

## To taxonomy of the genus *Cleigastra* Macquart, 1835 (Diptera: Scatophagidae) with description of two new species

### К таксономии двукрылых рода *Cleigastra* Macquart, 1835 (Diptera: Scatophagidae) с описанием двух новых видов

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КЛЮЧЕВЫЕ СЛОВА: Diptera, Scathophagidae, *Cleigastra*, новый вид, Россия.

ABSTRACT. It is offered to concern the genera *Cleigastra* Macquart, 1835, *Gonarcticus* Becker, 1894, *Gonatherus* Rondani, 1856, *Nanna* Strobl, 1894, *Orthacheta* Becker, 1894 and *Spathophilus* Becker, 1894 as one genus *Cleigastra* sensu lato with the three subgenera *Cleigastra* sensu stricto, *Gonatherus* and *Orthacheta*. Two species, new to science, are described: *Cleigastra* (*Cleigastra*) *intermedia* sp.n. from Novosibirsk Oblast and Khabarovsk Krai (Russia), and *Cleigastra* (*Orthacheta*) *maritima* sp.n. from Primorskiy Krai (Russia).

РЕЗЮМЕ. Предложено рассматривать роды *Cleigastra* Macquart, 1835, *Gonarcticus* Becker, 1894, *Gonatherus* Rondani, 1856, *Nanna* Strobl, 1894, *Orthacheta* Becker, 1894 и *Spathophilus* Becker, 1894 в одном роде *Cleigastra* sensu lato с тремя подродами *Cleigastra* sensu stricto, *Gonatherus* и *Orthacheta*. Описаны два новых для науки вида: *Cleigastra* (*Cleigastra*) *intermedia* sp.n. из Новосибирской области и Хабаровского края (Россия), и *Cleigastra* (*Orthacheta*) *maritima* sp.n. из Приморского края (Россия).

In our work with review of 7 genera of Scathophagidae of Russia we discussed if the genera *Cleigastra* Macquart, 1835, *Gonarcticus* Becker, 1894, *Gonatherus* Rondani, 1856, *Nanna* Strobl, 1894, *Orthacheta* Becker, 1894 and *Spathophilus* Becker, 1894 “might be better placed in one single genus *Cleigastra* sensu lato with two alternative compositions: with six subgenera (*Cleigastra* sensu stricto, *Gonarcticus*, *Gonatherus*, *Nanna*, *Orthacheta* and *Spathophilus*) or with only three subgenera (*Cleigastra* sensu stricto, *Gonatherus* and *Orthacheta*)” [Ozerov & Krivosheina, 2015: 203].

It was demonstrated that such characters like the lack or presence of proepisternal hairs, presence or absence of setulae on vein R<sub>1</sub> or the number of setae on

the scutellum are variable. They can therefore be used for separating species but not genera.

Basing on additional studied material (males of *C. intermedia* sp.n., see description below)<sup>1</sup> we make a conclusion to support the hypothesis on the necessity to unite abovementioned genera in one genus *Cleigastra* with three subgenera *Cleigastra* sensu stricto, *Gonatherus* and *Orthacheta*.

We consider *Gonatherus* and *Orthacheta* to be at subgeneric level because the females from these genera have ovipositor with moderate sternite 7, flattened laterally [Ozerov & Krivosheina, 2015: Figs. 50–53, 171–174]. The species of *Cleigastra* sensu stricto possess simple sternite 7, segment 7 often forming sintergosternite [Ozerov & Krivosheina, 2015: Figs. 14–16, 103, 179–181].

The nomenclatural summary is as follows.

#### Genus *Cleigastra* Macquart, 1835

Subgenus *Cleigastra* Macquart, 1835: 384. Gender: feminine. Type-species: *Cordylura apicalis* Meigen, 1826, by designation of Westwood, 1840.

*Cnemopogon* Rondani, 1856: 100. Gender: masculine. Type-species: *Cordylura apicalis* Meigen, 1826, by original designation.

