

## SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

### Taxonomy of *Neurotrixa* Shannon & Del Ponte (Diptera: Muscidae) with Description of New Species from Southern Brazil

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#### Taxonomia de *Neurotrixa* Shannon & Del Ponte (Diptera: Muscidae) com Descrição de Novas Espécies do Sul do Brasil

RESUMO - *Neurotrixa* Shannon & Del Ponte é redescrito, baseado no exame do espécime-tipo de *Anthomyia felsina* Walker, para incluir duas espécies novas: *Neurotrixa marinonii* sp. nov. e *N. sulina* sp. nov., ambas originárias de Colombo, PR, sul do Brasil. A diagnose de *Neurotrixa* e chave de identificação das três espécies são também incluídas.

PALAVRAS-CHAVE: Biodiversidade, Cyrtoneurinae, armadilha de Malaise, sistemática

ABSTRACT - *Neurotrixa* Shannon & Del Ponte is redescribed, based on the exam of the type-specimen of *Anthomyia felsina* Walker, to include two new species: *Neurotrixa marinonii* sp. nov. and *N. sulina* sp. nov., both species from Colombo, PR, southern Brazil. A diagnosis of *Neurotrixa* and a key for three species of the genus are also included.

KEY WORDS: Biodiversity, Cyrtoneurinae, Malaise trap, systematics

*Neurotrixa* is far known only by *N. mirata* Shannon & Del Ponte, 1926 (see Carvalho *et al.* 2005), described from San Isidro, Argentina, based on 14 males and 20 females. Nowadays this species is junior synonym of *N. felsina* (Walker, 1849). Its larval stages are known (Hernandez 1988) but nothing is known of its life cycle.

No phylogenetic studies for *Neurotrixa* exist, and therefore its monophyly has not yet been established (Couri & Carvalho 2002). The genus is included in the subfamily Cyrtoneurinae, not currently considered monophyletic (Couri & Carvalho 1997).

From a Malaise trap survey in natural areas in Paraná, southern Brazil (see Costacurta *et al.* 2003), we found two new species of the genus. We include here a diagnosis of *Neurotrixa*, a redescription of *N. felsina* and add two new species to the genus. A key to the three known species is also presented.

#### Material and Methods

This study is based on specimens that are deposited in the following institutions: The Natural of History Museum, London (BMNH), Departamento de Zoologia of the Universidade Federal do Paraná, Curitiba (DZUP) and the Museu Nacional, Departamento de Entomologia, Rio de Janeiro (MNRJ).

Terminology and abbreviations used for the external morphology, including terminalia, follows McAlpine (1981) slightly modified by Carvalho (1989).

#### Taxonomy

##### *Neurotrixa* Shannon & Del Ponte, 1926

*Steinella* Malloch, 1921: 171.

*Neurotrixa* Shannon & Del Ponte, 1926: 575.

Diagnosis. Male holoptic. Eyes shortly ciliated; arista pubescent; anepimeron with few setulae; proepimeron and meron bare.  $1a$  strong;  $R_1$  vein with hairs on entire dorsum, except 1/5 basal. Dc 2:4; anepimeron haired; katepisternals 2:2; hind tibia with one median seta and several setulae on anterodorsal, posterodorsal and anteroventral surfaces.

Monophyly. We understand that katepisternals 2:2 on *Neurotrixa* are apomorphic in relation to Muscidae ground-plan. Few unrelated genera of Muscidae as *Arthurella* Albuquerque, 1954 and *Lispoides* Malloch, 1920 (see Couri & Carvalho 2002) also have the same configuration of the katepisternal setae.

Comments. Since publication of the Neotropical Catalogue of Pont (1972), *Neurotrixa* have been included in Cyrtoneurinae (Couri & Carvalho 2002, Carvalho *et al.* 2005).

