

## THE MYDIDAE (DIPTERA) OF COSTA RICA

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*Abstract.*—The species of Mydidae occurring in Costa Rica are reviewed. Four genera and seven species are reported, including *Nemomydas loreni*, NEW SPECIES. Additionally, *Mydas quadrilineatus* Williston, NEW SYNONYM, is synonymized under *M. rufiventris* Macquart.

*Key Words.*—Insecta, Diptera, Mydidae, Costa Rica, insect fauna

Costa Rica occupies part of the isthmus of Central America and is a complex ecological mosaic (Hall 1985). It has been estimated that upwards of 300,000 species of insects may occur in Costa Rica. This fauna is a complex mixture of Mesoamerican and South American species. One group of flies that attract the attention of even the most specialized collectors are mydas flies. Mydids are a small, but worldwide, family composed of medium to very large, usually sparsely pilose, flies that often resemble wasps (Fig. 1). Adults occupy a wide variety of habitats and can be locally common, especially in arid areas. Many species are restricted to hot, sandy habitats and can be found visiting blossoms or resting on bare ground.

The preparation of a section (JLW, unpublished data) on the Mydidae of Costa Rica for the "Guia para las familias de Insectos de Costa Rica," stimulated this review. There is no single publication available treating all genera and species.

Morphology and terminology follows Wilcox (1981); genitalic structures are labeled in Figs. 4 and 12. Abbreviations for depositions that are used throughout the paper are: British Museum of Natural History, London (BMNH); University of California at Berkeley (UCB); Utah State University, Logan (USU); Museum National d'Histoire Naturelle, Paris (MNHN); Illinois Natural History Survey, Champaign (INHS); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ); and Texas A&M University, Lubbock (TXA&M); collection of J. L. Welch (JLW).

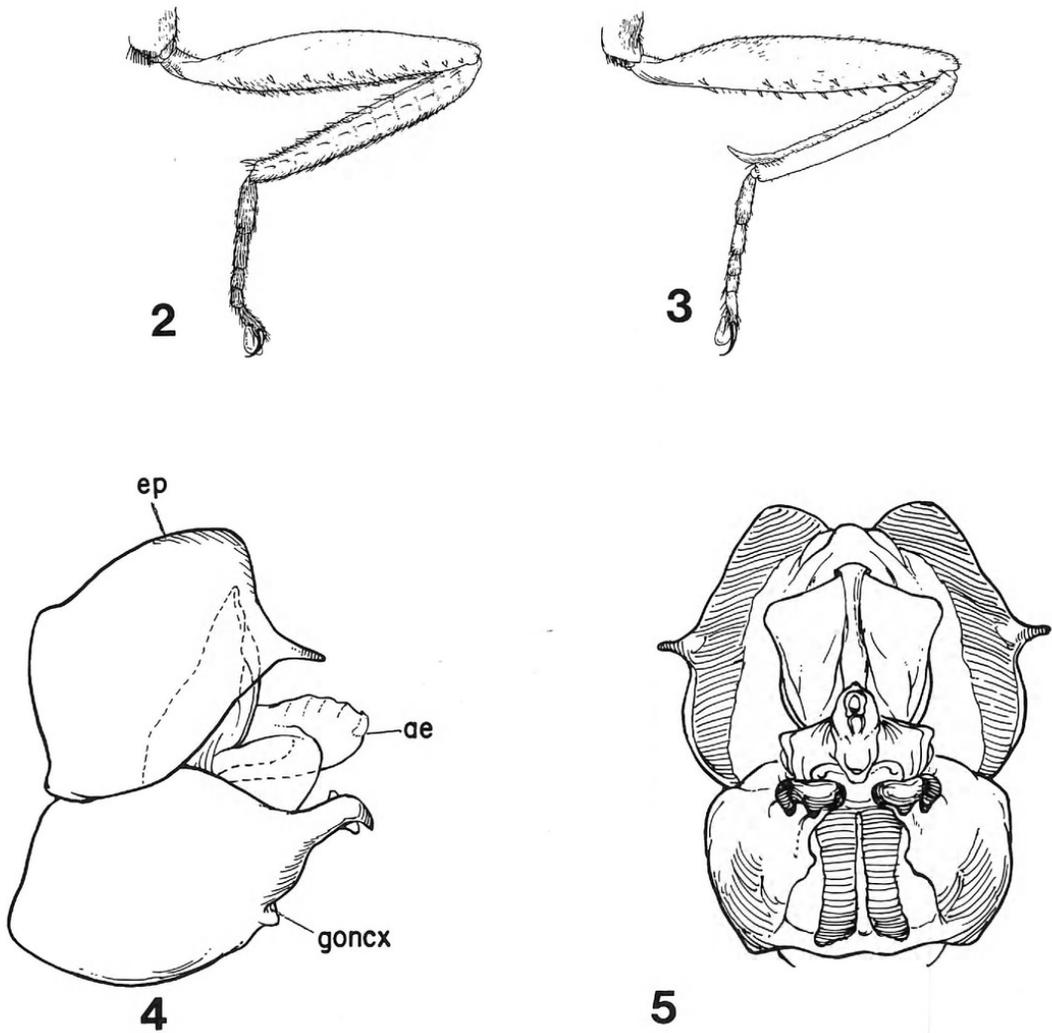
### KEY TO THE GENERA OF MYDIDAE OF COSTA RICA (modified from Wilcox 1981)

