New North American Tabanidae (Diptera). XXV. The Genus *Hybomitra* And Some Other New Tabanine Horse Flies in Mexico

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Subsequent to Bellardi's first review (1859) of tabanid species in Mexico, complexity of the fauna there has become apparent, as well as the common ancestral derivation of certain elements in the Tribe Tabanini so recently that attempted groupings within the genus *Tabanus sens. lat.* into separate subgenera or even genera has not been entirely practical (see Fairchild, 1969) as complicating intergradation continues to become evident in the Neotropical Region as a whole. It is, nevertheless, useful systematically in some cases to refer relationships to formerly named groups, such as *Lophotabanus* or *Neotabanus* pending assessment as further biological information among pertinent species accumulates.

Rearing immature stages, which has furnished helpful systematic clues to relationships in the adjacent Nearctic fauna (e.g., Burger, 1975 and other articles on the related Arizona fauna) has still received almost no attention in Mexico, but should be increasingly revealing in the foreseeable future (e.g., Tidwell and Philip, 1977). One tabanine element that has obviously evolved recently in Mexico, is the group of slender-bodied *Tabanus* with unistriate abdominal patterns but varying eye coloration; several of this group are discussed and/or described below. Mexican species of recently separated *Hybomitra*, which has speciated abundantly in temperate and boreal regions of the Northern Hemisphere, are only sparingly represented in north-central Mexico, as also discussed below.

In addition to standard metric abbreviations, others used in text include: altitude - alt., highways - hwys., California Academy of Sciences - CAS, Universities of California at Berkeley, (or) Davis - UC Berkeley, (or) Davis, Canadian National Collection, Ottawa - CNC, G.B. Fairchild, University of Florida, Gainesville - GBF, and L.L. Pechuman, Cornell University, Ithaca, New York - LLP. Specimens formerly published as in collection of the author, "CBP" (or so indicated to donors of duplicated material), have now been incorporated into the collection of CAS.

Tabanus arnaudi, new species
Figure 1

Diagnosis: A rather small brownish-red species with brown and gray-lined scutum and distinct (though more reduced than usual in the "*Lophotabanus* group") blackish scutellar-

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prescutellar "eye spot," mid-row of low to tall, almost equilateral gray triangles on chocolate- to red-brown, slender abdomen darkened caudally, reddish antennal plate and 2 hind pairs of legs, and subhyaline wing with normal venation, no spur vein.

Holotype female, length 11.5 mm. Eyes bare, purple with 2 median green bands (relaxed). Frons buff-gray pollinose with darker shadows and patch of black hairs but no tubercle at vertex, sides gently narrowed below, index 1/5.0; callosity dark brown, a little taller than broad, narrowly separated from eye margins, and rapidly tapered above into a strong median keel which is flanked by a median patch of evanescent, dusky pollen. Subcallus pale yellow pollinose. Face and cheeks whitish pollinose and pilose below. Scape pale pinkish yellow with pale hairs grading to brown above, about equal in height to base of plate, the latter dull red, dorsally subrectangulate, and distinctly longer than tall and than darkened style. Apical palpal segment (hereinafter often referred to as Palpus II) yellowish with pale and a few black hairs, slender and blunt apically.

Scutum dark brown with 2 admedian, gray, pale-haired stripes which together in certain lights form a pale longitudinal mid-stripe in front of the black prescutellum; lateral notal margins also gray. In caudal view, a reduced, basal scutellar spot recedes, leaving hind margin broadly pinkish gray, and shaggy pale-haired. Pleura and coxae gray-white pollinose and pilose. Fore legs with tibiae reddish, pale-haired on about basal halves otherwise black. Two hind pairs of legs reddish with indefinite darker shades basally on femora; hind tibial fringes mostly pale-haired basally.

Abdomen dorsally, light chocolate brown, darkening caudally on the last 3 tergites; dark-haired except for pale yellow hairs on gray median triangles, none of which clearly crosses respective tergites, though those on tergites 2 and 3 have faint, attenuated apical extensions; scattered yellow hairs laterally. Venter pale orange yellow, yellow-haired, also darkened caudally.

Type locality: Mexico: Chiapas, N slope Cerro Bola, N Cerro Tres Picos, 1524-2134 m alt., 5.V.72. D.E. Breedlove. In CAS, Ent. Type No. 11722.

Paratype females: 17, same data as holotype; 10, Chiapas-Oaxaca border, Municipio de Cintalapa, 38 km W Las Cruces, 1372 m alt., 13.V.72. D.E. Breedlove; 5, Chiapas, 61 km W San Cristobal jnc. hwys. 190-195., 12.V.59. H.J. Teskey. In colls. CAS, CNC, GBF, and LLP.

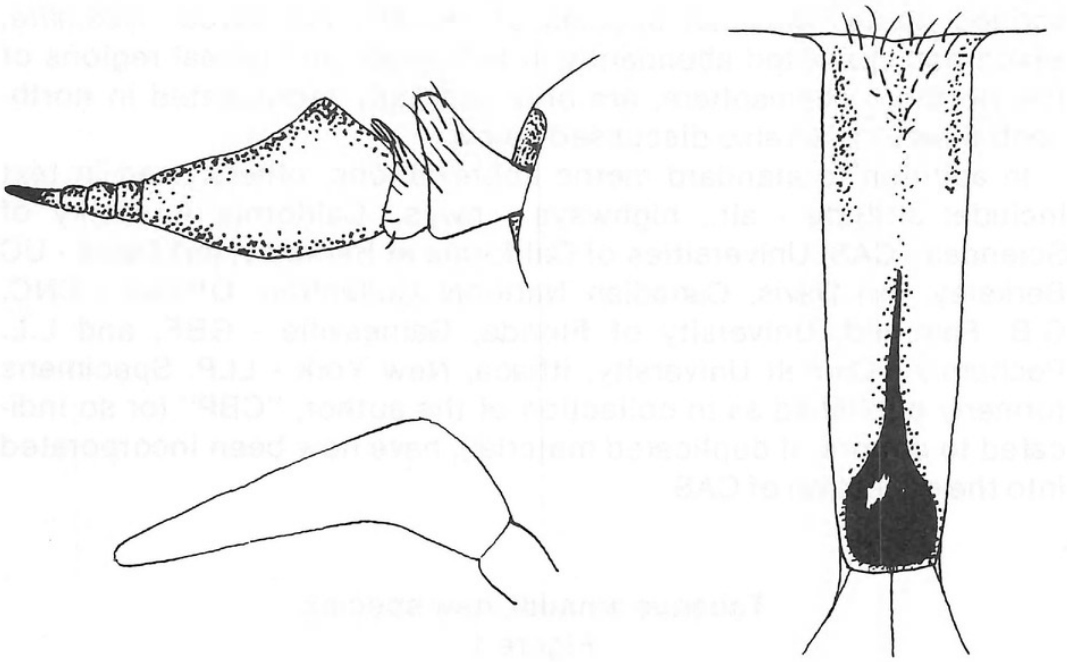

Figure 1. *Tabanus arnaudi* new species, female. Outlines of frons, antenna and palpus.

