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FOUR NEW SPECIES OF THE GENUS *MELANAGROMYZA* (DIPTERA, AGROMYZIDAE) FROM UKRAINE

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Four New Species of the Genus *Melanagromyza* (Diptera, Agromyzidae) from Ukraine.
Guglya, Yu. A. — *Melanagromyza trapezoidea* sp. n., *M. asymmetrica* sp. n., *M. cuprea* sp. n. and *M. pratensis* sp. n. are described, and a key to *Melanagromyza* species known to occur in Ukraine is provided.
Key words: Agromyzinae, *Melanagromyza*, new species, key, Ukraine.

Introduction

K. A. Spencer (1966) analyzed European *Melanagromyza* Hendel, 1920 and described, redescribed and illustrated 25 species. Currently, 39 described species are known in Europe and more than 360 species worldwide (Guglya, 2012; Papp, Černý, 2015).

In Ukraine, the genus *Melanagromyza* is studied since 2009 (Guglya, 2011–2016). By far, 56 species of *Melanagromyza* were collected and recognized by the author, but only 13 from them were identified. Most species do not fit any described *Melanagromyza*. Four new species collected in North-East of Ukraine are described, illustrated and keyed below.

Material and methods

All the material was collected by sweeping net. Dissected genitalia were macerated in potassium hydroxide solution, washed, examined in glycerol, and stored in a microvial pinned together with the fly specimen and deposited in the collection of the Museum of Nature of the Vasyl Karazin Kharkiv National University. All the illustrations are drawn by the author.

Morphological terminology follows Spencer (1981).

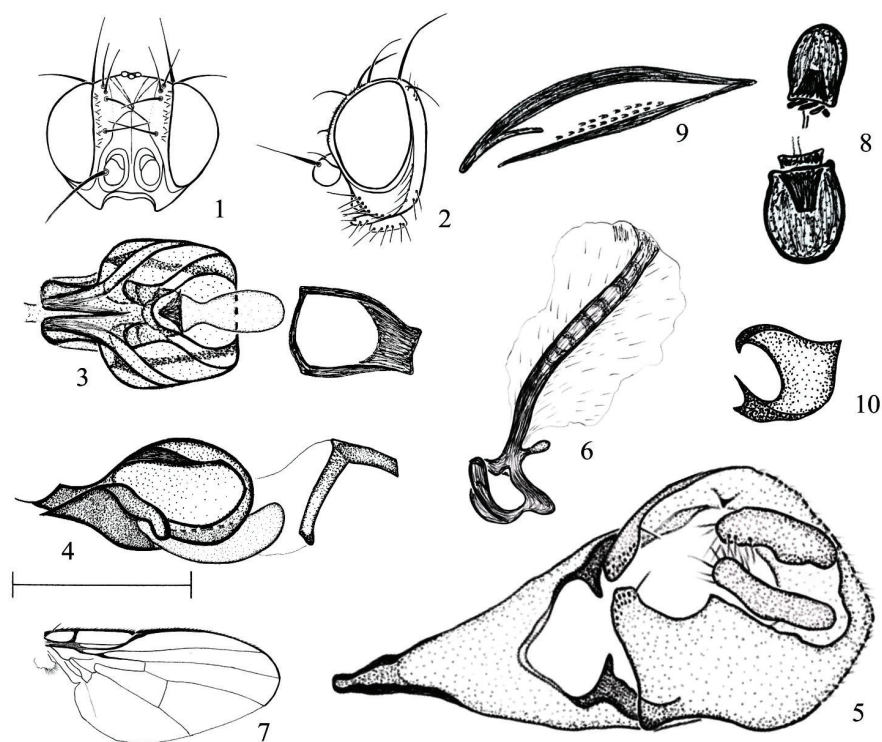
Abbreviation in text: ac — acrostichal setulae; dc — dorsocentral seta; frorb sta — fronto-orbital setula; fr s — frontal seta; orb s — orbital seta; sbvb s — subvibrisla seta.

