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Notes on Palaearctic *Muscina* (Diptera, Muscidae)

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Abstract. A review of Eurasian fauna of *Muscina* is offered. In our opinion, after synonymization of the two species, *Muscina pascuorum* Meigen, 1826 = *M. japonica* Shinonaga, 1974, **syn. nov.** and *Muscina levida* Harris, 1780 = *M. danubea* Zielke, 2019, **syn. nov.**, the Palaearctic fauna consists of six valid species. A detailed key for the Palaearctic *Muscina* is offered. New and the second European record of *M. angustifrons* in Mordovia is reported; the colour variability of this species is also discussed. The distribution of *M. minor* is clarified with the first record for Europe. Indonesian *M. sumatrensis* and doubtful specimens collected in Northern Vietnam are briefly discussed. New data on the habits of *Muscina* based on collecting by beer traps are reported.

Keywords: Diptera, Muscidae, *Muscina*, taxonomy, synonyms, phenology

Заметки по Палеарктическим *Muscina* (Diptera, Muscidae)

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Аннотация. Дан обзор евразийской фауны *Muscina*. По нашему мнению, после сведения в синонимы двух видов, *Muscina pascuorum* Meigen, 1826 = *M. japonica* Shinonaga, 1974, **syn. nov.** и *Muscina levida* Harris, 1780 = *M. danubea* Zielke, 2019, **syn. nov.**, палеарктическая фауна *Muscina* представлена шестью валидными видами. Предложен подробный ключ для палеарстических *Muscina*. *M. angustifrons* во второй раз отмечена в Европе, в Мордовии; обсуждена цветовая изменчивость этого вида. Прояснено распространение *M. minor*, вид впервые отмечен в Европе. Кратко обсуждены описанная из Индонезии *M. sumatrensis* и сомнительные экземпляры, пойманные в северном Вьетнаме. Приведены полученные при сборе насекомых в пивные ловушки новые данные по биологии *Muscina*.

Ключевые слова: Diptera, Muscidae, *Muscina*, систематика, синонимы, фенология

Introduction

The genus *Muscina* Robineau-Desvoidy, 1830 is represented by quite large and noticeable hemisynantropic flies of a typical Muscidae appearance. It is not surprising that all the six species, which are regarded by the authors of the present paper as valid ones, were described in the 18th or 19th centuries. The species of *Muscina* are quite variable in the details of coloration and several other characters, so it is not surprising that there are many synonyms in the genus, as many as eight for only *M. levida* (Pont 1986). The synonymy of *Muscina* was mainly established by Hennig (1962) with a few errors corrected by Pont (1986). The genus *Muscina* looked boring and not worthy of attention. However, while working on the fauna of Mordovia, the authors found a number of points concerning the genus that need to be clarified.

1. The available identification keys are not entirely satisfactory. The key by d'Assis-Fonseca (1968) is for the three British species only. The keys by Gregor et al. (2002) and Shinonaga (2003) are too short, sometimes it is difficult to come to an unambiguous conclusion using them. For example, the statement "palpi black" is not enough for a reliable identification of *M. levida*; it turned out that freshly emerged specimens of *M. angustifrons* also have black palpi. The key by Zielke (2019) includes all the eight Palaearctic species of *Muscina* described at that moment but we could not agree with some of Zielke's proposals.

2. In our opinion, the two recently described species (*M. japonica* Shinonaga, 1974 and *M. danubea* Zielke, 2019) should be added to the extensive list of synonyms of species of the genus *Muscina*. The two *Muscina* spp. with uncertain taxonomic status (*M. sumatrensis* and specimens recently collected in Northern Vietnam) should be briefly discussed.

3. The new data on the distribution of *M. minor* and *M. angustifrons* (the first and the second records in Europe, respectively) are worth to be published. Also, we would like to express our doubts in the generally accepted view on the distribution of *M. prolapsa*.

4. For two field seasons, we collected insects by beer traps (Ruchin et al. 2020) in Mordovia (European Russia). Analyzing specimens of *Muscina* collected by beer traps allowed us to get some new data on habits of the species of this genus.

This publication is an attempt to clarify these points.

Material and methods

Localities are given as follows: country, region/state/province (in italics), and geographical coordinates in decimal-degree format.

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

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

Key for ***Muscina*** ♂♂, ♀♀

1. Cell R_{4+5} strongly narrowed towards wing margin, at wing margin it is distinctly less than half as wide as at it widest part (Figs. 1–3). Lateral surface of scutellum covered with dense hairs, some of these hairs are at ventral margin of scutellum or even at ventral surface. Knob of halter dark. (Tibiae dark. Palpi yellow. Apex of pedicel and base of postpedicel more or less reddish. Male frontal vitta linear.) **2**
— Cell R_{4+5} slightly narrowed towards wing margin, at wing margin it is almost 3/4 as wide as at it widest part (Figs. 4–5). Lateral surface of scutellum covered with less dense hairs, they do not reach ventral margin of scutellum. Knob of halter yellow to dirty yellow. (Lower calypter always narrow.) **3**
2. Lower calypter broad, distinctly broader than upper one (Fig. 12). Cell R_{4+5} more strongly narrowed towards wing margin (about 0.36 as wide as at its widest part, Figs 1–2). Some hairs present around anterior notopleural seta. Body usually with

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a metallic-bluish tint (Fig. 1) .... ***pascuorum*** Meigen

