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A New *Metatrichia* Window Fly (Diptera: Scenopinidae) in Dominican Amber, with a Review of the Systematics and Biogeography of the Genus

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ABSTRACT

The distinctive new species *Metatrichia pria* is described from Dominican Republic amber of Oligo-Miocene age. The new species is illustrated and compared to its congeners. The closest relatives of *M. pria* are considered to be the Nearctic *M. bulbosa* and Neotropical *M. robusta*. Relationships and monophyly of the genus are discussed. These amber fossils extend the distribution of New World *Metatrichia* into the Caribbean. This is the only known fossil scenopinid.

INTRODUCTION

The Scenopinidae, commonly known as window flies, are a small family represented in all zoogeographic regions and containing almost 400 described species in 21 genera. The family has recently been expanded with the inclusion of four small genera of flies previously belonging to the subfamily Proratinae of the Bombyliidae (Yeates, 1992). Adults of those species with functional mouthparts presumably feed on nectar and pollen, however little is known of the biology of the family. Larvae are predacious on other insects; they have been reared from mammal, bird, and termite nests, and have been associated with dermestid and wood-boring beetle larvae (Kelsey, 1969).

The genus *Metatrichia* (Coquillett, 1900) was erected for the Nearctic *Scenopinus bulbosa* Osten Sacken 1877. Since then, eight other species have been added to the genus.

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Kröber (1913) described *M. robusta* from the Neotropical region, Kelsey (1969) transferred the African *Pseudomphrale lophyrosoma* Speiser 1920, *P. stevensoni* Bezzi 1925, and the Australian *P. waterhousei* Paramonov 1955 to *Metatrichia*. Kelsey (1970) described *M. thailandica* for specimens from Thailand and *M. papuana* for specimens from New Guinea. Kelsey (1981a) described *M. mongolica* from Mongolia and Kelsey (1981b) described *M. bituluua* from Israel and transferred *M. palaestinensis,* a species found in the Sinai Peninsula, from *Pseudomphrale* Kröber. The most recent species to be included in the genus is *M. nigeriana* Kelsey, 1984.

Metatrichia is represented in all zoogeographical regions, however it is not known from the Caribbean where these fossils were recovered. In fact, the family appears largely absent from the Caribbean islands, with the exception of four species from the largest genus, *Scenopinus* Latreille (Kelsey, 1969, 1971). Although intensive collecting in the Greater Antilles very likely will uncover additional species, the Caribbean surely lacks most genera of scenopinids.

The pieces of amber containing the specimens (AMNH DR-10-101 and NMNH 12495) are clear and dark amber-colored, typical for some Dominican material. Although no pyrolysis-gas chromatography was done to determine the authenticity of the pieces, the preservation of the specimens exactly matches that of specimens with tested authenticity. It can be reasonably assumed that the specimens are from the early Miocene–late Oligocene deposits in the Cordillera Central of the Dominican Republic. The amber surface does not react with ether or chloroform, as does copal from the deposits in the Cordillera Oriental. Krishna and Grimaldi (1991) gave a brief summary of Dominican amber. Methods of observation are detailed in Grimaldi (1993).

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TAXONOMY

Metatrichia pria
Yeates and Grimaldi, new species
(Figures 1–4, 7)

Description based on the female holotype in AMNH and the female paratype in the USNM. Holotype label. AMBER: Dominican Republic Oligo-Miocene AMNH DR-10-101; Paratype label. AMBER: Dominican Republic, La Toca, # 12495. Holotype condition: Good, entire, lying in the corner and on an edge of an oval piece 43 × 31 mm. Some bubbles occur near one surface; the only other insect inclusion is a minute nymph of a thrips (Thysanoptera). Paratype condition: Good, entire, most of surface silvered due to slight separation of amber from specimen (figs 2–3), lying in the corner and on an edge of a triangular piece 24 × 18 mm. Some bubbles near one surface; no other insect inclusions.

DIAGNOSIS: Frons and face of *M. pria* bulging more prominently than those of any of its living congeners (cf. figs 5–9).

