

G 93

The Families and Genera
of
North American Diptera

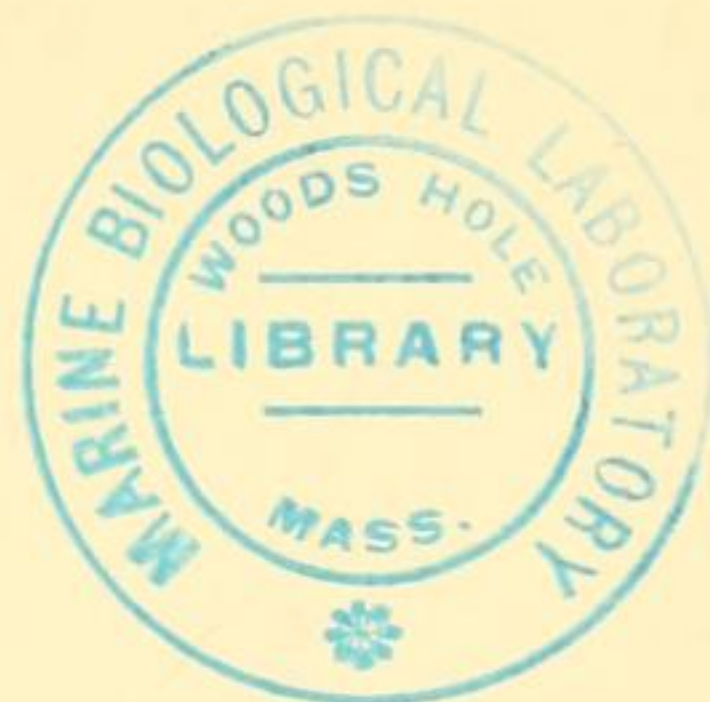
By C. H. CURRAN, D. Sc.,
American Museum of Natural History,
New York, N. Y.

C. H. CURRAN
1934



Copyright, 1934,
by C. H. CURRAN.

Printed in the United States of America by
THE BALLOU PRESS,
New York, N. Y.
1934.



CONTENTS

| | PAGE |
|--|-----------|
| Frontispiece. Portrait of Dr. S. W. Williston. | |
| Preface | 7 |
| Acknowledgements | 9 |
| Collection and Care of Diptera | 10 |
| Flies and Disease | 12 |
| Flies and Crops | 13 |
| Beneficial Flies | 14 |
| Anent the Insect War | 14 |
| Morphology of Diptera | 15 |
| Classification of Diptera | 16 |
| How to Use the Keys | 20 |
| Table of Families | 21 |
| Characteristics of Families and Keys to Genera | 28 to 479 |
| Glossary of Terms Used in Dipterology | 480 |
| Literature | 494 |
| Index | 496 |

Errata

p. 22. add the following line:

Wings rounded at the apex, almost always with crossveins.....31.

p. 76. *Isoecacta* Garrett = *Alluaudomyia*, and not *Dasyhelea*.

p. 82. third line, for *Amopheles* read *Anopheles* and for *Algypti* read *egypti*.

p. 274. for "29" in middle of page read 24.

pp. 286, 288, 290, 292, 294 and 295. for Trypaneidæ read Trupaneidæ.

p. 405. second line, for *Sacrophaga* read *Sarcophaga*.

p. 395, couplet 4, for 104 read 140.

p. 499. Cuphocera, for 47 read 447.

Superfamily Tipuloidea

These are the "Crane Flies" and include the families Tanyderidæ, Ptychopteridæ, Trichoceridæ, Tipulidæ and Anisopodidæ. The first four mentioned families are characterized by the presence of a V-shaped suture on the mesonotum, and have, until recent years constituted the family Tipulidæ. In the Ptychopteridæ this suture is more or less obsolete posteriorly where it extends into the prescutellar depression but its form is always very well marked. The inclusion of the Anisopodidæ with the Crane-Flies may be questioned by some students of the Order. I think the question is a debatable one: at any rate, the family seems to form more or less of a connecting link between the Tipulids and Mycetophilids.

The manuscript for the Tipuloidea has been prepared by Dr. C. P. Alexander and this fact assures the student of thorough and accurate keys together with the latest views on generic limits and classification. The study of this group might almost be said to be a "world apart" in the study of Diptera and I cannot fully express my gratitude to Dr. Alexander for the service he has rendered in preparing this part of the work.

Family Tanyderidæ—The Primitive Crane Flies

Generalized flies of medium size, usually with a handsomely banded wing-pattern. Mouthparts often produced. Antennæ with from 15 to 25 segments; flagellar segments simple, cylindrical. Eyes with erect setæ between ommatidia; ocelli lacking. Latero-cervical sclerites sometimes greatly elongated, short in the local species. Wings with five branches of Radius reaching the margin (*Fig. 11); most genera with one or two supernumerary crossveins in the outer radial or medial fields, these never exceeding two in any one genus, usually with a single such element. Male hypopygium with a single dististyle, usually simple, weakly bifid in the two regional genera. Aedeagus trifid.

The immature stages occur in sandy soil at margins of major streams, the larva being aquatic or nearly so.

There are 23 recent species of Tanyderidæ, distributed in 10 genera, chiefly Australasian in distribution. Two genera with three species occur in North America.

KEY TO GENERA

1. A supernumerary crossvein in cell M_3 of the wing (*Fig. 11). Protoplasa Osten Sacken
 Wings without supernumerary crossveins.....Protanyderus Handlirsch

The most important recent literature is as follows:

Alexander, C. P.

1919. The crane-flies of New York. Part I. Distribution and taxonomy of the adult flies. Cornell Univ. Agr. Expt. Sta., Mem. 25: p. 883, 1 fig.

1927. Diptera. Fam. Tanyderidæ. Genera Insectorum, Fasc. 189.

1930. Observations on the Dipterous family Tanyderidæ. Proc. Linn. Soc. New South Wales, lv, pp. 221-230, 2 pls., 1 fig. (larva and pupa).

Crampton, G. C.

1925. A phylogenetic study of the thoracic sclerites of the non-Tipuloid Nematocerous Diptera. Ann. Ent. Soc. America, xviii, pp. 49-74, 5 pls.

1926. The external anatomy of the primitive Tanyderid Dipteran *Macrochile spectrum* Lœw, preserved in Baltic Amber. Bull. Brooklyn Ent. Soc., xxi, pp. 1-14, 2 pls.

1930a. Some anatomical details of the pupa of the archaic Tanyderid Dipteran *Protoplasa fitchii* O. S. Proc. Ent. Soc. Washington, xxxii, pp. 83-98, 3 pls.

1930b. A comparison of the more important structural details of the larva of the archaic Tanyderid Dipteran *Protoplasa fitchii*, with other Holometabola, from the standpoint of phylogeny. Bull. Brooklyn Ent. Soc., xxv, pp. 239-258, 4 pls.

Williams, Inez

1933. The external morphology of the primitive Tanyderid Dipteran *Protoplasa fitchii* O. S., with notes on the other Tanyderidæ. Journ. N. Y. Ent. Soc., xli, pp. 1-36, 7 pls. (anatomy of adult; comparative wing-figures of all genera of Tanyderidæ).

* Plate II, Tipuloidea.

Family Ptychopteridæ—The False Crane Flies

Antennæ elongate, with 16 (Ptychopterinæ) to 20 segments (Bittacomorphinæ); flagellar segments cylindrical. Suture between prae-scutum and scutum obsolete—posteriorly. Wings with R_2 preserved as a distinct element, lying far distad, subequal in length to R_{1+2} ; three branches of Radius reach margin; two or three branches of Media; a single Anal vein (*Fig. 12).

The immature stages occur in saturated organic earth, the larvæ with an elongate caudal breathing-tube, the pupæ with a single greatly elongated pronotal breathing-horn.

There are two subfamilies, with 3 genera, *Ptychoptera* with 24 species, *Bittacomorphella* with 3 species, *Bittacomorpha* with 2 species. In the New World, the family is found only in the Nearctic region, all genera being found on the eastern and western coasts but rare or lacking in the plains region.

KEY TO GENERA

1. Antennæ 16-segmented; wings with cell M_1 , present (*Fig. 12); (Ptychopterinæ) **Ptychoptera** Meigen
Antennæ 20-segmented; wings with cell M_1 lacking; (Bittacomorphinæ) .. 2
2. Wings with macrotrichia in distal ends of radial and medial cells; basitarsi of legs not dilated **Bittacomorphella** Alexander
Wings without macrotrichia in cells; basitarsi of legs conspicuously dilated **Bittacomorpha** Westwood

The latest literature on the family:

Alexander, C. P.

1919. The crane-flies of New York. Part I. Distribution and taxonomy of the adult flies. Cornell Univ. Agr. Expt. Sta., Mem. 25, pp. 884-886, figs. 2-4.

1920. The same, Part II. Biology and Phylogeny. Ibid., Mem. 38, pp. 772-787, pls. 14-18, incl. (larva and pupa).

1927. Diptera. Fam. Ptychopteridæ. Genera Insectorum, Fasc. 188, pp. 1-12, 1 pl.

* Plate II, Tipuloidea.

Family Trichoceridæ—The Winter Crane Flies

Small or medium-sized flies of slender build, the antennæ elongate, setaceous. Three ocelli. Wings with m-cu lying far distad; two complete Anal veins, 2nd A very short, incurved to anal angle, slightly longer and more extended in *Diazosma*. Male hypopygium with a single dististyle, this cylindrical or with a variously developed lobe on basal portion of mesal face. Ovipositor with cerci upcurved, the convexity being on the ventral surface.

The so-called "winter crane flies" are most numerous in Spring and Fall, though sometimes abundant during mild days of Winter. They are usually found in large to small swarms in the open, but may be found in cellars, mines and similar places. The immature stages occur in decaying vegetable matter.

There are 4 valid genera with about 45 described species. *Trichocera* is essentially a genus of the northern Hemisphere; *Diazosma* is represented only by 2 species, with a wide distribution in the Holarctic region. *Paracladura* has several species in New Zealand and Chile, with a few others in eastern Asia; a single species (*trichoptera* O.S.) is found on our Pacific coast.

KEY TO GENERA

1. Wings with vein 2nd A subsinuate, not short and curved abruptly into the anal angle; north temperate.....**Diazosma** Bergroth
Wings with vein 2nd A short, curved abruptly into the anal angle..... 2
2. Tibial spurs present; tarsi with basitarsus longer than segments 2 and 3 taken together; (* fig. 13); north temperate to arctic.
Trichocera Meigen
Tibial spurs lacking; basitarsus very short, only two or three times as long as wide, shorter than the third tarsal segment; western.
Paracladura Brunetti

The most important recent literature:

Alexander, C. P.

1919. The crane-flies of New York. Part I. Distribution and taxonomy of the adult flies. Cornell Univ. Agr. Expt. Sta., Mem. 25, pp. 887-888, figs. 165, 166.
1920. The same. Part II. Biology and Phylogeny. Ibid. Mem. 38, pp. 789-791, pl. 19 (larva and pupa).
1926. The Trichoceridæ of Australia (Diptera). Proc. Linnean Soc. New South Wales, 51, pp. 299-304, 11 figs. (key to genera).

* Plate II, Tipuloidea.

