

Three new species of empidid dance flies of the genus *Empis* Linnaeus, 1758 (Diptera: Empididae) from Namibia

Три новых вида мух-толкунчиков рода *Empis* Linnaeus, 1758 (Diptera: Empididae) из Намибии

S.Yu. Kustov¹, I.V. Shamshev^{2*}
С.Ю. Кустов¹, И.В. Шамшев^{2*}

¹ Kuban State University, Stavropol'skaya str., 149, Krasnodar 350040, Russia. E-mail: semenkustov@rambler.ru

² Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg 199034, Russia. E-mail: shamshev@mail.ru

¹ Кубанский государственный университет, ул. Ставропольская 149, Краснодар 350040, Россия.

² Зоологический институт РАН, Университетская наб. 1, С.-Петербург 199034, Россия.

*Corresponding author

KEY WORDS. Diptera, Empididae, *Empis*, Afrotropics, Namibia, new species.

КЛЮЧЕВЫЕ СЛОВА. Diptera, Empididae, *Empis*, Афротропика, Намибия, новые виды.

ABSTRACT. Three new species of empidid dance flies of the nominative subgenus of the genus *Empis* Linnaeus (Diptera: Empididae) are described from Namibia (Windhoek env.): *Empis* (*Empis*) *khomasiensis* Kustov et Shamshev, **sp.n.**; *E. (E.) namibiensis* Kustov et Shamshev, **sp.n.**; *E. (E.) windhoekiensis* Kustov et Shamshev, **sp.n.**

РЕЗЮМЕ. Три новых вида мух-толкунчиков из номинативного подрода рода *Empis* Linnaeus (Diptera: Empididae) описаны из Намибии (окр. Виндхук): *Empis* (*Empis*) *khomasiensis* Kustov et Shamshev, **sp.n.**; *E. (E.) namibiensis* Kustov et Shamshev, **sp.n.**; *E. (E.) windhoekiensis* Kustov et Shamshev, **sp.n.**

Introduction

The genus *Empis* Linnaeus, 1758 is one of two megadiverse genera of empidid dance flies (along with *Rhamphomyia* Meigen, 1822), with about 800 described species worldwide although the most of them are known from the Holarctic [Yang et al., 2007]. In the Afrotropics, *Empis* remains insufficiently studied and currently it includes only 69 species known mostly from South Africa [Sinclair, Dauteron, 2017]. The genus is represented by two subgenera — *Disneyempis* Smith, 1976 and *Empis* sensu stricto [Dauteron, Grootaert, 2003]. The latter includes all Afrotropical species with incomplete vein(s) M that were previously assigned by the authors to the subgenus *Coptophlebia* Bezzi, 1909 as it follows from a re-definition of this group by Dauteron et al. [2011].

Up to now, no named species of *Empis* have been known from Namibia [Sinclair, 2000, 2003; Dauteron,

Grootaert, 2003; Sinclair, Dauteron, 2017]. Our paper includes descriptions of three new species of the subgenus *Empis* sensu stricto that were collected in environs of Windhoek of Namibia.

Material and methods

This study is based on material deposited in Zoological Museum of Moscow University, Russia (ZMMU), some paratypes of the new species described herein will be housed in the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZISP). The material was collected by Nikita Vikhrev (ZMMU) during his trip to Namibia. The photographs were taken using a Canon EOS 11 40D camera and a Canon MP-E 65 mm objective, with multiple layers combined using the Helicon Focus 5.3.14 software. To facilitate observations, the terminalia were macerated in cold 10% KOH, then immersed for a short period in 85% lactic acid and viewed in glycerine. Images served as model for hand drawings, details were added directly observing objects. Terms used for adult structures follow those of Cumming and Wood [2017].

Taxonomic account

Class Insecta Linnaeus, 1758
Order Diptera Linnaeus, 1758
Suborder Brachycera Macquart, 1834
Superfamily Empidoidea Latreille, 1804
Family Empididae Latreille, 1804
Genus *Empis* Linnaeus, 1758

Empis (Empis) khomasiensis Kustov et Shamshev, **sp.n.**
Figs 1–3.

TYPE MATERIAL. Holotype ♂, Namibia, Windhoek env., 22.545°S 17.255°E, 1870 m, 11–15.i.2021, N. Vikhrev (ZMMU). Paratypes: 5♂, 3♀, same data as holotype (4♂, 3♀ — ZMMU; 1♂ — ZISP); 2♂, 1♀, same locality as holotype, 28–31.i.2021, N. Vikhrev (ZMMU).

