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Notes on the Palaearctic fauna of *Renocera* (Diptera, Sciomyzidae)

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Abstract. After revision of diagnostic characters of *Renocera* (either non-genitalic or genitalic) a new identification key for Palaearctic species is offered. The key takes into account the variability of the number of orbital setae in *R. striata*. Genitalic characters are discussed. The authors find diagnostic use of the shape of surstyli more difficult and less reliable than the shape of sternites 5. As follows from rich examined material, all three species of *Renocera* have the same trans-Palaearctic distribution — they are restricted to the forest belt.

Keywords: Diptera, Sciomyzidae, *Renocera*, identification key

Заметки по Палеарктической фауне *Renocera* (Diptera, Sciomyzidae)

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Аннотация. По итогам ревизии диагностических признаков видов *Renocera* (не-генитальных и генитальных) предложен новый определительный ключ для палеарктической фауны рода. В ключе учтена изменчивость числа орбитальных щетинок у *R. striata*. Обсуждаются генитальные признаки. Авторы находят диагностику по форме сурстилей более трудоемкой и менее надежной, чем использование формы пятого стернита. Проверка имеющегося богатого материала показывает, что все три вида *Renocera* имеют одинаковое транспалеарктическое распространение, ограниченное лесным поясом.

Ключевые слова: Diptera, Sciomyzidae, *Renocera*, определительный ключ

Introduction

In 2009 Lloyd Knutson asked us to share the data on Palaearctic records of *Renocera striata* with him. We could not help him because we had difficulties with identification of this species.

The modest task of this publication is to revise the diagnostic characters of Palaearctic *Renocera*.

We examined the rich material of the Zoological Museum of Moscow University (not indicated in the text) and the Saint Petersburg Zoological Institute (indicated as ZIN).

Parasitism on Sphaeriidae molluscs (Bivalvia, not Gastropoda as in the majority of other Sciomyzidae) indicates that *Renocera* Hendel, 1900 may be a rather isolated group of Tetanocerini. Molecular data on phylogenetic position of *Renocera* (Chapman et al. 2012; Tóthova et al. 2012) are contradictory so far. The genus is restricted to the Northern Hemisphere with one Holarctic, two Palaearctic and three Nearctic species.

Renocera are medium sized (typical body length 4.5–6 mm) yellowish-brown sciomyzids (Figs. 1, 4); externally they resemble small *Tetanocera*. Mid-frontal stripe distinct, shining; 1 or 2 orbital setae; pedicel 3 times shorter than postpedicel, the latter yellow or partly black, not narrowed toward apex, oval-shaped; arista with black hairs, plumose or pubescent; palpi yellow. Scutal chaetotaxy: 1 pospronotal; 1 presutural and 1 postsutural intra-alar; 2 post-alar, 2 *post dc* setae; 1 prescutullar *ac* (anterior *post dc* and prescutullar *ac* may be absent). Prosternum bare or setulose; anepisternum and anepimeron bare; subalar setae absent; inner posterior margin of hind coxa bare. Wing without dark pattern, only crossveins darkened. Legs yellow; *f2* without submedian *a* seta typical of all other Sciomyzidae (except for *R. striata*), *t3* with one preapical seta.

Renocera and *Tetanocera* may be distinguished as follows:

— Large to medium size species. Postpedicel of a triangular shape, with a pointed apex, pedicel longer than scapus (Fig. 2). *t3* usually with 2 preapical setae: larger dorsal and shorter anterodorsal. *f2* always with median *a* seta. Prosternum bare except for large *T. robusta*. Antenna always yellow ..... ***Tetanocera***

— Medium size species. Postpedicel of a rounded or ellipsoid shape, with a rounded apex; pedicel as short as scapus. (Fig. 3). *t3* with 1 preapical seta. *f2* without or with median *a* seta. Prosternum bare or hairy. Antenna yellow or partly black (Fig. 1) ..... ***Renocera***

Material and methods

Localities are given as follows: country, region/state/province (in italics), and geographical coordinates in decimal-degree format. The full names of regions of Russian administrative subdivisions are an entangled result of political and historical events of no interest for zoology, so they are listed as name and word "region" (abbreviated in the text as "Reg.").

Illustrations are original unless otherwise credited. When referring to figures, to avoid confusion, we capitalize the first letter (Fig. or Figs.) for those appearing in this paper and use lowercase (fig. or figs.) for those published elsewhere.