Results and discussions

Melanagromyza trapezoidea Guglya, sp. n. (figs 1–10)

Type material. Holotype ♂: Ukraine: Kharkiv Region, near Orchyk (49°09' N, 35°01' E), 15.05.2011, 9.00–9.30, dry grass clearing in coniferous forest (Guglya) (No H-71) (dissected). Paratypes: 2 ♂, labels as in the holotype (No H-72, H-73); 1 ♂, Kharkiv, Sokolnyky (49°25' N, 36°15' E), 01.05.2012, motley grass (No H-74); 1 ♂, Kharkiv, Piatykhvatky (50°05' N, 36°14' E), 03.05.2014, deep narrow gully (No H-75) (Guglya); 1 ♂, same locality (50°05' N, 36°14' E), 28.08.2015, 15.30–16.30, sweeping on high grass in a gully (*Centaurea*, *Cirsium*, *Medicago*) (No H-76); 1 ♀, same locality and date, 16.30–17.30, sweeping on low grass in a gully (*Cicorium*, *Fragaria*, *Vicia*, *Cirsium*, *Poacea*) (No H-77) (Guglya) (all the paratypes dissected).

Description. Head (figs 1–2). Orbit projected above eye in profile; 2 orb s, 2 fr s (all strong), space between fr s 2.5× as big as spaces between neighbouring 2nd fr s and 1st and 2nd orb s; frorb sta in two rows, proclinate near the eye and reclinate near the frons; orbit wide and shining (frontal view); frontal carina narrow; lunule black, matt, high, acute dorsally, with distinct furrow; ocellar triangle dark brown, matt, large, reaching the lunule, with very slight contours; frons the same; vibrissa and four sbvb s equal; maximum high of eye 3.5× maximum high of gena; gena angular; 1st flagellomere round (lateral view).



Figs 1–10. *M. trapezoidea* sp. n., holotype: 1, 2 — male head; 3 — phallus, ventral view; 4 — same, lateral view; 5 — epandrium-hypandrium complex; 6 — ejaculatory apodeme; 7 — male wing; paratype: 8 — spermathecae; 9 — egg guide, left blade; 10 — basiphallus (aberrant). Scale bar 0.1 mm.

Wing (fig. 7) hyaline; costal vein brown, other veins light brown; costa reaching M_1 ; last section of CuA_1 $0.6\times$ as long as penultimate; costal sections 2–4 in the ratio of 5.2 : 1.8 : 1.00; calypter, margin and fringe white; hairs of fringe rather long. Wing length 2.5 (♂) to 2.7 (♀) mm. Mesonotum shining black, with greenish or coppery undertone (dorsal view); scutellum more matt; 2 dc; ac orange-red, in 8–9 irregular rows at level of 2nd dc. Halteres and legs uniformly dark brown. Mesonotum and scutellum of female more shining and green.

Male terminalia (figs 3–6, 10). Epandrium covered with sparse short hairs; cerci with long hairs only; inner surface of surstylus with numerous small prenisetae and one long seta located ventrally; hypandrium V-shaped, with rounded posterior apex; ejaculatory apodeme as long as phallus. Phallus 0.21 mm long; distiphallus trapezoid-shaped (ventral view); mesophallus long; basiphallus strongly sclerotized, narrowing anteriorly; both arms connected by crosspiece posteriorly.

Female terminalia (figs 8–9). Spermathecae unequal, dark brown, oval, with flat base; collar cylindrical in biggest one and finger-shaped in smallest one. Egg guide narrow, $4.7\times$ as long as its maximum width, $3.7\text{--}4.3\times$ as long as spermatheca length, acute apically; medial membrane with two rows of small brown teeth.

Bionomics. Two generations are recorded in May and August. Host plant unknown.

Diagnosis. Superficially the new species is similar to *Melanagromyza aeneoventris* (Fallén, 1823) (Papp, Černý, 2015) having orbit projected above eye in profile; 2 orb s and 2 fr s with space between fr s $2.0\text{--}2.5\times$ as big as spaces between neighbouring 2nd fr s and 1st and 2nd orb s and frorb sta in two rows proclinate and reclinate together. The new species differs from it by having white margin of calypter; mesonotum with greenish-coppery tinge; narrower, higher and acute dorsally lunule and phallus shape: distiphallus trapezoid-

shaped, widening posteriorly; arms of basiphallus are connected by crosspiece posteriorly (ventral view), whereas in *M. aeneoventris* distiphallus triangular, elongated and narrowing posteriorly; arms of basiphallus not connected posteriorly (ventral view).

Comments. One paratype has aberrant basiphallus (fig. 10), but in other respects it is identical to all specimen of the type series.

