

AMERICAN MUSEUM *Novitates*

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024
Number 2880, pp. 1-23, figs. 1-56
June 10, 1987

Amber Fossil Drosophilidae (Diptera), with Particular Reference to the Hispaniolan Taxa

DAVID A. GRIMALDI¹

ABSTRACT

All the known fossils of Drosophilidae occurring in amber are treated. *Neotanygastrella wheeleri*, new species, is named, redescribed (cf. Wheeler, 1963) with respect to certain features, and a holotype and paratype are designated for the two specimens from Chiapas, Mexico. Seven new species are described and two others are recorded from amber of the Dominican Republic (approximately early Miocene in origin): *Chymomyza primaeva*; *Drosophila* (*D.*?) *poinari*; *D.* (*Hirtodrosophila*) *paleothoracis*; *D. succini* (incertae sedis);

Miomyia io, new genus; *Protochymomyza miocena*, new genus; *Scaptomyza dominicana*; and two Drosophilinae species (A and B) incertae sedis. Relative genealogical relationships for some drosophiline genera and subgenera are briefly discussed. Illustrations and photographs of the specimens are included, as well as ideas on the significance of some of the fossils for Caribbean historical biogeography. A key to amber-fossilized Drosophilidae is provided.

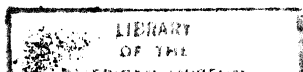
INTRODUCTION

Seven or eight fossilized specimens of Drosophilidae were previously known and all of them occur in amber. Four (two males and two females) are *Electrophortica succini* Hennig from the Baltic amber (Eocene to early Oligocene in age). Hennig (1965) gave very complete and detailed descriptions and drawings of *E. succini*, and Grimaldi (1987) discussed the placement of the species. This fly

will not be considered here. Two of the fossils are of a *Neotanygastrella* species from Chiapas, Mexico (late Oligocene to early Miocene in origin), which were described by Wheeler (1963).

Cockerell (1923) described *Drosophila berryi* from a specimen in amber found in Vallé de Jesús, Santander, Colombia. He noted (p. 331) that the "material, unfortunately of un-

¹ Assistant Curator, Department of Entomology, American Museum of Natural History.



certain age, is relatively soft, being easily cut with an ordinary knife." Langenheim (1969) mentioned two Colombian sites among the amber deposits known in the world, at Medellín and Girón (Antioquia Provincia), of unknown Tertiary age, and that *Hymenea* (Leguminosae) is the probable source. The location of Cockerell's specimen is unknown to me. Softness of the material strongly suggests the fossilized resin to be very recent, and perhaps it is even copal (1000 or more years old). If found, the matrix of the specimen should be examined for its C^{14} decay (Burleigh and Whalley, 1983). The original description is actually of sufficient detail to confirm the specimen's identity as a drosophilid, but an identification beyond this is impossible at present. Loew (1850) mentioned, but did not describe, a "*Drosophila*" from Baltic amber. This was the fly later described by Willi Hennig, *Electrophortica*. Bachofen-Echt (1949) listed three known amber fossil drosophilids, no doubt referring to Loew's specimen, to the other specimens later described by Hennig, and to Cockerell's specimen.

This study is an attempt to add some chronological data to emerging hypotheses on the phylogenetic relationships and historical biogeography of the Drosophilidae. Grimaldi (1987) hypothesized that some of the Antillean drosophilid lineages are relicts; that is, their endemism is imposed by extinction. Specimens from the rich amber deposits of the Dominican Republic (Schlee and Glöckner, 1978; Baroni-Urbani and Saunders, 1982) and elsewhere provide information on minimal age and perhaps on extinctions (e.g., Krishna and Emerson, 1983; Wilson, 1985) for some groups of the Antillean pomace flies. The former aspect would be particularly useful for comparison to the postulated dates of geological origin and position of Caribbean land masses.

Amber of the Dominican Republic originates from at least 10 major mining sites located throughout the eastern three-quarters of the country at various altitudes. As a result, geological processes such as sedimentation have had different effects upon each site, and the calculated ages of the amber deposits can vary among sites. Virtually transparent pieces of amber, which come from mines at Cotui,

are certainly the youngest in origin (Lambert et al., 1985). In general, though, an early Miocene origin of most Dominican amber is a reasonable estimate (Brouwer and Brouwer, 1982). This dating is based on the fact that the amber deposits are intercalated between marine microfossil deposits that were laid down approximately 23 mya, so the date is one of redeposition and is, therefore, a minimal age.

Langenheim and Beckh (1968) first analyzed the resinous components of various ambers and found that material from the Dominican Republic closely matched *Hymenea* (Leguminosae), which is a genus of trees widespread throughout Central and South America and the Greater Antilles. Lambert et al. (1985) found, however, three major classes of resinous components among samples from nine Dominican amber localities. They concluded that if *Hymenea* is the source of the amber then the fossil resin is more variable than samples from extant *Hymenea*. Also, relative dating of the amber was done based on the NMR intensity of the exomethylene carbon in the sample. Other than the dates provided by Brouwer and Brouwer (1982), the actual dates of origin for various Dominican ambers are rather hypothetical.

METHODS, MATERIALS, AND ACKNOWLEDGMENTS

All amber pieces from the Dominican Republic had been previously tumble-polished. For closer observation of some details, amber was ground down close to the specimen using a lapidary wheel and various-size grinding grits (Buhler 240–1000) with water; amber was polished with a white alumina powder (#2 Buhler-micropolish 2A) plus water. The fossils were examined using incident and reflected light from incandescent and fiber optics lamps, generally at 25–50 \times magnification using a Zeiss SV-8 stereoscope with attached camera lucida. Specimens were positioned by placing them on cotton that was molded to accommodate the shape of each amber piece, generally in an oil medium with a refractive index equal to that of the amber. Photography employed the use of an Olympus OM-2N camera with auto-bellows and a Zuiko macrolens (f6, about 12 \times magnifica-

tion) and a Zeiss Tessovar (1 sec exposure), and Kodak Pan-X film. The standard measurements made, where possible, were total length of body (TL), thorax length (ThL), wing length (WL), head width (HW), 4-vein index (4-V), and costal index of wing (CI). Protocol for these measurements is given in Grimaldi (1986). Measurements were made at 50× magnification with an ocular micrometer.

Dr. David Lindberg of the Museum of Paleontology, University of California, Berkeley, kindly loaned the two hypotypes of *Neotanygastrella* described by Marshall Wheeler. Mr. Jacob Brodzinsky allowed me to sort through his collection for the purchase of some specimens. Dr. George O. Poinar, Department of Entomology and Parasitology, University of California, Berkeley, generously loaned several specimens from his personal collection. Dr. Wayne N. Mathis, Department of Entomology, National Museum of Natural History, sorted through the collection at the Smithsonian, from which five amber pieces were borrowed. Drs. Gerhard Bächli, Ian Bock, Walter Hackman, Wayne Mathis, Toyohi Okada, George Poinar, Norman Platnick, Randall Schuh, and Marshall Wheeler provided comments on the manuscript, which Ms. Carol Ievolella kindly typed. Ms. Susan Klofak helped with the amber preparations.

Abbreviations for collections in which specimens are deposited are the following: AMNH, American Museum of Natural History (New York); GOP, George O. Poinar, Jr., personal collection, Berkeley, CA (to eventually be deposited at AMNH); NMNH, National Museum of Natural History, Washington, DC; UCMP, University of California Museum of Paleontology, Berkeley.

RESULTS AND DISCUSSION

CHYMOMYZA CZERNY

Chymomyza primaeva, new species

Figures 1–4

DIAGNOSIS: Arista with 3 dorsal and 2 ventral branches. Anterior reclinate slightly shorter than posterior reclinate. Proclinate about ½ the distance between the anterior and posterior reclinates. Acrostichal setulae in 4 rows. Wing completely hyaline. Pro-

thoracic leg with femur, tibia, and proximal ¾ of basitarsus darkened; remaining segments of leg light. Abdomen dark brown to black. Oviscape without peg ovisensilla (male unknown).

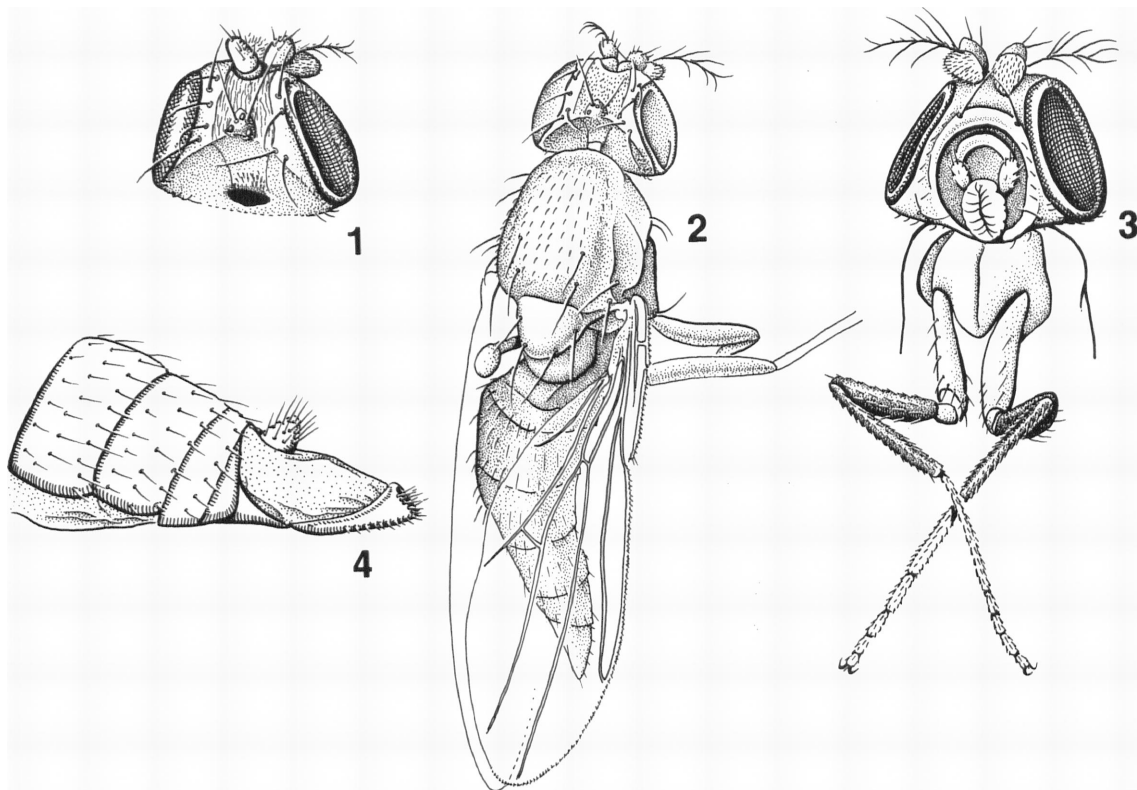
DESCRIPTION: Head light yellow. Arista with 3 dorsal and 2 ventral branches and 5–6 short medial ones. Pedicel with 2 long setae and several shorter ones. Ocellar setae extended about to facial margin. Face flat; without carina. One pair of vibrissae present; ends nearly touch; subvibrissae tiny. Clypeus and palps retracted within oral cavity. Eyes light red, bare of interfacetal setulae; collapsed in holotype. Inner vertical setae c. equal in length to outer verticals and anteromedial to them. Proclinate orbital about midway between anterior and posterior reclinates and c. equal in length or slightly shorter.

Acrostichal setulae in 4 even rows. Dorsocentrals thin and straight, parallel. Two humeral setae present. Anterior scutellar setae slightly divergent; apical scutellars convergent. Postnotum prominent. Halter lighter than evenly colored, yellow thorax. Wing completely hyaline (wings are folded in holotype in way to prevent accurate measurements). Meso- and metathoracic legs mostly yellow. Prothoracic leg with yellow coxa and trochanter; tarsal segments 2–5 lighter, nearly white. Forefemur, tibia, and proximal ¾ of basitarsus black-brown. Forecoxa elongate, length c. ⅔ that of femur. Abdomen slender, laterally compressed in holotype. Tergites black-brown, with few setae. Oviscape extruded, small, subtriangular, with setiform and no peg ovisensilla. Cercus small, conic, with fine setae about as long as cercus.