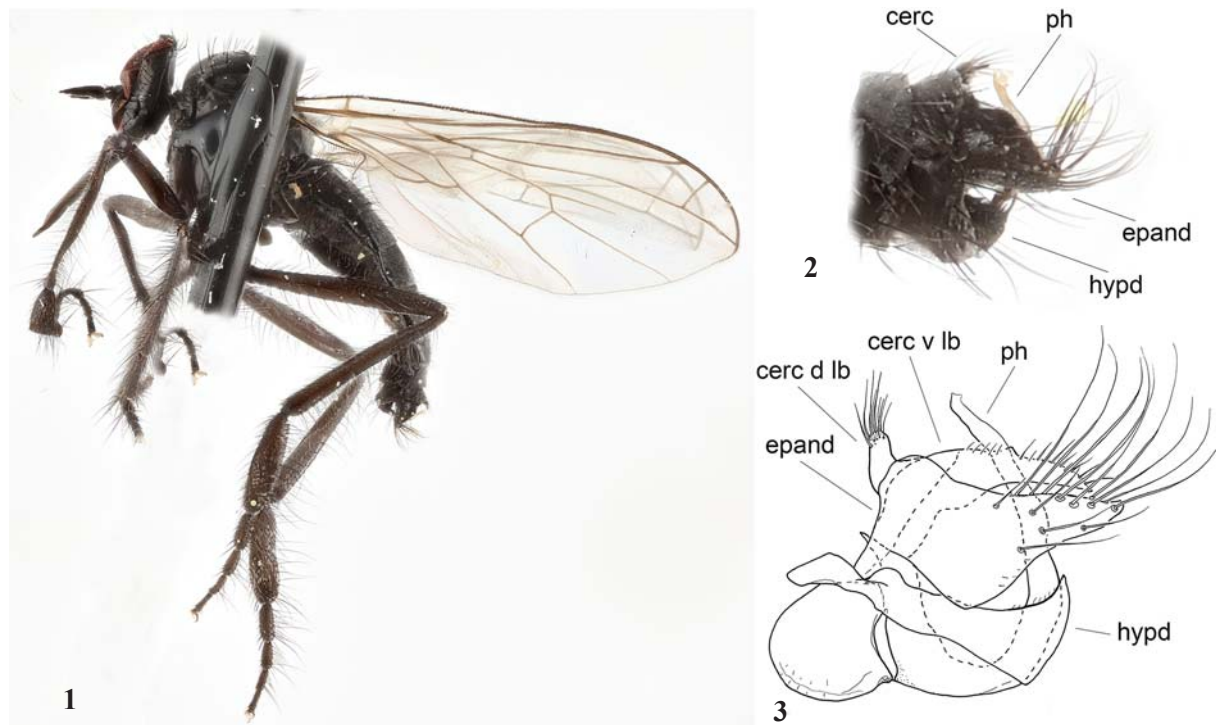
DIAGNOSIS. A small species of *E. (E.) setitarsus*-group; body about 3 mm, mesoscutum and abdomen extensively shiny; proboscis short, labrum only slightly longer than head height; thorax and abdomen black setose; M_1 and CuA+CuP incomplete, halter brown. Male: fore and hind tarsomeres 1–3 slightly thickened, tarsomeres 1–4 of all legs clothed in dense long setae.

DESCRIPTION. Body length 2.9; wing length 3.2 mm. **Male** (Fig. 1). Head with greyish, faint pruinescence on frons, face, clypeus (except shiny upper margin), ocellar triangle, occiput and postgena; black setose. Eyes holoptic, with upper ommatidia enlarged. Frons represented by very small, subtriangular space just below ocellar triangle and slightly larger space just above antennae. Face broad, almost parallel-sided, bare. Ocellar triangle with 2 very short fine setae and some minute setulae. Occiput with fine, moderately long postoculars and several similar setae laterally; postgena with hair-like setae. Antenna black; scape short, slightly longer than pedicel, both with short setulae; postpedicel elongate-conical, with narrow base and almost straight margins, nearly 3X as long as basal width and 2X longer than stylus. Proboscis short, with labrum only slightly longer than head height; labium lacking annulations, bearing scattered, minute setulae; labella rather short, nearly 2.5X shorter than labrum; with small, dorsal, desclerotised space on about

distal third (*in situ* visible as notch); palpus black, with black, scattered setulae.

Thorax black in ground-colour, black setose; mesonotum mostly faintly greyish pruinose, prothoracic sclerites (except postpronotal lobe) and mesopleuron densely greyish pruinose; mesoscutum with 2 narrow shiny vittae between rows of acrostichal and dorsocentral setae (situated in pruinose space) and 2 broader, elongate oval, shiny vittae between dorsocentral setae and upper margin of notopleuron (dorsal view), Proepisternum with 5–6 long setae on lower part and 3–4 short fine setae on upper part. Prosternum bare. Antepnotum with 3–4 moderately long setae on each side. Postpronotal lobe with 1 strong, long and several finer and shorter setae. Mesonotal setae well-differentiated: acrostichals moderately long, irregularly biserial, lacking on prescutellar depression; dorsocentrals irregularly biserial and more numerous before suture, uniserial and sparser along prescutellar depression, longer than acrostichal setae, 2 prescutellar setae longest; 1 presutural intra-alar (with 1–2 additional shorter and finer setae), 1 presutural supra-alar (with 1–2 setulae just beyond postpronotal lobe), 3 long notopleurals (with 2–3 setulae anteriorly), 1 postsutural supra-alar (with 1 additional short, fine seta anteriorly), 1 long and 1 minute postalars, 4 scutellars (apical setae long, lateral setae somewhat shorter and finer). Laterotergite with numerous setae of different lengths. Anterior and posterior spiracles brownish.

