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SHORT COMMUNICATION

N. E. Vikhrev. NOTES ON SYNONYMY OF TWO SPECIES OF THE GENUS *GRAPHOMYA* ROBINEAU-DESVOIDY, 1830 (DIPTERA, MUSCIDAE). – Far Eastern Entomologist. 2011. N 231: 5-12.

Summary. New synonymy is proposed: *Graphomya setifrons* Vockeroth, 1972 = *G. lehi* Kurahashi et Shinonaga, 2009, **syn. n.** The reasons to regard *G. minor* Robineau-Desvoidy, 1830 as a synonym of *G. maculata* (Scopoli, 1763) are provided based on rich collection kept in the Zoological Museum of Moscow University.

Key words. Diptera, Muscidae, *Graphomya*, taxonomy, new synonymy, Palearctic and Oriental Regions.

Н. Е. Вихрев. Замечания по синонимии двух видов рода *Graphomya* Robineau-Desvoidy, 1830 (Diptera, Muscidae) // Дальневосточный энтомолог. 2011. N 231. С. 5-12.

Резюме. Установлена новая синонимия: *Graphomya setifrons* Vockeroth, 1972 = *G. lehi* Kurahashi et Shinonaga, 2009, **syn. n.** По результатам изучения материала, хранящегося в Зоологическом музее МГУ, сделан вывод о том, что *G. minor* Robineau-Desvoidy, 1830 является синонимом *G. maculata* (Scopoli, 1763).

INTRODUCTION

The critical revision of the genus *Graphomya* Robineau-Desvoidy, 1830 (Diptera, Muscidae) is obvious. A complete revision of the large *maculata* species-group is a difficult problem which cannot be fulfilled at the present moment. Nevertheless I find it necessary to provide reasons for restoration of the currently abandoned Hennig's opinion on the limits of the species *G. maculata* (Scopoli, 1763) and establish a new synonym in *maculata* species-group.

Morphological structures are abbreviated as: *f1, t1, f2, t2, f3, t3* = fore-, mid-, hind- femur or tibia; *ac* = acrostichal setae; *dc* = dorsocentral setae; *a, p, d, v* = anterior, posterior, dorsal, ventral seta(e).

All examined material is preserved at the Zoological Museum of Moscow University.

TAXONOMY

Genus *Graphomya* Robineau-Desvoidy, 1830

Type species: *Musca maculata* Scopoli, 1763.

Graphomya maculata (Scopoli, 1763)

Figs 1–6, 16

Musca maculata Scopoli, 1763, Ent. Carniol.: 326 (type locality Carniola (Slovenia); type presumably lost).

Graphomya maculata Robineau-Desvoidy, 1830, Essai Myod.: 403.

Graphomya minor Robineau-Desvoidy, 1830, Essai Myod.: 404.

Cyrtoneura picta Zetterstedt, 1855, Dipt. Scand., 12: 4715.

Graphomya picta Schiner, 1862, Fauna Austr.: 582.

MATERIAL. Totally 241 specimens from vast area from 23°E (Greece) to 134°E (Russia, Primorsky krai) and from 68°N (Russia, Murmansk region) to 8°N (Thailand, Phang Nga province). **Europe.** Greece: Macedonia, 1♂, 1♀. Moldova: 6♂. Russia (European part): Astrakhan region, 1♂; Chelyabinsk region, env. Zlatoust (Ural), 1♀; Ekaterinburg region (Ural), 1♂; Krasnodarsky krai (North Caucasus), 7♂, 8♀; Kursk region, 1♂; Moscow region, 40♂, 20♀; Murmansk region, Monchegorsk env., 1♂, 41♀; Nizhny Novgorod region, 1♂; Samara region, 1♂; Ulyanovsk region, 1♀. Ukraine: Crimea, 1♂, 3♀; Ivano-Frankivsk, 4♂, 2♀; Zhitomir, 1♀; Zakarpattia region, 2♂, 1♀. **Asia.** Abkhazia: 2♂. Azerbaijan: Lenkoran region, 1♂, 2♀. China: env. Shanghai, 5♀. Kazakhstan: Akmola province, 1♀; Almaty province, 1♀; East Kazakhstan province, 1♀; South Kazakhstan province, 4♂, 1♀. Kirgizstan: Osh province, 1♀. Russia (Asian part): Altay, 1♀; Amur region, Zeya env., 2♂, 9♀; Khabarovsk krai, 1♂; Khanty-Mansi AO, 1♂, 4♀; Krasnoyarsky krai 1♂; Omsk region, 1♀; Primorsky krai, 13♂, 15♀; Sakha Republic, (S-W part), 2♀; Verkhoyansk, 1♀; Yamalo-Nenets AO, Labytnangi env., 6♂, 5♀. Thailand: Phang Nga province, 1♀. Turkey: Duzce province, 1♀; Isparta, 1♂; Sakarya, 1♀; Zonguldak, 1♂. Vietnam: Binh Thuan province, 1♀. E Uzbekistan: 10♂.