HOLOTYPE: Female; DOMINICAN REPUBLIC, specific locality unknown (GOP).

ETYMOLOGY: Latin for “early,” or “young,” in reference to the plesiomorphic condition of the wing as stated below.

COMMENTS: The specimen on which the description is based is shown in a photograph (fig. 1 in Poinar, 1984). In that paper the specimen was incorrectly identified as *Drosophila*. The specimen is of considerable interest because of the parasitic nematodes that apparently emerged from it when it was trapped in resin, and because of a recent revision of neotropical *Chymomyza* (Grimaldi, 1986). The quadrate head shape, placement



Figs. 1-4. *Chymomyza primaeva*, holotype. 1. Head, posterodorsal view; 2. dorsal habitus; 3. ventral view of head and anterior portion of thorax, with legs; 4. female terminalia, lateral view.

of the proclinate nearly midway between the other two frontal-orbital setae, the long forecoxae, the dark forefemora + tibiae + basitarsi, and the completely dark abdomen are derived characteristics which make it clear that this specimen is *Chymomyza*. Unfortunately, it is a female; so unless a male is found the presence and/or state of the ventral rows of prothoracic femoral spines must remain unknown. Also, as Okada (1976) first hypothesized, the presence of hyaline (not infuscate) costal and subcostal wing cells is plesiomorphic; I concur with this conclusion based on outgroup comparison. Since the fossil has an entirely hyaline wing, it and four other species in the *costata* species group are the only species of the genus known to lack the synapomorphy.

Chymomyza is a cosmopolitan genus of 49 species; the adults are found at injured areas on tree trunks, so the finding of this specimen in fossilized resin is not unexpected for the

drosophilids. Six species of *Chymomyza* exist in Central America, and three species, which belong to the *aldrichii* species group, occur on the Greater Antilles.

DROSOPHILA FALLÉN

Apart from the type subgenus, 14 subgenera have been proposed in the genus *Drosophila*. Approximately 1500 species have been placed in the genus, which includes about half of the world's Drosophilidae. Clearly, the taxonomic history of *Drosophila* has been one of convenience: although synapomorphies have been proposed for several subgenera, at the generic level *Drosophila* is distinguished by the absence of traits that are distinctive to other drosophiline genera. The monophyly of the genus is seriously questionable just on these grounds. Throckmorton (1975), in fact, viewed *Drosophila* and several of its subgenera as being ancestral to other drosophiline

genera; so at least in his view, the genus is not monophyletic.

Because I believe that taxonomic names should be genealogically meaningful, and also for the purpose of being explicit, I will employ here a definition of *Drosophila* that is narrower than the one in common use. At least for this paper, *Drosophila sensu stricto* includes species that have lost the prescutellar setae, and possess densely micropubescent eyes and an ovipositor (oviscape) with heavily sclerotized, peglike ovisensilla. Possession of a broad, flat facial carina may be a synapomorphy with which to link several *Drosophila* subgenera, including *Drosophila* and *Sophophora*. Figure 5 gives a preliminary cladogram of drosophiline relationships. Of pressing importance would be a scanning electron microscope study of eye pilosity among drosophilids, since this trait appears to be quite important in higher relationships but also seems to have arisen three times in the scheme in figure 5. Detailed comparison of fine structure of the eye surface would probably reveal whether the dense eye pilosity is convergent or synapomorphic. Also, I have tried to restrict the use of characters in figure 5 to external features, such as those applicable to the study of amber fossils. More detailed morphological analyses will be the subject of future work. Also, because figure 5 is very incomplete in its treatment of most drosophilid taxa, statements on higher classification in the Drosophilidae are deferred, pending comprehensive comparisons.

I adhere to Patterson and Rosen's (1977) arguments regarding the placement and naming of fossils into a classification composed mostly or wholly of extant taxa. Specifically, the fossils were treated cladistically; that is, where evidence allowed, they were placed as sister-groups to extant taxa. This is the most general phylogenetic statement; should further evidence ever prove compelling, ancestral-descendant relationships may then be proposed. In my opinion, no taxonomic problem exists with the placement and naming of ancestors, for they should be grouped with their descendants in the strict definition of "monophyletic." The Gordian knot is actually how and on what criteria ancestors should be recognized and, once these are proposed, predicting the level at which a taxon (species or otherwise) is ancestral.

Also, it is probably best not to propose higher taxa to accommodate the amber fossils. At least Cretaceous to Oligocene amber fossil taxa are often quite primitive compared to extant relatives (i.e., they branch early in a cladogram: for examples see Gagné, 1977; Hennig, 1965; McAlpine and Martin, 1966; Wilson et al., 1967; Woodley, 1986; but for more recent fossils see Petrunkevitch et al., 1971). So, in order to cladistically classify the fossils, higher-level and, at least for amber flies, monotypic categories would often need to be proposed. Even the best fossils, like amber specimens, are by nature incomplete, so nomenclatorial chaos can accompany the discovery and reinterpretation of single fossil specimens or characters. Other than the two genera, no supraspecific taxa of Drosophilidae were named here.

Electrophortica succini is apparently the only amber drosophilid that is not in the Drosophilinae. Unlike the Steganinae, the Drosophilinae may be monophyletic, as based on the loss of the prescutellar setae (this is undoubtedly a derived feature since prescutellars occur in sister families, the Camillidae, Curtonotidae, Diastatidae, and Ephydriidae). The other diagnostic feature, loss of one of the usual two katepisternal setae, I have found to occur very sporadically in the subfamily: more commonly observed is a state where the katepisternals are unequal in size. The presence of stout, heavily sclerotized, ovisensilla pegs on the oviscape is also a derived trait possessed by the Drosophilinae, but not by all genera in the subfamily.

***Drosophila (Drosophila?) succini*,
new species**

Figures 6–8, 12, 13

DIAGNOSIS: Anterior reclinate orbital directly lateral to proclinate; vertex slightly raised; carina low; vibrissae in 2 pairs; eyes with dense micropubescence; ovisensilla pegs present (male unknown).

DESCRIPTION: Integument light yellow to tan, much of it obscured by a silvery coating resulting from the embedding. Arista with 5 dorsal and 2 ventral branches. Anterior surface of pedicel with 2 stout setae. Flagellomere I with short, even setulae. Anterior reclinate orbital seta c. $\frac{1}{3}$ length of proclinate, lies just lateral to proclinate. Posterior reclinate

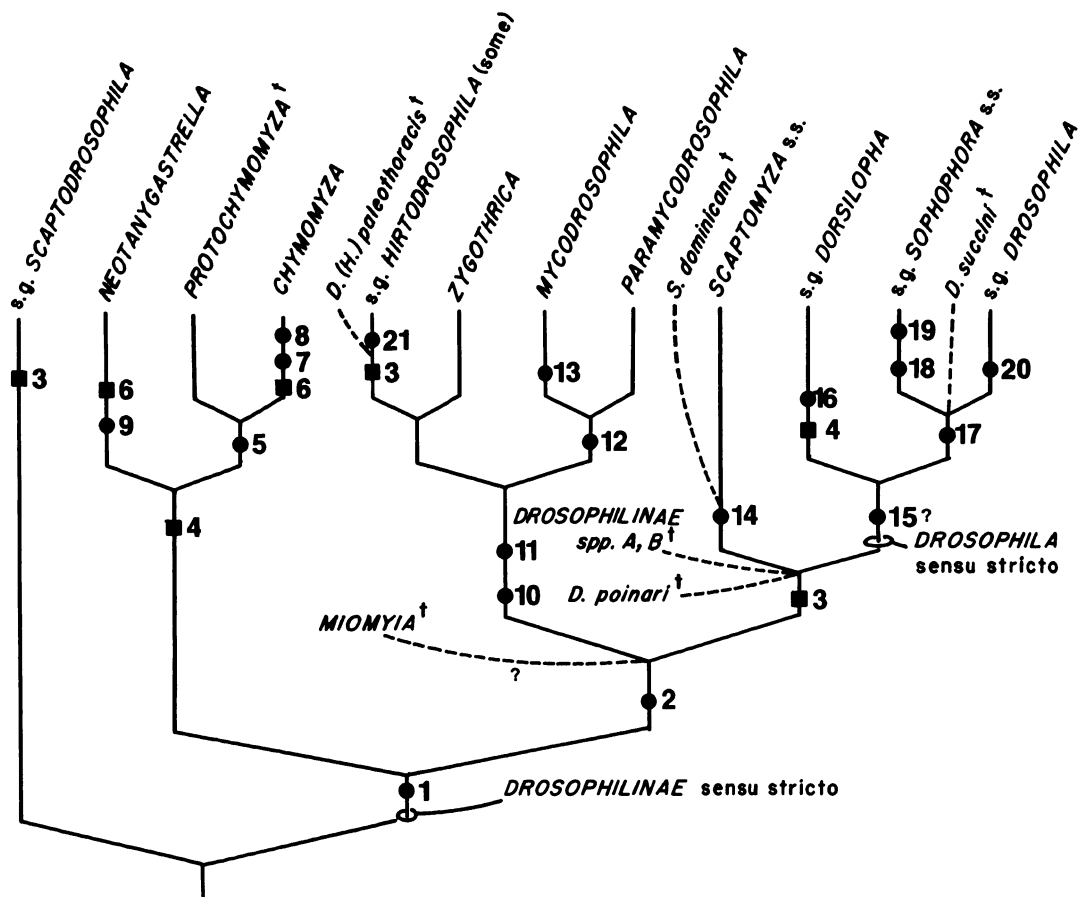


Fig. 5. Hypothesis of relative genealogical relationships for some major drosophiline genera and some subgenera of *Drosophila*. Numbers are synapomorphies (see table 1): those that are denoted by squares occur several times in the cladogram and may be convergent. Several fossil Drosophilidae are placed in the scheme.

nate seta c. equal in length to proclinate; distances between setal bases c. $\frac{1}{2}$ length of anterior reclinate. Ocellars, inner and outer vertical setae well developed. Vertex raised above dorsal margin of eye. Carina low. Two pairs of vibrissae present; each pair subtended by c. 4 smaller subvibrissae. Proboscis distended, membranous; clypeus large and broad. Palp with 1 apical seta, 3 small ventral setulae. Mentum slightly sclerotized, possesses 2 elongate, erect, and fine setae. Setae apparently only on anterior surface of labelum. Eyes with dense micropubescence.

Dorsocentral setae in 2 pairs; length of anterior ones $\frac{1}{2}$ that of posterior setae. Distance between anterior to posterior dorsocentral on each side c. equal to $\frac{3}{4}$ length of anterior se-

tae. Two pairs of scutellars present, orientations distorted. One large notopleural present, directed posteriad; 1 small notopleural (c. $\frac{1}{3}$ length of other), erect. Ventral surface of profemur with 3 setae, lengths c. equal to width of femur and located on distal $\frac{1}{3}$ of segment. Middle tibia with ventroapical seta. Wing hyaline; heavy costal-radial setulae end midway between R_{2+3} and R_{4+5} . Cercus short, conic; oviscape broad in lateral view, laterally flattened. Oviscape with 12–13 ovisensilla pegs on distal and ventral edges, plus 1 distomedially. One long ventrodistal, setiform ovisensilla also apparent.

MEASUREMENTS: WL = 1.90 mm; CI = 2.33; 4-V = 2.0.

HOLOTYPE: Female (NMNH, no. 8512).

Origin of the amber from the Dominican Republic unknown.

ETYMOLOGY: From Latin, meaning "sun," in reference to the mythical source of amber.

COMMENTS: The specimen resides in a large amber piece (fig. 13) in which there are trapped numerous insects, including a dryinine dryinid female (Hymenoptera), several psychodids (Diptera), and three drosophilids. Only the specimen described here is sufficiently visible (mostly in lateral view) to merit description. The large amber piece is rather dark, which indicates that the source is a relatively old amber deposit.