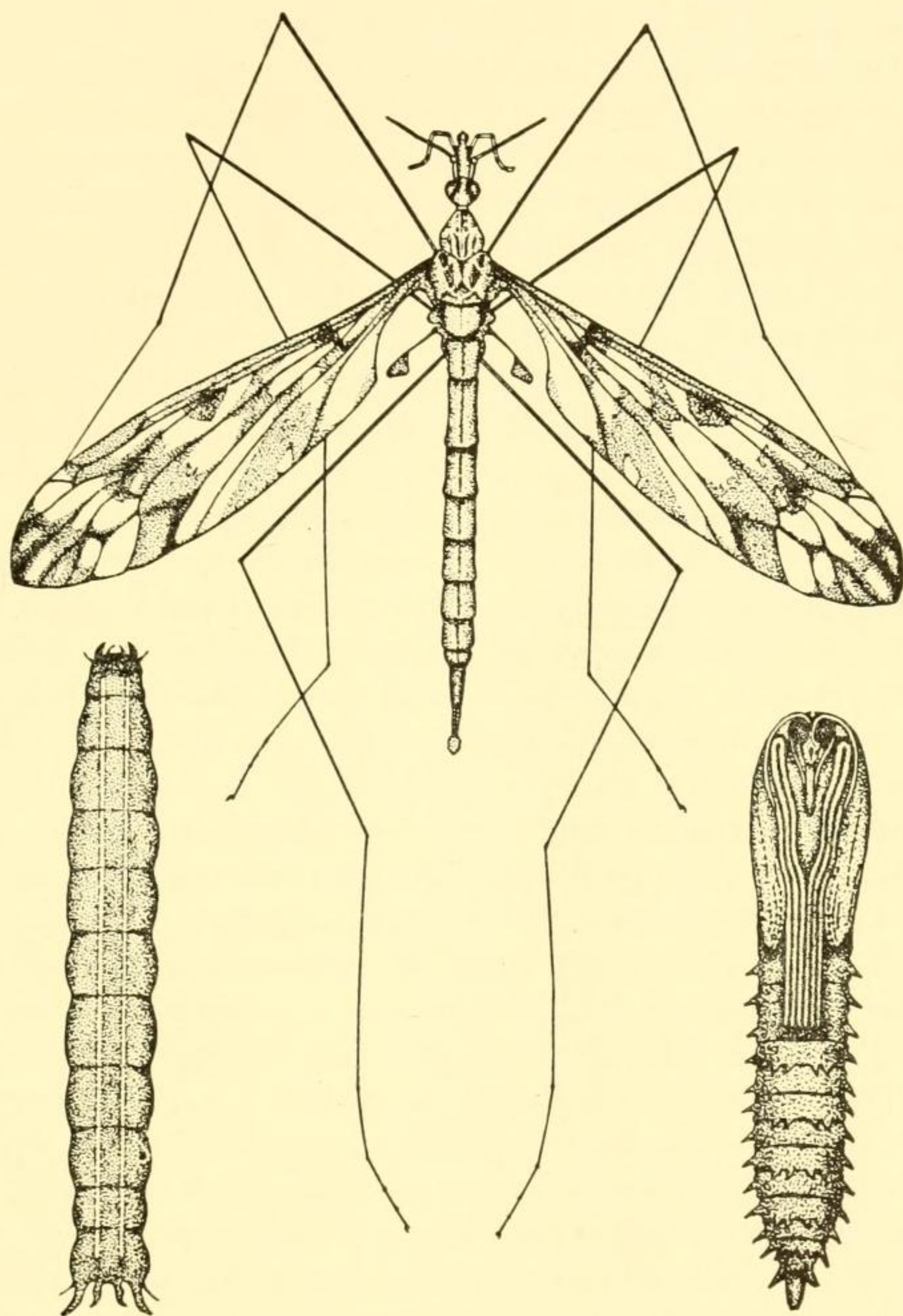
Edwards, F. W.

1928. Diptera. Fam. Protorhyphidæ, Anisopodidæ, Pachyneuridæ, Trichoceridæ. Genera Insectorum, Fasc. 190, pp. 1-41, 2 pls.

Rhynehart, J. G.

1925. The larva and pupa of *Trichocera regelationis* L. Proc. Belfast Nat. Hist. and Phil. Soc., sess. 1922-1923, pp. 3-14, pls. 1-3.

Family Tipulidæ—The Crane Flies



Tipula trivittata—adult, larva, pupa.

The present family, commonly called “crane flies”, includes slender-bodied flies, having long to very long, unusually brittle legs that break readily between the trochanter and femur. From allied families of Nematocera, they are readily told by the lack of ocelli, two Anal veins, and the presence of the so-called V-shaped suture between the mesonotal praescutum and scutum. In many species there is a closed discal (1st M_2) cell. In size, the various species show a range almost as great as that found in the entire order, from tiny flies with a wing-

length of about 2 millimeters (as *Dasymolophilus*) to gigantic forms with a wing-length in excess of 45 millimeters (*Ctenacroscelis*).

Rostrum sometimes greatly elongated, in some (*Elephantomyia: Toxorhina*) produced by a great lengthening of the front, the reduced mouthparts being at the extreme tip; in others (*Limonia: Geranomyia*) the similarly greatly lengthened mouthparts consist chiefly of the labial palpi. In most Tipulidæ the rostrum is short to very short. In many Tipulinæ it is further tipped by a small nose-like point, the *nasus*. Maxillary palpi ranging in number of segments from 1 (some *Limonia* and *Hexatoma: Conosia*) to the normal number of 4. Antennæ ranging in number of segments from 6 (*Hexatoma*) to 39 (*Gynoplistia: Cerozodia*); sometimes very greatly lengthened in males, being one or more times the length of the entire body (*Megistocera; Macromastix; Hexatoma: Eriocera; Rhabdomastix*); sometimes with branched flagellar segments (many Tipulinæ; some Cyliodrominæ; a few Limoniinæ, as *Limonia: Rhipidia* and *Gynoplistia*); pedicel shorter than scape (except in some Eriopterine Claduraria); sometimes the basal flagellar segments united into a fusion-segment (Claduraria, Toxorhinaria). Eyes with ommatidia variable in size and coarseness; sometimes holoptic (*Limonia*), usually broadly dichoptic. Pediceli with short erect setæ between ommatidia.

Pronotum sometimes lengthened (some *Limonia, Toxorhina*). Præscutum sometimes produced cephalad over pronotum (*Conosia, Trentepohlia*). Paired double dots, the *tuberculate pits*, often present, one on either side of midline on cephalic half of præscutum. *Pseudosutural foveae* often present as shiny depressions on humeral portion of præscutum. Postnotal pleurotergite sometimes produced into a tubercle (some Tipulinæ). Halteres long to very long. Legs with trochanters short, rarely lengthened (*Atarba, Rhabdomastix*); tibiæ with or without terminal spurs; claws simple or variously toothed (*Limonia, Tipula*). Wings of various shapes, sometimes long and narrow, the anal angle correspondingly reduced (some *Limonia*), sometimes with the region squarely developed (*Antocha*). In cases, a pale longitudinal fold in cell Cu of wings (*Dicranoptycha*). The details of venation are not discussed here, having been thoroughly considered by the present writer in recent papers that are cited in the morphological bibliography at end of paper and which may be consulted for details. The chief premise of the interpretation of the radial field is that the so-called radial cross-vein, r, of the Comstock-Needham system, has never been developed in the Diptera, the vein that has been so interpreted in the few families where it is found being the transverse free portion of R₂. The anterior branch of the radial field is labelled R₁₊₂, except in the subtribe Limoni-

aria, where the free tip of vein Sc_2 has migrated along vein R_1 to occupy the extreme tip of the vein. A series of diagrams (Figs. 3 to 10) indicates this tendency, which involves many hundreds of species in the vast genus *Limonia*. The medial and cubital fields are interpreted according to the Tillyard modification of the Comstock-Needham system.

Male hypopygium usually simple, the basistyles (coxites) bearing the dististyles (styles) at or near apex. Aedeagus and its subtending gonapophyses furnishing characters of paramount importance for specific determination. A dorsal lobe of the basistyle, the interbase, sometimes present. Ovipositor with the tergal valves (cerci) lengthened, heavily sclerotized, usually gently to strongly upcurved, exceeding the short, straight sternal valves (hypoalvæ); in a few cases (as some Tipulinæ; Cylindrotominæ; Styringomyia and others), the valves of the ovipositor are short and fleshy.

Tipulidæ are great lovers of moist conditions, being chiefly restricted by humidity. Species have been taken within 600 miles of the North Pole, while others occur at altitudes of over 17,000 feet in Thibet. The majority of the species occupy the intermediate zone, the family being very numerous in species in all temperate parts of the World and similarly numerous in the subtropical and temperate portions of the mountainous regions of the Tropics. Lowland tropical species are fewer in number and are apt to have a very wide distribution. The lesser oceanic islands are practically devoid of the larger crane flies (Tipulinæ) while having numbers of species of the small fragile Limoniinæ (as *Limonia*, s.l.; *Styringomyia*; *Gonomyia*; *Lipophleps*; *Trentepohlia*). Under rigorous conditions, as the arctic, wind-swept coasts, high mountains and the like, species with reduced wings are frequently found, being most numerous in the female sex. The greatest reduction of wings is found in *Chionea*, which is virtually apterous in both sexes.