List of examined material

Renocera pallida Fallen, 1820
Figs. 1, 8

BELARUS: *Vitebsk* Reg.: Eserische, 55.83°N 30.02°E, 16–17.05.2019, N. Vikhrev, 2♂; Orsha env., 54.58°N 30.45°E, 2.08.2019, N. Vikhrev, 1♂, 1♀. RUSSIA: *Buryatia* Reg.: Kyren env., 51.7°N 102.1°E, 750 m, 16–19.06.2021, N. Vikhrev, 2♂, 2♀; *Kaliningrag* Reg., Kurshskaya Kosa, Rybachiy (55.15°N 20.83°E), YP-Trap, V. Kolyada, 1♂; *Karelia* Reg., Valaam, Ladozhskoe L. (61.4°N 31.0°E), 26.06.1960, K. Gorodkov, 2♂ (ZIN); *Khabarovsk* Reg., Lidoga env., 49.45°N 136.78°E, 7.06.2014, N. Vikhrev, 4♂; *Komi* Reg., 5 km NW of Sivaya Maska station (66.70°N 62.65°E), 14.07.1961, K. Gorodkov, 1♀ (ZIN); *Kursk* Reg., Oboyan env., Psyol R. (51.191°N 36.313°E), 26.05.2007, N. Vikhrev, 3♂, 2♀; *Mordovia*

Fig. 1. *Renocera pallida*, copula
Рис. 1. *Renocera pallida*, копулирующая пара

Reg., Pushta vill. env., 54.71°N 43.22°E, 18–22.05.2020, N. Vikhrev, 3♀; Inorskoe Lake, 54.728°N 43.15°E, 20.05.2020, M. Esin, 2♂, 4♀; *Moscow* Reg., Naro-Fominsk, 55.364°N 36.738°E, 13.05.2008, D. Gavryushin, 5♂, 3♀; *Novosibirsk* Reg.: Akademgorodok env. (54.86°N 83.04°E): 14.06.2008, O. Kosterin, 1♀; 20.06.2008, O. Kosterin, 1♂, 1♀; 16–17.06.2016, N. Vikhrev, 1♀; Istikim env. (54.65°N 83.30°E), 7.06.2008, O. Kosterin, 1♂, 1♀; *Saint Petersburg* Reg., Luga Distr., Yaschera (59.15°N 29.91°E): 23.06.1961, A. Stackelberg, 2♀; 3–8.06.1963, A. Stackelberg, 6♀ (ZIN); *Yakutia* Reg., Aldan, 58.595°N 125.385°E, 620 m, 4.07.2022, O. Kosterin, 1♀; *Yamalo-Nenets* Reg., Langot R., 67.31°N 66.72°E, 25.07.2015, A. Barkalov, 1♀.

Distribution. Palaearctic, from Europe to Far East.

Renocera striata Meigen, 1830
Figs. 10–12

RUSSIA: *Buryatia* Reg.: Kyren env., 51.7°N 102.1°E, 750 m, 16–19.06.2021, N. Vikhrev, 1♂, 1♀; *Karelia* Reg., 60 km WSW of Petrozavodsk, Kaskesnavolok vill. (6159°N 33.32°E), 20.06.1979, K. Gorodkov, 1♂ (ZIN); *Khabarovsk* Reg., 4 km S Gur R. (near road P454), 50.01°N 137.08°E, 21.06.2022, N. Vikhrev, 1♀; Mayak env., 48.90°N 136.19°E, 24.06.2022, M. Yanbulat, 1♂; *Khanty-Mansi* Reg., Seliyarovo env., 61.467°N 70.731°E, 17–20.07.2010, K. Tomkovich, 1♂, 1♀; Khulga R. (tributary of Lyapin R.), 65.29°N 62.15°E, swamp, 10.07.2018, K. Tomkovich, 1♀; *Moscow* Reg.: Zelenogradsky settl. (56.1°N 37.9°E), 17.06.1953, E. Smirnov, 2♂, 1♀; Molzhaninovka, 55.937°N 37.386°E, 13.05.2010, A. Ozerov, 1♂; *Nenets* Reg., 70 km N of Naryan-Mar, Yarapenzya R. (68.2°N 53.0° E), 18.07.1978, K. Gorodkov, 1♀ (ZIN); *Primorsky* Reg., Lotos L., 42.46°N 130.64°E, 1–3.07.2014, N. Vikhrev, 3♂; *Saint Petersburg* Reg., Luga Distr., Yaschera (59.15°N 29.91°E), 2–22.08.1959, A. Stackelberg, 5♂ (ZIN); *Sakhalin* Reg., Kunashir Isl., Sernovodsk (≈ 43.906°N 145.642°E), 8.06.1971, E. Narchuk,