*Gonarcticus* Becker, 1894: 103. Gender: masculine. Type-species: *Scatomyza antennata* Zetterstedt, 1838, by original designation — **syn.n.**

*Nanna* Strobl, 1894: 77 [as subgenus of *Cordilura* Fallén, 1810]. Gender: feminine. Type-species: *Cordylura flavipes* Fallén, 1819, by designation of Vockeroth, 1965) — **syn.n.**

*Amaurosoma* Becker, 1894: 109. Gender: neuter. Type-species: *Cordylura flavipes* Fallén, 1819, by original designation.

<sup>1</sup>*C. intermedia* has a pair of strong lateral scutellar setae and a pair of apical scutellar setulae (as in *Cleigastra* sensu stricto and in *Nanna*), proepisternum with hairs in central part (as in *Nanna*), and vein R<sub>1</sub> setulose on apical third of dorsal surface (as in *Cleigastra* sensu stricto).

*Spathephilus* Becker, 1894: 121. Gender: masculine. Type-species: *Cordylura breviventris* Loew, 1873, by original designation — **syn.n.**

*Pselaphephila* Becker, 1894: 122. Gender: feminine. Type-species: *Pselaphephila loewi* Becker, 1894, by monotypy.

*Monochaeta* Becker, 1894: 87, 186. Gender: feminine. Junior secondary homonym, preoccupied by *Monochaeta* Brauer et Bergenstamm, 1890). Type-species: *Cordylura breviventris* Loew, 1873, by original designation.

Subgenus *Orthacheta* Becker, 1894: 101. Gender: feminine. Type-species: *Cordylura pilosa* Zetterstedt, 1838, by original designation — **syn.n.**

*Orthochaeta*: unjustified emend. [Aldrich, 1905: 567; Hendel, 1930: 8].

*Orthacheta* Rondani: error [wrong author given by Vockeroth, 1995: 733].

Subgenus *Gonatherus* Rondani, 1856: 99. Gender: masculine. Type-species: *Cordilura planiceps* Fallén, 1826, by original designation — **syn.n.**

Additionally two new species are described in this work, based on material deposited in the Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (ZISP), and Zoological Museum, Moscow State University, Russia (ZMUM).

The terminology used in the description of the new species follows McAlpine [1981], Cumming et al. [2009], and Stuckenberg [1999]. Dissected male genitalia were examined with a Nikon SMZ645 zoom stereomicroscope and then photographed using an eTREK DCM900 digital camera attached in place of an eyepiece of monocular microscope. Resulting batches of images were processed with CombineZP software [Hadley 2007], editing of stacked images was performed in Adobe Photoshop.

## Descriptions of new species

### *Cleigastra (Cleigastra) intermedia* sp.n.

Figs. 1–4.

**MATERIAL.** Holotype ♂, RUSSIA: Novosibirsk reg., Salair Range (54.55°N 84.86°E), 11.V.2015, O. Kosterin (ZMUM). Paratypes: 2 ♂♂, 1 ♀, data as for holotype (ZMUM); 1 ♀, RUSSIA: Khabarovsk reg. Khicha river (49.05°N 139.43°E), 690 m, 10.VI.2014, N. Vikhrev (ZMUM); 1 ♀, RUSSIA: Khabarovsk reg. Manoma river (49.44°N 137.41°E), 8.VI.2014, N. Vikhrev (ZMUM). Both paratype females from Khabarovsk region were mentioned as *Cleigastra apicalis* (Meigen, 1826) by Ozerov & Krivosheina [2015: 206].