Drosophila (Drosophila?) poinari,
new species

Figures 9–11, 14–16

DIAGNOSIS: Carina broad and flat; 1 pair of vibrissae present; eyes densely micropubescent; sternites large, overlapping, sclerotized; oviscape with ovisensilla pegs (male unknown).

DESCRIPTION: Ground body color yellow to light brown. Flagellomere I with short, even setulae. Arista bears 4 dorsal, 2 ventral branches. Carina low, flat, broadened at oral margin. Oral margin with raised "lip." One pair of vibrissae, subtended by 5–6 finer, small setulae. Clypeus shallow, broad in ventral view. Palpus narrow; with 3 setae (1 subapical, 2 ventral), lengths equal c. to palp width. Labellum broad, fleshy. Eyes densely micropubescent. Proclinate is longest frontal-orbital seta; anterior reclinate is $\frac{1}{2}$ length of posterior reclinate orbital. Anterior reclinate lies slightly posterolateral to proclinate. Posterior reclinate slightly closer to proclinate than to inner vertical. Inner verticals strongly convergent; outer verticals strongly divergent; both equal in length.

Thorax with 2 pairs of dorsocentrals. Anterior c. $\frac{1}{2}$ length of posterior ones; separated from posterior pair by distance c. equal to length of anterior dorsocentrals. Apical scutellars cruciate. One humeral (postpronotal), 1 notopleural, 1 anepimeral, 2 katepimeral setae present. Supra-alar seta elongate. Katepisternum with row of 7 setulae running between 2 large setae. Midtibia with ventroapical seta, 1 shorter preapical dorsal seta. Hind tibia with a preapical, dorsal, erect seta. Fore-femur with 5–7 erect, ventrolateral setae;

TABLE 1
Character States on the Cladogram in Figure 5
(Circles on the cladogram are synapomorphies; squares are derived features occurring several times that may be convergent.)

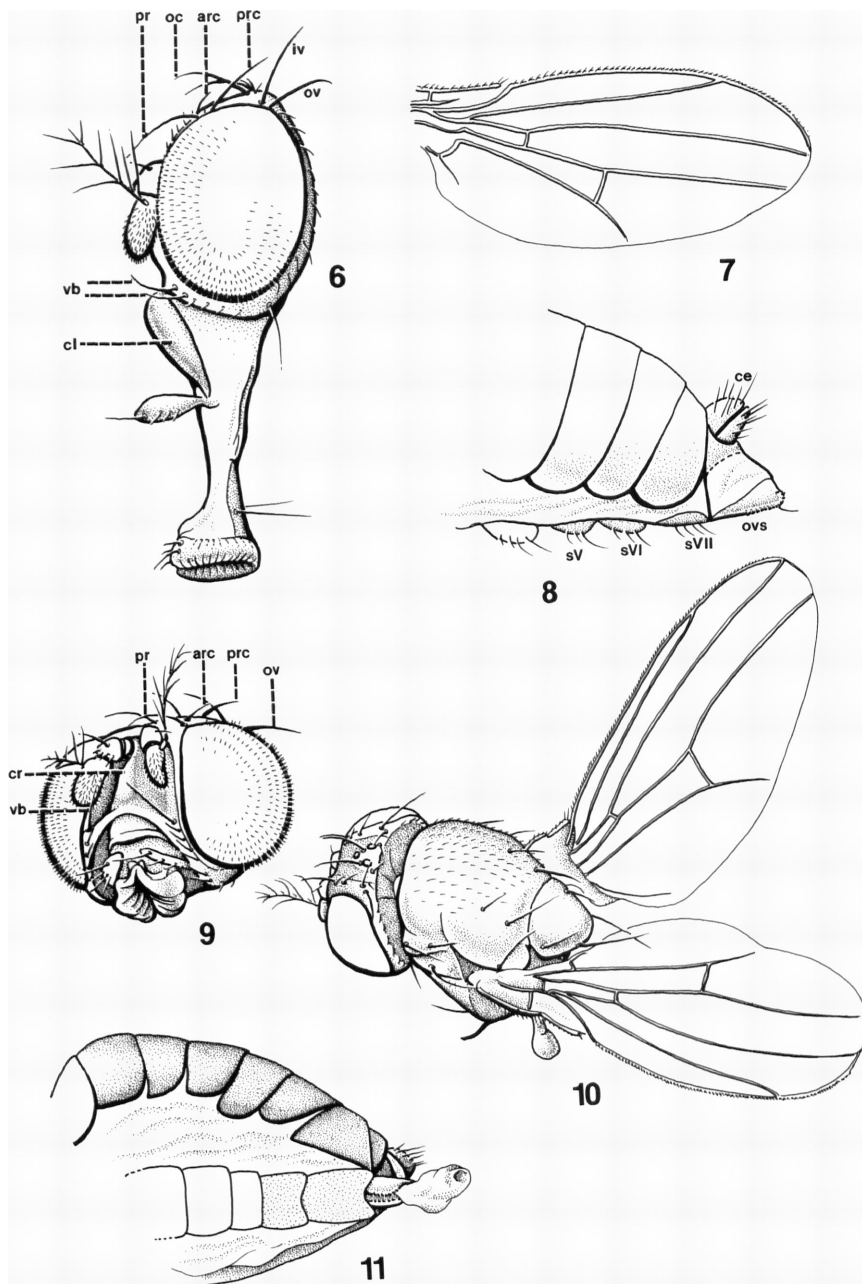
1. Loss of prescutellar setae.
2. Ovisensilla are stout, peglike, and heavily sclerotized.
3. Interfacetal (eye) setulae dense.
4. Anterior reclinate orbital seta anterior to proclinate orbital and lateral to it by varying degrees.
5. Head broad, flat, trapezoidal in dorsoventral view.
6. Forefemora and tibiae black, contrast with tarsi and coxae.
7. Abdominal tergites black, shiny.
8. Male fore- or midfemora with 2 ventral rows of spines.
9. Facial carina bulbous.
10. Adults mycophilous; feed and rendezvous at macrofungal sporophores.
11. Facial carina, when present, narrow.
12. Costal incision on wing deep, formed into lappet.
13. Costal lappet black.
14. Acrostichal setulae in 2–4 rows between anterior dorsocentral setae.
- 15.? Two pairs of large (oral) vibrissae present (NB: members of *Drosophila (D.) repleta* and *Drosophila (Sophophora) obscura* species groups retain the plesiomorphic state of 1 pair of vibrissae; these groups may require a revised taxonomic placement).
16. Preapical setae lost on mid- and foretibiae.
17. Facial carina prominent, broad, and flat.
18. Egg with 2 anterior respiratory filaments.
19. Male fore basitarsus with comb of stout, sclerotized setae (also occurs in subgenus *Lordiphosa*).
20. Egg with 4 anterior respiratory filaments.
21. Carina lost (some *Hirtodrosophila*).

lengths from $\frac{1}{3}$ to 1 times width of femur. Wings hyaline. Heavy costal-radial setae end just before midline between R_{2+3} and R_{4+5} .

Abdominal terga brown; median portion tergites 3–5 with diffuse yellow spot which occupies entire length of tergite. Thorax and head are lighter brown, shiny. Sternites sclerotized, large and overlapping; lighter than tergites. Pleural membrane white. Oviprovector everted. Oviscape laterally flattened; with row of small, ventral peg sensilla. Apex of oviscape obscured.

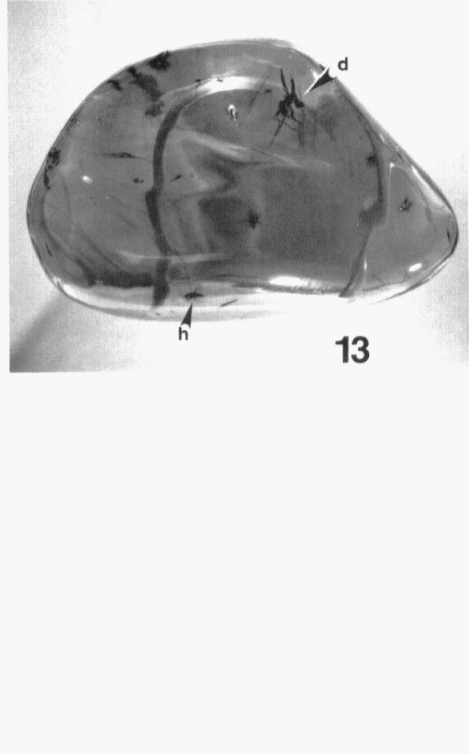
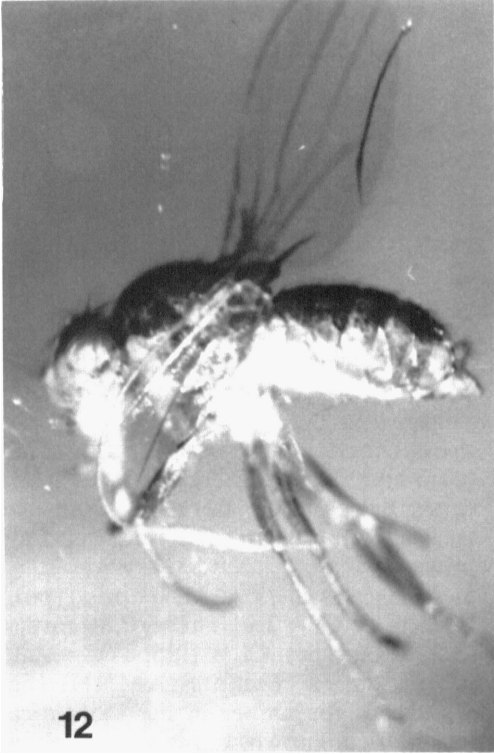
MEASUREMENTS: ThL = 1.0 mm; HW = 0.65 mm; WL = 1.65 mm; CI = 2.6; 4-V = 1.9.

HOLOTYPE: Female; in light piece of amber



Figs. 6–8. *Drosophila* (*D.*?) *succini*, holotype. 6. Lateral view of head; 7. wing; 8. lateral view of abdominal apex.

Figs. 9–11. *Drosophila* (*D.*?) *poinari*, holotype. 9. Head, oblique frontal view; 10. head and thorax, oblique dorsal view; 11. abdomen, ventral view, with oviprovectorev everted through oviscape. Abbreviations: arc, anterior reclinate seta; ce, cercus; cl, clypeus; cr, (facial) carina; iv, inner vertical seta; oc, ocellar seta; ov, outer vertical seta; prc, posterior reclinate seta; sV–VII, sternites V–VII; vb, vibrissae.



Figs. 12, 13. 12. *Drosophila succini* (NMNH 8512) close up. 13. NMNH amber piece no. 8512, showing position of holotype (h) and dryinine dryinid (d).

containing 2 specimens, collected in Dominican Republic near Cotui (GOP). Paratype is other specimen in same amber piece.

ETYMOLOGY: Patronym, in honor of George Poinar. Dr. Poinar has been very gracious in providing his personal collection for this study.

COMMENTS: Identity of the paratype is based mostly on setation since the coloration is obscured by a milky film over much of the specimen, including the wings. These are probably the youngest of the fossil drosophilid specimens based on the clear color of the amber in which they are preserved. They may belong to subgenus *Drosophila* or *Sophophora* (the latter defined, in the strict sense, on the possession of foretibial combs in the male, and 2 egg filaments). The large sternites are a derived feature that occurs in some members of the *Drosophila robusta* (i.e., *D. colorata*) and *D. virilis* species-groups, in *D.*

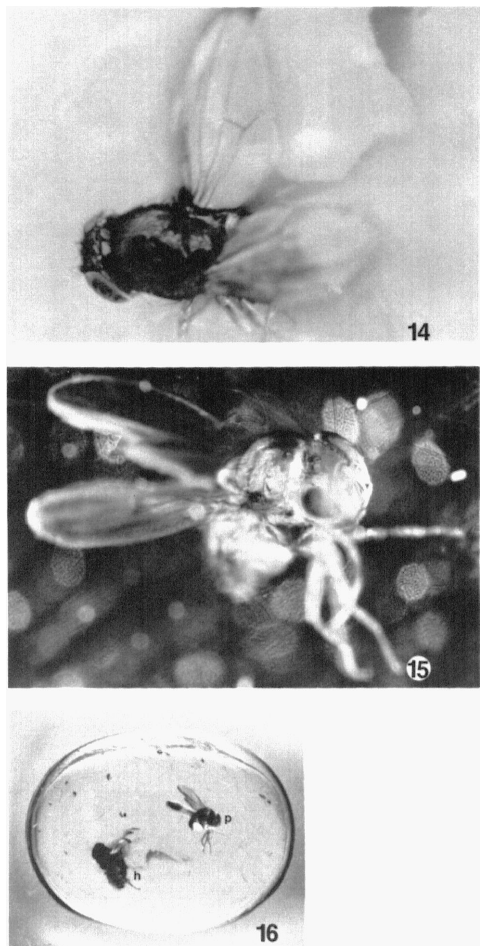
johnstonae, and perhaps other species as well. The tergal color pattern suggests an affinity with the *Drosophila* (*D.*) *tripunctata* species-group, except that members of the group have distinct, not diffuse, spots and small sternites.