DESCRIPTION: *Head* (fig. 7). Black; face and frons bulging, projecting bases of antennae forward. Distance from base of antennae to anterior eye margin in lateral view equal to length of scape and pedicel combined. Narrow strip between posterior eye margin and occiput clothed in sparse flattened hairs similar to those found in *M. bulbosa* (fig. 12); occiput flattened with margin smoothly curved. Mouthparts well developed, similar to those found in *M. bulbosa* (fig. 10); (visible) proboscis length from apex of proboscis sheath to apex of labellar lobes slightly less than head length. Prementum smooth; lobes of labellum large and fleshy with many erect hairs. Palp well developed, one-segmented, extending to base of labellar lobes, clothed in fine hairs. Ocellar tubercle not prominent, frons parallel-sided, width equal to distance between lateral ocelli (fig. 19). Antenna

Figs. **1–3**. Habitus of *Metatrichia pria* holotype and paratype. **1**, holotype, anterolateral view; **2**, paratype, lateral view; **3**, paratype, dorsal view.

slightly shorter than eye depth (fig. 7). Scape and pedicel small, conical; apices wider than bases; both with short erect hairs distally. Flagellum with fine pile of microtrichia; as long as scape and pedicel combined, maximum width slightly greater than half the length at 1/3 distance from base. Apex of flagellum truncate, with an apical depression containing a minute style.

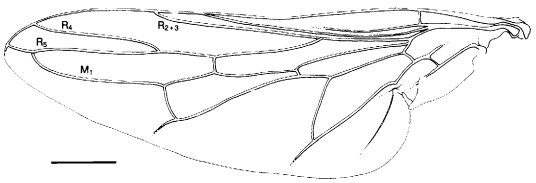


Fig. 4. Left wing of *M. pria* holotype. Scale 0.5 mm.

Thorax. Black, integument of scutum with short microtrichia. Wing (fig. 5) with veins distinct, brown, wing membrane translucent. Vein M_1 turning anteriorly to join R_5 shortly before wing tip, typical of this and several other scenopinine genera. R_4 arising from R_5 at level of apex of cell dm and slightly proximal to middle of cell rm.

Abdomen. Black. Broad, tapering from segment 6 to apex. Sternite 8 produced apically into a rounded point beneath cerci.

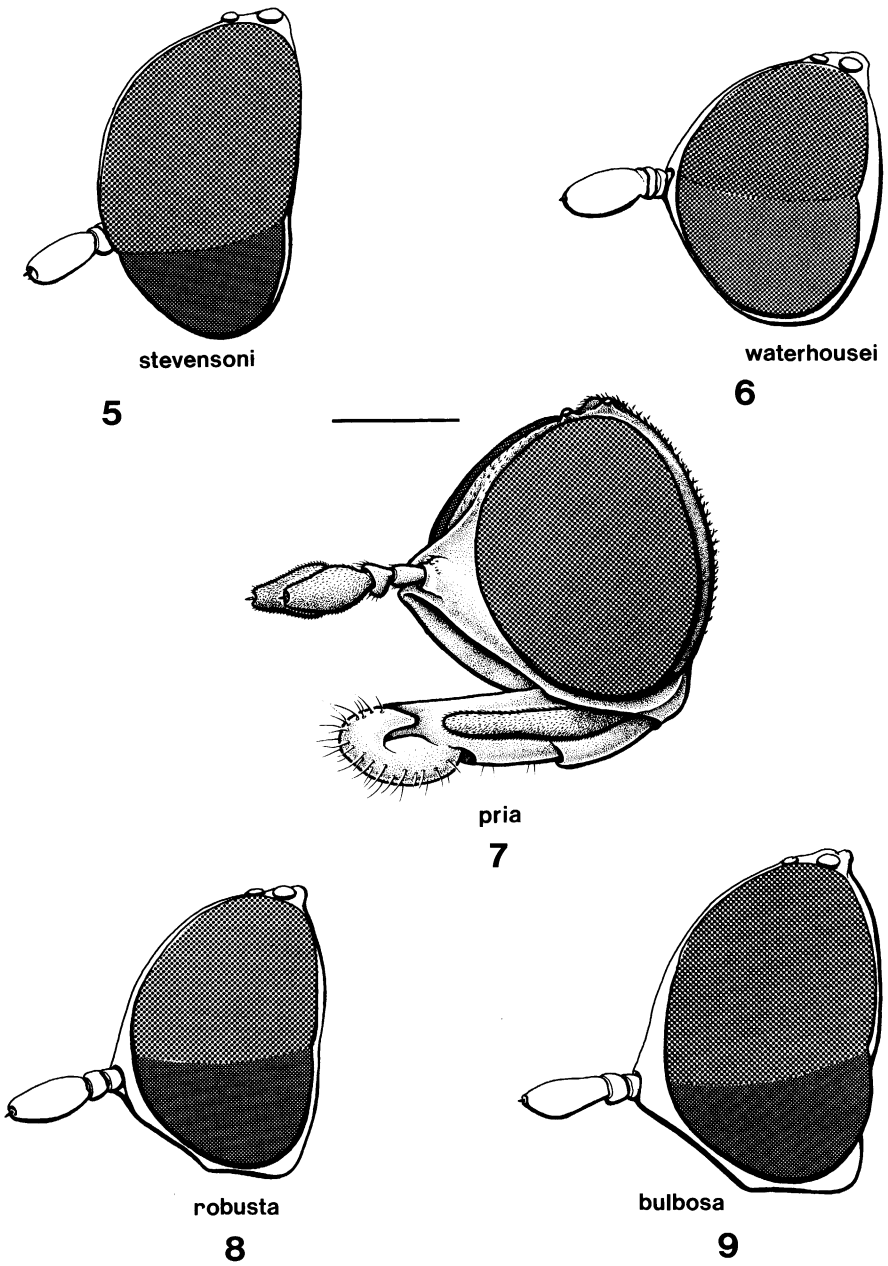
MEASUREMENTS (mm): Holotype. Body length: 7.62; head length: 1.11 (excluding antennae); head height: 1.45; head width: 1.67; antenna length: 0.64; proboscis length 0.96; thorax length: 2.86; thorax width: 1.80; wing length: 4.32; abdomen length: 3.71. Paratype. Body length: 6.51; head length: 0.79 (excluding antennae); head height: 1.47; head width: 1.73; antenna length: 0.59; proboscis length 0.93; thorax length: 2.67; thorax width: 2.01; wing length: 4.26; abdomen length: 3.06.