1. Laterotergite completely bare; proboscis subequal in length to subcranial cavity; labella broad; apex of female abdomen with setae; length variable ..... 2
- Laterotergite pilose; proboscis 1.0–2.0 × length of subcranial cavity; apex of female abdomen with circlet of spines; length 12–23 mm ..... *Nemomydas* Curran
- 2(1). Prementum of proboscis 0.5 × length of subcranial cavity; labella attached to prementum near its midpoint, and subequal with subcranial cavity in length; anterior margin of subcranial cavity situated at about 0.4 × the distance from lower eye margin to base of antennae; length 15–29 mm ..... *Messiasia* d'Andretta



Figure 1. *Mydas rufiventris*, general habitus.

- Prementum of proboscis and subcranial cavity subequal in length; labella attached to mentum near its apical one-half, and extending at about a 90° angle; anterior margin of subcranium level with lower margin of the eye ..... 3
- 3(2). Carina on hind tibia partially developed (Fig. 2); apical spur of hind tibia reduced or absent (Fig. 2); epandrium strongly arched in lateral view (Fig. 4); process of gonocoxite digitiform (Figs. 4-5); gonostylus saddle-shaped in caudal view (Fig. 5); length 29-45 mm .....  
..... *Protomydas* Wilcox, Papavero & Pimentel
- Carina on hind tibia completely developed (Fig. 3); apical spur of hind tibia long and stout (Fig. 3); epandrium rounded in lateral view (Fig. 6); gonocoxite simple or falciform (Figs. 6-7); gonostylus bilobed in caudal view (Fig. 7); length 25-26 mm ..... *Mydas* Fabr.



Figures 2-5. 2. *Protomydas rubidapex*, hind leg. 3. *Mydas clavatus*, hind leg. 4. *Protomydas rubidapex*, male terminalia, lateral view. 5. *Protomydas rubidapex*, male terminalia, caudal view.

#### MESSIASIA D'ANDRETTA

*Messiasia* d'Andretta 1951: 52.

*Type Species.* — *Messiasia carrerai* d'Andretta (by original designation).

*Diagnosis.* — See key to genera. Species included in this genus closely resemble, in general appearance those of *Mydas*, but they can be readily distinguished from Costa Rican *Mydas* species by their entirely black integument.

*Discussion.* — *Messiasia* is predominantly South American in distribution but five species are known to range from southwestern United States south to Panama (Wilcox & Papavero 1975).

#### Key to Costa Rican *Messiasia*

1. Wings pale amber; long white setae present above hind coxa; gonocoxite of male elongate, tapering to hook-like process; gonostylus serrate (Figs. 8-9) ..... *decor* (Osten Sacken)
- Wings dull black; sparse black setae present above hind coxa; gonocoxite

of male truncate apically, upper process pointed; gonostylus broadly truncate (Figs. 10–11) ..... *perpolita* (Johnson)

*Messiasia decor* (Osten Sacken)

*Midas decor* Osten Sacken 1886: 71.

