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Contribution to the knowledge of Tachinidae (Diptera) of Korea

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Abstract: We present the results of a relatively small collecting effort of Tachinidae in South Korea over the last few years. Of the total 33 species of Tachinidae found in this survey, half (17 species) prove to be new to South Korea and for the Korean Peninsula. One species, *Clairvillia nigra* ZEEGERS nov.sp. is described as new. The new species resembles some Nearctic species, like *C. nitoris*, at least superficially. Several interesting species have been found on light. We raise the number of Tachinidae known from South Korea to 173. The Korean fauna of Tachinidae is relatively poorly investigated and many more species are to be expected.

Key words: taxonomy, Phasiinae, Palaearctic region

Introduction

The family Tachinidae is one of the largest families of Diptera with nearly 8600 species recognized worldwide (O'HARA et al., 2020). All tachinids are parasitoids of arthropods, mostly insects. The huge diversity of the family has been discussed by STIREMAN et al. (2006). The phylogeny of the family on a molecular base has recently been treated by STIREMAN et al. (2021).

Currently, 156 species of Tachinidae have been recorded from South Korea (HAN et al., 2014; O'HARA et al., 2020). DRABER-MOŃKO (2009, 2012, 2013, 2015, 2017) mentioned in total 163 species for North Korea. In this paper, we present 17 new distributional records for the Korean peninsula, of which one species is described as new for science.

Material and methods

The material was collected by the second author between the years 2018-2021 and identified by the first author. Tachinids were hand-collected by net and by sweeping through the vegetation. Nocturnal species were collected at a light trap using a 400-Watt Metal halide lamp. Photographs of live individuals were obtained using a Nikon D5600 camera mounted with a 105 mm macro lens and an external flash; photographs of pinned specimen with a Canon camera EOS 70D with Canon MP-E 65 mm F2.8 1-5 x macro lens. Close-ups have been made with an Olympus stereomicroscope with an additional phototube and are stacked manually.

We used TSCHORSNIG & RICHTER (1998) for the identification to genus level, for identification to species level all literature available. All material, except for the holotype of the new species, are kept in the collection of the first author. In the terminology used to describe the external morphology, we follow MERZ & HAENNI (2000), and for male

genitalic structures we follow TSCHORSNIG (1985). The general distribution of mentioned species in eastern Asia is based on O'HARA et al. (2020). New distributional records are marked by an asterisk *.

Results

We present an annotated list of species first recorded for the Korean Peninsula, ordered by subfamily and in alphabetical order within each subfamily. No additional species in the subfamily Dexiinae were recorded.

Family T a c h i n i d a e

Subfamily E x o r i s t i n a e

Biomeigenia magna MESNIL, 1961 (Fig. 1D)

M a t e r i a l e x a m i n e d : 1♀, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 5.vi.2021, on light trap.

D i s t r i b u t i o n : Eastern Palaearctic: Russia (Far East), South Korea*.

R e m a r k : This species was found together with *Eutrixopsis javana* TOWNSEND, 1919, another nocturnal species attracted to light trap.

Blepharipa gigas (MESNIL, 1953)

M a t e r i a l e x a m i n e d : 1♀, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 2.vii.2019.

D i s t r i b u t i o n : Eastern Palaearctic: Russia (Far East), China, South Korea*.

R e m a r k : The species was originally described as variety of *B. jacobsoni* (TOWNSEND, 1927), but is currently considered to be a distinct species (RICHTER 2004; O'HARA et al., 2020).

Phorocera obscura (FALLÉN, 1810)

M a t e r i a l e x a m i n e d : 1♀, Mt. 105-2, Munwon-dong, Gwacheon-si, Gyeonggi-do, 37°24'55"N 126°59'44"E, 25.iv.2021; 1♂, Mt. Bonghwa, Wonju-si, Gangwon-do, 37°20'46"N 127°55'17"E, 29.iv.2021.

D i s t r i b u t i o n : Widespread in the Palaearctic region in the deciduous forest-zone. Eastern Palaearctic: Russia (Far East), China (Northeast), Japan, South Korea*.

Smidtia japonica (MESNIL, 1957)

M a t e r i a l e x a m i n e d : 1♂, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 5.vi.2021, on light trap.