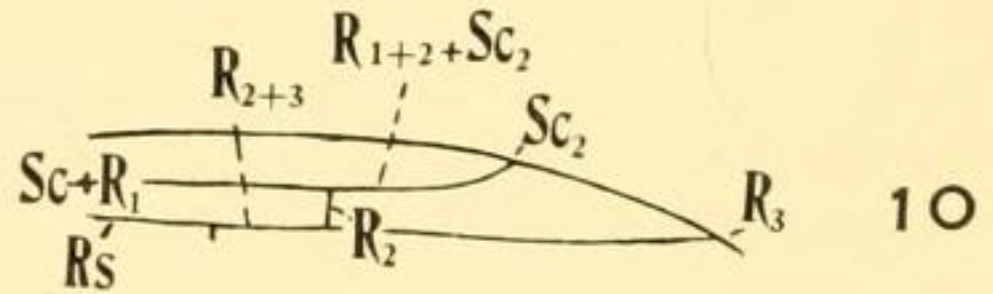
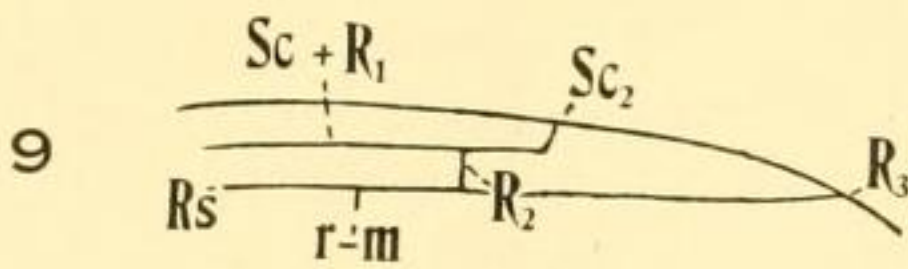
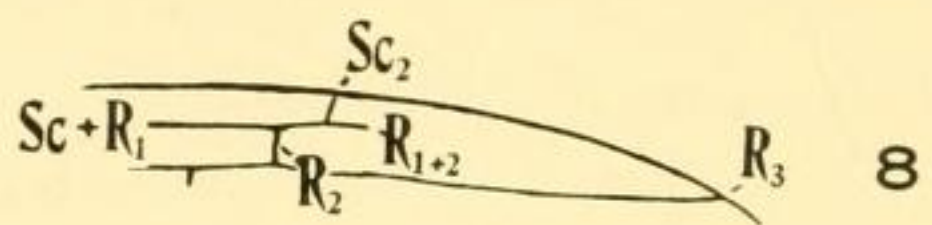
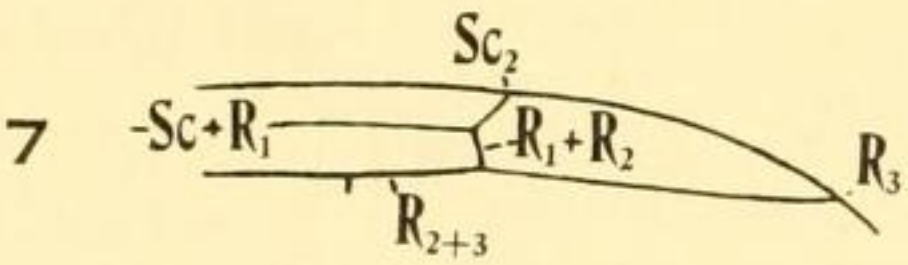
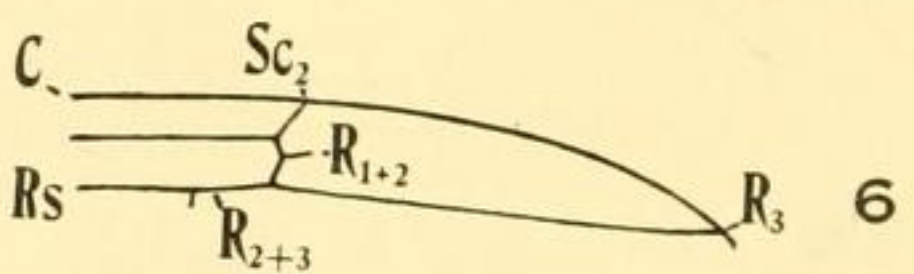
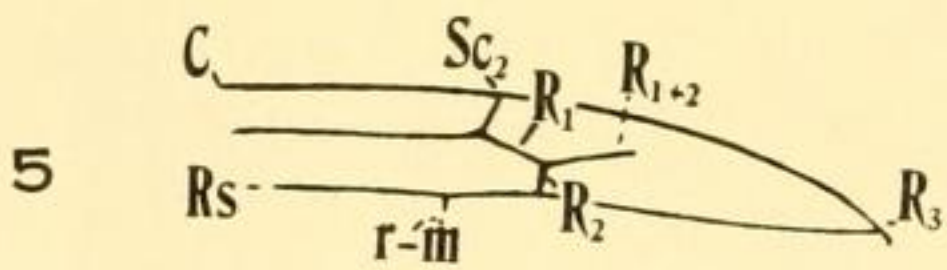
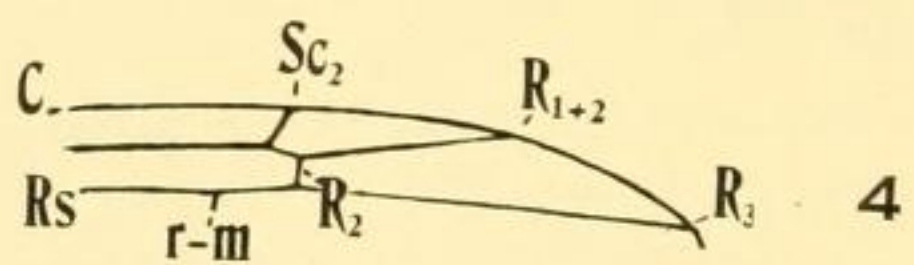
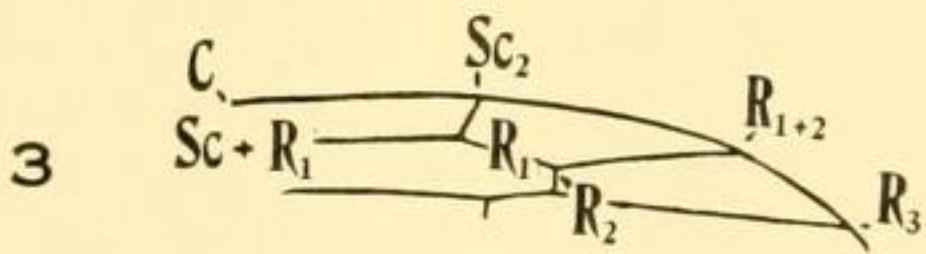
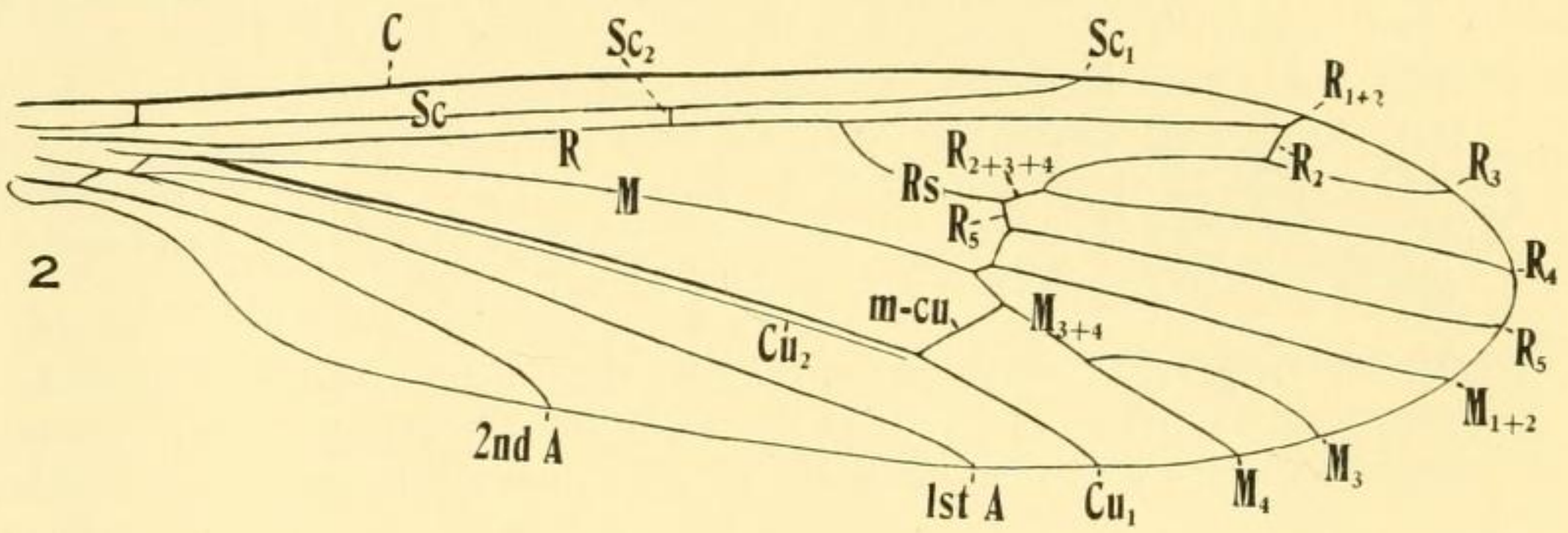
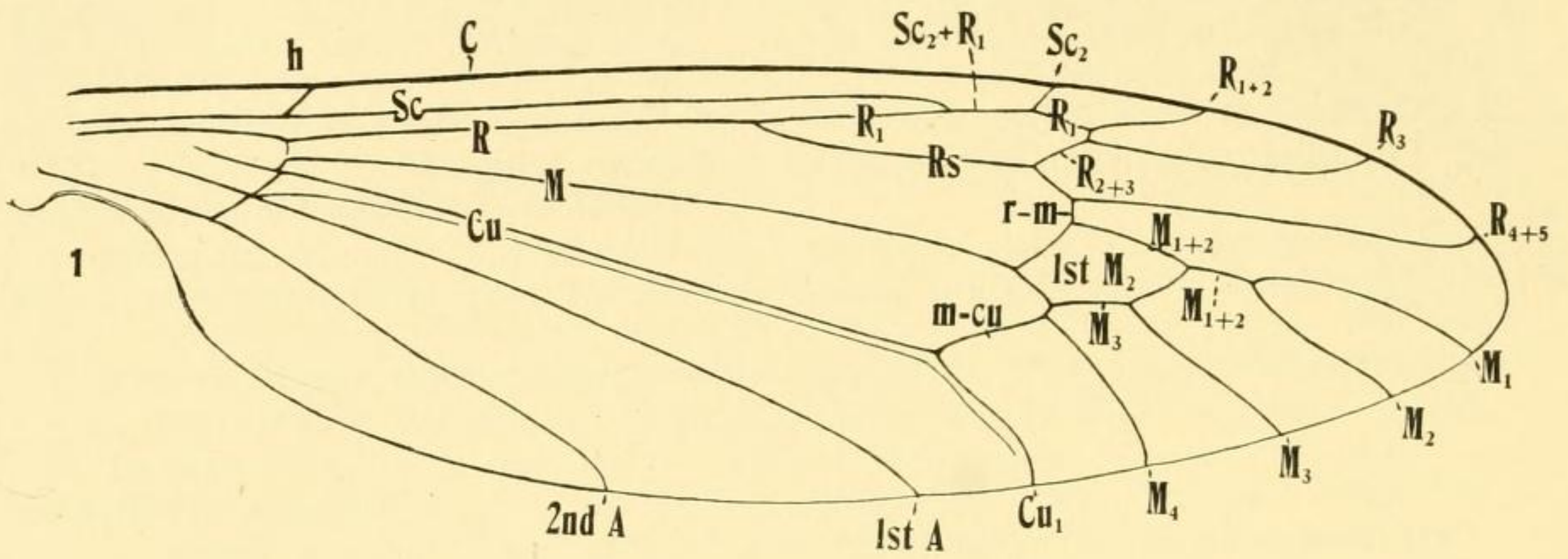
The Tipulidæ of the World now include more than 6000 species, arranged in 283 genera and subgenera (Tipulinæ, 76, Cylindrotominæ, 9; Limoniinæ, 198, the latter further distributed in the following tribes: Lechriini, 4; Limoniini, 37; Pediciini, 12; Hexatomini, 70, and Eriopterini, 75). Representatives of all three subfamilies and of all tribes with the exception of the Lechriini occur in the area under consideration.

Keys available for the identification of the adult flies are very few in number. The writer's preliminary study on the "Crane flies of New York", is now seriously out-of-date due to the great additions made in intervening years. The forthcoming volume on Diptera in the "Insects of Connecticut" series will largely supercede the earlier work. Both of these reports are restricted to the area embraced in northeastern

North America. No keys are available for most of the groups in other regions of the continent, with the exception of the papers listed in the bibliography on certain groups of Tipulidæ, which are lessened in value due to the great additions that have been made in later years.

KEYS TO SUBFAMILIES AND TRIBES, GENERA, ETC.

1. Terminal segment of maxillary palpus elongate, whiplash-like; nasus usually distinct; antennæ usually with 13 segments; wings with Sc_1 usually atrophied; vein Cu_1 constricted at m-cu, the latter usually at or close to fork of M_{3+4} (1, 17 to 20); body-size usually large. (Tipulinæ) 2
- Terminal segment of maxillary palpus short; no distinct nasus; antennæ usually with 14 or 16 segments; wings with Sc_1 present, its extreme tip atrophied in some *Cylindrotominæ*; vein Cu_1 straight, not constricted at m-cu, the latter placed far before the fork of M_{3+4} , usually at or close to fork of M (21 to 44); body-size usually small or medium..... 19
2. Legs unusually long and filiform; wings with vein R_{1+2} atrophied and with Sc_2 ending in Sc close to origin of R_s (*Dolichozeza*, 19), when R_{1+2} is preserved (*Brachypremna*, 18; *Tanypremna*; *Megistocera*, 17), vein Sc is very long, Sc_1 reaching C as a distinct element some distance beyond fork of R_s and with cell 2nd A usually very narrow (*Dolichozezaria*) 3
- Legs of normal stoutness for the family; wings with vein R_{1+2} preserved (20); when atrophied (a few species of *Tipula*) with Sc of moderate length, Sc_1 atrophied before fork of R_s and Sc_2 ending at or near midlength of R_s (exception, some species of *Longurio*); cell 2nd A of normal width..... 8
3. Wings with origin of vein M_4 basad of that of M_{1+2} ; R_{2+3} angularly bent at near midlength (17); tropical, subtropical.
Megistocera Wiedemann
- Wings with origin of vein M_4 distad of that of M_{1+2} , usually far beyond; R_{2+3} straight or nearly so, not angulated..... 4
4. Wings with R_{1+2} pale, perpendicular to R_{2+3} ; R_s strongly arcuated at origin (18).....*Brachypremna* Osten Sacken
- Wings with R_{1+2} , when present, oblique; R_s straight or gently arcuated throughout length, sometimes very short and transverse..... 5
5. R_s of moderate length, subequal to m-cu; Sc long, Sc_1 preserved, ending beyond fork of R_s ; R_{1+2} pale but preserved; tropical.
Tanypremna Osten Sacken
- R_s short, transverse, simulating a crossvein, about equal in length to one-half m-cu; Sc unusually short, Sc_1 atrophied, Sc_2 entering Sc before to just beyond origin of R_s ; R_{1+2} atrophied. (*Dolichozeza*) 6
6. Wings with cell 1st M_2 open by atrophy of basal section of M_3 , the outer medial field thus appearing pectinately branched (19); temperate*Dolichozeza: Dolichozeza* Curtis
- Wings with cell 1st M_2 closed..... 7
7. Cells beyond cord with abundant macrotrichia; tropical.
Dolichozeza: Megistomastix Alexander
- Cells beyond cord glabrous; temperate....*Dolichozeza: Orozeza* Needham



Tipuloidea, Plate I.