***Drosophila* (*Hirtodrosophila*) *paleothoracis*,
new species**

Figures 17–24

DIAGNOSIS: Facial carina low, rounded; 1 pair vibrissae; pleura light brown, notum yellow; dorsalmost ovisensilla peg with gap between it and closest pegs in posteroventral row (male unknown).

DESCRIPTION: Head entirely yellow-orange, as is notum. Frontal vittae golden, finely striate, shiny. Arista with 4–6 dorsal and 2–3 ventral branches. Flagellomere I with short setulae. Eyes lighter than head, densely setulose. Facial carina low, edge rounded (not



Figs. 14–16. *Drosophila (D.?) poinari*. 14. Holotype; 15. paratype; 16. amber piece showing both specimens.

flattened). Ocellars longest setae on head, then inner verticals. Anterior reclinate orbital much closer to proclinate than to posterior reclinate; slightly lateral to proclinate by c. 1 seta width. One pair of vibrissae present. Intraocular area light, same as head ground color. Postocellar seta length equal c. to length to anterior reclines. Palpus slender, yellow. Clypeus and anterior margin of face brown; clypeus broad. Labellum small, c. $1\frac{1}{2}$ times width of prementum.

Notum lighter than katapisternum, anepimeron, and anepisternum, which are light brown. Acrostichal setulae in 6 rows. Anterior dorsocentrals c. $\frac{1}{2}$ length of posterior ones. Apical scutellars convergent in para-

type, cruciate in holotype. Two humeral, 1 notopleural, 2 supra-alar, 1 large and 1 small katapisternal setae present. No katapisternal setulae. Legs light, mostly yellow. Forefemur with 2–4 ventral setae, lengths \leq width of femur. Halter light. Wings hyaline. Tergites mostly brown, with light areas laterad and dark rim on posterior edge. Cercus, tergite VII, t VIII, and oviscape (s VIII) lighter. Oviscape not fully everted in holotype, but everted in some paratypes. Tergite VIII extended down to oviscape, meeting it with a broad base in uneverted terminalia, possesses c. 4 sensilla. Oviscape with c. 18–20 stout, ovisensilla pegs; dorsalmost one separated from others in the row by a gap of about 2 pegs and slightly lateral to other pegs. Sternites light brown; unmodified in size and shape from typical, separated, quadrate sternites.

MEASUREMENTS: (AMNH paratype) WL = 1.55 mm; CI = 1.9; ThL = 0.85 mm; 4-V = 2.22 (holotype). CI = 1.85; 4-V = 2.36.

HOLOTYPE: Female (AMNH) (fig. 22). Source of the amber in the Dominican Republic is unknown, but is very likely not the easternmost mines around Cotui since color of the amber piece is dark.

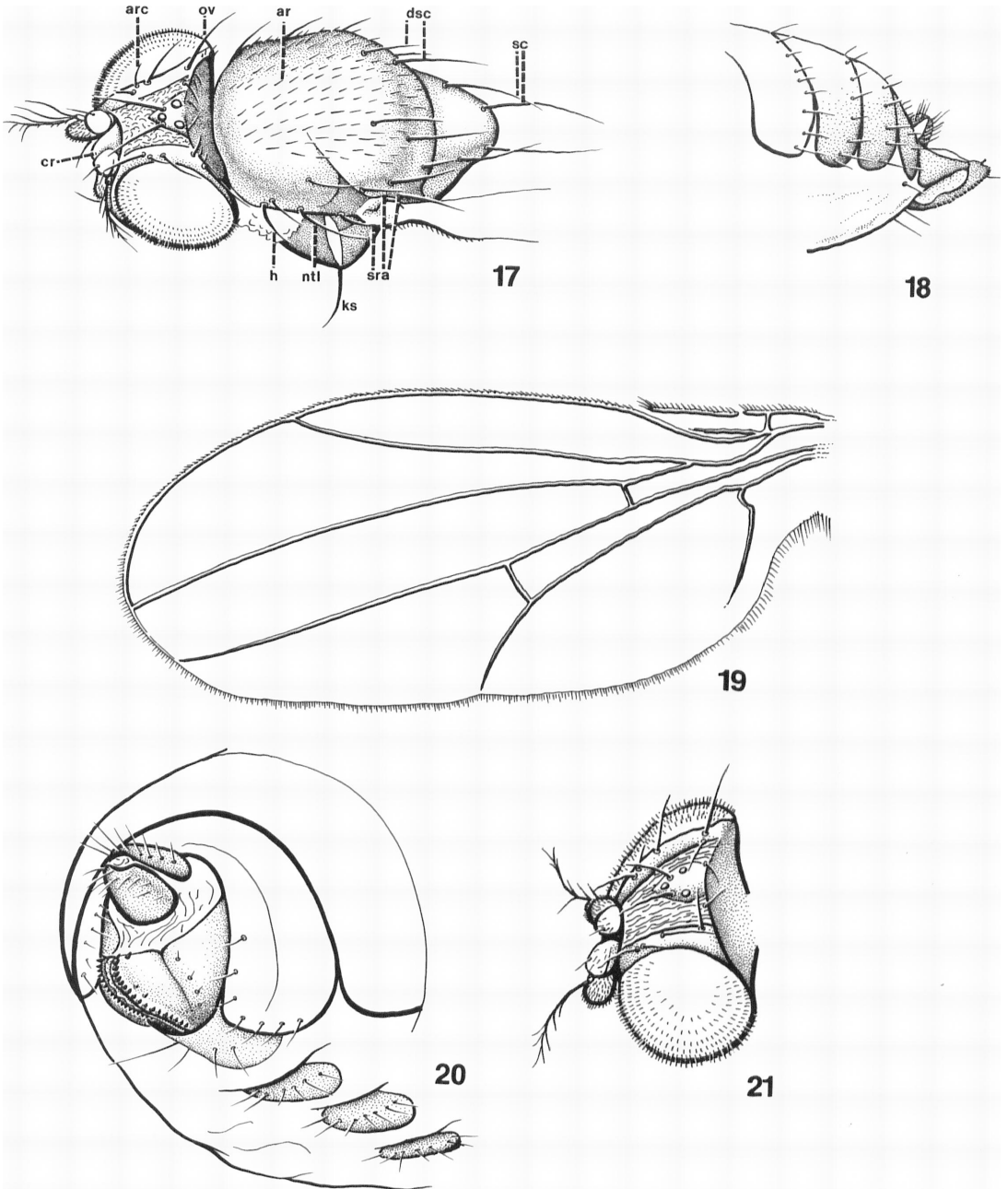
PARATYPES: ♀; NMNH 10664; 2♀ in amber piece from Palo Alto or La Toca mines, Santiago, Dominican Republic (AMNH); 2♀ in amber piece of unknown locality in Dominican Republic (GOP) (figs. 23, 24).

ETYMOLOGY: From Greek, for “old” *thoracis*, due to the relationships as discussed below.

COMMENTS: The oviscape is the key feature that allows identification of this species. A gap between the dorsalmost ovisensilla peg and the others, in the ventroapical row, as well as the pleural coloration, suggest that the species belongs to the *thoracis* species-group of *Drosophila (Hirtodrosophila)*. Capture of a drosophilid in this group at tree resin seems unusual because members of its group are found almost exclusively at fungal fruiting bodies.

MIOMYIA, NEW GENUS

DIAGNOSIS: One katapisternal seta present; no prescutellar setae. Ventral epandrial lobe (male) large, pendulous; oral cavity wide; la-



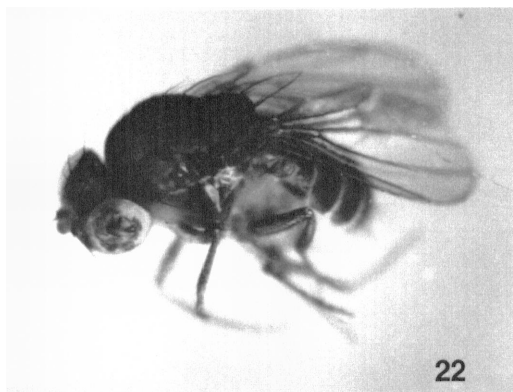
Figs. 17–21. *Drosophila* (H.) *paleothoracis*. 17. Head and thorax, oblique dorsal view; 18. posterior end of abdomen, lateral view. 19–21: holotype. 19. Wing; 20. terminalia, oblique posterior view; 21. head, oblique dorsal view. Abbreviations: same as in figures 6–9, plus the following: **ar**, acrostichal setulae; **dsc**, dorsocentral setae (anterior and posterior); **ks**, katapisternal seta; **ntl**, notopleural seta; **sc**, scutellar setae (anterior and posterior); **sra**, supra-alar setae.

bium sclerotized and stout. Extinct (female unknown).

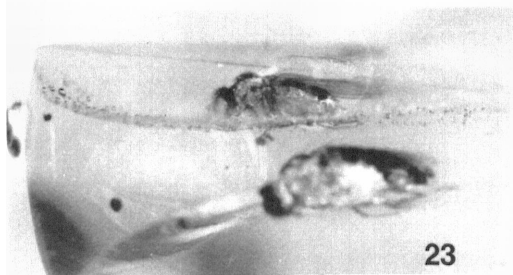
ETYMOLOGY: Feminine; from *Miocene*, the

geological epoch of the amber's origin; and *-myia* (Greek), or fly.

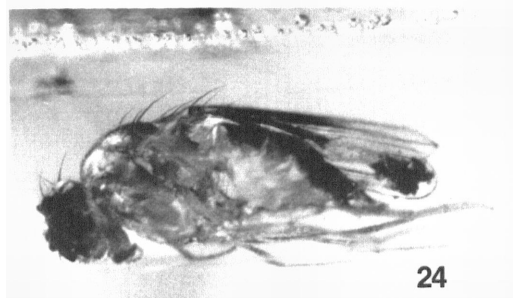
GENOTYPE: *Miomylia io*, new species.



22



23



24

Figs. 22–24. *Drosophila* (H.) *paleothoracis*, photographs. 22. Holotype; 23. piece showing two paratypes; 24. close-up of paratype in figure 23.

***Miomyia io*, new species**

Figures 29–32

DIAGNOSIS: See generic diagnosis above.

DESCRIPTION: Ground body color brown;

black-brown areas on katepimeron, medial portions of notum, and the entire portions of the abdominal tergites. Eyes silvery (not red, as in most drosophilids), glabrous. Flagellomere I length $1.5\times$ that of pedicel. Arista with 5 dorsal, 2 ventral branches. One vibrissa, subtended by c. 7–8 shorter, black setulae. Palpus bears 1 large apical seta and several smaller subapical ones. Width of oral cavity c. $3\times$ width of labellum. Proboscis short; almost entirely retracted into oral cavity. Labium about as broad as labellum, heavily sclerotized. Face flat (no carina present). Verticals, anterior reclines, and ocellar setae about as long as arista. Inner verticals convergent, outers divergent.

