

Redescription of *Vidalia impressifrons* Robineau-Desvoidy, the Type Species of *Vidalia* Robineau-Desvoidy (Diptera: Tephritidae), with Notes on Its Taxonomy and Phylogeny

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Ho-Yeon Han (2002) Redescription of *Vidalia impressifrons* Robineau-Desvoidy, the type species of *Vidalia* Robineau-Desvoidy (Diptera: Tephritidae), with notes on its taxonomy and phylogeny. *Zoological Studies* 41(2): 153-157. The taxonomic status of *Vidalia* Robineau-Desvoidy and the identity of its type species, *V. impressifrons* Robineau-Desvoidy, have been highly confused in the past. This problem was resolved by the designation of a neotype for *V. impressifrons* in 1999. To supplement this neotype designation, *V. impressifrons* is fully redescribed, illustrated, and distinguished from its congeners. Its phylogenetic position within *Vidalia* is also discussed based on a detailed examination of the male neotype, which is the only known specimen of this species. <http://www.sinica.edu.tw/zool/zoolstud/41.2/153.pdf>

Key words: Diptera, Tephritidae, *Vidalia impressifrons*, Neotype.

The genus *Vidalia* Robineau-Desvoidy currently includes 16 valid Oriental and Palaearctic fruit fly species (Han et al. 1994b, Han 1999, Norrbom et al. 1999). There has been a complex nomenclatural history of this genus, and the identity of the type species (*V. impressifrons* Robineau-Desvoidy) is crucial to understanding the generic concept and demarcation. Han (1999) provided the following summary regarding this matter:

There has been controversy about the name *Vidalia*, because the original description (Robineau-Desvoidy 1830) is inadequate, and the type specimen(s) from the East Indies (Indonesia) of the type species, *V. impressifrons* Robineau-Desvoidy, apparently has been lost (Munro 1938, Hardy 1987, Han et al. 1994b). Munro (1938) proposed *V. ceratophora* Bezzi as "neogenotype", but that was not a valid nomenclatural act. Since then, many tephritid species with enlarged male frontal setae have been placed in *Vidalia*. Han et al. (1993 1994a) removed a number of species to 3 other genera (*Paratrypeta*, *Cornutrypeta*, and *Stemonocera*), and later established a newly recognized monophyletic group under the resurrected name, *Pseudina* Malloch (Han et al. 1994b). However, Hancock and Drew (1995) synonymized *V. quadricornis* Meijere with *V. impressifrons*, res-

urrecting *Vidalia* for this taxon. Despite the fact that the original description of *V. impressifrons* is not adequate for positive identification, Hancock and Drew's treatment was followed by two recent major tephritid publications (Korneyev 1998, Norrbom et al. 1999). After e-mail discussion involving seven tephritid taxonomists (Freidberg, Han, Hancock, Korneyev, Merz, Norrbom, and White), we agreed to keep the long-used name *Vidalia* by designating a neotype for the sake of nomenclatural stability.

Based on the above decision, Han (1999) designated the holotype of *V. quadricornis* as the neotype of *V. impressifrons* to end this controversy. To supplement this neotype designation, I herein provide a full description of *V. impressifrons* including its genitalic structure, which contains critical information about its relationships to other members of the genus *Vidalia*. The male neotype is the only known specimen of *V. impressifrons*.

MATERIALS AND METHODS

The holotype male of *Vidalia quadricornis* (=

neotype of *V. impressifrons*) was loaned from the Zoologisch Museum, Univ. of Amsterdam. The terminology and morphological interpretations used in this paper follow White et al. (1999). The following 8 ratios are used in the descriptions: frontal-head ratio (width of frons/width of head in dorsal view); eye ratio (shortest eye diameter/longest eye diameter); genal-eye ratio (genal height/longest eye diameter), genal height is the distance between the lower eye margin and lower genal margin anterior to the genal seta; arista-antennal ratio (length of arista/length of the antenna excluding the arista); vein R_{4+5} ratio (distance along vein R_{4+5} between crossvein R-M and wing tip/distance between crossvein R-M and basal node of vein R_{4+5}); vein M ratio (distance along vein M between crossveins R-M and DM-Cu/distance between crossveins R-M and BM-Cu); subcostal-costal ratio (length of subcostal cell/length of costal cell, both measured along vein C); and wing-thorax ratio (wing length/thorax length).

Vidalia impressifrons Robineau-Desvoidy

Vidalia impressifrons Robineau-Desvoidy, 1830: 719 (type-locality: Indes Orientales [Indonesia?]; type(s) destroyed); Hardy 1977: 116 (in Oriental catalog); Kapoor et al. 1980: 53 (Indian distribution); Kapoor 1993: 101 (in Indian key); Han et al. 1994b: 104 (nomenclatural discussion); Norrbom et al. 1999: 257 (in world catalog); Han 1999: 286 (neotype designation-see "Type Material").

