

Arquivos de Zoologia

ARQ. ZOOL. S. PAULO, VOL. 17(4) : 199-255

23.V.1969

NOTES ON NEOTROPICAL TABANIDAE XII. CLASSIFICATION AND DISTRIBUTION, WITH KEYS TO GENERA AND SUBGENERA

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ABSTRACT

A summary of the classification of the Neotropical Tabanidae (Diptera) is provided, with keys to subfamilies, tribes, genera and subgenera. Distribution and content of each taxon to subgenus is given, together with discussion of patterns of distribution and phylogeny. One new genus and 10 new subgenera are characterized, all based on previously described species.

The present paper is preliminary to a catalogue of the Neotropical Tabanidae being prepared for publication under the editorship of Dr. Nelson Papavero. The last catalogue of this family for the Neotropics was published by O. Kröber in 1934, but so many changes are being incorporated in this new catalogue that a preliminary exposition of the classification to be followed seemed desirable. It was also necessary to provide diagnoses of a number of new taxa that appear to be useful. A summary of the relationships and distribution is also included.

The classification of the neotropical flies of the family Tabanidae has intrigued and challenged all those who have worked with them, but the bewildering array of structural and tinctorial specializations has led to the erection of large numbers of small groups rather than a consistent and workable system of classification. The problem was first attacked by Lutz, whose system, based largely on the Brazilian fauna, was reviewed most recently by Fairchild (1961). Enderlein (1922, 1925) attempted to provide a system for the world fauna, but ignored or misinterpreted many of Lutz' concepts. His system was in many respects highly artificial, and has been extensively criticized (Bequaert, 1924; Szilády, 1926). Kröber (1932) produced a scheme of classification for the Neotropical Tabanidae based on a synthesis of the work of Lutz and Enderlein, a system embodied in his indispensable catalogue (1934). Mackerras (1954, 1955, 1955a) greatly clarified understanding of the suprageneric categories by his use of genitalic characters to define subfamilies and tribes. He also was able to arrange most of the genera in the subfamilies Pangoniinae and Chrysopinae into a

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workable and coherent system, but felt he had insufficient material, particularly from the neotropics, to attempt detailed analysis of the Tabaninae. More limited efforts by Philip (1941, 1954), Barretto (1951) and Fairchild (1943) have dealt with geographic or taxonomic segments of the fauna.

The classification presented here follows Mackerras in the scope and arrangement of the categories above the generic level, and with slight modifications, Mackerras' arrangement of the genera in the subfamilies Pangoniinae and Chrysopsinae. The genera are discussed below under the subfamilies and tribes in which I believe they belong, with comments on their content, distribution and relationships. The keys which follow this discussion are frankly artificial, in that they are intended primarily as an aid to determination, and do not purport to express phylogenetic relations. For ease of use, the Pangoniinae and Chrysopsinae are keyed separately from the Tabaninae. A discussion of possible origins and phylogeny of the Neotropical fauna follows the key.

SUBFAMILY PANGONIINAE

This subfamily contains 3 tribes in the Neotropics, the Pangoniini, Scionini and Scepsidini. The last was treated by Mackerras (1954) as a separate subfamily to include the Neotropical *Scepsis* Walker, and 2 African genera. Further study of the male genitalia has convinced Dr. Mackerras (*in litt.*) that *Scepsis* is in the Pangoniinae, and the African genera are probably in the Chrysopsinae. Travassos Dias (1966) however considers that the two African genera should be placed in separate monotypic subfamilies. Their superficial similarities are quite possibly due to parallel adaptations to a sea beach environment. *Scepsis* is, however, so aberrant, that it seems best to place it in a separate tribe, the Scepsidini.

TRIBE PANGONIINI

The essential criterion for this tribe is the bifid condition of the style of the male genitalia, which is simple in the Scionini. Most genera have bare eyes and a strong appendix at fork of R_4 . None have the greatly elongate proboscis and conically produced face so frequent in Scionini. The following genera and subgenera are placed here.

Veprius Rondani, 1863. Type species, *V. presbiter* Rondani, 1863. This contains 7 Chilean and western Argentina species which much resemble small hairy Tabaninae such as the sympatric *Dasybasis*, having a broad frons with basal callus, third antennal segment with a basal plate and 4-annulate style, and large soft labella. Ocelli and hind tibial spurs are also present, which enables them to be quickly recognized. Philip (1960) has shown that the group treated by Mackerras and previous authors as *Chaetopalpus* is the same as *Veprius*, while the *Veprius* of Mackerras and others is in the Chrysopsinae.

Protodasygapha Enderlein, 1922. Type species, *Tabanus hirtuosus* Philippi, 1865. These insects much resemble *Veprius*, but the antennae

are 8 annulate, subulate, without a consolidated basal plate. Both genera have pilose eyes, though in a few species the pilosity is sparse. Three Chilean species are placed here, all apparently rare.

Apatolestes Williston, 1885. Type species, *A. comastes* Williston, 1885. These are mostly small insects resembling *Protodasypha* with third antennal segment subulate, 8 annulate, bare eyes, short proboscis with large soft labella, and broad frons, usually with a bare callus. The genus is mainly Nearctic, but 3 species occur in northwestern Mexico.

Protosilvius Enderlein, 1922. Type species, *P. termitiformis* Enderlein, 1922. The small genus of S. Brazilian species was revised by Fairchild (1962). They are small, slender long-winged insects with narrow frons, no callus, soft short proboscis, bare eyes and third antennal segment of a variable number of segments, showing a condition intermediate between the subulate 8 annulate segment and that with a basal plate and 4-annulate style. Five species are currently recognized.

Esenbeckia Rondani, 1863. Type species, *Silvius vulpes* Wiedemann, 1828. This is the dominant genus of the tribe in the Neotropics, species occurring throughout the region and extending into the southern Nearctic. *Esenbeckia* are medium to large, slender to robust flies with bare eyes, short to sparse body pilosity, often patterned wings, and usually long proboscis with small compact labella. The frons is generally narrow, with or without a slender to clavate callus. The four subgenera here recognized are as follows:

Subgenus *Palassomyia*, subg. nov. Type species, *Esenbeckia fascipennis* (Macquart), 1838. The single Chilean species placed here has male genitalia typical of the genus, but differs from other species of *Esenbeckia* in having proboscis much less than head height, the labella large, soft and rounded, without sclerotized plates. Palpi basally inflated, deeply grooved outwardly, nearly as long as proboscis. The wings bear prominent round dark confluent spots on all crossveins and at base of wings. The frons is moderately narrow, without callus. This appears to be the least specialized *Esenbeckia*.

Subgenus *Proboscoides* Philip, 1943. Type species *Proboscoides fairchildi* Philip, 1943. This group was proposed as a full genus, based on the highly aberrant structure of the proboscis, which has the labella inflated, sclerotized, forceps-like and apparently lacking pseudotracheae on inner aspect. However, several species have proboscides intermediate in structure between this and typical *Esenbeckia*, so that subgeneric status seems preferable. Six species and two subspecies are recognized, ranging from Panama to Argentina.

Subgenus *Ricardoia* Enderlein, 1922. Type species, *Pangonia semiflava* Wiedemann, 1830. Although treated as a synonym of *Esenbeckia* by both Philip (1954) and Fairchild (1951) on the basis that the character on which it was founded — short palpi — does not hold, it is

here revived as a subgenus for a group of mostly Mexican species. The species are characterized by slender proboscis with slender *Fidena*-like labella, palpi grooved or hollowed on external surface and generally less than half length of proboscis, and absence of a row of long hairs on oculo-genal margin. Twenty-seven species and 1 subspecies are included. The range is from Southern U. S. to Panama, with the great majority of the species in Mexico.

Subgenus *Esenbeckia* Rondani, 1863. The typical subgenus differs from the others in having rather broad but at least partly sclerotized labella, palpi slender to broad, at most flattened on outer aspect, and generally over half length of proboscis. A more or less prominent row of oculo-genal hairs is present. The frons may or not have a bare callus. The subgenus is best represented in South America, but ranges from Argentina to Mexico. Thirty-eight species and 4 subspecies are recognized.

The remaining New World genera in this tribe, although included in the key, are Nearctic and not discussed here. They have been adequately treated by Philip (1954).

TRIBE SCEPSIDINI

The single genus *Scepsis* is monotypic for *nivalis* Walker. It is a slender white fly with milky wings, atrophied mouthparts and both sexes with broad frons without callus. The ♂ genitalia are like the Pango-niini, the ♀ genitalia quite specialized. It occurs on white sand beaches from Rio de Janeiro south, probably to northern Argentina.

TRIBE SCIONINI

These insects, aside from the definitive male genitalic character of simple pointed styles, are usually recognizable by having pilose eyes, the only exception in the Neotropics being the otherwise aberrant genus *Mycteromyia*. Most of the species are rather stout chunky insects with long proboscis and short palpi. None have a clearly defined frontal callus and all possess prominent ocelli. Five genera and 8 subgenera occur in the Neotropics, with an additional monotypic genus in the Nearctic, *Goniops*.

Mycteromyia Philippi, 1865. Type species. *Pangonia conica* Bigot, 1857. A peculiar genus of medium-sized flies with broad frons, bare eyes, and generally long proboscis, but the face not much produced. Many of the species are quite hirsute. The males, like the females, are dichoptic, though the frons is narrower than in the respective females. The proboscis, or at least labium, appears to be hinged at the base, as in Old World *Philoliche*, not retractable as in other New World Scionini. The 14 described species are confined to Chile and Argentina.

Scaptia Walker, 1850. Type species *Pangonia aurata* Macquart, 1838. This genus is generally separable from the remainder of the tribe on the basis of the shorter, stouter proboscis, frons divergent below,

and less swollen, usually hairy face. Four subgenera are here recognized. In the Neotropics the genus is almost confined to temperate South America, but is well represented in Australia and New Zealand.

Subgenus *Pseudomelpia* Enderlein, 1922. Type species, *Pseudomelpia horrens* Enderlein, 1922. But a single Chilean species is assigned here. It is a small densely hairy insect with stout cylindrical palpi and the basal annuli of third antennal segment partially and irregularly fused into a basal plate.

Subgenus *Scaptia* Walker, 1850. These are large stout *Tabanus*-like insects, with short heavy proboscis and palpi over half length of proboscis. The antennae have 8 clear annuli. All the 7 recognized species are confined to western S. America, from Peru to Chile.

Subgenus *Pseudoscione* Lutz, 1918. Type species, *Diatomineura longipennis* Ricardo, 1902. This group is separated from *Scaptia* (*Scaptia*) by having generally longer and more slender proboscis with small compact labella and short flattened or hollowed-out palpi. The face is almost always more or less hirsute, never bare, and the first and fourth posterior cells always open. Most of the 12 recognized species occur in Chile and Argentina with two in Southeastern Brazil. The group appears annectant to *Fidena*.

Subgenus *Lepmia*, subg. nov. Type species, *Pangonia molesta* Wiedemann, 1828. The subgenus differs from *Pseudoscione* chiefly in the structure of the proboscis, which is stout and heavily sclerotized throughout, the labella with apices somewhat bulbous. *S. (Lepmia) seminigra* (Ricardo) is the only other described species. Both occur in Southeastern Brazil, and are moderate-sized stout species of dull coloration and with inflated subshiny abdomens.

Scione Walker, 1850. Type species, *Pangonia incompleta* Macquart, 1845. This group is characterized mainly by the closed and usually petiolate first and fourth posterior cells of the wing (5th R and 3rd M). The proboscis is long to very long, the labella small and compact, face often conically produced, generally hirsute and without bare areas. The wings are frequently patterned in yellow and brown and the thorax usually bears pale stripes and sutural lines. The frons is seldom very narrow, often slightly widened below and often with a conspicuous dark median patch of pollinosity. Except for the wing venation, the taxon is most similar to *Scaptia* (*Pseudoscione*). Thirty-two species and one subspecies are recognized, but the group is a difficult one and specific limits hard to define. The species are concentrated in the mountains of northwestern South America, from Venezuela to Bolivia, but occur north to Mexico and into western Mato Grosso, Brazil.

Pityocera Giglio-Tos, 1896. Type species, *Pityocera festae* Giglio-Tos, 1896. This is a small group of 3 subgenera and 5 species separated from *Fidena* by the specialized antennae, which bear branches or modified hair tufts on one or more of the annuli of the third segment. In addition, the fourth posterior cell is closed far from the wing margin by the anterior bending of M_1 , and the face is bulbous and shiny. All are dull brown species with brownish or yellowish tinted wings.

Subgenus *Elaphella* Bezzi, 1913. Type species, *Pangonia cervus* Wiedemann, 1828. The single species has a long dorsal projection on the basal annulus and short dorsal projections on second to sixth annuli of third antennal segment. It ranges from the Guianas to eastern Bolivia.

Subgenus *Pseudelaphella* Kröber, 1930. Type species *Pangonia nana* Walker, 1850. This group lacks projections on the antennae, but the first annulus of third segment is enlarged and bears a dense dorsal patch of hairs. The three described species range from western Brazil to Ecuador.

Subgenus *Pityocera* Giglio-Tos, 1896. The single species has plumose antennae, the first six annuli bearing both dorsal and ventral slender finger-like projections. It occurs from central Panama to northern Ecuador.

Fidena Walker, 1850. Type species, *Pangonia leucopogon* Wiedemann, 1828. This large and difficult genus has subulate antennae, first posterior cell closed or narrowed, rarely broadly open, fourth always open, face bare or pollinose, rarely sparsely long haired. It is separated from *Scaptia* (*Pseudoscione*) chiefly on more slender labella, and parallel-sided frons. Four subgenera are here recognized.

Subgenus *Neopangonia* Lutz, 1909. Type species, *N. pusilla* Lutz, 1909. Only one species has so far been described. It is a small species with long slender proboscis, widely open first posterior cell, and sparse hairs on face. The thorax is prominently striped. It combines features of *Scaptia* (*Pseudoscione*), *Scione* and *Fidena* (*Fidena*). It appears limited to the higher mountains of southeastern Brazil.

Subgenus *Laphriomyia* Lutz, 1911. Type species *L. mirabilis* Lutz, 1911. This small group is characterized largely by the densely long-haired femora and hind tibiae, giving the insects a woolly bee-like appearance. Three species and one subspecies are recognized, occurring in southeastern and northwestern Brazil, and Bolivia.

Subgenus *Leptofidena* Kröber, 1930. Type species, *L. beelzebul* Kröber, 1930 = *morio* Wulp, 1881. The single species from Argentina differs from typical *Fidena* chiefly in the shiny inflated palpi and long-stalked first posterior cell. The whole insect is black and shiny, but with nearly clear wings.

Subgenus *Fidena* Walker, 1850. Eighty-three species are here recognized, and many more remain to be described. Efforts to split the group have been so far unsuccessful, as the characters used have proven unreliable. Species occur from Mexico to Argentina but nearly two-thirds are Brazilian, largely in the southern half of the country.

There remains one little-known genus, *Zophina* Philip, 1954, based on a single species from Baja California, Mexico, whose genitalia have not been studied, so that it cannot yet be placed with certainty in any of the above tribes and is therefore not included in the key. It may possibly belong to the Chrysopsinae, but speculation is idle until fresh

material becomes available. The description indicates a slender long-winged blackish insect, with rather broad frons divergent below, swollen bare subcallus, and third antennal segment of a basal plate and four slender annuli.

SUBFAMILY CHRYSOPSINAE

The above emendatory spelling is used here to avoid conflict with Chrysopidae based on *Chrysopa* in the Neuroptera.

Except for the world wide genus *Chrysops*, this subfamily is poorly represented in the Neotropics. In addition to the diagnostic genitalic characters given in the key, the Neotropical species can generally be separated from most Pangoniinae by their slender antennae with long first segment and third segment with basal plate and 4 annuli. Only *Mesomyia* (*Coracella*) from Chile is likely to be confused with the more generalized Pangoniinae. Two tribes occur in the Neotropics.

TRIBE BOUVIEROMYINI

These are rare *Tabanus*-like flies with only two genera occurring in the New World, one in Chile and the other eastern Nearctic.

Mesomyia Macquart, 1850. Type species, *M. decora* Macquart, 1850. This genus is well represented in Africa and Australia, but only a single subgenus is known from the New World.

Subgenus *Coracella* Philip, 1960. Type species *Tabanus carbo* Macquart, 1850. The two Chilean species placed here were formerly considered to belong to *Veprius* Rondani, in the Pangoniinae, but Philip (1960) has shown that the latter name was misapplied by most authors. The species are medium sized dark or black flies with microscopically pilose (apparently bare) eyes with a single dark band in the female, narrow clavate or ridge-like frontal callus and short fleshy proboscis. Only 2 Chilean species are known.

TRIBE CHYSOPSINI

Only two genera of this tribe are present in the Neotropics. Both contain small slender insects with patterned wings, long antennae, and eyes with complicated patterns of spots or irregular speckles.

Chrysops Meigen, 1803. Type species, *Tabanus caecutiens* Linnaeus, 1758. This world-wide genus has the wings with a definite dark crossband or remnants thereof, and eyes with a specific pattern of dark spots and or bands. Sixty-eight species occur in the Neotropics, ranging from Mexico to Argentina, with but a single species in Chile.