Legs long, slender, entirely dark brown, mostly subshiny, faintly greyish pruinose, black setose, coxae denser pruinose; covered with almost uniformly fine setae, only mid femur and tibia with slightly stronger setae. Coxae and trochanters with simple setae, fore coxa with numerous setae anteriorly. Fore femur mostly with minute anteroventral and posteroventral



Figs 1–3. *Empis (Empis) khomasiensis*, **sp.n.**, ♂, lateral view: 1 — habitus; 2 — postabdomen; 3 — hypopygium. Abbreviations: cerc — cercus; cerc d lb — dorsal lobe of cercus; cerc v lb — ventral lobe of cercus; epand — epandrium; hypd — hypandrium; ph — phallus.

Рис. 1–3. *Empis (Empis) khomasiensis*, **sp.n.**, ♂, сбоку: 1 — габитус; 2 — постабдомен; 3 — гипопигий. Сокращения: cerc — церк; cerc d lb — дорсальная лопасть церка; cerc v lb — вентральная лопасть церка; epand — эпандрий; hypd — гипандрий; ph — фаллус.

setae, some longer setae present closer to base and similar setae on about basal half anteriorly. Fore tibia with numerous long setae dorsally and posteriorly. Fore tarsomeres 1–3 slightly thickened. Mid femur with more or less distinct row of numerous moderately long anterodorsal setae on about basal half; complete row of anteroventral setae, which are long on about basal 2/3 and short, fine on about apical 1/3 (long setae almost 1.5X as long as femur middle width); row of posteroventral setae, which are long on about basal 1/3 and short to moderately long on about apical 2/3. Mid tibia with numerous intermixed moderately long to long setae anterodorsally and posterodorsally (long setae nearly 1.5X longer than tibia width); row of dense, mostly very long anteroventral setae (2.5–3X longer than tibia width); row of less numerous, moderately long posteroventral setae. Mid tarsomeres slender. Hind femur with dense long setae along entire length anteriorly; row of anteroventral setae, which are rather long on about basal 2/3 and short on about apical 1/3; some long setae closer to base dorsally and posteriorly. Hind tibia slightly, evenly thicken toward apex (lateral view) and somewhat curved (posterior view); with dense, long setae anterodorsally and posterodorsally, similar shorter setae anteriorly and anteroventrally. Hind tarsomeres 1–3 slightly thickened. Tarsomeres 1–4 of all legs clothed in dense long setae.

Wing membrane hyaline; veins mostly brownish, somewhat paler proximally, well sclerotised; M_1 and $CuA+CuP$ incomplete; cell dm short, with slightly elongate apex. Pterostigma absent. Basal costal seta absent. Anal lobe well-developed; axillary incision right-angled. Squama brownish, black fringed. Halter brown.

Abdomen black in ground-colour, mostly almost shiny, very faintly greyish pruinose; segment 1, extreme anterior margin of segment 2, entire segments 7 and 8 denser pruinose; covered with numerous black, fine setae longer laterally. Segment 8 with separated sclerites; tergite 8 without projections, entire, rather long, with straight posterior margin, bearing 6–7 moderately long posteromarginal setae; sternite 8 broadly desclerotized posteriorly and narrowly on anterior part medially.

Terminalia (Figs 2–3) concolorous with abdomen (except noted), black setose. Epandrium divided into two lamellae (dorsal bridge absent); epandrial lamella subtriangular (lateral view), with numerous long marginal setae (more closely set at apex). Hypandrium short, in ventral view rather subrectangular, bifid apically, with two short, subtriangular projections on upper margin; bare. Hypoproct subrectangular (dorsal view), reaching phallus, bare. Phallus brownish yellow, mostly hidden, short, evenly curved, mostly thick with subapical part somewhat narrowed. Ejaculatory apodeme large, extended far beyond basal curvature of phallus, without lateral wings. Cerci attached to each other anteriorly and almost fused narrowly to anterodorsal part of epandrium; cercus viewed laterally broadly concave; dorsal lobe short, rather digitiform (lateral view), with short setae; ventral lobe viewed laterally very narrow, pointed apically, long, not reaching apex of epandrial lamella; ventral lobe viewed dorsally rather clavate, with apical part flattened and broadly ovate, covered numerous setulae.

