BERNSTEIN-FORSCHUNGEN

(Amber Studies)

Herausgegeben von

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zu Königsberg i. Pr.

Heft 2

Die „Bernstein-Forschungen" erscheinen in zwangloser Reihenfolge. Die Hefte haben verschiedenen Umfang. Groß-Oktav

Bei Subskription auf mindestens 5 Hefte ermäßigt sich der Preis der Hefte um 20%

Berlin und Leipzig 1931

Walter de Gruyter & Co.

vormals G. J. Göschen'sche Verlagshandlung — J. Guttentag, Verlagsbuchhandlung
Georg Reimer — Karl J. Trübner — Veit & Comp.

BERNSTEIN-FORSCHUNGEN (AMBER STUDIES)

Aufgabe der „Bernstein-Forschungen"

Vor Jahrmillionen erstreckte sich im Gebiete der heutigen südöstlichen Ostsee ein alttertiäres Festland, das paläogeographisch als Vorläufer des heutigen Skandinaviens betrachtet werden darf, aber andere Umrisse als dieses besaß, indem sein Südufer zwischen den Inseln Rügen und Bornholm verlaufen sein und sich über Libau nach Ostsüdosten in das heutige Rußland hinein erstreckt haben mag. Hier war die Heimat der als »Pinites succinifera« bekannten Nadelholzart, deren fossil gewordenes Harz uns heute in dem kostbaren Ostsee-Bernstein oder Succinit vorliegt. Seit dem klassischen Altertum wird dieses edle Material aus der Brandung des Baltischen Meeres, der Ostsee, herausgefischt oder vom Strande aufgelesen, da es die Wellen aus seiner Lagerstätte in den Schichten des Alttertiärmeeres ausspülen und auf den Strand werfen. In weit erheblicherer Menge — seit Jahrzehnten Tag für Tag durchschnittlich mehr als eine Tonne! — aber wird dieser Bernstein in neuerer Zeit durch Graben und Baggern in gewaltigen Tagebauten aus jenem Lager gewonnen. Das bei seiner Bildung flüssige Harz der Bernsteinkoniferen hat, aus mannigfach entstandenen Wunden an den Stämmen herabfließend und von den Ästen herabtropfend, fast alle in jenem Walde vorkommenden Dinge umflossen und eingehüllt. Dadurch aber wurden sie uns in einer Vollkommenheit überantwortet, die nach unseren bisherigen Kenntnissen in annähernd vergleichbarer Weise kein zweites Mal in der Erdgeschichte verwirklicht worden ist.

Während der Paläontologe sich aber im allgemeinen mit im Vergleich zu den lebenden Organismen kümmerlichen Resten begnügen muß, liegen in den Bernsteininklusen zum Teil geradezu musterhafte Präparate der Organismen eines Waldes vor, die in vieler Hinsicht wie rezente Objekte sogar die Untersuchung unter dem Mikroskop erlauben. Ferner vermögen wir an der Körperhaltung der eingeschlossenen Tiere, an den Massenanhäufungen bzw. der Vergesellschaftung der Individuen gleicher oder verschiedener Art interessanteste biologische Schlüsse über Kopulation, Parasitismus usw. —, sowie ökologische und biosoziologische Fragen zu gewinnen. Damit werden wir aber in den Stand gesetzt, uns ein Bild von den Lebensverhältnissen jener längst unwiederbringlich vorübergegangenen Erdperiode der Alttertiärzeit zu machen, wie wir es von keiner anderen Periode der geologischen Vorzeit besitzen.

Das deutsche Ostpreußen ist das Heimatland des Bernsteins, bei Palmnicken-Kraxtepellen an der seit alters her bekannten Bernsteinküste des Samlandes liegen seine hauptsächlichsten Gewinnungsstätten; dort, sowie in Königsberg erfolgt vor allem seine Verarbeitung, sein Sortiment und seine Verteilung in die verzweigten Kanäle des Welthandels, welchem der Bernstein seit den Zeiten des klassischen Altertums unterliegt, ein wertvolles Mittel zur Aufklärung der Handelsbeziehungen der Völker jener vergangenen Zeiten. In Königsberg auch befindet sich in der ihresgleichen auf der Erde nicht habenden »Bernsteinsammlung der Albertus-Universität« die von der Natur gegebene wissenschaftliche Zentrale für die Bernsteinforschung.

Die von dem Direktor der Bernsteinsammlung der Albertus-Universität zu Königsberg i. Pr. herausgegebenen »Bernstein-Forschungen« haben es sich zur Aufgabe gemacht, dieses wissenschaftlich einzigartige und unschätzbare Material — nicht nur, soweit es in dieser Sammlung vorhanden ist, sondern auch das in anderen Museen verstreute und neu gefundene — der Welt in Form von Monographien bekanntzugeben.

BERNSTEIN-FORSCHUNGEN

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Heft 2 — 1931

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Crane-flies of the Baltic Amber (Diptera)*)

By

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Introduction.

Our knowledge of the Tipuloidean flies that inhabited northern Europe during the early Tertiary is still very insufficient, although far more accurate and detailed than for any other geological period. The reason for this accuracy of knowledge lies almost solely in the fact of the abundance an beautiful state of preservation of the species included in Baltic Amber.

The writer first became interested in the subject of the Amber Tipulidae through the kindly interest of Dr. Alfons Dampf, State Entomologist of Mexico. Through Dr. Dampf's interest and intervention with the owners and directors of the principal collections of Amber Tipulidae in Königsberg and elsewhere, it became possible to study virtually all of the types of the numerous species earlier described by Meunier, as well as an abundance of material that had not been previously determined. I would here express my deepest gratitude to Dr. Dampf; to Dr. Elisabeth Skwarra for invaluable co-operation in the selection and shipping of the Klebs and Geological Institute Collections; to Frau Prof. Richard Klebs for the loan of the priceless series of specimens that had been amassed by her late husband; to Dr. K. Andrée, Director of the Amber Collections, for the very extensive and valuable series belonging to the Geological Institute of the University of Königsberg; to Amtsgerichtsrat Fritsch in Goldap, for more than one hundred specimens in his collection; to Dr. F. A. Bather for the loan of the collections of the British Museum of Natural History, not numerous in specimens but of unusual value because of including certain of the Loew types; to Director Prof. Zimmer for the material in the Zoological Museum of the University of Berlin; and to other friends and correspondents who are acknowledged elsewhere in the text.

Virtually all of the available collections of Amber Tipuloidea are preserved in Königsberg, Danzig and Goldap. The writer was unable to trace a single specimen in the great fossil collections of the American Museum of Natural History. The chief value of the present paper lies in the fact that the types of most of the hitherto described species were available for study and comparison with the several hundred unworked specimens. The numerous figures given herewith are all selected from type-material wherever this was possible. The scope and character of Meunier's work on the Amber Tipulidae has been discussed in some detail elsewhere in this paper and is not considered further at this point.

The Baltic Amber is now known to have been formed during the Lower Oligocene. Recent investigations on the age of the various geological epochs has succeeded in greatly increasing our estimates of the

length of time that has elapsed since the beginning of the Tertiary. The writer is indebted to Prof. Frederick B. Loomis, distinguished authority on the evolution of the horse, and to Prof. Alfred C. Lane, of Tufts College, for these figures on the duration of the various periods of the Tertiary: Eocene 55—35 (20) millions of years; Oligocene, 35—19 (16); Miocene, 19—7 (12); Pliocene, 7—1 (6); Quaternary, 1 million years. In the present paper, then, the age of the formation of the Baltic Amber is considered as being between 30,000,000 and 40,000,000 of years ago.

Following one's amazement at the beautiful state of preservation of these Amber specimens comes the feeling and realization of the tremendous abundance of Nematocerous life as it must have existed in the succiniferous forests. Very small blocks of Amber were found to contain two or more specimens of a given species. One such block belonging to the Geological Institute (No. 11 B 744), measuring 36 × 27 × 6 mm., is worthy of special notice. It included the following remains:

Tipulidae: *Tipula falco*, sp. n.; 3 specimens, types.
Trichoneura vulgaris Lw. 1.

Mycetophilidae:	2	genera;	2	species;	2	specimens.
Sciaridae:	1	genus	1	,,	1	,,
Cecidomyiidae:	1	,,	1	,,	1	,,
Chironomidae:	1	,,	1	,,	1	,,
Psychodidae:	1	,,	1	,,	1	,,
Leptidae:	1	,,	1	,,	1	,,

Total: 7 families of Diptera; 9 genera; 9 species; 11 specimens.

