



New *Agromyza* Fallén (Diptera, Agromyzidae) from Brazil and a key for the Neotropical species

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ABSTRACT

Agromyza Fallén (Diptera, Agromyzidae) is a genus of leaf mining flies, including species with high economic importance. The knowledge of this genus is very poor in the neotropics, with 12 known species, only six of them recorded from Brazil. This paper describes two new *Agromyza* species from “Cerrado” and “Pantanal” biomes and records three other species represented only by females that could not be identified to species level. We also present a taxonomic key to segregate the 14 Neotropical species. The specimens were collected in Mato Grosso and Mato Grosso do Sul states and are deposited at Museu de Zoologia, Universidade de São Paulo (São Paulo, Brazil) and Museu Nacional, Universidade Federal do Rio de Janeiro (Rio de Janeiro, Brazil) collections. The adults were photographed and the male terminalia were dissected and illustrated.

Key words: Leaf mining flies, morphology, new species, taxonomy.

INTRODUCTION

The species of *Agromyza* Fallén (Diptera, Agromyzidae) are mostly leaf miners, with a few known as agricultural pests, known to attack a wide variety of cereals such as barley, oats, rye, wheat and corn (Spencer 1973a). Some species are galling, such as the Brazilian *A. terebrans* Bezzi and Tavares, 1916 that induces galls on leaves of *Clitoria laurifolia* Poir (Fabaceae) (Zlobin 2000). A considerable number of species are associated with a variety of dicotyledonous as host-plants, including Betulaceae, Boraginaceae and Asteraceae (see Benavent-Corai et al. 2005), although many

species also occurs in monocotyledons. One particularly diverse group with characteristic male genitalia are found on numerous genera of grasses (Spencer 1990). Another group named the *orobi-group* includes species that feed on Fabaceae (Zlobin 2000).

Agromyza species are morphologically similar to *Phytobia* Lioy species, especially in the course of the Subcostal vein (Spencer and Steyskal 1986), but the presence of a stridulatory mechanism on the abdomen of both sexes in *Agromyza* can segregate these two genera (Tschirnhaus 1971). This stridulatory mechanism is present on the anterior lateral margin of the tergites 1+2 and on the posterior margin of the hind femur (Boucher 2010) and is one of the apomorphies that support the monophyly of the genus (Scheffer et al. 2007).

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The other characters of the genus are very variable, although the following diagnosis is generally accepted: Costal vein ending at vein R_{4+5} or continuing to M_{1+2} ; dm-cu crossvein present; Subcostal vein complete, joining vein R_1 before reaching the Costal vein; haltere white or yellow (black in *A. fusca* Spencer, 1963); orbital setulae reclinate; gena angulate, deepest at rear; usually at least 3 or 4 distinct dorsocentral setae (presuturals sometimes weak or absent); prescutelar present; general color of the body black or partly yellow, without metallic sheen; wing length 2-4 mm and rarely infusate (except in *A. fusca*) (Spencer and Steyskal 1986, Boucher 2010).

The number of *Agromyza* species in the world is around 200 (Boucher 2010), 12 of them recorded from the Neotropical region and only six known from Brazil (Martinez and Etienne 2002). The singular species *A. fusca*, with an infuscated wing, described from Brazil (Spencer 1963) is also recorded from Dominica (Spencer and Stegmaier Jr 1973) and was registered in Guadeloupe causing mines in *Ichnanthus pallens* (Sw.) (Poaceae) (Etienne and Martinez 2003).

This paper describes two new species of *Agromyza* found in Mato Grosso and Mato Grosso do Sul, in “Cerrado” and “Pantanal” biomes respectively. We also present an illustrated key for the Neotropical species.

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MATERIALS AND METHODS

The specimens of the new species herein described were collected in Mato Grosso and Mato Grosso do Sul states (Brazil), in areas of “Cerrado”, “Pantanal” biomes respectively, where the agromyzid fauna is almost unknown. The collections occurred during periodic expeditions of the “SISBIOTA Diptera” project, during the years of 2011-2013.

The specimens were captured using Malaise traps, preserved in 98% alcohol and mounted on entomological pins. Male terminalia were clarified in KOH 10% for 48 hours, immerse in glycerin on blades for analysis under optical microscope and drawn using a camera lucida.

Besides the material herein described, five females belonging to three other species were collected, but the identification could not be confirmed without the males.

Digital images were made using a Leica MZ16 stereomicroscope and the software AutoMontage Pro by Syncroscopy, version 5.03.0061. The terminology used followed Cumming and Wood (2009) and Boucher (2010). The map was made using DIVA-gis. The material is deposited at the collections of Museu de Zoologia, Universidade de São Paulo (MZUSP, São Paulo, Brazil) and Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ, Rio de Janeiro, Brazil).

We also included in the Taxonomy topic, data on all known Neotropical species which were also keyed.