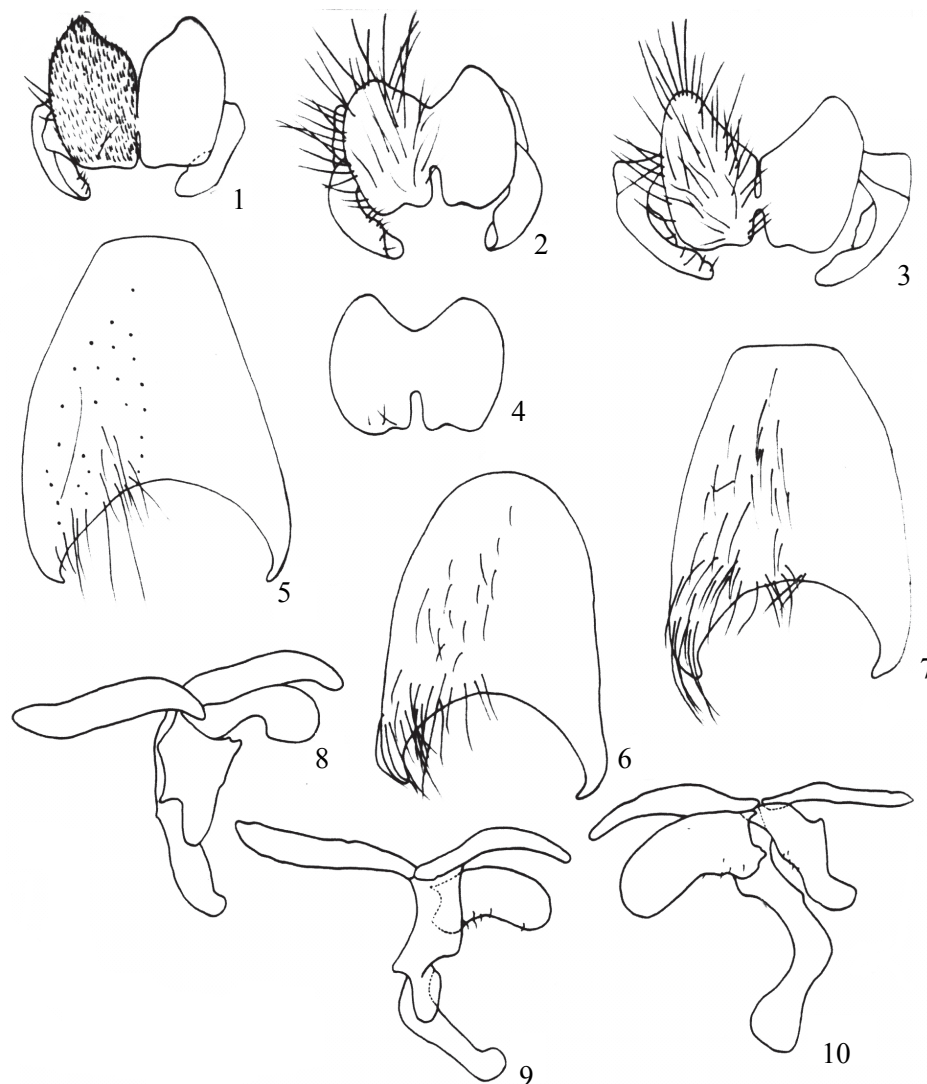
**Key to the species of *Neurotrixa***

- 1. Antenna and palpus dark brown; arista semi-pubescent with hairs shorter than diameter of arista at base. Posterior spiracle small (shorter than head of halter), bare. Wing with R<sub>4+5</sub> vein bare in dorsal view. Male: cercal plate with few long hairs in dorsal view (Fig. 1) .....*Neurotrixa felsina* (Walker)
- Antenna and palpus yellowish; arista pubescent with hairs longer than diameter of arista at base. Posterior spiracle large (larger than head of halter) and with few, difficult to see, setulae. Wing with R<sub>4+5</sub> vein with setulae from Rs in dorsal view. Male: cercal plate with several long hairs in dorsal view (Figs. 2, 3).....2
- 2. Wing with R<sub>1</sub> vein with one or several setulae in ventral