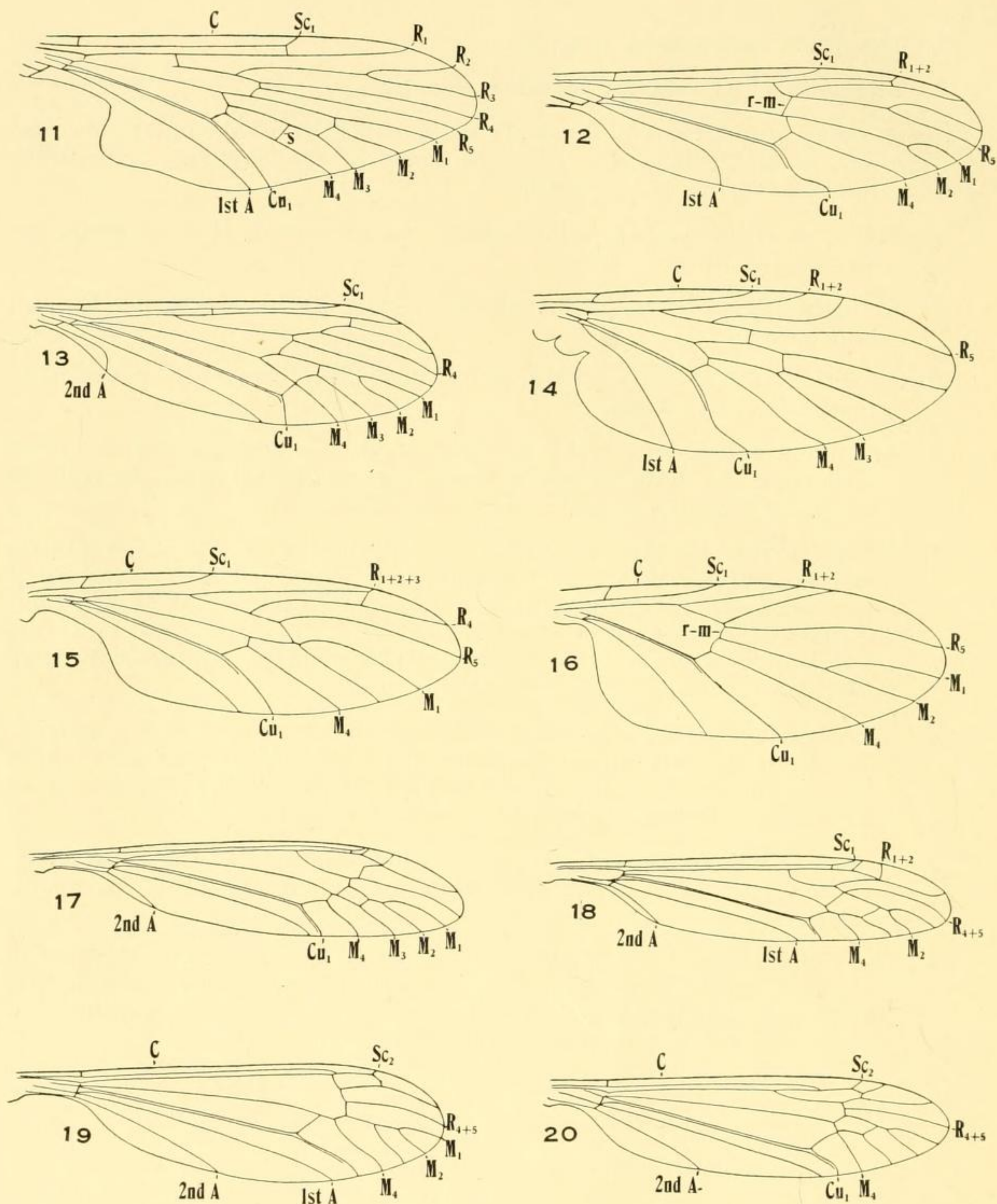
EXPLANATION OF PLATE

1. *Tanyptera fumipennis*, venation.
2. *Dicranota (Plectromyia) modesta*, venation.
- 3-10. A series of diagrams to illustrate the modification of the outer subcostal and radial fields of the wing, as found in the Tipulinæ, Cylindrotominæ, Lechriini and Limoniini.
3. The type found in the Orimargaria: Sc_2 preserved, R_{1+2} complete, attaining the wing-margin.
4. A further development of 3. Sc_2 has moved distad, shortening R_1 ; R_{1+2} still entire.
5. Condition as in 4 but with tip of R_{1+2} atrophied. Found in several Orimargaria, Limoniaria.
6. An accentuation of 5. The atrophy of R_{1+2} is still greater, R_1 more shortened and more or less in transverse alignment with the free tip of Sc_2 . Condition found in numerous Limoniaria.
7. A still further modification of 5. The atrophy of R_{1+2} is now complete and R_1 is in direct transverse alignment with R_2 , both in turn being in transverse alignment with the free tip of Sc_2 . This is the commonest type in the Limoniaria, being found in most members of the following subgenera of *Limonia*,—*Dicranomyia*, *Geranomyia* and *Rhipidia*, as well as in some *Limonia*, s.s.
8. A type that reverts back to condition 5, with a long spur of R_{1+2} persisting, with the free tip of Sc_2 migrated distad along this spur to lie beyond the level of R_2 . A condition found in several subgenera of *Limonia*, as *Peripheroptera*, *Limonia* and *Libnotes*.
9. A further modification of 8, where Sc_2 has migrated to the extreme tip of the spur of R_{1+2} but still forms a rectangular bend. *Limonia*: *Libnotes*.
10. The culmination of the series, where the free tip of Sc_2 has migrated to the extreme tip of the spur of R_{1+2} and then bends to the costal margin at a gently oblique angle. This condition is common in many *Limonia* of the subgenera *Limonia* and *Discobola*.

EXPLANATION OF SYMBOLS

Comstock-Needham system, as modified by Alexander and Tillyard

C = Costa; Cu = Cubitus; 1st M_2 = cell 1st M_2 ; M = Media; m-cu = medial-cubital crossvein; R = Radius; r-m = radial-medial crossvein; Rs = Radial sector; s = supernumerary crossvein; Sc = Subcosta; A = Anal veins.



Tipuloidea, Plate II.—11. *Protoplasma fitchii*, venation; 12. *Ptychoptera rufocincta*, venation; 13. *Trichocera colei*, venation; 14. *Anisopus alternatus*, venation; 15. *Axymyia furcata*, venation; 16. *Mycteboia divergens*, venation; 17. *Megistocera longipennis*, venation; 18. *Brachypremna dispellens*, venation; 19. *Dolichozepe (Dolichozepe) americana*, venation; 20. *Tipula (Tipula) dorsomacula*, venation.

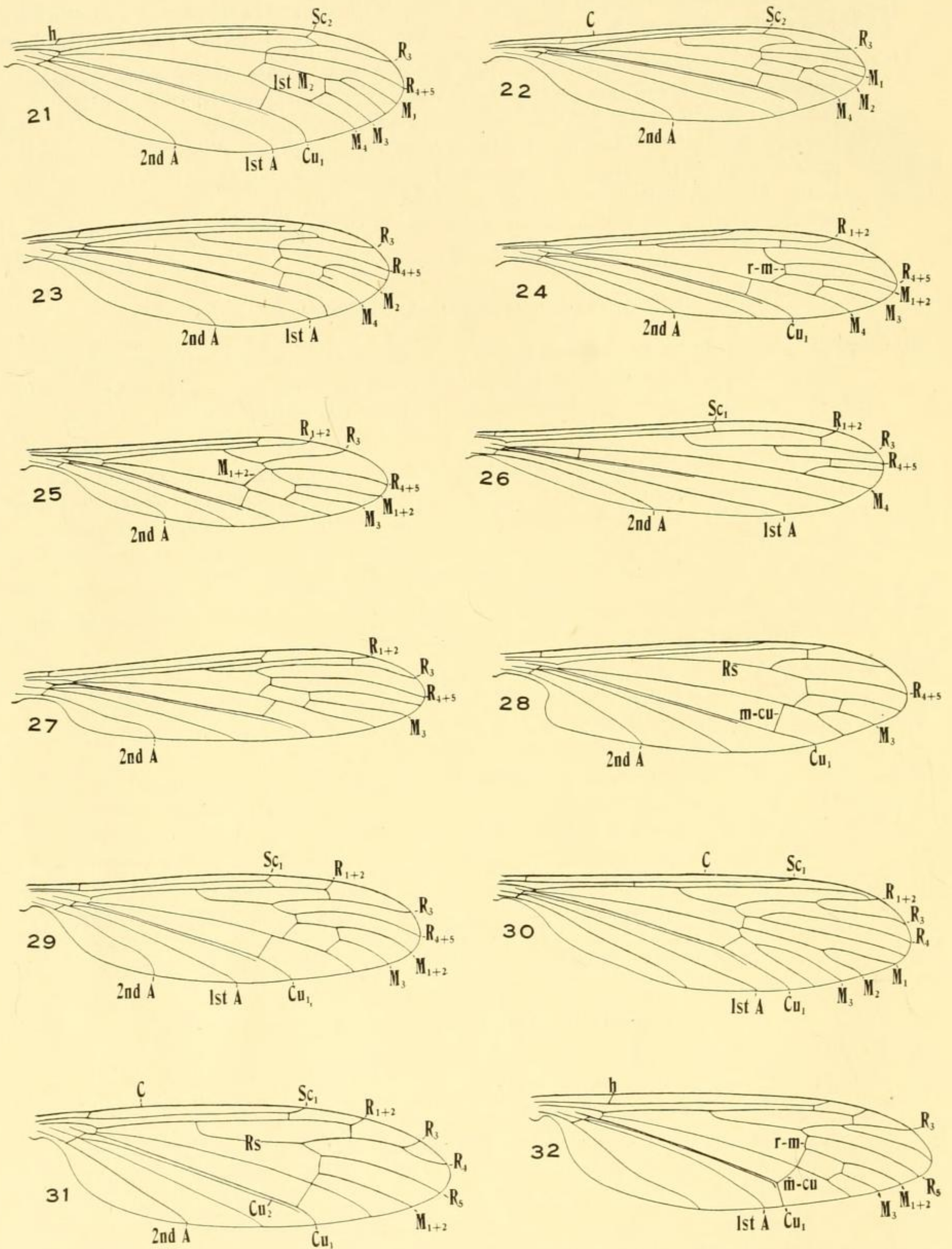
18. Wings with macrotrichia in apical cells... **Tipula: Trichotipula** Alexander
Wings with cells glabrous..... **Tipula: Tipula** Linnæus
19. Wings with tip of R_{1+2} atrophied, giving the appearance of a long fusion back from margin of veins R_1 and anterior branch of R_s ; free tip of Sc_2 preserved (21, 22, 23) (Cylindrotominæ)..... 20
Wings sometimes with tip of R_{1+2} atrophied (some Limoniini) but not giving the appearance of a long fusion backward from margin of veins R_1 and anterior branch of R_s ; free tip of Sc_2 preserved in many species of tribe Limoniini, lacking in other tribes in this fauna (24 to 44) (Limoniinæ)..... 24