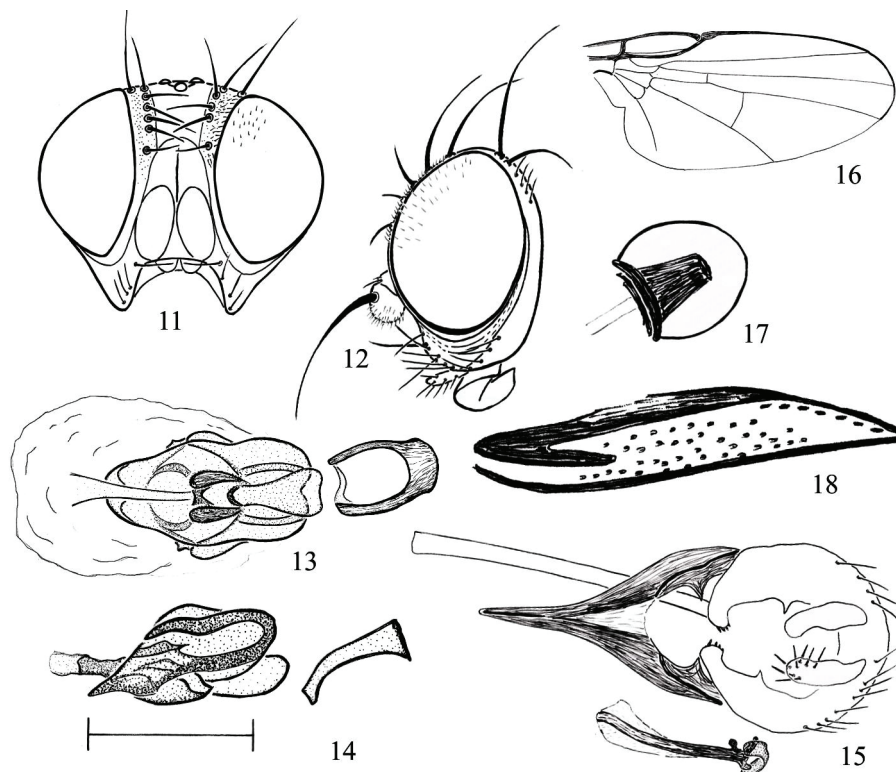
Etymology. The species name reflects the trapezoid shape of distiphallus.

***Melanagromyza asymmetrica* Guglya, sp. n. (figs 11–18)**

Type material. Holotype ♂: Ukraine: Kharkiv Region, near Petrivske (49°10' N, 36°58' E), 10.05.2014, 15.00, motley grass between coniferous and deciduous forest (No H-78) (Guglya) (dissected). Paratypes: Kharkiv Region, 1 ♂, 1 ♀, same locality, 11.05.2014, 15.00, flood land (No H-79, H-80) (Guglya); 2 ♂, near Haidary (49°37' N, 36°19' E), 04.06.2011, 18.00, motley grass in a gully (No H-81, H-82) (Guglya) (all dissected).

Description. Head (figs 11–12). Orbit not projected above eye in profile; 2–3 orb s, 3 fr s (all strong), all specimens in type series with different numbers of orb s, more, often two left and three right; frorb sta in two rows, mainly reclinate and lateroclinate, with a few proclinate at level of lunule; orbit wide and shining (frontal view); frontal carina not differentiated; lunule slightly shining, high, rounded dorsally, with distinct furrow; ocellar triangle matt, narrow, reaching level of 3rd orb s, with very slight contours; frons matt; vibrissa larger than sbvb s; maximum height of eye 5× as high as gena; gena angular; 1st flagellomere round (lateral view), covered with white elongated hairs.

Wing (fig. 16) hyaline; costal vein black, other veins brown; costa reaching M_1 ; last section of CuA_1 0.8× as long as penultimate; costal sections 2–4 in the ratio of 4.18 : 1.12 : 1.00; calypter yellowish, margin yellow; hairs of fringe rather long, yellowish. Wing length 2.95 (♂) to 3.2 (♀) mm.



Figs 11–18. *M. asymmetrica* sp. n., holotype: 11, 12 — male head; 13 — phallus, ventral view; 14 — same, lateral view; 15 — epandrium-hypandrium complex and ejaculatory apodeme; 16 — male wing; paratype: 17 — spermatheca; 18 — egg guide, left blade. Scale bar 0.1 mm.