Except for darkened apical annuli, antennae may be entirely red; abdomen sometimes darkened, or more reddened basally, and a few of the Cerro Bola series contain dried blood which the collector reported was probably obtained from range cattle in the vicinity; the flies were netted while they attacked the field party. In a few specimens, the triangles cross some tergites. Frontal indexes vary from 1/4.4-5.3 and body lengths from 11 to 13 mm. Wear may accentuate the red scutellar margins and decrease the prominence of the prescutellar "eye-spots." The thoracic stripes and generally smaller size distinguish this from related species, such as *T. nebulosus* DeGeer from Central America, which furthermore has chunkier palpi and sublateral abdominal spots. *T. yucatanus* Townsend is another small brownish species from the Yucatan Peninsula which lacks the distinct thoracic lines; the abdominal pattern is trivittate with white-haired triangles and sublateral spots; it has no prescutellar-basal scutellar black-haired "eye-spot," and has more excised antennal plates with sharper baso-dorsal teeth. The types in CAS prompt me to dedicate this nice species to Dr. Paul H. Arnaud, Jr., Chairman of the Entomology Department (CAS), whose cordial provision of facilities for my studies on Mexican and other Tabanidae is gratefully acknowledged.

Tabanus glaucomaculis, new species
Figure 2

Diagnosis: Somewhat like *T. glauconotatus* Philip, this is a medium-sized, blackish fly with gray-lined scutum and 3 rows of prominent, steel gray abdominal triangles. The antenna and fore femur are dark brown to blackish, scape somewhat swollen, wing lightly tinted with faint clouds on crossveins, halter blackish with strongly pale-seamed knob.

Holotype female, length 15.5 mm. Eyes bare, each with a strong, median purple stripe, the lower border indefinitely coppery, upper border greenish (relaxed). Frons gray pollinose with nearly parallel sides, index 1/3.8, and sparse black hairs, a small, non-elevated dark spot at vertex; callosity shining black, touching eyes at lower corners, abruptly tapered into a strong, black median keel nearly to vertex. Subcallus, face and cheeks steel-gray pollinose with white pile below; no lateral subcallar hairs. Scape rather swollen, gray black with black hairs, a little taller than the black, obtuse-angled plate which is distinctly longer, but a little less tall, than length of the black style. Palpus II robust basally, a little shorter than proboscis, blue gray, predominantly black-haired.

Thorax, including prealar lobes and scutellum, black with gray bloom and obscure pale-haired lines dorsally, and whitish pleural and coxal pile. Scutellum with pale hairs on outer corners and a peculiar, central triangle of pale hairs making a suggestion of an unusual geminate black figure on the disc, easily obliterated by wear. Fore tibia basally and 2 hind pairs of legs reddish brown with mixed white and some black hairs, the hind tibial fringe black: fore tibia black on distal half. Wing, including costal cell, subhyaline, cloud on fork and crossveins hardly discernable except to accentuate the veins; venation normal, no spur vein.

Abdomen elongated, a third longer than head and thorax together, but not markedly tapered, tergite 7 only moderately narrower than 6. Pattern basically black-haired; median triangles nearly equilateral with apexes just or not quite reaching anterior tergal margins; sublateral spots rhomboidal on first 3 tergites, rounded thereafter and, in some lights,

isolated from both margins; pale pattern whitish-haired, including narrow incisures. Venter entirely dark gray pollinose with pale hairs, accentuated on incisures, some coarse black hairs caudally.

Type locality: Mexico: Nuevo Leon, Chippinque Mesa, Monterey, 26.VIII.60. H.F. Howden. In CNC No. 12923. Paratypes - 2 females, same data. In colls. CNC and CAS. In close agreement with the type, but some characters less well preserved.

The bluish-gray pattern has considerable resemblance to *T. glauconotatus* Philip from Toluca, D.F., which, however, is smaller, less elongate, has smaller, more isolated callosity, a distinctly notched vertex, more plainly bicolored legs, whitish opaque, lower squamae, and the median row of truncated triangles continuous, thus dividing the submedian row of paired dark dashes. The scape of *T. glaucomaculus* is a little more swollen, but not as much as in related *T. abditus* Philip which has not been taken south of Arizona at present; the eyes of the latter are unbanded, and red under the lateral spots is more evident. The pattern in *T. pruinosus* Bigot is more reduced and all sublateral spots isolated. Taken at the same time with the *glaucomaculis* types was a female of casually, morphologically-similar *T. cazieri* Philip female, which, however, is much browner overall, particularly the scutellum and venter.

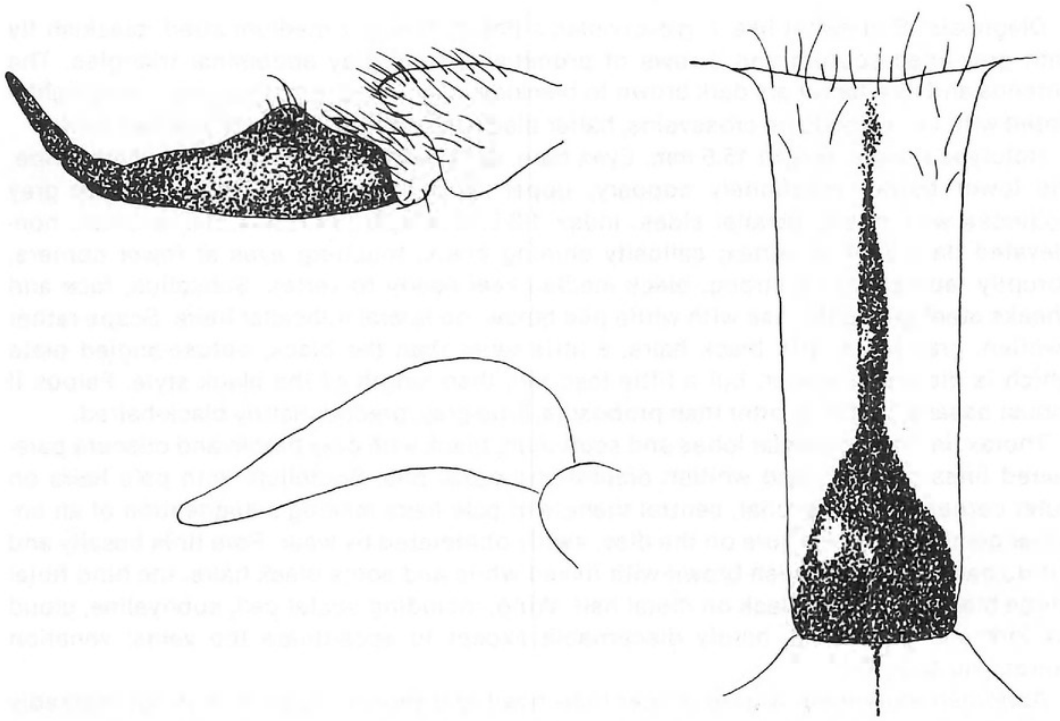

Figure 2. *Tabanus glaucomaculis* new species, female. Outlines of frons, antenna and palpus.

Tabanus rallus, new species
Figure 3

Diagnosis: A small reddish-brown species with entirely red antennae, black scutum and scutellum, midabdominal row of tall, white-haired triangles, and clear wing.

Holotype female, length, 12 mm. Eyes bare, purple with 2 green bands (relaxed). Frons buff gray, slightly narrowed below, index 1/5.2; paler gray pollinose toward the vertex in certain lights; callosity deep blackish brown, barely separated from eyes below and abruptly tapered into a stout median line to the upper third of frons. Subcallus and upper cheeks buff pollinose; lower cheeks and face whitish pollinose and pilose. Antenna brick-red, style a little darker, scape black-haired, subequal to plate in height; latter subrectangulate dorsally and but little longer than style. Palpus II dusky yellow, mostly black-haired, and somewhat thickened at knee, blunt apically.

