaria* group, with a tongue-shaped appendage directed backwards [*T.* (*Sch.*) *yerburyi* and *T.* (*Sch.*) *zonaria*].

3. *T. butzi* group, with a strongly bifurcated appendage [*T.* (*Sch.*) *butzi*].

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