Vidalia quadricornis Meijere, 1916: 83 (see "Type Material"); Hardy 1977: 116 (in Oriental catalog); Hardy 1987: 368 (type data; diagnosis); Hancock and Drew 1995: 59 (new synonymy with *impressifrons* -- doubtful, but followed here to conserve usage of *Vidalia*); Han 1999: 286 (neotype designation of *V. impressifrons* based on the holotype of *V. quadricornis*).

Pseudina quadricornis Han et al., 1994b: 109 (in key to 14 *Vidalia* spp. -- as *Pseudina*).

Diagnosis: The neotype male possesses the frontal modification and wing pattern typical of *Vidalia* (Fig. 1), but can easily be distinguished from any other known *Vidalia* spp. by its predominantly dark coloration: 1) frons dark brown, contrasting with yellow-brown occiput and gena; 2) scutum entirely shiny dark brown, contrasting well with the ivory white postpronotal lobes and scutellum; 3) thoracic pleura and legs yellow-brown; and 4) abdominal T_{3-5} shiny dark brown, contrasting with yellow-brown T_{1+2} .

Description: Body (Fig. 1) dark brown to ivory white with dark brown setae and setulae; wing length 4.48 mm. Head (Fig. 2) yellow-brown to

dark brown with frontal-head ratio 0.47, eye ratio 0.80 and genal-eye ratio 0.10; inner vertical seta 0.8x as long as longest diameter of eye; outer vertical seta 0.4x as long as inner vertical seta; postocellar seta 0.4x as long as inner vertical seta; paravertical seta 0.5x as long as postocellar seta; ocellar triangle dark brown with reduced ocellar seta; frons deeply concave, dark brown, contrasting well with yellow-brown occiput and gena; one strong orbital seta; four frontal setae highly modified, 2nd frontal seta strong and flattened, 1.5x as long as inner vertical seta, 1st frontal setae slightly shorter

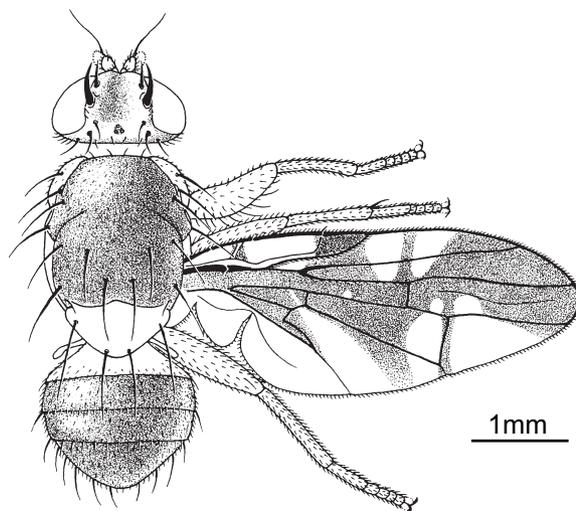
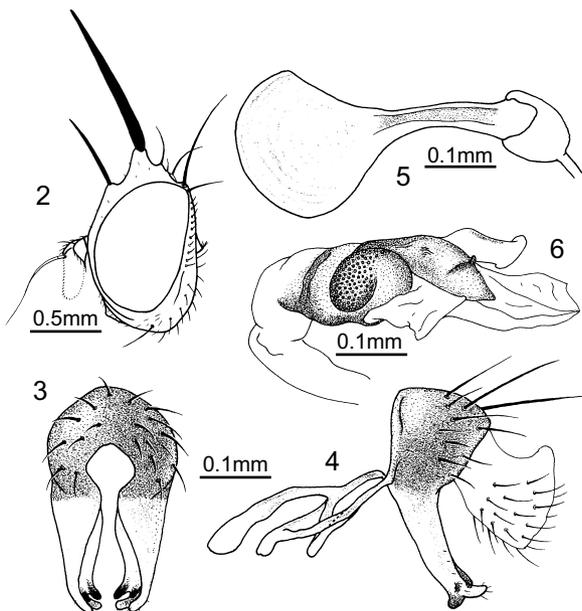


Fig. 1. *Vidalia impressifrons* Robineau-Desvoidy, neotype ♂.