— Lower calypter narrower, about as broad as upper one (Fig. 13). Cell R4+5 less strongly narrowed towards wing margin (about 0.44 as wide as at its widest part, Fig. 3). Hairs around anterior notopleural seta usually absent. Body without metallic-bluish tint ..... ***prolapsa*** Harris

3. Legs including tibiae black. Palpi and antennae black. In specimens collected long ago tibiae and palpi may become brownish. ♂: Frontal vitta usually linear, sometimes wider, distinct (Figs. 8–9). *f3* at base with 2–3 long fine *v* setae ..... ***levida*** Harris

— At least tibiae yellow. Palpi yellow. Apex of pedicel and base of postpedicel more or less reddish. (Freshly emerged specimens of *M. angustifrons* may have palpi and antenna entirely black.) **4**

4. Antenna entirely yellow or almost so (Fig. 6). Mid and hind femora entirely yellow. Body length at most 7 mm. ♂: distance between eyes wider than two widths of postpedicel (Fig. 6) ..... ***minor*** Portschinsky

— Antenna mostly dark (Figs 7, 10). Mid and hind femora partly or entirely dark. Body length always almost more than 7 mm. ♂: distance between eyes less than two widths of postpedicel at most as in Fig. 7 ..... **5**

5. Mid and hind femur partly yellow. Basicosta yellow. (Palpi always yellow; apex of pedicel and base of postpedicel yellow.) ♂: Frontoorbital plates separated by distinct frontal vitta (Fig. 7). *f3* at basal without long fine *v* setae ..... ***stabulans*** Fallen

— Mid and hind femur entirely dark. Basicosta black. (Palpi, apex of pedicel and base of postpedicel usually yellow, but dark in freshly emerged specimens, see Figs. 10, 11) ♂: Frontal vitta linear. *f3* at basal 1/3 with 3–4 long fine *v* setae .... ***angustifrons*** Loew

Muscina angustifrons Loew, 1858

Figs. 4, 10, 11

JAPAN, Honshu Island, Kobe (34.7°N, 135.1°E), Zhenzhurist, 12–19.06.1936, 5♂;

RUSSIA: *Altai Republic* Reg., Gorno-Altaysk (51.95°N, 85.96°E), V. Sychevskaya, 2.08.1971, 1♀; *Amur* Reg., Zeya env. (53.76°N, 127.28°E), A. Ozerov, 24.06 1979, 1♀; Zeya Nature Reserve (54.087°N 126.871°E), A. Ozerov, 14.08.1979, 1♂; *Khabarovsk* Reg.: Khabarovsk, airport env., 48.53°N, 135.13°E, N. Vikhrev, 5–7.06.2022, 1♀; Nizhnyaya Manoma, 49.33°N, 136.61°E, N. Vikhrev, 8.06.2022, 2♀; Ikchu R., 350 m asl, 49.11°N, 139.27°E, N. Vikhrev, 14.06.2022, 1♀; Solnechny env., 50.72°N, 136.67°E, N. Vikhrev, 17–19.06.2022, 1♀; Nizhnyaya Manoma, 49.33°N, 136.61°E, N. Vikhrev, 22.06.2022, 1♂; northern suburb of Khabarovsk, 48.6°N, 135.1°E, N. Vikhrev: 2–6.06.2014, 1♂, 1♀; 13.06.2014, 2♂; 25.07.2014, 2♂; 27–30.06.2022, 9♂, 1♀;

Mordovia Reg., Pushta vill. env., 54.71°N 43.22°E, beer traps, 370 ♂♀, see Notes on habits of *Muscina* below;

Primorsky Reg.: Kedrovaya Pad NR (43.1°N, 131.5°E), A. Zinovjev, 20.09.1978, 9♂, 1♀ (ZIN); Khanka L., Novokachalinsk env., (45.1°N, 132.0°E), A. Zinovjev, 7–8.09.1978, 4♂, 4♀ (ZIN); 10 km NE of Vladivostok, 43.21°N, 132.07°E, E. Erofeeva, 21–29.07.2019, 11♂; Volchanets env., 42.908°N, 132.726°E, E. Erofeeva, 1–4.08.2019, 5♂, 1♀;

Sakhalin Reg., Yuzhno-Kurilsk Distr., Kunashir Island, mouth of the Serebryanka R., 44.3438° 146.0055°E, I. Melnik, 1–3.07.2008, 1♀.

DISTRIBUTION. Known from the Russian Far East (Amur, Khabarovsk, Primorsky and Sakhalin regions), Japan (type locality) and East China. This Eastern Palaearctic species 25 years ago was unexpectedly found in Europe in Czechia (Gregor et al. 2002). Our series of *M. angustifrons* from Mordovian Nature Reserve is the second European record. The record from Altai is based on a single female but it is the first Siberian finding of this species. So, the distribution of *M. angustifrons* needs further study and clarification.

REMARKS. Specimens *M. angustifrons* collected in Khabarovsk region in 2022 showed interesting seasonal variability. Females collected from 5th to 19th of June have entirely yellow palpi and partly yellow antenna (apex of pedicel and basal third of postpedicel) (Fig. 10). Males and a single female collected from 22nd to 30th of June have palpi entirely or mostly black,

Fig. 1. Male *Muscina pascuorum* (photo by Andreas Haselboeck)
Рис 1. Самец *Muscina pascuorum* (фото: Andreas Haselboeck)

antenna almost indistinctly yellow at border between pedicel and postpedicel) (Fig. 11).