Scutum black with suggestions of faint gray lines anteriorly and reddish shades on discs of prealar lobes. Pleura and fore coxae gray pollinose and white pilose. Fore leg otherwise black with concolorous hairs; basal third of tibia reddish with pale hairs; 2 hind pairs reddish with pale hairs, basal two-thirds of femora with brown shadings, hind tibial fringe mostly black. Wing glass clear, costal cell faintly yellow, venation normal without spur vein. Halter with brown stem, orange knob.

Abdomen light reddish brown on basal 4 segments above and below, remaining 3 black, black-haired dorsally, pale-haired below; a continuous dorsal row of tall, easily-worn, whitish-haired, truncated triangles which are not expanded along the incisures, a small, elongate dark integumental spot beneath that on t. 2.

Type locality: Mexico: Oaxaca, "42 m St. (?S) Oaxaca," 13.VII.52.945 m. No collector. In coll. L.L. Pechuman.

Allotype male, length 11.5 mm. Except for usual sexual differences, like the female and readily associated. Eyes bare, facets gradually, moderately enlarged in about upper half. Black median spots on first 2 tergites larger than in female, and nearly reaching hind margin of t. 2. Palpus II pallid, ovoid, with mixed black and pale hairs. Mexico: Michoacan,

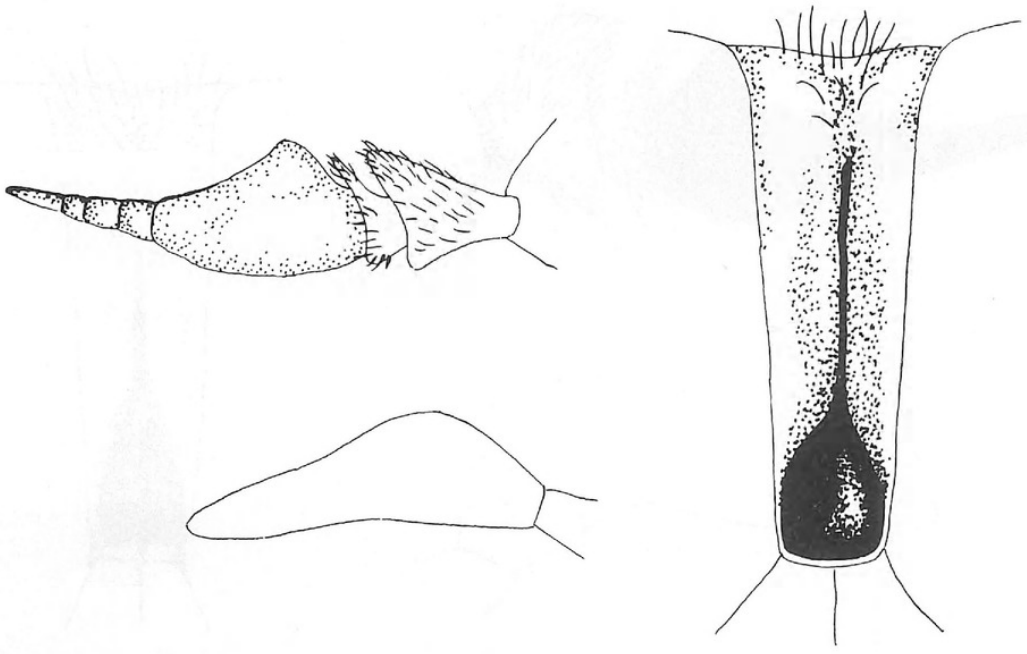

Figure 3. *Tabanus rallus* new species, female. Outlines of frons, antenna and palpus.

13 km N Cuatro Caminos, 300 m. 29.VI.75. E.M. Fisher, in CAS, Ent. Type No. 13103. Another male, same state and collector, 30.5 km S Uruapan, 945 m alt., is omitted from type series because headless. It agrees otherwise with the allotype. These and many other tabanids from southern North America were generously donated by Mr. Fisher of Long Beach State University to CAS.

Paratype female, also Oaxaca, 3 km NW Totalapan, 945 m alt., 7.VII.53 (no collector). In CAS. Differs in only minor respects; 11 mm. Frontal index 1/5.7; tergite 3 partially black behind.

Distinguished among other, slender, unistriate Mexican species by its smaller size, all-red antennae and narrow, less prominent, pale-haired, midabdominal line.

Tabanus searsi, new species
Figure 4

Diagnosis: A medium-large, reddish-brown species with elongated abdomen and single row of white-haired triangles, rather plainly lined scutums and indefinite blackish spot basally on reddish scutellum, black flagellum, faintly tinted wing, and fore tibia darkened only on about distal third.

Holotype female, length, 18 mm. Eyes bare, purple, each with 2 green bands narrower than the median purple interval. Frons pale buff pollinose, slightly widened above, index 1/5.3, callosity reddish brown, narrowly separated from eye margins, double-notched on lower margin, and tapered into a narrow median, bare ridge half way to vertex which is flanked in certain lights by a pair of evanescent brown lines. Subcallus pale buff pollinose. Face and cheeks whitish pollinose and pilose below. Antenna with basal 2 segments pale reddish, scape swollen dorso-apically with black hairs, height subequal to length and to basal height of plate; latter strongly excised, the tooth acute angulate,

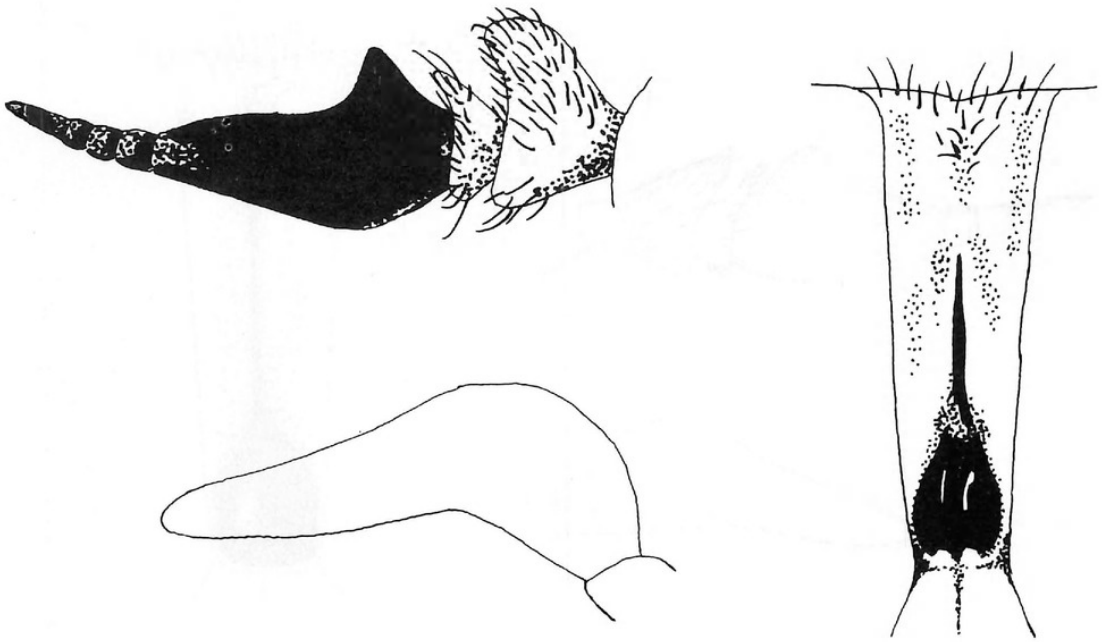

Figure 4. *Tabanus searsi* new species, female. Outlines of frons, antenna and palpus.

mostly black and longer than height, or than style. Palpus II rather slender, pale reddish, nearly as long as unsheathed stylets, tapered to a blunt apex, and with mixed short black and pale hairs.