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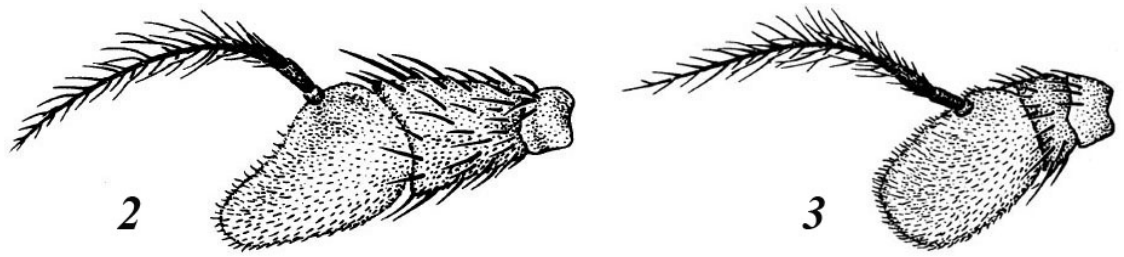


Figs. 2–3. Shape of antenna: *2 — Tetanocera*; *3 — Renocera* (from Knutson 1987)
Рис. 2–3. Форма антенны: *2 — Tetanocera*; *3 — Renocera* (по: Knutson 1987)

10♂, 2♀ (ZIN); *Yakutia* Reg., 7 km N of Yakokit vill., 58.95°N 125.85°E, meadow, 24–27.06.2022, O. Kosterin, 1♀.

Distribution. Holarctic.