D i s t r i b u t i o n : Eastern Palaearctic: Japan, Russia (Far East), China, South Korea*.

R e m a r k : The genus *Smidtia* ROBINEAU-DESVOIDY, 1830 was revised by SHIMA (1996).

***Smidtia laeta* (MESNIL, 1963)**

Material examined: 1♂, Seoguipo National Recreational Forest, 882, 1100-ro, Seogwipo-si, Jeju-do, 11.iv.2021.

Distribution: Apparently disjunct, both western Europe (France) and eastern Palaearctic: Russia (Far East), China (Northeast), Japan, South Korea*.

Remark: The species is extremely similar to *S. amoena* (MEIGEN, 1824). SHIMA (1996) illustrates the differences in male genitalia.

***Thelyconychia discalis* MESNIL, 1957 (Fig. 1B)**

Material examined: 2♀ 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'30"N, 128°08'39"E, 26.vi.2021, swept from grass.

Distribution: Eastern Palaearctic: Japan, Russia (Far East), China, South Korea*.

Remark: The related species *Thelyconychia solivaga* (RONDANI, 1861) has been recorded from North Korea; both species from Russian Far East and Japan.

Subfamily Phasiinae***Clairvillia nigra* ZEEGERS nov.sp. (Fig. 2)**

Material examined: 1♂, Bupyeong-ri, Gangcheon-myeon, Yeosu-si, Gyeonggi-do, 37°15'23" N 127°45'19" E, 5.vi.2021, swept from low grass.

The species is described below.

Subfamily Tachininae***Demoticoides pallidus* MESNIL, 1953**

Material examined: 1♀, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 19.ix.2018.

Distribution: Widespread eastern Palaearctic, Oriental region and Australasian regions. East Palaearctic: Russia (Far East, West Siberia), China (Central, Northeast), Japan, South Korea*.

***Dexiosoma caninum* (FABRICIUS, 1781)**

Material examined: 2♂♂, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 1.vii.2019; 1♂ same locality, 8.vii.2019.

Distribution: Widespread Palaearctic region. East Palaearctic: Russia (Far East), China (Central, Northeast), Japan, South Korea*.

***Lyphosia barbata* (MESNIL, 1957)**

Material examined: 1♂, 854, Hangye-ri, Buk-myeon, Inje-gun, Gangwon-do, 25.iii.2021.

Distribution: Eastern Palaearctic: Japan, Russia (Far East), South Korea*.

***Macquartia nudigena* MESNIL, 1972**

Material examined: 1♂, 854, Hangye-ri, Buk-myeon, Inje-gun, Gangwon-do, 25.iii.2021.

Distribution: Widespread on mainland of Palaearctic region. Eastern Palaearctic: Russia (Far East), South Korea*.

***Macquartia pubiceps* (ZETTERSTEDT, 1845)**

Material examined: 1♀, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 25.vi.2020.

Distribution: Widespread Palaearctic region. Eastern Palaearctic: Russia (Far East), South Korea*.

***Nemoraea japonica* (BARANOV, 1935) (Fig. 1E)**

Material examined: 1♀, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 5.vi.2021, on light trap.

Distribution: Eastern Palaearctic: Japan, Russia (Far East), China (Northeast), South Korea*.

***Panzeria meridionalis* SHIMA, 2020**

Material examined: 1♂, Bupyong-ri, Gangcheon-myeon, Yeosu-si, Gyeonggi-do, 37°15'23"N 127°45'19"E, 23.v.2021.

Distribution: Eastern Palaearctic: Japan, South Korea*.

Remark: Very recently described and illustrated by SHIMA (2020). So far, only known from a few localities in Japan on the southern island Kyushu, just across the Korea strait.

***Panzeria sulciforceps* (ZIMIN, 1960)**

Material examined: 1♂, 854, Hangye-ri, Buk-myeon, Inje-gun, Gangwon-do, 25.iii.2021

Distribution: Eastern Palaearctic: Russia (Far East), China (Northeast), South Korea*.

Remark: The species is very similar to *Panzeria puparum* (FABRICIUS, 1794). The male genitalia are distinctive (ZIMIN 1960).