*Mydas decor*; Williston 1898: 55.

*Messiasia decor*; d'Andretta 1951: 68.

*Messiasia decor*; Wilcox & Papavero 1975: 21 (includes specimens from La Suiza, Costa Rica).

*Types*.—Holotype, male; from: PANAMA. Bugaba; deposited in the British Museum (Natural History), London; examined.

*Diagnosis*.—The white setae above the hind coxae will usually separate both sexes of *M. decor* from *M. perpolita*.

*Discussion*.—This species is known from Costa Rica and Panama. Wilcox & Papavero (1975) indicate that this species occurs in forested areas. The illustration of the male terminalia of *M. decor* provided by Wilcox & Papavero (1975) is inaccurate.

*Material Examined*.—COSTA RICA. MONTEVERDE Prov.: 20–24 Jan 1986, W. Hanson and G. Bohart, 1 female (USU).

*Messiasia perpolita* (Johnson)

*Mydas perpolita* Johnson 1933: 72.

*Messiasia polita*; d'Andretta 1951: 64.

*Messiasia perpolita*; Wilcox & Papavero 1975: 31.

*Types*.—Holotype, male; from: MEXICO. YUCATAN: Chichen Itza; deposited in the Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; examined.

*Diagnosis*.—The dull black wings and no white setae above the hind coxae will distinguish both sexes of this species from *M. decor*.

*Discussion*.—This species is relatively common in Mexico. Janzen (1986) described the unique tropical dry forest habitat in Costa Rica where this species was collected. Janzen's specimens collected by malaise traps represent the southernmost range extension for this species.

*Material Examined*.—COSTA RICA. GUANACASTE Prov.: Santa Rosa National Park, 14–17 Jun 1977, D. H. Janzen, 1 female (AMNH); same data except, 300 m, May 1983, D. H. Janzen and W. Hallwachs, 2 females (AMNH); same data except 1–15 Jun 1982, 300 m, D. H. Janzen and W. Hallwachs, 1 male (AMNH).

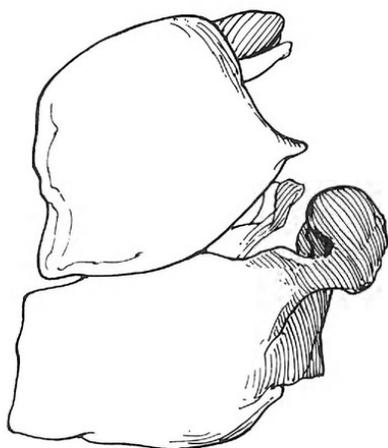
NEMOMYDAS CURRAN

*Nemomydas* Curran 1934: 165.

*Type Species*.—*Leptomysdas pantherinus* Gerstaecker (by original designation).

*Diagnosis*.—See key to genera. Additionally, males are easily distinguished from all other mydids by the digitate processes of the gonocoxite.

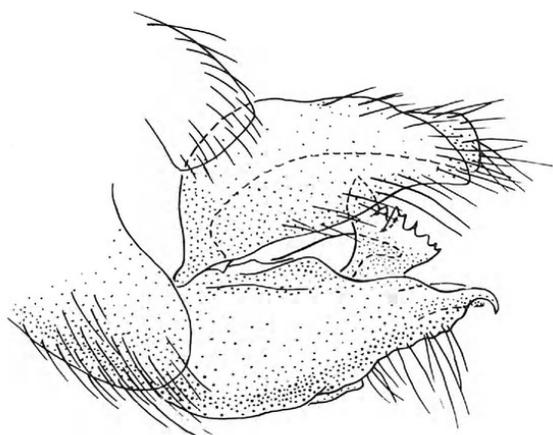
*Discussion*.—*Nemomydas* is restricted to North America and Central America and presently includes 19 species (Steyskal 1956, Kondratieff & Welch 1990,