COMMENTS: Tergite 2 of the abdomen has two small areas of modified setae similar to those of *M. bulbosa* (fig. 13) which is typical of Scenopinidae and an apomorphy for the family (Yeates, 1992). Wing venation of the fossil indicates that it belongs to the subfamily Scenopininae.

ETYMOLOGY: The specific epithet is derived from the Latin *prius*, meaning earlier or former.

RELATIONSHIPS OF THE FOSSIL *METATRICHIA*

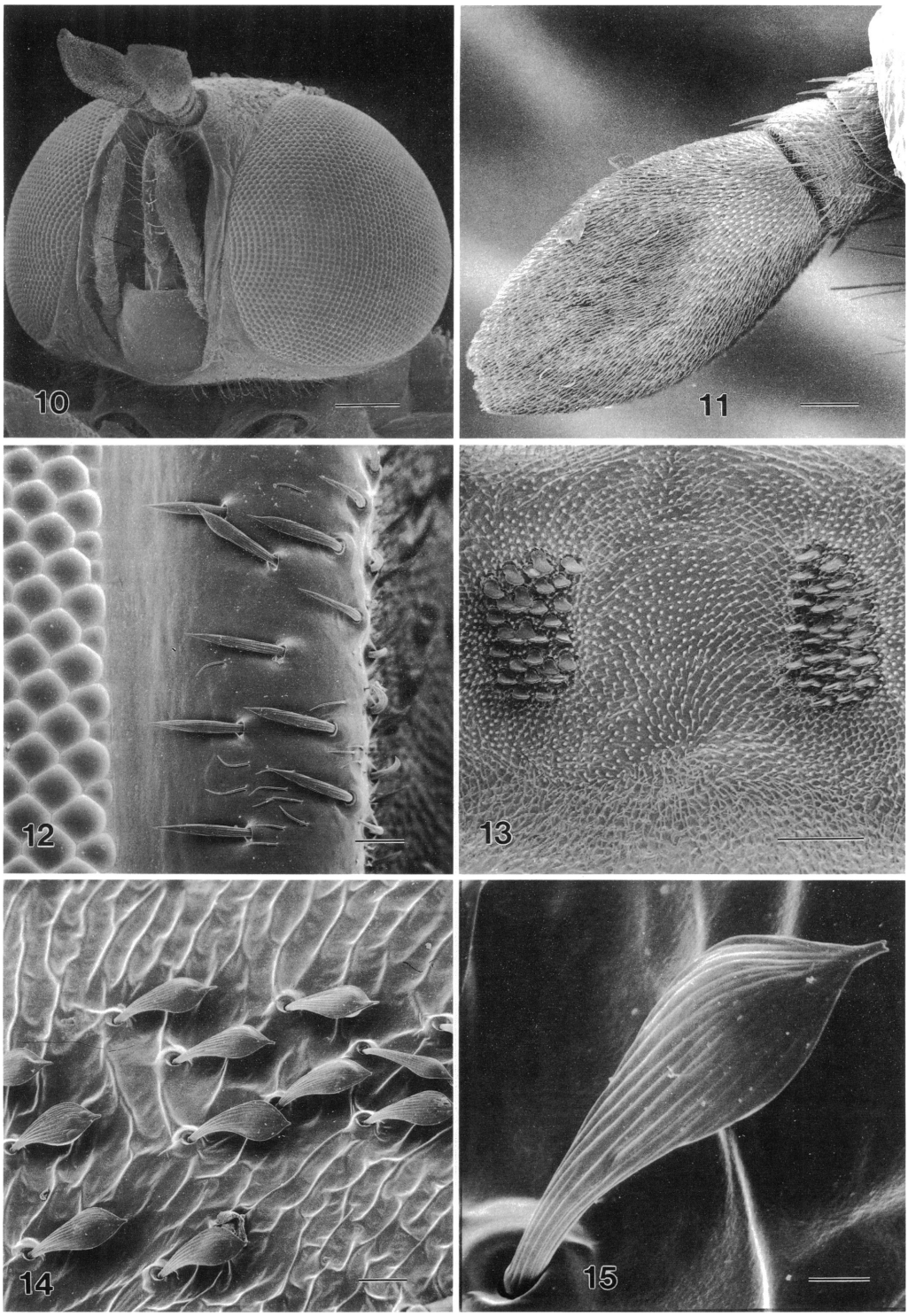
Although phylogenetic relationships between the subfamilies of Scenopinidae have been resolved (Yeates, 1992), relationships between genera within the subfamily Scenopininae, to which *Metatrichia* belongs, have not yet been elucidated. *Metatrichia* belongs to a group of thirteen scenopinine genera which are distinguished by vein M_1 meeting



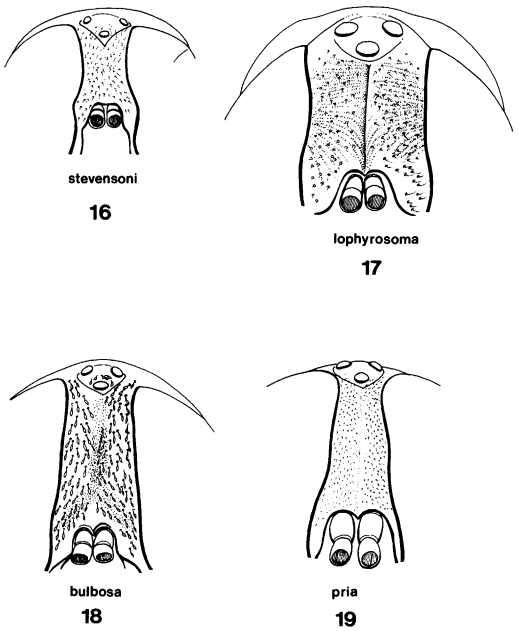
Figs. 5-9. Lateral view of the male heads of various extant *Metatrichia* species and the female head of the amber fossil. **5**, *M. stevensoni*; **6**, *M. waterhousei*; **7**, *M. pria*; **8**, *M. robusta*; **9**, *M. bulbosa*. Scale 0.5 mm.

R_5 preapically, forming an apomorphic closed cell R_5 (fig. 4). It is quite likely that this is a monophyletic group. The male genitalia of *Metatrichia* have a plesiomorphic bifurcate phallus, in comparison to many species of *Scenopinus* which have an apomorphic trifurcate phallus.

Kelsey (1969) noted that the large size, broad, flattened abdomen, and bulging frons and face of *Metatrichia* separate it from all



Figs. **10–15.** Scanning electron micrographs of female *M. bulbosa*. **10**, head, oblique ventral view showing oral cavity and mouthparts, scale 200 μm; **11**, lateral view of left antenna, scale 50 μm; **12**, detail of scalelike hairs on postocular band, scale 20 μm; **13**, sensory patch on tergite 2 of abdomen, an apomorphy for the Scenopinidae (Yeates, 1992), scale 50 μm; **14**, scales on scutum, scale line 20 μm; **15**, detail of scale showing longitudinal fluting, scale 5 μm.