NOTES. Hennig (1964) regarded *Graphomya minor* as a junior synonym of *G. maculata*. But the later authors (d'Assis Fonseca, 1968; Pont, 1986; Gregor et al., 2002) restored *G. minor* as a valid species. Gregor et al. (2002) proposed the following key to distinguish *minor* from *maculata*:

– Mid tibia with an anterodorsal seta; male parafacialia, in frontal view, glistening silvery white; yellow areas of male abdomen often reduced or absent; female thorax, in posterior view, with presutural median stripe less conspicuous and narrower than adjacent stripes ... *G. minor*
– Mid tibia without anterodorsal seta; male parafacialia more brownish-grey; tergites 2-4 of male abdomen almost entirely translucent yellow; female thorax, in posterior view, with presutural median stripe as conspicuous and nearly as broad as adjacent stripes *G. maculata*

Chaetotaxy of *t2* ranks first in the cited key, as well as in the key by d'Assis Fonseca (1968). This is the most comprehensible character shared by both sexes. I consider this character as the main one and other characters as secondary ones. So did other dipterologists, for example, Grzywacz (2009) who in his publication devoted to the record of *G. minor* for Poland showed photo of a male with *ad* seta on *t2*, but with the abdomen almost entirely translucent yellow.

Out of 241 examined specimens 70 have at least one anterodorsal seta on the mid tibia. Such specimens were found from the majority of regions listed above, excluding the southernmost locations (Thailand, Vietnam and China). In temperate areas such specimens are rather scanty, but in the northernmost locations (Murmansk region, Monchegorsk env. and Yamalo-Nenets AO, Labytnangi) the specimens with *ad* seta on *t2* predominate over specimens without this seta. I don't think that the presence of the anterodorsal seta may be used as a species-specific character for the following reasons:

1. There isn't a clear border between absence and presence of *t2 ad* seta: in 4 specimens *ad* seta is present on one tibia while no trace of a pore in the second tibia was found; in 8 specimens *ad* setae are present on both tibiae, but are very weak and only slightly longer than ground setulae.

2. This character is very variable. A large series of 41 females from the Murmansk region is especially interesting, being collected on carrion by mouse-baited traps without any selection of material. Only 6 of 41 specimens have no *ad* setae on *t2*, 19 with 1 *ad*, 11 with 2 *ad*, 4 with 3 *ad*. There are specimens with different amount of setae on the left and right mid legs, these setae being either strong or weak on different specimens or even on different legs of the same specimen.

3. Variability in the presence/absence of *t2 ad* was recorded also in other species of *Graphomya*: *G. atripes* Malloch, 1926 (Emden, 1965) and in ZMMU material 1 of 8 specimens *G. mellina* Stein, 1909 has this setae.