Female. Similar to male except the following characters. Frons broad, parallel-sided; labrum slightly longer than in male. Acrostichals and dorsocentrals shorter. Legs with ordinary setation, tarsomeres not thickened. Wing broader, slightly darkened. Abdomen almost shiny covered with shorter black setation. Cercus black, long, with scattered hair-like setulae.

REMARKS. Within the key to species of *Coptophlebia* from South Africa *E. khomasiensis* **sp.n.** would run to *E.*

abrupta Thomson, 1869 [Smith, 1969]. According to Smith's [1969: 177] not quite complete re-description of the male holotype of *E. abrupta* the new species differs from its by somewhat shorter proboscis as well as by shorter anteroventral and posteroventral setae on the mid tibia. In addition, the new species apparently has longer cercus and shorter hypandrium [Smith, 1969: 178, fig. 213]. Also, the new species could be compared with *E. cetywayoi* Smith, 1969, *E. vumba* Smith, 1969 and *E. nigrisquama* Smith, 1969. However, in *E. cetywayoi* the anal vein is complete whereas both *E. vumba* and *E. nigrisquama* have abdominal tergites with yellow setae laterally. The new species shows rather intermediate position between *E. (E.) setitarsus* and *E. (C.) bivittata* groups [sensu Daugeron, Grootaert, 2003] due to a combination of a medially desclerotised male abdominal sternite 8 (*E. (E.) setitarsus* group) and a bifid hypandrium (*E. (C.) bivittata* group). Provisionally, we placed the new species to the *E. (E.) setitarsus* group. It has short, simple hypandrium and hypandrial bifid structure may be evolved independently. In species of the *E. (C.) bivittata* group the hypandrium is massive and uprated in its apical half [Daugeron, Grootaert, 2003: 342, fig. 2].

ETYMOLOGY. The name of the new species refers to the Khomas Region of Namibia, where it was collected.

DISTRIBUTION. Afrotropics: Namibia.

Empis (Empis) namibiensis Kustov et Shamshev, **sp.n.**
Figs 4–6.

TYPE MATERIAL. Holotype ♂, Namibia, Windhoek env., 22.545°S 17.255°E, 1870 m, 28–31.i.2021, N. Vikhrev (ZMMU). Paratypes: 11♂ 3♀, same data as holotype (ZMMU, 1♂ — ZISP).

DIAGNOSIS. A species of *E. (E.) setitarsus*-group; body about 4.5 mm; proboscis long, labrum 1.5–2X as long as head height; laterotergite with pale setae; abdomen densely light grey pruinose, only pale setose; wing with complete veins M_1 and $CuA+CuP$. Male: wing hyaline. Female: legs with simple setae, wing somewhat broadened and slightly darkened.

DESCRIPTION. Body length 4.5–4.8; wing length 4–4.2 mm. **Male** (Fig. 4). Head with greyish, dense pruinescence on frons, face (except shiny lower margin), clypeus (except shiny upper margin), ocellar triangle, occiput and postgena; black setose (except noted). Eyes holoptic, with upper ommatidia enlarged. Frons represented by very small, subtriangular space just below ocellar triangle and slightly larger space just above antennae. Face broad, almost parallel-sided, bare. Ocellar triangle with several subequally short, fine setae. Occiput with fine, moderately long postoculars and several similar setae laterally; postgena with numerous long, pale, hair-like setae. Antenna black; scape short, slightly longer than pedicel, both with short setulae; postpedicel elongate-conical, with narrow base and almost straight margins, nearly 3X as long as basal width and 1.5–1.6X longer than stylus. Proboscis moderately long, with labrum nearly 1.5X as long as head height; labium lacking annulations, bearing scattered, minute setulae; labella moderately long, nearly 2X shorter than labrum; with small, dorsal, desclerotized space on about distal third (visible *in situ* as notch); palpus black, with black, scattered setulae.

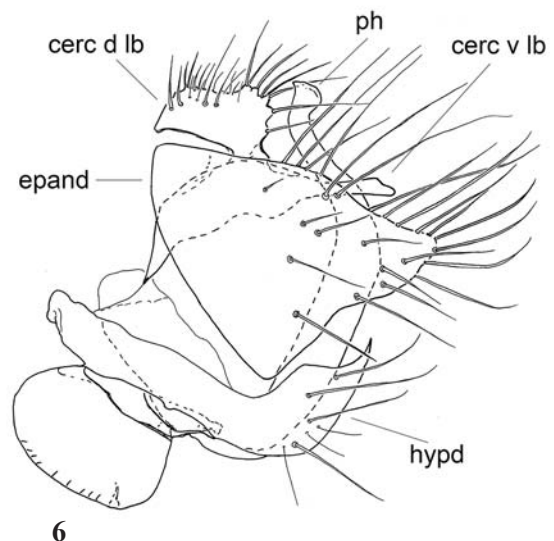
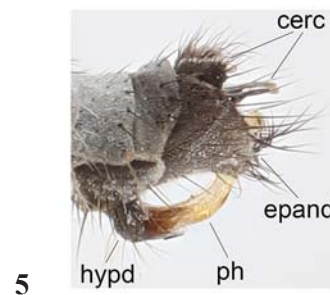
Thorax black in ground-colour, densely greyish pruinose; mesoscutum with 4 brownish vittae (dorsal view), lateral vittae (between dorsocentral and supra-alar setae) less distinct. Proepisternum with 6–7 long, fine, pale setae on lower part and 2–3 similar setae on upper part. Prosternum bare. Anteprotonotum with 4–5 pale setae on each side. Postpronotal lobe with 1 strong, long, black seta and several fine, pale, short setae anteriorly. Mesonotal setae well-differentiated, black; noto-