Thorax reddish brown with 2 submedian and 2 sublateral, darker scutal stripes, the sublateral brown intervals accentuated behind by coarse, easily-denuded pale hairs; prescutellum, and red scutellum basally, dull black, but not sufficiently contrasting for assignment to group *"Lophotabanus."* Legs reddish, mostly pale-haired; fore femur and apical third of fore tibia blackish gray, hind tibial fringe pale. Wing venation normal, no spur vein. Halter yellow.

Abdomen reddish brown, darkening caudally, last two segments black, mostly black-haired dorsally, entirely pale ventrally; pale hairs on edges of tergites, widened on hind corners but not extended along incisures to connect with tall, median, white-haired triangles on tergites 2 to 5, which only just cross tergites 2-3, but are nearly equilateral and shorter on 4 and 5; tergites 6 and 7 black except for a few pale hairs in the middle.

Type locality: Mexico: Chihuahua, Temoris, 1.VIII. 69. T.A. Sears (to whom the species is dedicated), R.C. Gardner, and C.S. Glaser. In UC, Davis, Type No. 441.

Paratype female, same data except 2.1VII.69. in CAS. In good agreement with type, but a recent (dried) blood meal has caused abdomen to appear darker, more tapered and narrower caudally.

This has obvious recent ancestral derivation in common with the smaller *T. arnaudi* new species from Chiapas, which, however, has more reddish, less excised plates, and fore tibiae hardly one-half pale basally. In *T. subfemoralis* new species from the West Coast, the mid-abdominal triangles are yellow-haired and less contrasting, plates more reddish and thoraxes not as plainly lined, in addition to green, only unibanded eyes.

Tabanus subfemoralis, new species
Figure 5

Diagnosis: An elongate species with scutums blackish, antennal flagellum and abdomen predominantly reddish brown, last 2 to 3 segments sharply black and midstripe composed of tall, yellow-haired, truncated triangles, plus less distinct, pale yellow, sublateral spots; legs bicolored.

Holotype female, length, 14.5 mm. Eyes bare, green, each with one purple band (relaxed). Frons buff-gray pollinose, with patch of black bristles in a distinct though low notch at vertex; nearly parallel-sided, index 1/4.3; callosity brown, narrowly separated from eye margins and rapidly tapered into a narrow median brown keel which extends over half way to vertex; lower margin with 2 small sublateral notches. Subcallus also buff-gray pollinose. Face and cheeks whitish pollinose and pilose below. Antenna mostly red, scape moderately swollen with black hairs above, plate brick-red, strongly excavated, dorso-basal tooth prominent, acute-angulate, grading to dark brown on style. Palpus II pale yellow, mostly black-haired, slender, a little thickened basally, blunt apically.

Scutum including scutellum dull black, with appressed yellow and some sparse black hairs but no plain lines, pleura and coxae gray pollinose and whitish pilose. Fore femur and apical three-fourths of tibia black and mostly black-haired, latter lasally red with pale hairs. Two hind pairs of legs red with pale hairs, basal two-thirds of femora and tips of tibiae and tarsi blackish; hind tibial fringes mostly black with some pale hairs basally. Wing lightly tinted, but accentuated along vein R_{2+3}. No spur vein. Halter with brown stem, yellow knob. Basicosta setulose.

Abdomen bright reddish, mostly black-haired above, pale yellow-haired below and on a conspicuous middorsal line of tall, truncated triangles which cross tergites 2 to 5, and with more obscure, yellow-haired rhomboidal, sublateral spots; last 2 segments sharply

black with a reduced median patch of pale hairs on t. 6.

Allotype male, length, 13 mm. Eyes bare, facets only slightly and gradually enlarged in upper halves. Tubercle in occipital notch, small and depressed below eye level. Frontal triangle buff-gray pollinose, darker in apex. Face and cheeks gray pollinose and whitish pilose. Palpus II pale yellow, a third longer than thick, blunt apically and with a few black hairs among mostly white ones. Abdomen more slender and pointed than in females; wear has nearly obliterated the middorsal pale-haired row of truncated triangles so that a dull blackish, middorsal spot on tergite 2, and black on segments behind the fourth are accentuated. Otherwise in good agreement with the holotype.

Type locality: Holotype, Mexico: Sinaloa, 40 km S Elota, 6.VIII.63. J. Powell. In CAS, Ent. Type No. 11721, on permanent deposit courtesy of UC Berkeley. Allotype: also same state and depository but 8 km N Mazatlan, black light. J.A. Chemsak. Paratype females: 5, same data as holotype, plus 1, same data but 5,VIII, J.A. Chemsak; 1, same data as allotype, plus 19, 22-25.VII.72, black light and Malaise traps. J.A. and M.A. Chemsak, A. and M. Michelbacker; 3, 41.5 km N Pericos, 13.VIII.60. P.H. Arnaud, Jr., E.S. Ross, D.C. Rentz; 10, Mazatlan, "at sea level," 31.VII.-16VIII.64. W.R.M. Mason, J.F. McAlpine, plus 5 others, same area and dates, up to 549 m alt., McAlpine, Mason, Howden and McGuffin; 1, 21 km and 14, 8 km E Villa Union, 26.VII,64, W.J. Gertsch, J.A. Woods. E Concordia, 5.VIII.64. L.A. Kelton; Nayarit - 1, 16 km W Acaponeta, 4.VII.62. Sleeper, Anderson and Somberby. Morelos - 1, 11 km SSW Yautepec, 2.VII.61. *"U Kans. Exped."* Michoacan - 1, 8 km SW Tiquicheo, 427 m alt., 8.VII.70. E. Fisher, P. Sullivan. Guerrero - 1, Acapulco, 4.VII.63. Parker, Stanke; 1, 14.5 km E. Chipaderos, 3.VII.63. Parker, Stanke. In colls. CAS, UC Berkeley and Davis, CNC, USNM, American Museum of Natural History, University of Kansas, GBF and LLP. Lenghts, 13-15 mm.