Renocera stroblii Hendel, 1900

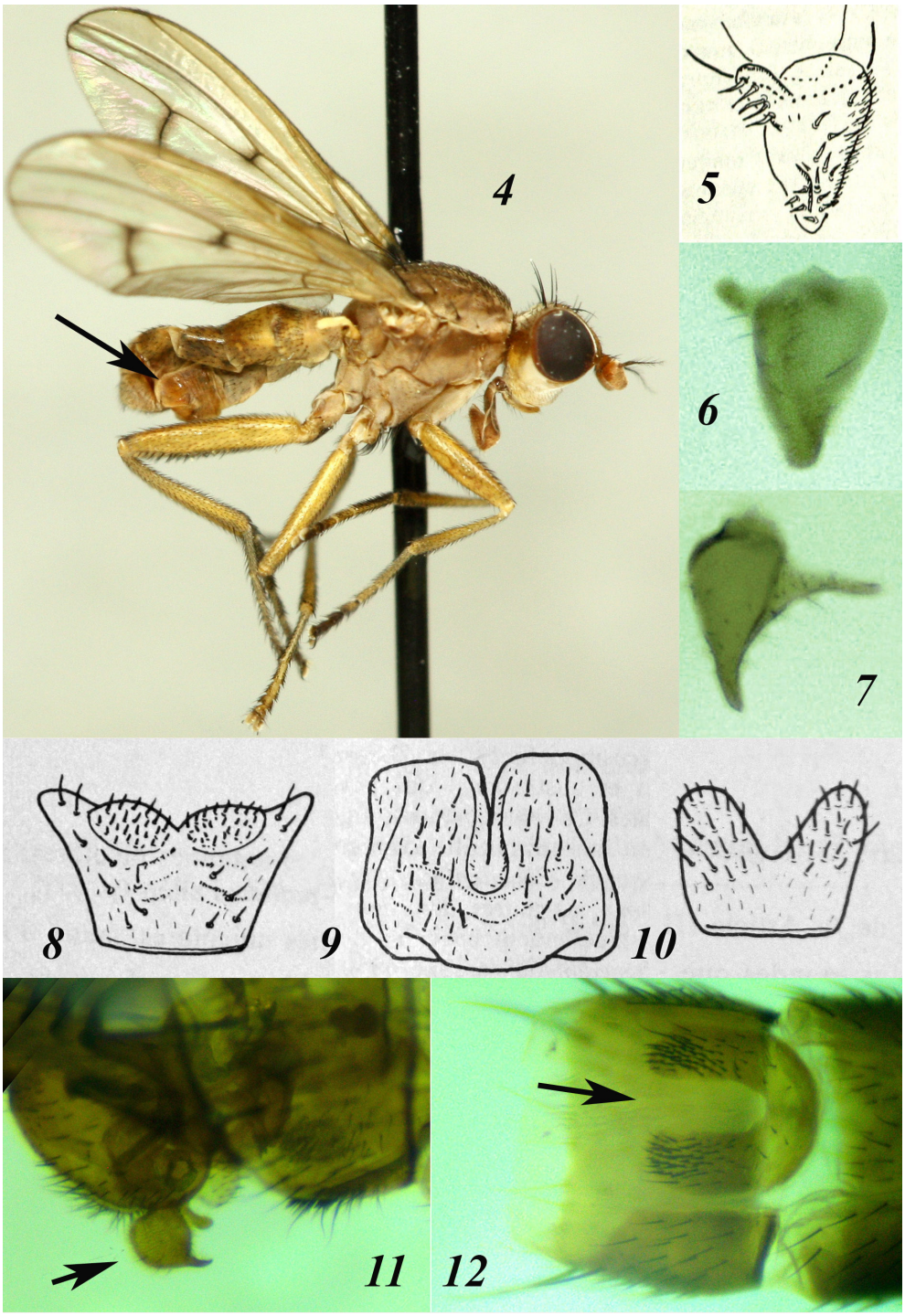
Figs. 4–7, 9

BELARUS: *Vitebsk* Reg., Orsha env., 54.555°N 30.630°E, 9–10.06.2019, N. Vikhrev, 1♂. RUSSIA: *Altai Kray* Reg., Zmeinogorsk Distr., Kolyvanskoe L. (51.36°N 82.18°E), 8.09.2007, O. Kosterin, 1♂; *Altai Republic* Reg., Uluscherga vill. (51.51°N 85.44°E), 27.07.2008, O. Kosterin, 1♂; Seminsky pass env., Sarlyk R., 51.11°N 85.60°E, 1200 m, 28–30.06.2016, N. Vikhrev, 2♂; *Amur* Reg., Zeya env. (53.77°N 127.28°E), 20.07–7.08.1981, A. Ozerov, 2♂; *Arkhangelsk* Reg., Solvychegodsk, 61.333°N 46.922°E, 14.08.2010, D. Gavryushin, 3♂, 1♀; *Bashkortostan* Reg., Abzakovo, 53.82°N 58.62°N, 500 m, 15–19.06.2020, N. Vikhrev, 1♂, 1♀; Beloretsk env., Nura R., 53.97°N 58.34°E, 10.08.2012, D. Gavryushin, 6♂, 1♀; *Buryatia* Reg., Kyren env., 51.7°N 102.1°E, 750 m, 16–19.06.2021, N. Vikhrev, 1♂; *Kamchatka* Reg., Kozyrevsk (56.05°N 159.87°E), 14.07.1985, V. Zlobin, 2♂ (ZIN); *Khabarovsk* Reg., Khabarovsk suburb, 48.6°N 135.1°E, 27–30.06.2022, N. Vikhrev, 3♂, 1♀; *Khakasia* Reg., Kubayka vill., 52.33°N 89.82°E, 625 m, 10–13.07.2017, N. Vikhrev, 2♂; *Khanty-Mansi* Reg., Khulga R. (tributary of Lyapin R.), 65.29°N 62.15°E, swamp, 17–18.07.2018, K. Tomkovich, 1♂; *Krasnoyarsk* Reg., E bank of Yenisey, Stolby (55.96°N 92.72°E), YP-Trap, 1.08.2009, K. Tomkovich, 1♂; *Moscow* Reg., Rozhdestveno env., 56.044°N 35.588°E, 17.07.2007, A. Ozerov, 2♂; Severovo, 55.40°N 37.51°E, 10.07.2021, K. Tomkovich, 2♂, 1♀; *Novosibirsk* Reg., Akademgorodok (54.86°N 83.04°E): 18.06.2009, O. Kosterin, 1♂; 17–18.06.2016, N. Vikhrev, 1♂; *Primorsky* Reg.: Kamenushka (43.62°N 132.23°E): 6–9.07.1988, A. Shatalkin, 2♂, 1♀; 22–24.06.2014, N. Vikhrev, 1♂; Kedrovaya Pad' (43.1°N 131.5°E), 3.09.1984, S. Churkin, 1♂, 1♀; Lotos L., 42.46°N 130.64°E, 1–3.07.2014, N. Vikhrev, 2♂; Anuchino env., 43.95°N 133.05°E, 20–21.06.2014, N. Vikhrev, 2♂, 2♀; *Ryazan* Reg., Kasimov env, Zalesnoe, 54.969°N 41.327°E, 21–26.07.2013, N. Vikhrev, 1♂; *Saint Petersburg* Reg., Luga Distr., Yaschera (59.15°N 29.91°E), A. Stackelberg: 6.07.1958, 1♀; 3.08.1959, 1♀; 2.06.1963, 1♀; 3.08.1963, 1♀ (ZIN); *Sakhalin* Reg., Sakhalin Isl., Novoaleksandrovka (≈ 47.05°N 142.73°E), 11.07.1968, E. Narchuk, 1♂ (ZIN); *Tver* Reg., Zapadnaya Dvina R., 56.312N 32.056E, 21.06.2012, N. Vikhrev, 1♂; *Tuva* Reg., Mazhalyg R., 50.98°N 95.18°E, 880 m, 4.07.2017, N. Vikhrev, 1♂; *Yakutia* Reg.: Olyokminsk Distr., Biryuk R. near mouth of Melichan R. (60.5°N 119.4°E), 13–14.07.2008, A. Ovchinnikov, 3♂ (ZIN); 7 km N of Yakokit vill., 58.95°N 125.85°E, meadow, 24–27.06.2022, O. Kosterin, 1♂; Aldan town, 58.595°N 125.385°E, 620 m, 4.07.2022, O. Kosterin, 1♂; *Yamalo-Nenets* Reg., Salekhard env., 66.6°N 66.8°E, 16–19.06.2019, N. Vikhrev, 2♂; *Zabaikalsky* Reg., Ulyatuy vill., 51.17°N 116.25°E, 740 m, 25.06.2011, A. Medvedev, 1♂; 3–6.06.2014, A. Medvedev, 1♂.