In addition to the above, the block includes 1 spider and numerous small Acarina. These latter are all free in the block but originally may have been attached to the flies and represent a case of phoresy.

Chronological development of our knowledge of the Amber crane-flies.

The pioneer work on the Tipulidae of the Baltic Amber was that of Sendel (1742) and Presl (1822). Their work was scarcely more than an indication that the family existed in some numbers in the amber and gave no hint of the great range in genera and species of the group. About 1844, Berendt interested Loew in studying the Diptera for his proposed monographic treatment concerning the organic remains in the amber. A preliminary list of the genera was given as an appendix to Berendt's first volume (1845). Loew (1850) followed this paper with one on the "Bernstein und Bernsteinfauna" in which 18 genera of Tipuloidea and Dixidae were indicated as occurring in the amber, 10 of

the names being proposed here for the first time. The status of Loew's amber genera is discussed under a separate caption in the present paper. It had been Loew's often-expressed intention to continue his survey of the Amber Diptera, and, in fact, at the time of his death in 1879, several plates of figures and some manuscript were available, but the collection itself had been broken up and returned to the various owners. The reasons for the failure of Loew to complete his proposed task have been given in full by Osten Sacken (1903: 63—68). While visiting Loew in Meseritz (1865), Osten Sacken took the opportunity to examine certain of these amber Tipulidae and added a few critical notes in his "Monograph" (1869) and "Studies" (1887). Although certain of the Loew types became the property of the Königsberg Museum, a great many have never been re-discovered, a fact that was noted by Meunier upon his re-investigation of the Loew types (1899 b: 174).

About 1894, Meunier began his study of the Amber Diptera, culminating, in the Tipulidae, in the publication of his "Monograph" (1906 c). This was preceded by a series of smaller papers and notes (1894—1899) on various phases of the subject. Meunier's work is far from satisfactory but was done as accurately, perhaps, as is possible for a student without a detailed taxonomic knowledge of the group in hand. As was indicated by Handlirsch (1906) the only hope for exact knowledge of the Diptera of the Amber is to have the work undertaken by specialists in the recent forms of the various groups. Meunier's so-called "Revision" of the Loew types (1899 b) called forth a bitter but wholly justified criticism from Handlirsch (1906) and must be considered as being an entirely unsatisfactory work. In this paper it should be noted that in scarcely any cases does Meunier give a character or characters that can be used in maintaining the names resurrected by him and that these still remain *nomina nuda*. That the paper in question was not satisfactory to the author himself is shown by his total omission of any of the names in his later detailed treatment of the group (1906 c). In this latter work, Meunier held a very erroneous conception that color in the amber Tipulidae was unusable. It is true that body-colors are altered by the infiltration of the amber and the removal of pruinosity or pollinosity normally present, and that further discoloration may result from a milky film produced by the exudation of body-fluids of the insect at the time of embalming. But when Meunier indicates that the pattern of the wing may disappear (1906 c: 378, under *Poecilostola*) he is laboring under a false conception that must have become apparent when he studied the beautiful *Austrolimnophila elegantissima* (1906 a). The stigma and other hairy regions of the wing may be further discolored

by an accumulation of amber or extraneous matter and rendered abnormal. In some respects, the "Monograph" is a creditable work but is very unsatisfactory in other regards. In his keys, Meunier has in very many cases ignored the true generic characters of the group in question, rendering them unusable. The figures of the antennae by Mrs. Meunier are satisfactory and are not repeated in the present work. In the figures of venation, however, it is vastly unfortunate that in many cases critical details, such as *r* and *m-cu* are totally omitted. Meunier's later papers on the Amber Tipulidae (1916, 1917) are more satisfactory than any of his earlier works. The most recent paper on the subject of Amber crane-flies is by Cockerell and Clark (1918).

Status of the Amber Genera of Loew and Meunier.

In his paper on the Amber Diptera, Loew (1850) proposed 10 names in the Tipulidae. The following disposition is made of these names in the present report:

I. The following have no mention of species and consequently have no possible status (compare with Meigen's 1800 paper):

Ataracta (= *Limonia*) ..... *A. grandis* later mentioned by Meunier (1899 b).

Calobamon (probably = *Phyllolabis*) ..... no type species ever mentioned.

Tanymera ..... *gracilicornis* mentioned by Osten Sacken (1869).

Haploneura (= *Adelphomyia*) ..... *hirtipennis* mentioned by Osten Sacken (1869).

II. The following include two or more mentioned species, but without designation of type or differentiation between the species, and, in my opinion, are likewise *nomina nuda*:

Critoneura.

Toxorhina ..... validated in 1851, by Loew.

III. The following names are based on a single species, named but not further characterized than in the above cases. It is held in this paper that the generic diagnosis validates both the genus and the species:

Macrochile (type, *spectrum*).

Tanysphyra (type, *gracilis*).

Trichoneura (type, *vulgaris*).

Allarithmia (type, *palpata*).

Meunier (1894—99) proposed seven generic names in the Amber Tipulidae and Psychodidae, all of which, with the exception of *Palaeogonomyia*, had later (1906 c) been relegated to the synonymy of other genera. The following disposition of these names is made in the present report:

Palaeopoecilostola (1899 a: 334) ... Valid.
* *Poecilostiella* (1899 a: 334) ..... *Tanysphyra* Loew.
* *Heteropoecilostola* (1899 a: 358) ... *Limnophila* Mcqt.
Sackeniella (1894: clxxviii) ..... *Trichoneura* Loew.
* *Gonomyiella* (1899 a: 335) ..... *Ormosia* Rond.
Palaeogonomyia (1899 a: 359) .... Valid subgenus of *Rhabdomastix* Sk.
* *Palaeoerioptera* (1899 a: 359) ..... Psychodoidea.

The names marked with an asterisk (*) are *nomina nuda* since no type-species or other specific name is mentioned.

Affinities of the Amber Genera.

The affinities of the crane-flies of the Baltic Amber are essentially Holarctic, most of the species being referable to genera having such a distribution at the present time. There is a relatively slight palaeotropical element, shown especially by *Styringomyia, Trentepohlia* and *Ceratocheilus*. The discovery in the Amber of the essentially antipodal genus *Macromastix* is of considerable interest. An even more surprising feature is found in *Polymera*, a genus that is now known only from tropical and subtropical America where it is represented by more than a score of known species.

The genera that are still living and their present centers of greatest abundance of species are as follows:

Trichocera	Holarctic
Macromastix	Antipodal
Tipula	Cosmopolitan, excepting Australia
Limonia	Holarctic, Ethiopian
Dicranoptycha	Holarctic, Ethiopian
Thaumastoptera	Holarctic (Palaearctic)
Helius	Cosmopolitan
Austrolimnophila	Antipodal
Phyllolabis	Holarctic
Trichoneura	Holarctic (Palaearctic)
Dactylolabis	Holarctic
Pseudolimnophila	Holarctic, Ethiopian
Limnophila	Holarctic
Pilaria	Holarctic
Polymera	Neotropical
Hexatoma	Holarctic
Eriocera	Tropicopolitan
Elephantomyia	Cosmopolitan

Adelphomyia	Holarctic, Ethiopian
Tricyphona	Holarctic
Styringomyia	Palaeotropical
Dasymolophilus	Holarctic
Ormosia	Holarctic
Erioptera	Holarctic
Empeda	Nearctic
Rhabdomastix	Cosmopolitan
Gonomyia	Holarctic
Gnophomyia	Holarctic
Trentepohlia	Palaeotropical
Ceratocheilus	Palaeotropical.

This occurrence of distinctly boreal types together with species that are as essentially tropical in their affinities, provides a serious problem that has been much discussed in the literature. Heer, Ulmer and other students have assumed that the Amber was derived not only from succiniferous forests growing on the Germanic lowlands where a tropical element may have been supposed to exist but that a considerable proportion may have come from the succiniferous forests far to the north in what is now Scandinavia. Assuming that Amber masses may have been carried by mountain torrents and rivers southward from the pine-covered highlands of Scandinavia and Finland to their present resting places in and near the southern shores of the Baltic Sea, we would thus have a concentrated fauna derived from a considerable range of territory and a great variety of ecological conditions. Moreover the age of the succiniferous forests may have been so great that more than a single geological period of the early Tertiary may have been involved. Wheeler (1910) in his studies on the Amber ants, likewise found the boreal element to far outnumber the tropical, a fact that weighs against the theory of Heer. Wheeler assumed that it was more probable that during the Lower Oligocene both the extinct and tropical genera were already reduced to dwindling relicts although co-existing with the circumpolar fauna. These latter were even then the dominant groups in the Baltic fauna. Wheeler has noted an instance where ants of tropical affinities were found in the same block of Amber as others of equally boreal relationships.