Silvius Meigen, 1820. Type species *Tabanus vituli* Fabricius, 1805. This genus differs from *Chrysops* in lacking a crossband on the wings, which may be clear or with extensive infuscation or clouds on all crossveins, and in having the eyes irregularly speckled in life. The genus is mainly Holarctic in distribution, with one precinctive subgenus

in the northern Neotropics, and another extending into Mexico from the Nearctic.

Subgenus *Griseosilvius* Philip, 1961. Type species, *Chrysops quadrivittatus* Say, 1823. These are slender greyish species with strongly spotted wings, the third antennal segment longer than the two preceding. One species each occurs in Mexico and Guatemala, and a third extends into northern Mexico from Texas.

Subgenus *Assipala* Philip, 1941. Type species, *Chrysops tanyceras* Osten Sacken, 1886. The wings are heavily clouded on crossveins to almost entirely blackish and the third antennal segment is very short, generally shorter than first, though the antennae are remarkably long. Four species are known, the group ranging from southern New Mexico to eastern Panama.

SUBFAMILY TABANINAE

In addition to the definitive genitalic characters, Tabaninae can always, at least in the Neotropics, be separated from the other subfamilies by the absence of hind tibial spurs and the absence of functional ocelli. In addition, the proboscis is very rarely longer than head height, and the face hardly ever greatly produced and snout-like. Two tribes are recognized, based on the presence or absence of strong setae on the subepaulet or basicosta. This character serves to separate the tribes in most areas, but in the Neotropics is often unreliable, as there are a considerable number of species with a few to numerous setae on the basicosta which are obviously more closely related to groups in which the basicosta is without setae (Diachlorini) than they are to those with fully setose basicosta (Tabanini). In the accompanying keys, recourse has been made to supplementary characters, such as sclerotized labella of the proboscis and vestiges of ocelli, which are common in Diachlorini, but almost unknown in Tabanini.

Lutz (1913, 1914) divided the Neotropical Tabaninae into those with a long tooth on the third antennal segment (Schistocerae) and those with at most an acute angle (Haplocerae). Although convenient, this arrangement cuts across the relationship based on condition of the basicosta. Within the Diachlorini as defined by bare or sparsely setose basicosta, however, those species with a long spine on antenna seem to form a rather natural group of apparently related forms. There are, of course, exceptions such as *Acanthocera*, which although lacking a tooth is surely derived from *Dichelacera*, and individual species in other groups with short tooth. Among the genera with simple antennae there are rarer exceptions, such as *Dasybasis*, subgenus *Nubiloides*, which may be a connecting link between *Dasybasis* and the dichelacerate group, or an independent specialization. In the Tabanini on the other hand the occurrence of a long antennal tooth seems more fortuitous, and with the exceptions of a few small groups, none Neotropical, does not seem to reflect relationships.

TRIBE DIACHLORINI

This includes more than half the species of Neotropical Tabaninae, and 32 of the 37 genera recognized here. Many of the specializations characteristic of this tribe appear to be related to mimicry of various aculeate Hymenoptera, or in a few cases, to mimicry of muscoid Diptera. Most of the more bizarre forms and the bulk of the genera are found within the tropical parts of the region, the species of Chile and temperate Argentina belonging to but a few conservative groups. Over 60 generic names have been proposed for species in this tribe. These are here reduced to 32, with 25 subgenera, and further reduction and consolidation is probably desirable. The characters on which genera are based in this assemblage are often striking but seldom basic, and seem often to be adaptations to largely unknown ways of life. The same structural modifications appear repeatedly in uncorrelated combinations. Being easily used in keys, it is tempting to base groupings upon them. But non-adaptive and correlated characters are singularly scarce. In the present arrangement I have attempted to place together species which seem to me to be related on the evidence available. This, however, reflects only my own taxonomic judgement, and the resulting classification may be no more "natural" than those of my predecessors.

The species in the Diachlorini fall very roughly into two groups, which for want of better terms may be called "conservative" and "specialized". The first group I believe is probably the more primitive, in the sense that they may resemble more closely a hypothetical ancestral type. It is defined more on the absence of noteworthy structures than on their presence. The species are mostly dull colored, of small to medium size, are dominant in the cooler areas, and elsewhere are likely to be found in specialized habitats, as if they were relicts. This group includes the genera *Dasybasis* and *Stenotabanus*, with their subgenera and some apparently related genera. The specialized group includes the remainder of the genera, most of which are strictly tropical. Discussion of the genera follows the order of the key.

Bolbodimyia Bigot, 1892. Type species, *B. bicolor* Bigot, 1892. A small specialized genus easily recognizable by the swollen subcallus and first antennal segment, and narrowed first submarginal cell (3rd R). The species are black or black and yellow, uncommon, and apparently crepuscular. The 11 described species range from Arizona, U. S. A. to Argentina, and Stone (1954) has revised the group.

Querbetia Fairchild, 1963. The single species, *bequaerti*, from Peru has the appearance of *Acanthocera*, but swollen first antennal segment like *Bolbodimyia*. Absence of the third antennal segment in the single known specimen makes relationships uncertain.

Holcopsis Enderlein, 1923. Type species, *H. fenestrata* Enderlein, 1923. The two known species are Mexican. They are yellowish brown insects with brownish wings, swollen shiny subcallus and shiny first antennal segment. The eyes are bare or sparsely long pilose, green

with a single dark median band. Its relationships to other Diachlorini are not apparent.

Chlorotabanus Lutz, 1909. Type species, *Tabanus mexicanus* Linnaeus, 1758. The pale greenish color, lack of frontal callosity, sclerotized labella and unicolorous eyes are distinctive. The group seems most nearly related to *Phaeotabanus*. *Cryptotylus* Lutz, which was treated as a subgenus by Philip and Fairchild (1956), is now believed less closely related. Five species are recognized, and the group ranges throughout the Neotropics, exclusive of Chile and the West Indies. There is also an additional species in southeastern U. S. The habits are crepuscular and nocturnal.

Pachyschelomyia Barretto, 1950. Type species, *P. notopleuralis* Barretto, 1950. A single rather isolated species forms this genus. It appears related to *Phaeotabanus*, but the incrassate fore tibiae, inflated notopleural lobes and basally black wings are distinctive. Known from southwestern Brazil and northern Argentina.

Mjiotabanus Lutz, 1928. Type species, *M. sarcophagoides* Lutz, 1928. This genus has been synonymized with *Stenotabanus* or *Leucotabanus*, but is distinct as pointed out by Barretto (1949). The proboscis is unusually long, with small partly sclerotized labella, the palpi short and inflated, the abdomen of female acutely pointed. The 2 described species are both small, and close mimics of Sarcophagid flies. One species each from Guatemala and Venezuela. Material from S. Paulo, Brazil, reported by Barretto, and from the Chaco region of Argentina and Paraguay seen by me may represent undescribed species. The type of *sarcophagoides* Lutz is lost and the description and figure disagree in several respects, so that its identity is uncertain.

Phaeotabanus Lutz, 1913. Type species, *Tabanus litigiosus* Walker, 1850. These are medium to large flies, generally with greenish tinge when fresh, with narrow frons, slender callus, unicolorous eyes, sclerotized labella, obtuse dorsal angle on antennal plate, and usually with dark wing markings. Thirteen species are included here, and the genus ranges from southern Mexico to northern Argentina, with the majority of the species in Brazil. It seems nearest *Chlorotabanus* in structure.

Eristalotabanus Kröber, 1931. Only a single Ecuadorian species, *violaceus* Kröber, is known. It is apparently a mimic of *Eristalis* (Syrphidae) or Calliphoridae, being metallic violet in color. The type is lost and no other specimens seem to have been taken. It is possibly a specialized offshoot from *Diadocera* or *Dasychela*, having a long tooth on third antennal segment and pilose eyes.

Acanthocera Macquart, 1834. Type species, *Tabanus longicornis* Fabricius, 1794. The essential character for separating this genus from the closely related *Dichelacera* is the elongate first antennal segment. On this basis, a number of species formerly placed in *Acanthocera* by Fairchild (1939) and Barretto (1947) are removed to a new subgenus of *Dichelacera*. Use of other characters would necessitate the placing

of *Dichelacera* as a subgenus of the older *Acanthocera*. The latter is in my opinion a mimetic specialization of *Dichelacera* or possibly a polyphyletic group. Three subgenera are here recognized.

Subgenus *Polistimima*, subg. n. Type species *Acanthocera polistiformis* Fairchild, 1961, sole species. The species is known from a single male from Amapá, Brazil. It is a uniformly reddish brown insect, including the wings, and differs from other subgenera in the lack of a lengthened style of third antennal segment. It closely resembles a species of *Polistes* (Hymenoptera: Vespidae).

Subgenus *Mimodynerus* Enderlein, 1922. Type species *Acanthocera amacantha* Lutz & Neiva, 1915. This name is revived from synonymy (Fairchild 1939) to cover those species which lack any trace of dorsal tooth or angle on basal plate of third antennal segment. The species also have very wide frons, transverse callus, and unusually inflated palpi. Five species are included, all from southern Brazil and Paraguay.

Subgenus *Acanthocera* Macquart, 1834. These species possess at least a dorsal angle or tubercle on basal plate, generally a fairly long tooth or slender spine, and the frons is rarely as wide as high, generally narrower. Five species are included, 4 occurring from southern Brazil to Argentina and Uruguay, the other in the northern half of the continent.

Dichelacera Macquart, 1838. Type species *Tabanus cervicornis* Fabricius, 1805. This genus is separated from *Catachlorops* chiefly on the basis of frontal characters, the callus being nearly always as wide as frons, the eyes usually with at least a single stripe, and the labella generally entirely sclerotized. Five subgenera are recognized. All of the species are small to medium, slender, generally with brightly marked bodies and wings with dark pattern.

Subgenus *Dichelacera* Macquart, 1838. This is by far the largest subgenus, and contains species with labella of proboscis wholly sclerotized, eyes always banded except for one species, wings with diagonal dark band or remnants thereof, and callus more or less square, as wide as frons. Fifty-one described species are included, plus several of uncertain status. The group ranges from southern Mexico to northern Argentina, but none are known certainly from Chile or the West Indies. All appear to be associated with a forest environment. Fairchild and Philip (1960) revised the group.

Subgenus *Nothocanthera*, subg. n. Type species, *Acanthocera tenuicornis* Lutz, 1915. Differs from *Acanthocera* in the short basal segments of antennae, and from other subgenera of *Dichelacera* in usually lacking diagonal wing band, bare or partly bare frontoclypeus and genae, labella not wholly sclerotized, scutellum usually pale, and often wasp-like appearance. The group stands between *Acanthocera* and *Dichelacera*, and nearly all the species were described in the former genus. The following species additional to the type are placed here: *albomarginata* Kröber, 1930, *apicalis* Fairchild, 1939, *cnephsa* Barretto,

1947, *costaricana* Fairchild, 1941, *diaphorina* Barretto, 1947, *leucotibialis* Barretto, 1947, *melanoptera* Hine, 1920, *nigricorpus* Lutz, 1918, *steli-thorax* Barretto, 1947 and *trigonifera* Schiner, 1868. The group ranges from Honduras to southern Brazil.

Subgenus **Idiochelacera**, subg. n. Type species, *Dichelacera subcallosa* Fairchild & Philip, 1960, sole species. Differs from other subgenera in partly bare subcallus, unbanded eyes, lack of markel wing pattern, and black scutellum. Only the type species from Colombia and Peru is known.

Subgenus **Desmatochelacera**, subg. n. Type species, *Dichelacera transposita* Walker, 1854, sole species. The single species resembles *Catachlorops* in having heavily black marked wings, though the pattern is different, and unicolorous eyes. The callus is as wide as frons at base, but tapers into a ridge reaching nearly to vertex. Labella only partly sclerotized. The range is from Panama to Ecuador.

Subgenus *Orthostyloceras* Lutz, 1933. The type species, *ambiguus* Lutz & Neiva, 1914, is a large slender brown insect with a wing pattern consisting of a brown discal patch which extends along costa to apex, with another extension along R4, somewhat as in certain species of subgenus *Dichelacera*, but frons narrow, callus clavate, and vertex sunken. Thorax unpatterned and abdomen with large yellow-haired triangle on tergites 3-4. The other species placed here, *nubiapex* Fairchild & Philip, 1960 is much smaller, with broader frons, more *Catachlorops*-like wing pattern, and pale haired scutellum. It is perhaps not closely related, but fits nowhere else satisfactorily. Both species are from southeastern Brazil.

Catachlorops Lutz, 1911. Type species, *Dichelacera fuscipennis* Macquart, 1847. The genus has been expanded since the reviews of Kröber (1939) and Barretto (1946) to include most of the small to medium sized species with narrow frons, clavate or ridge-like frontal callus, long-spined antenna, and pictured wings. Palpi are slender to thread-like, all tibiae slender, labella of proboscis rarely without sclerotized plates. The separation of this group from *Dichelacera* is based largely on structure of frontal callus and there are intermediate forms. Separation on eye color between those species with bicolored or unicolorous eyes does not seem warranted, as both conditions may exist in the same species (Fairchild & Philip, 1960:78). Furthermore the type species of *Catachlorops* and *Amphichlorops* differ hardly at all in structure. Six subgenera are here recognized, based chiefly on color characters, especially wing patterns. A number of species do not fit easily into these categories, and others could be placed with equal justification in either of 2 or more subgenera. Future work may show some or all these subgenera to be unnecessary.

Subgenus *Psalidia* Enderlein, 1922. Type species, *Pangonia furcata* Wiedemann, 1828. The chief character separating this group is the closed or coarctate first posterior cell, although in a few species otherwise related, it is but slightly narrowed. The wing pattern is variable,

but the discal cell always basally hyaline, and usually the apex and small areas in the marginal and first submarginal cells. Frons are narrow to very narrow, with ridgelike callus. Palpi very slender. Antennal tooth very long, frequently recurved at tip. Labella fully sclerotized. Body colors are usually yellow to orange or brown, occasionally black. The 11 species range from Mexico to southeastern Brazil, with over half the species in Central America and Panama.

Subgenus *Catachlorops* Lutz, 1909. These species are mostly small to medium sized, slender, brown to black insects. The wing pattern is black, characteristically a large rounded discal patch including all the discal cell, but wings may be all black, with only apex hyaline, or obscurely brownish tinted. Frons is narrow to moderate, the callus often clavate. First posterior cell rarely somewhat coarctate. Antennal tooth long to short, seldom if ever recurved at tip. Labella often partly pollinose. Twenty-four species are recognized, nearly all in southeastern Brazil, with a few species reaching the Guianas, Colombia, and Argentina.

Subgenus *Rhamphidommia* Enderlein, 1922. Type species, *Rhamphidommia muscosa* Enderlein, 1922. The wing pattern is rather characteristic, with an irregular diagonal band from margin through outer half of discal cell, and an isolated spot beyond fork of third vein. Frons is of moderate width, the clavate callus almost as wide as frons at base. Antennal tooth sometimes quite short. Labella largely or wholly pollinose. Thorax generally prominently striped and abdomen with prominent middorsal triangles on most tergites. The 4 recognized species range from S. Paulo, Brazil south to Argentina.

Subgenus *Psarochlorops*, subg. n. Type species, *Dichelacera testacea* Macquart, 1846. This group appears related to *Psalidia*, the wing pattern derivable by reduction to a small irregular band below stigma and clouds around crossveins and fork of third vein. First posterior cell is not coarctate, frons moderate, callus clavate, rarely obsolescent. Labella partly pollinose. Included here in addition to the type species are: *alcis* Williston, 1896, *auripilis* Philip, 1960, *difficilis* Kröber, 1931, *ecuadoriensis* Enderlein, 1925, and *quadrifasciatus* Macquart, 1846. The group ranges from Ecuador and the Guianas into the northern Amazon basin, with one species on St. Vincent in the West Indies.

Subgenus *Hadrochlorops*, subg. n. Type species, *Tabanus scutellatus* Macquart, 1838. This group contains relatively large and robust species with wing hyaline, faintly tinted, brownish or with veins dark margined. Frons are relatively broad, callus clavate, antennae unusually short and chunky, labella wholly or largely pollinose, and palpi rather stout. They differ from subgenus *Amphichlorops* in stouter build, with stouter antennae and palpi, and in the usually wholly soft labella. The following species, beside the type, are included, *ferrugineus* Barretto, 1948, *fuscivittatus* Barretto, 1948, *rufipennis* Macquart, 1838, and *unicolor* Lutz, 1912. The group is in several respects transitional to *Dicla-*

docera, but has bare eyes and bare basicosta. It was treated by Fairchild (1958) under *Dicladocera*. All the species are limited to southern Brazil.

Subgenus *Amphichlorops* Lutz, 1913. Type species, *Tabanus flavus* Wiedemann, 1828. A small group of 4 species not structurally separable from subgenus *Catachlorops*, but with wings yellowish to smoky, often darker on apical half. Two of the species occur in southern Brazil to Paraguay, the other 2 from Colombia to Bolivia.

Stibasoma Schiner, 1868. Type species, *Tabanus theotaenia* Wiedemann, 1828. This is a genus of mostly specialized beelike species, with swollen and heavily fringed tibiae, inflated palpi, sclerotized labella, and short chunky antennae with a long dorsal spine. All the species appear to be arboreal, flying in the forest canopy. Several have been bred from larvae in epiphytic Bromeliaceae. Two subgenera are recognized.