Mesonotum weakly shining, blackish-grey (dorsal view); scutellum more matt; 2 dc; ac black, in 10 irregular rows at level of 2nd dc; halteres and legs shining black. Mesonotum and scutellum of female more shining with coppery undertone.

Male terminalia (figs 13–15). Epandrium covered with long hairs; cerci with long hairs only; inner surface of surstylus covered with numerous small prensisetae; hypandrium Y-shaped, with acute apex; ejaculatory apodeme shorter than phallus; phallus 0.20 mm long, distiphallus complex elongated, oval, acute concaved anteriorly (ventral view); mesophallus of medium length, slightly concaved apically; anterior part and arms of basiphallus strongly sclerotized; both arms are connected by weakly sclerotized crosspiece posteriorly.

Female terminalia (figs 17–18) Both spermathecae identical, dark brown, suboval, slightly concaved basally; egg guide $5.4\times$ as long as spermatheca; egg guide narrow, $5.3\times$ as long as its maximum width, acute apically; medial membrane covered with numerous small brown teeth, with one row of somewhat larger teeth located apically along dorsal margin.

Bionomics. One generation was recorded in May–June. Host plant unknown.

Diagnosis. The new species is superficially similar to *Melanagromyza albocilia* Hendel, 1931 in having bright whitish-yellow calypter, margin and fringe, last section of CuA_1 $0.8\times$ as long as penultimate, costal vein black, other veins beige; arms of basiphallus connected by crosspiece posteriorly, differing by having blackish-grey slightly shining mesonotum, 3 orb s; frorb sta thick, laterocline, distiphallus narrowing in posterior third, mesophallus slightly concaved apically (in *M. albocilia*, body black with yellowish-green tinge and strongly shining mesonotum, 2 orb s, frorb sta sparse, inclinate and reclinate; distiphallus narrowing in posterior half; mesophallus rounded apically).

Etymology. The species name reflects asymmetrical position of orb s and fr s in the type series.

Melanagromyza cuprea Guglya, sp. n. (figs 19–29)

Type material. Holotype ♂: Ukraine: Sumy Region: Vakalivshchyna (51°02' N, 34°55' E), 12.06.2013, on leaves of *Sambucus nigra* L. (No H-83) (Guglya) (dissected). Paratypes: Sumy Region: 2 ♂, 1 ♀, labels as in the holotype (No H-84, H-85, H-86) (♀ dissected); 1 ♂, same locality, 14.06.2010, 11.00, dry motley grass under trees (No H-87) (Guglya) (dissected); 1 ♂, Kharkiv Region: near Rubizhne (50°10' N, 36°47' E), 17.08.2014, 15.30, high and thick grass in the forest stand of *Robinia pseudoscacia* L. and *Pinus* sp. (No. H-88) (Guglya) (dissected).

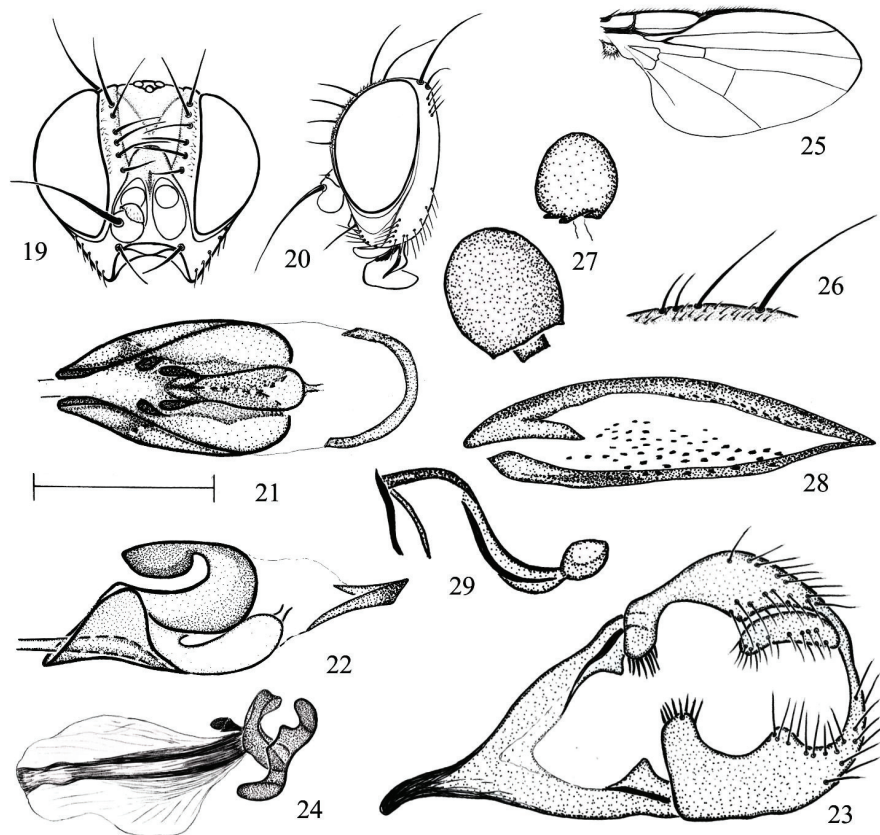
Description. Head (figs 19–20). Orbit projected above eye in profile; 2–4 orb s, 3 fr s (in holotype 3 orb s, 3 fr s); frorb sta in two rows, reclinate and procline together; orbit wide and shining (frontal view); frontal carina of medium width, visible only pedicel at level; lunule slightly shining, high, rounded dorsally, without distinct furrow, but with elongated hollow near frontal carina; ocellar triangle matt, wide, reaching the level between 3rd orb s and 1st fr s, with distinct contours; frons matt; vibrissa longer than sbvb s; maximum height of eye $3.8\times$ as high as gena; gena angular; 1st flagellomere elongated (lateral view).