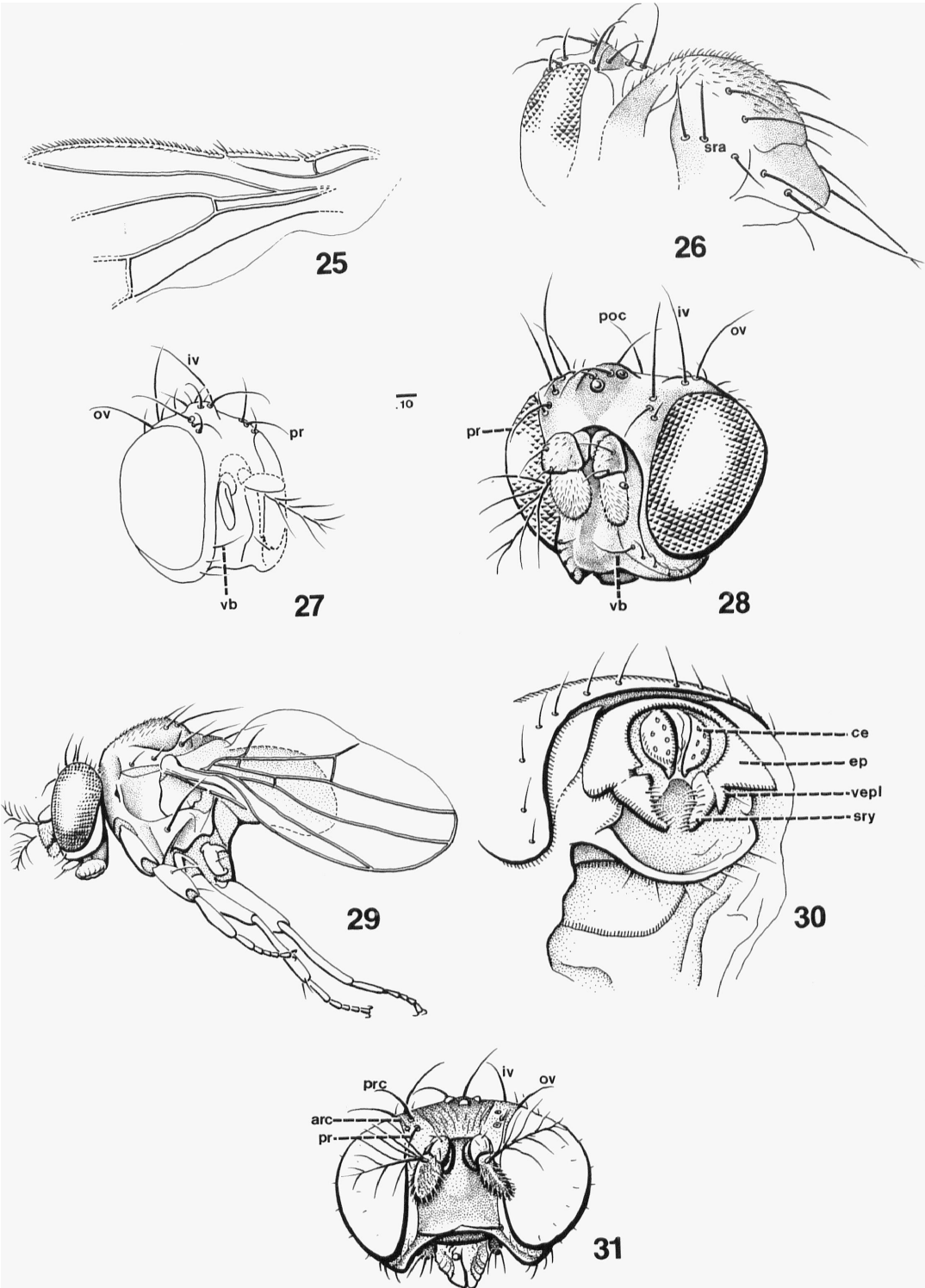
Dorsocentral setae in 2 pairs; anterior pair $\frac{1}{2}$ length posterior pair. No prescutellar setae present. Two pairs scutellar setae, lengths equal to dorsocentrals. Two notopleural, 1 supra-alar setae present (length notopleurals $\frac{1}{2}$ that of supra-alar). One katepisternal seta present, longer than posterior dorsocentrals. Forefemora without ventral spines, middle of forefemur with 1 upright seta on lateral surface. Foretibia with subapical dorsal seta. Hind tibia with dorsoapical seta. Five sternites visible, anterior one (s I + II) in 3 sections. Epandrium with pendulous, small ventral lobes and several long setae lateral to each. Surstyli with prenisetae apparent; prenisetae setiform, not peglike; in even row on medial surface. Wing hyaline.

MEASUREMENTS: TL = 1.46 mm; ThL = 0.66 mm; WL = 1.31 mm; CI = 1.6; 4-V = 2.16.

HOLOTYPE: Male; in amber collected within a 20 m radius of El Valle, Dominican Republic (AMNH). The specimen is in near perfect condition except for some orbitals; all setae are intact and even the color seems well preserved.

ETYMOLOGY: Latin for “oh!,” in reference

Figs. 25–31. *Neotanygastrella* and *Miomyia*. *Neotanygastrella wheeleri*, paratype (25) and holotype (26, 27). 25. Basal portion of wing; 26. posterolateral view of dorsal portion of thorax; 27. head, oblique frontal view; 28. *Neotanygastrella* sp. (Trinidad). Abbreviations: same as other figures, also: poc, post-ocellar seta. 29–31. *Miomyia io*, holotype. 29. Habitus, lateral view; 30. terminalia, oblique posterior view; ce, cercus; ep, epandrium; vepl, ventral epandrial lobe; sry, surstylus (bears prenisetae); 31. frontal view of head.



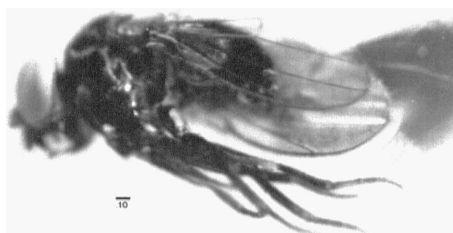


Fig. 32. *Miomyia io*, photograph of holotype (scale line in mm).

to the first find of a Dominican amber-fossilized drosophilid.

COMMENTS: Affinities apparently lie with several genera of Drosophilinae sensu stricto. A well-developed ventral epandrial lobe is characteristic of *Chymomyza*, some *Microdrosophila*, and African *Neotanygastrella*. The fossil, however, retains the plesiomorphic arrangement of the orbital seta (unlike *Chymomyza* and *Neotanygastrella*). Unlike *Microdrosophila*, it does not possess the following: a fringe of heavy bristles on the costal segment of the wing between R_{2+3} and R_{4+5} , a high (≥ 5.0) 4-V index, an apically lanceolate wing, dense eye micropilosity, a high narrow carina, thick pretarsi, or a deep costal incision on the wing. Shared with *Microdrosophila* are a state of the surstylus (δ) without peglike prensisetae (as cited originally by Malloch, 1921, and by Okada, 1985—but I believe this trait to be symplesiomorphic at least at the level of the family), one pair of vibrissae with tiny subvibrissae, a wide face and oral cavity, and small size. The stout, sclerotized labium is a trait shared with some members of *Drosophila* (*Hirtodrosophila*); otherwise, the closest relationship appears to be with *Microdrosophila*. *Microdrosophila* is a genus of 48 species, with most of the described taxa from Southeast Asia. It is a primitive drosophiline genus by virtue of the plesiomorphic ov scape (no peg ovisensilla) and surstylus (lack of peglike prensisetae). However, *Microdrosophila* also shares several derived traits with the recently derived genus *Mycodrosophila*: deep costal incision on the wing (synapomorphy 12; fig. 5), rounded and short notum, and a very narrow facial carina.

These traits may be a result of convergence. Until the female of *Miomyia* is found, its position in the scheme in figure 5 must remain tentative.

NEOTANYGASTRELLA DUDA

As mentioned previously, Wheeler (1963) described the two *Neotanygastrella* specimens from Chiapas amber but did not name them. My examination also shows their placement to be in this genus. Unlike the Dominican specimens, these are crudely preserved (only fragments are not obscured by fractures and debris). Several characters not mentioned by Wheeler that allow a finer analysis of relationships are given below.

Neotanygastrella wheeleri, new species

Figures 25–27

DIAGNOSIS: See abbreviated description below.

DESCRIPTION: Eyes dorsoventrally elongate. Face elongate, vibrissa situated far anterior (above line extended across ventral margins of eyes). Carina present, bulbous portion raised slightly above vibrissae. Ocular area raised. Facial colorations not evident. Inner vertical setae cruciate. Median portion of notum and scutellum, and at least the anterior portions of the supra-alar regions and the postpronotal lobes, are dark brown. Ground body color light yellow. Postocellar area brown. Two very long supra-alar setae present, lengths about equal to lengths of anterior dorsocentral setae. Anal vein of wing absent; basal-radial cell elongate and narrow, length at least 8 times the width.

HOLOTYPE: UCMP 12700/B5103. Collected from Chiapas, Mexico (see Wheeler [1963] for details of the locality). Only the head and thorax are present.

PARATYPE: UCMP 12864/B5104. This specimen is more complete, but many parts are obscured.

ETYMOLOGY: Patronym, in honor of Marshall R. Wheeler.

COMMENTS: The single vibrissa on each side of the face, anterior reclinate setae that are shorter than and anterolateral to the proclimates, and the presence of a bulbous facial carina make it evident that the specimens belong in *Neotanygastrella*. In addition, the

thoracic coloration suggests a relationship to *N. tricoloripes* Duda (known from Costa Rica to Brazil). A prominently raised ocellar triangle is found in females of some *Neotanygastrella*, but the occurrence of the trait is not accurately known. Also, long supra-alar setae are unusual in drosophilids; the trait has not been surveyed well in the genus.

A hypotype is essentially a voucher specimen for which a description has been provided but no name given. Since, in the opinion of the description's author, the specimen may or may not represent a new species, naming the specimen is deferred. A name has been provided here for the two hypotypes since I consider the specimens distinct from extant neotropical species of *Neotanygastrella*. Coloration and setal patterns are often sufficient for distinguishing species in the genus (fig. 28). Four species of *Neotanygastrella* occur in Central America; one, *N. antillea* Wheeler, occurs on Jamaica.

PROTOCHYMOMYZA, NEW GENUS

DIAGNOSIS: Head trapezoidal in dorsoventral view; anterior reclinate setae slightly anterolateral to proclinate orbitals; eyes bare; inner vertical seta directly anterior to outer vertical; postocellars elongate, nearly equal in length to verticals; face flat; tergites each with a pair of brown, paramedian areas; prescutellar setae lost. Extinct (? unknown).

ETYMOLOGY: Feminine; Greek "fore" *Chymomyza*, in reference to the fossilized and phylogenetic status.

GENOTYPE: *Protochymomyza miocena*, new species.

Protochymomyza miocena, new species

Figures 33–37

DIAGNOSIS: See generic diagnosis.

DESCRIPTION: Head entirely golden yellow, except for light brown intraocellar area. Frontal vitta with granular surface. Eyes glabrous, rosy-pink. Face flat, yellow. Pedicel, flagellomere I yellow; arista with 4:2 dorsal/ventral branches. Postocellar setae long, lengths c. equal to orbitals; cruciate for about $\frac{1}{2}$ their length; bases near outer corners of ocellar triangle. Ocellar setae straight, extended to pedicels. Anterior reclinate lateral and slightly anterior to proclinate. Inner verticals long,

strongly convergent, ends touch; bases directly anterior to outer verticals. Outer verticals equal in length to inner verticals, divergent. Vibrissae strongly curved, ends almost touch; 1 pair present.

Notum uniformly golden, with 8 rows acrostichal setulae. No prescutellar setae present. Anterior dorsocentrals c. $0.5 \times$ length of posterior dorsocentrals. Two humeral, 1 notopleural, 1 lateronotal, 2 supra-alar (1 very short), and 2 katepisternal setae present. Anterior scutellar setae divergent; apical scutellars cruciate for c. $\frac{1}{3}$ their length. Wing completely hyaline. Halter light. Legs yellow-orange, including forefemora, tibiae, and tarsi. Forefemur c. $2 \times$ length of forecoxa, with 3 long, erect setae on lateral surface. Ventral spines on fore- or midfemora not present. Tergites mostly golden, anterior ones each with a pair of dark brown, paramedian areas; the markings gradually coalesced posteriad.