Distribution. Palaearctic, from Europe to Far East.

Discussion

1. The drawback of the identification key for *Renocera* by Rozkosny (1987) was the using of the amount of orbital setae as the first



Figs. 4–12. *Renocera*: *4* — male *R. stroblii*, arrow indicates sternite 5 visible on intact specimen; *5–7*, surstylus of *R. stroblii*: *5* — drawing (from Vala 1989: fig. 101e), *6* — outside view, *7* — the same sternite, inside view; *8–10*, sternite 5 of *Renocera* (from Vala 1989: figs. 100–101): *8* — *R. pallida*, *9* — *R. stroblii*, *10* — *R. striata*; *11–12*, *R. striata*: *11* — abdomen in lateral view (bended surstylus is indicated by an arrow), lateral view, *12* — abdomen in ventral view (horseshoe-shaped sternite 5 is indicated by an arrow)

Рис. 4–12. *Renocera*: *4* — самец *R. stroblii*, стрелка указывает на стернит 5, хорошо определимый на сухом экземпляре; *5–7*, сурстиль *R. stroblii*: *5* — рисунок из Vala (1989: fig. 101e), *6* — фото, вид снаружи, *7* — тот же сурстиль, вид изнутри; *8–10*, стернит 5 *Renocera* из Vala (1989: figs. 100–101): *8* — *R. pallida*, *9* — *R. stroblii*, *10* — *R. striata*; *11–12*, *R. striata*: *11* — брюшко сбоку (на отогнутый сурстиль указывает стрелка), *12* — брюшко снизу (на стернит 5 в форме подковы указывает стрелка)

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and main character. Also the absence or presence of anterior seta on *f2* was not discussed. Vala (1989) repeated these omissions but added several useful drawings of the genitalia structure. Only 40 years later Murphy et al. (2018) stated that Holarctic *R. striata* may have 2 or 1 orbital setae and, in contrast with other *Renocera,* has a submedian *a* seta on *f2*. Thus, all non-genitalic characters are clarified and ready for organization in a key.