All of the Amber crane-flies belong to extinct species. Of the 38 genera and subgenera treated in the present paper, 9 belong to extinct groups, a percentage of 23.66. A comparison with other families and groups of insects that are relatively well-known both as fossil and recent groups shows that the Tipulidae occupy an intermediate position in

this respect. Thus Cockerell found 14 species of bees in Amber, all belonging to extinct genera; Ulmer found that 46.4% of the Amber Trichoptera, and Wheeler approximately 44% of the ants belong to extinct genera. However, Brues in his preliminary studies on the parasitic Hymenoptera found no extinct genera (1910) and only 2 (Bethylidae) in 1923. It is very possible, however, that the tremendous series of specimens now being studied by Brues will considerably increase these percentages. The only genus of fleas ever discovered in Amber (Dampf, 1911) belongs to a genus, *Palaeopsylla*, that is known from a few living species, confined to the Insectivora.

Besides the Amber, the only Tipulidae from the Lower Oligocene of Europe that are known are the interesting series described by Gockerell (1921) and Cockerell and Haines (1921) from the Bembridge beds at Gurnet Bay, Isle of Wight. A critical study of the descriptions and figures fails to show that any of these species are conspecific with those from the Amber. As just indicated, the duration of the Oligocene was so great (approximately 16 million years) that the elapsed time between the deposition of the Bembridge beds and the formation of the Amber may have been one or more millions of years, a space of time amply sufficient to allow of distinct speciation in the two localities. It may be noted that Cockerell has described what seem to be without question species of *Macromastix*, *Styringomyia* and *Trentepohlia* (as *Mongoma*), all recorded from the Amber in the present account. His record of *Adelphomyia*, however, is not convincing. The record of *Holorusia* certainly seems to be correct and adds a second essentially Neotropical element to the Lower Oligocene of Europe. The species described by Cockerell as *Megistocera gurnetensis* (1921: 456) is not of this genus but a true species of *Brachypremna* (compare the venation with the known species of the genus, — Alexander, Journ. N. Y. Ent. Soc., 20: pl. 16; 1912, especially with the Antillean *B. unicolor* O. S.). This record adds a third Neotropical element to the Oligocene of Europe, since, as indicated elsewhere in this paper, Meunier's record of *Brachypremna eocenica* does not pertain in the slightest manner to this genus. Cockerell's record of *Gymnastes* in the Gurnet Bay beds is much more doubtful. His record of *Limnophila aliena* cannot pertain to this genus since cell R_2 is lacking; it is possible that the fly is an *Elephantomyia*. In conclusion, the crane-fly described by Cockerell and Haines (1921) as *Dicranomyia undulata*, certainly appears to represent a third species of *Thaumastoptera*, distinguished from the genotype, *calceata* Mik, and the Amber species described in this paper, by the extreme brevity of subcosta.

Ecological conditions.

As is now well-established, amber is the fossilized gum of certain coniferous trees, notably *Pinus succinifera* (Göppert), that formed extensive forests in north-central Europe during the early Tertiary. To the present-day entomologist, amber is of the greatest possible interest because of the abundance of insects that were caught in the soft resin and permanently imbedded. Their remains have been handed down to us in a marvellous state of preservation, many being fully as satisfactory as a recent slide preparation. It is now known that this excessive production of resin was the result of a pathological condition of the pines and that virtually all of the remains of the amber pines show evidences of this enzymatous resinosis.

From a study of the insects thus found entombed in amber, together with a knowledge of the habits and activities of their closest living relatives, a more or less clear picture of the conditions that obtained in the succiniferous forests of the lower Oligocene can be obtained. Ulmer in his splendid revision of the amber caddis-flies (1912) showed that the terrain occupied by these forests of amber-producing pines was highly mountainous in its nature, since a considerable proportion of the Trichoptera discovered belong to recent genera that are known to spend their developmental stages in rushing mountain streams while a much smaller proportion are such as inhabit quiet water. Loew (in Osten-Sacken, 1864: 308—310) in a critical resumé of the amber Diptera, based on a vast number of specimens brought together and studied over a period of 17 years, in combination with an unparalleled knowledge of the Diptera of the recent European fauna, has pictured the conditions that must have obtained in northern Europe during the formation of the amber. His studies have indicated a very rich development of Psychodidae, Tipulidae, Mycetophilidae, Empididae, the bark-inhabiting Dolichopodidae and other groups that require or prefer more or less humid conditions in dense shade, together with the negative testimony derived from the almost total lack of those groups that require arid conditions or open exposed sunlit places. One can do no better than to quote a short paragraph from this paper:

"We behold then the Diptera, now entombed in amber, in their once living swarms, in strife among themselves, at war with others, sometimes conquerors, sometimes vanquished, in a damp region where fungi grew abundantly, sheltered from the wind by thick forests, surrounded by a phanerogamous flora, rich in species; and we involuntarily ask: In what sort of a climate lay this paradise for long-legged gallinippers and impudent gnats?"

Loew then explains that of all the Dipterous faunae known to him, the amber Diptera resemble most closely those living forms now inhabiting eastern North America between the latitudes of 32° and 40°.

From his studies on the amber Tipulidae, the present writer can substantiate this account. The frequent occurrence of numerous individuals of a single species in a single small block of amber (in genera such as *Limonia, Trichoneura, Dasymolophilus, Erioptera,* and its subgenus *Empeda*) would indicate that the habits of these flies in the amber forests of long ago was not different from their near allies at the present time. Most of the captured specimens are males and it is not difficult to visualize these small dancing swarms beneath the shade of the great pines, with occasional specimens becoming enmeshed in the still soft gum and finally imbedded. In the genus *Tipula* a similar and parallel condition exists in the fact that virtually all of the numerous specimens that have been found are males. This would compel the belief concerning the Oligocene *Tipulae,* many of which are notable by their pygmy stature, that in the species that have been preserved to us in amber the mating habits were not different from many present-day members of the genus. It is more than probable that these males sought their more retiring mates upon the tree-trunks, progressing up and around the boles by a part-flying, part-walking motion, and were occasionally entrapped in the flowing resin. Such a courting habit is very characteristic of certain woodland-inhabiting *Tipulae* of the present day, notably the *marmorata* group.

Table to show the systematic arrangement of the Amber Tipuloidea.

Family	*Subfamily*	*Tribe*	*Subtribe*	*Genus*	*Number of Amber species*
Tanyderidae				**Macrochile* Lw.	1
Trichoceridae				*Trichocera* Meig.	2
Tipulidae	Tipulinae	Tipulini	Tipularia	*Macromastix* O. S.	1
				Tipula Linn.	
				*Subg. *Electrotipula,* n.	1

* Extinct genus.

Family	*Subfamily*	*Tribe*	*Subtribe*	*Genus*	*Number of Amber species*
				Subg. *Tipula*	14
	Limoniinae	Limoniini	Limoniaria	*Limonia* Meig.	5
			Dicranoptycharia	*Dicranoptycha* O.S.	1
			Thaumastopteraria	*Thaumastoptera* Mik.	1
			Heliusaria	*Helius* St. Farg.	1
		Hexatomini	Epiphragmaria	**Palaeopoecilostola* Meun.	3
				**Tanysphyra* Lw.	1
				Austrolimnophila Alex.	1
				Phyllolabis O. S.	1
				***Trichoneura* Lw.	2
			Dactylolabaria	**Electrolabis*, n.	1
				**Dactylolabis* O. S.	
				*Subg. *Idiolabis*, n.	1
				Subg. *Dactylolabis*	1
			Pseudolimnophilaria	*Pseudolimnophila* Alex.	10
			Limnophilaria	*Limnophila* Mcqt.	5
				**Tanymera*, n.	4
				Pilaria Sint.	4
			Polymeraria	*Polymera* Wied.	1

* Extinct genus.