Figs. **16–19**. Female frons of extant and fossil *Metatrichia* species.

other scenopinids. Size is a poor taxonomic character and the abdomen shape of *Metatrichia* is little different from that found in other genera such as *Scenopinus*. The bulging frons and face of *Metatrichia* hold the most promise as a putative synapomorphy of the genus. The bulging frons and face are prominent in both sexes of the type species, *M. bulbosa* (fig. 9), however they are less prominent or absent in other species. The African species *M. lophyrosoma*, *M. stevensoni*, (fig. 5) and *M. nigerianus*; the Palaearctic *M. palaestinensis* and *M. bilituua*; and the female of the Neotropical *M. robusta*, in fact, have a smoothly curving frons and face. In addition, the Palaearctic *M. mongolica* has the frons slightly swollen, but not at the base of the antennae as in the type species. The African species also have vestigial mouthparts, unlike the other members of the genus, but this could simply be autapomorphic within *Metatrichia*. Within the Scenopininae, vestigial mouthparts are also present in *Belosta* Hardy, a small genus from western North America. *M. palaestinensis*, *M. mongolica*, and the African *M. lophyrosoma* differ from all other species of the genus because they have a much wider female frons, which is about twice the width of the ocellar tubercle (cf. figs 16–19), with a deep median furrow and transverse striations.

Thus the single character (bulging face and frons) possibly providing evidence of the monophyly of *Metatrichia* is absent from many species and there is variation in other significant characters. We suspect that *Metatrichia* is not monophyletic, and that future studies will place at least the African and Palearctic species in other genera. At least the remaining six species of *Metatrichia* form a monophyletic group based on the possession of a bulging face and frons, and we will confine our discussions of the relationships of *M. pria* to those species. In external appearance all are extremely similar. Of the six species, *M. pria* has by far the most prominently bulging face and frons (cf. figs. 5–9). The most prominently bulging face and frons among the remaining species is found in *M. bulbosa* (fig. 9) and *M. robusta* (fig. 8), both New World species. Of the remaining species, *M. papuana* and *M. thailandica* have the head shaped most similar to that of *M. robusta*, and *M. waterhousei* has a very feeble bulge at the base of the antennae (fig. 6). *M. waterhousei* and *M. bulbosa* share scales rather than hairs on the body, in comparison to other congeners, and this may indicate a relationship. *M. pria* has simple hairs on the thorax and frons, but the hairs around the edge of the occiput are flattened and similar to those found in *M. bulbosa* (fig. 7).

On the basis of head shape it appears that the closest relatives of *M. pria* are the Nearctic *M. bulbosa* and the Neotropical *M. robusta*.

DISCUSSION

Grimaldi (1990) reviewed Cretaceous Diptera records, and Larsson (1978) indicated no scenopinids in the extensive Baltic amber deposits. None are known from the likewise extensive Oligocene shales of Florissant, or from other deposits. The specimens at hand are probably the only fossils of the family.

This is the third family of Asiloidea from Dominican amber; Schlüter (1976) described a mythicomyiine Bombyliidae from the Cordillera Septentrional and Scarbrough and Poinar (1992) described two species of Asi-

lidae in lower Oligocene–upper Miocene amber from the Cordillera Septentrional.

Woodley (1989) hypothesized a Triassic origin of the Brachycera, and the families of Asiloidea probably arose in the Triassic and/or Jurassic. Woodley (1989) considered the scenopinids the sister-group to the therevids, based on the secondarily segmented abdomen found in the larvae of both families. An undescribed possible therevid occurs in the limestone from the Santana formation, Aptian (Lower Cretaceous, ca. 125 mybp), of Brazil (Grimaldi, 1990). An origin of the Therevidae and Scenopinidae in the Jurassic would not be at all surprising, since the oldest Bombyliidae belongs to an extant subfamily, the Mythicomyiinae, and is from the Jurassic of Siberia (Kovalev, 1985). An additional bombyliid subfamily is known from the Cretaceous (Zaytsev, 1986). The earliest definitive asilid is from the Santana Formation (Grimaldi, 1990). The discovery of *M. pria*, belonging to an extant genus occurring in the Oligo-Miocene, provides supporting evidence for a Mesozoic origin of scenopinids.

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