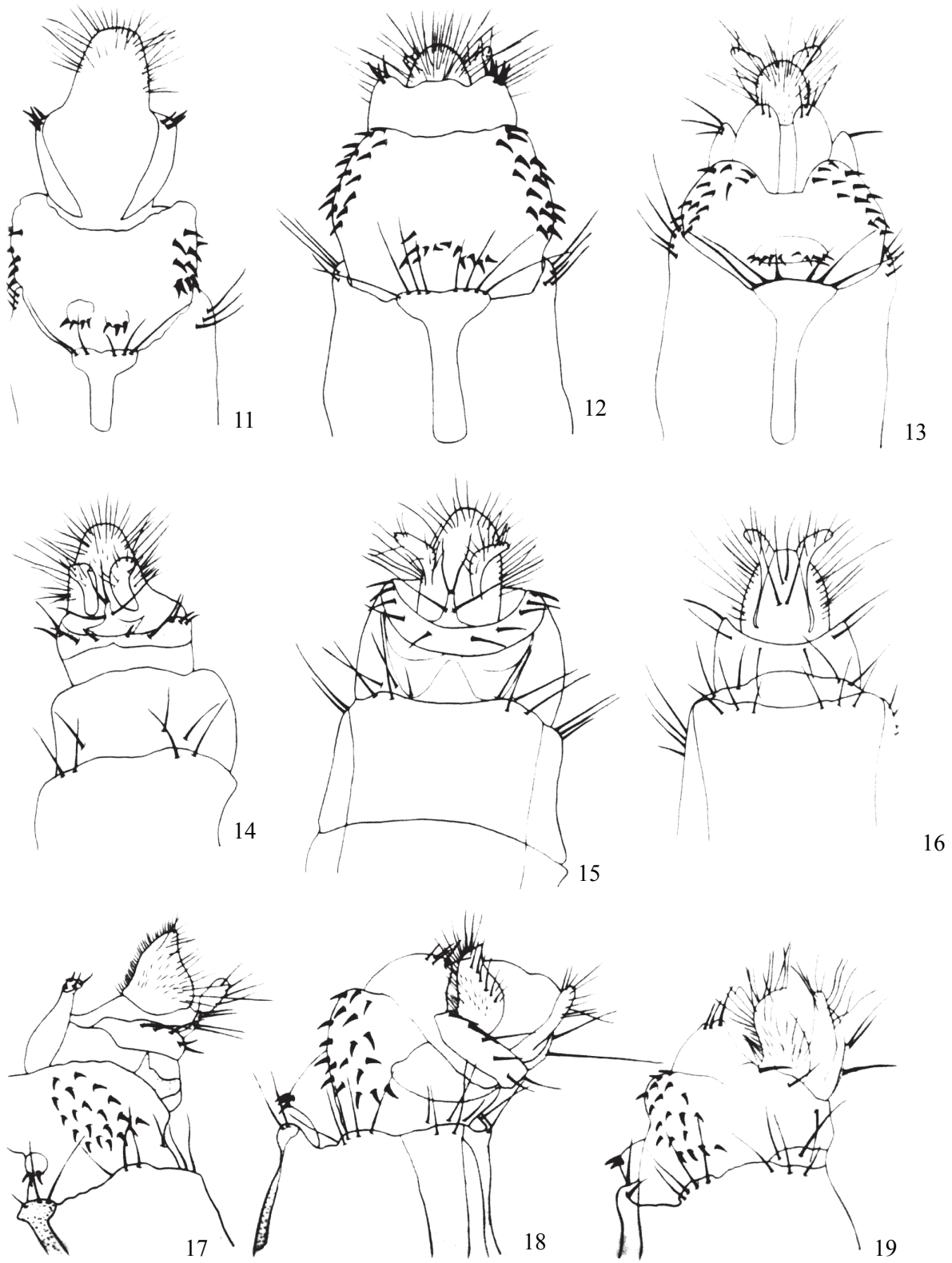
- view. Male: hind tibia frequently with one median seta in anteroventral view. Cercal plate without hairs in ventral view .....*Neurotrixa sulina* sp. nov.
- Wing with R<sub>1</sub> vein bare in ventral view. Male: hind tibia frequently with 2-3 median setae in anteroventral view. Cercal plate with two or more setulae in ventral view (Fig. 4).....*Neurotrixa marinonii* sp. nov.

***Neurotrixa felsina* (Walker, 1849)**  
(Figs. 1, 5, 8, 11, 14, 17)

- Anthomyia felsina* Walker, 1849: 955.
- Spilogaster limbatinevris* Macquart, 1851: 234.
- Limnophora fuscinevris* Macquart, 1851: 236.
- Steinella prima* Malloch, 1921: 172.
- Neurotrixa mirata* Shannon & Del Ponte, 1926: 575.



Figures 1-10. Male. Cercal plate and surstyli, dorsal view: 1, *Neurotrixa felsina*; 2, *N. marinonii*; 3, *N. sulina*. Cercal plate, ventral view: 4, *N. marinonii*. Fifth sternite, dorsal view: 5, *Neurotrixa felsina*; 6, *N. marinonii*; 7, *N. sulina*. Aedeagus complex; 8, *Neurotrixa felsina*; 9, *N. marinonii*; 10, *N. sulina*.