** Genus described from Amber, later found living.

Family	*Subfamily*	*Tribe*	*Subtribe*	*Genus*	*Number of Amber species*
			Hexatomaria	*Hexatoma* Latr.	2
				Eriocera Mcqt.	2
			Elephantomyaria	*Elephantomyia* O.S.	4
		Pediciini	Adelphomyaria	*Adelphomyia* Bergr.	1
			Pedicaria	*Tricyphona* Zett.	3
		Styringomyini		***Styringomyia* Lw.	1
		Eriopterini	Eriopteraria	*Dasymolophilus* Goetg.	1
				Ormosia Rond.	4
				Erioptera Meig.	
				Subg. *Erioptera*	2
				Subg. *Empeda* O.S.	8
			Gonomyaria	*Rhabdomastix* Skuse	
				*Subg. *Palaeogonomyia* Meun.	5
				Gonomyia Meig.	
				Subg. *Electrogonomyia*, n.	1
				Subg. *Gonomyia*	1
				Gnophomyia O. S.	5
				Trentepohlia Big.	1
			Toxorhinaria	*Ceratocheilus* Wesché	1

* Extinct genus.

** Genus described from Amber, later found living.

Taxonomic portion

Superfamily *Tipuloidea*

In the Amber fauna, the superfamily Tipuloidea is represented by the three families Tanyderidae, Trichoceridae and Tipulidae. The groups represent three very different elements of the Nematocera and it is highly probable that their association together in a single superfamily is entirely artificial and cannot be maintained. The Tanyderidae, represented by the genus *Macrochile*, is intimately connected with the Psychodidae through the subfamily Bruchomyiinae. The Trichoceridae represents a second element that appears to lead directly to the Anisopodidae, and thence to the great Mycetophilid-Cecidomyiid complex. The third group, Tipulidae, includes the vast majority of the fossil and recent species that are assigned to the superfamily.

KEY TO THE FAMILIES OF THE TIPULOIDEA.

1. Wings with five radial veins; a single anal vein (Fig. 2) TANYDERIDAE (p. 13).
   Wings with less than five radial veins; two anal veins present. 2.
2. Ocelli present; wings with vein *2nd A* very short, curved strongly into the anal angle. TRICHOCERIDAE (p. 17).
   Ocelli lacking; wings with vein *2nd A* longer, running generally parallel to the anal margin of the wing, short and incurved to the anal angle only in *Trentepohlia* (Fig. 167). TIPULIDAE (p. 17).

Family *Tanyderidae*.

The only genus of the family so far discovered in the Amber is *Macrochile* Loew. It should be noted, however, that the Psychodid subfamily Bruchomyiinae, represented in Amber by *Nemopalpus* Macquart (*Palaeosycorax* Meunier) approaches *Macrochile* very closely in several respects and the two groups are certainly very closely allied. The writer's reasons for using the subfamily name Bruchomyiinae in preference to Nemopalpinae have been given in an earlier paper (Insec. Inscit. Menst., 9:157—158; 1921). The blood-sucking Psychodidae, the Phlebotominae, represent a third group of the family, a contention that is upheld by the recent critical work by Dr. Crampton on the thoracic morphology of the Nematocerous Diptera (Ent. News, 37:38 and 65; 1926).

Macrochile Loew

1850. *Macrochile* Loew; Bernstein und Bernsteinfauna, p. 36.
1851. *Macrochile* Loew; Linnaea Entomol., 5:402—403, pl. 2, fig. 24 (head), fig. 25 (wing).

The remarkable extinct genus *Macrochile* was described from the Baltic Amber and has not been recorded from elsewhere. Osten-Sacken and Meunier believed that the fly was identical with the recent genus *Protoplasa* Osten-Sacken, but this is certainly not the case. Osten-Sacken placed the name in the synonymy of *Protoplasa* under the belief that *Macrochile* was not available because of the earlier use of *Macrochila* Stephens and *Macrochilo* Hübner.

Characters of the genus.

Mouthparts elongated, somewhat shorter in the female than in the male; rostrum about one-half longer than the head, the very long labial palpi nearly twice as long as the rostrum; maxillary palpi long and slender, 5-segmented, the basal segment short, only one-third the second; third segment nearly one-half longer and more slender than the second; fourth segment about one-half the third; fifth segment long and slender, a little longer than the second and about one-half longer than the fourth.

Antennae 19-segmented, the flagellum long, setaceous, the segments cylindrical, with short, scattered setae and sparse subbasal verticils that do not exceed the segments in length; flagellar segments decreasing very gradually in length and diameter to the last, which is a trifle longer than the penultimate. If bent backward, the antenna would extend to about opposite midlength of the third abdominal segment.

Head relatively small. Eyes large, rounded, with small ommatidia, between which project short, erect setae. Anterior vertex reduced to a narrow strip. Cervical sclerites short and inconspicuous.

Halteres very short and stout. Legs with the coxae elongate; trochanters small; femora relatively short and stout, clothed with short, suberect, black setae; tibiae slender, the spurs long and conspicuous; tarsi with the segments gradually decreasing in length and very slightly in thickness, each segment on ventral face terminating in a small spine; tarsal claws small, smooth, erect.

Wings (Fig. 2) with *Sc* relatively short, Sc_1 extending to about opposite one-third the length of R_{2+3}, Sc_2 a little longer than Sc_1; *Rs* a little longer than R_{2+3}, gently arcuated at origin; cell R_2 variable in length, in most cases a little more than twice its petiole; a short spur on *r-m* close to its union with R_{4+5}, jutting into cell *R*; *M* in direct