Examination of other material confirmed that freshly emerged specimens of *M. angustifrons* have dark palpi and antenna, while in aged specimens palpi and antenna become entirely or partly yellow, respectively.

Muscina levida Harris, 1780
Figs. 5, 8, 9
Muscina assimilis Fallen, 1823
Muscina danubea Zielke, 2019, **syn. nov.**
AZERBAIJAN: *Lankaran* Distr., Xanbulan, 38.66°N, 48.80°E, N. Vikhrev, 25.10.2008, 2♂;
Yardimli Distr., Kyurekchi, ulmus forest, 38.86°N, 48.11°E, 1700 m, K. Tomkovich, 23–25.05.2009, 2♂;
FINLAND, Harjavalta, on dead mice, 61.31°N, 22.14°W, T. van Ooik, 25.06.2009, 1♂, 1♀;
GREECE, *Serres* Reg., Promachonas env., 41.3772N, 23.3663E, G. Ramel, 18–24.07.2007, 1♂;
KAZAKHSTAN: *Kyzylorda* Reg., Kazalinsk env., 45.757°N, 62.311°E, K. Tomkovich, 15–19.05.2011, 1♂; *Almaty* Reg., Medeu, Malaya Almatinka R., 43.17°N, 77.04°E, 1450 m, N. Vikhrev, 15–21.05.2016, 1♂;
MOLDOVA, Vadul lui Voda near Chișinau (47.08°N, 29.10°E), V. Sychevskaya, 16.09.1973, 5♂, 6♀;
RUSSIA: *Altai Kray* Reg., Biysk (52.50°N, 85.15°E), V. Sychevskaya, 23.08.1971, 1♂;
Altai Republic Reg., Shebalino Distr, Peschanaya R. (51.95°N, 86.39°E), O. Kosterin, 29.07.2008, 1♂;
Amur Reg., Tygda vill., pasture, (55.1°N, 126.3°E), G. Veselkin, 25.07.1977, 1♂;
Arkhangelsk Reg., Yuras R., 64.52°N, 40.70°E, N. Vikhrev, 5.08.2011, 1♂;
Buryatia Reg., Turan env., 51.67°N, 101.684°E, 870 m, N. Vikhrev, 9.06.2021, 1♂;
Kamchatka Reg., Lazo (55.54°N, 159.76°E), Ovcharenko, 17.06.1981, 1♀;
Khabarovsk Reg., Khabarovsk, airport env., 48.53°N, 135.13°E, N. Vikhrev, 5–7.06.2022, 4♂; Nizhnyaya Manoma, 49.33°N, 136.61°E, N. Vikhrev, 22.06.2022, 1♂, 1♀;
Khanty–Mansi Reg., Shapsha vill., 61.09°N,

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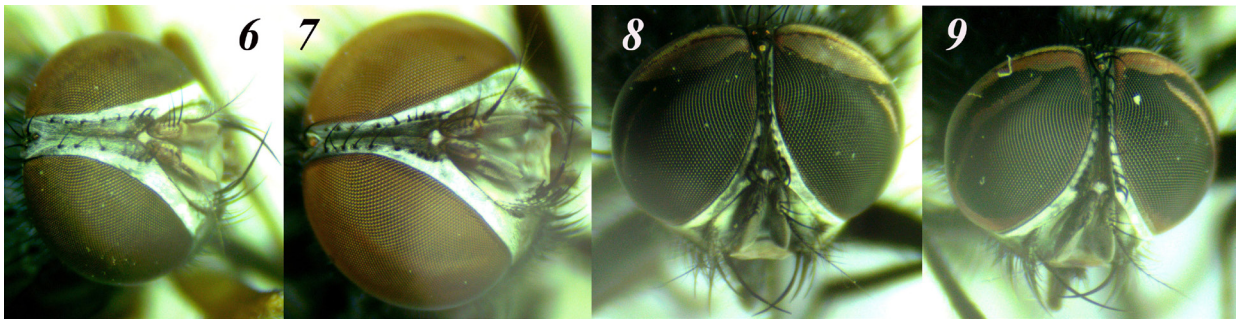
Figs. 2–5. Wings of *Muscina*: *2 — M. pascuorum*; *3 — M. prolapsa*; *4 — M. angustifrons*; *5 — M. levida*
Рис 2–5. Крылья видов *Muscina*: *2 — M. pascuorum*; *3 — M. prolapsa*; *4 — M. angustifrons*; *5 — M. levida*