4. Presence/absence of *t2 ad* doesn't strictly correlate with other characters mentioned in the key.

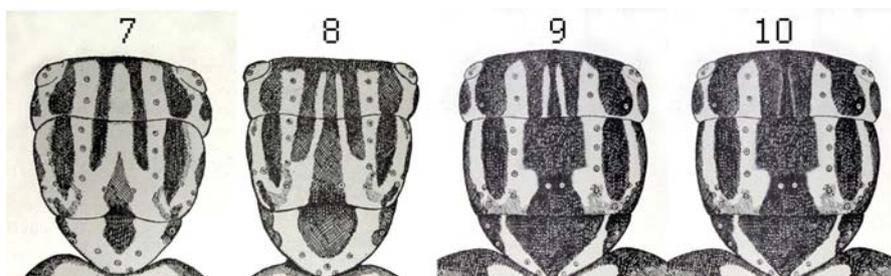


Figs. 1-6. *Graphomya maculata* male terminalia, dorsal view. 1-3 – males without *ad* seta on *t2*; 4-6 – males with *ad* seta on *t2*. Localities: 1, 4 – East Uzbekistan; 2, 5 – Russia, Yamalo-Nenets AO; 3, 6 – Russia, Moscow region.

Other characters are: male dusting of parafacialia; development of yellow colour on abdomen in male, thoracic median vitta in female. This list may be broadened by the shape of abdomen (d'Assis Fonseca, 1968 as *G. picta*), development of the hairs on eyes Arntfield (1975), the width of frons, presence of reddish colour on the scutellum and so on. Often the secondary characters correlate with the chaetotaxy of the mid tibia as proposed in the cited key, but at least this correlation is far from being strict and a lot of specimens with a contradictory combination were found from most locations. Note also that these characters show a gradual variability and do not permit the dividing of specimens into two natural groups.

I examined genitalia of 7 male specimens with *t2* without *ad* seta (W Ukraine, Carpathians; Krasnodarsky krai; Moscow reg.(2); NW Siberia, Labytnangi; E Uzbekistan and Russian Far East, Primorsky krai) and 3 male specimens with *t2* with *ad* seta (Moscow reg.; NW Siberia, Labytnangi; E Uzbekistan). The cercal plate shows significant variability in the distance between the apical processes and in the width and length of the processes themselves, but the difference is rather between males from different localities, than between males with or without *t2 ad* seta from the same locality (Figs. 1-6). One of the specimens from Uzbekistan

has an especially aberrant apex of the cercal plate. The drawing of the cercal plate given in Gregor et al., 2002 also strongly differs from all genitalia I have examined, the total variability I found is comparable with variability shown by Arntfield (1975) for the North American *Graphomya*.



Figs. 7-10. Patterns of scutum in *G. maculata* and related species (modified from Emden, 1965).

Some examined populations look very recognizable, for example, a series of females from Murmansk region is characterized by 1-2 (0-3) *ad* setae on *t2*; a dark mesonotum with the presutural median stripe dark but wide; a yellow apical part of the scutellum; a large body size, but all these characters require the preceding word “usually”. The only male from Murmansk region has all secondary characteristics of *minor*, but has not even trace of *ad* setae on both *t2*. Other series of the northernmost *maculata* from Yamalo-Nenets AO looks quite similar to that from Murmansk, but the apex of the scutellum is never yellow.

Other interesting case is a curious specimen from Khao Lak (Thailand): the female has mesonotum with a typical male pattern: median and submedian vittae fused into a single supervitta (as on Fig. 10). Fig. 7-10 show typical development of median and submedian vittae in *G. maculata* and related species: female *maculata* (7) and male *maculata* (9 and 10). Males of Oriental *G. rufitibia* Stein, 1918 usually have an intermediate development of these vittae as in Fig. 8. Females of the Neotropical *G. tropicalis* Malloch, 1934 have the male pattern similar to the female from Khao Lak. The reciprocal situation is also known: males of *G. cubana* Dodge, 1965 have the scutum with a female pattern. I labeled the female from Khao Lak as *maculata* and I would like to express my doubts on the validity of the neotropical *maculata*-like species described on a basis of the inversion of coloration of the sexes which may be simply a matter of individual variations of *G. maculata*.