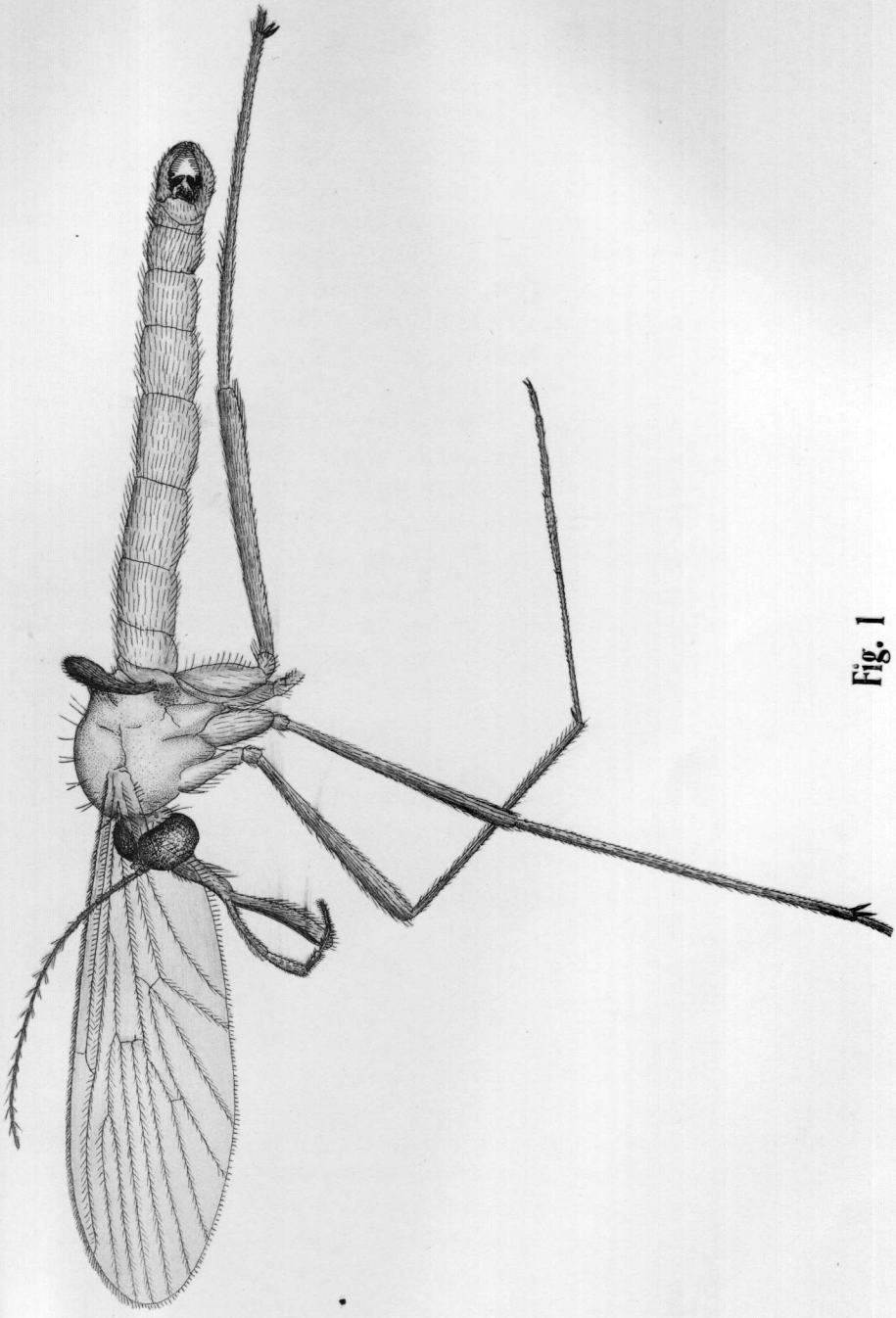


Fig. 1

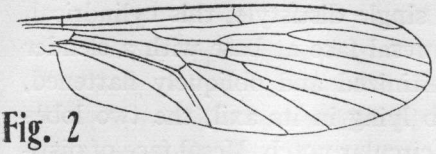


Fig. 2

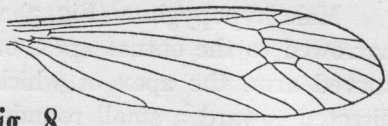


Fig. 8

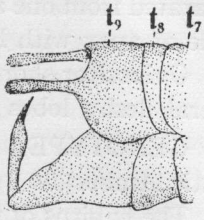


Fig. 10

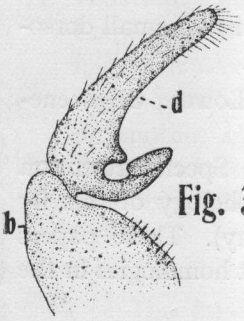


Fig. 3

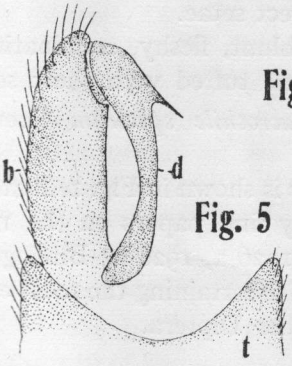


Fig. 5

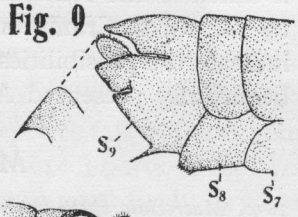


Fig. 9

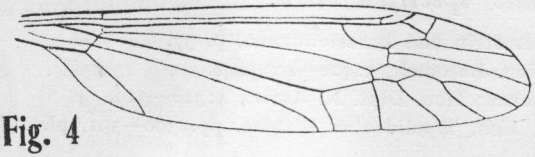


Fig. 4

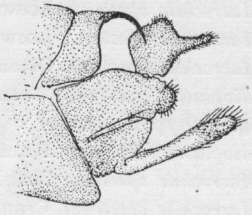


Fig. 11

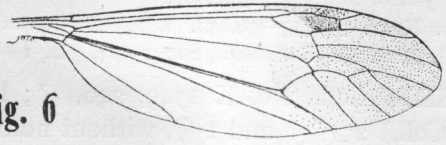


Fig. 6

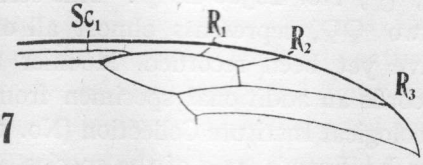


Fig. 7

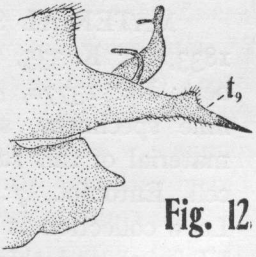


Fig. 12

alignment with M_{1+2}; cell *1st* M_2 long and narrow, the basal section of M_{1+2} from one-third to one-half R_{2+3}; *m-cu* at the fork of M_{3+4}; Cu_2 well-indicated, extending almost to the wing-margin; a single well-preserved anal vein. A ♀ (Geol. Inst. Coll.) has *Sc* even shorter, ending opposite the basal deflection of R_{4+5}; R_{2+3} very long, more than one-half longer than *Rs*, cell R_2 being correspondingly reduced; basal section of M_{1+2} only one-third R_{2+3}. Anal angle of wing well-developed but not so squarely as in *Protoplasa*.

Male hypopygium (Fig. 3) with a single dististyle, this cylindrical, narrowed to the obtuse apex, on the mesal face at base with a slender curved arm, the apex of which is chitinized and obliquely flattened, directed toward a small rounded knob lying in its axil, the two lobes separated from one another by a small circular notch. Mesal face of dististyle at apex with long erect setae.

Ovipositor short and blunt, fleshy, terminating in two small dorsolateral fleshy lobes that are tufted with short setae.

GENOTYPE. — *Macrochile spectrum* Loew (Lower Oligocene-Baltic Amber).

The habitus of this fly is shown in Fig. 1, Plate I. Special attention is called to the remarkably fine papers on the morphology of this fly by Dr. G. C. Crampton (1926 a, 1926 b; Bibliography). These papers indicate the possibilities of ascertaining the most exact homologies in the beautifully preserved Amber Diptera.

Macrochile spectrum Loew.

1850. *Macrochile spectrum* Loew; Bernstein und Bernsteinfauna, p. 37.
1851. *Macrochile spectrum* Loew; Linn. Entomol., 5:402—403, figs.
1869. *Macrochile spectrum* Osten Sacken; Mon. Dipt. N. Amer., 4:318—319.
1906. *Idioplasta spectrum* Meunier; Mon. Tipulidae et Dixidae, pp. 390—391, pl. 16 fig. 2 (hypopygium ♂).
1917. *Idioplasta spectrum* Meunier; Neues Jahrb. Mineral., 1917: 99.
1926. *Macrochile spectrum* Crampton; Ent. News, 37: 33—38, pl. 3, fig. 1 (thorax).
1926. *Macrochile spectrum* Crampton; Bul. Brooklyn Ent. Soc., 21: 1—14, pls. 1—2

MATERIAL STUDIED. — Klebs Coll., No. K 1749, 246, ♂; K 1833, ♂; K 335, ♀. Geol. Inst. Coll., 2 ♂♂ and 1 ♀, without numbers; No. 13778, ♂; No. 16795, ♂; No. 26306 B, ♂. This series of nine specimens, seven ♂♂, two ♀♀, represents almost all of the material of this rare fly that have yet been recorded. Meunier (Miscell. Entomol., 7:173; 1899) records an additional specimen from the Loew collection as being in the Geological Institute Collection (No. 14543 VI 8383) and this may possibly be Loew's type of the species. This last mentioned specimen has not been seen by the writer.

MALE. — Length (excluding rostrum) 9—10 mm.; wing 7—7.8 mm.; rostrum alone 2—2.8 mm.

FEMALE. — Length (excluding rostrum) 10—12 mm.; wing 6.2—8.5 mm.; rostrum alone 1.5—2 mm.; antenna 5 mm.

General coloration of the fly dark, unvariegated. Wings with a strong brownish tinge, the veins dark brown. Vague indications of dusky spots at end of vein *Sc*, on *r-m* and at the fork of M_{3+4}.

Family *Trichoceridae*.

No representatives of this family have been seen by the writer. Loew (Bernstein und Bernsteinfauna, pp. 36—37; 1850) mentions the occurrence of two species of *Trichocera* in the Amber, stating that they differ from the existing European species only in slight differences in venation. Meunier (Miscell. Entomol., 7:174; 1899) was unable to find Loew's types in the Königsberg Museum and no further trace of them has been discovered. In view of Loew's remarks on the venation, it seems possible that the Amber Trichoceridae may belong to some one or another of the other genera of the family, notably to *Diazosma* Bergroth or to *Paracladura* Brunetti. The re-discovery of members of this group in Amber is greatly to be desired.

Family *Tipulidae*.

The family Tipulidae includes the great majority of the Amber Tipuloidea. The majority of the genera and species fall in the subfamily Limoniinae, as is the case in the recent fauna in all parts of the World. The subfamily Tipulinae is represented by a comparatively large number of species arranged in a few genera, *Tipula* being the largest and most characteristic. The third subfamily of recent Tipulidae, the Cylindrotominae, has not yet been discovered in the Amber, although it was very characteristic of the Eocene and Miocene of the New World. No representatives of the Architipulinae, a small group of Mesozoic Tipulidae, have been discovered in Amber.