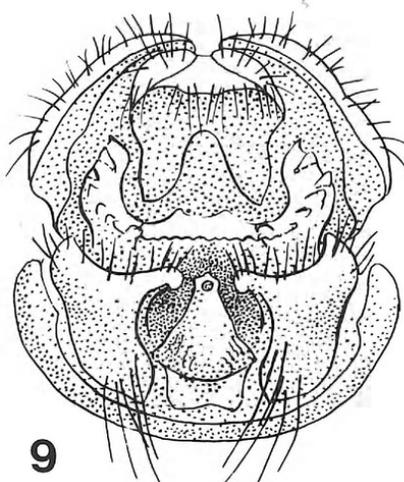
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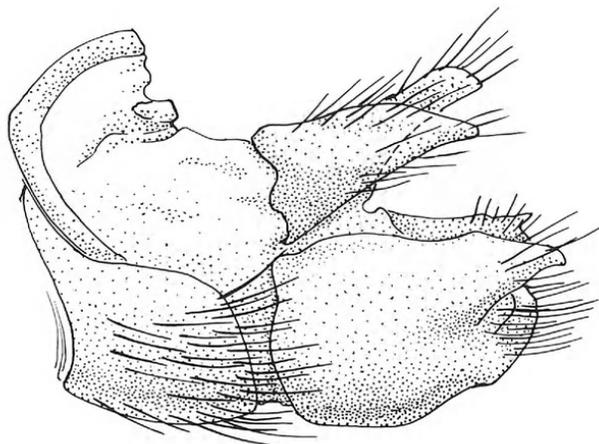
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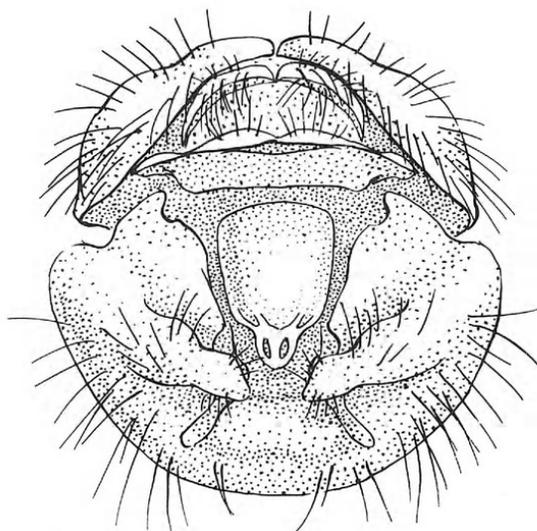
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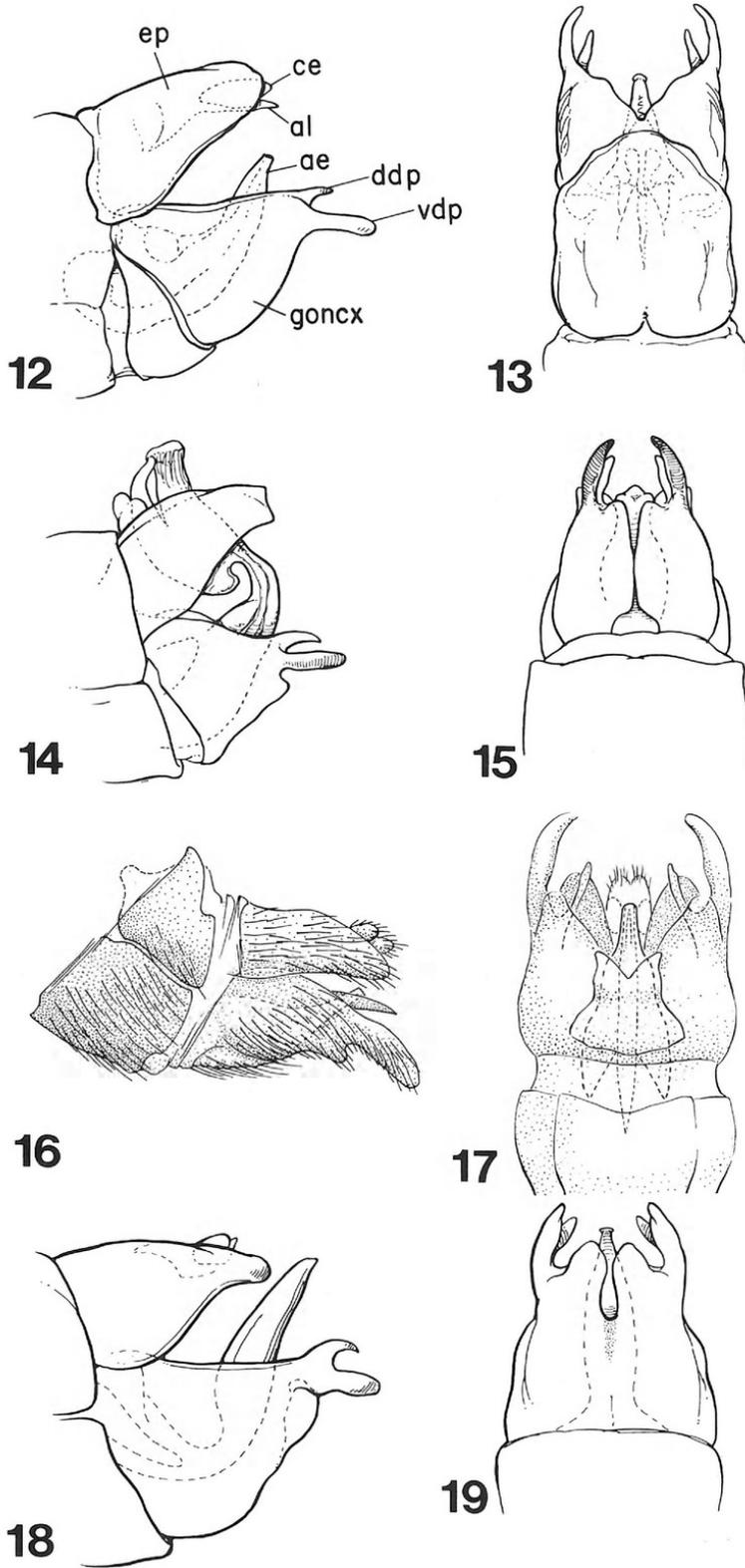