Acronyms used for the location of the types:

BMNH - The Natural History Museum, London, England

CAS - California Academy of Sciences, San Francisco, California, USA

DEI - Deutsches Entomologisches Institut, Eberswalde, Germany

MCZ - Museum of Comparative Zoology, Harvard University Cambridge, Massachusetts, USA

NMNH - National Museum of Natural History, Washington D.C., USA

RESULTS

Taxonomy

Agromyza animata Spencer, 1973b Holotype male (DEI); Martinez and Etienne 2002: 27 (list).

Notes: Host-plant: unknown

Known geographical distribution: Costa Rica

Agromyza apfelbecki Strobl, 1902 Syntype male, female (coll. Strobl, Austria); Hendel 1931-1936: 107; Spencer 1963: 295 (key, recorded from Chile); Spencer 1967: 83.2 (catalogue); Spencer 1973a: 148 (redescription, Figs 208-213); Valladares 1998: 105 (redescription, Figs 1-2 and recorded from Argentina); Martinez and Etienne 2002: 27 (list); Civelek et al. 2009: 251 (recorded from Turkey); Gil-Ortiz et al. 2010: 309 (geographical distribution and host-plant).

Agromyza abiens Zetterstedt, 1848: 2747 var. *apfelbecki*; Spencer 1963: 295 (synonymic list); Valladares 1998: 105 (synonymic list).

Agromyza andalusiaca Strobl, 1906: 380; Spencer 1963: 295 (synonymic list); Valladares 1998: 105 (synonymic list).

Notes: Host-plants: *Carduus* L., *Cirsium* Mill., *Cynara cardunculus* L., *Cynara scolymus*, L., *Cynara baetica* (Spreng.) Pau (all Asteraceae)

Known geographical distribution: Argentina, Chile, Palearctic region, Turkey

***Agromyza corumbensis* sp. nov. (Figs 1, 2, 4-6)**

ZooBank Life Science Identifier (LSID) - urn:lsid:zoobank.org:act:EA46C50C-121E-4552-A5FD-755C16F640E7

Type material: Holotype male: BRASIL: MS [Mato Grosso do Sul]: Corumbá, BEP Paratudal. S 19°34'11.04" W 57°01'08.5", Malaise 01, 01-16.viii.2012. Lamas, Nihei & eq. cols. [MZUSP], Paratype male: one, same data as holotype [MNRJ] (Fig. 1).

Etymology: The specific name is a reference to the type locality.

Description: Male. Body length: 1.6 mm; wing length: 1.4 mm (Fig. 2)

Color. Frons dark brown; fronto-orbital plate and ocellar triangle weakly shining dark brown; lunule brown with grey pollinosity; face and gena dark brown; scape and pedicel dark brown, first flagellomere brown, light brown, ventrobasally; arista entirely brown; palpus brown, proboscis and labellum yellowish brown; scutum and all pleurae shining dark brown; haltere entirely white; calypters grey, with margin and fringe brown; wing clear; legs brown, with fore knee yellowish; pulvilli yellow; abdomen and terminalia entirely shining dark brown.

Head. Four pairs of fronto-orbitals, two ori inwards directed two ori backwards directed; orbital setulae reclinate in one row; eye height about 3.5 the gena

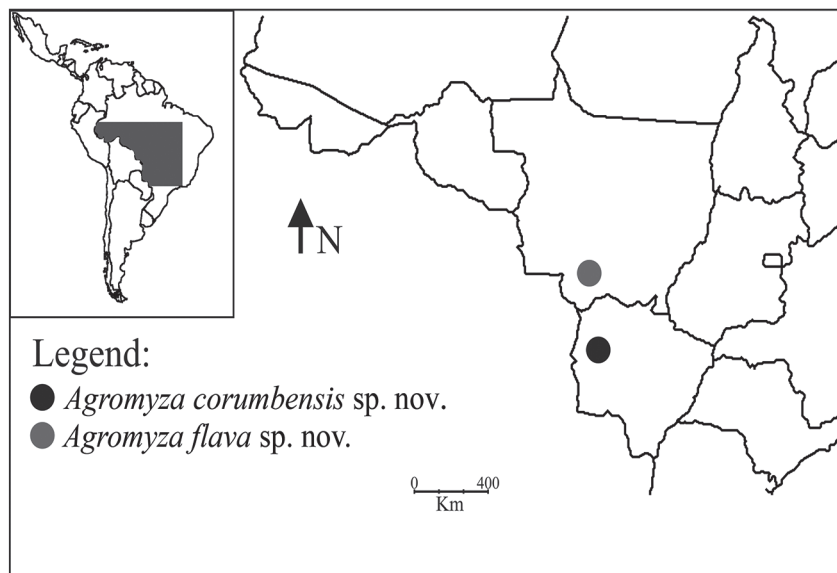


Figure 1 - Map with the collected localities of the new *Agromyza* Fallén species.

height; ocellar triangle long, ending before the first ors; ocellar setae divergent and forward directed; first flagellomere slightly elongated and finely pubescent; arista long and pubescent; vibrissa strong.