***Schineria majae* ZIMIN, 1947 (Fig. 1C)**

Material examined: 1♀, 800, Bonghwa-ro, Anheung-myeon, Hoengseong-gun, Gangwon-do, 37°27'27"N 128°08'42"E, 29.ix.2018; 1♀ same locality, 30.vi.2019, 1♀ same locality, 2.vii.2019.

Distribution: Eastern Palaearctic: China, Russia (Far East), South Korea*.

***Therobia mongolica* (RICHTER, 1972) (Fig. 1F)**

Material examined: 1♀, 944, Haedong-ri, Yaksan-myeon, Wando-gun, Jeollanam-do, 34°22'23"N 126°54'33"E, 19.vi.2021, on light trap.

Distribution: Eastern Palaearctic: Mongolia, Russia (Far East), South Korea*.

Remark: We have not seen other material of this species, but our female is a good match with the original description by RICHTER (1972).

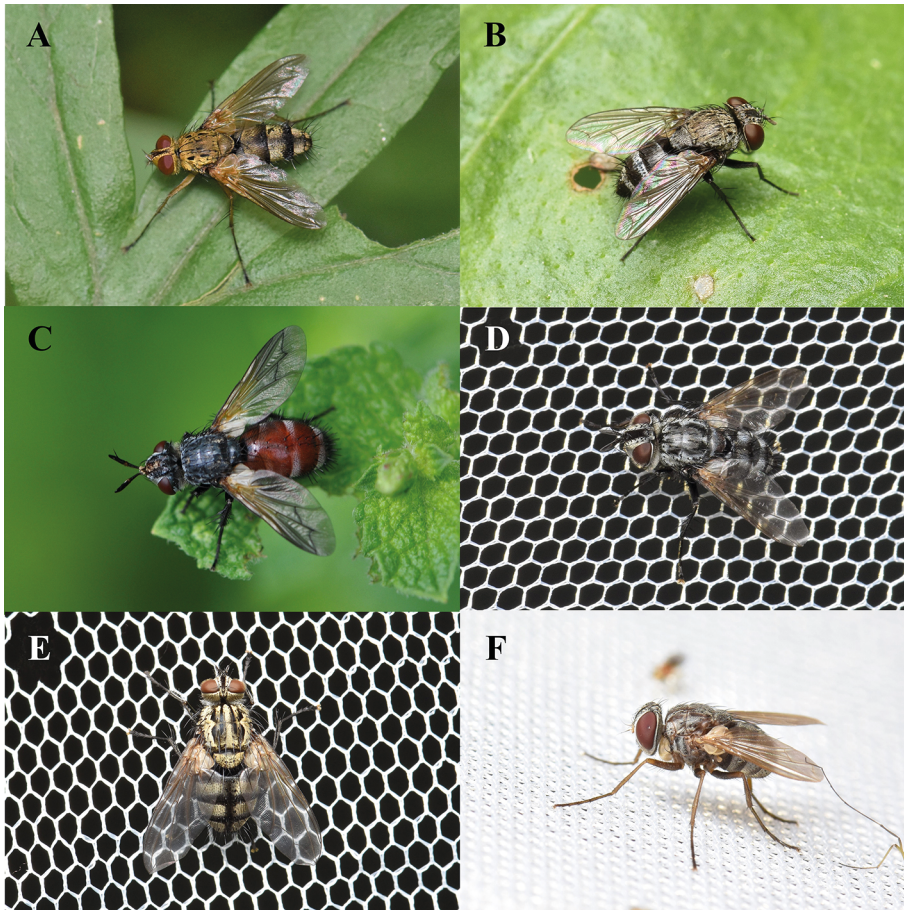


Fig. 1A-F: Habitus of six Tachinid species recorded here for the first time for Korea. (A) *Dexiosoma caninum*; (B) *Thelyconychia discalis*; (C) *Schineria majae*; (D) *Biomeigenia magna*; (E) *Nemoraea japonica*; (F) *Therobia mongolica*.

Description of a new species

Clairvillia nigra ZEEGERS nov.sp. (Figs 2, 3A, 4A)

H o l o t y p e : male: Republic of Korea, Bupyeong-ri, Gangcheon-myeon, Yeosu-si, Gyeonggi-do, 37°15'23" N 127°45'19" E, 5.vi.2021, swept from low grass, leg Wonwoong Kim. Will be deposited in the collection of Naturalis Biodiversity Center, Leiden, the Netherlands.