CYLINDROTOMINÆ: GENERA

20. Head and intervals of mesonotal præscutum with numerous deep punctures; a deep median groove on præscutum.... **Triogma** Schiner
Head and intervals of mesonotal præscutum smooth; no median præscutal groove 21
21. Three branches of Radius reach the margin, R_{1+2} being preserved as a distinct element **Phalacrocera** Schiner
Two branches of Radius reach the margin, R_{1+2} being entirely atrophied, giving the appearance of a long backward fusion of veins R_1 and anterior branch of R_s (21-23)..... 22
22. Four branches of Media reach the margin (21).. **Cylindrotoma** Macquart
Three branches of Media reach the margin..... 23
23. Wings with crossvein r-m present; outer end of cell 1st M_2 almost always closed by a single transverse vein, cell M_1 being present, sessile to short-petiolate; cells 2nd M_2 and M_3 confluent by atrophy or partial atrophy of distal section of vein M_3 ; antennæ nearly simple, the lower face of individual segments not produced (22, 23) **Phalacrocera** Schiner
Wings with crossvein r-m usually shortened to quite obliterated by the approximation or fusion of veins R_{4+5} and M_{1+2} ; outer end of cell 1st M_2 closed by two transverse veins, these being M and the basal section of M_3 ; cell M_1 lacking, cells 2nd M_2 and M_3 distinct; antennæ strongly nodulose, especially in male, the individual flagellar segments nearly cordate..... **Liogma** Osten Sacken

TRIBES OF LIMONIINÆ

24. Eyes hairy; wings with vein Sc_1 very long, Sc_2 lying basad of origin of R_s (2, 30). (Pediini)..... 41
Eyes glabrous; wings with Sc_1 short or of moderate length, when long (some Eriopterini), Sc_2 lying distad of origin of R_s ; where Sc_2 lies basad of origin of R_s (some Limoniini, Eriopterini), the entire vein Sc is shortened..... 25
25. Wings with free tip of Sc_2 often present; veins R_4 and R_5 fused to margin, only two branches of R_s being present; antennæ usually with 14 (Limoniaria) or 16 segments; (4-10, 24-29) (Limoniini).. 27
Wings with free tip of Sc_2 atrophied; veins R_4 and R_5 separate, the former usually transferred to the upper branch, R_{2+3} , to form a distinct element R_{2+3+4} ; usually with three branches of R_s present (except in **Atarba**, **Elephantomyia**, **Styringomyia**, **Teucholabis**, **Gonomyia** and **Toxorhina**, where R_4 is captured by R_{2+3} , as above); antennæ usually with 16 segments; (31-44)..... 26

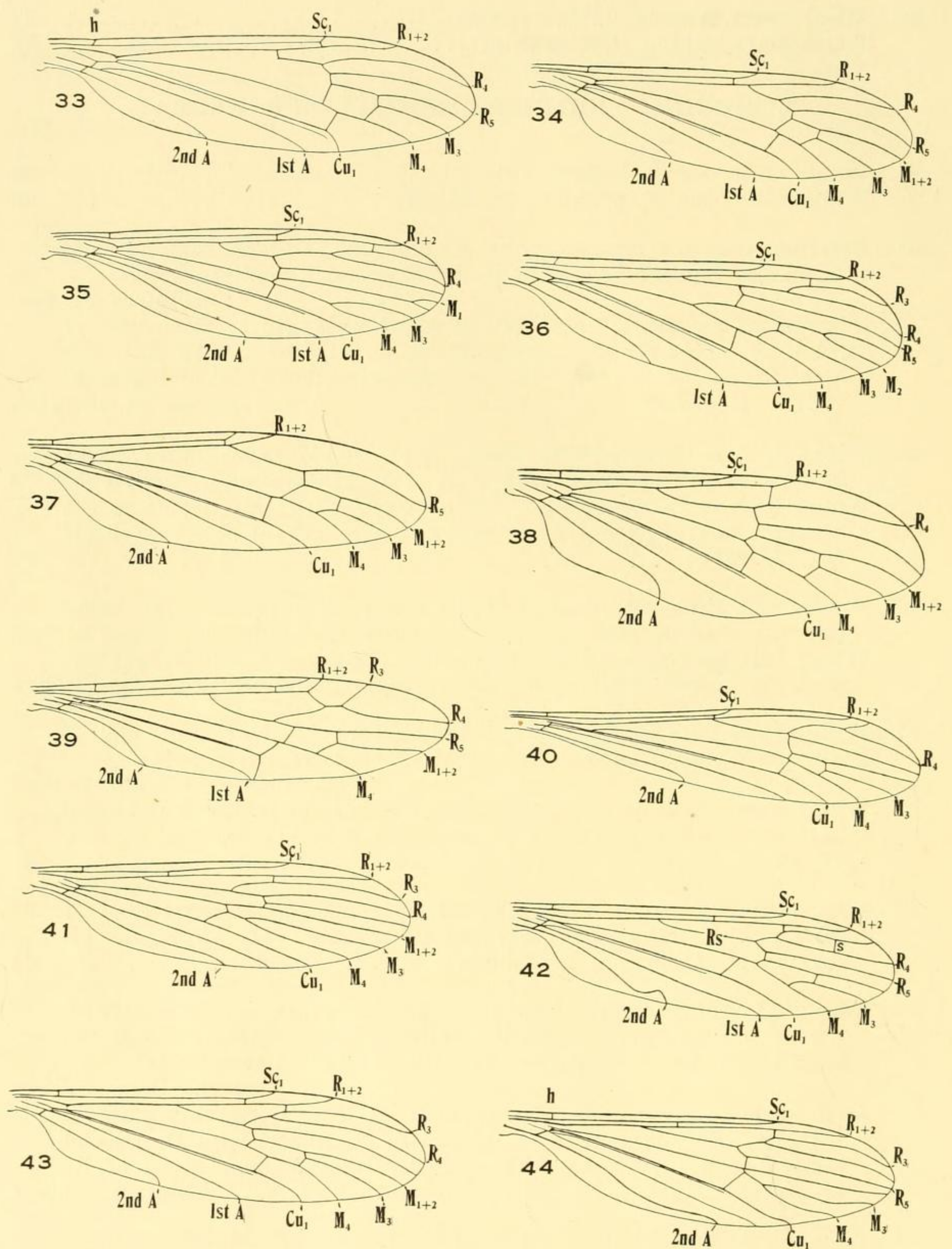


Tipuloidea, Plate III.—21. *Cylindrotoma tarsalis*, venation; 22. *Phalacrocera tipulina*, venation; 23. *Phalacrocera occidentalis*, venation; 24. *Elliptera tennesseea*, venation; 25. *Helius (Helius) flavipes*, venation; 26. *Orimarga (Diotrepha) mirabilis*, venation; 27. *Dicranoptycha tigrina*, venation; 28. *Antocha saxicola*, venation; 29. *Limonia (Limonia) immatura*, venation; 30. *Pedicia (Tricyphona) protea*, venation; 31. *Hexatoma (Hexatoma) megacera*, venation; 32. *Hexatoma (Eriocera) longicornis*, venation.

26. Tibial spurs present. (Hexatomini)..... 51
 Tibial spurs lacking. (Eriopterini)..... 78

LIMONIINI: SUBTRIBES, GENERA, SUBGENERA

27. Wings with vein R_2 lacking (25)..... 28
 Wings with vein R_2 present (24, 26, 29)..... 29
28. Rostrum short and inconspicuous; Rs long and straight, running close to R_1 and in alignment with R_{2+3} ; r-m distinct. (Ellipteraria).
Elliptera Schiner
 Rostrum of moderate length, about equal in length to remainder of head; Rs short, gently arcuated, not in alignment with R_{2+3} ; r-m often shortened or obliterated by approximation of adjoining veins (25). (Heliaria)Helius St. Fargeau
29. Wings with m-cu more than three, (and usually much more), times its own length before the fork of M (26). (Orimargaria, Orimarga) 30
 Wings with m-cu close to or beyond the fork of M, if before, the distance not or scarcely exceeding the length of the vein itself (24, 27, 29) 31
30. Wings with three branches of Media reaching margin, cell M_3 being present; m-cu beneath Rs.....Orimarga: Orimarga Osten Sacken
 Wings with two branches of Media reaching margin, cell M_3 lacking; m-cu far before origin of Rs (26)..Orimarga: Diotrepha Osten Sacken
31. Wings with vein R_2 lying far distad, beyond level of outer end of cell 1st M_2 ; m-cu beyond fork of M (27) (Dicranoptycharia).
Dicranoptycha Osten Sacken
 Wings with vein R_2 in almost transverse alignment with r-m and basal half of cell 1st M_2 ; m-cu at or slightly before fork of M (24, 28, 29) 32
32. Wings with Rs long and straight (24, 28); antennæ 16-segmented... 33
 Wings with Rs shorter and more arcuated (21); antennæ 14-segmented. (Limoniaria, Limonia)..... 34
33. Anal angle of wing very prominent, almost square; Rs long, diverging at an acute angle from R_1 , ending approximately between the branches of Rs or in alignment with R_{4+5} (28) (Antocharia).
Antocha Osten Sacken
 Anal angle of wing normally rounded; Rs long, lying very close to R_1 and nearly parallel to it, its end in alignment with R_{2+3} ; basal section of R_{4+5} short and arcuated, diverging from the end of Rs at nearly a right angle (24) (Ellipteraria).....Elliptera Schiner
34. Wings with M and both sections of M_3 lacking, cell M_3 thus entirely obliteratedLimonia: Alexandriaria Garrett
 Wings with at least the distal section of M_3 preserved and usually with both sections, together with m, cell M_3 thus usually present (29) 35
35. Supernumerary crossveins present in certain cells of wing..... 36
 No supernumerary crossveins in cells of wing (excepting a weak element sometimes evident in cell Sc) (29)..... 37



Tipuloidea, Plate IV.—33. *Elephantomyia westwoodi*, venation; 34. *Atarba (Atarba) picticornis*, venation; 35. *Polymera (Polymera) rogersiana*, venation; 36. *Prolimmophila areolata*, venation; 37. *Toxorhina (Toxorhina) muliebris*, venation; 38. *Teucholabis (Teucholabis) complexa*, venation; 39. *Trentepohlia (Paramongoma) bromeliadicola*, venation; 40. *Gonomyia (Gonomyia) subcinerea*, venation; 41. *Molophilus nitidus*, venation; 42. *Helobia hybrida*, venation; 43. *Gnophomyia tristissima*, venation; 44. *Erioptera (Erioptera) septentrionis*, venation.