pleuron with several short, fine, pale setae anteriorly, sometimes pale setulae present just behind postpronotal lobe: acrostichals rather long, biserial, lacking on prescutellar depression; dorsocentrals irregularly 2–3-serial and similar to acrostichals before suture, uniserial and sparser along prescutellar depression, 2 prescutellar setae longest; 1 fine, moderately long presutural intra-alar, 1 similar presutural supra-alar, 3 long notopleurals, 1 postsutural supra-alar (with 2–3 additional short, fine setae anteriorly), 1 long and 1 minute postalar, 4 scutellars (apical setae long and cruciate, lateral setae short and fine). Laterotergite with numerous pale setae of different lengths. Anterior and posterior spiracles brownish.

Legs long, slender, entirely dark brown, mostly faintly greyish pruinose, coxae densely pruinose, black setose (except noted). Coxae and trochanters mostly with pale fine setae, mid and hind coxae often with some additional dark setae. Fore femur with rows of very short, fine, mostly pale anteroventral and posteroventral setae. Fore tibia with slightly longer setulae posterodorsally and posteriorly; setae of subapical circling mostly short, fine, 1 anteroventral and 1 posteroventral setae longer. Fore basitarsus slender; fore tarsomeres covered with short setae (except circling of some-

what longer subapical setae). Mid femur with row of mostly pale posteroventral setae becoming longer toward base of femur (longest setae nearly 1.5X longer than femur basal width). Mid tibia with 4–5 moderately long dorsal (at most 1.5X longer than tibia width) setae and some numerous, slightly shorter setae ventrally (besides circling of short subapicals). Mid tarsomeres slender, mostly covered with short setae; mid basitarsus with numerous, short, spine-like setae ventrally. Hind femur with mostly very short anteroventral setae (slightly longer closer to apex); long, pale, fine setae on about basal half posteroventrally and posteriorly. Hind tibia slightly almost uniformly thickened viewed laterally (except extreme base), slightly curved viewed posteriorly; with rows of numerous anterodorsal and posterodorsal setae of different lengths (longest setae at most 1.5X as long as tibia middle width), some rather short setae ventrally. Hind basitarsus slightly, uniformly thickened but not broader than apex of hind tibia; with several moderately setae dorsally and numerous short, spine-like setae ventrally.

Wing membrane hyaline, veins brownish; longitudinal veins complete, well sclerotised, only CuA+CuP (anal vein) somewhat weakened beyond midway toward wing margin;



Figs 4–6. *Empis (Empis) namibiensis*, sp.n., ♂, lateral view: 4 — habitus; 5 — postabdomen; 6 — hypopygium. Abbreviations: cerc — cercus; cerc d lb — dorsal lobe of cercus; cerc v lb — ventral lobe of cercus; epand — epandrium; hypd — hypandrium; ph — phallus.

Рис. 4–6. *Empis (Empis) namibiensis*, sp.n., ♂, сбоку: 4 — габитус; 5 — постабдомен; 6 — гипопигий. Сокращения: cerc — церк; cerc d lb — дорсальная лопасть церка; cerc v lb — вентральная лопасть церка; epand — эпандрий; hypd — гипандрий; ph — фаллус.

cell dm short, with elongate apex. Pterostigma brownish. Basal costal seta present, short, fine. Anal lobe well-developed; axillary incision almost right-angled. Squama yellow, pale fringed. Halter yellow.

Abdomen black in ground-colour, uniformly densely light grey pruinose, tergites with narrowly pale posterior margin; covered with numerous pale hair-like setae longer laterally. Segment 8 with separated sclerites; tergite 8 without projections, entire, somewhat concave posteriorly; sternite 8 broad, desclerotized medially.