D i a g n o s i s : Generally shiny black species (thorax, scutellum, abdomen, legs, antenna, palpus). Ocellar seta very weak, reclinate. Mid tibia with only one ventral seta. Male genitalia generally similar to *Clairvillia biguttata* (MEIGEN, 1824), but syncercus in lateral view only as large as gonites-complex.

Description: Generally shiny black species, with black thorax, scutellum, abdomen, legs, antenna and palpus (Fig. 2). Frontal vitta dull black, inner margin of fronto-orbital plate like a shiny black varnish, fronto-orbital plate otherwise white and parafacial shiny white. Hairs on gena completely and on backside of head mostly black, light hairs restricted to the lower part of the occiput. Thoracic dorsum with an inconspicuous silvery-grey rectangular spot on postpronotal lobe, reaching backwards towards transverse suture. Upper and lower calypter white, haltere dark. Wing with strong yellow venation and dark yellow colouration at wing base, more so in costal cell; tegula and basicosta black.

Vertex narrow, about 1/3th of the width of one eye. Frontal vitta before anterior ocellus twice as broad as fronto-orbital plate. Head in lateral view: vibrissal angle slightly projecting, gena narrow, about 1/5th of larger diameter of an eye, parafacial narrower than gena and narrower than third antennal segment. Proboscis about 4.5 times as long as its diameter. Eye with ommatidia in upper 2/3 distinctly larger than in lower 1/3th, the two types quite sharply separated. Vertex with both inner vertical seta broken off, apparently quite strong, no visible outer vertical, about ten long, slender postverticals slightly bend forward. Occiput with quite stout seta slightly bend forward. Ocellar seta hairlike, laterocline and slightly reclinate. Upper four frontal seta reclinate, other frontal seta crossed, the row descending towards base of pedicel, fronto-orbital plate and parafacial otherwise bare.

Antenna with pedicel twice as long as broad, first flagellomere 1.5 times as long as second. Arista thickened at basal quarter, second aristemere nearly twice as long as broad.

Thorax with 2 postpronotal setae, no obvious acrostichal setae, dorsocentrals 2+3, intralar 1+2 (the anterior one placed outwards), a small first and a strong second supra-alar seta, the third lacking, 2-3 katepisternal setae accompanied by many long, stout, bristle-like hairs. Anepimeral seta not differentiated from adjacent hairs. Scutellum with three marginal setae of similar size, apical ones crossed; a much smaller fourth pair present near apicals. Lower calypter quite large, reaching to nearly halfway syntergite 1&2.

Excavation on syntergite 1&2 small, reaching only one quarter of syntergite. Syntergite 1&2 with a pair of strong central marginal setae and 1-2 pairs of lateral marginals, tergite 3 partly damaged but with several strong lateral marginal setae (so supposedly also central marginals), tergite 4 with a row of marginal; no discal setae present but hairs on all tergites erect. Sternites, except first, hidden by tergites.

Fore tibia with 2 small pd setae, claws and pulvilli slightly longer than apical tarsal segment. Mid tibia with a strong ventral seta, a strong ad seta accompanied by a second, much smaller one and 2 smaller posterior setae. Hind tibia with 3 av, 3 ad, 2 pd setae and 3 dorsal pre-apicals (pd, d and ad), coxa bare on backside, postmetacoxal area membranous.

Bend in vein M in wing gently curved, vein M reaching wing margin close to vein R₄₊₅ and close to apex of wing, hence cell r₄₊₅ open. Crossvein dm-cu distinctly closer to bend of vein M than to cross-vein r-m. Costal spine present, but small. First, second and basal half of third section of costa from below with small setulae. Base of vein R₄₊₅ with one long but slender seta.

Male genitalia: quite different from most other Tachinidae, but resembling those of *Clairvillia biguttata* (TSCHORSNIG, 1985): cerci fused to a syncercus, hook-shaped in lateral view, surstylus vestigial, pre- and postgonite fused, building a claw-like structure

in lateral view (Fig. 4). Epandrium elongated, in dorsal view 1.5 times as long as its basal width, in lateral view nearly twice as long as syncercus.

Length: 7 mm.