Thorax. Acrostichals in six irregular rows; presutural dorsocentrals 1; postsutural dorsocentrals 3; 1 presutural and 1 postsutural long intra-alar seta; two supra-alar setae; one postalar seta; two long and strong pairs of scutellar setae, one sub-basal and one apical; two notopleural setae; length of ultimate section of vein CuA₁ divided by the penultimate section: 1.2; vein r-m at middle of cell dm.

Legs. Fore femur with a strong row of setae in the posterodorsal surface; mid and hind femora without differentiated setae; mid tibia with two posterodorsal setae on middle third and one strong apical ventral seta; hind tibia with one ventral apical seta.

Terminalia. Epandrium rounded, setulose and with long setae; cercus long, setulose with long setae; surstylus rounded with 8-13 large spines and 5-6 setae; hypandrium Y-shaped; phallapodeme about twice the length of the hypandrium; basiphallus

with broadened sclerites at distal end; mesophallus short, asymmetric and measuring about half the size of the distiphallus; distiphallus cup-shaped with microscopic spines at apical two-thirds (Figs 4, 5); ejaculatory apodeme rounded, at its broader part about 7.1 times wider than the constricted area at base (Fig. 6).

Female. Unknown

Host-plant. Unknown

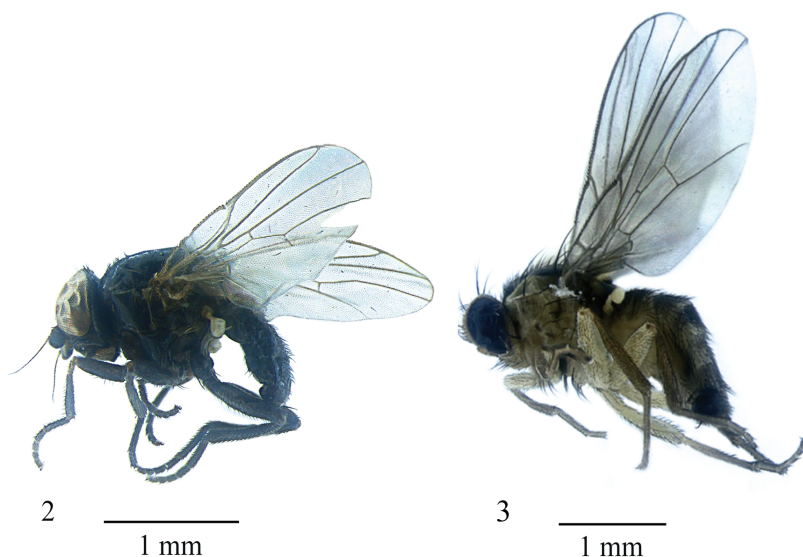
Known geographical distribution. Mato Grosso do Sul (Brazil)

Comments. This species resembles *Agromyza megaepistoma* Sasakawa, 2005 known from El Salvador, in the general coloration of the body and wing size, however, can be distinguished, besides the characters in the key, by the number of dorsocentral setae (1+3).

***Agromyza flava* sp. nov. (Figs 1, 3, 7-9)**

ZooBank Life Science Identifier (LSID) - urn:lsid:zoobank.org:act: E3EA29A8-BF06-4932-943D-D9E96D62A34D

Type material: Holotype male: BRASIL: MT [Mato Grosso]: Poconé, Fazenda Rio Clarinho. S 16°26'21" W 56°43'31.0", Light trap [armadilha



Figures (2-3) - *Agromyza corumbensis* sp. nov.: (2) adult male holotype, lateral view; *Agromyza flava* sp. nov.: (3) adult male holotype, lateral view.