Terminalia (Figs 5–6). Epandrium densely greyish pruinose, black setose, divided into two lamellae (dorsal bridge absent); epandrial lamella subtriangular (lateral view), with long setae along upper margin and apically. Hypandrium with basal part faintly greyish pruinose, bearing several moderately long, fine, pale setae; apical part subshiny, yellowish brown; short, in ventral view rather subrectangular, with slightly concave upper margin. Hypoproct slender, digitiform (dorsal view), bare. Phallus yellowish, mostly hidden, short, evenly curved, mostly thick with subapical part narrowed. Ejaculatory apodeme large, extended far beyond basal curvature of phallus, without lateral wings. Cerci black, subshiny, black setose; separated from each other by distinct membranous space but almost fused narrowly to anterodorsal part of epandrium; cercus somewhat concave posteriorly (lateral view); dorsal lobe subrectangular, short, with short marginal setae; ventral lobe nearly as long as dorsal lobe but very slender, with 2 long setae.

Female. Similar to male except the following characters. Frons broad, parallel-sided; labrum somewhat longer than in male Acrostichals and dorsocentrals shorter. Legs with shorter, simple setation. Wing broader, slightly darkened. Abdomen densely light grey pruinose, covered with shorter setae. Cercus black, long, with scattered hair-like setulae.

REMARKS. *Empis namibiensis* sp.n. belongs to the *E. (Empis) setitarsus*-group [Daugeron, Grootaert, 2003; Sinclair, Daugeron, 2017]. Within the key to species of this

group the new species would run to *E. namaqua* Smith, 1969 and *E. corana* Smith, 1969 [Daugeron, Grootaert, 2003]. The new species differs from both these species primarily by pale setae on the laterotergite and abdomen [Smith, 1969].

ETYMOLOGY. The name of the new species refers to the country of its origin.

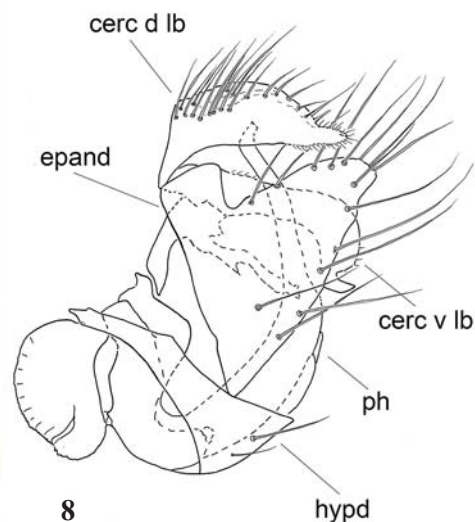
DISTRIBUTION. Afrotropics: Namibia.

Empis (Empis) windhoekiensis Kustov et Shamshev, sp.n.
Figs 7–8.

TYPE MATERIAL. Holotype ♂, Namibia, Windhoek env., 22.545°S 17.255°E, 1870 m, 28–31.i.2021, N. Vikhrev (ZMMU). Paratypes: 8 ♂, same data as holotype (ZMMU, 1 ♂ — ZISP).

DIAGNOSIS. A species of *E. (E.) setitarsus*-group; body 3.5–4.5 mm; proboscis short, labrum only slightly longer than head height; laterotergite with black setae; abdomen greyish pruinose, only pale setose; wing with incomplete veins M_1 and CuA+CuP, pterostigma pale yellowish, halter brown. Male: fore basitarsus slightly thickened; wing hyaline.

DESCRIPTION. Body length 3.5–4.2, wing 4.2–4.5 mm. **Male** (Fig. 7). Head with greyish, dense pruinescence on frons, face, clypeus (except shiny upper margin), ocellar triangle, occiput and postgena; black setose. Eyes holoptic, with upper ommatidia enlarged. Frons represented by very small, subtriangular space just below ocellar triangle and slightly larger space just above antennae. Face broad, almost parallel-sided, bare. Ocellar triangle with several fine setae, 2 setae somewhat longer. Occiput with fine, moderately long postoculars and several similar setae laterally; postgena with numerous hair-like setae. Antenna black; scape short, slightly longer than pedicel, both with short setulae; postpedicel elongate-conical, with lower margin slightly concave distally, nearly 2.5X as long as basal width; stylus short, nearly 2.5X shorter than postpedicel. Proboscis short, with labrum only slightly longer than head height (1.2–1.3X); labium lacking annulations, bearing scattered, minute setulae; label-



Figs 7–8. *Empis (Empis) windhoekiensis*, sp.n., ♂ lateral view: 7 — habitus; 8 — hypopygium. Abbreviations: cerc d lb — dorsal lobe of cercus; cerc v lb — ventral lobe of cercus; epand — epandrium; hypd — hypandrium; ph — phallus.

Рис. 7–8. *Empis (Empis) windhoekiensis*, sp.n., ♂, сбоку: 7 — габитус; 8 — гипопигий. Сокращения: cerc d lb — дорсальная лопасть церка; cerc v lb — вентральная лопасть церка; epand — эпандрий; hypd — гипандрий; ph — фаллус.

la moderately long, nearly 2X shorter than labrum, with small desclerotized space on about distal 1/3 (visible *in situ* as notch); palpus black, with black, scattered setulae.