The most characteristic genera in the Amber are *Tipula, Limonia, *Palaeopoecilostola, *Tanysphyra, Trichoneura, Pseudolimnophila, *Tanymera, Pilaria, Elephantomyia, Erioptera* (subgenus *Empeda*), *Ormosia* and *Rhabdomastix* (*subgenus *Palaeogonomyia*). The names marked with an asterisk (*) indicate extinct groups. *Trichoneura* was supposed to be quite extinct but a living species has recently been discovered in the Himalayas, as is discussed under the account of the genus. The species of *Tipula* and *Limonia* present a somewhat different facies from the existing species of the genera but do not differ sufficiently to warrant new generic or subgeneric groups. The species of *Pseudolimnophila, Pilaria, Elephantomyia* and *Ormosia* greatly resemble the existing species of the same genera.

KEY TO THE SUBFAMILIES OF TIPULIDAE AND THE TRIBES AND SUB-TRIBES OF THE LIMONIINAE IN AMBER.

1. Last segment of the palpi elongate, whiplash-like; nasus usually distinct; antennae usually with 13 segments; wings with *Sc* almost

always ending in R; *m-cu* connecting with M_{3+4} at the fork or with M_4 shortly beyond this fork; vein Cu_1 weakly angulated at the point of insertion of *m-cu*. ..... TIPULINAE (p. 18)

Last segment of the palpi short; no distinct nasus; antennae with 11, 14, 15 or 16 segments, very rarely 13-segmented; wings with *Sc* ending in *C*, with Sc_2 preserved; *m-cu* connecting with M_{3+4} far before its fork, the distance usually equal to or greater than the length of the crossvein alone; in the amber fauna, *m-cu* lies closest to the fork of M_{3+4} in *Tanymera* (Figs. 93—96); *m-cu* straight, not angulated at the point of insertion of *m-cu*. (LIMONIINAE) 2

2. Four branches of R reach the wing-margin. 3

Two or three branches of R reach the wing-margin 6

3. Tibial spurs present. 4

Tibial spurs lacking.

ERIOPTERINI; ERIOPTERARIA, GONOMYARIA (p. 96)

4. Sc_2 lying beyond the origin of *Rs*; eyes glabrous. 5

Sc_2 lying before the origin of *Rs*; eyes hairy.

PEDICIINI; PEDICARIA (p. 93)

5. Apical cells of wing with macrotrichiae.

PEDICIINI; ADELPHOMYARIA (p. 92)

Apical cells of wing without macrotrichiae. HEXATOMINI (p. 43)

6. Rostrum very elongate, approximately as long as the body..... 7

Rostrum shorter than the head and thorax taken together..... 8

7. Legs with the setae simple; *Rs* longer than the basal section of R_{4+5}; cell *2nd A* narrow.

HEXATOMINI; ELEPHANTOMYARIA (p. 87)

Legs with the setae profoundly bifid; *Rs* and basal section of R_{4+5} short, subequal; cell *2nd A* wide.

ERIOPTERINI; TOXORHINARIA (p. 124)

8. Wings with R_{2+3} very short, oblique, less than one-half the outer section of R_{4+5}, not exceeding cell *1st* M_2 in length; cell R_3 at wing-margin very wide, more than four times cell *2nd* R_1.

STYRINGOMYIINI (p. 95)

Wings with R_{2+3} elongate, subequal to or longer than the outer section of R_{4+5} and much longer than cell *1st* M_2; cell R_3 at wing-margin narrower than cell *2nd* R_1. ..... LIMONIINI (p. 35)

Subfamily Tipulinae

Tribe Tipulini.

The majority of the Tipuline crane-flies in the Amber seem to be referable to isolated and perhaps extinct groups within the great genus

Tipula. The most interesting and isolated type within the subfamily is the genus *Macromastix*, discussed below.

KEY TO THE GENERA OF THE TIPULINI.

1. Vein *Sc* very elongate, Sc_1 and R_1 lying close together at wing-margin; antennae of male very long, nearly three times as long as the entire body. ..... *Macromastix* O. S. (p. 19)
   Vein *Sc* shorter, Sc_1, when preserved, remote from the tip of R_1; antennae of male short, not exceeding the length of the body, in most cases shorter than the head and thorax. 2
2. Cell M_1 sessile; basal deflection of R_2 perpendicular at origin (Fig. 7); cells of wing beyond the cord with numerous macrotrichiae (Fig. 6).
   Tipula; Subgenus *Electrotipula*, nov. (p. 21)
   Cell M_1 petiolate; basal deflection of R_2 usually shorter and less perpendicular; cells of the wing beyond the cord without macrotrichiae, except in *T. handlirschiana* (Fig. 26) and *T. scudderiana* (Fig. 28), in which cases cell M_1 is petiolate.
   Tipula; Subgenus *Tipula* Linn. (p. 23)

Macromastix Osten Sacken.

1886. *Macromastix* O. S.; Berlin. Ent. Zeitschr., 30: 185—187.

The discovery of a species of *Macromastix* in the Baltic Amber is of the very greatest importance. The existing members of the genus are virtually confined to the Antipodes, there being approximately 60 described species in New Zealand, more than a score in Australia and Tasmania, and 2 or 3 in Southern South America.

The Amber species, *M. bornhardti* Meun., has an unusually generalized facies for a member of the genus.

The antennae of the male are nearly three times as long as the entire body; the basal scapal segment is very large and incrassated, as is usual in those species of Tipulidae with greatly elongated antennae; second scapal segment correspondingly reduced; flagellar segments greatly elongated, with a delicate erect pubescence and a row of scattered, erect, spinous setae along the inner face of the organ, the function of these presumably being the same as in existing species, of aiding in the extrication of these greatly elongated organs from the pupal sheath; second flagellar segment shorter, but similarly armed with spinous setae; remaining flagellar segments gradually decreasing in length. Head with the eyes large, protuberant, the ommatidia small and numerous; vertical tubercle large and simple.

Thorax densely clothed with erect white pubescence of unusual length. Legs with the tarsi long and slender, especially the basitarsi which are more than twice the remaining tarsal segments taken together; claws small, simple. Wings (Fig. 4) relatively narrow. Venation: *Sc* long, Sc_1 not quite attaining costa, its apical half being atrophied, the base preserved as a strong spur that is longer than Sc_2; *Rs* short and very strongly arcuated; R_2 nearly perpendicular, gently sinuous; cell R_2 large; *m-cu* longer than either of the other elements that close cell M_4 (distal sections of M_4 and Cu_1); Cu_1 strongly angulated at the point of insertion of *m-cu*; cell *2nd A* broad.

Abdomen elongate for a member of the genus. Male hypopygium (Fig. 5) with the basistyle (b) very long and slender, the outer face with relatively long, suberect setae; only a single dististyle (d) is evident in the unique type, this very elongate, on the outer face before midlength with a suberect acute spine; apex of style slightly expanded. The type of hypopygium found here is much more generalized than in the existing members of the genus, suggesting the ancestral types in the Tanyderidae, Psychodidae, Trichoceridae, and others.

Macromastix bornhardti Meun.

1917. *Macromastix bornhardti* Meun.; Neues Jahrb. Mineral., 1917: 99—101, pl. 15, fig. 71 (wing ♂), pl. 16, fig. 76 (hypopygium ♂).

MATERIAL STUDIED. — Geol. Inst. Coll., (no number), ♂, holotype.

MALE. — Length 11 mm.; wing 15 mm.; antenna, about 30 mm. Antennae black throughout. Palpi with the terminal segment slender, longer than the remaining segments taken together.

Wings with a faint brown tinge, the costal region very slightly darker; veins dark brown. Venation (Fig. 4): Veins R_1 and R_2 relatively close together at wing-margin, the distance between them less than R_2 alone; *r* nearly longitudinal in position, its exact location obscured by artifacts in the type; R_3 elongate, approximately three times as long as R_2 alone; cell *1st* M_2 irregularly pentagonal, the shortest element being M_{3+4}; cell M_1 large, about twice the length of its petiole; *m-cu* on M_4 immediately beyond its base; distal section of Cu_1 shorter than the distal section of M_4; veins Cu_1 and *1st A* relatively close together at wing-margin. Basal portion of vein *1st A* forming the chitinized posterior margin of the wing-petiole, as in the genotype, *M. costalis* (Swed.); elements of the arculus in oblique alignment with *h*; posterior extension of vein *1st A* lying close to that of vein *2nd A*, becoming entirely obsolete basally, the main prearcular cell being very large.

Abdomen elongate, clothed with long, erect, pale setae.