Figures 11-19. Female. Ovipositor, ventral view: 11, *Neurotrixa felsina*; 12, *N. marinonii*; 13, *N. sulina*. Ovipositor, dorsal view; 14, *Neurotrixa felsina*; 15, *N. marinonii*; 16, *N. sulina*. Ovipositor, lateral view; 17, *Neurotrixa felsina*; 18, *N. marinonii*; 19, *N. sulina*.

Diagnosis. Species apparently have a wider distribution than previously thought. They may be easily recognised by antenna, dark brown palpus and the bare, small posterior spiracle (smaller than head of halter). The wing with bare  $R_{4+5}$  vein in dorsal view and the cercal plate of male has several ground setulae in dorsal view.

Redescription. Antenna and palpus dark brown. Mesonotum dark brown with four vittae. Upper and lower calypters yellowish with brown margins. Wing hyaline with brownish crossveins, mainly the r-m. Legs brown. Abdomen dark brown with silver polinosity.

Male. 4.8-7.9 mm (n = 10). Wing: 5.2-7.6 mm (n = 10).

Eye ciliated, cilia short. Nine frontal setae, beginning on lunule and terminating below anterior ocelli; upper seta reclinate. Antennal insertion above mid-level of eye; basal flagellomere about two times pedicel length. Parafacialia at pedicel about half gena width at inferior eye margin. Palpus spatulate.

Thorax. dc 2:4; acr similar in length to ground setulae; two humeral; one post-humeral; ia 1:1; one sa; two psa; one pra stronger. Notopleura with one anterior seta slightly stronger than posterior, without ground setulae. Scutellum with one basal and one lateral seta, smaller than apical seta. One strong proepisternal and one proepimeral seta. Katepisternals 2:2. Anepimeron haired. Posterior spiracle small, less than diameter of halter head. Wing with  $R_{4+5}$  vein bare in dorsal view; M slight curved to  $R_{4+5}$ . Fore tibia with small submedian setae on posterodorsal surface. Mid femur with one pre-apical seta on anterodorsal, posterodorsal, posterior and posteroventral surfaces. Mid tibia with two submedian setae on posterior surface. Hind femur with row of strong setae on anterodorsal surface, stronger the last four. Hind tibia with one median seta on anterodorsal and anteroventral surfaces; one median (calcar) seta on posterodorsal surface.

Abdomen. Sternite 1 bare.

Terminalia. See Figs. 1, 5, 8.

Female. 6.3-7.4 mm (n = 3). Wing: 5.1-7.1 mm (n = 3).

Similar to male.

Terminalia. See Figs. 11, 14, 17. Three spermathecae.

Type-material examined. *Anthomyia felsina* Walker, 1849: "Holotype"; "Anthomyia / felsina Walk. [handwriting label]"; "one of Walkers/series s [?] named. / Eaw [wrote on back of previous label]"; "M. Vides [handwriting rectangle label]"; "m./vides [handwriting round label]"; "45/68 [wrote on back of previous label]"; "Monte Video [Montevideo]; Ch. Darwin./B.M. 1845-68 [handwriting label]"; "Holotype male / Anthomyia / felsina Walker/1849, List Dipt. / Brit. Mus., 4: 955 [Adrian Pont's handwriting label]. Specimen in poor condition, covered with fungus and dust, lacking the right median leg and part of wings.

*Steinella prima* Malloch, 1921: "Holo-/type"; "Steinella/ prima/ Mall type [handwriting label of J.R. Malloch]"; "Colon, / Monte Video. / Uruguay. / 5.v.96 / O. Thomaz. / 98-98". Specimen in fair condition, lacking the left fore leg and both hind legs; thorax and right wing broken. The type series include four female paratypes, one of them with allotype label; all them in good condition.