69.46°E, K. Tomkovich, 22–31.07.2018, 1♂; 1–15.08.2018, 1♂;
Moscow Reg. Ruza env., 55.66°N, 36.05°E, E. Erofeeva: 11–20.07.2015, 1♂; 10–20.08.2015, 1♂; Podolsk env., 55.385°N, 37.509°E, forest glade, K. Tomkovich, 16.05.2021, 1♀;
Murmansk Reg., Monchegorsk env. (67.9°N, 32.8°E), M. Kozlov, 25–31.07.2009, 1♂;
Sakhalin Reg.: Yuzhno–Kurilsk Distr., Ivanoskiy Cape (43.839°N, 145.411°E), I. Melnik, 8–15.08.2008, 1♂, 4♀ Tretyakovo env., near stream (43.99°N, 145.80°E), I. Melnik, 13–22.09.2009, 1♂; volcano Golovnina, lodge Ozernyi (43.874°N, 145.482°E), K. Makarov, A. Zaitsev, 25–27.08.2009, 1♂; 13 km south of the city of Nevelsk (46.51°N, 141.86°E), Proschalykin, Loktionov, 16.07.2011, 1♂, 2♀;
Yamalo-Nenets Reg., Schuchya R. (66.8°N, 67.1°E), P. Basikhin, 22–25.06.1084, 3♀; 16.07.1984, 2♀;
SERBIA, Kalna village, Timok River, 43.417°N, 22.424°E, N. Vikhrev, 19–21.09.2014, 1♂;
SPAIN, *Canary Islands* Reg., Tenerife Isl.: south slope, 28.166°N, 16.637°W, 1500 m, N. Vikhrev, 30.03.2011, 1♂; north part, N. Vikhrev, 25–30.03.2011, 1♀;
TAJIKISTAN, Varzob Distr.: Varzob vill., (38.77°N, 68.82°E), 1134–1210 m, K. Tomkovich, 30.05.2010, 1♀; Kondara Gorge, 38.81°N, 68.82°E (1200 m), A. Medvedev, 19.06.2016, 4♂;
TURKEY, *Sakarya* prov., Karasu, 41.1°N, 30.7°E, N. Vikhrev, 14–15.06.2010, 1♂;
UKRAINE: *Cherkasy* Reg., Kaniv env., (49.7°N, 31.4°E): M. Delikatnyi, 01.08.1977, 3♀; V. Sychevskaya, 16.09.1975, 1♂;
Zakarpattia Reg., Uzhgorod Distr., Turya Polyana NR (48.7°N, 22.8°E), L. Zimina, 27.06.1954, 1♀.

DISTRIBUTION. A Holarctic species distributed in the south to the Levant and in the north beyond the Arctic Circle.

SYNONYMY. *Muscina danubea* was described from a single male collected in 1976 from Romania, Danube Delta near Mahmudia (45.08°N 29.10°E). In the description Zielke (2019: 72) wrote "palpus … of changing colour depending on angle of light, from yellowish-orange to dark". In the diagnosis Zielke (2019: 73) mostly argued that the new species is not *M. prolapsa*: a glance at the photo of the holotype is enough to agree with it. Zielke also mentioned that his new species was not *M. levida* because its palpi were not black and male frontal vitta was not linear. We discussed above that the colour of palpi in *M. angustifrons* is variable depending on the age of specimen, in *M. levida* the palpi never become pure yellow, but they often become brownish in specimens collected long ago. For example, we have a series of *M. levida* from Moldova which is neighboring Romania (the type locality of *M. danubea*) and collected as long ago as the holotype of *M. danubea* (in 1973). Several specimens from the Moldovan series have distinctly yellow-brown palpi. The width



Figs. 6–9. Heads of males of *Muscina*: *6 — M. minor*; *7 — M. stabulans*; *8 — M. levida*, narrow frons; *9 — M. levida*, wider frons

Рис 6–9. Лбы самцов *Muscina*: *6 — M. minor*; *7 — M. stabulans*; *8 — M. levida*, узкий лоб; *9 — M. levida*, более широкий лоб

of the frontal vitta in *M. levida* is more variable than in the other species of *Muscina*, it may be linear as in Fig. 8 or broader as in Fig. 9. Zielke (2019: 73) also mentioned the presence of several long fine *v* setae near the base of *f3* of *M. danubea*, such setae are actually present in *M. levida* (and to a less extent in *M. angustifrons*). So, Zielke's arguments are unconvincing and *Muscina levida* Harris, 1780 = *M. danubea* Zielke, 2019, **syn. nov**.

Muscina minor Portschinsky, 1881
Figs. 6, 14
Muscina krivosheinae Lobanov, 1977 (Pont 1986)
Holotype *M. minor*, ♀: (GEORGIA), Mtskheta (41.84°N, 44.71°E, 500 m) (ZIN).
Holotype *M. krivosheinae*, ♂: TURKMENISTAN, Danew (39.3°N, 63.2°E), from an *Agaricus* mushroom, N. Krivosheina, collected 6.04.1973, reared 28.04.1973 (ZIN).
Paratypes *M. krivosheinae*, 2♂, 1♀: the same label as on the holotype (ZIN), (two more paratypes (1♂, 1♀) should be in Ivanovo State Medical Academy, Department of Biology).
Other material:
KYRGYZSTAN, Chu River 30 km W of Rybachye (now Balykchi) (42.52°N, 75.82°E), D. Kasparyan, 14.07.1979, 1♂ (ZIN).
TAJIKISTAN, *Khatlon* Reg, Jilikul env., Tigrovaya Balka NR (37.4°N, 68.5°E), M. Krivosheina, 15.05.1988, 3♂, 3♀ (ZMUM).
UKRAINE, Odessa (only this information on the label), 1♀ (ZMUM).
UZBEKISTAN, Tashkent env., Nikolskoe (41.55°N, 69.55°E), rearing from badly rotted *Agaricus* mushroom, 22.05.1919, Tashkent Entomological Station (V. Plotnikov), 3♂, 3♀ (ZIN).
DISTRIBUTION. Was known from the Caucasus and Central Asia. The northern Black Sea coast is a new record for Europe.