47. Cell 1st M_2 closed; eastern.....**Dicranota: Eudicranota** subg. n.
Cell 1st M_2 open by atrophy of m..... 48
48. Cell M_1 lacking**Dicranota: Paradicranota** subg. n.
Cell M_1 present**Dicranota: Dicranota** Zetterstedt
49. Cell 1st M_2 closed; eastern**Dicranota: Amalopina** Brunetti
Cell 1st M_2 open by atrophy of m..... 50
50. Cell M_1 lacking (2).....**Dicranota: Plectromyia** Osten Sacken
Cell M_1 present**Dicranota: Rhaphidoiabis** Osten Sacken

HEXATOMINI: SUBTRIBES, GENERA, SUBGENERA

51. Antennæ with not more than 12 segments (**Hexatomaria, Hexatoma**). 52
Antennæ with more than 14 segments 54
52. Cell 1st M_2 open; two branches of M reach the wing-margin (31);
eastern.....**Hexatoma: Hexatoma** Latreille
Cell 1st M_2 closed; three or four branches of M reach the wing-
margin (32)..... 53
53. Feet snowy-white; eastern and tropical..**Hexatoma: Pentoptera** Schiner
Feet not white (32).....**Hexatoma: Eriocera** Macquart
54. Wings with only two branches of Rs present; vein R_2 lacking..... 55
Wings with three branches of Rs present; vein R_2 preserved (except
in **Phyllolabis**) 56
55. Rostrum elongate, exceeding one-half the length of the entire body
(33); (**Elephantomyria**).....**Elephantomyia** Osten Sacken
Rostrum short and inconspicuous, not exceeding the remainder of head
(34); eastern and tropical (**Atarbaria**).
Atarba: Atarba Osten Sacken
56. Apical cells of wing with macrotrichia 57
Cells of wing without macrotrichia (excepting in stigmal area)..... 61
57. A supernumerary crossvein in cell M; eastern (**Limnophilaria**).
Limnophila: Trichephelia Alexander
No supernumerary crossvein in cell M 58
58. Cell R_3 of wings sessile, subsessile or short-petiolate; R_{2+3+4} lacking
or much shorter than m-cu. (**Limnophilaria**) 59
Cell R_3 of wings long-petiolate, R_{2+3+4} being as long as or longer than
m-cu. 60
59. Wings with macrotrichia abundant, involving the cells basad of cord.
Ulomorpha Osten Sacken
Wings with sparse macrotrichia in cells beyond cord only.
Limnophila: Lasiomastix Osten Sacken
60. Small species (wing, ♂, less than 5 mm.); cell M_1 usually present; an-
tennæ short in both sexes (**Adelphomyria**)....**Adelphomyia** Bergroth
Larger flies (wing, ♂, over 6 mm.); cell M_1 lacking; antennæ of male
very long; tropical (**Limnophilaria**)**Shannonomyia** Alexander
61. A supernumerary crossvein in cell C (**Epiphragmaria**).
Epiphragma Osten Sacken
No supernumerary crossvein in cell C (35)..... 62

62. Wings with vein R_2 lacking; m-cu at outer end of cell 1st M_2 ; western.
Phyllolabis Osten Sacken
 Wings with vein R_2 present; m-cu at or before two-thirds the length
 of cell 1st M_2 , when the latter is present (35, 36)..... 63
63. Wings with cell 1st M_2 open by atrophy of m (35); male with
 elongate nodulose antennæ; tropical and subtropical.
Polymera: Polymera Wiedemann
 Wings with cell 1st M_2 closed; antennæ of male not nodulose..... 64
64. Wings with Sc very long, Sc_1 , R_{1+2} and R_3 all ending close together
 at costal margin; tropicalPsaronius Enderlein
 Wings with Sc short, widely separated from either R_{1+2} or R_3 (36)... 65
65. Wings with m-cu at or close to fork of M; anterior arculus lacking.
 (Dactylolabaria)Dactylolabis Osten Sacken
 Wings with m-cu beyond the fork of M, at from one-third to about
 one-half the length of cell 1st M_2 ; where close to fork of M (some
Pseudolimnophila) the arculus complete..... 66
66. Wings with the anterior arculus lacking (36) (Pseudolimnophilaria,
 in part) 67
 Wings with the anterior arculus present 68
67. Cell 1st M_2 of wings very large, its inner end lying far proximad of
 the other elements of the cord (36).....Prolimnophila Alexander
 Cell 1st M_2 of wings of normal size, its inner end straight and in ap-
 proximate alignment with the elements of the anterior cord.
Archilimnophila, g. n.
68. Wings with Sc relatively short, Sc_1 ending before the level of the fork
 of R_s ; where slightly longer (**Limnophila albipes** Leonard) the pos-
 terior tarsi snowy-white. (Limnophilaria, in part)..... 69
 Wings with Sc longer, Sc_1 ending opposite or beyond the fork of R_s ;
 (compare some species of **Pilaria**, distinguished by having the an-
 tennal verticils of unusual length) 70
69. Antennæ with long conspicuous verticils; tuberculate pits present,
 small, placed at extreme cephalic end of præscutum; R_s elongate,
 exceeding vein R_3 ; cell M_1 present or lacking.....Pilaria Sintenis
 Antennæ with short verticils; tuberculate pits lacking; R_s short and
 strongly arcuated or angulated at origin; cell M_1 lacking.
Shannonomyia Alexander
70. Head strongly narrowed and prolonged behind; radial and medial
 veins beyond cord long and sinuous; vein R_3 extending generally
 parallel to vein R_4 , not diverging markedly at tips; vein 2nd A
 strongly curved to margin (Pseudolimnophilaria, in part).
Pseudolimnophila Alexander
 Head broad, not conspicuously narrowed behind; radial and medial
 veins beyond cord more nearly straight; vein R_3 diverging strongly
 from vein R_4 , cell R_3 conspicuously widened at margin; vein 2nd A
 not curved strongly into margin (Limnophilaria, in part, **Limno-
 phila**).
71. Supernumerary crossveins in either cell R_3 or cell M of wing..... 72
 No supernumerary crossveins in cells of wing..... 74

72. A supernumerary crossvein in cell R_3 ; eastern.
Limnophila: Dicranophragma Osten Sacken
 A supernumerary crossvein in cell M..... 73
73. R_s long-spurred at origin; antennæ of male elongate.
Limnophila: Idioptera Macquart
 R_s slightly if at all spurred at origin; antennæ short in both sexes.
Limnophila: Elæophila Rondani
74. Cell R_3 sessile; cell M_1 lacking.....**Limnophila: Idiolimnophila**, subg. n.
 Cell R_3 petiolate; cell M_1 present..... 75
75. Very large species (wing over 16 mm.); wings with the branches of M leaving the main stem at a strong angle, cell 1st M_2 thus being strongly hexagonal; eastern.....**Limnophila: Eutonia** Van der Wulp
 Smaller species (wing under 14 mm.); wings with the branches of M not strongly divergent, especially M_{3+4} , cell 1st M_2 being more nearly rectangular in outline..... 76
76. Wings with vein R_{2+3+4} short, subequal to the basal deflection of R_5 ; R_s elongate, exceeding four times R_{2+3+4} ; coloration polished black or gray, the latter group having the male hypopygium with a series of teeth on margin of outer dististyle, producing a comb-like appearance**Limnophila: Prionolabis** Osten Sacken
 Wings with R_{2+3+4} longer, usually exceeding the basal deflection of R_5 ; R_s shorter, not exceeding three times R_{2+3+4} ; where the above characters are doubtful, the species have a closely irrorate brown wing-pattern; body coloration never polished black; when gray, male hypopygium without a comb of spines on outer dististyle.... 77
77. R_s short, weakly to more strongly angulated at origin, more rarely merely arcuated; R_{2+3+4} subequal to or shorter than m-cu; antennæ short in both sexes.....**Limnophila: Phylidorea** Bigot
 R_s longer, more gently arcuated; in species with shorter R_s , antennæ of male elongate and usually with R_{2+3+4} long, considerably exceeding m-cu.....**Limnophila: aberrant species**

ERIOPTERINI: SUBTRIBES, GENERA, SUBGENERA

78. Nearly apterous, the wings reduced to microscopic structures that are smaller than the halteres; northern. (Claduraria).**Chionea** Dalman
 Fully-winged species 79
79. Wings with cell M_1 present 80
 Wings with cell M_1 lacking (37-44)..... 84
80. Antennæ with the basal two to four segments united into a fusion-segment; wings with R_{2+3+4} much longer than the short basal section of R_5 ; veins Sc_1 and R_{1+2} widely separated at margin, the distance on Costa between them approximately three times r-m; legs plainly colored; temperate. (Claduraria)..... 81
 Antennæ with all flagellar segments distinct; wings with basal section of R_5 elongate, much exceeding R_{2+3+4} ; veins Sc_1 and R_{1+2} closely approximated at margin, the distance on costa between them subequal to or shorter than r-m; legs conspicuously hairy, banded with black, rufous and white; tropical. (Lecteriaria).
Lecteria Osten Sacken

81. Wings with R_{2+3+4} subequal to or longer than vein R_3 , cell R_3 thus being subequal to its petiole; vein R_2 at or before the fork of R_{3+4} .
Neolimnophila Alexander
 Wings with R_{2+3+4} shorter than vein R_3 , cell R_3 being much longer than its petiole; R_2 far beyond fork of R_{2+3+4} 82
82. Wings with cell M_1 very small, about one-third its petiole; fusion-segment of antenna very long, about equal to the succeeding four segments combined; western.....**Pterochionea** Alexander
 Wings with cell M_1 subequal to or longer than its petiole; fusion-segment of antennæ shorter, about as long as the succeeding two or three segments combined. (**Cladura**)..... 83
83. Wings with R_{1+2} elongate, exceeding R_{2+3+4} ; R_{2+3} subequal to m-cu; male hypopygium with two dististyles..**Cladura: Neocladura** Alexander
 Wings with R_{1+2} shorter than R_{2+3+4} ; R_{2+3} approximately twice m-cu; male hypopygium with a single powerful dististyle.
Cladura: Cladura Osten Sacken
84. Rostrum very long and slender, approximately one-half the entire body or longer; setæ of legs profoundly bifid (**Toxorhinaria**, **Toxorhina**) 85
 Rostrum short, not exceeding remainder of head; setæ of legs simple. 86
85. Wings with R_s having a single branch (37); eastern and tropical.
Toxorhina: Toxorhina Osten Sacken
 Wings with R_s having two branches; tropical.
Toxorhina: Ceratocheilus Wesché
86. Two branches of R_s reach the wing-margin (38)..... 87
 Three branches of R_s reach the wing-margin (39-44)..... 89
87. Wings with R_1 ending before midlength; anterior branch of R_s diverging strongly from posterior branch, arising at or close to r-m, straight and oblique; tropical. (**Styngomyaria**)..**Styngomyia** Loew
 Wings with R_1 ending about opposite two-thirds their length; branches of R_s subparallel on basal half. (**Gonomyaria**)..... 88
88. Wings with R_2 present, close to fork of R_s ; Sc usually long, Sc_1 ending beyond origin of R_s (38); some eastern, but chiefly tropical.....**Teucholabis: Teucholabis** Osten Sacken
 Wings with R_2 lacking; Sc short, Sc_1 ending opposite or before origin of R_s ; chiefly tropical (**Gonomyaria**)...**Gonomyia: Lipophleps** Bergroth
89. Wings with R_5 fused with M_{1+2} to form the entire cephalic face of cell 1st M_2 , r-m thus obliterated; only two branches of M reach the margin; vein 2nd A very short (39); tropical. (**Trentepohliaria**).
Trentepohlia: Paramongoma Brunetti
 Wings with R_5 entirely distinct from M_{1+2} , being separated by the r-m crossvein (the veins fused only in a few species of **Paratropesa**, where the alternative characters hold); three branches of M reach the margin; vein 2nd A of normal length (40-41)..... 90
90. Wings with cell R_3 short, vein R_3 shorter than the petiole of cell R_3 (40) 91
 Wings with cell R_3 deep, vein R_3 longer than the petiole of cell R_3 (42-44); shortest in **Progonomyia** and **Empedomorpha**..... 99