Subgenus *Stibasoma* Schiner, 1868. In this subgenus the antennal spine is long, exceeding end of basal plate, and often clubbed. Fore tibiae always and others usually incrassate. Wings usually patterned. Generally hairy species resembling bees. Sixteen species are recognized, ranging from Mexico to Argentina. Species are very variable in color of vestiture, and some included here as species may prove but color forms when adequate material becomes available.

Subgenus *Rhabdotylus* Lutz, 1909. Type species, *Tabanus planiventris* Wiedemann, 1828. This group is less specialized than *Stibasoma*. The antennal tooth shorter, more slender, the fore tibiae only slightly incrassate, the wings without definite pattern and abdomen greenish in life. Four closely similar species are currently recognized, the group ranging from southern Brazil to Guatemala.

Cryptotylus Lutz, 1909. Type species, *Tabanus unicolor* Wiedemann, 1828. This genus was formerly considered a subgenus of *Chlorotabanus* (Philip and Fairchild, 1956) due to greenish color and reduced or absent frontal callus, but structure of antennae with strong dorsal angle or tooth suggests it is more likely related to *Stibasoma*. The species are chunky greenish insects with yellow to brown unicolorous vestiture, clear wings, and frontal callus a small narrow ridge or virtually absent. The labella are wholly sclerotized and the antennal tooth often no more than a strong acute angle, never reaching end of basal plate. Four species and one subspecies are currently recognized. The species are crepuscular or nocturnal and seldom attack man.

Dasychela Enderlein, 1922. Type species, *Dicladocera limbativena* Enderlein, 1922. In 1958 I discussed this name and concluded it was probably a synonym of *Stypochela* Enderlein, 1922. Since seeing the type species of both concepts (Fairchild 1966a), it is apparent that they are not closely related, and that *Dasychela limbativena* Enderlein the type species, belongs to the *badia* group as defined by me in 1958. The genus consists of medium to large species with long slender palpi and long to very long proboscis with compact but pollinose labella. Frons moderate to narrow, the callus ridgelike to clavate. Antennae usually with basal

plate unusually long, style proportionally short, the dorsal tooth very long, except in *limbativena*, and with 2 dorsal spines in one species. The wing pattern consists of a dark discal band and basal infuscation which leaves area around ends of basal cells and apex of wing hyaline. The eyes are pilose or bare. Two subgenera are recognized.

Subgenus *Triceratomyia* Bequaert, 1937. Type species, *T. macintyreii* Bequaert, 1937. Although described as a genus on basis of the triramous antennae, the discovery of a second closely allied species with biramous antennae makes subgeneric placement necessary. These are brown insects with very long proboscis and protuberant face, long antennae with one or two long slender dorsal spines whose opposing surfaces bear long erect hairs. The eyes are bare. Two species are recognized, occurring from Ecuador to Bolivia on the eastern side of the Andes.

Subgenus *Dasychela* Enderlein, 1922. Similar in appearance to subgenus *Triceratomyia*, but antennae less specialized, shorter, and lacking long hairs. Eyes bare or pilose. Five species are recognized, ranging from Costa Rica to Peru and northwestern Brazil. The group appears related to *Catachlorops* (*Psarochlorops*), as *C. (P.) ecuadoriensis* End. is similar in wing pattern to *D. (D.) inca* Philip, though antennae and frontal callus are quite different.

Lepiselaga Macquart, 1838. Type species, *Tabanus lepidotus* Wiedemann, 1828 = *crassipes* Fab. A small genus of small, chunky, predominantly black species with black patterned wings with discal cell constricted, incrassate tibiae, and flattened shiny palpi. Two subgenera are recognized. Some of the species are probably mimics of stingless bees. The group was revised by Fairchild (1966).

Subgenus *Lepiselaga* Macquart, 1838. This contains the single ubiquitous species *L. crassipes* (Fabricius), recognizable by frons twice as high as wide, notopleural lobes not protuberant, and whole body clothed with iridescent green scale-like hairs. The species ranges throughout the Neotropics except Chile but including the West Indies, and is at times a serious pest. The larvae live in floating aquatic vegetation in fresh-water swamps.

Subgenus *Conoposelaga* Barretto, 1949. Type species, *Lepiselaga aberrans* Lutz, 1913. The 3 recognized species have frons as wide as high or wider, inflated spherical notopleural lobes, and lack green scales. The group ranges from eastern Colombia to Argentina.

Oopelma Enderlein, 1923. The single species, *globicornis* Wiedemann, 1821, is one of the smallest Neotropical Tabanidae, and has all the characters of *Stenotabanus*, except for the greatly inflated first antennal segment. It is surely a specialized offshoot of *Stenotabanus*. It is apparently confined to the state of Bahia, Brazil.

Himantostylus Lutz, 1913. Type species, *H. intermedius* Lutz, 1913. The single species much resembles *Lepiselaga*, but the discal cell is not constricted, the wing not so extensively black basally, and the frons different, with callus as wide as frons and well marked vestiges of ocelli. The range is from Panama to Bolivia.

Erioneura Barretto, 1950. Type species, *Tabanus fuscipennis* Wiedemann, 1828. This monobasic genus was formerly placed in *Phaeotabanus*, but differs in wholly membranous labella, callus large, as wide as frons, and subcallus bare and shiny. The wings are black except for a hyaline triangle covering apices of all posterior cells and extending into middle of second submarginal cell. The tip of the abdomen is flattened and upturned and fore tibiae slightly inflated, as in *Pachyschelomyia*, to which it may be related.

Eutabanus Kröber, 1930. Type species, *E. pictus* Kröber, 1930. This monobasic genus is characterized by the protuberant and conical notopleural lobes, inflated fore tibiae and flattened hind tibiae. It is a small insect of black and white coloration with a narrow abbreviated dark discal band on wing, and bare unicolorous eyes. Specimens are known from northern Brazil, eastern Peru and Surinam.

Diachlorus Osten Sacken, 1876. Type species, *Tabanus bicinctus* Fabricius, 1805. A widespread and abundant group of small flies of generally yellow and black coloration. The pleura have a patch of pearly pollinosity, the wings are dark patterned, generally with a dark patch at apex, and the eyes have characteristic patterns of lines and spots much like *Chrysops*. The structure of frons is quite variable, ranging from very slender and parallel sided to broad and divergent below, but all have at least frontoclypeus bare and shiny. Some are mimics of wasps. Twenty species are recognized, ranging from south eastern United States and the Bahamas to Argentina, but absent from Chile and the West Indies.

Stenotabanus Lutz, 1913. Type species, *Tabanus taeniotes* Wiedemann, 1828. This is an assemblage of very small to medium sized, mostly inconspicuous *Tabanus*-like flies difficult to characterize. The eyes are bare, with at least 2 transverse bands in life, frons moderate to broad, the callus not ridgeline, generally as wide as frons. It seems likely that this group derived from *Dasybasis*, from which some species are difficult to separate, and in turn may have given rise to more specialized groups such as *Diachlorus* and *Himantostylus*. Seven subgenera are here recognized.

Subgenus *Brachytabanus* Fairchild, 1942. Type species, *Stenotabanus longipennis* Kröber, 1930. Two very small species belong here. The frons is very broad, callus small and protuberant, tentorial pits black and shiny within, and antennal style with but 3 visible annuli. The males of the one species where that sex is known have a pair of velvety black spots on frontal triangle. One species occurs from Panama to Venezuela, the other in Argentina.

Subgenus *Phorcotabanus* Fairchild, 1961. Type species, *Tabanus cinereus* Wiedemann, 1821. This group has rather broad but convergent frons, with large protuberant callus, no tubercle at vertex, sparse setae on basicosta, and antennal style generally with but 3 easily discerned annuli, although 4 may be present. They are blackish species with abdomen marked with 3 rows of white spots, the median pale mark

on second tergite often reduced or absent. Wings are clear, or with clouds on crossveins. Two described species belong here, and I have seen a third, as yet undescribed. Both described species are from northeastern Brazil or eastern Colombia.

Subgenus *Stenochlorops*, subg. n. Type species, *Diachlorus vitripennis* Lutz, 1918. Differs from *Stenotabanus* s.s. in having subcallus and face largely bare and shiny, eyes with slender green lines forming two narrow transverse loops, and scutellum contrastingly pale-haired. The group contains also *paradoxus* (Lutz, 1913) and an undescribed species treated as *paradoxus* Lutz by Bequaert (1926:224). I have seen types of both Lutz species and they are distinct and both different from Bequaert's specimens. The species are shiny black, with scattered greenish scalelike hairs when fresh, glass clear wings and white tibiae. *Stenotabanus* (*Stenotabanus*) *calviti* Fairchild is close, but lacks the bare face and characteristic eye pattern, and has abdomen with yellow bands. All three species are Brazilian, from Amazonas to Mato Grosso.

Subgenus *Melanotabanus* Lutz & Neiva, 1914. Only a single species is so far known, *fuliginosus* Lutz & Neiva, from the State of Rio de Janeiro, Brazil. It is a small blackish species with wing veins strongly dark margined, a long appendix on fork of third vein, and frons distinctly widened below, with large protuberant callus. I have seen what appears to be another species of the same group.

Subgenus *Cretotabanus*, subg. n. Type species, *Stenotabanus cretatus* Fairchild, 1961, sole species. Differs from other subgenera in narrow and strongly converging frons with callus much higher than wide and extended above in a ridge, strong tubercle at vertex, and in unusual coloration. The thorax is black with two abbreviated dorsal white stripes and margins and scutellum also white. Abdomen has small white middorsal spots on first and second tergites and a large white square patch on third. The species is known only from the types from Amapá, Brazil.

Subgenus *Aegialomyia* Philip, 1941. Type species, *Tabanus psammophilus* Osten Sacken, 1876. This group includes mostly broad fronted, pale, beach or arenicolous species of small to medium size. The separating characters given in the key do not all invariably apply, and certain species such as *cribellum* Osten Sacken, *chiapanensis* Fairchild and a few others placed here in subgenus *Stenotabanus* could go equally well in *Aegialomyia*. The 17 included species range from southeastern United States to Ecuador and Bahia, Brazil, with most of the species on the coasts and islands of the Caribbean Sea and Gulf of Mexico. I regard the group as conservative and adapted to beach and desert environments.

Subgenus *Stenotabanus* Lutz, 1913. These are mostly small to very small species with medium to narrow, generally parallel-sided frons with callus round or square, as wide as frons, and usually with a dark hair patch in middle of frons. Often there is a median callus and tubercle at vertex. Wings clear, fumose or spotted on cross veins. Eyes usually

with 2 green bands. Abdomen various, unicolorous, banded, or with a median stripe or series of triangles. Forty species are recognized ranging from Mexico to Argentina, including the West Indies. Several species also occur in southern United States. None are known from Chile.

Anaerythropros Barretto, 1948. Type species, *A. lanei* Barretto, 1948. An anomalous genus of 2 species apparently related to *Stenotabanus*, but with bicolored eyes and bare areas on face. It is known only by the types, both sexes of one species, the male only of the other. Both are from southeastern Brazil.

Dasybasis Macquart, 1847. Type species, *D. appendiculata* Macquart, 1847. This is a large assemblage of mostly medium sized species. They resemble *Tabanus* or *Hybomitra* in general appearance, but have bare or rarely sparsely setose basicostas, generally pilose eyes which are usually unicolorous or with a single dark stripe. Many of the species are densely hairy, and most have medium to very broad frons. The recent revision of Coscarón & Philip (1967) divides the group into 5 subgenera. Headquarters of the group is in temperate Argentina and Chile, from which a number of species extend northwards at high elevations in the Andes to Venezuela. The genus is also well represented in Australia and New Zealand, extending to New Caledonia and New Guinea.

Subgenus *Scaptiodes* Enderlein, 1922. Type species, *S. nigerrima* Enderlein, 1922 = *gagatina* (Philippi, 1865). A monotypic group for *gagatina* Philippi of southern Argentina and Chile. The species is small, entirely shiny black, with clear wings.

Subgenus *Nubiloides* Coscarón & Philip, 1967. Type species, *Tabanus nigripennis* Philippi, 1865. This is also monotypic and also from southern Argentina and Chile. The species is moderately large, blackish with heavily fumose wings, narrow ridgelike callus and a moderately long tooth on basal plate of antenna. It seems to be an independant specialization, as the antenna has short basal plate with tooth nearly erect, and long style, quite different from *Catachlorops* and *Di cladocera* to which it might seem related.

Subgenus *Haematopotina* Coscarón & Philip, 1967a. Type species, *Chrysozona argentina* Brèthes, 1910. The two species and 1 subspecies placed here are small slender insects with very broad frons, transverse callus and a transverse band of dark pollinosity in middle of frons. The wings have a lace-like grey pattern and clouded cross-veins similar to *Haematopota*, where the type species was originally placed. The group occurs in Argentina, Chile and Bolivia.

Subgenus *Agelanius* Rondani, 1863. Type species, *Agelanius meridianus* Rondani, 1863. This group differs from subgenus *Dasybasis* in generally narrower frons with ridgelike or clavate callus and strong vestiges of ocelli at vertex. Some species have fairly abundant setae on basicosta, so that the subgenus has been keyed out twice. Seven species and two subspecies are recognized, ranging from southern Chile and Argentina to Peru.

Subgenus *Dasybasis* Macquart, 1847. This subgenus contains the bulk of the species, 64 and 2 subspecies. They differ from other subgenera in generally broader frons with callus filling frons, or rarely reduced or absent, no strong tubercle at vertex, or at least without vestiges of ocelli. The antennae are without tooth, wings clear or clouded on crossveins, and bodies pollinose. The range is as for the genus, with most of the species in Chile and Argentina. One species extends south to Tierra del Fuego, and is the most southern Tabanid known.

Selasoma Macquart, 1838. A monotypic genus, for *tibiale* Fabricius, 1805, a stout black shiny species with basal halves of wings black, incrassate tibiae and palpi and basal plate of antenna flattened, much longer than style and obtusely angled above. It is not obviously related to any other genera. Range is from Mexico to Argentina, but it seems to be nowhere common.

Hemichrysops Kröber, 1930. Another monotypic genus for *fascipennis* Kröber, 1930. This is a small slender black species with long, largely black wings, produced face, slender *Diachlorus*-like antennae and long proboscis. It appears to have no close relatives. The few known specimens are from Costa Rica, Panama and Colombia.

Leptapha Enderlein, 1923. This is also a monotypic genus for *fumata* (Wiedemann, 1821). It is a slender brown insect with brown wings, very long and slender third antennal segment, and bare areas around tentorial pits. All the known specimens come from the state of Bahia, Brazil.

Pseudacanthocera Lutz, 1913. Type species, *Silvius sylveirii* Macquart, 1838. A small genus of slender somewhat wasp-like flies closely related to *Leucotabanus* Lutz. They differ from the latter in shiny inflated palpi, more slender antennae, and elongate body. One species has face shiny, in the others it is thinly pollinose. Three species are recognized, occurring from eastern Colombia to northern Argentina.

Dicladocera Lutz, 1909. Type species *Tabanus guttipennis* Wiedemann, 1828. I use this name here for the *guttipennis* group, as discussed previously (Fairchild, 1958). It includes mostly Andean species with long antennal tooth, short proboscis with pollinose soft labella, generally some setae on basicosta, often pilose eyes, and a usually characteristic wing pattern consisting of black discal band with clear fenestra in discal cell. The frons is moderate to broad, with a clavate callus. Twenty-six species are recognized, ranging from eastern Panama to Venezuela and northern Argentina, with two rather aberrant species, including the type of the genus, in southern Brazil. Most of the species are concentrated in the highlands from Colombia to Peru.

Philipotabanus Fairchild, 1943. Type species, *Tabanus ebrius* Osten Sacken, 1886. A moderate-sized group of small to medium-sized slender species with mostly extensively patterned wings, narrow to very narrow frons with clavate to threadlike callus, tubercle at vertex, mostly slender palpi and unicolorous eyes. Three subgenera are recognized.

Subgenus *Philipotabanus* Fairchild, 1943. These species are characterized by the dark wing pattern which leaves hyaline fenestrae around crossveins and fork of third vein. The frons is always narrow to very narrow, over 7 times as high as wide, the palpi very slender and eyes bronzy in life. Fourteen species are recognized, ranging from Mexico to Bolivia and the northern Amazon basin. There is apparently considerable geographic variation and some species listed may prove to be synonyms.

Subgenus *Melasmatabanus* Fairchild, 1964. Type species, *Tabanus fascipennis* Macquart, 1845. This group is similar structurally to the preceding, but the wing pattern is solid, without fenestrae around crossveins, and the species are all largely black. Eyes green in life. Four species are included, ranging from Panama to Venezuela and Ecuador.

Subgenus *Mimotabanus* Fairchild, 1964. Type species, *Philipotabanus inauratus* Fairchild, 1947. Similar to the foregoing in solid wing pattern, or with pattern reduced to a mere shade below stigma, but with broader frons, clavate callus, and stouter palpi. One species has brick-red eyes in life, prominently striped thorax and but a trace of wing pattern and resembles a Muscoid fly. The other species resemble species of *Catachlorops* in wing pattern and body color. Four or possibly 5 species belong here, ranging from Guatemala to Peru.