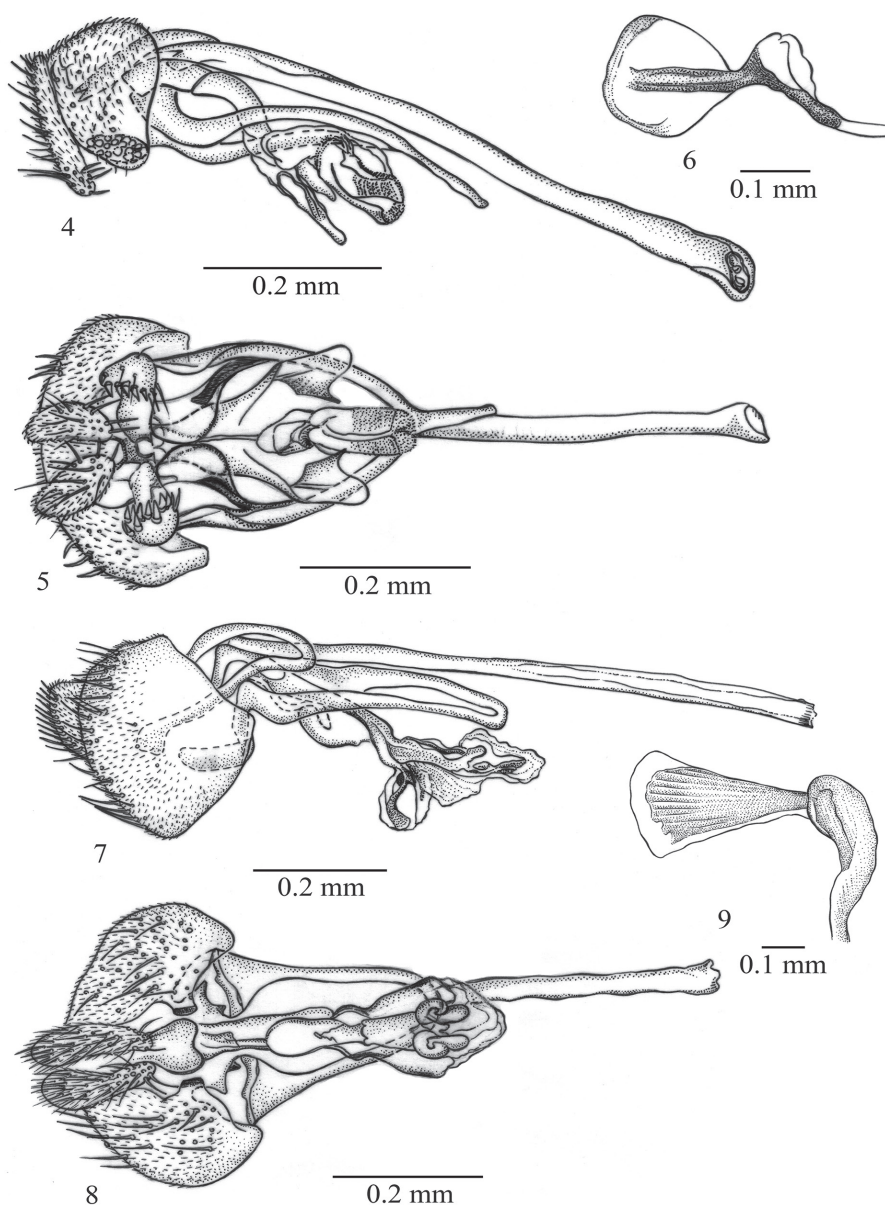
luminosa], 14.vii.2012. Lamas, C.J.B. & eq. cols. [MZUSP] (Fig. 1).

Etymology: The epithet *flava* refers to yellow coloration of the body.

Description: Male. Body length: 2.4 mm; wing length: 2.1 mm (Fig. 3)

Color. Frons and fronto-orbital plate yellow; ocellar triangle brown; lunule, face and gena

yellow; antenna yellowish orange; arista entirely brown; palpus, proboscis and labellum yellow; scutum shining brown with a yellow area before scutellum; postpronotum yellow, with a small central brownish spot; notopleuron yellow; anepimeron brownish yellow; anepisternum yellow with three spots arranged diagonally; katepimeron yellow; katepisternum brown, yellow on superior



Figures (4-9) - *Agromyza corumbensis* sp. nov.: (4) phallus lateral view; (5) phallus ventral view; (6) ejaculatory apodeme lateral view. *Agromyza flava* sp. nov.: (7) phallus, lateral view; (8) phallus ventral view; (9) ejaculatory apodeme lateral view.

part; meron brown, yellow around; haltere entirely yellow; calypters grey, with margin and fringe dark brown; wing clear; legs yellow with mid and hind tibiae and tarsi brownish yellow; pulvilli yellow; abdomen yellow, all tergites shining brown with superior and lateral margins yellow; terminalia entirely shining brown.

Head. Four pairs of fronto-orbital setae, two ori inwards directed, two ors backwards directed; orbital setulae reclinate in two irregular rows; eye height about 4 times gena height; ocellar triangle short, ending before the second ors; ocellar setae divergent and forward directed; first flagellomere rounded and finely pubescent; arista long and plumose; vibrissa strong.

Thorax. Acrostichals in six irregular rows; prescutellars weak; presutural dorsocentrals 1; postsutural dorsocentrals 3; 1 presutural and 1 postsutural long intra-alar seta; two supra-alar setae; one postalar seta; one postpronotal seta; two long and strong pairs of scutellar setae, one sub-basal and one apical; two notopleural setae, the anterior longer than the posterior; three anepisternal setae long and strong, the superior longer than the others; length of ultimate section of vein CuA₁ divided by penultimate section: 1.6; vein r-m slightly past midpoint of cell dm.

Legs. Fore femur with a strong row of setae on the posterodorsal surface; mid and hind femora without differentiated setae; mid tibia with one posterodorsal seta on middle third and one strong apical ventral seta; hind tibia with one ventral apical seta.

Terminalia. Epandrium rounded, with two sclerotized lateral lobes, and with long setae; cercus long, setulose with long setae; surstylus elongated; hypandrium U-shaped; phallapodeme about twice the length of the hypandrium; basiphallus rounded; mesophallus long, bulb-shaped; distiphallus well sclerotized, forming a simple plate at base and bilobed at the apex, with a membrane surrounding it (Figs 7, 8); ejaculatory apodeme triangular, at its larger part about 4.5 times wider than the constricted area at base (Fig. 9).