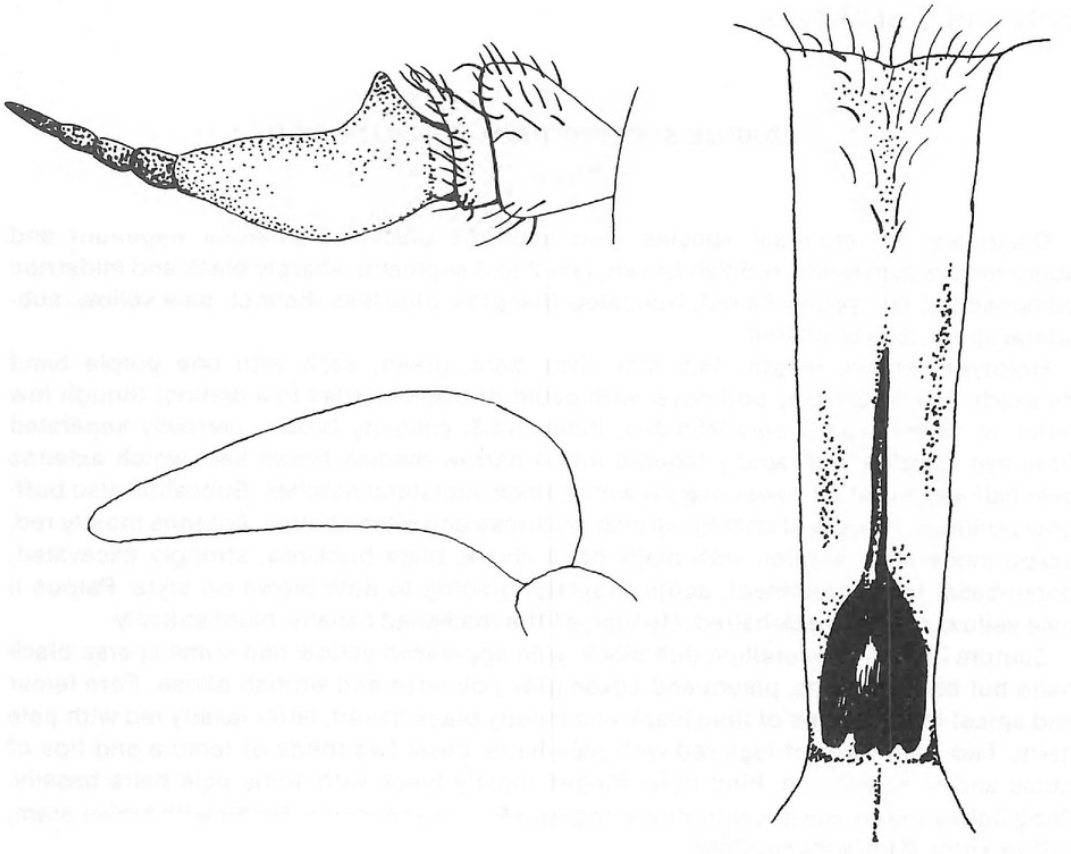

Figure 5. *Tabanus subfemoralis* new species, female. Outlines of frons, antenna and palpus.

Darkening of 2 hind pairs of femora, basally, of tergite 5, and of basal callosity are somewhat variable, and wear may obliterate vague sublateral spots. The black-light captures could indicate either crepuscular habits or attraction from nearby evening perches.

Specimens of related, presumed *T. femoralis* Krober from Guatemala, Honduras and Chiapas differ in fronts being a little narrower (about 1/5), scutums more brownish, eyes purple with 2 green bands, antennal plates more excised and darkened beyond the basal tooth, and wings with brown-margined veins. *T. tumiscapens* Philip also occurs along the western coast of Mexico and has unibanded eyes, but is quickly differentiated from *T. subfemoralis* by the more enlarged antennal scapes and browner abdomens with whitish middorsal stripes. *T. nondescriptus* Fairchild from Darien, Panama, and Columbia, has some resemblance to *T. subfemoralis* but is more brownish overall, including thorax, femora and tinted wings, and the median triangles are more slender and attenuated apically.

Tabanus tumiscapens Philip

Originally described from Nayarit (23 May), specimens have since been seen from Puebla (12 August), Michoacan, and Guerrero; most in June and early July, and up to 1100 m alt. A male was taken with 3 females in Puebla and is described below as the neallotype by comparison with the females.

Neallotype male, 12.5 mm in length. Eyes bare, the facets moderately enlarged in upper two-thirds. Apical palpal segment subovoid with a blunt, downward-pointed nipple apically, about twice longer than thick. Entire whitish body vestiture shaggier, including that on the middorsal stripe of truncated triangles, and white hairs more evident on sides and incisures of abdomen: a more prominent inverted black integumental triangle crossing first 2 tergites. Black hairs on scutum and scutellum longer, more upright.

Neallotype locality: Mexico: Puebla, 11 km NW Tehuitzingo, 1100 m, 1-2.VII.75 E.M. and J.L. Fisher. In CAS, Ent. Type No. 13108.

Tabanus femoralis Krober

The type female from Guatemala of this rather inadequately described species with broken antennae was a war casualty in Hamburg. Accumulation of a few specimens from Guatemala and Honduras has permitted presumptive recognition, as well as of probable occurrence of *femoralis* in Chiapas, Mexico. The species will be redescribed by Dr. G.B. Fairchild of University of Florida, based on a Neotype he will establish from among a series of 7 females in CAS

taken by Mr. E.M. Fisher near Flores, Guatemala, of which the following is a brief characterization that fits some Chiapas specimens as well.

Diagnosis: A medium-sized, brownish-red, slender species with thorax including prealar lobes cinnamon-brown, and hind margin of scutellum a little more reddish, abdomen elongate, brighter reddish than in related Mexican species with mid-row of tall, pale yellow, truncated triangles on tergites 2 to 6, wings tinted with vein margins darkened apico-costally, and legs mostly reddish, pale-haired, including coxae, the fore femora darker with black hairs. Eyes (relaxed) purple, each with 2 green bands; frons gently convergent below, index about 1/5, vertex moderately depressed; antenna mostly reddish, style black, plate strongly excised, the dorsobasal tooth subrectangulate; palpus rather slender, yellowish with black and some pale hairs.

Material examined: Females: 9, Guatemala; 2, Honduras; Mexico - Chiapas: 2, N Slope Cerro Bola, N Tres Picos, 1524-2134 m alt., 5.V.72. D.E. Breedlove; 1,10 km W San Christobal, jnc. hwys. 190-195, 11.VI.60, light. H.J. Teskey; 1, El Sumidero, 7.VI.69. J.E.H. Martin, and 1, same collector but 12.V.69; 1, border Chiapas-Oaxaca, in pine forest, 13.V.67. Halfter and Reyes. In CAS and CNC.

Separation from related *T. subfemoralis* new species is discussed under that species.

Occasional specimens from Chiapas are now doubtfully referred here which were at first set up as a distinct species because of varyingly prominent suggestions of black-haired, darkened integument in the basal scutellar-prescutellar areas and the lack of pale-haired incisural fringes mentioned originally by Krober. The significance of these differences will have to await interpretation from more adequate material.

Tabanus furunculus Williston

Females now assigned to this rather common "species" from Sinaloa to Chiapas, have shown such variation that they are suspected of representing a composite complex. The paler, more reddish form is represented by the syntype female studied in BM (NH) from "Santiago Yacuintla" in Jalisco in the north with reddish legs, callosity, bases of plates, and scutellar margins, as well as basal abdominal segments without black margins enclosing pale median lines. This paler, reddish form has been taken less frequently than a darker form with above-mentioned parts mostly black as represented by the later-synonymized (Fairchild, 1971) *T. aztecus* Philip. I still doubt this synonymy. The original intention of differentiating the latter from the more reddish syntype of *furunculus* was unfortunately confused by ascribing *in lapsus* the syntype characters of *furunculus* to the very different type of *T. haemagogus* Williston in BM (NH), and studied by me at the same time. Males are infrequent in collections, but so far only a hirsute, dark form, represented by the other syntype in BM (NH) from Guerrero, has been seen. The white hairs on many parts of head and body are longer than on any females seen. The tubercle in occipital notch is small but at eye level, and eyes are bare,

upper facets not greatly enlarged, but line of separation at about lower third is distinct. Palpi are ovoid with slightly downward-pointed, blunt apical nipples. It seems not improbable that rearing and biological studies will eventually enable association of these males with a particular group of females in this complex. None of the females with data duplicated with males, in the few instances seen from Nayarit, Morelos and Guerrero, have shown either the same preponderance of long white body hairs or wide middorsal black band enclosing the median white line.