91. Wings with vein R_2 present 92
 Wings with vein R_2 lacking 95
92. R_2 at end of R_s , in alignment with the other elements of the cord; r-m obliterated by the long fusion of veins R_{4+5} and M_{1+2} ; tropical. (Gonomyria).....**Teucholabis: Paratropesa** Schiner
 R_2 its length or more beyond the fork of R_s , R_{2+3+4} subequal to or longer than R_2 ; r-m distinct 93
93. Wings with R_s long and straight, exceeding the distal section of M_{1+2} ; tuberculate pits on cephalic portion of præscutum; trochanters elongate; arctic and subarctic. (**Rhabdomastix**).
Rhabdomastix: Sacandaga Alexander
 Wings with R_s shorter, less than the distal section of M_{1+2} ; tuberculate pits removed from cephalic margin of præscutum; trochanters short. (**Erioptera**)..... 94
94. Wings with veins R_3 and R_4 strongly diverging, cell R_3 having a **Gonomyia**-like shape.....**Erioptera: Gonempeda** Alexander
 Wings with veins R_3 and R_4 more generally parallel, cell R_3 having the more normal **Erioptera**-shape, but shorter.
Erioptera: Empeda Osten Sacken
95. Wings with Sc long, Sc_1 extending to near opposite or beyond mid-length of R_s ; m-cu at or beyond fork of M . (Eriopteraria, **Rhabdomastix**)96
 Wings with Sc short, not extending to beyond midlength of R_s ; if Sc is relatively long (**Ptilostena**), m-cu lies more than its own length before the fork of M . (Gonomyria, **Gonomyia**)..... 97
96. Antennæ of male longer than body; chiefly tropical
Rhabdomastix: Rhabdomastix Skuse
 Antennæ of male scarcely attaining wing-root; chiefly temperate.
Rhabdomastix: Sacandaga Alexander
97. Wings with m-cu more than its own length before fork of M .
Gonomyia: Ptilostena Bergroth
 Wings with m-cu at or very close to fork of M (40) 98
98. Wings with cell R_3 very small, at margin subequal in extent to cell R_2 ; antennal verticils long and conspicuous.
Gonomyia: Lipophleps Bergroth
 Wings with cell R_3 larger, at margin considerably exceeding in extent cell R_2 ; antennal verticils not conspicuously elongated.
Gonomyia: Gonomyia Meigen
99. Wings with distinct macrotrichia in outer cells.....100
 Wings with the outer cells glabrous103
100. Wings with R_s shortened, its union with R_{2+3+4} forming an angle, so cell R_1 is nearly equilateral in outline; chiefly tropical. (Eriopteraria)**Cryptolabis** Osten Sacken
 Wings with R_s long, normal in position, cell R_1 elongate.....101
101. Size very small (wing, 3 mm. or less); R_s ending in cell R_3 , this cell thus being sessile, without element R_{2+3+4} ; temperate. (Eriopteraria)..... **Dasymolophilus** Gœtgebuer
 Size larger (wing over 4 mm.); R_s ending in cell R_4 , cell R_3 being petiolate by the presence of a distinct element R_{2+3+4}102

102. Wings with Sc_2 close to tip of Sc_1 , the two veins thus being subequal in length or nearly so. (Gonomyria).....**Gnophomyia** Osten Sacken
Wings with Sc_2 far removed from tip of Sc_1 , the latter vein long, subequal in length to R_s ; temperate. (Eriopteraria)....**Ormosia** Rondani
103. Wings with R_s ending in cell R_3 , there being no element R_{2+3+4} (41) (Eriopteraria)**Molophilus** Curtis
Wings with R_s ending in cell R_4 , cell R_3 being petiolate by a distinct element R_{2+3+4} (42-44).....104
104. Wings with a supernumerary crossvein in cell R_3 ; vein 2nd A strongly bisinuate (42). (Eriopteraria).....**Helobia** St. Fargeau
Wings without a supernumerary crossvein in cell R_3 ; vein 2nd A straight or simply sinuous (43, 44).....105
105. Wings with veins R_3 and R_4 divergent, unequal in length, R_3 being less than two-thirds R_4 , cell R_3 at margin much more extensive than cell R_2 106
Wings with veins R_3 and R_4 nearly equal in length, or with R_3 exceeding three-fourths of the length of R_4 , the veins extending generally parallel to one another to the margin; cell R_2 at margin wider than cell R_3107
106. Wings with veins R_3 and R_4 very unequal in length, widely divergent or sprawly, R_3 being only about one-fourth R_4 and ending in costa close to vein R_{1+2} ; cell R_3 at margin some eight times as wide as cell R_2 ; tropical.....**Neognophomyia** Alexander
Wings with veins R_3 and R_4 less conspicuously unequal, R_3 being about one-half R_4 ; cell R_3 at margin some three or four times as wide as cell R_2 ; tropical and subtropical. (**Gonomyia**).
Gonomyia: Progonomyia Alexander
107. Antennæ of both sexes with the flagellar segments more or less kidney-shaped to give a nodulose appearance to the organ; large species (wing, 15 mm. or more); tropical. (**Sigmatomeraria**).
Sigmatomera Osten Sacken
Antennæ of both sexes simple or nearly so, not nodulose; smaller (wing less than 12 mm., usually less than 10 mm.).....108
108. Coxæ of middle and hind legs only slightly separated by the small meral region; wings with Sc_1 relatively short, not exceeding one-third the length of R_s109
Coxæ of middle and hind legs widely separated by a large "pot-bellied" meral region; wings with Sc_1 very long, exceeding one-half the length of R_s . (Eriopteraria).....110
109. Wings with R_s in alignment with R_{2+3+4} ; Sc short, Sc_1 ending opposite the fork of R_s and far before R_2 ; Sc_1 and Sc_2 subequal; male hypopygium with interbasal structures conspicuously developed as blackened spines; temperate.....**Lipsothrix** Lœw
Wings with R_s in approximate alignment with R_5 ; Sc long, Sc_1 ending opposite or shortly before R_2 , at or beyond midlength of R_{2+3+4} ; Sc_1 much longer than Sc_2 (43); male hypopygium without evident interbases**Gnophomyia** Osten Sacken
110. Wings with R_2 far before fork of R_{2+3+4} , at or just beyond the fork of R_s ; male with a very large hairy stigmal region that more or less distorts the adjoining veins; western plains..**Empedomorpha** Alexander
Wings with R_2 beyond the fork of R_{2+3+4} ; stigma normal.....111

111. Wings with vein Cu_1 nearly straight, its distal section not swinging cephalad toward wing-tip; cell 1st M_2 small, less than one-half the distal section of M_{1+2} ; terminal three segments of antennæ smaller than the remainder of flagellum.....**Trimicra** Osten Sacken
 Wings with vein Cu_1 having its distal section slightly deflected at apex toward wing-tip; cell 1st M_2 , when present, elongate, subequal to or longer than the distal section of M_{1+2} ; flagellar segments becoming progressively smaller to outer end (44) (**Erioptera**).....112
112. Wings with vein 2nd A arcuated so cell 1st A at midlength is as broad as, or broader than it is at margin; cell 1st M_2 opening into cell 2nd M_2 by atrophy of m; (44); chiefly temperate.
Erioptera: Erioptera Meigen
 Wings with anal veins divergent, cell 1st A being widest at margin; cell 1st M_2 generally closed.....113
113. Wings with cell 1st M_2 open.....114
 Wings with cell 1st M_2 closed, the basal section of M_3 greatly exceeding m in length115
114. Wings with cell 1st M_2 opening into cell M_3 by atrophy of basal section of M_3 ; where closed, the elements closing outer end not greatly disproportionate in length, m being one-half or more of M_3 ; chiefly tropical**Erioptera: Mesocyphona** Osten Sacken
 Wings with cell 1st M_2 opening into cell 2nd M_2 by atrophy of m; northern and western**Erioptera: Psiloconopa** Zetterstedt
115. Wings with a spur from the basal section of vein M_3 , jutting basad into cell 1st M_2**Erioptera: Hoplolabis** Osten Sacken
 Wings with no such spur as described.....**Erioptera: Ilisia** Rondani

SUPPLEMENTARY KEY TO THE SUBAPTEROUS TIPULIDÆ

1. Frontal prolongation of head with nasus (Tipulinæ).....**Tipula** Linnæus
 Frontal prolongation of head (or rostrum) without nasus..... 2
2. Eyes with numerous short erect setæ between ommatidia (Pedicini).
Tricyphona Zetterstedt
 Eyes without setæ 3
3. Tibial spurs present. (Hexatomini).....**Limnophila** Macquart
 Tibial spurs lacking. (Eriopterini).....**Chionea** Dalman

TYPE SPECIES OF THE NEW GENERA AND SUBGENERA PROPOSED

- Dicranota: Eudicranota**; type, *Dicranota notabilis* Alexander.
Dicranota: Paradicranota; type, *Dicranota rivularis* Osten Sacken.
Archilimnophila; type, *Limnophila unica* Osten Sacken.
Limnophila: Idiolimnophila; type, *Limnophila emmelina* Alexander.

BIBLIOGRAPHY OF IMMATURE STAGES

Alexander, C. P.

1920. The crane-flies of New York. Part II. Biology and Phylogeny. Cornell Univ. Agric. Expt. Sta. Mem. 38; pp. 691-1133, 87 pls. (bibliography to 1920).
1931. Deutsche Limnologische Sunda-Expedition. The Crane-flies. Archiv für Hydrobiologie, Suppl. Bd. IX, Tropische Binnengewässer, 2; pp. 135-191, 51 figs., 1 pl. (bibliography of biology, 1920-30).

Rogers, J. S.

1933. The ecological distribution of the crane flies of northern Florida. Ecological Mon., 3, No. 1, pp. 1-74, figs. 1-25.

BIBLIOGRAPHY OF KEYS TO SPECIES OF NORTH AMERICAN TIPULIDÆ

The genera of which Keys are given follow the reference and the regions covered are indicated: Neo., Neotropical; Nea., Nearctic.

Alexander, C. P.

- 1912a. On the tropical American Rhipidiæ. Bull. Brooklyn Ent. Soc., VIII, pp. 6-17, 1 pl.
(**Limonia: Rhipidia**, Neo.).
- 1912b. A revision of the genus **Brachypremna** Osten Sacken. Journ. New York Ent. Soc., XX, pp. 225-236, 1 pl.
(**Brachypremna**).
- 1912c. New species of **Furcomyia**. Canadian Ent., XLIV, pp. 333-334.
(**Limonia: Dicranomyia**, Neo., in part).
- 1913a. New Neotropical Antochini. Psyche, XX, pp. 40-54, 1 pl.
(**Orimarga; Toxorhina**, Neo.).
- 1913b. A synopsis of part of the Neotropical crane-flies of the subfamily Limnobiinæ. Proc. United States Nat. Mus., XLIV, pp. 481-549, 4 pls.
(**Epiphragma; Polymera; Lecteria; Trentepohlia; Gonomyia; Gnophomyia; Cryptolabis; Molophilus; Erioptera; Mesocyphephona**, Neo.).
- 1913c. The Neotropical Tipulidæ in the Hungarian National Museum. I, II. Ent. News, XXIV, pp. 404-412, 439-449.
(**Limonia: Peripheroptera; Teucholabis: Paratropesa**).
- 1914a. New or little-known Neotropical Hexatomini. Psyche, XXI, pp. 33-45, 1 pl.
(**Hexatoma: Eriocera, Penthoptera**, Neo.).
- 1914b. A revision of the American species of **Tanypremna** Osten Sacken and **Megistocera** Wiedemann. Journ. New York Ent. Soc., XXII, pp. 205-218, 1 pl.
(**Tanypremna**).
- 1914c. On a collection of crane-flies from British Guiana. Trans. American Ent. Soc., XL, pp. 223-255, 2 pls.
(**Psaronius; Trentepohlia**, part; **Sigmatomera; Teucholabis: Teucholabis; Gonomyia: Lipophleps**, part, Neo.).
1915. Two new crane-flies from Porto Rico. Insec. Inscit. Menst., III, pp. 104-107.
(**Hexatoma: Eriocera**, part).