Thorax black in ground-colour, black setose; mesoscutum faintly greyish pruinose (dorsal view), prothoracic sclerites and mesopleuron somewhat denser greyish pruinose. Proepisternum with 4–5 rather short, fine setae on lower part and 4–6 similar setae on upper part. Prosternum bare. Antepronotum with 3 moderately long setae on each side. Postpronotal lobe with 1 strong, long and several fine, short setae. Mesonotal setae well-differentiated; acrostichals moderately long, thin, arranged in 2 close, irregular rows, lacking on prescutellar depression; dorsocentrals longer than acrostichals, 1–2-serial before suture, uniserial and longer along prescutellar depression, 2 prescutellar setae longest; 1 fine, moderately long presutural intra-alar, 1 longer presutural supra-alar, 3 notopleurals (2 setae stronger; additionally, with some setulae anteriorly), 1 postsutural supra-alar (with 3–4 additional short, fine setae anteriorly), 1 long and 1 minute postalar, 4 scutellars (apical setae long and cruciate, lateral setae only slightly shorter). Laterotergite with 5–6 long and some short fine setae. Anterior and posterior spiracles dark brown.

Legs rather robust, black, subshiny (except coxae), faintly greyish pruinose, black setose; coxae densely pruinose. Fore coxa and trochanter almost bare, only with scattered minute setulae; hind trochanter with long, dense setae. Fore femur with row of short anteroventral fine setae on about basal half, almost bare posteroventrally, only some minute posteroventral setulae closer to base. Fore tibia with numerous long, fine setae posterodorsally (longest setae about 2X as long as tibia width). Fore basitarsus thickened but only slightly stouter than fore tibia at apex; with moderately long, dense, fine setae posterodorsally; tarsomeres 1–4 with rather long setae of subapical circlet. Mid femur with complete rows of numerous anteroventral and posteroventral setae, which are long on about middle part of femur and short near its base and apex; longest anteroventral setae nearly 1.5X as long as femur middle width. Mid tibia with several intermixed moderately long to long ad setae closer to base, more or less distinct row of moderately long posterodorsal setae and rows of moderately long anteroventral and short posteroventral setae. Mid basitarsus nearly as broad as mid tibia at apex; tarsomeres 1 and 2 with short spine-like setae ventrally, tarsomeres 1–3 with rather long setae of subapical circlet (longer dorsally). Hind femur with complete rows of long anteroventral (longest setae on about apical half nearly 1.5X as long as femur middle width) and short posteroventral setae. Hind tibia slightly uniformly thickened (lateral view) and somewhat curved (posterior view); with numerous moderately long to long setae dorsally; no seta in posteroapical comb. Hind basitarsus slender; with dorsal setation as on hind tibia, numerous short, spine-like setae ventrally.

Wing membrane hyaline, veins mostly brownish, paler proximally; M_1 beyond cell dm and CuA+CuP (anal vein) very thin, M_2 and M_4 weakened before wing margin; M_1 and CuA+CuP incomplete; cell dm short, with slightly elongate apex. Pterostigma pale yellowish, hardly distinguishable. Basal costal seta present, long, black. Anal lobe well-developed; axillary incision right-angled. Squama brownish, pale fringed. Halter brown.

Abdomen black in ground-colour, uniformly greyish pruinose, mostly covered with numerous pale hair-like setae longer on tergites laterally; sternite 7 with some fine black postermarginal setae, segment 8 with black setae of different lengths. Segment 8 with separated sclerites; tergite 8 without projections, entire, somewhat concave posteriorly; sternite 8 desclerotized medially.

Terminalia (Fig. 8) moderately large, concolorous with abdomen (except noted), black setose. Epandrium divided into two lamellae (dorsal bridge absent); epandrial lamella subtriangular (lateral view), with rather deep excision closer to base dorsally, with long, fine setae along lateral margins. Hypandrium short, subtriangular (ventral view), with 2 long and 2 short setae. Hypoproct strongly sclerotised, elongate, reaching phallus, narrow on middle part and broadened distally, bare. Phallus brownish yellow, mostly hidden, short, evenly curved, thick on about basal 2/3 and slender on apical 1/3. Ejaculatory apodeme large, extended far beyond basal curvature of phallus, without lateral wings. Cerci closely attached and almost fused anteriorly, separated from epandrium; cercus almost entirely divided in two lobes by narrow notch (lateral view) posteriorly; dorsal lobe rather trapezoid (lateral view), with short, dense, strong setae anteriorly and scattered, fine setae on remaining part; ventral lobe much narrower and slightly longer than dorsal lobe (lateral view), slightly extended beyond epandrial lamella, digitiform, gently curved downwards on about apical half, with some minute setulae.

Female. Unknown.