than inner vertical seta; 3rd and 4th frontal setae much shorter and more proclinated; antenna with arista-antennal ratio 2.08; scape and pedicel brown with dark brown setulae; arista dark brown, apparently bare; face brown with lower face slightly projecting beyond anterior margin of parafacial and facial ridge in profile; parafacial very narrow, about 0.2x as wide as flagellomere 1; facial ridge with fine dark brown setulae; gena yellow-brown with strong brown genal seta; postgena yellow-brown, slightly swollen with brown setulae; occiput flat, shiny yellow-brown; supracervical setae yellow-brown; postocular setae extending 0.7x distance from upper eye margin to lower eye margin. Thorax (Fig. 1) dark brown to ivory white with dark brown setae and setulae; postpronotal lobe, upper anepisternum to wing base ivory white, forming distinct streak; scutum shiny dark brown with dorsocentral seta slightly lower than postsutural supraalar seta; scutellum ivory white with basal seta 1.8x as long as scutellum, apical seta 1.6x as long as scutellum, apical scutellar setae more or less parallel sided; thoracic pleura entirely yellow-brown,

proepisternum densely covered with pale setulae; anepisternum with upper seta slightly longer than lower one; katatergite yellow-brown, anatergite and mediotergite shiny dark brown. Legs yellow-brown with brown setae and yellow-brown setulae; fore femur with 6 posteroventral setae; midtibial spur 2x as long as tibial width. Wing (Fig. 1) hyaline with dark brown pattern; wing-thorax ratio 2.0, vein R_{4+5} ratio 1.62, vein M ratio 0.36; R_{4+5} with 9 tiny setulae between node and R-M. Male abdomen (Fig. 1) about as long as wide, tergites 1+2 yellow-brown, tergites 2-5 shiny dark brown; epandrium dark brown and surstylus brown; outer surstylus with both anterior and posterior lobes (Figs. 3, 4); inner surstylus with mesal prensiseta slightly larger than lateral prensiseta (Fig. 3); aedeagal apodeme wide, fan shaped (Fig. 5); aedeagal glans (Fig. 6) with distinct trumpet-shaped subapical lobe; dorsal sclerite of glans more or less smooth except for subapical protuberance; median sclerite of glans with internal sculptured pattern of round granulations.

Type Material: Neotype ♂ (= holotype of *V. quadricornis*) designated by Han (1999) (Fig. 7). Indonesia: Sumatra, Fort de Kock (Bukittinggi). Col. date: written as "10. 1913". Meijere's determination label is written as "*Vidalia quadricornis* type" (Fig. 8). Deposited in the Zöologisch Museum, Univ. of Amsterdam. The specimen is in good condition with its abdomen dissected and kept in a genitalia vial.



Figs. 2-6. *Vidalia impressifrons* Robineau-Desvoidy, neotype ♂: 2, head, lateral view; 3, epandrium and surstyli, posterior view (proctiger removed); 4, epandrium, surstyli, and proctiger, lateral view; 5, ejaculatory apodeme; 6, glans, dorsolateral view.

Distribution: Since the distribution range provided in the original description was rough ("Indes Orientales"), I restrict its range only to the neotype locality (Sumatra).

Remarks: In the recent phylogenetic analysis of the genus *Vidalia* (as *Pseudina*), no specimen was available for *V. impressifrons* (Han et al. 1994b). Nevertheless, they suggested that *V. impressifrons* (as *P. quadricornis*) might belong to the *bicolor* group based on Hardy's (1987) note that it was closely related to *V. bicolor*. Han et al. (1994b) defined the *bicolor* group based on the following 3 synapomorphies: 1) distiphallic glans without median granulate sclerite; 2) serration on the female aculeus reduced to only 2 pairs of strong subapical denticles; and 3) possession of 2 spermathecae. A detailed examina-



Fig. 7. *Vidalia impressifrons* Robineau-Desvoidy, neotype ♂.

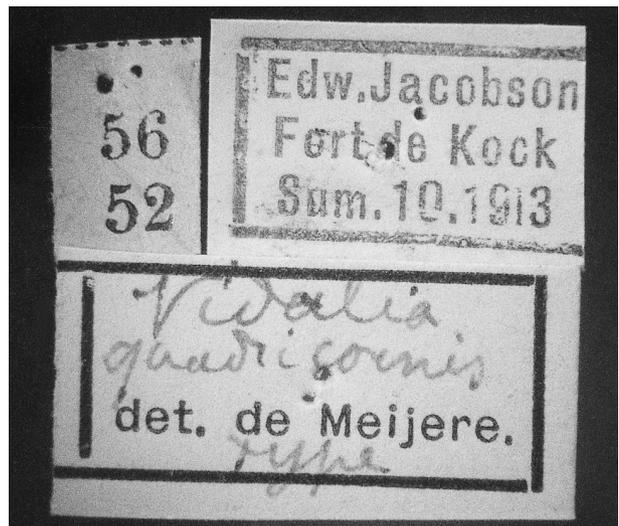


Fig. 8. Original labels of the holotype of *Vidalia quadricornis* Meijere (= neotype of *Vidalia impressifrons* Robineau-Desvoidy).

tion of the male neotype of *V. impressifrons* revealed that it did not have the proposed male synapomorphy of the *bicolor* group (above character 1), but instead possessed the synapomorphy of the *bidens* group: distiphallus with the enlarged apical membrane (Fig. 6). Even though the 2 female synapomorphies (characters 2 and 3 above) could not be confirmed, possessing the median granulate sclerite (Fig. 6) alone appears significant enough to remove this species from the *bicolor* group. This plesiomorphic state is such a complex structure that it is unlikely to have evolved again after once having been lost (apomorphic state).