Muscina pascuorum Meigen, 1826
Figs 1, 2, 12
Muscina japonica Shinonaga, 1974, **syn. nov.**
AZERBAIJAN: Lankaran Distr., Hircan park, 38.65°N, 48.78°E, K. Tomkovich, 15–22.05.2009, 3♂; Yardimli Distr., Kyurekchi vill., ulmus forest, 38.86°N, 48.11°E, 1700 m, K. Tomkovich, 23–25.05.2009, 2♂; Lankaran Distr., Xanbulan vill., 38.66°N, 48.80°E, N. Vikhrev, 25.10.2008, 2♂;
CHINA, Port-Artur (=Dalian, 38.9°N, 121.6°E), Chernyshov, 12.07.1904, 1♂ (ZIN);
KAZAKHSTAN, *Almaty* Reg., Almaty env. (43.2°N, 76.9°E), B. Kuzin, 06.1945, 2♂;
KYRGYZSTAN: *Jalal-Abad* Reg., Chatkal Distr., Sary-Chelek L. (41.9°N, 72.0°E), L. Zimina, 29.05.1952, 2♀;
NEPAL, Rasuwa Distr., Dhunche env., 28.10°N, 85.32°E, 2000 m, A. Medvedev, 7–9.06.2017, 8♂, 2♀ (ZMUM).
RUSSIA: *Buryatia* Reg., Tarbagatay (51.5°N 107.3°E), K. Grunin, 3.07.1957, 3♂ (ZIN);
Mordovia Reg., Pushta vill. env., 54.71°N, 43.22°E, 1–5.09.2020, N. Vikhrev, 1♀ (ZMUM); 1000 ♂♀, see Notes on habits of *Muscina* below;
Moscow Reg., Serpukhov Distr., Prioksko-Terrasny NR (54.9°N, 37.6°E), E. Knyazeva, 3.09.2020, 1♂ (ZMUM).
Tyumen Reg., Tyumen suburb (57.2°N, 65.7°E), G. Veselkin: 15.09.1975, 1♂; 1.06.1976, 1♀;

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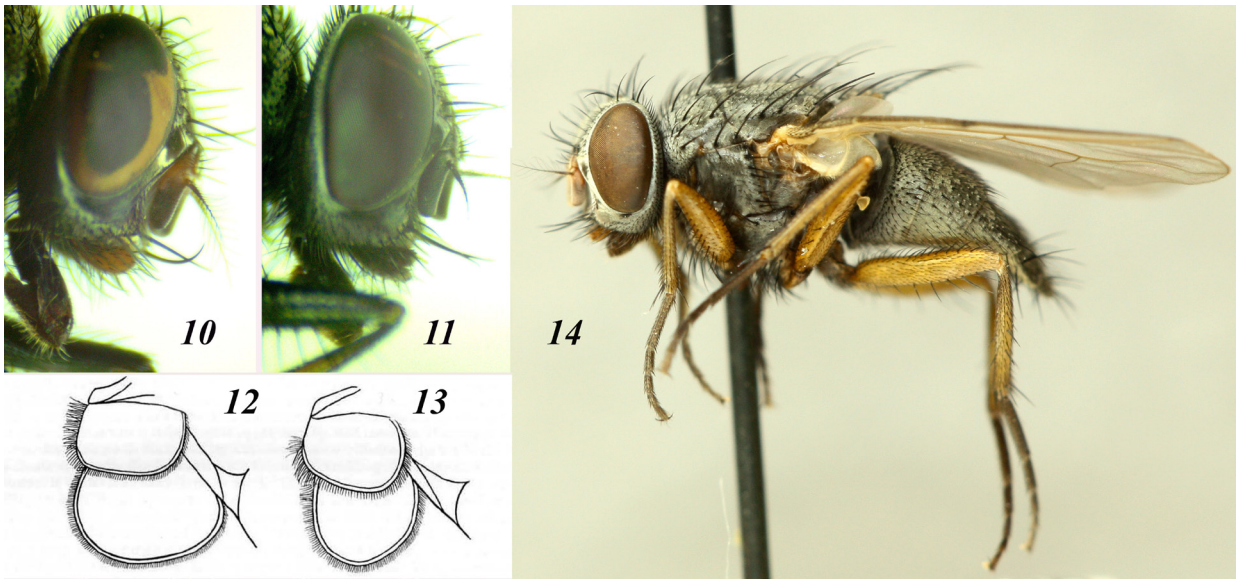

Figs. 10–14. *10, 11*: female *Muscina angustifrons*: *10* — overwintering female; *11* — freshly emerged female; *12, 13*: calypters of *Muscina* (from Hennig 1962: textfigs 312 and 313): *12* — *M. pascuorum*; *13* — *M. prolapsa*; *14* — female *Muscina minor*, general view

Рис 10–14. *10, 11*: самки *Muscina angustifrons*: *10* — зимовавшая самка; *11* — недавно выведшаяся самка; *12, 13*: калиптры *Muscina* (по Hennig 1962: textfigs 312 и 313): *12* — *M. pascuorum*; *13* — *M. prolapsa*; *14* — самка *Muscina minor*, общий вид