Wing (fig. 25) slightly yellowish, with all veins brown; costa reaching M_1 ; last section of CuA_1 $0.7\times$ as long as penultimate; costal sections 2–4 in the ratio of $3.85 : 1.21 : 1.00$; calypter and fringe yellowish, margin orange. Wing length 2.75 (♂) to 3.35 mm (♀).

Mesonotum strongly green shining (dorsal view); scutellum matt, with coppery undertone; abdomen shining coppery-green; 4 dc (2 strong and 2 much slender and short) (fig. 26); ac black, in 10 irregular rows at level of 2nd dc; halter and legs dark brown.

Male terminalia (figs 21–24). Epandrium covered with long hairs; cerci with long hairs only; inner surface of surstylus with numerous, not long, but strong setae; hypandrium Y-shaped (ventral view); ejaculatory apodeme longer than phallus; phallus 0.22 mm long; distiphallus complex elongated, oval and narrowing posteriorly (ventral view); mesophallus of medium length, rounded apically; basiphallus short, wide and rounded anteriorly.

Female terminalia (figs 27–29). Both spermathecae suboval, of different size, dark brown, with flattened base; collars present in both spermathecae, but of different shape; egg guide relatively wide, $3.9\times$ as long as maximum width, acute apically and $4.3\text{--}6.2\times$



Figs 19–29. *M. cuprea* sp. n., holotype: 19, 20 — male head; 21 — phallus, ventral view; 22 — same, lateral view; 23 — epandrium-hypandrium complex; 24 — ejaculatory apodeme; 25 — male wing; 26 — dorsocentral setae; paratype: 27 — spermathecae; 28 — egg guide, left blade; 29 — ventral seminal receptacle. Scale bar 0.1 mm.

as long as length of spermatheca; middle and ventral part of medial membrane covered with numerous small brown teeth and one row of small teeth located apically along dorsal margin; ventral seminal receptacle as on fig. 29.

Bionomics. Two generations are recorded, in June and August. Host plant unknown.

Diagnosis. The new species differs from all other *Melanagromyza* species by the combination of strongly shining orbits (frontal view); medium sized frontal carina; lunule with elongated hollow near frontal carina; mesonotum strongly green shining (dorsal view); scutellum matt, with coppery undertone; abdomen strongly shining coppery-green; two additional small dc; basiphallus short, wide and rounded anteriorly; inner surface of surstylus with numerous, not long, but strong setae.

Etymology. The name reflects the copper sheen of the mesonotum and abdomen.