2. Structure of genitalia. The surstyli (gonostyli according to Rozkosny or Vala) of *Renocera* are of a complicated shape, drawing and using them as diagnostic characters lead to difficulties which have been recently discussed in our publications (Vikhrev, Yanbulat 2019; Vikhrev 2022). Let us consider these difficulties on an example of the surstylus of *R. stroblii*. Rozkosny (1987: 74) described it as "surstylus without anterior part" (in contrast with bilobed surstyli of two other *Renocera* species). Vala (1989: 233) referred to his own drawings of the surstylus of *R. stroblii* (Vala 1989: figs. 101 a–e) without explanations; one of them is reproduced in Fig. 5. When photographing an isolated surstylus of *R. stroblii* from outside we have got an image similar to Vala's (Fig. 6), but the photo from the inside (Fig. 7) shows that the anteriorly directed projection of surstylus is actually long and strongly sclerotized; it may well be interpreted as the anterior lobe of the surstylus. *R. pallida* has a posterior surstylus narrower and longer than in *R. stroblii*; the anterior surstylus is weakly sclerotized, covered with spinulose setulae at the apex. *R. striata* has a bilobed surstylus, the posterior part of which has an unmistakable shape: rounded, with an antero-ventrally directed apical hook (Fig. 11).

Fortunately, a careful isolation of surstylus is not required to confirm the identification of *Renocera* males. As in the case of the genus *Psacadina* (Vikhrev 2022), it is more reliable and much easier to use the structure of the sternite 5. Drawings of sternites 5 by Vala (1989: figs. 100–101) are reproduced in Figs. 8–10; we received the same results except for a quite recognizable but somewhat different shape in case of *R. striata*, which is shown in Fig. 12 (we specially photographed it without isolating it from other sternites). The species-specific shape of sternite 5 is often well recognizable on intact dry specimens as it is in Fig. 4. Thus, we used the shape of sternite 5 in our key but did not use the shape of surstyli (except for the posterior surstylus of *R. striata* which is also often exposed in pinned, dry specimens).

3. Distribution. To our surprise all the three species of *Renocera* seem to have the same distribution. Once in a wet meadow near Kyren (Buryatia) were collected all on the same day. In the Palaearctic the *Renocera* species are restricted to the forest belt from Europe to the Far East; to the north they extend beyond the Polar Circle, to the south till 42.5°N in the cool and rainy Far East. The genus is absent from the Caucasus. The presence of *Renocera* in the Russian Far East and in the Kuril and the Sakhalin Islands suggests that the genus is present in China and Japan, though it has not been found there so far. In the European Russia both *R. pallida* and *R. stroblii* are equally common; the most common Asian species is *R. stroblii*; *R. striata* is a less common species.

Key to Palaearctic *Renocera* ♂♀

1. *f2* with median *a* seta. Prosternum hairy. Aristal hairs much shorter than half width of postpedicel. Wing with brownish tint apart from darkened crossveins. Orbital setae 2 or 1. (Cheeks narrower than half width of eye. Frons matte except for median stripe. Postpedicel usually partly dirty-brown darkened.) ♂: sternite 5 horseshoe-shaped, posterior halves covered with spinulose setulae (Fig. 12). Posterior surstylus well developed, often exposed in pinned, dry specimens (as in Fig. 11), it is rounded, with antero-ventrally directed apical hook. Apical half *f3* with distinct though rather weak *v* setae. ♀: *v* setae on *f3* absent ..... ***striata*** Meigen
— *f2* without median *a* seta. Prosternum bare. Longest aristal hairs distinctly longer than half width of postpedicel **2**
2. Postpedicel black in anterior half (Fig. 1). Anterior third of frons shining. Cheeks narrower than half width of eye (Fig. 1).

One pair of orbital setae present. Apical half of *f3* without *v* setae in both sexes. ♂: sternite 5 mostly membranose, but in posterior half with a pair of sclerotize tubercles of ellipsoid shape which are densely covered with spinulose setulae (Fig. 8) ..... ***pallida*** Fallen

— Antenna entirely yellow (Fig. 4). Frons matte except for median stripe. Cheeks wider than half width of eye (Fig. 4). Two pairs of orbital setae. Apical half of *f3* with short but strong *v* setae in both sexes, in female these setae even stronger. ♂: sternite 5 large, deeply emarginated posteriorly, covered with sparse fine setulae (Fig. 9), it is usually well recognized in pinned, dry specimens (as in Fig. 4) .... ***stroblii*** Hendel

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