Male genitalia: Ventral surface of epandrium c. $2 \times$ longer than dorsal surface. Medial surface of epandrium with 8–10 long, thin, and straight setae; lateral surface of epandrium bare. Ventral epandrial lobe long and narrow: length c. equal to length of cercus. Ventral epandrial lobe with several long, thin setae. Surstylus attached to epandrium dorsomedial to where ventral epandrial lobe attached to epandrium. Surstylus narrow, lobate, bearing 5 or 6 small, sclerotized prenisetae that point mediad.

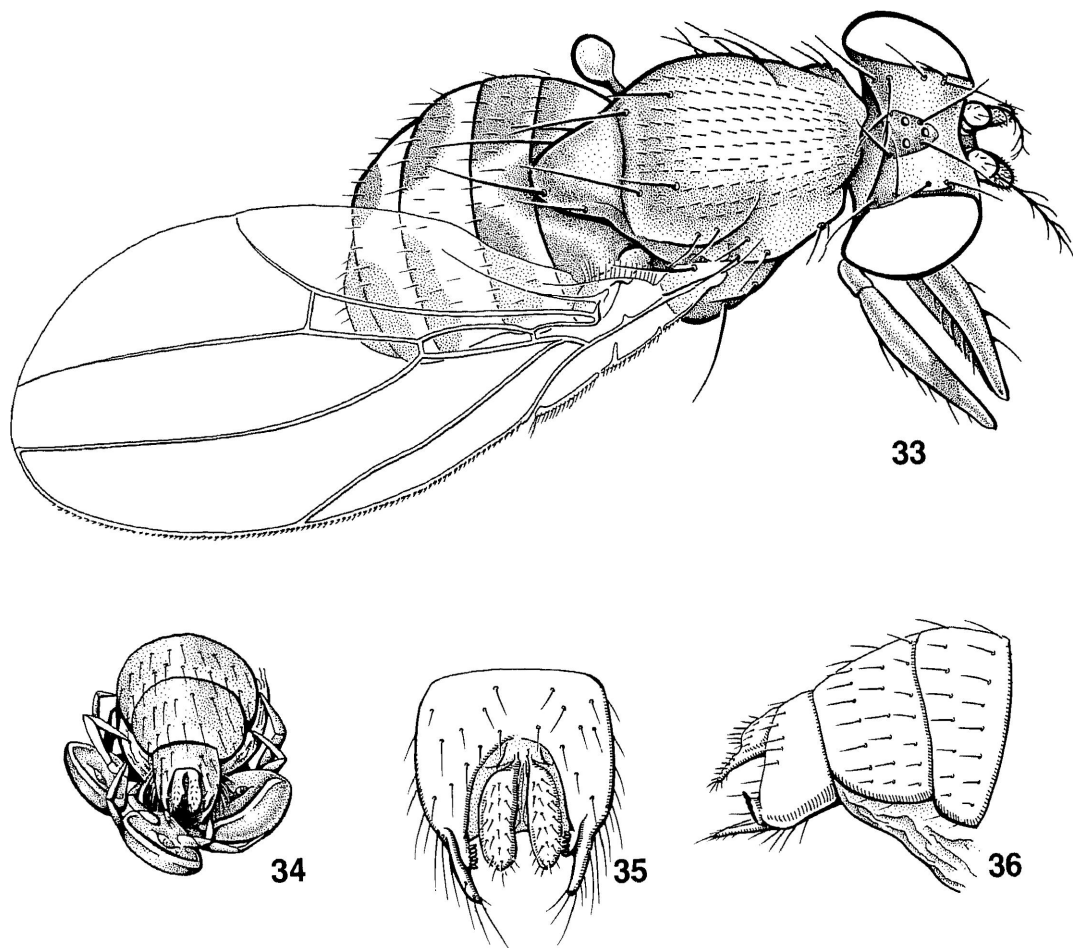
MEASUREMENTS: PARATYPE: TL = 1.50 mm; ThL = 0.70 mm; HW = 0.60 mm; WL = 1.45 mm.

HOLOTYPE: Male (GOP); DOMINICAN REPUBLIC. Specific locality within the country not available, but from mines in vicinity of Santiago.

PARATYPE: Male; same locality information (GOP). This specimen has three large mites attached to the ventral surface of the abdomen (fig. 34).

ETYMOLOGY: Feminine (Latin) derivative of *Miocene*, the geological age of the amber's origin.

COMMENTS: A new genus is erected for this fossil since the specimens apparently belong to the sister group of *Chymomyza* (fig. 5). The head shape, orbital setation, long coxae, small surstyli with stout prenisetae, plus elongate and setose ventral epandrial lobes



Figs. 33–36. *Protochymomyza miocena*. 33. Dorsal habitus of holotype; 34–36. paratype terminalia, posterior and lateral views (showing mites on abdomen in fig. 34).

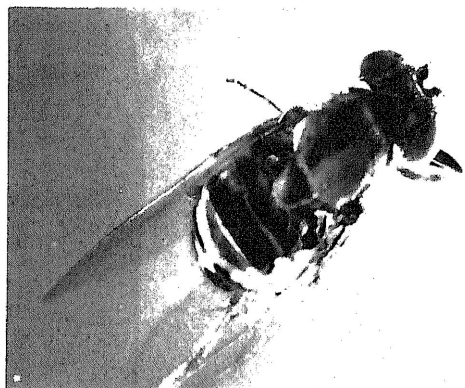


Fig. 37. *Protochymomyza miocena*. Photograph of holotype.

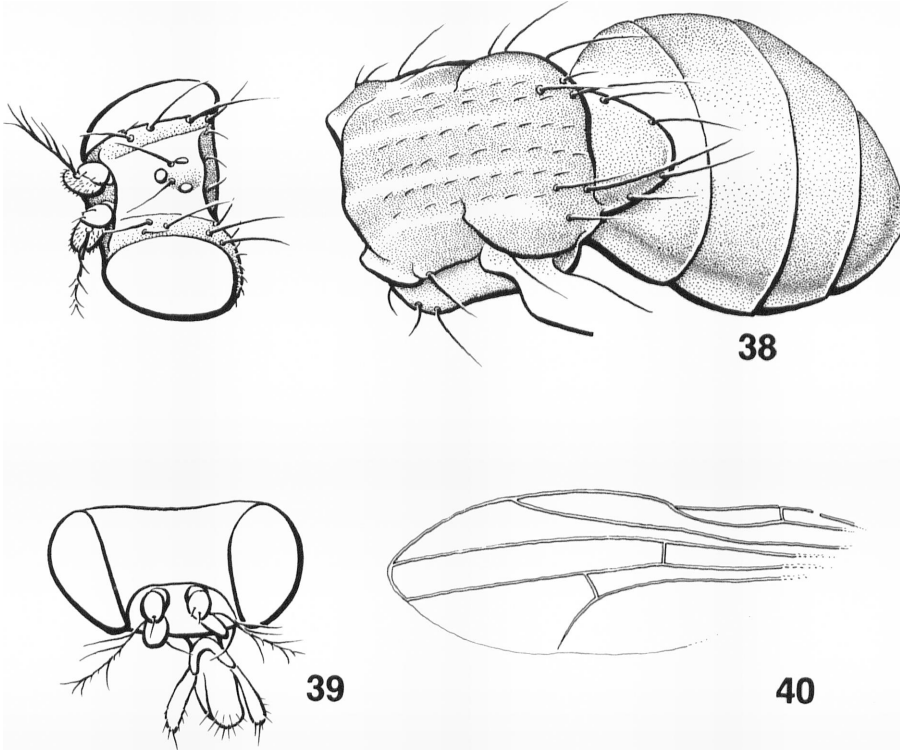
are derived features shared with *Chymomyza*. The flattened cerci are autapomorphic for this group of flies. The position of the anterior reclinate orbital, however, is not as far anterior to the proclinate as is found in *Chymomyza*. Plesiomorphic, at least at the family level, are the unadorned femora, hyaline wings, six rows of acrostichals, and the abdominal coloration.

SCAPTOMYZA HARDY

Scaptomyza dominicana, new species

Figures 38–41

DIAGNOSIS: Head quadrate, flat; anterior reclinate setae tiny; face nearly flat; 1 pair of



Figs. 38–40. *Scaptomyza dominicana*, holotype. 38. Habitus, dorsolateral view; 39. head, dorso-frontal view showing proboscis with clypeus and long, narrow palps; 40. wing, portion.

vibrissae present; acrostichals in 4 rows; notum with 4 grey vittae (male unknown).

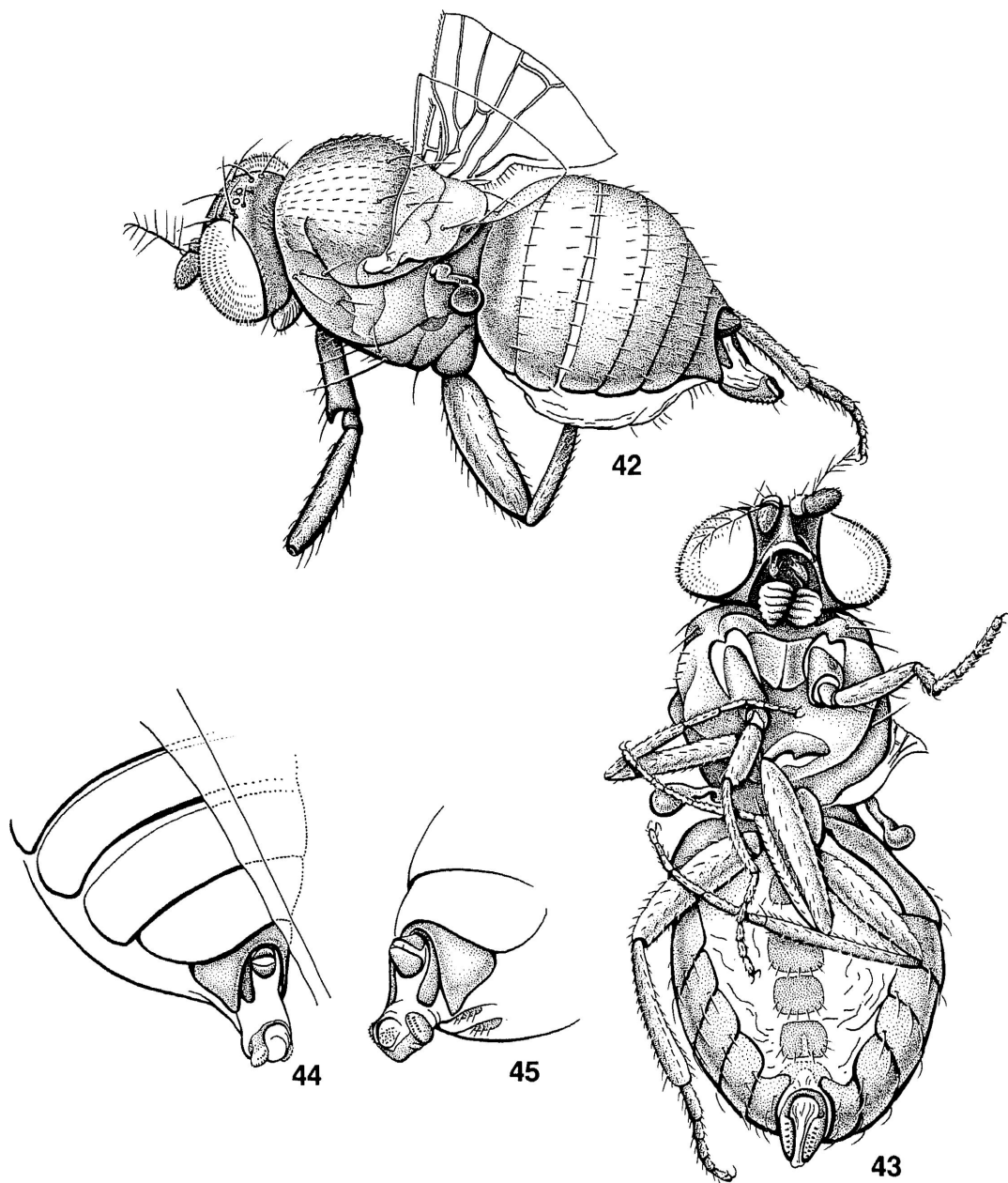
DESCRIPTION: This specimen is obscured in certain portions by fractures. The only views where features are distinctly visible are from fully dorsal and anterodorsal angles. Most of the wing surface is closely adpressed to the abdomen, and portions are also fractured, so some veins were not easily discerned.