For practical, referral purposes, the more reddish female syntype discussed above from Jalisco, primarily described by Williston, is herewith designated as lectotype in BMNH. The front is parallel-sided, index 1/3.5, the callosity reddish, quadrate ("quadrilateral"), the 2 hind pairs of legs and hind margin of scutellum red. The first 3 abdominal segments reddish, black-haired except for the white-haired median line, beneath which basally is an obscure dark elongate integumental spot (this becomes accentuated by wear or discoloration).

Lengths of females vary from 10 mm (Guerrero) to 15 mm (Chiapas). Revivable eye patterns show lower borders purple, upper green and a median cross-stripe of each color. While bodies are slender, they are not typically as evenly tapered nor the scapes as swollen as in related *T. tumiscapens* Philip with single eye stripes, which is more restricted on the West Coast.

It is difficult to accept as this species, a series of females from Nayarit with similar appearance, except the abdomens are more strongly tapered and darker above and below. Likewise puzzling are individuals from several localities with middorsal, almost equilateral triangles barely crossing tergites, and with data matching others with more characteristic middorsal lines. Variation is also observed in widths of fronts and shapes of callosities in otherwise inseparable material. For these reasons, I refrain from recognizing the dark "*Aztecus* form" until more information is available on this complex, particularly on critical distribution.

The genus Hybomitra Enderlein in Mexico

To the 5 species of *Hybomitra* now recognized in Mexico and keyed below, may now be added 2 more newly described species. Only one, *H. laticornis* (Hine), overlaps the northern Mexican and southern Nearctic faunas, but Burger (1975) considers that the distinctive immature characters should exclude its assignment to this genus, but it is here retained pending further information.

Another Nearctic species that is a vigorous colonizer and recorded as far south as Brazoria County, Texas (Dr. P.H. Thompson, *in litt.*), *H.*

lasiophthalma (Macquart), I had suggested (1968) might occur in northern Mexico, but is still unrecorded there. Two others, *H. cincta* (Fabricius) and *H. zonalis* (Kirby), occur too far north of the border to make early, meantime unconfirmed, Mexican reports credible. A third, *"T". comastes* Williston (= *captonis* Marten), listed by Townsend (1895), was undoubtedly a misidentification (see Philip, 1975), and speculation as to its identity is useless until more is known about the Baja California tabanid fauna.

The genus is replaced to the south from Central Mexico by *Poecilo-deras* Lutz which lacks the characteristic tubercle at vertex, and has other restrictive differences.

The 2 *Hybomitra* species herein added to the Mexican fauna on basis of their vertical tubercles, have imperceptible eye hairs under low magnification. This character is more evident on most species to the north, but varies in *Hybomitra* as it does in *Tabanus*. The males, when discovered, will probably have more evident hairs on the eyes, but their apparent lack in the present females is not considered to impede their placement in *Hybomitra*.

Key to females of known Mexican Hybomitra species

1. Wings with prominent, isolated clouds; (subcallus bare and shining black) (?Mexico highlands; Nearctic to so.-cent. Texas). . . . . *lasiophthalma* (Macquart)
   Wings hyaline, tinted, or with faint clouds on forks 2
2. Femora dark brown to blackish (2 hind pairs at least basally), tibiae obviously lighter reddish; hind tibial fringes mostly black 3
   Legs, at least the 2 hind pairs, essentially unicolorous; hind tibial fringes at least basally, mostly pale-haired 4
3. Sublateral abdominal spots on predominantly reddish abdomen; plates as wide as long, usually entirely red, the styles sharply black; eyes (relaxed) green with 1 purple stripe and lower border indefinitely purple; subcallus with upright hairs laterally unless worn . . . . . (some *laticornis* (Hine), see coupl. 5)
   Sublateral pale spots on predominantly dark integument; plates narrower, mostly brownish-black; eyes similar, but stripe broader and lower border more sharply purple; subcallus reddish, thinly pollinose or with bare areas, no lateral hairs . . . . . (some *aitkeni* with dark femora, coupl. 8)
4. The fronts moderately narrow, 1/3.5 to 1/4.0 (either 3 rows of gray spots on dark abdomen or subcallus usually with sparse upright hairs laterally) 5
   The fronts wider, about 1/3.0 6

5. Frons 1/4.0; abdomen with 3 rows of prominent greenish-gray spots separated by paired submedian, sickle-shaped, black-haired dashes, pinkish only under the lateral spots on first 2 tergites and first 3 sternites (Mexico, D.F. and Durango) ..... *zancla* Philip

   Frons 1/3.5; abdomen broadly reddish on sides and with less prominent sublateral spots on dorsum and venter (NW Mexico, SW U.S.) ..... *laticornis* (Hine)

6. Midfrontal callus predominantly a linear upward extension of callosity 7

   Midfrontal callus an ovoid expansion, narrowly connected or not to basal callosity 8

7. Frons gently convergent below where filled with red basal callosity; plate shorter than tall and than style (Durango) ..... *howdeni* n.sp.

   Frons parallel-sided and dark brown callosity narrowly separated from eye margins; plate distinctly longer than tall or than style (Chihuahua, Durango) ..... *burgeri* n. sp.

8. Eyes sparsely short-pilose with one accentuated median band in life, the lower border less distinctly also purple; abdomen dark with rather isolated, pinkish dashes (NW Mexico) . *aitkeni* Philip

   Eyes densely short-pilose; abdomen more broadly reddish on sides 9

9. Vertex with large bare black spot surrounding tubercle; mid-frontal callus flanked by dark pollinose crossband; eyes purple with 2 green bands (Chihuahua, ?Durango) ..... *mima* Philip

   Bare area at vertex reduced or wanting; no pronounced dark mid-frontal pollinosity beside ovoid mid-callus; eye pattern unknown ("Mexico") ..... *craverii* (Bellardi)

Hybomitra aitkeni Philip

Since description originally from Mexico, D.F. and Durango, much additional material reveals this to be chiefly a montane species, and shows some melanistic variation. Only one record is from Baja California: a female taken by Paul H. Arnaud, Jr. (CAS), "Sierra San Pedro Martir, on trail Socorro to La Joya, 9.VI.59," about 1200 m alt. J.F. McAlpine and colleagues of the Canadian Mexican Expedition took over a hundred specimens from Durango and 1 from Chihuahua, of which 3 males and 46 females were studied, dated 1 June to 27 July, about 2,250-2600 m alt. Except for the usual sex differences and reddish sublateral spots being a little more extensive, males resemble females. While typically, the subcalli in females are pollinose, and femora and sides of basal abdominal segments reddish, in some there may be bare subcallar areas, or the femora are darkened basally and ground color of sublateral spots is buff to steel-

gray, approaching *H. zancla* Philip. The latter, however, has narrower fronts and antennal plates, and eyes are purple with 2 green bands. In the most melanistic *aitkeni* female from Durango in August, the femora are entirely dark, sublateral spots are reduced gray, and mid-longitudinal black band occupies middle third of venter.

Hybomitra burgeri, new species
Figure 6

Diagnosis: A medium-sized, dark grayish species with blackish, middorsal, abdominal stripe serrated along the margins by reddish-yellow, diagonal dashes, over broad red sides, frontal callosity brownish black, the upper corners rounded, narrowly separated from eyes, and a short, linear extension above; 3 vestigial ocelli on a low tubercle with bare spots at vertex, and 2 hind pairs of legs reddish.