Spilotabanus, gen. n. Type species, *Tabanus (Phaeotabanus) multiguttatus* Kröber, 1930, sole species. The single species has bare or sparsely setose basicosta, rather broad frons with large callus as wide as frons, pointed above, small tubercle at vertex, long slender proboscis with long narrow soft labella, long, slender, slightly flattened palpi, somewhat protuberant face, and slender antennae. The eyes are bare, apparently unicolorous. The thorax is prominently striped, the abdomen black with bright silvery white-haired median triangles on fourth to sixth tergites. The wings are long, hyaline, with large circular dark spots on all crossveins, a black patch in basal halves of basal cells, and small round dark spots before the ends of all longitudinal veins. The anal and axillary area of wing are also paler fumose. Relationships are not clear, but it seems nearest *Philipotabanus*, though unlike any of the subgenera in frons and wing pattern. It is known from eastern Colombia and Ecuador, apparently at elevations over 1000 meters.

Leucotabanus Lutz, 1913. Type species, *Tabanus leucaspis* Wiedemann, 1828 = *exaestuans* Linnaeus, 1767. The group includes species of small to medium size, basicosta sparsely to abundantly setose, frons narrow to moderate, the callus clavate or ridgelike, narrower than frons. Vertex with a prominent tubercle, often with vestiges of ocelli. Proboscis short, labella large, soft. Palpi moderately inflated, short. Subcallus frequently bare and shiny, and abdomen often pointed in female. Species are usually black with scutellum and often mesonotum contrastingly pale haired, and with the abdomen usually with pale bands on some or all tergites, often also with median triangles, rarely entirely dark. Due to variation in basicostal setae, the genus is keyed

twice. It seems nearest *Stypommisa* in structure but never has patterned wings. Thirteen species are recognized, ranging from Mexico to Argentina, with an additional southern Nearctic species. Larvae have been found associated with rotten wood, and in the bases of standing hollow trees.

Stypommisa Enderlein, 1923. Type species, *Stypommisa punctipennis* Enderlein, 1923. These are mostly small slender species, the basicosta with few to numerous setae, rarely bare. Frons narrow to very narrow, rarely broad, the callus drop-shaped, clavate or linear, and with generally a well marked tubercle at vertex. They differ from *Leucotabanus* in generally having some pattern on wings, clouds on cross veins or anterior or terminal infuscation, and in often having fork of third vein appendiculate. Colors are light to dark brown, less often black, the abdomens with median triangles or unicolorous, not usually banded. Proboscis short, labella soft, palpi moderately slender. Eyes green or bronzy, usually unbanded, rarely with single narrow dark stripe. A few species are Muscoid mimics, and have striped thorax and bluish pruinose abdomens, with or without white median triangles. Some also have pilose eyes in both sexes, or in male only. Twenty-four species are placed here though in one or two cases placement is questionable. Range is from Nicaragua to Argentina.

TRIBE TABANINI

This includes but five genera in the Neotropics, two of which are Nearctic elements which extend only into northern Mexico. Of the other three, one is a monotypic genus of uncertain relationships, one is a poorly differentiated derivative of *Tabanus* and the other the world-wide genus *Tabanus*. Fully setose basicostas, wholly pollinose labella and lack of any vestiges of ocelli will usually serve to distinguish Tabanini from Diachlorini. There are, however, a few species or groups difficult to place because of more or less setose basicostas, such as *Leucotabanus*, some species of *Stypommisa*, and certain *Tabanus* species with long antennal spines. The first two generally have well-marked tubercles at vertex, often with clear vestiges of ocelli, while the last can be separated from similar appearing species of *Di cladocera* by narrow frons, ridge-like callus, bare eyes and no tubercle at vertex.

Stigmatophthalmus Lutz, 1913. A monotypic genus for *altivagus* Lutz, 1913, a black species somewhat resembling *Selasoma*, but with setose basicosta, a strong short tooth on antenna, and normal palpi. The body is black, the abdomen shiny, with small white-haired median triangles on fourth and fifth tergites. Wings black nearly to fork of third vein, with small hyaline spots in ends of basal cells, discal cell, and fourth and fifth posterior cells. There is a small tubercle at vertex, the frons is narrow, with a clavate callus poorly defined at lower end. The species is known only from the coastal mountains of southeastern Brazil. It appears to be a relict species, with relationships to *Tabanus*, *Di cladocera* and *Selasoma*.

Atylotus Osten Sacken, 1878. Type species, *Tabanus bicolor* Wiedemann, 1821. This is a Holarctic genus, with but a single somewhat aberrant species in Mexico. Eyes are pilose, with a single narrow stripe. Frons is moderately narrow, with a small round basal callus and often a small unconnected median callus, or without any calli.

Poeciloderas Lutz, 1921. Type species, *Tabanus quadripunctatus* Fabricius, 1805. This name covers a small and poorly defined group of Neotropical species resembling *Hybomitra*, but probably not closely related to it. They differ from *Hybomitra* in having the first antennal segment inflated and produced dorsally, cap-like, often wider than third segment, and eyes with but 2 green bands. There is usually a low rounded tubercle at vertex, the eyes are pilose in male, often also in female. Wings generally with clouds on crossveins, and first posterior cell usually coarctate, sometimes closed. The 7 species are mainly south temperate or Andean, though not in Chile, but one species, *quadripunctatus* Fabricius, is widespread from Mexico to Argentina. Relationships seem to lie with the *lineola* group of *Tabanus*, and they might better be treated as a subgenus of *Tabanus*, but since they are as distinct as *Hybomitra*, generic status is retained here.

Hybomitra Enderlein, 1922. Type species, *Hybomitra solox* Enderlein, 1922 = *rhombicus* Osten Sacken, 1876. This Holarctic group enters the Neotropics only in Mexico where 4 species occur, one ranging also into Arizona. The group is separated from *Tabanus* on pilose eyes and the presence of a tubercle at vertex. The first antennal segment is not enlarged as in *Poeciloderas*, nor is the first posterior cell coarctate or closed. Two additional Nearctic species, *cincta* (Fabricius) and *zonalis* (Kirby) were reported from Mexico in the last century, but their known distribution makes this unlikely and there has been no recent confirmation of their presence.

Tabanus Linnaeus, 1758. Type species, *Tabanus bovinus* Linnaeus, 1758. The genus is world-wide and distinguished from related groups mainly on negative characters, having bare eyes, with or without pattern, no tubercle at vertex, short proboscis with soft labella, setose basicosta, uninflated legs, dorsal angle of basal plate of third antennal segment obtuse or acute, rarely with a long tooth or spine, palpi various but not excessively slender or bare and shiny. Wings never banded (in Neotropical species), though they may be tinted, spotted on crossveins, veins brown margined, or entirely dark or black. Frons, callus and coloration very diverse. At least in the Neotropics, the group may be polyphyletic.

The problem of breaking *Tabanus* into usable subgenera will eventually have to be faced, but this should be done on a worldwide basis. The 12 subgenera proposed at various times for Neotropical species include only a fraction of the species, and are almost impossible to define. Those which have been most frequently used are discussed here.

Neotabanus Lutz, 1909. The original content of this group, as far as can be ascertained from Lutz' published remarks and study of his

collection (Fairchild, 1961:242), included species with banded eyes, unstriped thorax, unspotted wings, no appendix on third vein and no median frontal callus. Kröber (1934) included primarily species with 1 or 3 mid-dorsal abdominal stripes or series of connected triangles, and this in general has been the sense in which the name has subsequently been used (Fairchild, 1942; Philip, 1942, 1965). There are however, a considerable number of species having more or less striped abdomens, such as the species related to *trivittatus* Fabricius, *sorbillans* Wiedemann, *pungens* Wiedemann, *claripennis* Bigot, *mucronatus* Fairchild, and *strigimaculus* Fairchild which in other respects do not appear closely related to the type species. If additional characters, such as frontal structure and eye pattern are included in the definition, the group becomes too restricted to be of much utility while a return to the largely negative definition of Lutz would necessitate inclusion of a large percentage of Neotropical *Tabanus* in the group, which was possibly Lutz' intention.

Lophotabanus Szilády, 1926. The main character used to define this group has been the presence of a round velvety black spot on disk of scutellum and adjoining thorax, mostly surrounded by pale contrasting hairs and pilosity. The species are otherwise not homogeneous, having clear or dark wings, with first posterior cell closed or open, a long appendix or none on fork, banded or unicolorous eyes, abdomens plain, with a middorsal stripe, with transverse segmental bands or with 1 or 3 rows of triangles or dorsolateral oblique marks. Some species obviously related to the type in other respects lack the scutellar spot, or it may be faint and ill defined. Species such as *nebulosus* De Geer and *olivaceiventris* Macquart have a black spot on praescutellum, but are not otherwise similar to species usually placed in *Lophotabanus*. In fact the black scutellar spot is well developed in a number of Central American and Caribbean species not otherwise very similar, while it is faint or lacking in otherwise quite similar South American species.

Macrocormus Lutz, 1909. Lutz seems to have intended this name for species with a long appendix on fork of third vein, simple antennae, a claviform frontal callus and banded eyes. The type species is similar in most respects to many species placed in *Lophotabanus*, but lacks the scutellar spot. Others with the long appendix and claviform callus have unicolorous eyes. *T. strigimaculus* forms a perfect intergrade with *Neotabanus*, having a clear median abdominal stripe, banded eyes, an almost claviform callus, and a marked appendix on fork.

Chelotabanus Lutz, 1909. I previously attempted to define this group (Fairchild, 1964:180), but now feel that this action was premature. Although species there included seem related, many others share one or more characters of the group, and a decision as to their inclusion or not would be very difficult. Such species as *rubripes* Macquart, *chaltothrix* Fairchild, and *defilippii* Bellardi are difficult to assign, having characters of *Macrocormus*, *Lophotabanus* and *Chelotabanus*.

In view of the foregoing considerations, I am omitting subgenera of *Tabanus* from the forthcoming catalogue of Neotropical species. It

may be eventually possible to define groups of similar and possibly related species, much as has been done by Oldroyd (1954) for the African fauna, but since too many Neotropical species are still very inadequately known, this would not be of much use at the present time.

KEY TO SUBFAMILIES AND TRIBES OF AMERICAN TABANIDAE

1. Ninth tergite undivided in both sexes. Style of ♂ genitalia simple, pointed, or bifid. Caudal ends of spermathecal ducts simple, without cup-like expansions. Third antennal segment generally of 7-8 annuli, rarely with a basal plate of fused annuli. Ocelli and hind tibial spurs present. Eyes unpatterned in life. Pangoniinae. . . . 3
 Ninth tergite divided in both sexes. Third antennal segment of a basal plate and a 4 or fewer annulate style. . . . 2
2. Style of ♂ genitalia simple, pointed. Caudal ends of spermathecal ducts simple, without cup-like expansions. Ocelli present. Hind tibial spurs usually present, rarely apparently absent or difficult to see. Eyes frequently patterned with bands or spots of contrasting color in life. Chrysopsinae 5
 Style of ♂ genitalia truncate. Caudal ends of spermathecal ducts with cup-like expansions. Functional ocelli absent, though vestiges frequently present. Hind tibial spurs absent. Eyes plain or with horizontal stripes, rarely otherwise. Tabaninae 6
3. Style of ♂ genitalia simple, the apex sometimes hooked. Eyes pilose except in *Goniops* and *Mycteromyia*. Face usually inflated, often strongly conically produced, the proboscis often much exceeding head height. Vein R₄ often without appendix. Scionini
 Style of ♂ genitalia bifid. Eyes bare except in *Veprius*, *Brennania* and *Protodasyapha*. Face not markedly conically produced, the proboscis rarely much longer than head height. Vein R₄ nearly always with a strong appendix. 4
4. Mouthparts vestigial, the terminal palpal segment nearly spherical, with a terminal pit. Frons of ♀ much wider than high, without callus; of ♂ dichoptic, about twice as high as wide. Third antennal segment subulate, 8-annulate, slender. Small slender whitish flies with milky wings found on sea beaches. Scepsidini
 Mouthparts functional, the palpi not as above. Males holoptic. Antennae and proboscis very variable. Pangoniini
5. First antennal segment hardly longer than wide; antennae shorter than antero-posterior thickness of head. Frontal callus illdefined or clavate or ridge-like, clearly narrower than frons. Eyes plain or with a transverse band. Bouvieromyini

- First antennal segment clearly longer than wide, generally at least twice as long as wide; antennae longer than thickness of head. Frontal callus generally as wide as high or wider. Eyes speckled or with a specific pattern of spots and bars. Chrysopsini
6. Basicosta with strong setae as dense as on adjoining costa. Sometimes a tubercle at vertex, but no vestiges of ocelli. Labella without sclerotized areas. Antennae with first segment rarely much longer than wide, third rarely with less than 4 annuli in style. Frons generally markedly higher than wide parallel sided or narrowed below, with or rarely without basal callus, but not with paired dark pollinose spots. Wings clear, solidly colored or spotted on crossveins, rarely otherwise. Tabanini
- Basicosta without setae, or these sparse, or if numerous then with strong vestiges of ocelli, or labella partly sclerotized, or wings strongly patterned, or third antennal segment with strong dorsal spine, or frons with paired dark pollinose spots. 7
7. Wings with characteristic grey lace-like pattern, frons with paired black pollinose spots above callus and third antennal segment with but 3 annuli. Eyes with wavy transverse bands in life. . . . Haematopotini (Nearctic only)
- Wings rarely as above, but often otherwise patterned. Frons without pollinose spots. Antennae rarely with less than 4 annuli, but frequently with strong dorsal spine. Vestiges of ocelli frequently present. Labella often wholly or partly sclerotized. Frons parallel sided or widened below, less often narrowed below. Eyes unicolorous or patterned, but not as above. Diachlorini

KEY TO AMERICAN GENERA AND SUBGENERA OF PANGONIINAE AND CHRYSOPSINAE

1. Ninth tergite undivided in both sexes. Style of ♂ genitalia simple or bifid. Third antennal segment generally of 7-8 segments, rarely with a basal plate of fused annuli. Pangoniinae 2
- Ninth tergite divided in both sexes. Style of ♂ genitalia simple, pointed. Third antennal segment of a basal plate and a 4 or less annulate style. . . . Chrysopsinae 28
2. Style of ♂ genitalia bifid. Eyes bare except in *Veprius*, *Brennania* and *Protodasygpha*. Vein R_4 nearly always with a strong appendix, always present in hairy-eyed genera. Face not markedly conically produced, the proboscis rarely much longer than head height. 3
- Style of ♂ genitalia simple, pointed. Eyes pilose except in *Goniops* and *Mycteromyia*. Vein R_1 often without an

- appendix. Face usually inflated, often strongly conically produced, the proboscis frequently much exceeding head height. Scionini 15
3. Mouthparts vestigial, the terminal palpal segment nearly spherical, with a terminal pit. Frons of female much wider than high, without callus. Male dichoptic, the frons about twice as high as wide. Third antennal segment 8-annulate, subulate, slender. Slender whitish flies with milky wings found on sand beaches. (S. Brasil to Argentina). Sepsidini (*Sepsis* only)
- Mouthparts well developed, the palpi not as above. Males holoptic. Pangoniini 4
4. Eyes distinctly pilose. Proboscis short, not much longer than palpi, the labella large and fleshy. Frons broad, seldom over twice as high as wide, usually with median or basal calli. 5
- Eyes apparently bare. Proboscis and frons variable. ... 7
5. Third antennal segment of a consolidated basal plate and style of 4 annuli. (Chile, S. Argentina). *Veprius*
- Third antennal segment of 7-8 annuli, the basal annuli not consolidated into a plate. 6
6. Palpi of female with a deep dorsal concavity. Basal annulus of third antennal segment markedly wider than succeeding annuli. (California, N. Mexico). *Brennania*
- Palpi of female without dorsal concavity. Basal annulus of third antennal segment not much wider than succeeding annuli. (Chile, S. Argentina). *Protodasyapha*
7. Third antennal segment of a broad basal plate and abruptly slender style of 2 or 3 annuli. Frons pollinose, without callus, higher than wide, widened below. Proboscis and palpi short, subequal in length, the labella fleshy (Texas). *Asaphomyia*
- Third antennal segment of at least 5 divisions. 8
8. First posterior cell of wing closed at or before margin. Third antennal segment of 8 annuli, the basal annuli much the widest, the terminal long and slender. Frons generally over 3 times as high as basal width, widened below, pollinose or with a narrow to clavate bare callus. (Southern U. S. to Argentina and Chile). *Esenbeckia* 12
- First posterior cell open. 9
9. Frons broad, generally less than 3 times as high as basal width, nearly always with bare callus, or largely bare and shiny. Proboscis short, subequal to palpi, the labella large and fleshy (Mexico, Western U. S.). *Apatolestes*
- Frons narrower, generally over 3 times as high as basal width, always pollinose and without callus. 10
10. Proboscis short, the labella large and fleshy. Third antennal segment of 7 annuli, the basal 3 often more or less fused