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Figures 6–11. Male terminalia. 6. *Mydas rufiventris*, lateral view. 7. *Mydas rufiventris*, caudal view. 8. *Messiasia decor*, lateral view. 9. *Messiasia decor*, caudal view. 10. *Messiasia perpolita*, lateral view. 11. *Messiasia perpolita*, caudal view. Abbrev.: ae, aedeagus; ep, epandrium; goncx, gonocoxite.



Figures 12–19. Male terminalia. 12. *Nemomydas bequaerti*, lateral view. 13. *Nemomydas bequaerti*, ventral view. 14. *Nemomydas sponsor*, lateral view. 15. *Nemomydas sponsor*, ventral view. 16. *Nemomydas loreni*, lateral view. 17. *Nemomydas loreni*, ventral view. 18. *Nemomydas lamia*, lateral view. 19. *Nemomydas lamia*, ventral view. Abbrev.: ae, aedeagus; al, anal lamellae; ce, cercus; ddp, dorsal digitate process; ep, epandrium; goncx, gonocoxite; vdp, ventral digitate process.

Welch & Kondratieff 1990). Three species occur in Costa Rica including a new species described here: *N. lamia* (Seguy), *N. sponsor* (Osten Sacken), and *N. loreni* NEW SPECIES. These three species are very similar in appearance; females are difficult to separate without associated males.

Key to *Nemomydas* males south of Mexico

1. Abdominal tergites black, posterior margins yellow ..... 2
- Abdominal tergites yellow-brown with middorsal black-brown spots or dashes; terminalia as Figs. 12–13 (Honduras) ..... *bequaerti* (Johnson)
- 2(1). Distal section of aedeagus in lateral view, abruptly expanded and re-curved medially (Figs. 14–15) (Guatemala, Costa Rica) .....  
..... *sponsor* (Osten Sacken)
- Distal section of aedeagus in lateral view, tube-like (Figs. 16–17) or tongue-like (Figs. 18–19) ..... 3
- 3(2). Distal section of aedeagus in lateral view, tube-like (Figs. 16–17) ....  
..... *loreni* NEW SPECIES
- Distal section of aedeagus in lateral view, tongue-like (Figs. 18–19) ..  
..... *lamia* (Séguy)

*Nemomydas lamia* (Séguy)

*Nomoneura lamia* Séguy 1928: 146.