I also do not share Arntfield’s opinion that all variations in *maculata* should be described as new species (Arntfield, 1975). *G. maculata* has an unusually wide geographical distribution, the fly is recorded from northward of the Polar circle to the equator, from Palearctic, Oriental region, Oceania, North Africa, Nearctic and Neotropical (Brazilia, Marques & Couri, 2007) regions. Either *G. maculata* should be divided all over the world into numerous local species with quite vague borders between them or subdivision of only North American *maculata*-like flies onto 9 (!) species based on the even more uncertain characters than those proposed for *minor*, should be considered very doubtful.

So, I agree with Hennig’s opinion and regard *G. maculata* as a widespread and polymorphic species and, at least, *G. minor* as its synonym.

***Graphomya setifrons* Vockeroth, 1972**

Figs 11–15, 17

Graphomya setifrons Vockeroth, 1972, Pacific Insects Monograph, 29: 118, Fig. 136, 137, 146, 147 [holotype – ♂ (Universitetets Zoologiske Museum, Copenhagen), Banatam, Lavongai, Bismarck Arch., 19.III 1962. Paratypes (Bishop Museum, Honolulu; British Museum of Natural History, London; Universitetets Zoologiske Museum, Copenhagen): 2 ♀, same data as holotype but 18.III and 23.III; 1 ♂, Mendi, S Highlands, SE New Guinea, 1660m, 13.X 1958, in light trap, J.L. Gressitt; not examined].

Graphomya lehi Kurahashi et Shinonaga, 2009, Jpn. J. Syst. Ent., 15(2): 301 [holotype – ♂, and paratypes – 32 ♂, Malaysia, Borneo, Sarawak State, Mari div., Bario; not examined], **syn. n.**

MATERIAL. Thailand: Phuket prov., 8.091°N, 98.304°E, a grassy swamp overgrown with some Poacea grass the height of a human and densely twined by a climbing fern *Ligodium* sp. and the pitcher plant *Nepenthes mirabilis* (Lour.) Druce, collected on foliage; 16-26.II 2009, 9 ♂, 4 ♀ (N.Vikhrev) and 7-11.XII 2009, 2 ♂, 1 ♀ (N.Vikhrev); Phang Nga prov., 8.226°N, 98.299°E, tree standing near a pond, 23.II 2009, 1 ♂ (N.Vikhrev).



Figs. 11-12. *Graphomya setifrons* Vockeroth, dorsal view. 11 – male, 12 – female.

DESCRIPTION. Male. Body length 5-6 mm. Ground colour black with a dense dusting. Dusting yellow in most views, but brownish in anterior view (Fig. 11, 13).

Head. Eyes bare, upper anterior facets only slightly enlarged. Frons at the narrowest point – at middle about 0.1 of head width, slightly widened to vertex, strongly widened to lunula. Interfrontalia black, 1.5 times as wide as each fronto-orbital plate, fronto-orbital plate yellowish dusted in upper view and brown in anterior view, of subequal width all along. Fronto-orbital plate with 7-8 strong inclinate setae in anterior 3/4, several weaker intermediate setulae and a pair of reclinate setae slightly in front of level of anterior ocellus. Parafacialia yellowish dusted in upper view and brown in anterior view. Gena dark grey. Occiput whitish-yellow dusted at narrow postocular area, otherwise black.

Antennae black, inserted at middle of eye. Postpedicel covered with short pale pubescence, falling short of mouth margin, by only 1/3 of its own length. Arista yellowish, long plumose. Palpi black.

Thorax. In posterior view mesonotum densely yellowish dusted with 3 black undusted vittae. Median vitta wide, slightly narrowed anteriorly, submedian vittae narrower, extend from neck to level between 3-d and 4-th *post dc*. Also a pair of narrow oblique black stripes present on line of prealar-supraalar setae. Pleura black, but anepisternum and katepisternum in posterior 2/3 and anepimeron in lower half yellowish dusted. Scutellum with large black equilateral triangle, otherwise yellowish dusted. 2+4 *dc*; posthumeral and presutural setae strong; prealar seta almost as long as posterior notopleural; katepisternal setae 1+2 (anterior weak), katepimeron with 3(4) rather long setulae; meron with 8-9 setulae and 1 strong seta below posterior spiracle and with 2-3 setulae above hind coxa.