- into a basal plate. Palpi subequal to proboscis in length, curved, hairy. Slender small-headed long-winged species. (S. E. Brazil). *Protosilvius*
- Proboscis equalling head height or longer, at least the theca sclerotized. Third antennal segment of 8 annuli, the first much the largest. Palpi slender, short-haired, conspicuously shorter than proboscis. 11
11. Vein R_4 with an appendix. Female cerci with an apical lobe or acutely rounded. Male genitalia with style simple, without outwardly projecting basal process. Male eyes pilose (Western U. S. and Canada). *Pilimas*
- Vein R_4 , without appendix. Female cerci more bluntly rounded, without apical lobe. Male style with outwardly projecting basal process. Male eyes bare. (U. S. and Canada). *Stonemyia*
12. Proboscis short, markedly less than head height, the labella soft, rounded, without sclerotized areas. Palpi basally inflated, deeply grooved outwardly, nearly as long as proboscis. Wings with rounded dark spots. (Chile). *Esenbeckia (Palassomyia)*
- Proboscis seldom less than head height, labella partly or wholly sclerotized. Palpi broad or slender, not basally inflated; if deeply grooved outwardly, then much shorter than proboscis. Wings not with rounded spots. 13
13. Labella wholly sclerotized, narrow and forceps like, apparently without pseudotracheae on inner surface. Palpi long, slender to broad. No bare frontal callus when undenuded. Wings at most slightly tinted. Hairs on oculo-genal margin sparse. (Panama to Argentina). *Esenbeckia (Proboscoides)*
- Labella not as above, either with pseudotracheae, only partly sclerotized, or slender and *Fidena*-like. 14
14. Labella small and slender, *Fidena*-like. No hairs on oculo-genal margin below antennal bases. Palpi deeply grooved or hollowed on outward aspect, generally less than half length of proboscis. (Southern U. S. to Panama). *Esenbeckia (Ricardoia)*
- Labella broader, partly or wholly sclerotized and with pseudotracheae on inner aspect. At least a single row of long hairs along oculo-genal margin immediately below subantennal suture. Palpi slender to spatulate or pointed, at most flattened on outer aspect, generally over half length of proboscis. Frontal callus present or absent. (Mexico to Argentina).
- *Esenbeckia (Esenbeckia)*
15. Eyes bare. Frons of female nearly as wide as high or wider. Palpi simple, cylindrical, hirsute, without groove or bare areas. 16

- Eyes pilose. Frons of female very rarely less than twice as high as wide. Palpi grooved, hollowed or with flattened bare areas on outer aspect. 17
16. Proboscis short and fleshy. Male eyes holoptic. Wings with first posterior cell open and contrasting dark design. (Eastern United States). *Goniops*
 Proboscis long and slender, sclerotized, hinged at base. Male eyes widely dichoptic. First posterior cell closed. R_4 with long appendix at fork and cross veins often with dark clouds. (Argentina and Chile). . . . *Mycteromyia*
17. Proboscis short, generally less than head height and not over twice length of palpi. Labella large and fleshy. Face but little produced, hairy. 18
 Proboscis longer, generally exceeding head height and always over 3 times length of palpi, the labella small, compact often shiny sclerotized. 19
18. Third antennal segment with basal annuli partially fused, forming a pseudoplate, and 4 to 6 annulate style. Palpi stout and cylindrical. Small densely hairy species. (Chile). *Scaptia (Pseudomelpia)*
 Third antennal segment with 8 clear annuli. Palpi flattened or grooved outwardly. (Chile). . . . *Scaptia (Scaptia)*
19. Proboscis seldom over twice head height, with labella well marked, fleshy and broader than theca or wholly shiny sclerotized. Palpi generally short and broad or hollowed on external aspect. 20
 Proboscis generally over twice head height, the labella small and slender, usually not broader than theca. Palpi generally slender, if otherwise, the first posterior cell closed. 21
20. Proboscis heavily sclerotized, the labella clubbed, wholly shiny. Palpi flat, nearly as broad as long. (South Brazil). *Scaptia (Lepmia)*
 Proboscis not as above, the labella at least partly fleshy. Palpi variable. (Southern South America).
 *Scaptia (Pseudoscione)*
21. Third antennal segment subulate, the annuli without projections or prominent hair tufts. 22
 Third antennal segment with projections or prominent hair tufts on one or more annuli. (Panama to Brazil)
 *Pityocera* 26
22. First and fourth posterior cells closed and generally stalked. Wings often patterned or spotted and mesonotum usually patterned. (Central and S. America). *Sciene*
 Fourth posterior cell open, first closed or open. Wings and mesonotum rarely patterned. (Central and S. America). *Fidena* 23

23. First posterior cell broadly open. Face pollinose and with abundant long hairs. Small species usually with strongly patterned mesonotum and long slender proboscis. (South East Brazil). *Fidena* (*Neopangonia*)
- First posterior cell normally closed, always coarctate. Face pollinose or bare, rarely with sparse scattered long hairs. Mesonotum rarely strongly patterned. 24
24. Posterior tibiae and all femora with dense long outstanding hairs. Face largely or wholly bare. (Brazil, Bolivia) *Fidena* (*Laphriomyia*)
- All tibiae sparsely short haired. Femora short or long-haired. Face bare or pollinose. 25
25. Palpi inflated, shiny, grooved on outer aspect. Face pollinose. First posterior cell long-stalked. (Argentina). *Fidena* (*Leptofidena*)
- Palpi flattened on outer aspect. Face variable. (Neotropical). *Fidena* (*Fidena*)
26. Annuli of third antennal segment without projections, the first annulus much enlarged and densely haired dorsally. (Amazon Basin). *Pityocera* (*Pseudelaphella*)
- Annuli of third segment with projections. 27
27. First annulus with long hirsute forward projecting dorsal finger-like horn, second to sixth with shorter dorsal teeth, seventh and eighth fused into a single long cylindrical segment. (Northern South Americana). *Pityocera* (*Elaphella*)
- First to sixth annuli with long dorsal and ventral finger-like processes, those on the first longest, progressively decreasing. Seventh annulus very short, often fused with long finger-like eighth. (Panama to Ecuador). *Pityocera* (*Pityocera*)
28. Eyes in life unicolorous or banded. Antennae shorter than antero-posterior thickness of head. First antennal segment hardly longer than wide. Frontal callus when present much higher than wide, ridgelike. (Bouvieromyini) 29
- Eyes in life speckled or with a pattern of spots and lines. Antennae longer than antero-posterior thickness of head. First antennal segment longer than wide, generally at least twice as long as wide. Frontal callus generally as wide as high or wider. (Chrysopsini) 30
29. Third antennal segment of a basal plate and 2 or 3 annuli. Eyes unicolorous. Face receding, wholly pollinose. Frontal callus diffuse. *Tabanus*-like species with wings brown or with veins sometimes brown-margined. (Eastern United States). *Merycomyia*
- Third antennal segment with a basal plate and 4 annuli. Eyes in life with a single dark median band. Face and subcal-

- lus bare or pollinose. Frontal callus well marked, linear or clavate. Wings unicolorous or hyaline, not patterned. (Chile). *Mesomyia* (*Coracella*)
30. Eyes in life irregularly speckled. Wings hyaline or with clouds on cross veins and elsewhere, but not with distinct crossbands. *Silvius* 31
- Eye in life with specifically characteristic pattern of spots and bands. Wings nearly always with dark crossbands; if not, then abdomen globose and spotted, or slender, black and shiny. 34
31. Third antennal segment longer than two preceding segments together. 32
- Third antennal segment shorter than two preceding, generally shorter than first segment. 33
32. Stout species with predominantly yellow abdomens and hyaline unspotted wings; R₄ usually with appendix at fork. (Western United States). *Silvius* (*Silvius*)
- Slender species with predominantly grey abdomens and strongly spotted wings; R₄ usually without appendix at fork. (Southern and Western U. S. to Guatemala). *Silvius* (*Griseosilvius*)
33. Antennae longer than head width, the third segment clearly shorter than second and not over half length of first segment. (South Western United States to Panama). *Silvius* (*Assipala*)
- Antennae subequal to head width, the third segment longer than second, over half length of first. (California, Oregon). *Silvius* (*Zeuximyia*)
34. Wings evenly fumose. Abdomen globose, yellow with two rows of dark spots. (Eastern U. S.). . . . *Neochrysops*
- Wings with dark crossband or remnants thereof, or completely hyaline. Abdomen slender or flattened, unicolorous or variously patterned, but not as above.. *Chrysops* 35
35. Wings with dark crossband. (Worldwide). *Chrysops* (*Chrysops*)
- Wings hyaline. Face and cheeks wholly shiny. Abdomen slender, wholly black and shiny. (S. Eastern U. S.). *Chrysops* (*Liochrysops*)

KEY TO NEOTROPICAL GENERA AND SUBGENERA OF TABANINAE

1. Basicosta smoothly pollinose, without setae. If setae are present, sparse or numerous, and there are vestiges of ocelli, a strong tubercle at vertex, labella partly sclerotized, a long tooth on third antennal segment, wings strongly patterned, or other striking specializations, see couplet 49. Diachlorini 2

- Basicosta with setae as dense as on adjoining costa. Without vestiges of ocelli or sclerotizations on labella, and rarely with other striking specializations. *Tabanini* 60
2. With one or both of the following characters: basal plate of third antennal segment with an acute dorsal spine or tooth; labella of proboscis compact and with at least some shiny sclerotized areas. 3
 Without either of the above characters, the basal plate at most obtusely angled above and the labella wholly pollinose. 29
3. Basal plate of third antennal segment with at most an obtuse angle, 90° or more, never excessively long nor with first segment cylindrical and elongate. Labella of proboscis partly or wholly sclerotized. 4
 Basal plate with a long or short spine or acute angle, or greatly elongate, both style and first segment unusually long. Labella sclerotized or not. 10
4. First antennal segment shiny and globose, moderately to markedly inflated. Sub-callus inflated and shiny. 5
 First antennal segment normal, subcallus pollinose. . . . 7
5. Vein R₄ of wing bent abruptly forward so that cell 3rd R is somewhat narrowed at wing margin. All tibiae usually more or less inflated. Wings and body largely black or yellow, the wing apex always hyaline. Third antennal segment slender, the plate with small angle close to base dorsally. Palpi slender, pollinose. Eyes with lower half irregularly speckled, upper half unicolorous. *Bolbodimyia*
 Vein R₄ not bent forward. Tibiae slender. 6
6. Palpi inflated and shiny. First antennal segment very greatly inflated, black; third segment unknown. Frontoclypeus and genae extensively bare and shiny. Wing with anterior half black. Wasp-like species with basal callus as wide as frons. *Querbetia*
 Palpi moderately slender, pollinose. First antennal segment not greatly inflated, shiny yellow. Third segment moderately broad with obtuse dorsal angle. Frontoclypeus and genae pollinose. Wing otherwise, not wasp-like, frontal callus much narrower than frons. . . . *Holcopsis*
7. Frontal callus absent. Basal plate broad with obtuse dorsal angle. Labella wholly sclerotized. Pale yellowish or greenish unicolorous stout flies with wings hyaline or with small discrete black spots. *Chlorotabanus*
 Frontal callus present. 8
8. Fore tibiae incrassate and curved. Notopleural lobes inflated and protuberant. Frontal callus a slender line. Wings basally blackish to end of discal cell. Eyes unicolorous. *Pachyschelomyia*

- Fore tibiae slender. Notopleural lobes normal. Frontal callus broader. Wings variable. 9
9. Very small muscoid-like flies with striped thorax and banded abdomen. Frontal callus clavate, subcallus bare in middle. Eyes with single dark median stripe. Palpi very short and inflated, hardly half length of slender proboscis, latter with small, compact, partly sclerotized labella. Third antennal segment with basal plate trapezoidal, nearly as broad as long. Abdomen of female acutely pointed. *Myiotabanus*
- Larger species with unstriped thorax, not mimetic. Frontal callus small and rounded, usually with a slender upper ridge-like extension. Subcallus bare or pollinose. Eyes unicolorous, green or bronzy in life. Palpi more slender, pointed, over half length of proboscis. Labella largely or wholly sclerotized. Wings generally with dark pattern, sometimes hyaline. Abdomen of female normal. *Phaeotabanus*
10. Metallic blue species with densely pilose eyes, transverse swollen callus, inflated bare subcallus and antennae with dorsal spine reaching first annulus. Wings hyaline. *Eristalotabanus*
- Without the above combination of characters. 11
11. Frontal callus as wide as frons, or if not, frons widened below, callus rounded and protuberant and bare areas on face. Eyes usually with at least a median dark transverse stripe, generally with several green or purple stripes, rarely unicolorous. Slender species, the tibiae slender, abdomen never green. 12
- Frontal callus narrower than frons; if not, then triangular and extended upward in a ridge, the lower angles barely touching eyes, or tibiae incrassate or abdomen greenish. Eyes unicolorous or bicolored, very rarely striped. 19
12. Antennae very long, first 2 segments notably elongate, the first segment subequal to basal plate of third segment. Style generally hirsute and much exceeding basal plate, stout. Dorsal spine of basal plate moderate to absent. Frontoclypeus and genae largely or wholly bare and shiny, at least the first much inflated. Abdomen generally constricted basally, wasp-like. Wings with fore border broadly infuscated, rarely with an additional diagonal fascia. Labella of proboscis partly sclerotized. *Acanthocera s.l.* 13
- Antennae not unusually long, the first segment notably shorter than basal plate. Dorsal spine short to very long. Style not unusually hirsute, rarely longer than plate, slender. Abdomen slightly if at all constricted. Wings

- various, rarely unpatterned. Labella often entirely sclerotized. *Dichelacera* s.l. 15
13. Third antennal segment shorter than sum of two preceding segments. The basal plate with low dorsal hump, slightly shorter than style. First 3 annuli of style wider or as wide as long. Legs and wings unicolorous.
 *Acanthocera* (*Polistimima*)
- Third antennal segment much longer than sum of two preceding segments. All annuli of antennal style longer than wide. Legs and wings various. 14
14. Basal plate of third antennal segment cylindrical, without dorsal tooth or angle. Palpi rather stout and inflated. Legs unicolorous, dark, except pale basitarsi. Abdomen strongly constricted. Frons wider than high, the callus transverse. *Acanthocera* (*Mimodynerus*)
- Basal plate with dorsal angle or tooth, which may reach end of basal plate. Palpi stout to very slender. Legs often with some or all tibiae partly pale. Abdomen more or less constricted. Frons higher than wide or as high as wide, the callus more or less triangular.
 *Acanthocera* (*Acanthocera*)
15. Labella of proboscis wholly sclerotized and shiny. Wings with a diagonal dark fascia from apex to fifth posterior cell. Eyes with one or more transverse bands except in *ochracea*. Scutellum nearly always darker than adjoining mesonotum; the latter usually transversely banded.
 *Dichelacera* (*Dichelacera*)
- Labella partly pollinose. Wings otherwise. Eyes banded or unicolorous. Scutellum often paler than mesonotum, the latter never transversely banded 16
16. Fronto-clypeus inflated and shiny, the genae bare, or at least with bare stripe. Antennal tooth short, not reaching end of basal plate. Wings with area anterior to vein R infuscated, or apical third of wing dusky, or wing largely black, rarely with vestiges of a diagonal dark fascia. Subcallus pollinose. Scutellum generally with some pale hairs, often contrastingly pale. All tibiae at least basally white. Eyes usually banded.
 *Dichelacera* (*Nothocanthocera*)
- Genae pollinose, frontoclypeus pollinose or partly bare. Wings not as above. 17
17. Center of frontoclypeus and subcallus bare and shiny. Wings yellowish tinted, with area beyond fork of 3rd vein and apex of discal cell faintly dusky. Mesonotum striped, the scutellum black. Eyes unbanded.
 *Dichelacera* (*Idiochelacera*)
- Frontoclypeus and subcallus wholly pollinose. 18

18. Wing with irregular dark discal patch, extended along costa to apex, and with an extension along R₄. Vertex rather sunken, without vestiges of tubercle. Scutellum brown or pale-haired. Abdomen with pale-haired triangles on tergites 2 or 3 to 4. Eyes bicolored or unicolorous. Legs unicolorous or the tibiae darker than femora.
 *Dichelacera* (*Orthostyloceras*)
- Wing black with hyaline apex and hyaline band from costa to hind margin covering ends of basal cells. Body black with white triangle on fourth abdominal tergite. Legs black, only fore tibiae bicolored. Eyes unicolorous.
 *Dichelacera* (*Desmatochelacera*)
19. Tibiae all slender. Tubercle at vertex generally distinct and prominent, rarely obsolete. Palpi slender to thread-like. Proboscis generally with small compact labella, wholly or partly sclerotized, rarely wholly membranous. Antennae slender, the dorsal spine slender, pointed, rarely shorter than basal plate. Frons usually narrow, the callus clavate or ridge-like, rarely otherwise. Wings nearly always patterned, rarely lightly tinted, never wholly clear. *Catachlorops* 20
- Tibiae inflated, or tubercle at vertex absent, or palpi inflated, or dorsal antennal spine clubbed or very short or frons broad. 25
20. First posterior cell closed or strongly coarctate. Frons very narrow, the callus ridge-like. Wings with dark pattern which leaves area around apices of basal cells or most of discal cell, and apex or oval spots in 1st R and 3rd R clear or paler. Antennae with long slender tooth, its apex often recurved. Labella wholly sclerotized. Palpi very slender. *Catachlorops* (*Psalidia*)
- First posterior cell open; if somewhat coarctate, then wings otherwise. 21
21. Wings with a dark discal patch which includes all of discal cell, the latter sometimes fenestrate, or wings wholly black, or black with hyaline apex, the basal cells hyaline or partly or wholly dark. Frontal callus often clavate. Labella often partly pollinose. Thorax at most faintly striped. *Catachlorops* (*Catachlorops*)
- Wings not as above. 22
22. Wings with definite pattern of bands or spots. 23
- Wings without definite pattern, yellow, smoky or veins brown margined. 24
23. Wings with a characteristic irregular dark diagonal band crossing discal cell and a dark spot in base of cell 4th R. Thorax prominently striped. Abdomen with prominent median white triangles on tergites 1-6. Frontal callus