Other examined material. BRASIL. Paraná, Castro, ix/

1961, S. Laroca (one male, DZUP); Curitiba, 13/i/1984, M.L. Pilotto & A. Carine (two males, two females, DZUP); ibidem, 8.vii.1965, F. Giacomel (one male, BMNH). Santa Catarina: Caçador, 4/xii/1980, Orth & Silveira (one male, two females, DZUP). Rio Grande do Sul: Pelotas, 1-5, xi.1960, C. Biezanko, BM 1961-553 (one male, BMNH); Quaraí (Estância S. Roberto), 19-22/xi/1985, J.R. Cure (five males, DZUP). URUGUAY. Montevideo, 17.x.1926, F. & M. Edwards, BM 1927-63 (two males, three females, BMNH). ARGENTINA. Buenos Aires, 21.x.1926, F. & M. Edwards, BM. 1927-63 (one male, BMNH); ibidem, without date (one female, BMNH).

Comments. Complete references of *N. felsina* may be found in the Neotropical catalogue of Carvalho *et al.* (2005).

### *Neurotrixa marinonii* sp. nov.

(Figs. 2, 4, 6, 9, 12, 15, 18)

Diagnosis. This species is easily recognized from the other species of the genus by wing with  $R_1$  vein bare in ventral view. Male with cercal plate with two or more setulae in ventral view (Fig. 4).

Description. Antenna and palpus pale yellow. Mesonotum dark brown and pleura yellowish. Upper and lower calypter yellowish with brown margins. Wing hyaline with membrane covered by microtrichia; costal margin and crossveins slight yellowish. Legs yellowish with dark brown tarsi. Abdomen bluish-brown with silver polinosity; yellowish base of tergite 1+2.

Male. 6.5-9 mm (n = 6). Wing: 7-10.2 mm (n = 6).

Eye ciliated, cilia short. Eight-nine frontal setae, initiated on lunule and terminated below anterior ocelli; upper setae stronger. Antennal insertion above eye mid-level, basal flagellomere about two times pedicel. Parafacialia at level of pedicel about half gena width, at inferior level of eye. Palpus slender.

Thorax. dc 2:4; ac 0:1; two humeral; one post-humeral; ia 1:1; two psa; one pa stronger and about the same length of anterior ntpl. Notopleura with similar setae and few ground setulae. Scutellum with one basal seta similar to apical seta and one discal half smaller than apical half. One strong proepisternal setae and two similar proepimerals. Anepisternum with one setae on anterior angle. Katepisternals 2:2. Superior anepimeron with tuft of hairs and inferior with sparse hairs. Posterior spiracle large, with setulae on posterior margin. Wing with  $R_1$  vein bare on ventral view. M vein slightly curved to  $R_{4+5}$ . Fore tibia with small median setae on anterior surface. Mid femur with one pre-apical setae on anterodorsal, posterodorsal, posterior and posteroventral surfaces. Mid tibia with one median and one submedian setae on posterior surface. Hind femur with row of setae on anterodorsal and anteroventral surfaces; one preapical seta on posterodorsal surface. Hind tibia with one median seta on anterodorsal surface; frequently with 2-3 median setae on anteroventral surfaces; one median (calcar) seta on posterodorsal surface.

Abdomen. Sternite 1 bare.

Terminalia. See Figs. 2, 4, 6, 9.

Female. Body: 6.4-9 mm (n = 28). Wing: 7-10.3 mm (n = 28).



Similar to male.

Terminalia. See Figs. 12, 15, 18. Three spermathecae.

Type material examined. Holotype male in DZUP, labelled as follow: "Colombo-PR / Embrapa Br [road] 476 km 20 / Brasil 20.vii.1987 / Lev. [survey] Ent. [entomological] Profaupar [Project of fauna of Paraná] / Malaise"; "Neurotrixa marinonii sp.n. / Costacurta & Carvalho"; "Holotipo" [red label]. Specimen in good condition.

Other examined material. Total: 34 paratypes, six males, 28 females (DZUP, MNRJ): BRAZIL. Paraná: Santa Clara, Guarapuava, 25.viii.1986 (one female); *ibidem*, 22.ix.1986 (one male); *ibidem*, 27.vii.1987 (two females); Colombo, Br 476, km 20, 18.iii.1986 (one female); *ibidem*, 29.vi.1986 (one female); *ibidem*, 11.viii.1986 (one male); *ibidem*, 18.viii.1986 (two females); 25.viii.1986 (one female); *ibidem*, 15.ix.1986 (one male, one female); *ibidem*, 22.ix.1986 (one female); *ibidem*, 6.x.1986 (one female); *ibidem*, 20.x.1986 (one female); *ibidem*, 27.x.1986 (three females); *ibidem*, 13.iv.1987 (one female); *ibidem*, 11.v.1987 (one male); *ibidem*, 6.vii.1987 (two females); *ibidem*, 13.vii.1987 (one female); *ibidem*, 20.vii.1987 (one male, two females); *ibidem*, 27.vii.1987 (three females); Vila Velha, Ponta Grossa, BR 376, 20.vii.1987 (one male); *ibidem*, 18.viii.1986 (one female); *ibidem*, 25.viii.1986 (one female); *ibidem*, 1.ix.1986 (one female); *ibidem*, 6.x.1986 (one female); *ibidem*, 27.x.1986 (one female); *ibidem*, 16.iii.1987 (one female).