**DESCRIPTION.** Male, female. Slender flies, about 3.7–6.2 mm long.

Head. Frontal vitta matt, black in upper part and yellow in lower third or half; fronto-orbital plate black, with greyish pollen. Face, parafacial and gena pale yellow. Postcranium black, greyish dusted, covered with whitish and black hairs and with row of black postocular setulae. Setae: 3 orbitals, 3 frontals, 1 ocellar, 1 inner vertical, 1 outer vertical (short), 1 postocellar; 1 pair of strong vibrissae and 1–2 pairs of short subvibrissae present. Antenna black. Postpedicel with acutely angled upper apical corner, about 3 times as

long as wide. Arista black, pubescent throughout its length. Palpus slender, yellow.

Thorax black, grey dusted. Acrostichals short in two or three rows, prescutellar pair not differentiated or only slightly longer than the other acrostichals, dorsocentrals 3+3, intra-alars 0+2, supra-alars 1+2, postpronotals 2, notopleurals 2, postalar 2. Proepisternum with hairs in central part (3–4 in female and only 1 in male), with 2 setae near lower margin. Proepimeron with 1 seta. Anepisternum covered with hairs in posterior part and with 4–5 black setae along posterior margin. Katepisternum covered with black setae in ventral corner and 3 strong katepisternal setae. Anepimeron bare. Scutellum black, with a pair of strong lateral scutellar setae and a pair of apical scutellar setulae.

Legs yellow, only fore femur posterodorsally, femora apex of mid and hind legs, coxae and tarsi of all legs darkened (Fig. 1). Fore femur with rows of posterodorsal (posterior) and anteroventral setae, with 3 anterodorsal and 4–5 anteroventral (in basal half) setae. Fore tibia with 1 posterodorsal, 2 dorsal (anterodorsal) and 1 posterior setae at middle, and ring of apicals. Mid femur with rows of anterior, and posteroventral setae, with 1 anteroventral seta in apical third, with 1 preapical posterior, and 1 preapical posterodorsal setae. Mid tibia with 2 posterodorsal, 2 anterodorsal, 1 posterior, 1 anteroventral setae, and ring of apicals. Hind femur with rows of anterodorsal, anteroventral and posteroventral setae, with 2 preapical anterior and 1 preapical posterodorsal seta. Hind tibia with 3 anterodorsal, 2 posterodorsal, 1 anteroventral, and ring of apicals, apical posteroventral setae present.

Wing clear or tinged with brownish; veins blackish; vein  $R_1$  setulose on apical third of dorsal surface. Calypters, margins of calypters, and halteres yellowish.

Abdomen cylindrical, black, greyish dusted, covered with hairs. Tergites 2–6 each with row of marginal setae. Male sternite 4 simple, about 2 times as long as wide (Fig. 2). Male sternite 5 with triangular-shaped lobes (Fig. 2). Surstyli simple, cerci with long seta in middle (Figs 3, 4). Ovipositor moderately long, cylindrical; sclerites of ovipositor shining. Female tergite 7 desclerotized in middle, in some species forming syntergosternite; sternite 8 as two small round sclerites.

**COMPARISON.** The next combination of characters: 1) proepisternum with hairs in central part, 2) vein  $R_1$  setulose on apical third of dorsal surface, 3) scutellum with a pair of strong lateral scutellar setae and a pair of apical setulae differentiate the new species from all other species of *Cleigastra* sensu lato.

### *Cleigastra (Orthacheta) maritima* sp.n.

Figs. 5, 7, 8–10.

**MATERIAL.** Holotype ♂, RUSSIA: Primorskiy Kray, Gribnoe (44.2574°N 132.6817°E), 10 km SE of Chernigovka, 19.V.1979, A. Zinoviev (ZISP). Paratype ♀, RUSSIA: Primorskiy Kray, Lazovskiy Reserve, Korpod' Cordon (43.2529°N 134.1265°E), 19–20.V.2007, V. Sidorenko (ZMUM).

**DESCRIPTION.** Male, female. Slender fly, about 4.5 mm long.



Figs 1–4. *Cleigastra intermedia* sp.n., holotype ♂: 1 — fore femur, anterior view; 2 — sternites 4 (lower) and 5 (upper); 3 — epandrium, cerci and surstyli, lateral view; 4 — same, dorsal view.