REMARKS. *Empis windhoekiensis* **sp.n.** belongs to the *E. (Empis) setitarsus*-group [Daugeron, Grootaert, 2003; Sinclair, Daugeron, 2017]. Within the key to species of this group the new species would run to the couplet 19 joining *E. vetula* Smith, 1969 and *E. cinerarius* Daugeron et Grootaert, 2003 [Daugeron, Grootaert, 2003]. The new species can be readily distinguished from both these species primarily by black setae on the laterotergite. In addition, in the male of *E. vetula* the phallus is well-exposed, longer, and uniformly slender [Smith, 1969: 175, fig. 209], whereas in the male of the new species the phallus is short, mostly hidden, thick on about basal 2/3 and slender on apical 1/3. Besides the colour of laterotergal setae, *E. windhoekiensis* **sp.n.** differs from *E. cinerarius* by shorter proboscis (labrum only slightly longer than head height versus labrum about 2X longer than head height), shorter and thicker antennal stylus as well as by the structure of the male hypopygium.

ETYMOLOGY. The name of the new species refers to the type locality, Windhoek.

DISTRIBUTION. Afrotropics: Namibia.

Discussion

Daugeron and Grootaert [2003] recognised seven monophyletic groups within Afrotropical *Empis*. We have placed all three new species to the *E. setitarsus* group, primarily based on a similarity of the structure of the male postabdomen. However, in these species the labellum has a desclerotized space that is one of two synapomorphies of the *E. hyalea* group sensu Daugeron et Grootaert. Nevertheless, the new species cannot be included in the *E. hyalea* group because they share completely divided epandrium (*versus* with dorsal bridge). In addition, as we have noted above, *E. khomasiensis* **sp.n.** has a bifid hypandrium somewhat resembling that in species of the *E. bivittata* group. The phylogenetic background of the presence of these characters in the species of the *E. setitarsus* group is not clear but probably may suggest more complicated relationships within Afrotropical *Empis*. In addition, couplets 17–18 of the key to genera of Afrotropical Empididae [Sinclair, Daugeron, 2017: 1230], that join the *E.*

hyalea, *E. setitarsus* and *E. bivittata* groups, may be sometimes confusing. Within the *E. setitarsus* group, the new species probably belong to the *E. barotse*-complex. The *E. setitarsus* group is Afrotropical endemic and now it includes 27 named species known mostly from South Africa and Namibia but also from Kenya, Mozambique, Tanzania and Zimbabwe [Daugeron, Grootaert, 2003; Sinclair, Daugeron, 2017].

Acknowledgements. The authors are indebted to Dr. Andrey Ozerov and Dr. Nikita Vikhrev (both ZMMU) for the loan of specimens used in this study. The study of Igor Shamshev was performed within the frames of the Russian State Research Project No. 122031100272-3 of the Ministry of Science and Higher Education of the Russian Federation. We are grateful to two anonymous reviewers for helpful remarks.

Competing interests. The authors declare no competing interests.

References

- Cumming J.M., Wood D.M. 2017. 3. Adult morphology and terminology // A.H. Kirk-Spriggs, Sinclair B.J. (eds.). Manual of Afrotropical Diptera. Vol.1. Introductory chapters and keys to Diptera families. Suricata 4. Pretoria: SANBI Graphics & Editing. P.89–133.
- Daugeron C., Grootaert P. 2003. Assessment of monophyly of species-groups within Afrotropical Empidini (Diptera: Empididae: Empidinae), with a cladistic analysis of the *Empis setitarsus*-group // Systematic Entomology. Vol.28. P.339–360. <https://doi.org/10.1046/j.1365-3113.2003.00214.x>.
- Daugeron C., Plant A., Shamshev I., Stark A., Grootaert P. 2011. Phylogenetic reappraisal and taxonomic review of the *Empis (Coptophlebia) hyalipennis*-group (Diptera: Empididae: Empidinae) // Invertebrate Systematics. Vol.25. P.254–271. <http://dx.doi.org/10.1071/IS11006>.
- Sinclair B.J. 2000. Empidoidea, exclusive of Dolichopodidae (Diptera) // Cimbebasia Memoir. Vol.9. P.223–225.
- Sinclair B.J. 2003. Southern African Empidoidea (Diptera) — phylogenetic patterns and biogeographic implications // Cimbebasia. Vol.19. P.205–213.
- Sinclair B.J., Daugeron C. 2017. Empididae (empidid dance flies or balloon flies) // A.H. Kirk-Spriggs, B.J. Sinclair (eds.). Manual of Afrotropical Diptera. Vol.2. Nematocerous Diptera and lower Brachycera. Suricata 5. Pretoria: SANBI Graphics & Editing. P.1221–1235.
- Smith K.G.V. 1969. The Empididae of Southern Africa (Diptera) // Annals of the Natal Museum. Vol.19. P.1–347.
- Yang D., Zhang K.Y., Yao G., Zhang J.H. 2007. World Catalog of Empididae (Insecta: Diptera). Beijing: China Agricultural University Press. 599 pp.