Meunier states that the fly has a wing-length of 20 mm, but this is too great. The species was dedicated to Oberbergrat W. Bornhardt, of Berlin.

Tipula Linn.

As is indicated elsewhere in this paper, the majority of the species pertain to isolated and probably extinct groups of the genus. As was indicated by Loew (1850), females of the genus *Tipula* appear to be very uncommon in the Amber. The preponderance of males is presumably due to the habit (that still obtains in many existing woodland species of the genus) of the males searching out their mates by mounting the trunks of the amber pines by a part-walking, part-flying method of progression. While thus fluttering along the bark, it may easily be pictured how they became enmeshed in the fresh resin of the pines.

Although very rare, females of the genus *Tipula* are occasionally discovered and show that the affinities of these small flies are really with *Tipula* and not with *Macromastix*. The type of *T. eocenica* (Meun.) is a female with greatly reduced antennae, a character that may later be found to be typical of a certain group of the genus and which later may warrant the erecting of a separate genus or subgenus. Other females have a more normal Tipuline antenna that is elongate, although shorter than that of any of the males with which it may be associated. Thus one of these typical females in the Klebs Collection (Klebs, X 363) shows a small species allied to *T. media* but with *m-cu* placed some distance before the fork of M_{3+4}. The valves of the ovipositor are long, straight and heavily chitinized, the slender tergal valves greatly exceeding the sternal valves, the latter with the tips obtusely rounded.

Electrotipula, subgen. n.

Palpi elongate, especially the terminal segment, the entire palpus nearly as long as the female antenna. Antennae 12-segmented, in the male elongate; flagellar segments nearly cylindrical, the extreme base of each segment a trifle enlarged and here provided with a few powerful verticils that are shorter than the segments in both sexes; surface of flagellar segments in male covered with a dense erect pubescence.

Wings (Fig. 6) with abundant macrotrichiae in all the cells beyond the cord. Venation: Sc_1 preserved as a weak spur basad of the origin of R_3, Sc_2 uniting with R at near one-third the length of the short, gently arcuated sector; r in direct alignment with R_1, the distal section of R_2 almost so (Fig. 7); basal section of R_2 elongate, perpendicular to the end

of R_{2+3} at the end of the stigma, approximately equal in length to *r-m*; R_3 elongate; cell M_1 sessile; cell *1st* M_2 elongate, the outer end pointed; *m-cu* inserted on vein M_4 immediately beyond its origin; vein *1st A* running generally parallel with Cu_1, cell *Cu* at wing-margin a little narrower than cell M_4, cell *1st A* thus being very wide at margin.

Male hypopygium moderately incrassated. Ovipositor with small, fleshy valves.

Type of subgenus. — *Tipula* (*Electrotipula*) *pinetorum*, sp. n. (Lower Oligocene-Baltic Amber).

The present fly is an extremely interesting type that exhibits several features of great interest. In its venation, the species shows some characters of the genus *Nephrotoma*, notably the sessile cell M_1 and relatively short *Rs*. However, the point of insertion of *m-cu* would place it closer to the genus *Tipula* where it would appear to represent a new subgeneric group, distinguished especially by the unusual length of the basal section of vein R_2 and the corresponding arrangement of the veins in this field of the wing (Fig. 7), the sessile cell M_1, the abundant macrotrichiae on the wing-membrane and the structure of the antennae and ovipositor.

Tipula (*Electrotipula*) *pinetorum*, sp. n.

MALE. — Length about 6.5 mm.; wing about 7 mm.; antenna about 5 mm.

FEMALE. — Length about 6 mm.; wing about 7.5 mm.

MATERIAL STUDIED. — Berlin Museum, ♂, holotype. Geol. Inst., No. B 14864, ♀, allotype.

Antennae of male elongate, if bent backward extending to beyond midlength of the abdomen; first scapal segment short-cylindrical; flagellar segments very elongate, gradually decreasing in length outwardly. In the female, the flagellar segments are shorter.

Wings grayish subhyaline, the stigma distinct, darker brown; veins dark brown; pale obliterative areas at the end of *Rs*, basal section of M_{1+2} and basal portion of the basal section of M_3. The macrotrichiae occupy not only the cells beyond the cord, more abundantly so in the radial and medial fields, but there are a few scattered trichiae in the distal ends of cells *R* and *M*. Wings with a short basal petiole; anal margin with a row of elongate setae.

Abdomen in male dark brown, the caudal margins of the tergites with very narrow paler margins; in the female, the tergites seem to show a reversal of this pattern, the basal half or less being pale, the caudal

margin dark brown. The details of the male hypopygium cannot be plainly detected in the type but the caudal margin of the tergite appears to be notched medially. The ovipositor has the valves very small and fleshy. In the type female, there are seven large, oval, black eggs extruded into the amber block.

Subgenus Tipula Linn.

A considerable number of names have been proposed by various authors, some of which are valid and are considered below. Other names are unrecognizable or must be held to be *nomina nuda.* The following names have been omitted from consideration in this paper:

Tipula antiqua, T. curvicornis and *T. protogaea* Presl (1822), unrecognizable from the descriptions and, in some cases at least, of uncertain generic position. *Tipula brevirostris, T. eucera* and *T. goliath* Loew (1850), all *nomina nuda* and the types apparently lost. *T. crassipes, T. culiciformis* and *T. terricola* Meunier (1899), unrecognizable or *nomina nuda. T. grandissima* Meun. (1906) has not been seen by the writer and is omitted from the accompanying key. The four species, *Tipula graciosa, T. longipalpis, T. major* and *T. media* Meunier (1906) have been studied and are re-described at this time. The fly described by Meunier as *Brachypremna eocenica* (1906) is certainly not a member of *Brachypremna* and is herein considered as being an aberrant species of *Tipula.*

KEY TO THE AMBER SPECIES OF TIPULA LINNAEUS. (MALES ONLY).

1. Apical cells of the wing with abundant macrotrichiae. 2
   Cells of the wing without macrotrichiae. 3
2. Macrotrichiae of wing membrane confined to cells beyond the cord (Fig. 28); *m* less than one-third the petiole of cell M_1.
   T. scudderiana, sp. n. (p. 32)
   Macrotrichiae of wing membrane more extensive, including the outer ends of cells *R, M, Cu* and *1st A* (Fig. 26); *m* nearly as long as the petiole of cell M_1. ..... *T. handlirschiana,* sp. n. (p. 32)
3. Antennae (♂) elongate (more than 10 mm.).
   T. longipalpis Meun. (p. 24)
   Antennae (♂) shorter (less than 7 mm.). 4
4. Wings uniform in color, except the stigmal spot when this is present. 5
   Wings subhyaline, variegated with brown clouds.
   T. presliana, sp. n. (p. 27)

5. Male hypopygium with the ninth sternite bearing two elongate, finger-like lobes that are directed caudad (Fig. 11).
T. digitifera, sp. n. (p. 26)
Male hypopygium without such finger-like lobes. 6
6. Ninth tergite of male hypopygium produced medially into a short, broadly depressed median lobe that appears to be narrow, when viewed from the side (Fig. 9). 7
Ninth tergite not produced medially; in some cases (Fig. 10) each lateral angle long-produced. 11
7. Median lobe of ninth tergite, when viewed laterally, appearing short and blunt (Fig. 9). 8
Median lobe of ninth tergite, when viewed laterally, appearing long and acutely pointed (Figs. 17, 22). 9
8. Ninth sternite with a small, acute, median spine (Fig. 9).
T. media Meun. (p. 25)
Ninth sternite not so armed (Fig. 25). *T. graciosa* Meun. (p. 31)
9. Outer dististyle of male hypopygium (Fig. 19) with two acute spines. ..... *T. spinistyla*, sp. n. (p. 30)
Outer dististyle of male hypopygium unarmed. 10
10. Lobe of ninth tergite, when viewed laterally, appearing gently upcurved (Figs. 17, 18). ..... *T. major* Meun. (p. 28)
Lobe of ninth tergite, when viewed laterally, appearing strongly decurved, beak-like (Fig. 22). ..... *T. falco*, sp. n. (p. 30)
11. Lateral lobes of ninth tergite slender but blunt at tips (Fig. 10).
T. submedia, sp. n. (p. 26)
Lateral lobes of ninth tergite long and powerful, produced apically into an acute spine (Fig. 12). *T. phoracantha*, sp. n. (p. 27)

Tipula (?) *eocenica* (Meun.) is known only from the unique female type and is omitted from the above key to the males. The fly is readily distinguished by the structure of the antennae which show but 11 segments.