Рис. 1–4. *Cleigastra intermedia* sp.n., голотип ♂: 1 — голень передней ноги, спереди; 2 — стерниты 4 (нижний) и 5 (верхний); 3 — эпандрий, церки и сурстили, сбоку; 4 — то же, сверху.

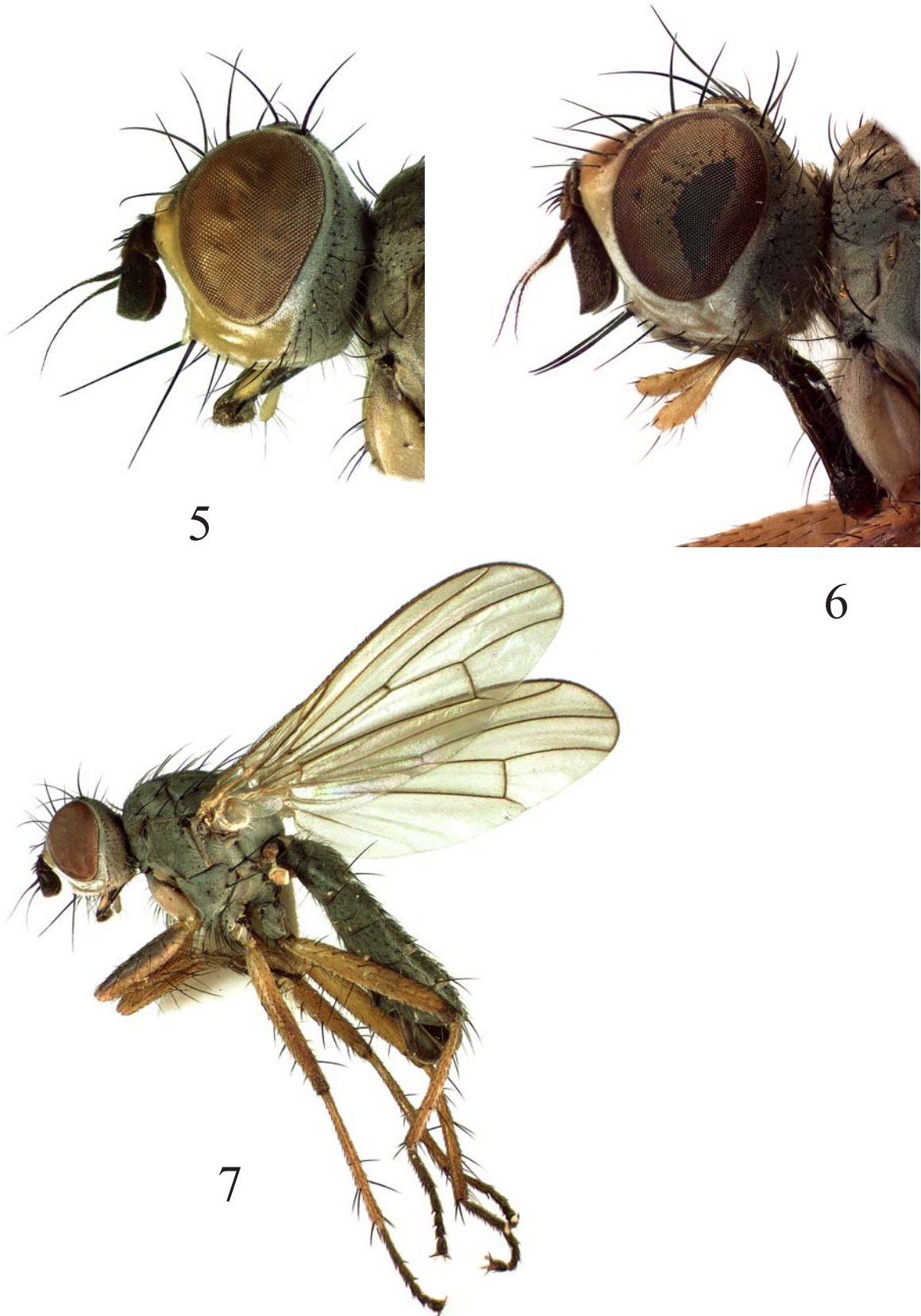
Head (Fig. 5). Frontal vitta matt, black in upper part and yellow in lower third; fronto-orbital plate black, with greyish pollen. Face, parafacial and gena pale yellow. Postcranium black, grey dusted, covered with yellow and black hairs and with row of black postocular setulae. Setae: 3 orbitals, 2 in female and 4–5 in male frontals, 1 ocellar, 1 inner vertical, 1 outer vertical, 1 postocellar; 1 pair of strong vibrissae and 1–2 pairs of short subvibrissae present. Antenna black. Postpedicel with acutely angled upper apical corner, about 2 times as long as wide. Arista black, pubescent throughout its length (Fig. 5). Palpus slender, yellow.