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REFERENCES

- Han HY. 1999. Phylogeny and behavior of flies in the tribe Trypetini (Trypetinae). In M Aluja, AL Norrbom, eds. Fruit flies (Tephritidae): phylogeny and evolution of behavior. Chapter 11. Boca Raton, London, New York, Washington, D.C.: CRC Press, pp. 253-297.
- Han HY, XJ Wang, KC Kim. 1993. Revision of *Cornutrypeta* Han and Wang, a new tephritid genus proposed for Oriental and Palaearctic species (Diptera: Tephritidae). Entomol. Scand. **24**: 167-184.
- Han HY, XJ Wang, KC Kim. 1994a. *Paratrypeta* Han and Wang, a new genus of Tephritidae (Diptera) from China. Orient. Insects **28**: 49-56.
- Han HY, XJ Wang, KC Kim. 1994b. Taxonomic review of *Pseudina* Malloch (Diptera: Tephritidae) with descriptions of two new species from China. Orient. Insects **28**: 103-123.
- Hancock DL, RAI Drew. 1995. New genus, species and synonyms of Asian Trypetinae (Diptera: Tephritidae). Malay. J. Sci. **16A**: 45-59.
- Hardy DE. 1977. Family Tephritidae (Trypetidae, Trupaneidae). In MD Delfinado, DE Hardy, eds. A catalog of the Diptera of the Oriental Region, Vol. 3. Suborder Cyclorrhapha, (excluding Division Aschiza). Honolulu: Univ. of Hawaii Press, pp. 44-134.
- Hardy DE. 1987. The Trypetini, Aciurini and Ceratitini of Indonesia, New Guinea and adjacent islands of the Bismarcks and Solomons (Diptera: Tephritidae: Trypetinae). Entomography **5**: 247-374.
- Kapoor VC. 1993. Indian fruit flies (Insecta: Diptera: Tephritidae). New Delhi, Bombay and Calcutta: Oxford & IBH Publishing. viii + 228 pp.
- Kapoor VC, DE Hardy, ML Agarwal, JS Grewal. 1980. Fruit fly (Diptera: Tephritidae), systematics of the Indian subcontinent. Jullundur: Export India Publication. 113 pp.
- Korneyev VA. 1998. New data and nomenclatural notes on the Tephritidae (Diptera) of Far East Russia. II. J. Ukr. Entomol. Soc. **3**: 5-48.
- Meijere JCH de. 1916. Studien uber sudostasiatische Dipteren X. Dipteren von Sumatra. Tijdschr. Entomol. **58(Suppl.)**: 64-97.
- Munro HK. 1938. Studies on Indian Trypetidae (Diptera). Mem. Indian Mus. **40**: 27-37.
- Norrbom AL, LE Carroll, FC Thompson, IM White, A Freidberg. 1999. Systematic database of names. In FC Thompson, ed. Fruit fly expert system and systematic information database, pp. 65-251. Diptera Data Dissemination Disk 1 and *Myia*.
- Robineau-Desvoidy JB. 1830. Essai sur les Myodaires. Mém. Prés. Div. Sav. Acad. R. Sci. Inst. Fr. Ser. 2. 830 pp.
- White IM, DH Headrick, AL Norrbom, LE Carroll. 1999. Glossary. In M Aluja, A Norrbom, eds. Fruit flies (Tephritidae): phylogeny and evolution of behavior. Chapter 33. Boca Raton, London, New York, Washington, D.C.: CRC Press, pp. 881-924.

果實蠅科 *Vidalia* 屬模式種 *V. impressifrons* 的再描述，並記述其分類與系統學

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果實蠅科 *Vidalia* 屬及其模式種 *V. impressifrons* 的分類地位過去一直令人相當地困惑，直到1999年重新指定了 *V. impressifrons* 的新模後才獲得解決。為了使新模的指定更為完整，本研究藉由對一隻新模式詳細的特徵檢查，對此新模加以重新描述、繪圖並陳述其特徵。本研究亦探討本科在 *Vidalia* 屬內和親緣位置。

關鍵詞：雙翅目，果實蠅科，*Vidalia impressifrons*，新模。

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