Figs. 13-16. *Graphomya* ssp. 13-15 – *G. setifrons*: 13 – male, lateral view; 14 – cercal plate, dorsal view; 15 – male terminalia, lateral view; 16 – *G. maculata*, male terminalia, lateral view.

Abdomen. Tergite 1+2 black, dusted only on posterior margin; tergites 3 to 5 densely yellow-grey dusted with paired black rounded spots with indistinct margin; tergites 3 and 4 with 2 pairs of spots: median (bigger) and lateral (smaller); tergite 5 with a pair of small median spots only. Sternite 1 hairy. Male terminalia as shown on Fig. 14, 15.

Wing distinctly brownish infuscated; bend of *M* vein broadly rounded, cell *R4+5* in the widest place only 2 times as wide as at apex; vein *R4+5* setulose on both sides, setulae extend till half distance to *r-m* crossvein. Calypters brown, but lower third of upper one yellow and borders yellow-brown; lower calypter of *Musca*-type; halter yellow-brown.

Legs black, but knees and basal 1/4 of tibiae yellow(ish). *t1* without setae; *f2* with 5-6 *a*-setae in basal half (median seta the longer, about 2 times as long as tibia width), 3 *pv* setae in basal 1/3, 2 *pd* preapical setae; *t2* with strong submedian *p*-seta and weaker *pd* in apical 1/3; *f3* with rows of *ad* and *av* setae and *pd* preapical seta; *t3* with submedian *ad*, 3(2-4) *av* setae at third quarter, in apical 1/4 with long fine hairs on *av* and *pv* surface.

Female (Fig. 12, 17) differs from male as follows:

Body dusting more whitish-grey, less yellowish. Frons wide and distinctly widened anteriorly: 0.22 head width at vertex, 0.39 at lunula, black interfrontalia of equal width all along, without frontal triangle, fronto-orbital plates distinctly widened anteriorly, about half width of interfrontalia at middle. Fronto-orbital plates with 6-8 inclinate setae on inner margin, in outer part with sparse fine setulae and 2 reclinate setae near vertex. A pair of narrow oblique black stripes on thorax indistinct, thoracic vittae and black triangle on scutellum slightly narrower than in male. Wings hyaline, at most slightly infuscated, calypters brownish-yellow with yellow border. *t3* with only 1 *av*.



Fig. 17. *Graphomya setifrons*, female.

DISCUSSION. The description given by Kurahashi and Shinonaga (2009) for *G. lehi* from Malaysia, Borneo, Sarawak fits with Vockeroth's description and with my series, including the presence of one strong seta on the meron among the usual setulae. Other diagnostic characters are also similar: dark legs; black palpi; 3 thoracic vittae almost similar in both sexes; body size 6 mm or less. In addition the male has characteristic genitalia with a long surstylus and modified hind tibia with 2-4 *av* setae and fine *av* and *pv* hairs in the apical third. The presence of orbital setae on almost the entire length of the frons not mentioned for *G. lehi*, but the contrary was not mentioned either. Katepisternal setae stated for *G. lehi* as 0+2 was probably due to overlooking the weak anterior one. Kurahashi and Shinonaga didn't refer the Vockeroth (1972), so it seems that they overlooked *G. setifrons*.

DISTRIBUTION. The species described by 4 specimens from the Solomon Isl. and Bismark Arch, that is 6000 km from recorded sites in Thailand. Another record from Malaysia, Borneo (as *G. lehi*) shows that *G. setifrons* is rather widespread in South Oriental region.

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Author's address:

Zoological Museum, Moscow Lomonosov State University,
Bolshaya Nikitskaya 6, Moscow, 125009, Russia.
e-mail: hydrophorus@rambler.ru

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