- clavate, its lower angles often touching eyes. Labella nearly or entirely pollinose.
 *Catachlorops* (*Rhamphidommia*)
- Wing pattern similar to *Psalidia*, but more reduced, often to a series of spots at fork of 3rd vein, apex of discal cell, tips of R_{2+3} and R_4 , and bases of 1st and 3rd R or only 2 connected dark patches. Frons generally wider, callus clavate, rarely obsolescent. Labella largely pollinose. *Catachlorops* (*Psarochlorops*)
24. Stout species with relatively broad frons, wholly pollinose labella, moderately stout palpi, and chunky antennae. *Catachlorops* (*Hadrochlorops*)
- Slender species with narrower frons, partly sclerotized labella, slender palpi and slender antennae.
 *Catachlorops* (*Amphichlorops*)
25. Palpi basally inflated. Proboscis short, heavy, labella wholly sclerotized. Stout species with proportionately short stout antennae. 26
- Palpi long, slender, generally exceeding antennae. Proboscis long to very long, slender, the labella pollinose. Not stout chunky species, the antennae slender. Brown species with a dark wing pattern which leaves area around ends of basal cells and apex of wing hyaline or paler. 28
26. Dorsal tooth on third antennal segment short, an acute angle to a short spine, seldom exceeding end of basal plate. Fore tibiae slender to moderately inflated, remaining tibiae slender. Wings hyaline or slightly smoky, or veins brown margined. Abdomen and appendages often greenish in life. Not bee-like species. 27
- Dorsal tooth always exceeding end of basal plate, sometimes nearly reaching apex of style, often clubbed. Fore tibiae always incrassate, remaining tibiae generally also inflated. Wings various, never wholly hyaline or uniformly tinted, generally with black or contrasting pattern, often resembling bees. *Stibasoma* (*Stibasoma*)
27. Frontal callus reduced to a short narrow ridge, small streak, or virtually absent. Wings glass clear to faintly smoky, the costal cell yellowish. Yellow, greenish, or brown unicolorous species, the legs unicolorous, the body without contrasting hair patterns. *Cryptotylus*
- Frontal callus round or square, as wide as frons, extended above in a broad or narrow ridge. Wings yellowish or smoky, veins sometimes brown margined. Thorax brown abdomen strongly greenish or yellowish, both body and legs with contrasting hair patterns.
 *Stibasoma* (*Rhabdotylus*)
28. Basal plate of antenna with one or two long dorsal spines, one or both of which reach beyond end of basal

- plate, their opposing surfaces fringed with long erect hairs. Style very short, hardly more than one-third length of basal plate. Proboscis exceeding head height, the labella small, pollinose. Eyes bare. *Dasychela (Triceratomyia)*
- Basal plate with but one dorsal spine, without fringing hairs. Antennae generally shorter, the style proportionately longer. Proboscis as above or shorter. Eyes often pilose. *Dasychela (Dasychela)*
29. Discal cell of wing narrowed by anterior bending of vein M_3 . Small blackish species with wings largely black to beyond discal cell, inflated shiny palpi, inflated tibiae, and elongate first antennal segment. *Lepiselaga s.l.* 30
30. Discal cell normal. 31
- Frons about twice as high as wide, parallel sided, the vertex without bare area. Notopleural lobes not strongly protruding. Body when undenuded clothed with iridescent greenish scales. *Lepiselaga (Lepiselaga)*
- Frons as wide or wider than high, widened below, the vertex protuberant and shiny. Notopleural lobes strongly inflated and protuberant. Body without greenish scales. *Lepiselaga (Conoposelaga)*
31. First antennal segment shiny and spherical. Palpi moderately inflated, pollinose. Very small *Tabanus*-like species with fore border of wings and all crossveins clouded with brown *Oopelma*
32. First antennal segment not inflated, or not shiny. 32
- Wings with strong solid black areas which include at least basal half of wing and contrast with remainder of wing. 33
- Wings otherwise. 34
33. Wing basally black or heavily tinted to ends of basal cells, remainder hyaline. Whole face and entire body including legs, black and shiny. Palpi strongly inflated. Third antennal segment subcylindrical, without marked dorsal angle. *Himantostylus*
- Wing entirely brownish black except for a triangular hyaline area on outer margin and two small round spots in ends of basal cells. Face and body brown, greyish pollinose. Palpi slender. Third antennal segment with a well-marked dorsal angle. *Erioneura*
34. Notopleural lobes bluntly conical, protuberant. Fore tibiae inflated, hind tibiae flattened and with a fringe of long hairs. Subcallus bare. Frontal callus broadly clavate. Wings with a narrow abbreviated discal band below stigma. Eyes unicolorous. *Eutabanus*
- Notopleural lobes normal, tibiae usually slender, the hind pair never flattened. 35

35. Mesopleuron and mesosternum darker than adjoining sclerites, the mesopleuron shiny pearly pollinose. Wings usually with dark markings, the apex often blackish. Eyes with characteristic pattern of green spots and stripes, resembling *Chrysops*. *Diachlorus*
 Mesopleuron and mesosternum concolorous with adjoining sclerites, not pearly pollinose. Wings various. Eyes unicolorous or banded, but not as above. 36
36. Eyes bare with at least two transverse bands in life, light on dark, or dark on light, the light usually greenish, the dark purplish or blackish. Mostly small species with bare eyes, moderately broad frons with often a median dark-haired patch, and rounded or square callus generally as wide as frons. (If frons very narrow, callus ridge-like and eyes unbanded, see *Stypommisa* couplet 59). *Stenotabanus s.l.* 37
 Eyes with at most a single dark median stripe, generally unicolorous or rarely bicolored, often pilose. 43
37. Antennal style with basal 2 annuli partly fused, appearing 3 annulate. 38
 Antennal style normal, clearly 4-annulate. 39
38. Frons very broad, less than twice as high as wide, the callus much narrower than frons, rounded or wider than high. Subcallus and face pollinose, but tentorial pits black and shiny within. Very small species with broad pale middorsal abdominal stripes and entirely hyaline wings. *Stenotabanus (Brachytabanus)*
 Frons narrower, convergent below, the callus large and as wide as frons. Tentorial pits pollinose. Larger species, the wings with crossveins at least with weak clouds. The abdomen with three rows of white spots. *Stenotabanus (Phorcotabanus)*
39. Subcallus and face largely bare and shiny. Wings glass clear, the stigma yellow. Eyes with slender green lines forming two narrow transverse loops. Scutellum contrastingly pale haired, the abdomen black, shiny, immaculate. All tibiae largely white. *Stenotabanus (Stenochlorops)*
 At least face wholly pollinose. Eyes not as above, with 2 or more wider green bands. 40
40. Frons distinctly widened below, the callus large, protuberant, filling width of frons. Wings smoky, the veins heavily dark margined, appendix at fork of R_4 long. *Stenotabanus (Melanotabanus)*
41. Frons parallel sided or narrowed below. 41
 Frons narrowed below, over twice as wide at vertex as at base, with strong tubercle at vertex, and callus much higher than wide. Black species with thorax and abdo-

- men boldly marked with white.
 *Stenotabanus (Cretotabanus)*
- Frons parallel sided or but slightly narrowed below; if strongly narrowed, then callus square or wider than high. 42
42. Basal frontal callus rarely with upper median prolongation; a median expanded callus never present. Frons generally broad, often slightly to strongly narrowed below, the basal callus generally as wide or wider than high. Abdomen whitish to brown, patternless or with median stripe and often with sublateral rows of pale spots. Eyes often with 3 or more transverse green bands.
 *Stenotabanus (Aegialomyia)*
- Basal frontal callus usually with upper median prolongation; a median expanded callus and black hair patch often present. Frons generally narrower, seldom narrowed below, the basal callus frequently higher than wide, rarely wider than high. Abdomen various, but not whitish and rarely with sublateral spots. Eyes rarely with more than 2 green bands.
 *Stenotabanus (Stenotabanus)*
43. Eyes bare, bicolored, reddish violet above, green below. Face with extensive bare areas. Wing with apex and large circular spots surrounding all crossveins brown.
 *Anaerythropterus*
- Eyes sometimes pilose, unicolorous or with a single dark stripe. 44
44. Small black and almost wholly shiny species, lacking pollinosity even on frons and face. Wings entirely hyaline.
 *Dasybasis (Scaptiodes)*
- Generally larger species, variously colored and even if black, extensively pollinose. 45
45. Basal plate of third antennal segment with a strong acute dorsal tooth or spine. Frontal callus ridge-like. Tubercle at vertex well marked, with vestiges of ocelli. Black species with all wing veins heavily margined with black.
 *Dasybasis (Nubiloides)*
- Basal plate usually with only an obtuse dorsal angle. Tubercle of vertex rarely prominent, often absent. Body and wings variable. 46
46. Frons very broad, never over 1.5x as high as wide, with a transverse dark pollinose median band and callus wider than high. Wings with crossveins spotted and a pattern of greyish nebulosity similar to species of *Haematopota*.
 *Dasybasis (Haematopotina)*
- Frons variable, without median band. Wings hyaline or spotted, but without grey *Haematopota* pattern. ... 47

47. Frons relatively narrow; callus narrower than frons and prolonged above in a ridge or spur; tubercle at vertex generally with vestiges of 3 ocelli. If callus is subquadrate with short spur, the abdomen has prominent pale median triangles (See also couplet 58). *Dasybasis* (*Agelanius*)
 Frons variable; basal callus usually broad and nearly always as wide as frons, without median upper spur, and without ocelli-bearing tubercle at vertex. If callus is narrower than frons, the abdomen is without prominent pale triangles. *Dasybasis* (*Dasybasis*)
48. Basicosta with few to numerous setae, but seldom with setae as dense as on adjoining costa. Generally with one or more of the following characters: tubercle at vertex; bare areas on face; partly sclerotized labella of proboscis; long dorsal spine on plate of third antennal segment; first antennal segment subcylindrical; wings with extensive dark pattern; swollen tibiae. 49
 Basicosta with setae as dense as on adjoining costa. Rarely with any of the above characters. 60
49. All tibiae greatly inflated. Wings black to middle of discal cell, hyaline beyond. Palpi greatly inflated, shiny black. Subcallus and face shiny black. Third antennal segment with basal plate much longer than style, flattened, obtusely angled above. *Selasoma*
 Tibiae not inflated. 50
50. Frontoclypeus and/or genae with bare shiny areas, or wholly bare, or with shiny inflated palpi. 51
 Face entirely pollinose, palpi pollinose. 53
51. Wings black except for axillary area and apices of basal cells. Face wholly subshiny, much produced, proboscis equalling head height. Frontal callus slender, flat, clavate, narrower than frons. Vertex with a well-marked tubercle. *Hemichrysops*
 Wings not black. Face not produced. Frontal callus as wide as frons. 52
52. Third antennal segment very long and slender over 2 x sum of first two segments, the basal plate with dorsal angle close to base. Subcallus pollinose. Area around tentorial pits bare and shiny. Tubercle at vertex obscure, ridge-like without vestiges of ocelli. Palpi slender, pollinose. Pale brownish insects with brown tinted wings, unicolorous abdomen and white tibiae. *Leptapha*
 Third antennal segment not as above, less than twice the sum of first two segments. Palpi somewhat inflated and shiny. Subcallus partly or wholly bare. Tubercle at vertex well marked, with vestiges of ocelli. Wings hyaline, often with a more or less distinct dark costal

- border. Abdomen brownish black with white transverse bands on some segments. *Pseudocanthocera*
53. Basal plate with acute dorsal angle or long spine which may reach beyond first annulus of style. Frons seldom over 4 x as high as wide. Frontal callus clavate, occasionally as wide as frons at base, usually narrower. Palpi rather long and stout, never very slender nor markedly inflated basally. Eyes often pilose. Wings very rarely entirely hyaline, generally with a dark discal patch below stigma and usually with discal cell fenestrate. Basicosta rarely bare. *Di cladocera*
- Basal plate with dorsal angle obtuse, or frons much narrower. 54
54. Wings with extensive dark pattern not consisting of spots on crossveins. If wings apparently unmarked, then thorax prominently striped or frons exceedingly narrow and callus thread-like. 55
- Wings hyaline, tinted or with dark pattern primarily of dark spots around crossveins. 57
55. Wings with an irregular dark pattern of variable extent which always leaves clear areas surrounding all crossveins and fork of third vein. Frons narrow, 7 or more times as high as wide. Palpi very slender. Eyes unicolorous, bronzy in life.
. *Philipotabanus (Philipotabanus)*
- Wings ranging from almost all black to hyaline with small dark area below stigma, but crossveins not surrounded by clear spots when within dark areas. 56
56. Slender species with frons 7 x as high as wide or narrower; palpi and antennae slender; proboscis considerably longer than palpi with small labella. Eyes bright green in life. *Philipotabanus (Melasmatabanus)*
- Stouter species with frons not over 6 x as high as wide; palpi inflated, antennae broader; proboscis hardly longer than palpi, the labella large. Eyes green or brick-red in life. *Philipotabanus (Mimotabanus)*
57. All crossveins and ends of all longitudinal veins close to wing margin with large dark spots, sometimes confluent. Frons broad, not over 3 x as high as wide, the callus rounded, pointed above, as wide as frons. Vertex with distinct tubercle. Palpi slender, flattened, shorter than long proboscis. Thorax prominently striped.
. *Spilotabanus*
- Wings never as extensively spotted, never with distinct spots on ends of longitudinal veins. Palpi not flattened, proboscis short. 58
58. Frons less than 4 x as high as wide, generally wider. Eyes usually densely pilose. (See also couplet 47).
. *Dasybasis (Agelanius)*

- Frons more than 4 x as high as wide, generally narrower.
Eyes very rarely pilose. 59
59. Wings hyaline or evenly tinted, the costal cell often darker, but never with spots on crossveins or apical clouds. Frontal callus clavate or ridge-like. Abdomen black or brown, nearly always with transverse bands at least on fourth tergite, rarely otherwise. At least scutellum and often mesonotum pale pollinose and pale haired, generally contrasting with abdomen. Appendix on fork of third vein absent. Eyes unbanded, dark. *Leucotabanus*
- Wings with clouds on at least discal crossveins, often with apical infuscations. If entirely hyaline or tinted, then abdomen and thorax not as above. Often with appendix on fork of third vein. Eyes unbanded, green or bronze, or light with single dark stripe. Frontal callus variable. Rarely with basicosta bare. *Stypommisa*
60. Fore and mid tibiae moderately incrassate; hind tibiae with a prominent fringe of long hairs. Basal plate of third antennal segment with acute, short dorsal tooth. Wing basally blackish to beyond end of discal cell, with small hyaline fenestrae in outer half of discal cell and base of fourth posterior cell. *Stigmatophthalmus*
- Tibiae all slender; wings not as above. 61
61. Eyes generally pilose in ♀, always in ♂. 62
- Eyes very rarely sparsely pilose in ♀, generally bare in ♂. 64
62. Frontal callus reduced or absent; if present it is small and rounded. Tubercle at vertex generally absent. Eyes brown or bronzy with at most a single narrow median stripe. *Atylotus*
- Frontal and often a median callus present, the former often as wide as frons. A more or less well developed tubercle at vertex. Eyes variable. 63
63. First antennal segment with dorsal anterior margin much produced, cap-like. Eyes of ♀ with 2 green bands, often bare or very sparsely pilose. Tubercle at vertex usually low and rounded, sometimes absent. Wings with crossveins often clouded, the first posterior cell generally at least coarctate, often closed and petiolate. Mainly south temperate species. *Poeciloderas*
- First antennal segment but slightly or not produced. Eyes of ♀ variable, usually pilose. Tubercle at vertex often prominent. Wings generally unspotted, the first posterior cell rarely coarctate, never closed. Mainly north temperate species. *Hybomitra*
64. Vertex with a strong tubercle, often bearing vestiges of ocelli. Eyes unicolorous, greenish black. Frontal callus clavate or ridge-like. Abdomen plain or banded, never striped. At least scutellum and often mesonotum pale pollinose

- and pale-haired, generally contrasting with abdomen.
 (See also couplet 59). *Leucotabanus*
 Vertex with at most a small denuded spot. Eyes variously
 patterned or unicolorous, bare. *Tabanus*

CLIMATIC ZONES AND DISTRIBUTION

The Neotropical region may be divided roughly into three climatic zones, and the tabanid fauna of each then discussed.