Head width slightly greater than the width of the notum; head dorsoventrally compressed. Inner vertical setae longest ones on head; anteromedial to outer verticals. Outer verticals divergent, slightly shorter in length than inner verticals (inner vertical positions distorted). Orbital setae golden, not black. Anterior reclinates tiny, lateral, and slightly anterior to proclinate. Posterior reclinates about same length as inner verticals. Distance between proclinate and anterior reclinate is $\frac{1}{3}$ distance between proclinate and inner vertical. Frontal region and face golden orange.

Carina very weak; face almost flat. One pair of vibrissae present; subvibrissae obscured. Flagellomere I c. $1\frac{1}{2}$ the length of pedicel. Arista with 3 dorsal and 2 ventral branches, 5–6 minute medial ones. Palpi elongate: with 1 long terminal and several subapical setae. Eyes glabrous; brick red.



Fig. 41. *Scaptomyza dominicana*, photograph of holotype, dorsal view.



Figs. 42-48. *Drosophilinae* sp. A. 42, 43. Hypotype, dorsolateral and ventral views; 44, 45. oblique posterior view of terminalia; 46, 47. detail of head, lateral and oblique ventral views; 48. wing.

Thorax ground color golden brown, with 4 silvery-grey vittae. The 2 light paramedian vittae diminished and ended at c. $\frac{3}{4}$ the notal length. Vitta pair lateral to these diminished just anterior to paramedians. Two long dorsocentrals present; anterior pair c. $\frac{1}{2}$ length

of posterior pair. One lateral prescutellar/side, length c. $\frac{1}{2}$ that of anterior dorsocentral. Acrostichals in 4 rows between anterior dorsocentrals, in 2 rows between posterior dorsocentrals, 6 rows anterior to dorsocentrals. Pleural regions obscured. Scutellum unicol-

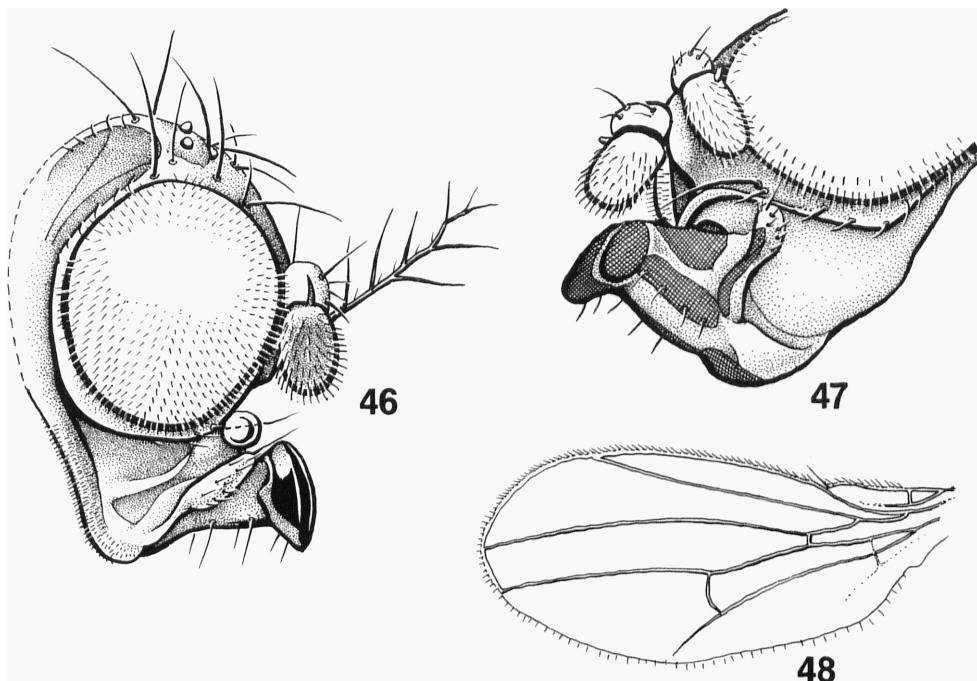


Fig. 42-48. Continued.

orous brown: apical scutellar setae convergent, anterior scutellars c. $\frac{1}{2}$ length of apicals. Two subequal humeral, 2 large katapisternal, 1 notopleural setae are present. Wings hyaline. Legs elongate, unicolorous, orange-brown. Forecoxae relatively short: length $\frac{1}{3}$ – $\frac{1}{2}$ that of forefemur.

Abdomen with black-brown terga, except for medial portions of t II, III, which are light yellow and gradually faded into dark ground color. Oviscape extruded, but details of ovisensilla obscured. Oviscape triangular in lateral view, apically pointed.

MEASUREMENTS: TL = 1.40 mm; ThL = 0.67 mm; HW = 0.53 mm; WL = 1.60 mm; CI = 1.2; 4-V = 2.2.

HOLOTYPE: Female (GOP); from mines in the vicinity of Santiago, Dominican Republic.

ETYMOLOGY: From Latin, "Dominican," pertaining to origin of the amber.

COMMENTS: The four rows of acrostichals, the grey-brown notal vittae, and long legs make it certain that this is a *Scaptomyza* species. However, the eyes are bare; in extant species, the eyes have short, dense, interfascicular setulae. The orbital setation, where the

anterior reclinate is directly lateral or slightly anterolateral to the proclinate, is shared by *Chymomyza* and *Protochymomyza*. A flat, widened head, like that found in the fossil, occurs in four species from Indo-Pacific islands which belong to the subgenus *Parascaptomyza*. However, because there are two subequal humeral setae, the fossil species would otherwise belong to subgenus *Scaptomyza*, according to Hackman's (1959) definitions. Terminalia of female and especially of male *Scaptomyza* are replete with characters; without access to these characters, placement of the fossil in *Scaptomyza* would be approximate at best. *Scaptomyza* is a very large, cosmopolitan genus (226 species); the flies are very abundant in most parts of the world except Australia. Eleven described species of *Scaptomyza* occur in Central America, but only three are on the Greater Antilles: *S. (Mesoscaptomyza) conquillei* (circumcaribbean), *S. (M.) paravittata* (circumcaribbean and southwestern U.S.), and *S. (M.) vittata* (circumcaribbean). The fossil possesses none of the diagnostic features of *Mesoscaptomyza*, such as upturned apical scutellars, two rows of acrostichals, and presutural dor-



Fig. 49. Photograph of *Drosophilinae* sp. A, female.

socentrals. This fossil evidently represents extinction of a primitive *Scaptomyza* lineage which existed at least on Hispaniola.

DROSOPHILINAE INCERTAE SEDIS

Species A Figures 42–49

DIAGNOSIS: Eyes densely micropubescent; 1 pair of vibrissae; carina low, rounded; body completely black-brown, including halteres and legs (male unknown).

DESCRIPTION: Eyes with short, dense setulae; silvery, not red. Arista with 5–6 dorsal and 2–3 ventral branches, evenly spaced; 5 short, fine medial branches. One pair of vibrissae; subvibrissae much thinner and shorter. Width of oral cavity c. 1.7 times width of labellum. Labellum with 7 or 8 pseudotracheal lobes. Orbital setae stout, strongly curved. Anterior reclinate short, c. $\frac{1}{3}$ length of posterior reclinate, much closer to proclinate than to posterior reclinate. Proclinate and posterior reclinate about equal in length. Mentum sclerotized. Carina low; surface not flattened but slightly rounded.

Body completely black-brown, including

legs. Notum short, very curved, c. 2 times length of scutellum. Two pairs of dorsocentral setae present, posterior pair longer. Acrostichals in 6 even rows; no prescutellar setae. Two pairs of scutellars; apicals longer, perhaps cruciate. Pleural setae stout, black: 2 humerals, 1 notopleural, 2 anepimeral, 2 katepisternals (a long one sticks out from body, shorter one directed upward). Wings of holotype cut at proximal third. Halteres dark brown. Forefemur of paratype with ventral row of 5 or 6 stiff, short setae. Mesothoracic tibia with stout ventroapical bristle (length c. 2 times width of tibia). Metathoracic tibia with dorsopreapical and erect seta, length c. equal to tibia width. Hind tibia and tarsomere 1 broadened slightly in full lateral view.

Abdomen stout; width slightly greater than thorax width, length about equal to thorax length. Sternites heavily sclerotized, about as much as tergites. Sternite V divided slightly by median area of weak sclerotization. Ventral portion of t VIII connected by light sclerotization. Oviscape everted in both specimens; heavily sclerotized; with small peg ovisensilla and ventroapical setal sensilla. Tergite IX is a narrow saddle partially hidden dorsally by t VIII. Cercus short, conical.

MEASUREMENTS: TL = 1.95 mm; ThL = 0.82 mm; HW = 0.92 mm.

HYPOTYPE: Female (GOP); DOMINICAN REPUBLIC, specific locality not known.

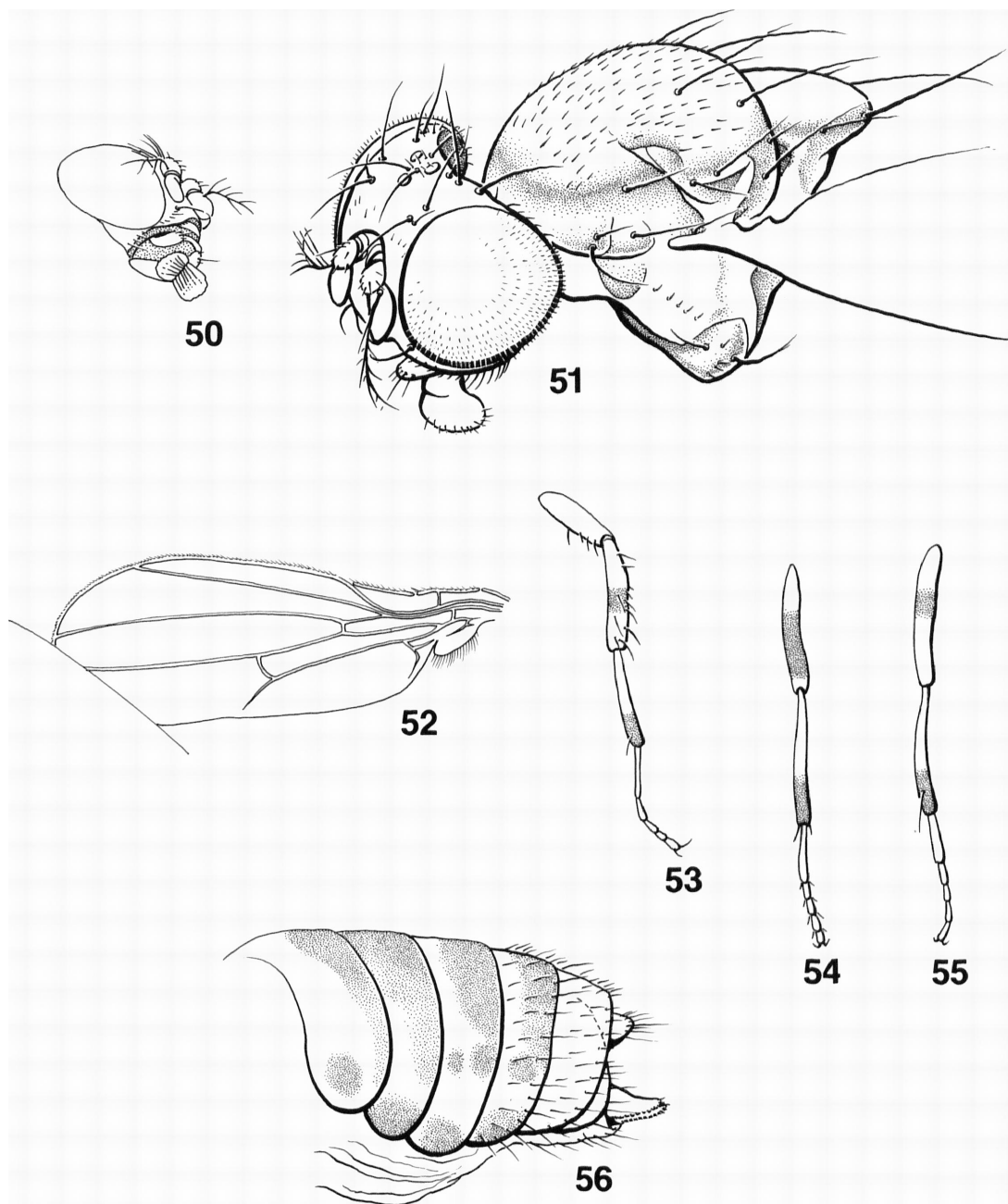
OTHER: Female (NMNH 8512); female (GOP) (fig. 49), specific localities in Dominican Republic also not given.