Alexander, C. P. (Continued)

- 1916a. New Limnophiline Crane-flies from the United States and Canada. Journ. New York Ent. Soc., XXIV, pp. 118-125, 1 pl.
(**Limnophila: Prionolabis**, part: Nea.)
- 1916b. New species of Crane-flies from the West Indies. Ent. News, XXVII, pp. 343-347, 6 figs.
(**Hexatoma: Eriocera**).
- 1916c. New or little-known crane-flies from the United States and Canada. Part 3. Proc. Acad. Nat. Sci. Philadelphia, 1916, pp. 486-549, 7 pls.
(**Dicranota: Rhabdrolabis; Gonomyia**, Nea.).
1917. New Nearctic crane-flies. Part 3. Canadian Ent., XLIX, pp. 199-211.
(**Erioptera: Empeda**, Nea.).
- 1919a. Notes on the genus **Dicranoptycha** Osten Sacken. Ent. News, XXX, pp. 19-22.
(**Dicranoptycha**).
- 1919b. Records and descriptions of Neotropical craneflies. Journ. New York Ent. Soc., XXVII, pp. 132-154, 1 pl.
(**Trentepohlia**, part; **Gnophomyia**, s.l.).
- 1919c. The crane-flies of New York. Part I. Distribution and taxonomy of the adult flies. Cornell Univ. Agr. Expt. Sta., Mem. 25; 765-993, 55 pls.
(**Tanyptera; Ctenophora; Nephrotoma; Tipula; Dolichopeza; Oropiza; Phalacroceras; Cylindrotoma; Limonia: Dicranomyia, Rhipidia, Geranomyia, Limonia; Helius; Dicranoptycha; Pedicia; Pedicia, Tricyphona; Dicranota: Dicranota, Rhabdrolabis; Ula; Adelphomyia; Epiphragma; Limnophila, s.l.; Eriocera; Chionea; Cladura; Gonomyia; Teucholabis; Rhabdomastix; Molophilus; Ormosia; Erioptera; Toxorhina**).
- 1920a. Undescribed Tipulidæ from western North America. Proc. California Acad. Sci., (4), X, pp. 35-46.
(**Ulomorpha**).
- 1920b. New or little-known crane-flies from tropical America. Canad. Ent., LII, pp. 141-144.
(**Polymera**, part, Neo.).
- 1926a. Studies on the crane-flies of Mexico. Part II. Ann. Ent. Soc. America, XIX, pp. 158-179, 2 pls.
(**Atarba; Nea., Neo.**).
- 1926b. Undescribed species of crane-flies from Cuba and Jamaica. Journ. New York Ent. Soc., XXXIV, pp. 223-230.
(**Gonomyia**, part, Neo.).
1927. Undescribed species of the genus **Limnophila** from eastern North America. Part II. Bull. Brooklyn Ent. Soc. XXII, pp. 56-64.
(**Limnophila: Elæophila**)
1929. The crane-flies of New York: Fourth Supplementary List. Bull. Brooklyn Ent. Soc., XXIV, pp. 295-302.
(**Pedicia**, Nea.)
1930. The genus **Sigmatomera** Osten Sacken,—with observations on the biology by Raymond C. Shannon. Encycl. Entomol., Diptera, V, pp. 1-8, 8 figs.
(**Sigmatomera**).

Dietz, W. G.

1913. A synopsis of the described North American species of the Dipterous genus *Tipula* L. *Ann. Ent. Soc. America*, VI, pp. 461-484.
(*Tipula*, Nea.).
1914. The *hebes* group of the Dipterous genus *Tipula* Linnæus. *Trans. American Ent. Soc.*, XL, pp. 345-363, 2 pls.
(*Tipula*, part; Nea.)
1916. Synoptical table of the North American species of *Ormosia* Rondani (*Rhypholophus* Kolenati), with descriptions of new species. *Trans. American Ent. Soc.*, XLVII, pp. 135-146, 1 pl.
(*Ormosia*, Nea.).
1917. Key to the North American species of the *tricolor* group of the Dipterous genus *Tipula* Linnæus. *Ent. News*, XXVIII, pp. 145-151, 1 pl.
(*Tipula*, part; Nea.).
1918. A revision of the North American species of the Tipulid genus *Pachyrhina* Macquart, with descriptions of new species. *Trans. American Ent. Soc.*, XLIV, pp. 105-140, 4 pls.
(*Nephrotoma*, Nea.).
1919. The *streptocera* group of the Dipterous genus *Tipula* Linnæus. *Ann. Ent. Soc. America*, XII, pp. 85-94, 1 pl.
(*Tipula*, part; Nea.).
- 1921a. The *impudica* group of the Dipterous genus *Tipula* Linnæus. *Ann. Ent. Soc. America*, XIV, pp. 1-15, 1 pl.
(*Tipula*, part; Nea.).
- 1921b. Description of two new species of the *angustipennis* group of the Dipterous genus *Tipula* Linnæus, with table of species. *Ent. News*, XXXII, pp. 299-302.
(*Tipula*, part; Nea.).

Doane, R. W.

- 1908a. Notes on the Tipulid genus *Dicranomyia*. *Ent. News*, XIX, pp. 5-9.
(*Limonia: Dicranomyia*, Nea.).
- 1908b. New North American *Pachyrhina*, with a table for determining the species. *Ent. News*, XIX, pp. 173-179.
(*Nephrotoma*, Nea.).
- 1908c. New species of the Tipulid genus *Rhypholophus*, with a table for determining the North American species. *Ent. News*, XIX, pp. 200-202.
(*Ormosia*, Nea.).

Garrett, C. B. D.

1922. New Tipulidæ from British Columbia. *Proc. Ent. Soc. Washington*, XXIV, pp. 58-64, 13 figs.
(*Limonia: Alexandriaria*, Nea.)

Hine, J. S.

1903. The genus *Peditia*, with one new species. *Ohio Nat.*, III, pp. 416-417.
(*Pedieia*, Nea.)

Johnson, C. W.

1909. New and little known Tipulidæ. Proc. Boston Soc. Nat. Hist., XXXIV, pp. 115-135, 2 pls.
(*Dolichopeza*: *Oropeza*, Nea.)

Osten Sacken, C. R.

1869. Diptera of North America, Part 4. Smithson. Miscel. Coll. 219, pp. 1-345, 4 pls., 7 figs.
(*Limonia*: *Geranomyia*, *Dicranomyia*, *Rhipidia*, *Limonia*; *Pedicia*: *Tricyphona*; *Limnophila*; *Eriocera*; *Gonomyia*; *Ormosia*; *Erioptera*).
1886. Biologia Centrali-Americana. Insecta, Diptera, I, pp. 1-216, 3 pls.
(*Nephrotoma*; *Hexatoma*: *Eriocera*, Neo.)

GENERAL BIBLIOGRAPHY OF MORPHOLOGICAL TERMS OF ESPECIAL VALUE IN A STUDY OF THE TIPULIDÆ.

Alexander, C. P.

1927. The interpretation of the radial field of the wing in the Nematoceros Diptera, with special reference to the Tipulidæ. Proc. Linn. Soc. New South Wales, LII, pp. 42-72, 92 figs.
1929. A comparison of the systems of nomenclature that have been applied to the radial field of the wing in the Diptera. IVth Internat. Congress Ent., Trans., II, pp. 700-707, 3 pls.

Cole, F. R.

1927. A study of the terminal abdominal structures of the male Diptera. Proc. California Acad. Sci., (4), XVI, pp. 397-499, 287 figs.

Crampton, G. C.

- 1923a. The genitalia of male Diptera and Mecoptera compared with those of related insects, from the standpoint of phylogeny. Trans. American Ent. Soc., XLVIII, pp. 207-225, 3 pls.
1923b. Preliminary note on the terminology applied to the parts of an insect's leg. Canadian Ent., LV, pp. 126-132, 1 pl.
1925. Evidences of relationship indicated by the thoracic sclerites of certain Eriopterine Tipuloid Diptera. Insec. Inscit, Menst., XIII, pp. 197-213, 2 pls.
1926. The external anatomy of the primitive Tanyderid Dipteran *Macrochile spectrum* Loew, preserved in Baltic Amber. Bull. Brooklyn Ent. Soc., XXI, pp. 1-14, 2 pls.
1928. The eulabium, mentum, submentum and gular region of insects. Journ. Ent. and Zool., XX, pp. 1-18, 3 pls.
1931. A phylogenetic study of the posterior metathoracic and basal abdominal structures of insects, with particular reference to the Holometabola. Journ. New York Ent. Soc., XXXIX, pp. 323-357, 4 pls.

Snodgrass, R. E.

1903. The terminal abdominal segments of female Tipulidæ. Journ. New York Ent. Soc., XI, pp. 177-183, 2 pls.
1904. The hypopygium of the Tipulidæ. Trans. American Ent. Soc., XXX, pp. 179-236, 11 pls.

SYSTEMATIC ARRANGEMENT OF GENERA AND SUBGENERA, WITH CITATIONS TO THE ABOVE BIBLIOGRAPHY OF KEYS

Tipulinæ

- Ctenophora** (Alexander, 1919c)
Tanyptera (Alexander, 1919c)
Nephrotoma (Alexander, 1919c; Dietz, 1918; Doane, 1908b; Osten Sacken, 1886.)
Tipula, s.l. (Alexander, 1919c; Dietz, 1913, 1914, 1917, 1919, 1921a, 1921b.)
Brachypremna (Alexander, 1912b)
Tanypremna (Alexander, 1914b)
Dolichozepea: Orozepea (Alexander, 1919c; Johnson, 1909)

Cylindrotominæ

- Phalacroceras** (Alexander, 1919c)
Cylindrotoma (Alexander, 1919c)

Limoniinæ

Limoniini

- Limonia: Limonia** (Alexander, 1919c; Osten Sacken, 1869)
Dicranomyia (Alexander, 1912c, 1919c; Doane, 1908a; Osten Sacken, 1869)
Alexandriaria (Garrett, 1922)
Peripheroptera (Alexander, 1913c)
Rhipidia (Alexander, 1912a, 1919c; Osten Sacken, 1869)
Geranomyia (Alexander, 1919c; Osten Sacken, 1869)
Orimarga: Orimarga (Alexander, 1913a)
Dicranoptycha (Alexander, 1919a, 1919c)
Helius (Alexander, 1919c)

Pedicini

- Pedicia: Pedicia** (Alexander, 1919c, 1929; Hine, 1903)
Tricyphona (Alexander, 1919c; Osten Sacken, 1869)
Dicranota: Dicranota (Alexander, 1919c)
Rhaphidolabis (Alexander, 1916c, 1919c)
Plectromyia (Alexander, 1919c)
Ula (Alexander, 1919c)

Hexatomini

- Adelphomyia** (Alexander, 1919c)
Epiphragma (Alexander, 1913b, 1919c)
Polymera (Alexander, 1913b, 1920b)
Dactylolabis (Alexander, 1919c; Osten Sacken, 1869)
Pseudolimnophila (Alexander, 1919c)
Limnophila, s.l. (Alexander, 1919c; Osten Sacken, 1869)
Prionolabis (Alexander, 1916a, 1919c; Osten Sacken, 1869)
Eutonia (Alexander, 1919c)
Lasiomastix (Alexander, 1919c; Osten Sacken, 1869)
Phylidorea (Alexander, 1919c)
Elæophila (Alexander, 1919c, 1927; Osten Sacken, 1869)
Idioptera (Alexander, 1919c)
Dicranophragma (Alexander, 1919c)
Pilaria (Alexander, 1919c)
Ulomorpha (Alexander, 1920a)

Psaronius (Alexander, 1914c)

Hexatoma: Eriocera (Alexander, 1914a, 1915, 1916b, 1919c;
Osten Sacken, 1869, 1886)

Penthoptera (Alexander, 1914a)

Atarba: Atarba (Alexander, 1926a)

Eriopterini

Chionea (Alexander, 1919c)

Cladura, s.l. (Alexander, 1919c)

Lecteria (Alexander, 1913b)

Sigmatomera (Alexander, 1914c, 1930)

Trentepohlia: Paramongoma (Alexander, 1913b, 1914c, 1919b)

Teucholabis: Teucholabis (Alexander, 1914c, 1919c)

Paratropesa (Alexander, 1913c)

Gonomyia, s.l. (Alexander, 1916c, 1919c; Osten Sacken, 1869)

Progonomyia (Alexander, 1916c)

Lipophleps (Alexander, 1914c, 1916c, 1919c)

Gonomyia (Alexander, 1913b, 1916c, 1919c, 1926b; Osten Sacken,
1869)

Ptilostena (Alexander, 1916c)

Gnophomyia, s.l. (Alexander, 1913b, 1919b)

Rhabdomastix: Sacandaga (Alexander, 1919c)

Erioptera, s.l. (Alexander, 1919c; Osten Sacken, 1869)

Erioptera (Alexander, 1919c; Osten Sacken, 1869)

Mesocyphona (Alexander, 1913b, 1919c; Osten Sacken, 1869)

Ilisia (Alexander, 1919c)

Empeda (Alexander, 1917, 1919c)

Cryptolabis (Alexander, 1913b)

Ormosia (Alexander, 1919c; Dietz, 1916; Doane, 1908c; Osten Sacken,
1869)

Molophilus (Alexander, 1913c, 1919c)

Toxorhina: Toxorhina (Alexander, 1913a, 1919c)