Primorsky Reg.: Slavyanka (42.87°N, 131.38°E), K. Grunin, 5.07.1971, 1♂ (ZIN); Kamenushka, 43.62°N, 132.23°E, N. Vikhrev, 22–24.06.2014, 1♀; Gorno-Tayozhnoe, (43.70°N, 132.16°E), K. Borisova, 10.08.1962, 1♂ (ZIN);
Sakhalin Reg., Iturup Island, 5 km SW of Kurilsk (45.20°N, 147.85°E), V. Rikhter, 22.06.1968, 1♀ (ZIN);
Samara Reg., Shiryaevo env., 53.40°N, 50.05°E, I. Melnik, 13.07.2012, 1♂;
TAJIKISTAN, Varzob Gorge, Takob, 38.84°N, 68.90°E, K. Tomkovich, 2–4.06.2010, 1♀;
UKRAINE: *Zakarpattia* Reg., Uzhgorod Distr., Turya Polyana vill. (48.7°N, 22.8°E), L. Zimina, 27.06.1954, 1♀;
Cherkasy Reg., Kaniv, (49.7°N, 31.4°E), M. Delicatny, 01.08.1977, 3♀; V. Sychevskaya, 16.09.1975, 1♂;
USA, *RI* state., Coventry Co, 41.69°N, 71.55°W, A. Medvedev, 1–14.05.2017, 1♀.
VIETNAM, Sa Pa env., 22.321°N, 103.856°E, 140 m, N. Vikhrev, 19–29.03.2019, 1♂, 1♀.
DISTRIBUTION. The Holarctic and the north of Oriental region. It is remarkable that *M. pascuorum* is the only Palaearctic *Muscina* which did not expand to remote Atlantic islands (Azores, Canary or Madeira).

SYNONYMY. *M. japonica* Shinonaga, 1974 was described as a species similar to *M. pascuorum* but with the lower calypter dark brown. However, in his publication on Muscidae of Nepal, Shinonaga (1994: 140) described Nepalese *Muscina* as having "Lower squama dark brown, broad" as *M. pascuorum*. (As follows from the listed material we also examined series of *M. pascuorum* from Nepal and our specimens also have lower calypter brown.) Later Shinonaga (2003: 10) came back to the initial diagnosis, "Lower squama yellowish white — *pascuorum* … Lower squama dark brown — *japonica*'. It seems that the author himself is unsure of the validity of his species. Actually, the colour of calypters in *M. pascuorum* varies widely and gradually (white or yellow to brownish or brown), and we did not find a correlation of this character with any other variable characters. Our specimens of *M. prolapsa* have calypters white, but a single male from Tenerife has the calypter brown. We believe that such colour differences should be considered as intraspecific variability until serious reasons for otherwise are obtained. So, we suppose *Muscina pascuorum* Meigen, 1826 = *M. japonica* Shinonaga, 1974, **syn. nov**.

Muscina prolapsa Harris, 1780
Fig. 13
Muscina pabulorum Fallen, 1817
AZERBAIJAN, Lankaran Distr., Hirkan NP (38.65°N, 48.78°E), K. Tomkovich, 28.05.2009, 1♀;
MOLDOVA, Vadul lui Voda near Chișinau (47.08°N, 29.10°E), V. Sychevskaya, 16–18.09.1973, 1♂, 1♀.
RUSSIA, *Dagestan* Reg., Sergokalinsky Distr., Myurego vill., 700 m, 42.38°N, 47.67°E, O. Kosterin, 19.06.2021, 1♂;
Donetsk Reg., Volnovakha Distr., 10 km E of Donskoe (47.50°N, 37.65°E), K. Tomkovich, 20–31.08.2008, 1♂, 1♀;
Mordovia Reg.: Pushta env., pine forest, 54.736°N, 43.215°E, beer trap, A. Ruchin, 2–11.10.2019, 1♂; 5 km SW of Torbeevo, 54.0371°N, 43.2120°E, yellow pan traps, K. Tomkovich, M. Esin, 31.07–04.08.2020, 1 ♂;
Moscow Reg., Moscow, Schukino, on a window, 55.8°N, 37.49°E, N. Vikhrev, 27.09.2022, 1♂;
SPAIN, *Canary Islands* Reg., Tenerife Isl., Puerto de la Cruz, 28.406°N, 16.570°W, N. Vikhrev, 10–14.10.2011, 1♂;
TURKEY, *Antalya* Prov., Side env. (36.76°N, 31.42°E): N. Vikhrev, 27.03.2007, 1♂; 21–27.02.2008, 2♂, 1♀; *Hatay* Prov., Samandag (36.1°N, 36.0°E), N. Vikhrev, 14–16.04.2010, 1♀; *Mersin* Prov., 36.631°N, 34.205°E, 600 m, N. Vikhrev, 21.04.2010, 1♀;
UKRAINE, *Cherkasy* Reg., Kanev NR (49.74°N, 31.46°E), V. Sychevskaya, 12–16.09.1975, 7♂, 2♀;
USA, *RI* state, Coventry Co, 41.69°N, 71.55°W, A. Medvedev, 1–14.05.2017, 1♂, 2♀.
DISTRIBUTION. Reliably known from the W. Palaearctic and Nearctic, reputedly *M. prolapsa* is also present in the Eastern Palaearctic. However, it was not listed for Japan (Shinonaga 2003). For China (Xue & Chao 1998) it was listed only for Taiwan (compare with *M. pascuorum* reported for 11 Chinese provinces). Even more convincing is the fact that neither in Moscow nor in Saint Petersburg collections with hundreds of specimens of *Muscina,* there is not a single specimen of *M. prolapsa* collected east of Azerbaijan (49°E), either from Siberia or from Central Asia. The Siberian records given in Sorokina & Pont (2010) may be based on erroneous identifications by previous authors. For example, Sorokina and Pont refer to the report of V. Sychevskaya who collected *M. prolapsa* in Altai Krai near Biysk. We found in Zoological Museum of Moscow University several *Muscina* specimens collected in this locality by Sychevskaya, but these were only *M. levida* and *M. stabulans*. Thus, the presence of *M. prolapsa* in the Eastern Palaearctic seems to us doubtful. It is also worth mentioning the colonization by *M. prolapsa* of such remote Atlantic islands as Azores, Canary or Madeira. We assume that expansion to these islands occurred recently, along with the settlement of people. If so, the occurrence of *M. prolapsa* in the Nearctic region should have the same origin.