Female. Unknown

Host-plant. Unknown

Known geographical distribution. Mato Grosso (Brazil)

Comments. The species runs to couplet 5 in the key herein presented and can be segregated from *Agromyza simillima* Spencer, 1963 by the morphology of the phallus. This species resembles the yellow *Japanagromyza* Sasakawa species, but the presence of the stridulatory mechanism confirms its position among the *Agromyza*.

Agromyza fusca Spencer, 1963 Holotype male (BMNH); Spencer 1967: 83.2 (catalogue); Spencer and Stegmaier Jr 1973: 139 (short notes, Figs male terminalia 324 and 325, recorded from Dominica); Martinez and Etienne 2002: 27 (list); Etienne and Martinez 2003: 250 (notes on host-plants and recorded from Guadeloupe).

Notes: Host-plant: *Ichnanthus pallens* (Poaceae)

Known geographical distribution: Brazil, Dominica, Guadeloupe

Agromyza insolens Spencer, 1963 Holotype male (BMNH); Spencer 1967: 83.2 (catalogue); Martinez and Etienne 2002: 27 (list).

Notes: Host-plant: unknown

Known geographical distribution: Brazil

Agromyza megaepistoma Sasakawa, 2005 Holotype male (CAS).

Notes: Host-plant: unknown

Known geographical distribution: El Salvador

Agromyza parvicornis Loew, 1869 Lectotype male (MCZ); Frick 1959: 356 (key, short notes and recorded from New York); Spencer 1966: 1 (short notes, Fig. male terminalia 1 and recorded from Florida); Spencer 1969: 51 (redescription and recorded from Canada); Spencer 1973a: 252 (redescription, Figs 370-373 and notes on economic importance); Spencer and Stegmaier Jr 1973: 18 (key, redescription and recorded from U.S.A.);

Spencer and Steyskal 1986: 67 (key, diagnosis and Figs 417-419); Spencer 1990: 361 (geographical distribution and host-plants); Spencer et al. 1992: 270 (short notes and recorded from Guadeloupe); Valladares 1998: 106 (redescription, Figs 3-10 and recorded from Argentina); Martinez et al. 1993: 167 (notes and recorded from Dominican Republic); Martinez and Etienne 2002: 28 (list).

Notes: Host-plants: *Echinochloa crus-galli* (L.) P. Beauv., *Panicum miliaceum* L., *Zea mays* L. (all Poaceae).

Known geographical distribution: Argentina, Cuba, Canada, Dominican Republic, Guadeloupe, Puerto Rico, Saint-Vincent, U.S.A.

Agromyza plaumanni Spencer, 1963 Holotype male (BMNH); Spencer 1967: 83.2 (catalogue); Martinez and Etienne 2002: 28 (list).

Notes: Host-plant: unknown

Known geographical distribution: Brazil

Agromyza proxima Spencer, 1969 Holotype male (NMNH); Spencer and Stegmaier Jr 1973: 19 (key, redescription and recorded from U.S.A); Spencer and Steyskal 1986: 67 (key, diagnosis, Figs 421 and 422); Spencer 1990: 361 (geographical distribution and host-plants); Valladares 1998: 106 (redescription, Figs 11-13 and recorded from Argentina); Martinez and Etienne 2002: 28 (list).

Notes: Host-plants: *Echinochloa walteri* (Pursh) Heller, *Echinochloa crus-galli*, *Panicum dichotomiflorum* Michx. (all Poaceae).

Known geographical distribution: Argentina, Canada, U.S.A.

Agromyza serratimentula Sasakawa, 1992 Holotype male (CAS); Martinez and Etienne 2002: 28 (list).

Notes: Host-plant: unknown

Known geographical distribution: Brazil

Agromyza simillima Spencer, 1963 Holotype male (BMNH); Spencer 1967: 83.2 (catalogue); Martinez and Etienne 2002: 28 (list).

Notes: Host-plant: unknown

Known geographical distribution: Brazil

Agromyza terebrans Bezzi and Tavares, 1916 (sex?, location of type unknown); Spencer 1963: 300 (diagnosis); Spencer 1967: 83.2 (catalogue); Martinez and Etienne 2002: 28 (list).

Notes: Host-plant: *Clitoria laurifolia* Poir. (Fabaceae)

Known geographical distribution: Brazil

Agromyza venezolana Spencer, 1963 Holotype male (BMNH); Spencer 1967: 83.2 (catalogue); Spencer and Stegmaier Jr 1973: 139 (short notes, Fig. 327 and recorded from Bahamas, Costa Rica and Puerto Rico); Martinez and Etienne 2002: 28 (list).