Melanagromyza pratensis Guglya, sp. n. (figs 30–38)

Type material. Holotype ♂, Ukraine: Sumy Region: Vakalivshchyna (51°02' N, 34°55' E), 13.06.2013, 10.00–11.00, meadow, on *Centaurea jacea* L. (No H-89) (Guglya) (dissected). Paratypes: Sumy Region: 1 ♂, 4 ♀, labels as in holotype (No H-90, H-94) (Guglya) (dissected); 1 ♀, same locality and date, 11.00, motley grass on a slope (No H-95) (Guglya) (dissected); Kharkiv Region: 1 ♂, near Rubizhne (50°10' N, 36°47' E), 11.06.2011, 16.00, dry gully (No H-96) (Guglya) (dissected); 1 ♂, 6 ♀, same locality and date, 13.00, edge of deciduous forest (No H-97, H-103) (Guglya) (dissected).

Description. Head (fig. 30–31). Orbit projected above eye in profile only at level of orb s; 3 orb s, 3 fr s; forb sta elongated in several rows, reclinate nearest to eye and proclinate

nearest to frons; orbit wide and shining (frontal view); frontal carina absent; lunule slightly shining, high, rounded dorsally, with deep furrow; ocellar triangle as matt as frons, wide, with distinct contours; vibrissa and sbvbs are of the same length; maximum high of eye $4.8\times$ as maximum high of gena; gena slightly acute ventrally; 1st flagellomere rounded (lateral view).

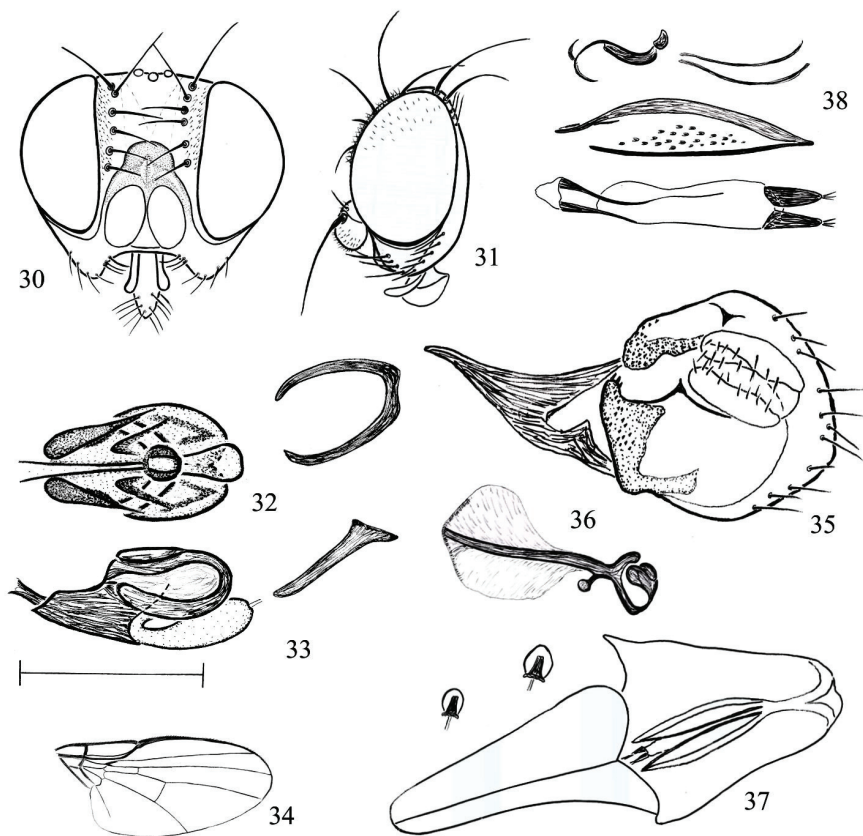
Wing (fig. 34) slightly yellowish, with all veins brown; costa reaching M_1 ; last section of CuA_1 $0.85\times$ as long as penultimate; costal sections 2–4 in the ratio of $3.87 : 1.06 : 1.00$; calypter and fringe white, margin yellow. Wing length 2.7 mm in both sexes.

Mesonotum and scutellum slightly shining, blackish-grey (dorsal view); abdomen strongly shining, yellowish-green; 2 dc; ac in 8 irregular rows at level of 2nd dc; halteres and legs dark brown.

Male terminalia (figs 32, 33, 35, 36). Epandrium covered with long hairs; inner surface of surstylus covered only with numerous short and small prenisetae; hypandrium V-shaped, with obtuse apex (ventral view); ejaculatory apodeme slightly longer than phallus; phallus 0.21 mm long; distiphallus complex elongated, oval and narrowing posteriorly (ventral view); mesophallus long, flattened apically; basiphallus typical for the genus.