Muscina stabulans Fallen, 1817
Fig. 7
ARMENIA, Khosrov Forest NR, (40.06°N, 44.87°E, ≈1700 m), V. Rikhter, 18.07.1969, 1♂ (ZIN).
AZERBAIJAN, *Lankaran* Distr., (Khanbulan Reservoir), 38.65°N, 48.78°E, N. Vikhrev, 20.10.2008, 1♂; K. Tomkovich, 15–22.05.2009, 1♂;
BRAZIL, Sao Paulo, V. Alin, 19.09.1976, 1♂;
ETHIOPIA, Addis Ababa, 9.00°N, 38.73°E, 2330 m, N. Vikhrev, 1.02.2021, 1♂;
KENYA, *Kiambu* Reg., Limuru, 1.107°S, 36.63°E, 2280m, N. Vikhrev, 15.12.2013, 1♂;
MOROCCO: Marrakesh, garden, glass plot, 31.63°N, 7.98°W, N. Vikhrev, 21.03.2009, 1♂; Oukaimeden, 31.310°N, 7.755°W, 1000m, N. Vikhrev, 16.05.2012, 1♂; Ouzoud env., 32.016°N 6.720°W, 700m, O. Kosterin, 16.05.2021, 1♂; Oualidia lagune, 32.746°N, 9.024°W, N. Vikhrev, 30.04.2012, 2♂;
NAMIBIA: Luderitz, sewage field, 26.61°S, 15.19°E, N. Vikhrev, 20–22.10.2008, 2♂;
Windhoek env.: 22.54°S, 17.27°E, 1860m, N. Vikhrev, 21–24.11.2018, 3♂, 1♀; 22.545°S 17.255°E, 1870 m, N. Vikhrev, 11–15.01.2021, 1♀;
PORTUGAL, Vila do Conde, Vairao, (41.32°N, 8.66°W), O. Kosterin, 2–6.07.2010, 1♂;
RUSSIA: *Adygea* Reg., Maykop, garden, 44.6°N, 40.1°E, K. Tomkovich, 13.06.2009, 1♀;
Altai Kray Reg., Biysk (52.50°N, 85.15°E), V. Sychevskaya, 10.07.1970, 1♀; Klyuchi, 52.25°N, 79.16°E, O. Kosterin, 20.06.2009, 1♂;
Altai Republic Reg.: Manzherok L., 51.82°N, 85.81°E, O. Kosterin, 12.08.2021, 1♂;

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Donetsk Reg., Volnovakha Distr., 10 km of Donskoe, K. Tomkovich, 20–31.08.2008, 1♂, 1♀;
Khabarovsk Reg., Khabarovsk, airport env., 48.53°N, 135.13°E, N. Vikhrev, 5–7.06.2022, 2♂;
Khanty–Mansi Reg., Shapsha vill., 61.09°N, 69.46°E, K. Tomkovich, 22–31.07.2018, 1♂; 1–15.08.2018, 1♂;
Magadan Reg.: Evensk, swapping (61.93°N, 159.23°E), K. Gorodkov, 7.09.1978, 1♂ (ZIN); Magadan env., Nagaevo (59.57°N, 150.73°E), Kononov, 10.09.1963, 1♂ (ZIN);
Murmansk Reg., Murmansk suburb, 68.88°N, 33.03°E, A. Ozerov, 19.07.2011, 1♂;
Omsk Reg., Omsk near Vorovskogo street, 54.88°N, 73.35°E, O. Kosterin, 30.06.2008, 1♀;
Primorsky Reg., Lazo Distr., Lazo env. (43.3°N, 133.9°E), A.L. Ozerov, 27.08.1987, 1♀;
Voronezh Reg., Khopersky NR, Dubovaya Khata, 51.25°N, 41.78°E, K. Tomkovich, 6.08.2022, 1♂;
Yamalo-Nenets Reg., Labytnangi, (66.65°N, 66.40°E), V.I. Sychevskaya, 8.08.1973, 1♀;
SPAIN, *Canary Islands* Reg., Tenerife Island: Puerto de la Cruz, 28.406°N, 16.570°W, N. Vikhrev, 10–14.10.2010, 1♂; Teno Peninsula, lowland, (28.35°N, 16.92°W), N. Vikhrev, 25–30.03.2011, 2♂;
TANZANIA, Makete, 9.26°S, 34.12°E, 2250 m, N. Vikhrev, 19–24.12.2021, 1♂;
TURKEY: *Hatay* Prov., Samandag env. (36.09°N, 35.98°E), N. Vikhrev, 14–16.04.2010, 2♂; *Kayseri* Prov., Karaoren env., 38.50°N, 35.919°E, N. Vikhrev, 18.04.2010, 1♂;
USA, *RI* state, Coventry Co, 41.69°N, 71.55°W, A. Medvedev, 1–14.05.2017, 2♀;
VIETNAM, Sa Pa env., 22.321°N, 103.856°E, 1400 m, N. Vikhrev, 19–29.03.2019, 1♂;
DISTRIBUTION. Cosmopolitan. From Polar region of Eurasia to South Africa and Brazil.