Notes: Host-plant: unknown

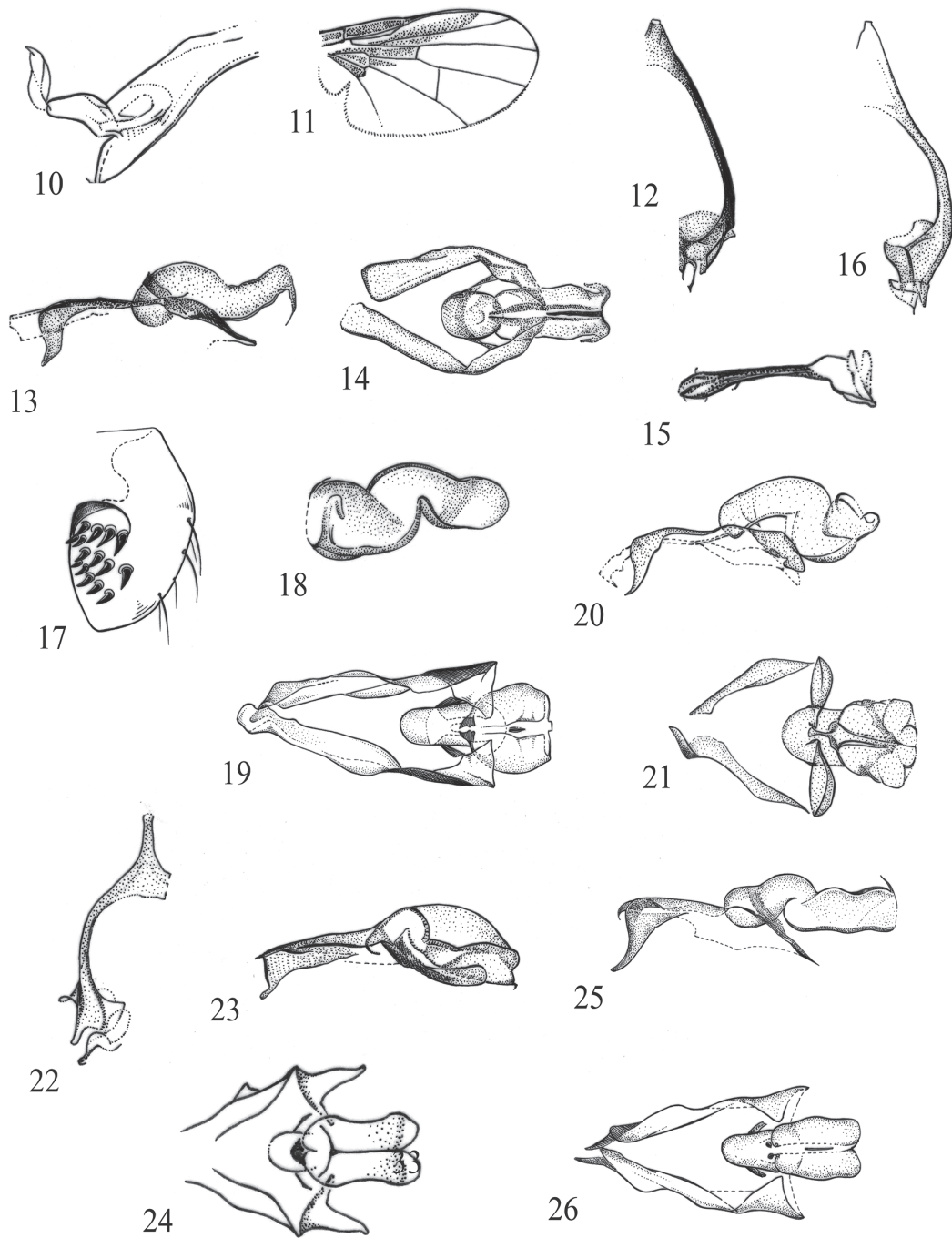
Known geographical distribution: Bahamas, Costa Rica, Puerto Rico, Venezuela