Female terminalia (figs 37–38). Both spermathecae oval, of different size, dark brown, flattened basally; both spermathecae with collars; egg guide relatively wide, $4.5\times$ as long as maximum width, acute apically; middle and ventral part of medial membrane covered with numerous small brown teeth; ventral seminal receptacle, left blade, proctiger and cerci as on fig. 38.

Bionomics. One generation was recorded in June. Host plant unknown, but probably the flies are associated with *Centaurea jacea* L., as six specimens were caught in



Figs 30–38. *M. pratensis* sp. n., holotype: 30, 31 — male head; 32 — phallus, ventral view; 33 — same, lateral view; 34 — male wing; 35 — epandrium-hypandrium complex; 36 — ejaculatory apodeme; paratype (female terminalia): 37 — spermathecae, VII tergite, VII sternite; 38 — ventral seminal receptacle, egg guide, left blade, proctiger and cerci. Scale bar 0.1 mm.

thicket of this plant in a small meadow, where no other possible host plants were present. Other specimens were collected on motley grass meadows with *Centaurea jacea* L., too.

Diagnosis. The new species is superficially similar, in having proclinate and reclinate frons together, wide lunule with slight furrow and white calypter, to *M. dettmeri* Hering, 1933, running to that species in the key by Papp, Černý (2015), but differing by the orbit slightly projecting above eye only at level of orbits (lateral view); last section of $CuA_1 > 0.75\times (0.85\times)$ as long as penultimate; margin yellow; mesonotum and scutellum slightly shining, blackish-grey (dorsal view); abdomen strongly shining, yellowish-green; inner surface of surstylus covered only with numerous short and small spines; setae on cerci short, whereas in *M. dettmeri* orbit projecting as narrow ring above eye (lateral view); last section of $CuA_1 < 0.75\times (0.67\times)$ as long as penultimate; margin pale brown; mesonotum “matt, faintly greenish or coppery, abdomen distinctly shining, variably coppery-greenish or bluish”; “inner surface of surstylus with group of denser and long setae on ventral margin and group numerous spines on inner surface” (Papp, Černý, 2015); setae on cerci long.

Etymology. The name reflects the locality (a thicket of meadow plants), where all the specimens were collected.

Key to males *Melanagromyza* species known to occur in Ukraine

1. Fronto-orbital setulae only proclinate, thick, in several rows, elongated..... 2
- Fronto-orbital setulae only reclinate or proclinate and reclinate together..... 3
2. Calypter white, margin and fringe yellow; mesonotum black, shining..... *rodendorffi* Spencer, 1966
- Calypter grey, margin and fringe black; mesonotum blackish-grey, matt..... *aenea* (Meigen, 1830)
3. Frontal carina distinct, flattened (fig. 19)..... 4
- Frontal carina absent (fig. 11) or crest-shaped (fig. 1)..... 7
4. 3 frontal setae and 3 orbital setae, all strong on equal space from each other..... 5
- 3 frontal setae and 2 orbital setae, on unequal spaces from each other..... 6
5. Calypter and fringe whitish-yellow, margin orange; mesonotum strongly green shining (dorsal view); 4 dorsocentral setae: two strong and 2 short and more slender (fig. 26); frontal setae and orbital setae of various length (figs 19, 20)..... *cuprea* sp. n.
- Calypter and fringe whitish-grey, margin black; mesonotum black, shining (dorsal view); 2 strong dorsocentral setae; frontal setae and orbital setae equal..... *verbasci* Spencer, 1957
6. 2 strong dorsocentral setae, sometimes 2 short additional dorsocentral setae present; calypter and fringe dark grey, margin black; smaller species: wing length < 2.2 (2.1) mm, height of head < 0.76 (0.7) mm in male and < 0.87 (0.75) mm in female..... *zlobini* Pakalniškis, 1997
- 1st dorsocentral setae strong and 2nd dorsocentral seta short and more slender; calypter and fringe beige, margin brown; larger species: wing length > 2.2 (2.3) mm, height of head > 0.77 (0.85) mm in male and > 0.87 (1.0) mm in female..... *symphyti* Griffiths, 1963
7. Fronto-orbital setulae reclinate and proclinate together..... 8
- Fronto-orbital setulae only reclinate..... 10
8. 3 frontal setae, 3 orbital setae; space between all fronto-orbital bristles approximately equal; frontal carina absent (figs 30, 31)..... *pratensis* sp. n.
- 2 frontal setae, 2 orbital setae; space between frontal setae $2.0\text{--}2.5\times$ as big as spaces between neighbouring 2nd frontal setae and 1st and 2nd orbital setae; frontal carina very narrow, crest-shaped..... 9
9. Calypter margin yellowish, darker than calypter and fringe; mesonotum black, with bluish tinge; distiphallus triangular-shaped, elongated and narrowing posteriorly (ventral view); arms of basiphallus not connected by crosspiece (Černý, 2015: fig. 83E)..... *aeneoventris* (Fallén, 1823)
- Calypter margin white, as calypter and fringe; mesonotum black with greenish-coppery tinge; distiphallus trapezoid-shaped, widening posteriorly (ventral view); arms of basiphallus are connected by crosspiece posteriorly (figs 3, 4)..... *trapezoidea* sp. n.
10. Anterior margin of distiphallus protuberant (ventral view) (Guglya, 2012: figs 1, 2)..... 11
- Anterior margin of distiphallus flattened, concaved or slit-shaped (ventral view) (Černý, 2015: figs 91E, 95E)..... 12
11. Larger species: wing length > 2.7 mm; orbit projected above eye in profile more at level of frontal setae; lunula in centre have elongated diamond-shaped hollow; length of basiphallus $1.15\times$ as long as width; mesophallus with parallel margins (ventral view) (Guglya, 2012: fig. 2)..... *pubescens* Hendel, 1923