*Nemomydas lamia*; Papavero & Wilcox 1968: 34.11.

*Nemomydas lamia*; Kondratieff & Welch 1990: 474.

*Types*. — Lectotype, male; from: COSTA RICA. La Caja; deposited in the Museum National d'Histoire, Paris; examined.

*Diagnosis*. — See key to *Nemomydas* species.

*Discussion*. — Kondratieff & Welch (1990) provided descriptions of both sexes of this uncommon species. The specimens examined are apparently the first additional material collected since its original description.

*Material Examined*. — COSTA RICA. GUANACASTE Prov.: S. Cañas, 26–31 Jan 1989, F. D. Parker, 1 male (CSU), 2 males (USU). La Caja, Paul Serre, 1920, 1 male, 6 females (MNHN).

*Nemomydas sponsor* (Osten Sacken)

*Leptomysdas sponsor* Osten Sacken 1886: 68.

*Nemomydas sponsor*, Kondratieff & Welch 1990: 475.

*Types*. — Holotype, female; from: GUATEMALA. San Geronimo; deposited in the British Museum (Natural History), London; examined.

*Diagnosis*. — See key to *Nemomydas* species.

*Discussion*. — Kondratieff & Welch (1990) provided the first description of the male of this species.

*Material Examined*. — COSTA RICA. SAN JOSE Prov.: San Jose, 27–29 Dec 1987, F. D. Parker, 4 males, 2 females (USU); Escazu, 14–16 Jan 1989, F. D. Parker, 1 male (USU); 1 male (MNHN).

*Nemomydas loreni* Welch & Kondratieff, NEW SPECIES

*Types*. — Holotype male, data: COSTA RICA. GUANACASTE Prov.: S. Cañas, 1–3 Feb 1989, F. D. Parker; deposited: Utah State University, Logan. Paratypes deposited in Utah State University, Logan, except as indicated; data: 16 males,

1 female, same data as holotype (1 male deposited CSU), (1 male deposited JLW); same data except 1–5 Mar 1989, 1 male; same data except 21–25 Jan 1989, 4 males; same data except 26–31 Jan 1989, 3 females; same data except 9–14 Feb 1989, 1 male, 9 females (1 female deposited CSU); same data except 22–24 Feb 1989, 1 male (deposited CSU); Tamarindo, 6 Nov 1977, M. E. Irwin, ex. beach sand, 1 male (deposited INHS). *SAN JOSE Prov.*: Escazu, 14–16 Jan 1989, F. D. Parker, 2 females (1 female deposited JLW); Puntarenas, 19 Dec 1989, F. D. Parker, 2 males; Comelco Property, 30 Jan 1976, H. Reed, 1 male (deposited TXA&M).

*Description.*—*Male.* Length 12–16 mm. Head shiny black, with white, erect setae; orbital of eye yellow pollinose; antenna 3.6–3.8 mm long, black, flagellomere two white pollinose dorsally, brown pollinose ventrally; proboscis long, 2.6 times as long as subcranial cavity, black. Scutum black, with a pair of submedian yellow pollinose stripes that converge posteriorly, and a pair of lateral yellow pollinose stripes, setae yellow, long, erect, sparse; postpronotal lobe yellow pollinose; scutellum yellow pollinose, black posteriorly; metanotum black, yellow pollinose anteriorly. Wings brown, longitudinal veins brown, costa black with black setae; knob of halter black, stem brown. Foreleg and midleg brown black, setae white dorsally, black ventrally; hind femur white basally, black apically; hind tibia white dorsally, brown-black ventrally; with short, white setae, dorsally, black ventrally; tarsomeres brown-black. Abdominal tergites shiny black, posterior margins yellow to brown; bulla black; tergite one with setae white, long anteriorly, short, sparse posteriorly; tergite two with setae black, short, decumbent, medially; setae white, long, divergent, anteriorly and laterally; tergites three to five with setae black, short, decumbent; tergites six and seven with setae white, long, decumbent; sternites shiny black, sternites two to five with posterior margins yellow to brown; sternites two to four with setae white, long, decumbent; sternites five to seven with setae black, long, decumbent. Terminalia brown-black. Gonocoxite with dorsal digitate process distinctly claw-like, ventral digitate process oblong, rounded, slightly directed inwardly; a smaller rounded protrusion ventrally. Aedeagus tube-like distally, swollen basally (Figs. 16–17).