Key to Neotropical species of *Agromyza* Fallén

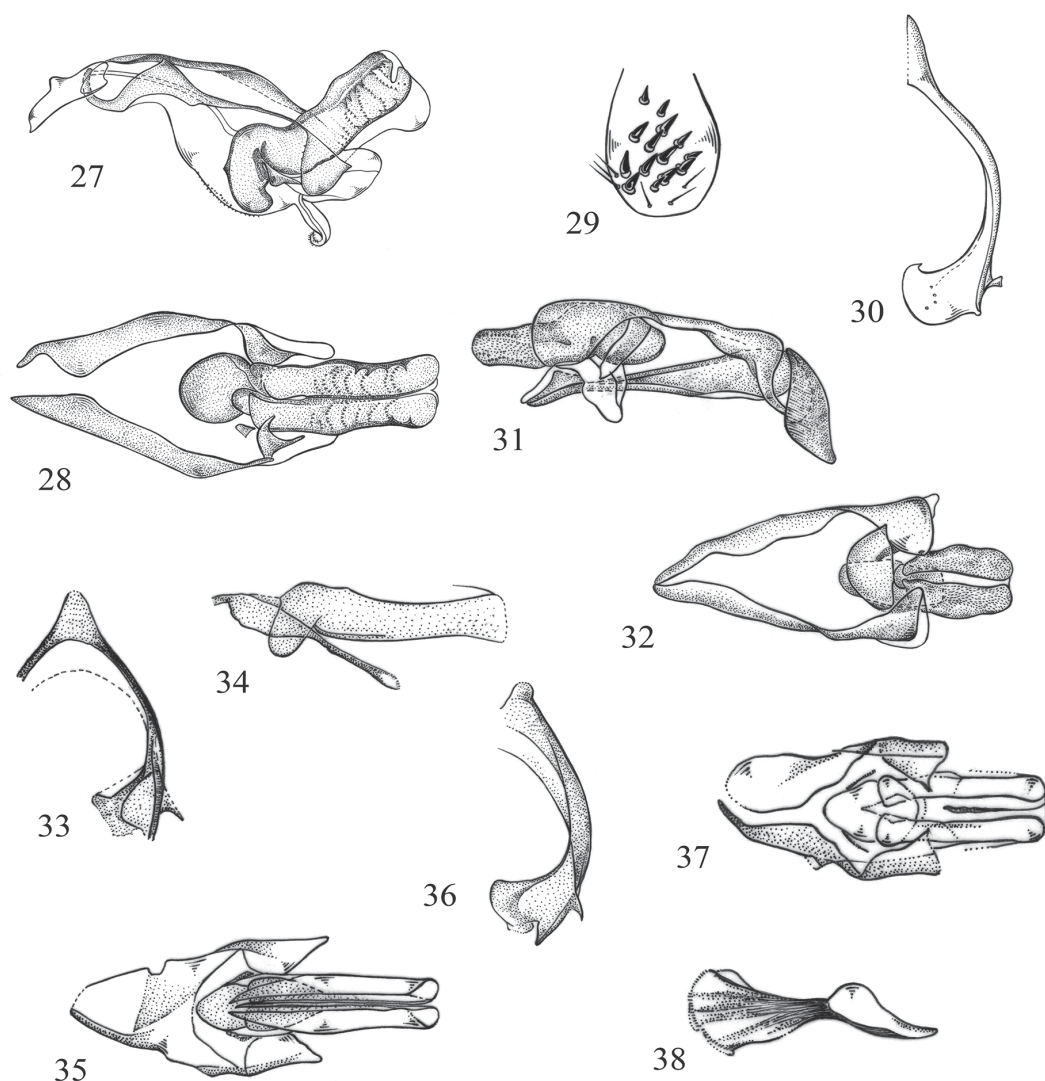
1.	Scutum matt or matt grey.....	2
-	Scutum shining.....	3
2.	Frons reddish; wing 3.4 mm in male and 4.2 mm in female; calypters pale gray; dorsocentrals variable, but normally 4+2 [surstylus with a patch of strong setae on inner face; phallus as in Fig. 10].....	<i>A. apfelbecki</i> Strolb
-	Frons yellowish; wing with 2.5-3.0 mm; calypters yellow; dorsocentrals with 2 setae [antenna yellowish with first flagellomere black].....	<i>A. terebrans</i> Bezzi & Tavares
3.	Arista plumose.....	4
-	Arista bare or pubescent.....	6

Key to Neotropical species of *Agromyza* Fallén (continuation)