Thorax black, grey dusted. Acrostichals short in two rows, prescutellar pair slightly longer than the other acrostichals, dorsocentrals (3–4)+3, intra-alars (0–1)+2 (very short in female), supra-alars 1+2, postpronotals 1 in female and 2 in male, notopleurals 2, postalars 2. Proepisternum with hairs in central part,

with 1 seta near lower margin. Proepimeron with 1 seta. Anepisternum covered with hairs in posterior part and with 2–4 black setae along posterior margin. Katepisternum covered with black in female and pale in male setae in ventral corner and 3 strong katepisternal setae. Anepimeron bare. Scutellum black, with a pair of strong basal scutellar and a pair of strong apical scutellar setae.

Legs yellow, only fore femur posterodorsally and tarsi of mid and hind legs darkened (Fig. 7). Fore femur with rows of anterodorsal (anterior), posterodorsal, posterior and ventral setae, in male additionally with long pale setae on posterior surface. Fore tibia with 1 posterodorsal, 2 dorsal (anterodorsal) and 1 posterior setae at middle, and with apicals: dorsal, ventral and posterior. Mid femur with rows of anterior, anteroventral and ventral (posteroventral) setae, 1 preapical posterior, and 1 preapical posterodorsal setae. Mid tibia with 2





Figs 5–7. *Cleigastra maritima* sp.n. (5, 7) and *Cleigastra strigipes* (Johnson) (6), ♀♀: 5, 6 — head, lateral view; 3 — habitus.  
 Рис. 5–7. *Cleigastra maritima* sp.n. (5, 7) и *Cleigastra strigipes* (Johnson) (6), ♀♀: 5, 6 — голова, сбоку; 3 — общий вид.



Figs 8–10. *Cleigastra maritima* sp.n., holotype ♂: 8 — sternites 4 (lower) and 5 (upper); 9 — epandrium, cerci and surstyli, lateral view; 10 — same, dorsal view.

Рис. 8–10. *Cleigastra maritima* sp.n., голотип ♂: 8 — стерниты 4 (нижний) и 5 (верхний); 9 — эпандрий, церки и сурстили, сбоку; 10 — то же, сверху.

posterodorsal, 2 anterodorsal, 1 posterior, 1 anterior (anteroventral) setae, and ring of apicals. Hind femur with rows of anterodorsal and anteroventral setae and with 1 preapical posterior (posterodorsal) seta, and row of posteroventral setae, two of these in basal half very long. Hind tibia with 3 anterodorsal, 3 posterodorsal, 1 anteroventral, 1 preapical dorsal setae, and ring of apicals, apical posteroventral setae present.

Wing tinged with brownish, veins blackish; vein  $R_1$  setulose on apical third of dorsal surface. Calypters, margins of calypters, and halteres whitish.