*Female.*—Length 12–16 mm. Color and structure similar to male, except setae on abdominal tergites short and sometimes tergites six and seven without yellow posterior margins.

*Diagnosis.*—The male of *N. loreni* can be distinguished from all other meso-american species by the combination of black abdominal tergites with yellow posterior margins and tube-like distal section of the aedeagus. The female cannot be satisfactorily separated from *N. lamia*.

*Etymology.*—This species is named in memory of JLW's father, who encouraged her to take an interest in Diptera because of their intriguing life histories.

*Material Examined.*—Type series.

#### *PROTOMYDAS WILCOX, PAPAVERO & PIMENTEL*

*Protomydas* Wilcox, Papavero & Pimentel 1989: 13.

*Type Species.*—*Mydas coerulescens* Olivier (by original designation).

*Diagnosis.*—See key to the genera.

*Discussion.*—Wilcox et al. (1989) recognized three species in this primarily Neotropical genus; only one is known from Costa Rica and listed here. D'Andretta (1951) provided illustrations of the male terminalia and other characters for these species.

#### *Protomydas rubidapex* (Wiedemann)

*Mydas rubidapex* Wiedemann 1830: 626.

*Mydas dives* Westwood 1841: 50. (Synonymized by Wilcox, Papavero & Pimentel 1989: 16.)

*Protomydas rubidapex*; Wilcox, Papavero & Pimentel 1989: 16.

*Types.*—The type of *P. rubidapex* is from MEXICO, and is deposited in Humboldt Universitat, Berlin; it was not examined. The type of *P. dives*, from an unknown locality, is deposited in Hope Museum, Oxford, England, and was not examined.

*Diagnosis.*—*Protomydas rubidapex* is easily separated from all *Mydas* species by the reduced or absent carina of the hind tibia, the arched epandrium, digitiform process of the gonocoxite, and the saddle-shaped gonostylus.

*Redescription.*—*Male.* Length 29–45 mm long. Head shiny black, with long, erect, black setae; mystax with long, decumbent, black and yellow setae; orbital margin of eye black; antenna 10–12 mm, orange or black with flagellomere 2 orange; proboscis black. Scutum dull black; setae sparse, decumbent, black; wing opaque orange to brown, wing margin broadly brown to black; veins orange, or sometimes brown apically, costa with black setae basally, and mixed black and orange setae apically; calypter with long dense fringe of black squamose setae; halter black; legs black, setae and bristles black; hind tibia with carina absent or reduced, apical spur weakly developed, shorter than width of first hind tarsal segment. Abdominal tergite one black, with long, decumbent, sparse, golden setae; tergite two black, with short, recumbent, golden setae; bulla black; tergites three to seven with short, recumbent, black, setae; sternites with short, sparse, recumbent setae. Terminalia with epandrium, in lateral view (Fig. 3) arched, concave above spur; gonocoxite with produced, “grasping” digitiform process that is incurved in caudal view; gonostylus saddle shaped; aedeagus tube-like, ribbed dorsally, with lateral rounded ridges (Fig. 4).

*Female.*—Length 35–40 mm. Antenna length 14.0–15.5 mm. Coloration and structure similar to male.

*Discussion.*—Wilcox et al. (1989) did not provide a thorough description of this species, and the redescription above is based on Costa Rican specimens. This species ranges from northern Mexico to Venezuela and Brazil.

*Material Examined.*—COSTA RICA. GUANACASTE Prov.: Santa Rosa National Park, 21–24 Dec 1979, D. H. Janzen, ex malaise trap, 1 male (AMNH); same data as above except, 1–15 Jan 1982, 300 m, D. H. Janzen and W. Hallwachs, 1 male (AMNH); Sotobosque, Cerro El Hacha, 12 Sep–2 Jan 1988, Tacotal, ex malaise trap, 1 female (AMNH).