-
4. Haltere entirely dark brown [wing darkened in basal area (Fig. 11); dorsocentrals 0+3; hypandrium with side-arms conspicuously black (Fig. 12); phallus as in Figs 13 and 14].....*A. fusca* Spencer
 - Haltere entirely yellow.....5
5. Body mostly brown; wing slightly darkened; dorsocentral 0+2 with one smaller anterior one; prescutelars strong [ejaculatory apodeme distinctive with blade entirely reduced (Fig. 15); hypandrium with narrower side-arms and smaller postgonites (Fig. 16)].....*A. simillima* Spencer
 - Body mostly yellow; wing clear; dorsocentral 1+3; prescutelars fine [surstylus elongated; hypandrium U-shaped; phallapodeme about twice the length of the hypandrium; basiphallus rounded; mesophallus long and bulb-shaped; distiphallus well sclerotized, forming a simple plate at base, bilobed at the apex, with a membrane surrounding it (Figs 7 and 8); ejaculatory apodeme triangular, at its broader part about 4.5 times wider than the constricted area at base (Fig. 9)].....
*Agromyza flava* **sp. nov.**
6. Calypters white or yellowish7
 - Calypters grey or dark grey9
7. Dorsocentral 0+4-5 [surstylus with a group of some 15 spines on inner margin (Fig. 17); phallus with conspicuously short and broad distiphallus (Figs 18 and 19)].....
*A. parvicornis* Loew
 - Dorsocentral 0+3.....8
8. Wing length in male 1.9 mm [phallus with distiphallus conspicuously short and broad (Figs 20 and 21)].....*A. animata* Spencer
 - Wing length in male 2.4 mm [hypandrium with narrow, rounded side-arms and elongated hypandrial apodeme (Fig. 22); phallus as in Figs 23 and 24].....
*A. venezolana* Spencer
9. Dorsocentral 0+2.....10
 - Dorsocentral 0+3.....13
10. Arista bare [phallus with long relatively narrow distiphallus (Figs 25 and 26)]...
*A. proxima* Spencer
 - Arista pubescent.....11
11. Wing length in male 2.4 mm; palpus pale brown [phallus subequal to hypandrium in length; basiphallus with a membranous, short and apically hairy process ventrally; distiphallus in distal tubules with rows of serrulate spinule on surface (Figs 27 and 28)].....*A. serratimentula* Sasakawa
 - Wing length in male 1.4 to 2.1 mm; palpus brown or dark brown.....12
12. Haltere yellow, with stalk faintly brown-tinged [surstylus with 12-14 spines (Fig. 29); hypandrium with short apodeme (Fig. 30); phallus nearly ½ length of phallapodeme; basiphallus with sclerites broadened at distal ends; distiphallus densely hairy on outer side and spinulose internally (Figs 31 and 32)]*A. megaepistoma* Sasakawa
 - Haltere entirely white [surstylus rounded with 8-13 large spines and 5-6 setae; hypandrium Y-shaped; phallapodeme about twice the length of the hypandrium; basiphallus with broadened sclerites at distal end; mesophallus short, asymmetrical and measuring about half the size of the distiphallus; distiphallus cup-shaped with microscopic spines at apical two thirds (Figs 4 and 5); ejaculatory apodeme rounded, at its broader part about 7.1 times wider than the constricted area at base (Fig. 6)]*Agromyza corumbensis* **sp. nov.**
13. Haltere darkened brownish-yellow, with knob yellow; wing length in male 2.5 mm; hypandrium as in Fig. 33; distiphallus with elongate paired tubules (Figs 34 and 35).....*A. insolens* Spencer
 - Haltere entirely yellow; wing length in male 3.3 mm; hypandrium as in Fig. 36; distiphallus rather long and slender (Fig. 37); [ejaculatory apodeme relatively large, blade asymmetrical (Fig. 38)].....*A. plaumanni* Spencer
-



Figures (10-26) - *Agromyza apfelbecki* Strolb: (10) phallus; *Agromyza fusca* Spencer: (11) wing; (12) hypandrium; (13) phallus, lateral view; (14) phallus, ventral view; *Agromyza simillima* Spencer: (15) ejaculatory apodeme; (16) hypandrium; *Agromyza parvicornis* Loew: (17) surstylus; (18) phallus, lateral view; (19) phallus, ventral view; *Agromyza animata* Spencer: (20) phallus, lateral view; (21) phallus, ventral view; *Agromyza venezolana* Spencer: (22) hypandrium; (23) phallus, lateral view; (24) phallus, ventral view; *Agromyza proxima* Spencer: (25) phallus, lateral view; (26) phallus, ventral view (Fig. 10 modified from Spencer 1973a; Figs 11-16 modified from Spencer 1963; Figs 17-19 modified from Spencer and Stegmaier Jr 1973; Figs 20, 21 modified from Spencer 1973b; Figs 22-24 modified from Spencer 1963; Figs 25, 26 modified from Spencer 1969).



Figures (27-38) - *Agromyza serratimentula* Sasakawa: (27) phallus, lateral view; (28) phallus, ventral view; *Agromyza megaepistoma* Sasakawa: (29) surstylus; (30) hypandrium; (31) phallus, lateral view; (32) phallus, ventral view; *Agromyza insolens* Spencer: (33) hypandrium; (34) phallus, lateral view; (35) phallus, ventral view; *Agromyza plaumanni* Spencer: (36) hypandrium; (37) phallus, ventral view; (38) ejaculatory apodeme. (Figs 27, 28 modified from Sasakawa 1992; Figs 29-32 modified from Sasakawa 2005; Figs 33-38 modified from Spencer 1963).

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RESUMO

Agromyza Fallén (Diptera, Agromyzidae) é um gênero de moscas minadoras, com espécies que tem grande importância econômica. O conhecimento desse gênero é insuficiente no neotrópico, com 12 espécies conhecidas, apenas seis delas registradas para o Brasil. Esse artigo descreve duas novas espécies de *Agromyza* dos biomas Cerrado e Pantanal e registra três espécies representadas apenas por fêmeas, que não puderam ser identificadas em nível específico. Apresentamos também uma chave taxonômica para as 14 espécies assinaladas na região Neotropical. Os espécimes foram coletados nos estados do Mato Grosso e Mato Grosso do Sul e estão depositados nas coleções do Museu de Zoologia, Universidade de São Paulo e do Museu Nacional, Universidade Federal do Rio de Janeiro. Os adultos foram fotografados e as terminálias masculinas foram dissecadas e ilustradas.

Palavras-chave: Moscas minadoras, morfologia, novas espécies, taxonomia.

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