Muscina with uncertain taxonomic status

Muscina sumatrensis Shinonaga & Kurahashi, 2002

No material examined. Described from Indonesia, Sumatra, Lake Toba, about 1000 m a. s. l. Frontal vitta linear; antenna reddish at margin between pedicel and postpedicel; palpi black; cell R4+5 only slightly narrowed; lower calypter narrow; tibiae dark. Taxonomic status uncertain but the record of *Muscina* (not *stabulans*) so far south is very interesting.

Muscina sp.

VIETNAM, *Lai Chau* Prov.: Hoang Lien NP, 22.348°N, 103.770°E, 1900 m, 22.05.2014, A. Ozerov, 1♂; Sa Pa env., 22.321°N, 103.856°E, 1400 m, 19–29.03.2019, N. Vikhrev, 1♂ (both ZMUM).

REMARKS. These two males have the femora entirelly dark; the palpi and antenna are also dark as it is typical for fresh specimens of *M. angustifrons*, basicosta black. On the other hand, the male frontal vitta is as wide as in *M. stabulans*. In addition, the lateral sides of scutellum are hairless, this character was never found in other *Muscina*. The cosmopolitan *M. stabulans* has the same phenotype from Polar regions to the southern hemisphere. So, there are two possible interpretations of our specimens: (1) it is a variability of *M. angustifrons* at the southern limit of the natural habitat of the species or (2) the specimens may result from crossbreading between *M. angustifrons* and *M. stabulans*.

Notes on the habits of Muscina

As we wrote above, the finding of *M. angustifrons* in Mordovia is the second European record of this Far Eastern species. During our work on Mordovian fauna in 2019–2022, we collected Diptera either by net or by beer traps. The remarkable fact is that all the specimens of *M. angustifrons* were collected by beer traps only. A beer trap is a five-litre plastic container with fermenting beer and with a window cut out on one side of it, see Ruchin et al. (2020).

Our beer traps also attracted *M. pascuorum*, uncommon in net collecting and, to a lesser extent, very common *M. levida*, while common *M. stabulans* was collected by net, but have never visited beer traps. In contrast to Mordovia, all our Far Eastern specimens of *M. angustifrons* were collected only with a net, we did not use traps there. There are two possible explanations for this: either the habits of European population differ from those of the Far Eastern one (1) or *M. angustifrons* is simply much more numerous in the Far East (2).

Table 1

Seasonal activity of the three species of *Muscina* monitored in 2019–2020 field seasons

Таблица 1

Сезонная активность трех видов *Muscina* по данным сезонов 2019–2020

5 beer traps, 2019	11.06–2.07	2–14.07	14–23.07	23.07–3.08	3–20.08	20–26.08	26.08–06.09	6–18.09	18.09–2.10	2–17.10	17–29.10	total
M. angustifrons	1	1	0	2	4	0	3	6	1	9	0	27
M. levida	2	3	0	0	0	2	0	2	1	61	9	80
M. pascuorum	1	0	0	0	0	1	1	18	3	114	4	142

16 beer traps, 2020	2.06–2.07	2–16.07	16–28.07	28.07–10.08	10–16.08	16–28.08	28.08–11.09	total
M. angustifrons	9	14	3	30	57	196	39	348
M. levida	2	25	13	3	0	0	0	43
M. pascuorum	5	41	43	4	60	342	385	880

To make a choice it would be useful to try beer traps collecting in other localities.

Collecting insects with a net often makes it possible to observe their habits and provides specimens in much better conditions than those from traps. On the other hand, collecting by traps allows us to get objective data on seasonal activity or vertical distribution of insects in a forest.

During our collecting of insects by beer traps in the vicinity of Pushta village from 24 June to 29 October in the field season 2019 and from 15 June to 11 September in the field season 2020, we collected more than 1500 specimens of the three species of *Muscina*, these data are presented in Table 1. Both years the most numerous species in beer traps was *M. pascuorum*, while *M. angustifrons* was uncommon in 2019 but numerous in 2020; *M. levida* vice versa.

In 2019, the peak of activity of species of *Muscina* occurred in October, they were less numerous in September. In 2022, the peak of activity of *Muscina* was earlier, in August and September. Unfortunately, we do not yet have data on the activity from April to late June.

We also investigated the attendance of beer traps by *Muscina* depending on the height of their position above the ground. Some dipterans clearly preferred low-placed (1.5 m) traps, the others, on the contrary, high ones (12 m) (Ruchin et al. 2023, in work). Species of *Muscina* did not show such preferences and visited high or low traps almost equally often.

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