#### MYDAS FABR.

*Mydas* Fabr. 1794: 252.

*Type Species.*—*Musca clavata* Drury (by subsequent designation).

*Diagnosis.*—See key to the genera.

*Discussion.*—This genus and its allies were recently revised by Wilcox et al. (1989); we do not agree with several of the taxonomic conclusions reached in that study and will publish our interpretations elsewhere. *Mydas rufiventris* is the only *Mydas* known from Costa Rica.

#### *Mydas rufiventris* Macquart

*Mydas rufiventris* Macquart 1850: 364.

*Mydas vittatus* Macquart 1850: 364.

*Mydas militaris* Gerstaecker 1868: 99. (New name for *Mydas vittatus*, preoccupied.)

*Stratiomydas rufiventris*; Wilcox et al. 1989: 127.

*Mydas quadrilineatus* Williston 1898: 56. NEW SYNONYM.

*Stratiomydas quadrilineatus*; Wilcox et al. 1989: 125.

*Types.*—The holotype male of *M. rufiventris* is labeled “BRAZIL” (in error); it is deposited in the Museum National d’Histoire Naturelle, Paris, and was ex-

amined. The holotype female of *M. vittatus* is labeled MEXICO; it is deposited in the Museum National d'Histoire, and was examined. The syntypes of *M. quadrilineatus* are labeled "MEXICO"; they are deposited in the British Museum (Natural History), London, and were examined.

*Diagnosis.*—The white to yellow mystax and the four pollinose stripes of the mesonotum will easily distinguish this species from all other possible *Mydas* species.

*Discussion.*—In a recent review of the Mydini by Wilcox et al. (1989), *M. rufiventris* was distinguished from *M. quadrilineatus* by the color of the abdominal tergites which are primarily black in *M. quadrilineatus* and red in *M. rufiventris*. Examination of specimens throughout the range of both species (Arizona, Mexico, El Salvador, and Costa Rica) indicated the presence of only one variable species. The male terminalia of both forms are alike. The key of Wilcox et al. (1989) to this group is unusable, however, especially with females. The series of both sexes, collected by Paul A. Opler near Cañas, contains all color morphs, ranging from specimens with all abdominal tergites completely black to some with tergites two through five or two through seven red. This often extreme polymorphism in abdominal color is common in other species groups of *Mydas* (e.g., *Mydas ventralis* Gerstaecker of the southwestern United States).

*Material Examined.*—COSTA RICA. GUANACASTE Prov.: Cañas, 6.4 km NW of La Pacifica, 14 May 1971, P. A. Opler, ex *Casearia* sp. ("nitida"), 1 male, 1 female (UCB); same data except 15 Nov 1971, 1 female; same data except 23–30 May 1972, ex *Forsteronia* sp. ("spicata"), 2 males, 2 females (UCB), 1 male (CSU); same data except 6 Jun 1973, ex *Asclepias* sp. ("liana"), 2 males (UCB); same data except 2–4 June 1973, *Asclepias* vine, 1 male, 2 females (UCB).

#### ACKNOWLEDGMENT

We thank the following people who made material available for study: J. E. Chainey (British Museum [Natural History]); John T. Doyen (University of California, Berkeley); Wilford J. Hanson (Utah State University); L. Mátile (Museum National d'Histoire Naturelle, Paris, France); Kathryn C. McGiffen (Illinois Natural History Survey); Stephen Pratt (Museum of Comparative Zoology, Harvard University); and Edward G. Riley (Texas A&M University). David Carlson, Conery Calhoun, and Michael G. Kippenhan (Colorado State University) prepared the illustrations. Howard E. Evans reviewed the manuscript before submission. Two reviewers made many helpful suggestions that improved an earlier version of this manuscript.

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*Received 11 October 1990; accepted 16 January 1991.*



Welch, Judith L. and Kondratieff, Boris C. 1991. "The Mydidae (Diptera) of Costa Rica." *The Pan-Pacific entomologist* 67(2), 124-134.

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