Holotype female, length 15 mm. Eyes ostensibly bare under low magnification, no bands revived on brief relaxing. Frons gray pollinose, some sparse black hairs above, sides sub-parallel, index 1/3.0; an irregular, bare brownish inverted U-shaped spot at vertex with a vestigial ocellus in each arm, and surrounding a small raised tubercle with a suggested, median ocellus. Subcallus, face and cheeks pale gray pollinose, the beard white. Antenna rather short and compact, reddish basally, brown to black beyond dorso-basal angle of plate, which is a little longer than tall and than style, scape not noticeably swollen. Apical palpal segment pale reddish, swollen basally and attenuated apically, mostly pale-haired.

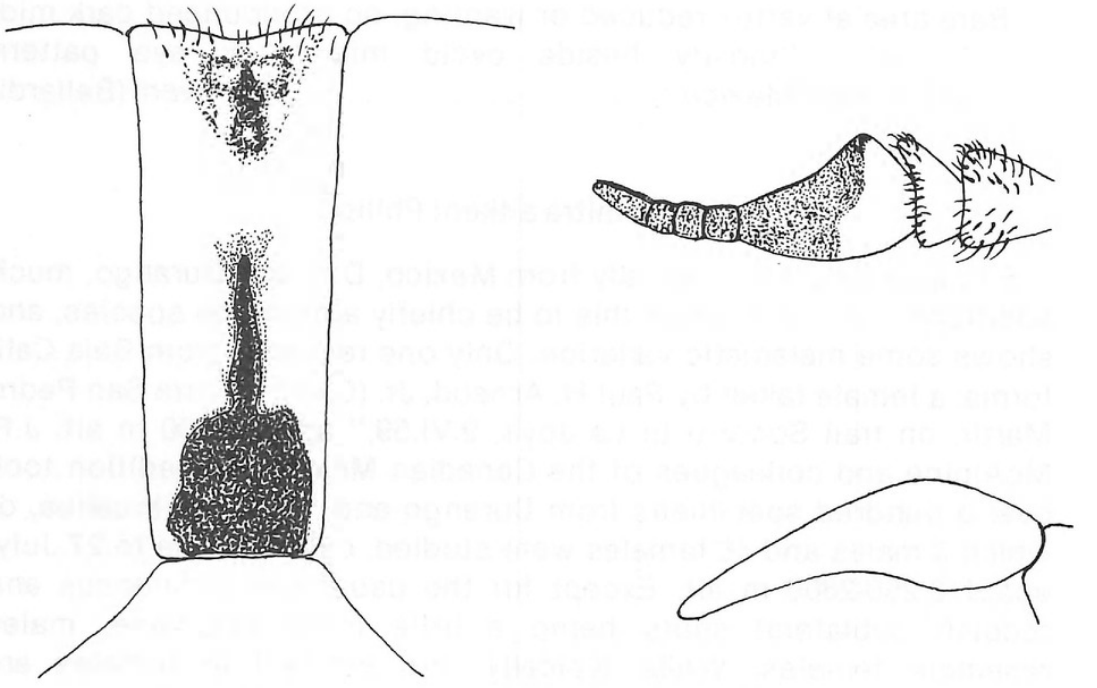

Figure 6. *Hybomitra burgeri* new species, female. Outlines of frons, antenna and palpus.

Scutum and scutellum blackish (worn) without distinct lines; prealar tubercles reddish. Pleura and coxae pinkish gray, mostly white-haired. Legs predominantly reddish with mostly pale hairs including hind tibial fringes; fore femur, fore tibia apically and fore tarsi brown to black. Wing hyaline, costal cell lightly tinted, venation normal without spur vein. Halter with brown stem, pale yellow knob.

Abdomen with broadly reddish sides plus accentuated, yellow-haired, sublateral diagonal paler spots, and red, entirely pale-haired venter. The middorsal black stripe on tergites 2 to 5, narrower than scutellum, median pale triangles only faintly evident (perhaps also reduced by wear).

Type locality: Mexico: Chihuahua, Sierra Madre Mts., 38 km N Creel, 4VII.72. D. Giuliani, at U.V. light. In CAS, Ent. Type No. 11987.

Paratype female, Durango, 10.4 km E El Salto, 21.VI.64. J.F. McAlpine. In CNC. Eyes also without evident hairs, but possibly with 2 faint green stripes on purple ground (briefly relaxed). Callosity more brown, and only the anterior ocellus suggested on small tubercle at vertex.

H. aitkeni Philip also occurs in both states, and specimens were taken in the same vicinity in Durango by the same collector at about the same time as the paratype of *burgeri*. The former differs in expanded, not linear, midfrontal callus, is darker with more isolated sublateral dashes, and the median eye stripe is more distinct. In *H. howdeni* new species, also from Durango, the differences in taller, shorter plate and more convergent frons filled below by the callosity, are quickly apparent by comparison with Figure 7; median pale triangles are plainer in the middorsal black stripe. Ovoid mid-frontal calli differentiate some other related species such as *H. craverii* (Bellardi).

Hybomitra howdeni, new species
Figure 7

Diagnosis: A robust, brownish-red species with 3 rows of abdominal maculae, brownish-red legs, hyaline wing, and antenna with peculiarly wide, short, bicolored plate.

Holotype female, length 16 mm. Eyes with almost imperceptible, short sparse hairs, an indistinct median purple band revived on each (relaxed). Frons pinkish-gray pollinose (apparently somewhat discolored), gently convergent below, index 1/3.2; a small but distinct tubercle without ocelli beneath black hairs at vertex; callosity red, filling lower frons and abruptly tapered above into a narrow, median red ridge half way to vertex, and flanked by median dark pollinosity reaching nearly to tubercle. Subcallus pinkish pollinose without lateral hairs. Face and cheeks whitish pollinose and pilose with some black hairs on upper parafacials beside the antennal bases. Antenna reddish to black distally, black-haired basally, scape swollen, plate as tall as scape, subrectangulate and gently excavated dorsally, distinctively shorter than tall, red basally, sharply black on apical half and on the longer, rather slender style. Palpus II pinkish with mostly pale, and a few black, hairs, swollen basally and tapered to slender points.

Scutal and scutellar integument dark, overlain by obscure gray pollinose lines anteriorly, and pinkish ones laterally across pre-alar tubercles, covered with pale hairs with sparse black and appressed scattered coppery ones intermixed. Pleura and coxae pinkish with long white pile. Remainder of legs reddish, darkened distally on fore tibiae and tarsi, with mostly white hairs, some black ones dorsally on other tibiae including hind-tibial fringes. Wing venation normal, no spur veins, costal cell faintly yellow. Halter brown, knob mostly pale yellow.

Abdomen rounded behind, not unusually tapered, a middorsal band of black-haired geminate spots enclosing tall, though not quite joined, pale-haired triangles which expand behind but do not join lateral pale-haired, narrow incisural fringes on which are based sublateral, diagonal pinkish spots somewhat as in *H. aitkeni* Philip, margined outwardly by reddish-brown, black-haired areas. Venter reddish, entirely pale-haired except for median discontinuous patches of black hairs.

Type locality: Mexico: Durango, 105 km W El Salto, 2700 m alt., 5.V.61. Howden and Martin. In CNC No. 12927. Named for one of the Canadian Mexican Expedition collectors.

Specimens of *H. aitkeni* Philip, taken about the same time within 3.5 km of the type locality of *howdeni* are distinguished by narrower fronts with black callosities, more slender black plates, and more evident eye hairs.