COMMENTS: Certainly a drosophiline; this species cannot be placed into any monophyletic group of the subfamily as the present taxonomy allows.

Species B Figures 50–56

DIAGNOSIS: Eyes densely micropubescent; anterior reclinate just lateral to proclinate; face flat; vibrissae in 1 pair; femora and tibiae with light brown band on each; ovisensilla pegs present (δ unknown).

DESCRIPTION: Coloration of head and thorax difficult to discern since a silvery and metallic sheen covers the pattern. Postocellars convergent, lengths c. $\frac{3}{4}$ that of ocellars. Inner



Figs. 50–56. *Drosophilinae* sp. B, hypotype. 50. Head, oblique ventral view; 51. head and thorax, dorsolateral view; 52. wing; 53–55. pro-, meso-, and metathoracic legs, respectively; 56. abdomen, lateral view, showing color pattern and cercus plus oviscape.

verticals convergent, outers divergent, lengths of each approximately equal and c. 2 times longer than postocellars. Posterior reclinate orbital slightly closer to proclinate orbital than

to inner vertical. Anterior reclinate orbital base laterally adjacent to proclinate. Anterior reclinate tiny: length c. $\frac{1}{3}$ that of other orbital setae. Some interorbital setulae apparent. Eyes

with dense interfacetal setulae. Arista with 5 dorsal, 2 ventral, and 4–5 minute medial branches. Face flat. One pair of strong vibrissae subtended by numerous shorter and thinner setae. Palpus with 1 long, subapical seta and numerous smaller ones. Clypeus broad: width equal to width of oral cavity. Each labellar lobe with c. 6 pseudotracheal rows.

Thorax with 6 rows acrostichal setulae (between anterior dorsocentral setae). Anterior dorsocentrals c. $\frac{1}{2}$ length of posterior dorsocentrals. One small lateral prescutellar seta on each side. Pair of anterior scutellar setae based on side of scutellum. Pair of apical scutellars; length c. twice that of anterior scutellars; cruciate. Three supra-alar setae per side: anterior one short (about $\frac{1}{2}$ length of others). One large and 1 small humeral, 1 notopleural, 1 lateral presutural seta present. Anepisternum with transverse row of 5 short, fine setulae. Katepisternum with 1 large seta projected posteriad, a smaller one projected anteriad, and 4 fine setulae. Femora and tibia with a light brown band on each. Wing hyaline. Abdominal terga with dark medial bands that are gradually narrowed laterad. Lateral portions terga III–IV with dark spot. Tergite VIII with posterior fringe of c. 7 setae (each side). Oviscape apparently sclerotized, triangular in lateral view, with 3–4 terminal ovisensilla and about 10–11 smaller ones on ventral side.

MEASUREMENTS: ThL = 0.85 mm; WL = 1.70 mm; CI = 2.5; 4-V = 2.37.

HYPOTYPE: Female (GOP); in amber piece collected from vicinity surrounding Santiago, Dominican Republic.

COMMENTS: The dense eye setulae and ovisensilla pegs make it appear that this species is a *Drosophila* sensu stricto as previously defined. Coloration of the legs and lateral portions of the abdomen, the apically narrowed oviscape, and anterior reclinate setae that are laterally adjacent to the proclinales, in fact, suggest an affinity with the *Drosophila repleta* species-group. However, if the setal spots, which are present on the notum of most species in the group, occur in the fossil, they are hidden by a golden sheen covering the integument. At best the fossil is basal to the *repleta* species-group based on the few above synapomorphies; in fact, it has many features

primitive at the level of the genus: no facial carina, a row of setulae on the anepisternum, and posterior reclinate setae closer to the proclinales than to the inner verticals.

KEY TO AMBER-FOSSILIZED DROSOPHILIDAE

1. Prescutellar setae present; arista pubescent;
Baltic amber *Electrophortica succini*
Prescutellars lost; arista plumose; Chiapas and
Dominican amber 2
2. Facial carina bulbous; head high; ocellar area
raised; wing with anal vein absent; Chiapas
amber *Neotanygastrella wheeleri*, n. sp.
If present, carina narrow or flat; head and
ocellar areas otherwise; anal vein well de-
veloped; Dominican Republic amber . . 3
3. Interfacetal setulae sparse/absent (eye bare)
[best seen with reflected light] 4
Eyes densely micropubescent 7
4. Head trapezoidal in dorsoventral view, flat
. 5
Head spherical, not distinctly flattened; body
entirely brown; oral cavity and face wide;
1 katepisternal seta *Miomysia*, n. gen.
5. Postocellars elongate, equal in length to ver-
ticals; each tergite with pair of brown, para-
median spots; 8 rows acrostichals; notum
unicolorous *Protochymomyza*, n. gen.
Postocellars much shorter than verticals; ter-
gites mostly black-brown, with no distinct
markings; 4 rows acrostichals 6
6. Forefemur and tibia dark, rest of leg light;
notum unicolorous; anterior reclinate an-
terior to reclinate by distance $\geq 3 \times$ width
of setae *Chymomyza primaeva*, n. sp.
Foreleg unicolorous; notum with 4 grey vittae;
anterior reclinate just lateral to or anterior
to proclinate by 1 seta width
. *Scaptomyza dominicana*, n. sp.
7. Face flat; without a carina
. Drosophilinae sp. B
Face carinate 8
8. Vibrissae present in 2 pairs; vertex slightly
raised *Drosophila* (*D.*?) *succini*, n. sp.
Vibrissae in 1 pair; vertex not noticeably raised
. 9
9. Body completely dark brown, even halteres
and legs Drosophilinae sp. A
Body mostly yellow, including halteres and
legs 10
10. Carina broad, flat; sternites large, overlapping
. *Drosophila* (*D.*?) *poinari*, n. sp.
Carina low, rounded; sternites separate
. *Drosophila* (*H.*) *paleothoracis*, n. sp.

LITERATURE CITED

- Bachofen-Echt, A.
1949. *Der Bernstein und Seine Einschlüsse*. Wien: Springer-Verlag.
- Baroni-Urbani, C., and J. B. Saunders
1982. The fauna of the Dominican Republic amber: the present status of knowledge. *Trans. 9th Caribbean Geol. Conf. (Santo Domingo)*: 213-223.
- Brouwer, S. B., and P. A. Brouwer
1982. *Geología de la region ambarífera oriental de la Republica Dominicana*. *Trans. 9th Caribbean Geol. Conf. (Santo Domingo)*: 303-322.
- Burleigh, R., and P. Whalley.
1983. On the relative geological ages of amber and copal. *J. Nat. Hist.*, 17:919-921.
- Cockerell, T. D. A.
1923. Insects in amber from South America. *Am. J. Sci.*, 5:331-333.
- Gagné, R. J.
1977. Cecidomyiidae (Diptera) from Canadian amber. *Proc. Entomol. Soc. Wash.*, 79:57-62.
- Grimaldi, D.
1986. The *Chymomyza aldrichii* species-group (Diptera: Drosophilidae): relationships, new neotropical species, and the evolution of some sexual traits. *J. New York Entomol. Soc.*, 94:342-371.
1987. Relicts in the Drosophilidae. In J. K. Liebherr (ed.), *Historical biogeography of the Caribbean insect fauna*, (in prep.).
- Hackman, W.
1959. On the genus *Scaptomyza* Hardy (Dipt., Drosophilidae). *Acta Zool. Fenn.*, 97:1-71.
- Hennig, W.
1965. Die Acalyptratae Baltischen Bernsteins. *Stuttg. Beitr. Naturkd.*, 145:1-213.
- Krishna, K., and A. E. Emerson
1983. A new fossil species of termite from Mexican amber, *Mastotermes electromexicus* (Isoptera, Mastotermitidae). *Am. Mus. Novitates*, 2676:1-8.
- Lambert, J. B., J. S. Frye, and G. O. Poinar, Jr.
1985. Amber from the Dominican Republic: an analysis by nuclear magnetic resonance spectroscopy. *Archaeometry*, 27: 43-51.
- Langenheim, J. H.
1969. Amber: a botanical inquiry. *Science*, 163:1157-1169.
- Langenheim, J. H., and C. W. Beckh
1968. Catalogue of infrared spectra of fossil resins (ambers). I. North and South America. *Bot. Mus. Leaf. Harv. Univ.*, 22:65-120.
- Loew, H.
1850. *Über den Bernstein und die Bernstein Fauna*. Programm Realshule Meseritz, 44 pp.
- Malloch, J. R.
1921. Some notes on Drosophilidae (Diptera). *Entomol. News*, 32:311-312.
- McAlpine, J. F., and J. E. H. Martin
1966. Systematics of Sciadoceridae and relatives with descriptions of two new genera and species from Canadian amber and erection of family Ironomyiidae (Diptera: Phoroidea). *Canadian Entomol.*, 98:527-544.
- Okada, T.
1985. A revision of the genus *Microdrosophila* with descriptions of ten new species (Diptera; Drosophilidae). *Int. J. Entomol.*, 27:310-326.
- Patterson, C., and D. E. Rosen
1977. Review of the Ichthyodectiform and other Mesozoic teleost fishes and the theory and practice of classifying fossils. *Bull. Am. Mus. Nat. Hist.*, 158:83-172.
- Petrunkovitch, A., et al.
1971. Studies of fossiliferous amber arthropods of Chiapas, Mexico. Part II. *U. Cal. Publ. Entomol.*, 63:1-106.
- Poinar, G. O., Jr.
1984. First fossil record of parasitism by insect parasitic Tylenchida (Allantonematidae: Nematoda). *J. Parasitol.*, 70: 306-308.
- Schlee, D., and W. Glöckner
1978. Bernstein. *Stuttg. Beitr. Naturkd.*, ser. C, 8:1-72.
- Throckmorton, L. H.
1975. The phylogeny, ecology, and geography of *Drosophila*. In R. C. King (ed.), *Handbook of genetics*, vol. 3, pp. 421-469. New York: Plenum.
- Wheeler, M. R.
1963. A note on some fossil Drosophilidae (Diptera) from the amber of Chiapas, Mexico. *J. Paleontol.*, 37:123-124.
- Wilson, E. O.
1985. Invasion and extinction in the West Indian ant fauna: evidence from the Dominican amber. *Science*, 229:265-267.
- Wilson, E. O., F. M. Carpenter, and W. L. Brown, Jr.
1967. The first Mesozoic ants. *Science*, 157: 1038-1040.
- Woodley, N. E.
1986. Parhadrestinae, a new subfamily for *Parhadrestia* James and *Cretaceogaster* Teskey (Diptera: Stratiomyidae). *Syst. Entomol.*, 11:377-387.

Recent issues of the *Novitates* may be purchased from the Museum. Lists of back issues of the *Novitates*, *Bulletin*, and *Anthropological Papers* published during the last five years are available free of charge. Address orders to: American Museum of Natural History Library, Department D, Central Park West at 79th St., New York, New York 10024.