Female unknown.

E t y m o l o g y : *niger*, a Latin adjective, meaning ‘shiny black’, refers to the generally very shiny black habitus. Other known Palearctic species have a pair of large red side-markings on the abdomen.

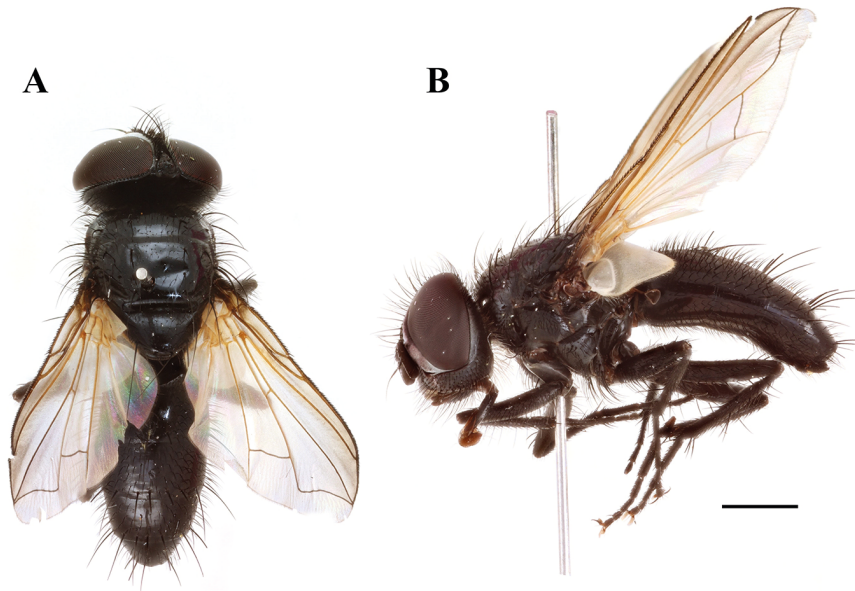


Fig. 2A-B: Male *Clairvillia nigra* nov.sp., holotype, habitus; (A) dorsal view; (B) lateral view. Scale bar = 1 mm.

Generic affiliation: Based on the presence of only 2 post intra-alar setae and the reclinate (though vestigial) ocellar seta, the species is placed within the tribe Leucostomatini. It is considered to belong to genus *Clairvillia*, despite the absence of red coloration on the tergites, which is present in other Palearctic species of the genus. This is supported by the peculiar shaped united pre- and postgonites in male genitalia. Also, the sharply separated larger and smaller ommatidia in the eye are not seen in other Leucostomatini.

The new species differs from other black Leucostomatini by the lack of presutural acrostichals (present in *Dionaea* ROBINEAU-DESVOIDY, 1830 and *Psalidoxena* VILLENEUVE, 1941), the open cell r_{4+5} (petiolated in *Leucostoma* MEIGEN, 1803), the number of katepisternal setae and slightly projecting vibrissal angle (only 2 katepisternal setae present and vibrissal angle not projecting in *Clairvilliops* MESNIL, 1959) and the membranous postmetacoxal area (sclerotized in both *Clelimyia* HERTING, 1981 and *Takanoella* Baranov, 1935). In the genus *Labigastera* Macquart, 1834, the epandrium is enlarged and flattened, one pair of strong posterior acrostichal setae and distinct grey pruinescence on tergites is present.

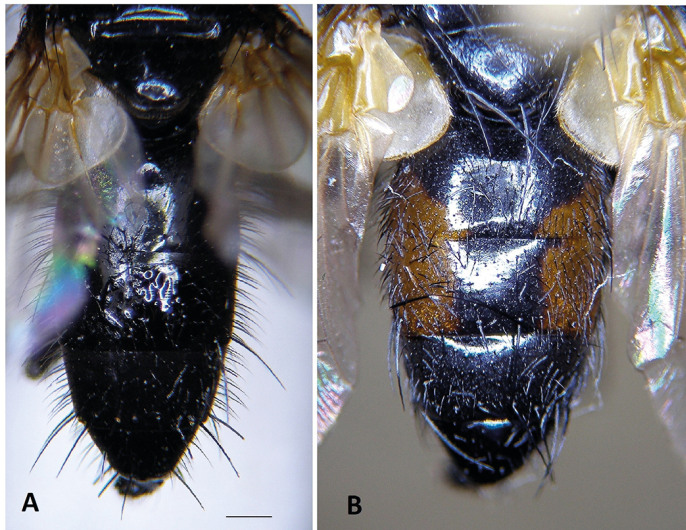


Fig. 3A-B: Male *Clairvillia*, abdomen, dorsal view. (A) *C. nigra* nov.sp. holotype; (B) *C. biguttata* (male from Spain: Asturias). Scale bar = 0,5 mm.