Abdomen cylindrical, black, greyish dusted, covered with hairs. Tergites 2–6 each with row of marginal setae. Sternites 4 and 5 as in Fig. 8. Surstyli simple, long (Figs 9, 10).

**COMPARISON.** The new species is close to north-american *Cleigastra strigipes* (Johnson, 1927)<sup>2</sup>, differing from it by short postpedicel, about 2 times as long as wide (Fig. 5), hind tibia with apical posteroventral setae, intra-alar setae very short (as setulae), two frontal setae present. *C. strigipes* has long postpedicel, about 3.5 times as long as wide (Fig. 6), hind tibia

without apical posteroventral setae, intra-alar setae strong, four frontal setae present.

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## References

- Aldrich J. M. 1905. A catalogue of North American Diptera (or two-winged flies) // Smithsonian Institution, Smithsonian Miscellaneous Collections. Vol.46. No.1444. P.1–680.
- Becker T. 1894. Dipterologische Studien. I. Scatomyzidae // Berliner Entomologische Zeitschrift. Bd.39. H.1. S.77–196.
- Cumming J.M., Wood D.M. 2009. Adult morphology and terminology // Brown B.V., Borkent A., Cumming J.M., Wood D.M., Woodley N.E., Zumbado M. (eds.). Manual of Central American Diptera. Vol.1. Ottawa: National Research Council Press. P.9–50.
- Hadley A. 2007. CombineZM. Open source image processing software package for creating extended depth of field images. Available from: <http://www.hadleyweb.pwp.blueyonder.co.uk/> (accessed 17 January 2011)

<sup>2</sup> The differences are based on the study of male (Canada: Alberta, Onefour (49.1°N 110.4°W), 6.VI.1955, J.R. Vockeroth) and female (Canada: Alberta, Drumheller (51.4628°N 112.7053°W), 18.VI.1957, Brooks, MacNay) of *Cleigastra strigipes*.

- Hendel F. 1930. Entomologische Ergebnisse der schwedischen Kamtchatka-Expedition 1920–1922. 28. Diptera Brachycera 2. Fam. Cordyluridae und Dryomyzidae // Arkiv för Zoologi. Bd.21A. No.18. S.1–12.
- Macquart J. 1835. Histoire naturelle des Insectes. Diptères. Vol.2. Paris: Roret. 710 pp.
- McAlpine, J. F. 1981. Morphology and terminology-adults. Pp. 9–63. In: McAlpine J.F., Peterson B.V., Shewell G.E., Teskey H.J., Vokeroth J.R., Wood D.M., Coordinators. Manual of Nearctic Diptera. Volume 2. Research Branch. Agriculture Canada. Monograph 27, Ottawa. Vi+674 pp.
- Ozerov A.L., Krivosheina M.G. 2015. A review of the genera *Cleigastra* Macquart, *Gonarcticus* Becker, *Gonatherus* Rondani, *Hexamitocera* Becker, *Nanna* Strobl, *Orthacheta* Becker and *Spathephilus* Becker (Diptera, Scathophagidae) of Russia // Zootaxa. Vol.4012. No.2. P.201–258.
- Rondani C. 1856. Dipterologiae Italicae Prodromus. Vol. I. Genera Italica ordinis dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata. Parmae. 228 pp.
- Strobl G. 1894. Die Dipteren von Steiermark. II. Theil. // Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark. Bd.30. S.1–152.
- Stuckenberg B.R. 1999. Antennal evolution in the Brachycera (Diptera), with a reassessment of terminology relating to the flagellum // Studia Dipterologica. Vol.6. S.33–48.
- Vokeroth J.R. 1995. Validation of *nomina nuda* of Nearctic Tethinidae, Scathophagidae, and Muscidae proposed in Manual of Nearctic Diptera // Proceedings of the Entomological Society of Washington. Vol.93. No.3. P.732–734.