- Smaller species: wing length from <2.4 mm; orbit projected above eye in profile uniformly; length of basiphallus 0.72× as long as width; mesophallus strongly widening anteriorly (ventral view) (Guglya, 2012: fig. 1). *provecta* (de Meijere, 1910)
- 12. Slit of anterior margin of distiphallus asymmetrical, very deep and narrow; mesophallus long, curved leftwards (ventral view) (Černý, 2015: fig. 95E). *cunctans* (Meigen, 1830)
- Anterior margin of distiphallus symmetrically concaved, not deep, or anterior margin flattened; mesophallus short, straight (ventral view) (Černý, 2015: fig. 91E, 97E). 13
- 13. 2 frontal setae, 2 orbital setae, all at equal space from one to another; orbit narrow, slightly shining (frontal view). 14
- 2–3 frontal setae, 3 orbital setae, space between neighbouring bristles various; orbit wide, shining (frontal view). 15
- 14. Both dorsocentral setae strong, but 2nd slightly shorter; anterior margin of distiphallus flattened; arms of basiphallus connected posteriorly by crosspiece; distiphallus wide, its length 1.7× as big as width (Černý, 2015: fig. 91E). *astragali* Spencer, 1976
- 1st dorsocentral seta strong, 2nd dorsocentral seta weak and short; anterior margin of distiphallus concaved; arms of basiphallus not connected posteriorly; distiphallus narrow, its length 2.6× as big as width (Černý, 2015: fig. 97E). *cuscutae* Hering, 1958
- 15. Calypter and fringe dark grey, margin black; last section of CuA10.66× penultimate; all veins brown; distiphallus with almost parallel lateral margins, uniformly wide, its length 1.9× as big as maximum width; arms of basiphallus not connected by crosspiece posteriorly (ventral view) (Černý, 2015: fig. 113E). *submetallescens* Spencer, 1966
- Calypter, margin and fringe yellowish; last section of CuA1 0.8× penultimate; Costal vein black, other veins beige; distiphallus strongly narrowing posteriorly, wide only in anterior half, its length 1.5–1.6× as big as maximum width; arms of basiphallus connected by crosspiece posteriorly (ventral view). 16
- 16. Smaller species, wing length from 2.0 mm in male to 2.2 mm in female; very narrow frontal carina presents; mesonotum black, with yellowish-green tinge, strongly shining; fronto-orbital setulae sparse, elongated; orbit projected above eye in profile; mesophallus rounded apically (ventral view) (Černý, 2015: fig. 85E). *albocilia* Hendel, 1931
- Larger species, wing length from 2.95 mm in male to 3.2 mm in female; frontal carina absent; mesonotum blackish-grey, slightly shining; fronto-orbital setulae thick, in several rows; orbit not projected above eye in profile (figs 11, 12); mesophallus concaved apically (fig. 13). *asymmetrica* sp. n.

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