The south temperate zone includes Argentina roughly south of the latitude of Buenos Aires, and Chile. Climatically cool to cold climates extend north along the Andes into Colombia and Venezuela at increasingly higher elevations.

The north temperate zone extends south in the highlands perhaps to Mexico City, with possible disconnected islands on the highest mountains as far as western Panama.

The remainder of the region is essentially tropical, though ranging from desert to rainforest, and with broad to narrow connecting areas of subtropical conditions.

THE SOUTH TEMPERATE ZONE

The fauna of this zone may be considered under three divisions, Chile, temperate Argentina and the Andean region.

Chile is the most isolated, in the sense that it is separated by the strongest and most impenetrable barriers from the rest of South America. It consists of a relatively narrow coastal strip backed on the east by a nearly continuous range of high mountains. The northern end of the country is an inhospitable desert, with only a narrow corridor of moister climate leading north at high elevations. In the far south, the mountain barrier is somewhat broken and there is more interchange of faunas. The tabanid fauna as a result has a very high proportion of endemic forms.

Of the four tribes of Pangoniinae, two occur in Chile, Pangoniini and Scionini. The first is represented by two rather primitive genera, *Veprius* and *Protodasyopha*, and a primitive monobasic subgenus of the widespread *Esenbeckia*. Six of the eight species of *Veprius* are Chilean, and all the three of *Protodasyopha*. The Scionini are represented by *Mycteromyia* and three subgenera of the genus *Scaptia*. *Mycteromyia* occurs also in Argentina, though most species are Chilean. *Scaptia* (*Pseudomelpia*) is endemic, the other two are represented both north into Peru and Bolivia and east into Argentina, though the majority of the species are Chilean. The dominant Neotropical genera *Fidena* and *Scione* are not certainly known from Chile.

The Chrysopsinae are represented by a single endemic subgenus of Bouvieromyini, *Mesomyia* (*Coracella*), the tribe not known elsewhere in the Neotropics, and a single species of the widespread genus *Chrysops*.

The Chilean Tabanini consist of a single genus of apparently primitive Diachlorini, *Dasybasis*, with numerous species, and one widespread

and 3 apparently endemic *Tabanus*. *Dasybasis* also occurs in Argentina and north at high elevations into Venezuela.

It is this Chilean fauna which most resembles that of Australia, since *Scaptia*, *Mesomyia* and *Dasybasis* are all well represented in that continent.

The fauna of temperate Argentina much resembles that of Chile, with species of *Dasybasis*, *Mycteromyia* and *Scaptia* predominating. Northward there is an increasing infusion of species of *Tabanus*, *Chrysops*, *Esenbeckia*, *Fidena* and specialized Diachlorini, but few of these tropical elements seem to have penetrated very far south.

The Andean fauna appears to consist chiefly of species of *Dasybasis* in the south and at higher elevations northwards, to which have been added a few species of primarily tropical groups such as *Esenbeckia*, *Fidena*, *Scione*, *Tabanus* and specialized Diachlorini. The fauna of the high Andes has been little studied, and I do not know just how many groups have developed cool adapted species which can live at elevations where frost is common or the temperatures continuously low.

THE NORTH TEMPERATE ZONE

The North Temperate zone of the Neotropics is essentially an extension of the Nearctic, extending south at increasingly higher elevations into Central America. Here occur several primitive Pangoniini, *Brennania*, *Apatolestes*, *Esenbeckia* (*Ricardoia*) and the anomalous *Zophina*, as well as *Silvius* in the Chrysopsini and *Hybomitra* and *Atylotus* in the Tabanini. Few of these extend south of Mexico, but most are well represented northward.

THE TROPICAL ZONE

The Tropical Zone includes most of the Neotropics, except for the highest mountains, and encompasses a varied assemblage of habitats. I do not intend here to attempt to analyze in detail the possible centers of evolution and diversification within this large area, though such undoubtedly exist, but to summarize the characteristic aspects of the Tabanid fauna as a whole, by subfamilies and tribes.

In the Pangoniinae, three tribes are represented, the Sepsidini represented by the monotypic genus *Scepsis* on sea beaches in southern Brazil, and the Pangoniini and Scionini. In the Pangoniini only two genera occur the primitive *Protosilvius* in southeastern Brasil and the widespread *Esenbeckia* of which three of the four subgenera here recognized occur within this zone. The Scionini are well represented by two subgenera of *Scaptia* on the southern edge of the area, and by *Pityocera*, *Fidena* and *Scione*, with several subgenera. *Fidena* is the largest genus with about eighty species, and is dominant south of the equator. *Scione* is also a large group, centered in the intermediate altitudes of the Andes.

The Chrysopsinae are represented mainly by the genus *Chrysops*, well distributed throughout the area, though perhaps more numerous in species near the southern and northern borders of the area. A few

species of *Silvius*, subgenera *Silvius* and *Assipala*, extend into the northern part of the area, *Assipala* reaching western Panama. No Bouvieromyini or Rhinomyzini occur.

Of the Tabaninae, the Haematopotini are absent, but Tabanini and especially Diachlorini are abundant. The first is represented by *Tabanus* and *Poeciloderas*, the last by a large array of mostly specialized and endemic genera and a very large number of species.

To summarize, the south temperate parts of the Neotropics have a fauna dominated by primitive Diachlorini and Pangoniini with a single genus of Bouvieromyini, that is, mostly primitive elements of the three subfamilies. In this the fauna resembles that of temperate Australia and southeastern Africa, although there are marked differences in the proportional representation of the different groups. The tropical part of the region is dominated by specialized Pangoniinae (Scionini), Tabanini and specialized Diachlorini. It is much less similar in the composition of its fauna to corresponding climatic zones in the Old World, but seems slightly closer to the northern Australian-Papuan and Oriental regions than it does to Africa. With the former it shares abundance of Tabanini and specialized Diachlorini and presence of Scionini, but lacks Bouvieromyini, Rhinomyzini and Haematopotini. Pangoniini occur in both areas though apparently they are not present much north of Australia in the Old World tropics. The African fauna is dominated by Tabanini, Haematopotini, Bouvieromyini and Philolichini, with no Scionini and but few and primitive Pangoniini and Diachlorini in the temperate south. Rhinomyzini are also quite well represented. The north temperate part of the Neotropics shares with the southern, and especially western, Nearctic, a few primitive Pangoniini (*Brennania*, *Apatolestes*), and a few Nearctic Tabanini (*Hybomitra*, *Atylotus*), but otherwise is an extension of the tropical fauna with strong Nearctic mixture. The supposed relationship of predominantly Mexican *Esenbeckia* (*Ricardoia*) with Palearctic *Pangonius*, suggested by Mackerras (1955 : 481), may be more apparent than real. The Palearctic *Pangonius* are largely if not wholly nectar feeders, while many if not all *Ricardoia* are haematophagous. It seems more likely that Palearctic *Pangonius* arose from Holarctic *Stonemyia*-like stock, and that *Esenbeckia* and its subgenera are derived from a tropical stock of which the Chilean *E. (Palassomyia) fascipennis* is the sole remaining Neotropical representative. *Stonemyia* and its allies also appear to be nectar feeders.

It is thus evident that those primitive elements which the Neotropics share with other regions are almost entirely cool adapted forms, mostly in the south. It is my opinion that these represent in most cases relicts of an earlier stage of evolution within the family preserved in part by their adaptations to a less competitive environment, and in part by geographic isolation in Chile and Australia, and to a lesser extent in S. Africa. Whether the similarities noted in these relicts are due to the preservation in cool refugia of earlier character states once widespread in the family, or indicate a once much closer geographic approximation of the continents is a difficult question. The former implies an extraordinary amount of convergent evolution to achieve species in

Australia and Chile which are placed, on structure, in the same species groups within the same genus; the latter implies much continental movement and a very slow rate of evolutionary change in the cool areas in comparison with the tropics. I prefer the latter alternative, since non-biological evidence is accumulating that the continents have moved, and there is abundant evidence that evolutionary change can be exceedingly slow, while convergence of what amounts to a whole fauna seems highly improbable.

I would, therefore, hypothecate that at a time, probably in early Mesozoic, when the Tabanidae had begun to diversity into subfamilies represented by primitive Pangoniini, Diachlorini and Bouvieromyini, the continental configurations and latitudes were such that representatives of all three subfamilies were able to establish themselves throughout the tropical areas of the world. At that time, large parts of the present southern hemisphere continents, and possibly Antarctica, were fairly close together and probably had, at least at some periods, a cool to cold habitable climate. Representatives of the then existing groups became cool adapted and occupied all habitable parts of these continents. As continental drift commenced or continued northward, the northern parts of these continents separated from each other more rapidly and more widely than the southern parts. The already more conservative cool adapted forms moved south as the continents moved north, maintaining themselves in the coolest habitable parts of the continents, and continuing to exchange faunas with the still nearby parts of adjacent continents, probably at times by way of Antarctica. The tropical faunas, however, then became too widely separated by continental drift, and were cut off from exchange by way of the south by cool climates to which they were not adapted. It therefore results that the tropical faunas evolved and diversified more rapidly but more independently than did those in the cool south. Those continents, like Australia and South America, which still have considerable areas of cool climate, retained the largest number of cool adapted forms, while S. Africa, further north now, has fewer, and India, if it were involved at all, has none. If the present northern continents were once much further south, they surely had also warmer climates, and there is evidence, such as fossil palms in Greenland, that this was so. It therefore seems likely that the present fauna of cool adapted Holarctic Tabanidae, such as *Hybomitra* and *Theriopectes*, evolved after the northern continents reached suitable latitudes. They will therefore represent in general less primitive stocks than do the cool adapted relicts of the south temperate zones.

The geologically recent period of Pleistocene glaciation and cooling, in which we are still to some extent involved, probably had two effects. It eradicated many species adapted to warm temperate climates which might have given us leads to past distributions, and it enlarged the areas available to cool adapted forms, probably giving rise to bursts of evolution in these groups. Examples of the latter are the swarm of closely related *Dasybasis* species in the cool temperate Neotropics and the equally difficult and numerous Holarctic *Hybomitra* species.

PHYLOGENY AND RELATIONSHIPS

The determination of phylogenetic lineages depends, in the absence of a good fossil record, on judgements as to the relative degree of primitiveness of the taxa being ranked. The present classification of higher categories depends mainly on the structure of the genitalia of both sexes (Mackerras, 1954 *et seq.*), and the assumption that the Tabanidae are monophyletic. If this assumption is correct, then the most primitive members of each subfamily will most resemble each other, that is, primitive Tabaninae, Chrysopsinae and Pangoniinae will be much alike in characters other than their genitalia. There are, in fact, species which it is difficult or impossible to place in the proper subfamily without knowledge of the genitalic structures. It has generally been felt that of the three subfamilies the Pangoniinae are the most primitive, because the undivided condition of the ninth tergite, the multiannulate third antennal segment and the well developed spurs on the hind tibiae are thought to be more primitive character states than their opposites. The Chrysopsinae are believed to be derived from Pangoniinae and differ in divided ninth tergite and antennae with more or less consolidated basal plate. The Tabaninae are like the Chrysopsinae in having a divided ninth tergite, but styles of δ genitalia have truncate or faceted tips, φ spermathecae have caplike expansions on ducts, and hind tibiae lack spurs.

If the Pangoniinae are the oldest stock, one would expect that numerous specialized branches would have developed, and this is so, as the Pangoniinae do seem to show the widest diversity in structure, even of the genitalia. In contrast to the rather monotonous genitalia of Chrysopsinae and Tabaninae, the Pangoniinae show considerable diversity, especially in structure of the style. They have also developed numerous other specializations, such as the bizarre antennae of *Pityocera*, the elongated mouth parts of many forms, the curious proboscis of *Subpangonia*, the modified wing venation of *Scione*, etc. There is greater difference between *Philoliche* and *Scepsis* than is to be found in either of the other subfamilies. The Chrysopsinae also show considerable diversity (compare, for example *Orgizomyia*, *Assipala* and *Mesomyia*), but on the whole seem less diverse than Pangoniinae. The Tabaninae seem even more uniform in structure, and only in the Diachlorini are there any very bizarre specializations.

As to the relative primitiveness of the tribes of Pangoniinae, Mackerras is probably correct in believing that the Pangoniini are the most primitive, the Scionini and Philolichini having developed from them. Whether Scionini and Philolichini arose as separate branches or the latter from the former is a question. I am inclined to prefer the latter alternative, as the genitalia are quite similar and the Scionini are more diverse and retain, in general and in individual cases, more primitive character states. The contrast between *Goniops* and *Pityocera* in the Scionini, for example, is greater than any to be found in the Philolichini.

The Chrysopsinae perhaps originated from some primitive Scionine as they retain the simple pointed style of that tribe. The nearest extant Scionini that show character states similar to primitive Chrysopsinae are *Goniops* and *Scaptia* (*Pseudonelpia*). The aberrant African *Adersia*, for which Travassos Dias (1962) erected the subfamily Andersinae, and *Braunsiomyia*, which he placed (1958) as a separate tribe Braunsiomyiini, in the subfamily Sceptidinae, have characters both of Scionini and Chrysopsinae, and perhaps reflect some of the character states to be expected at the point of divisions between these two groups, though they are too adaptively specialized to be in the direct line of descent. I prefer to consider *Braunsiomyia* as an aberrant member of the Pangonniinae, where its genitalia place it either in Scionini or Philolichini, more likely the former. *Adersia*, I think, would be best in Chrysopsinae, tribe Bouvieromyiini. Erection of a monobasic subfamily for *Adersia* seems to me to obscure its relationships, while placing *Braunsiomyia* with *Scepsis* on the basis of adaptive features, when the ♂ genitalia do not support this relationship, is unacceptable.

Of the three tribes recognized in Tabaninae, the Diachlorini is by far the most diverse assemblage and I believe contains the most primitive Tabaninae. Some Diachlorini are so like generalized Chrysopsinae of the tribe Bouvieromyiini in all features save genitalia that they are difficult to distinguish. Chrysopsinae have ocelli and hind tibial spurs, but some Diachlorini also show ocelli, though probably not functional, and a few Chrysopsinae have the hind tibial spurs very short or rarely absent. I believe it probable, therefore, that the Diachlorini branched off from Bouvieromyiini at about the level represented by some of the species of *Mesomyia*, and that the most generalized or primitive Diachlorini belong to the genera *Dasybasis*, *Stenotabanus*, *Cydistomyia* (*Amanella*) and *Atelozella*. It seems probable that the remaining Tribes, Tabanini and Haematopotini, are independent derivatives of Diachlorini. The Haematopotini are surely monophyletic, with the possible exception of the aberrant *Heptatoma*, and may have evolved from a *Dasybasis*-like ancestor similar in some respects to *Dasybasis* (*Haematopotina*). The Tabanini may well be polyphyletic, derived at different times and places from different Diachlorini. The main character depended on to separate the tribes is the bare or setose condition of the basicosta or subepaulet. This, however, breaks down frequently, especially in the Neotropics where such genera as *Leucotabanus*, *Stypomisa*, *Di cladocera*, *Philipotabanus* and *Dasybasis* (*Agelanius*) cannot be placed on this character alone. Further work may show that division of the Tabanini into a number of subtribes and the abandonment of the Diachlorini, (at least as an equivalent division), may better indicate relationships. It is to be noted, as Oldroyd (1952) observed, that the basicosta in Haematopotini is of little significance, bearing in most species a few setae, more rarely bare or densely setose (*Heptatoma*).

I have attempted in the following section to place the Neotropical genera, in each subfamily and tribe, in order from primitive to specia-

lized, with comments on distribution and possible relationships outside the area. In general, I have little to add to Mackerras' (1955, 1955a) conclusions in regard to the genera he discussed.

PANGONIINAE-PANGONIINI

Mackerras divided this tribe into a primitive and a specialized division, the latter containing but one Neotropical genus. The primitive genera, consisting of *Veprius*, *Protodasyapha* and *Protosilvius*, are all southern, the first two in Chile and Argentina, the last in southern Brazil. They are paralleled by another group of southern Nearctic genera, *Apatolestes*, *Brennania* and *Asaphomyia*, some of which extend into northern Mexico. All are small unspecialized insects with short fleshy proboscides, and show a tendency for the basal annuli of the antennae to become fused into a basal plate. There seem to be two tendencies among this group of primitive genera, one towards broad frons and development of a basal callus, (*Veprius*, *Protodasyapha*), the other towards narrowing of the frons and absence of callus (*Protosilvius*). The latter group seems to represent the stock from which the more specialized Pangoniini developed, while the Scepsidini may well be a specialized offshoot of the broad-fronted group. Both groups are represented in Australia and in the southern Nearctic, but the South African *Stuckenbergina* appears to belong to the narrow-fronted group. In the southern Nearctic also occur *Pilimas* and *Stonemyia*, more specialized in having longer proboscides, and somewhat intermediate to the more specialized Pangoniini. *Esenbeckia* is the dominant and only specialized genus in the Neotropics, but clearly derived locally from forms similar to the Chilean *E.* (*Pallassomyia*), which appears to represent about the same grade of specialization as the Australian *Austroplex* and Nearctic *Pilimas*. It is noteworthy that but one of the primitive New World Pangoniini is tropical, *Protosilvius*, and that occurs mainly in the highlands of southeastern Brazil. All the remainder are warm temperate or cool adapted forms. To summarize, the American Pangoniini appear to have been present for a very long time. The most primitive genera are cool or warm temperate adapted, and show many similarities to Australian genera and to the cool adapted South African *Stuckenbergina*. The single specialized genus *Esenbeckia* is tropical and probably arose in South America. It is, I think, more specialized than any Australian genus, in that the proboscis in most subgenera is more developed and the frons narrower.