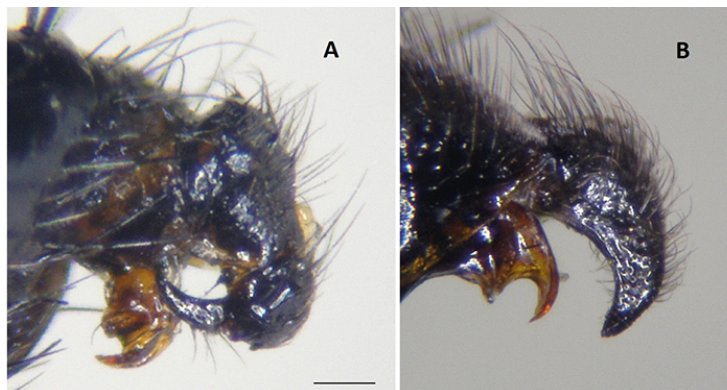


Fig. 4A-B: *Clairvillia* male genitalia in lateral view. (A) *C. nigra* nov.sp., holotype; (B) *C. biguttata* (male from Greece, Peloponnesos). Scale bar = 0,1 mm.

Reduction of reddish sidemarkings in Tachinidae is not uncommon. In fact, the first author caught a male *Clairvillia biguttata* near Komsomolsk, Khabarovskii Krai, Russian Far East with strongly reduced reddish sidemarkings on tergites (ZEEGERS 2017). The new species differs from such aberrant specimens of *biguttata* by its different male genitalia (Fig. 4) and also by the reduction of the ocellar seta, the absence of a second ventral seta on mid tibia and the slightly more elongated abdomen (Fig. 3).

Actually, the new species looks more similar to the western Nearctic *Clairvillia nitoris* (COQUILLET, 1898) by sharing a shiny black elongated abdomen and reduced ocellar seta. The latter differs by the presence of the median light vitta on anterior part of thoracic dorsum and the yellow colouration of the palpus.

Discussion

Our study raises the number of tachinid species known from South Korea to 173. This is still less than half of the number of species known from the adjacent Primorskii Krai, i.e. 371 species (ZIEGLER & SHIMA 1996) and also less than the poorly studied Khabarovskii Krai in Russia, i.e. 186 species (ZEEGERS 2017). Except for the newly described *Clairvillia nigra*, all species recorded for the first time for Korea had already been recorded in neighbouring regions (Northeast of China, Russian Far East and/or Japan), though none in North Korea.

Given the fact that a short collection effort resulted in an 11 % extension to the list of South Korean Tachinidae, it is likely that more unrecorded or undescribed species are yet to be found. Therefore, continuing studies and collection efforts in South Korea is needed to increase the understanding of the Tachinidae biodiversity richness of Korea.

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Zusammenfassung

Wir präsentieren die Ergebnisse einer relativ kleinen Aufsammlung an Tachinidae in Südkorea von den letzten Jahren. Von den insgesamt 33 Tachinidae-Arten, welche im Zuge der Untersuchung gefunden wurden, erwies sich die Hälfte (17 Arten) als neu für Südkorea und für die koreanische Halbinsel. Eine Art, *Clairvillia nigra* ZEEGERS nov.sp., wird neu für die Wissenschaft beschrieben. Die neue Art ähnelt, zumindest am ersten Blick, einigen nearktischen Arten wie beispielsweise *C. nitoris*. Mehrere interessante Arten wurden am Licht gefunden. Die Anzahl der aus Südkorea bekannten Tachinidae-Arten beläuft sich nun auf 173. Die koreanische Fauna der Tachinidae ist unzureichend erforscht und es sind noch viele weitere Arten zu erwarten.

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