Comments. All material of *N. marinonii* Costacurta & Carvalho, new species, was collected using Malaise trap in woody well-preserved areas.

***Neurotrixa sulina* sp. nov.**

(Figs. 3, 7, 10, 13, 16, 19)

Diagnosis. This species may be recognized from other species in the genus by wing with  $R_1$  vein with few setulae on ventral view. Male with cercal plate without setulae in ventral view.

Description. Antenna and palpus pale yellow. Mesonotum dark brown and yellowish ventrally. Upper and lower calypteres yellowish with margin brownish. Wing hyaline with membrane entirely covered by microtrichias and crossveins slightly brownish. Legs yellowish with light brown tarsi. Abdomen bluish-brown with silvery polinosity; tergite 1+2 basally yellowish.

Male. 8 mm ( $n = 1$ ). Wing: 9.1 mm ( $n = 1$ ).

Eye ciliated, cilia short. Nine pair of frontal setae initiated on lunule and finished below of anterior ocelli level. Antennal insertion below mid-level of eye; basal flagellomere about two times pedicel. Parafacialia on level of pedicel about 1/3 of gena width on inferior level of eye. Palpus slender.

Thorax. dc 2:4; ac 0:1; two humeral; one post-humeral; Ia 1:1; two psa; one pa stronger about the same length of posterior ntpl. Notopleura with posterior setae stronger than anterior and with few ground setulae. Scutellum with one basal seta similar to apical one and one discal half smaller than apical one. One strong proepisternal and one

proepimeral seta. Anepisternum with one seta on anterior angle. Katepisternals 2:2. Anepimeron superior with tuft of hairs and inferior with sparse hairs. Posterior spiracle big and with setulae on posterior margin. Wing with  $R_1$  vein with one or several setae on ventral view. M vein slight curved to  $R_{4+5}$ . Fore tibia with small median seta on anterior surface. Mid femur with one pre-apical setae on anterodorsal, posterodorsal, posterior and posteroventral surfaces. Mid tibia with one median and one submedian setae on posterior surface. Hind femur with a row of setae on anterodorsal and anteroventral surfaces; one preapical seta on posterodorsal surface. Hind tibia with one median seta on anterodorsal and frequently with one median seta on anteroventral surfaces; one median (calcar) seta on posterodorsal surface.

Abdomen. Sternite 1 bare.

Terminalia. see Figs. 3, 7, 10,

Female. Body: 6-8.6 mm ( $n = 53$ ); wing: 6.8-0.6 mm ( $n = 53$ ).

Similar to male.

Terminalia. See Figs. 13, 16, 19. Three spermathecae.

Type material examined. Holotype male in DZUP, labelled as follow: "Colombo-PR / Embrapa Br [road] 476 km 20 / Brasil 20.vii.1987 [handwriting] / Lev. [survey] Ent. [entomological] Profaupar [Project of fauna of Paraná] / Malaise"; "Neurotrixa sulina sp.n. / Costacurta & Carvalho"; "Holotipo" [red label]. Abdomen in microvial attached to pin. Specimen in good condition.