PANGONIINAE-SCIONINI

This tribe includes the majority of Neotropical Pangoniinae, with five genera and eight subgenera. The most primitive known Scionine is probably the Nearctic cool temperate *Goniops*, but it is quite aberrant in several ways and is probably not in the direct line of descent of other existing genera. *Mycteromyia*, a cool temperate Argentine and Chilean genus is apparently also primitive, though at the same time very aberrant

in a number of respects, and not very clearly related to other genera. The remainder of the genera form a graded series from the more primitive *Scaptia* (*Scaptia*) to the highly specialized *Pityocera*. *Scaptia* (*Scaptia*) and *S.* (*Pseudomelpia*) are Chilean and cool temperate Argentina, while *S.* (*Pseudoscione*) and *S.* (*Lepmia*) extend into the tropics in southeastern Brazil. The more specialized *Fidena*, *Scione*, and *Pityocera* are nearly all tropical, the first two reaching north to Mexico. Elsewhere the tribe occurs in Australia, New Guinea and New Zealand, but only *Scaptia*, with several subgenera, occurs outside the Neotropics. The Australian *Scaptia* appear to be more numerous and diversified than the Neotropical forms, and have occupied the tropical areas to a greater extent, but the absence of either primitive or specialized forms comparable to *Goniops*, *Mycteromyia* and *Pityocera* suggests that the tribe may be American in origin.

PANGONIINAE-SCEPSIDINI

The tribe Sepsidini consists of only the primitive and aberrant monotypic *Sepsis*, and, in my opinion, represents a very early stage in the evolution of the subfamily, though not on the main line of descent.

CHRYSOPSINAE-BOUVIEROMYINI

Only two genera of this tribe occur in the Americas, the Nearctic *Merycomyia*, which appears to be related to the eastern Palearctic *Thaumatomyia* (Philip & Mackerras, 1960) and *Mesomyia* (*Coracella*). The last is Chilean, a subgenus of an extensive Old World genus, and most similar to the Australian *Mesomyia* (*Vepriella*). The Tabaninae very likely arose from a form similar to some Australian *Mesomyia*, but there is no indication that the sole Neotropical representative was especially close to this line, and it has no near Neotropical relatives. Certainly the main evolution of the Chrysopsinae was not in the Neotropics.

CHRYSOPSINAE-CHRYSOPSINI

In this tribe only two genera are Neotropical. *Chrysops* is world-wide in distribution, but poorly represented in the Oriental and Australian regions. The sixty-eight described species, and I know of at least six more, make the Neotropical fauna equal or superior to any other in numbers, though my impression is that there is not the diversity shown by the African fauna. Species are most abundant outside the tropical forest areas, in southern Brazil and Argentina, and in Mexico and northern Central America. Several endemic species groups are probably definable, as well as others clearly related to Nearctic elements, but no comparative analysis has been made. I would guess that the genus arrived in the Neotropics fairly early from the north. The other genus represented in the Neotropics is *Silvius*. The typical subgenus is Holarctic, best developed in the warm temperate southern Palearctic.

The subgenus *Griseosilvius* is southern Nearctic, but extends south into Guatemala. The subgenus *Assipala* is endemic to the northern Neotropics, from New Mexico to Panama. It combines characters of *Chrysops* and *Silvius*, but appears to be an independent development, perhaps from stock similar to Nearctic *S.* (*Zeuximyia*). Only a single species of *Chrysops* has reached Chile.

TABANINAE-DIACHLORINI

This is by all odds the dominant group of Tabanidae in the Neotropics furnishing three-fifths of the genera and about half the species known from the region. There appear to be two main divisions, a generalized one of usually obscurely colored species with simple antennae and short fleshy proboscides, lacking notable specializations, and a specialized one containing the more bizarre forms. There are, however, a number of cases where species within the same genus show a graded series from generalized to specialized. Generalized forms are dominant in the south temperate areas, but occur to some extent throughout the Neotropics. Specialized forms are almost entirely tropical.

In the Diachlorini there seem to be several groups which show within themselves a more or less graded series from generalized to specialized, while there are other groups of one or a few closely similar genera which, due to lack of connecting forms, seem quite isolated and whose relationships can only be guessed at.

The genus *Dasybasis* with its several subgenera seems on the whole to represent the most generalized stage in the tribe, and I think it probable that the other groups and genera of Diachlorini and Tabanini arose from *Dasybasis*-like ancestors. I think this occurred a number of times, so that neither Diachlorini nor Tabanini are to be thought of as representing single lines of descent from single *Dasybasis*-like precursors. Attempts to relate the present groups of more or less specialized Diachlorini and Tabanini to specific species or groups of extant *Dasybasis* seem to me futile, at least in the present state of knowledge. Certain character states present in one or another species of *Dasybasis* often appear in more developed form in more specialized genera, for example the extended dorsal angle on the third antennal segment of *Dasybasis* (*Nubiloides*) *nigripennis*, and *D.* (*Agelanius*) *philippii* is seen in many specialized Diachlorini and some Tabanini. The following groups are possibly monophyletic, and some show a fairly complete range of character states from generalized to specialized.

Stenotabanus-*Diachlorus* group

This includes *Stenotabanus* and subgenera, *Diachlorus*, *Oopelma*, *Leptapha*, *Himantostylus*, *Anaerythroptus*, *Myiotabanus*, *Eutabanus* and possibly *Hemichrysops*. I think that *Stenotabanus* (*Melanotabanus*) and *St.* (*Aegialomyia*) are the most generalized members, the former close to *Dasybasis*. *St.* (*St.*) *liokylon* and allied species show slightly swollen and bare antennal scapes, leading to the specialized *Oopelma*.

St. (*Stenochlorops*) appears to lead towards *Diachlorus* and *Himantostylus*. The other genera are associated with this group on head and antennal characters, but detailed relationships are not obvious. All are specialized in some respect.

Dichelacera group

This group contains those genera with a strong dorsal spine on basal plate of third antennal segment, except *Acanthocera* and a few species in other genera where it is apparently secondarily reduced. Species of *Catachlorops* (*Rhamphidommia*), especially *muscosus* End. and *nebulosus* Kröb., and of *Dicladocera*, especially some Andean species, appear the most generalized in this group. The group may be diphyletic, one line leading from *Rhamphidommia* through *Catachlorops* to *Acanthocera* and *Dichelacera* and their subgenera, the other giving rise to the aberrant *Dasychela* and in another direction to *Stibasoma* and *Cryptotylus*. The most generalized species seem to be in the south or in the cool Andes.

Phaeotabanus group

This includes the genera *Phaeotabanus*, *Chlorotabanus*, *Pachyschelomyia*, *Erioneura* and *Holcopsis*. Certain species of *Phaeotabanus* appear the least specialized with unpatterned wings and bodies and unremarkable structure. The group is mainly tropical, with only *Pachyschelomyia* in the south and *Holcopsis* in Mexico. *Chlorotabanus* with its lack of frontal callus and green coloration seems the most specialized in most ways.

Leucotabanus group

This group includes two genera (*Leucotabanus* and *Stypommisa*) close to *Tabanus*, but with ocelli or at least an ocellar tubercle and generally with sparse setae on basicosta, and *Pseudacanthocera*, a specialized mimetic genus close to *Leucotabanus*. Some of the species of *Stypommisa*, as *furvus* Hine and *punctipennis* End., are quite similar to species of *Dasybasis* (*Agelanius*) in many respects, and it is just these generalized species which occur in the southernmost range of the group, N. Argentina and Bolivia. I think it therefore likely that the group is a mainly tropical derivative of *Dasybasis*-like ancestors, and may very well be close to the lineage of some *Tabanus* groups. *Stypommisa boliviensis* Kröber and small specimens of *Tabanus piceiventris* Rond., for example, are exceedingly similar, separable only by the presence of a well marked ocellar tubercle in the former and minor details of callus shape and color. Both have abundantly setose basicostas.

The remaining genera in the tribe, *Selasoma*, *Lepiselaga*, *Bolbodimyia*, *Philipotabanus* and *Spilotabanus*, I have refrained from trying to group. *Selasoma* and *Lepiselaga* I have discussed previously (Fairchild, 1965), and can only conclude that they are possibly highly specia-

lized relicts of lineages now extinct. *Philipotabanus* seems most nearly related structurally to *Stypommisa*, but the exceedingly narrow frons and highly patterned wings of most species makes placement uncertain. *Spilotabanus* is also of dubious relationships. The wide frons and large callus suggests *Dasybasis*, but the presence of some setae on basicosta, the narrow flattened palpi and long proboscis are like some *Philipotabanus*, while the wing pattern is unlike any other Neotropical species.

TABANINAE-TABANINI

Of the 5 genera placed here, *Atylotus* and *Hybomitra* are Nearctic elements barely extending into the Neotropics in Mexico. *Stigmatophthalmus* is an isolated monotypic genus from the mountains of southeastern Brasil whose relationships are obscure. *Poeciloderas* is very similar to *Hybomitra*, but I believe represents a parallel Neotropical development. All but a single widespread species are southern or occur at higher elevations in the Andes. Both *Hybomitra* and *Poeciloderas* seem to me to be less specialized than *Tabanus*, and stocks similar to both may well have given rise to more specialized groups now placed in *Tabanus*. As stated under discussion of Diachlorini, I think it probable that the present genus *Tabanus* is polyphyletic, but detailed analysis on a world-wide basis will be needed to untangle the often convergent lineages. In general in the Neotropics, *Tabanus* species are more numerous outside the heavily forested areas and are somewhat more numerous north of the equator. Very few species reach the south temperate zone. With about 150 species and subspecies, *Tabanus* is still the largest genus of Tabanidae in the Neotropics, though it forms only slightly more than 1/4 of the Tabaninae. In all other regions except the Australian, it is the dominant group of Tabaninae.

REFERENCES

BARRETTO, M. P.

- 1946: Estudos sobre Tabânidas Brasileiros. II. Sobre o gênero *Catachlorops* Lutz com descrições de sete espécies novas. *An. Fac. Med. Univ. S. Paulo* 22: 151-183, 29 figs.
- 1947: *Idem*. IV. Sobre o gênero *Acanthocera* Macquart com as descrições de cinco novas espécies. *Ibidem* 23: 89-115, 16 figs.
- 1949: *Idem*. IX. Sobre o gênero *Myiotabanus* Lutz. *Ibidem* 24: 81-86, 2 figs.
- 1951: *Idem*. XII. Sobre a systemática da Tribo *Dichelacerini* Enderlein da Subfamília *Tabaninae* Loew. *Arg. Mus. Nac. Rio de Janeiro* 42: 63-76 (should be XIV of this series).

BEQUAERT, J.

- 1924: Notes upon Surcouf's treatment of the Tabanidae in the Genera Insectorum and upon Enderlein's proposed new classification of this family *Psyche* 31 (1): 24-40.
- 1926: Tabanidae, in *Medical Report of the Hamilton Rice seventh expedition to the Amazon, etc.*, Chapter XV, Insecta, pp. 214-235, Cambridge.

COSCARÓN, S. & C. B. PHILIP

- 1967: Revision del genero *Dasybasis* Macq. en la region Neotropical. *Rev. Mus. Argent. Sci. Nat. Bernardino Rivadavia, Entomologia* 2 (2): 15-266, 113 figs.

ENDERLEIN, G.

- 1922: Ein neues Tabanidensystem. *Mitt. Zool. Mus. Berlin* 10 (2): 333-351.
- 1923: Vorläufige Diagnosen neuer Tabanidengenera. *Deutsch. Ent. Zeit.* 1923 (5): 544-545.
- 1925: Studien an blutsaugenden Insekten. I. Grundlagen eines neuen Systems der Tabaniden. *Ibidem* 11 (2): 255-409, 5 figs.

FAIRCHILD, G. B.

- 1939: Notes on the genus *Acanthocera* Macquart. *Rev. Ent.* 10 (1): 14-27, 23 figs.
- 1942: Notes on Tabanidae from Panama. VII. The subgenus *Neotabanus* Lutz. *Ann. Ent. Soc. Amer.* 35 (2): 153-182, 2 pls.
- 1943: *Idem*. X. The genus *Tabanus* and resumé of the Tabanidae of Panama. *Ibidem* 35 (4): 441-474, 2 pls. (1942).
- 1951: Descriptions and notes on Neotropical Tabanidae. *Ibidem* 44 (3): 441-462, 11 figs.
- 1958: Notes on Neotropical Tabanidae. II. Descriptions of new species and new records for Panama. *Ibidem* 51 (6): 517-530, 2 pls.
- 1961: The Adolfo Lutz collection of Tabanidae. I. The described genera and species, condition of the collection, and selection of lectotypes. *Mem. Inst. Oswaldo Cruz* 59 (2): 185-249, 2 pls.
- 1962: Notes on Neotropical Tabanidae. III. The genus *Protosilvius* Enderlein. *Ann. Ent. Soc. Amer.* 55 (3): 342-350, 3 pls.
- 1964: *Idem*. IV. Further new species and new records for Panama. *J. Med. Ent.* 1 (2): 169-185, 2 pls.
- 1966: *Idem*. VI. A New species of *Lepiselaga* Macq. with remarks on related genera. *Psyche* 72 (3): 210-217, 1 pl. (1965).

- 1966a: *Idem*. V. The species described by G. Enderlein. *J. Med. Ent.* 3 (1): 1-19, 28 figs.
- FAIRCHILD, G. B. & C. B. PHILIP
1960: A revision of the Neotropical genus *Dichelacera* subgenus *Dichelacera* Macquart. *Studia Ent.* 3 (1-4): 1-86, 7 pls.
- KRÖBER, O.
1932: Bemerkungen über die Systematik der neotropischen Tabaniden, nebst Bestimmungstabelle der Subfamilien und Gattungen. *Rev. Ent.* 2 (2): 185-202, 6 figs.
1934: Catalogo dos Tabanidae da America do Sul e Central, incluindo o Mexico e as Antilhas. *Ibidem* 4 (2-3): 222-276, 291-333.
1939: Das Tabanidengenus *Catachlorops*. Lutz. *Veröff. deut. Kol.-u. Übersee Mus. Bremen* 2 (3): 211-232, 4 pls.
- LUTZ, A.
1913: Sobre a systematica dos tabanideos, subfamilia Tabaninae. *Brazil Medico* 27 (45), 7 pp., 1.XII.1913 (reprint pp. 1-7).
1914: *Idem*. *Mem. Inst. Oswaldo Cruz* 6 (3): 163-168.
- MACKERRAS, I. M.
1954: The classification and distribution of Tabanidae. I. General Review. *Austr. J. Zool.* 2 (3): 431-454, 10 figs.
1955: *Idem*. II. History: Morphology: Classification: Subfamily Pangoniinae. *Ibidem* 3 (3): 439-511, 39 figs.
1955a: *Idem*. III. Subfamilies Scepsidinae and Chrysopinae. *Ibidem* 3 (4): 583-633, 26 figs.
- OLDROYD, H.
1954: *The horseflies of the Ethiopian region*. Vol. 2, *Tabanus* and related genera. X + 341 pp., 31 maps, 238 figs., British Museum (Natural History). London.
- PHILIP, C. B.
1941: Comments on the supra-specific categories of Nearctic Tabanidae. *Can. Ent.* 73: 2-14.
1942: Notes on Nearctic Tabaninae. III. The *Tabanus lineola* complex. *Psyche* 49 (1-2): 25-40.
1954: New North American Tabanidae. VIII. Notes on and keys to the genera and species of Pangoniinae exclusive of *Chrysops*. *Rev. Brasil. Ent.* 2: 13-60, 10 figs.
1960: Further records of Neotropical Tabanidae mostly from Peru. *Proc. Calif. Acad. Sci.*, ser. 4, 31 (3): 69-102, 1 fig.
1965: The identity and relationships of *Tabanus (Neotabanus) vittiger* and notes on two cases of teratology in Tabanidae. *Ann. Ent. Soc. Amer.* 58 (6): 876-880, 3 figs.
- PHILIP, C. B. & G. B. FAIRCHILD
1956: American biting flies of the genera *Chlorotabanus* Lutz and *Cryptotylus* Lutz. *Ibidem* 49 (4): 313-324, 1 pl., 1 fig.
- STONE, A.
1954: The genus *Bolbodimyia* Bigot. *Ibidem* 47 (2): 248-254.
- SZILÁDY, Z.
1926: Kritische Bemerkungen über Enderlein's Tabanidensystems. *Zool. Anz.* 66 (9-12): 325-328.
- TRAVASSOS DIAS, J. A.
1966: *Tabanideos de Moçambique*. XVI + 1238 pp., 10 maps, 302 figs., Lourenço Marques.