Although 169 *H. aitkeni* Philip (type locality also El Salto), taken by the Expeditions in later years in various Durango localities, were also studied, none other carried the exact data of the above. Variations in

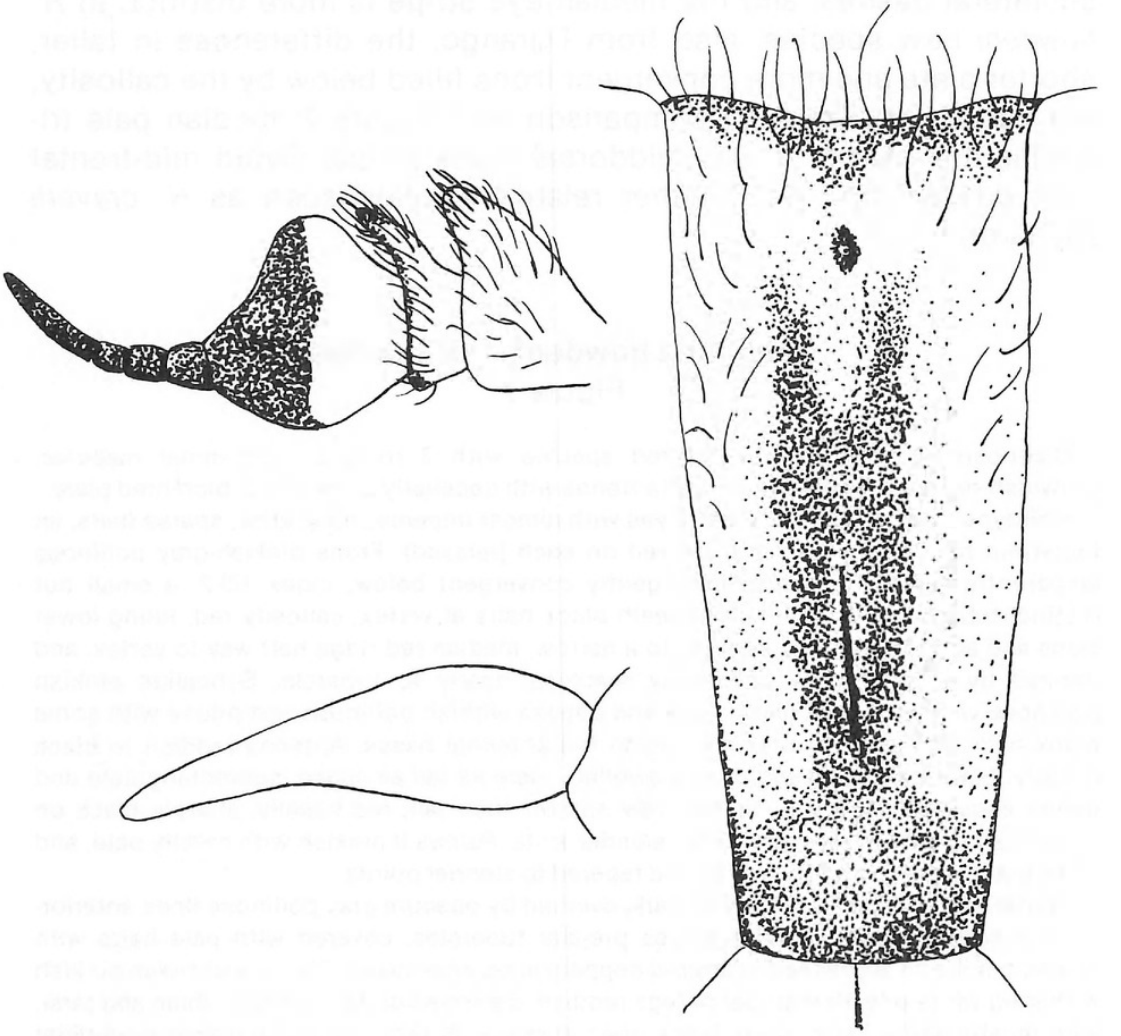

Figure 7. *Hybomitra howdeni* new species, female. Outlines of frons, antenna and palpus.

H. aitkeni were discussed previously. Occasional females have brownish callosities, but these are more rounded and narrowly separated from eye margins in slightly narrower, more parallel fronts, antennae more slender, styles not longer than plates, and scutums more plainly lined. In *H. laticornis* (Hine) with similar though more reddish-patterned abdomens, the fronts are narrower, callosities darker, smaller, and the plates usually entirely red. *H. mima* Philip from Chihuahua, also has some similarities, but the double green-banded eyes were more densely hirsute, the ocelligerous tubercle enclosed by a larger bare brown area at vertex, and the large ovoid blackish median callus, flanked by a transverse black pollinose, mid-frontal spot, is not an extension of the basal callosity. *H. craverii* (Bellardi) from unknown Mexican locality, with an equally wide frons and red callosity, differs in disconnected median ovoid callus, and plate more slender and longer than style.

Some Mangrove-Associated Tabanids, Particularly in Mexico

A collection by Dr. John T. Doyen of University of California, Berkeley, in an unbaited canopy trap set in the middle of a mangrove thicket, Isla San Jose, Gulf of Lower California, 10-11 April, 1974, included 4 females of *Tabanus guatemalanus* Hine and 1 of *T. oldroydi* Philip. This reinforces the postulated idea of breeding in such brackish water ecosystems (Philip, 1976) of certain tabanid species, which includes the above 2 from the eastern and/or northwestern coasts of Mexico, and of *T. vittiger* Thomson in the Galapagos Archipelago.

On recent specimens from Baja California of *T. oldroydi* are labels of collectors or campers from near or behind mangrove. Of course, host-seeking females undoubtedly fly considerable distances from probable mangrove breeding environs, but this hardly explains the record of *T. oldroydi* from near Yuma, Arizona (Philip, 1971), which may indicate the species is also breeding along the lower Colorado River. Most are early spring records in April, but 2 are for as late as 17 June and 27 July.

The coastal records for *T. guatemalanus* are from around the Caribbean and Mexican Gulf Coast areas and include southern Florida, as well as northwestern Mexico from Sonora and Baja California to Nayarit, 10 April to 16 August. I have also seen specimens from Yucatan, Campeche and Quintana Roo on the eastern coast, 20 March to 15 October. These considerations seem to support specific separation from more inland *T. subsimilis* Bellardi to which it has been related by me and others in the recent past.

In the American Museum of Natural History is a female of *Stenotabanus (Aegialomyia) littoreus* (Hine) taken at the port of Progreso, Yucatan, 21 August 1964, a species of which Hine (1907) reports the

type series of both sexes as collected at Puerto Barrios, Guatemala, "from twigs and branches of mangrove growing just at the edge of the water." This is probably another species adapted to breeding in such brackish environs. Six more of this species, dated 3, 12.VIII.74, and 4.VIII.75, were taken in a New Jersey Light Trap in or near mangrove at coastal Cancun, Quintana Roo, by Dr. Donald J. Pletsch of Mexico, D.F., to whom I am also indebted for the following records from the same environs, all females, in both years: *T. guatemalanus,* 8, 23-27.III; 3, 21-24.IV; 2, 4-20.V; 3, 2-21.VI; 5, 1-25.VII: 4, 13-15.VIII; and 1, 15.X. *T. campechianus* Townsend, 3, 24-27.III; 2, 21-27.IV; 3, 5.V; 8, 2.VI; 8, 3-5VII; 13, VIII; and 2, 5-6.XII. These were intermittent collections, so only reflect availability of the flies on the dates of collection in mangrove environs.

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