Other examined material. Total: 53 female paratypes [DZUP, MNRJ]: BRAZIL. Paraná: Santa Clara, Guarapuava, 4.viii.1986 (two females); *ibidem*, 25.viii.1986 (one female); *ibidem*, 1.x.1986 (one female); *ibidem*, 27.vii.1987 (one female); Vila Velha, Ponta Grossa, BR 376, 18.vii.1986 (one female); *ibidem*, 1.xi.1986 (one female); *ibidem*, 22.ix.1986 (one female); *ibidem*, 6.x.1986 (one female); *ibidem*, 27.x.1986 (one female); *ibidem*, 27.vii.1987 (three females); *ibidem*, 16.iii.1987 (one female); *ibidem*, 6.vii.1987 (one female); *ibidem*, 13.vii.1987 (one female); *ibidem*, 20.vii.1987 (three females); Colombo, BR 476, km 20, 4.viii.1986 (two females); *ibidem*, 11.viii.1986 (one female); *ibidem*, 18.viii.1986 (two females); *ibidem*, 25.viii.1986 (one female); *ibidem*, 8.ix.1986 (two females); *ibidem*, 15.ix.1986 (one female); *ibidem*, 22.ix.1986 (three females); *ibidem*, 13.x.1986 (three females); *ibidem*, 20.x.1986 (two females); *ibidem*, 27.x.1986 (one female); *ibidem*, 17.xi.1986 (one female); *ibidem*, 30.iii.1987 (one female); *ibidem*, 20.iv.1987 (one female); *ibidem*, 22.vi.1987 (one female); *ibidem*, 6.vii.1987 (two females); *ibidem*, 20.vii.1987 (six females); *ibidem*, 27.vii.1987 (three females).

Comments. All material of *N. sulina* Costacurta & Carvalho, new species, was collected using Malaise trap in woody well-preserved forest areas.

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of *Anthomyia felsina* Walker and *Steinella prima* Malloch during his stay in the BMNH. To the Conselho Nacional de Desenvolvimento Científico e Tecnológico, CNPq an agency of the Brazilian Government, for scientific and technological development, by a grant to CJBC (process 304148/2002–4). This paper is number 1330 of the Departamento de Zoologia of the Universidade Federal do Paraná.

### Literature Cited

- Carvalho, C.J.B. de. 1989.** Revisão das espécies e posição sistemática de *Palpibracus* Rondani (Diptera, Muscidae). Rev. Bras. Zool. 6: 325-376.
- Carvalho, C.J.B. de, M.S. Couri, A.C. Pont, D. Pamplona & S.M. Lopes. 2005.** A catalogue of the Muscidae (Diptera) of the Neotropical Region. Zootaxa 860: 1-282.
- Costacurta, N. do C., R.C. Marinoni & C.J.B. de Carvalho. 2003.** Fauna de Muscidae (Diptera) em três localidades do estado do Paraná, Brasil, capturada por armadilha Malaise. Rev. Bras. Ent. 47: 389-397.
- Couri, M.S. & C.J.B. de Carvalho. 1997.** Revision of *Polietina* Schnabl & Dzedzicki (Diptera, Muscidae) and considerations on its new systematic position. Rev. Bras. Zool. 14: 255-281.
- Couri, M.S. & C.J.B. de Carvalho. 2002.** Part II, Apical Muscidae, p.133-259. In C.J.B. de Carvalho (ed.), Muscidae (Diptera) of the Neotropical Region: Taxonomy. Curitiba, Editora Universidade Federal do Paraná, 287p.
- Hernandez, M.C. 1988.** Dipteros coprofagos: *Neurotrixa felsina* (Walker) (Diptera, Muscidae). Descripción de estadios larvales. Rev. Soc. Entomol. Argent. 47: 95-99.
- Macquart, J. 1851.** Diptères exotiques nouveaux ou peu connus. Suite du 4.<sup>e</sup> Supplément publié dans les mémoires de 1849 [part]. Mem. Soc. Sci. Agric. Lille 1850: 134-294.
- Malloch, J.R. 1921.** Exotic Muscaridae (Diptera).– I. Ann. Mag. Nat. Hist. 7: 161-173.
- McAlpine, J.F. 1981.** Morphology and terminology – adults, p.9-63. In J.F. McAlpine, B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth & D.M. Wood (eds.), Manual of Nearctic Diptera, v. 1. Ottawa, Research Branch Agriculture Canada, 674p.
- Pont, A.C. 1972.** Family Muscidae. In A Catalogue of the Diptera of the Americas South of the United States, Museu de Zoologia, Universidade de São Paulo, 97, 111p.
- Shannon, R.C. & E. Del Ponte. 1926.** Sinopsis parcial de los muscoideos argentinos. Rev. Inst. Bact., B. Aires 4: 549-590.
- Walker, F. 1849.** List of the specimens of Dipterous insects in the collection of the British Museum, 4, 689-1172. British Museum, London.

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