Tipula longipalpis Meun.

1906. *Tipula longipalpis* Meunier; Mon. Tipulidae Ambre Baltique, pp. 392—393, pl. 16, fig. 3 (antenna ♂), pl. 16, fig. 4 (palpus ♂).

MATERIAL STUDIED. — Klebs Coll., No. K 4503, 543, ♂, holotype.

As stated by Meunier, the unique type lacks both wings. Meunier gives additional notes on a female that he determines as being this species, but whether the two are actually conspecific is not certain.

MALE. — Length about 16.5 mm.; abdomen alone 11 mm.; antenna about 11 mm.

The characters have been well described and figured by Meunier. The antennae extend to opposite mid-length of the abdomen; flagellar segments long-cylindrical, the basal enlargement very small; verticils of the basal flagellar segments short, those on the subterminal segments longer, the longest not exceeding one-third the length of the segment.

Male hypopygium strongly incrassated, the enlargement involving all the segments beyond the fifth. Unfortunately, no conspicuous details of structure can be given from this specimen, other than that the dististyles are small and do not project far beyond the generally rounded contour of the apex of the abdomen.

Tipula media Meun.

1906. *Tipula media* Meunier; Mon. Tipulidae Ambre Baltique, p. 392, pl. 15, fig. 13 (wing, ♂).

MATERIAL STUDIED. — Klebs Coll., No. 21, ♂, selected as lectotype. Additional specimens: No. K 32, ♂, determined by Meunier as *T. major*; No. K 241, ♂; No. K 4034, 218, ♂; No. K 1526, ♂; No. K 1834, ♂. Geol. Inst. Coll., 648, ♂; 2776, ♂; 14161, ♂; 14314, ♂; 14669, ♂; 16793, ♂; B 16817, ♂.

In the Geol. Inst. Collection, No. 5588, determined as *media* by Meunier is his *graciosa*; Nos. 2833 and 3826 are not *media* but their exact further identity cannot be confirmed. An additional specimen is in the British Museum, No. 18703 (ex Mus. Stantien et Becker, No. 13509, ♂).

Wings grayish, the stigma oval, brown; veins brownish black. Venation (Fig. 8): *Rs* relatively short, about one-half longer than R_{2+3}; tip of R_2 entirely preserved, its length somewhat variable; cell 1*st* M_2 relatively elongate; cell M_1 approximately twice its petiole.

Male hypopygium (Fig. 9) relatively small, the sclerites of the ninth segment more or less fused; tergal region extended caudally into a short median lobe; sternite extensive, on median line near base (S 9) with a slender, acicular, blackened spine, the tip acute, directed ventrad and slightly caudad. Eighth sternite (S 8) unarmed. Basistyle small, the apex narrowed, the suture indicated beneath. Dististyles small and relatively inconspicuous; outer dististyle produced into a spine (Fig. 9, enlarged sub-figure).

The three small species of *Tipula* described by Meunier (*graciosa*, *major* and *media*) are very insufficiently defined by their describer.

The species were based on the relative size of the wings, with only a single millimeter's difference between each of them. This is unquestionable a highly variable character that is further complicated by the fact that the measurements as given by Meunier in his keys (l. c., p. 362) are in all cases 1 mm. greater than those given in the original diagnoses (l. c., pp. 391—392). The three species have been studied by the writer and lectotypes designated for each. *T. media* may be recognized by the presence of a slender spine on the ninth sternite of the male hypopygium.

Tipula submedia, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. K 1837, ♂, holotype. The specimen had been earlier determined by Meunier as being his *T. media*.

MALE. — Length about 8.5 mm.; wing 9.5 mm.

General size and structure as in *T. media* Meun., the structure of the male hypopygium very distinct.

Male hypopygium (Fig. 10) moderately dilated, the ninth tergite (t 9) massive, the caudal lateral angles produced caudad into slender, straight rods that are gently expanded outwardly, their tips obtuse. Ninth sternite massive, conically narrowed outwardly, at apex with a powerful spinous lobe directed dorsad.

The hypopygium of this species vaguely suggests that of *T. scudderiana*, sp. n.

Tipula digitifera, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. K 7848, D 46, ♂, holotype. The specimen had been earlier determined by Meunier as being his *T. major*.

MALE. — Length about 11 mm.; wing about 12 mm.

Antennae relatively slender, brownish black throughout; flagellar segments with small basal enlargements, the longest verticils of the outer segments a trifle shorter than the segments alone.

Wings grayish subhyaline; stigma brown; veins brownish black.

Male hypopygium (Fig. 11) moderately large. Ninth tergite small; from what appears to be the lateral angle of the tergite there extends a slender, strongly curved, black chitinized hook; the possibility exists that these hooks may represent styli lying in this position and appearing to be tergal in origin. Better preserved material will be needed to fully settle the details of structure of the hypopygium. Basistyle large,

extending cephalad to the eighth sternite; dististyle small, the caudal edge produced into a slender hairy lobe, the dorsal edge into a low rounded tubercle that is sparsely setiferous. Ninth sternite with two long, cylindrical, finger-like lobes that are directed caudad, the lobes fleshy, pale, provided with short erect setulae. Eighth sternite unarmed.

T. digitifera differs notably from other described species of the genus in the pincer-like digitiform lobes on the ninth sternite.

Tipula phoracantha, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. K 7849, D 47, ♂, holotype. Determined by Meunier as being his *T. major*. Paratype, ♂, in the Geol. Inst. Coll.

MALE. — Length about 12 mm.; wing about 13.5 mm.

Antennae of male slender, the basal swellings of the flagellar segments slight; verticils relatively long and slender, approximately equal in length to the segments that bear them.

Wings grayish subhyaline, the costal margin somewhat darker; stigma oval, darker brown; veins brownish black. Venation: *Rs* gently arcuated at origin; tip of R_2 entirely preserved; petiole of cell M_1 longer than *m*; *m-cu* on M_4 shortly beyond its origin.

Male hypopygium (Fig. 12) of very remarkable structure. Ninth tergite (t 9) large, the caudal margin transverse or nearly so, the dorsal surface with dense setae of moderate length; caudal lateral angles of the tergite produced caudad into a powerful flattened blade, the tip extended into a powerful straight spine. Ninth sternite extensive, produced caudad into a small rounded point. Dististyles slender; outer style a slender, curved, boomerang-shaped structure; inner style broad at base, the apex narrowed, before the tip on the cephalic face with a slender beak-like extension that is longer than the apex beyond it. Eighth sternite unarmed.

T. phoracantha differs from all other species so far described by the peculiar structure of the male hypopygium.

Tipula presliana, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype.

MALE. — Length about 11 mm.; wing about 11 mm.

The entire cephalic end of the type is badly crushed and eviscerated. The abdomen is light reddish brown, on the fifth and succeeding abdominal segments passing into blackish to form a distinct dark terminal

ring. Fragments of the antennae that are preserved indicate an organ of moderate length only.

Wings (Fig. 13) subhyaline, handsomely pictured with brown; stigma oval, dark brown; paler brown clouds are distributed over the membrane as follows: At fork of *Rs*, extending to cell *1st* M_2 and there becoming confluent with a somewhat larger cloud that occupies the outer half of cell *1st* M_2 and the base of cell *2nd* M_2; a very large and somewhat darker colored cloud surrounds *m-cu*; a cloud on vein R_3 in both cells R_2 and R_3; a cloud adjoining vein Cu_1 near midlength of cell *M*; the ground-color of the wing immediately distad of this latter cloud and before the large one at *m-cu* is brighter, almost whitish, than the ground-color. Conspicuous obliterative areas at the fork of *Rs* and the basal section of M_{1+2}. Venation: *Rs* moderately long, in alignment with R_{2+3}; cell M_1 large and ample; *m-cu* connecting with vein M_4 a short distance beyond its origin; Cu_2 extending almost to the wing-margin.

Male hypopygium badly discolored and distorted in the unique type. The dististyles (Fig. 14) are borne near the apex of the basistyle and appear to be shaped as indicated in the drawing.

This handsome fly is named in honor of Professor Johann S. Presl, a pioneer in the study of the Amber Diptera. *T. presliana* is distinguished from the other described Amber *Tipulae* by the handsomely patterned wings. It is to be hoped that additional material will be forthcoming so the rather peculiar structure of the male hypopygium may be more clearly described.

Tipula major Meun.

1906. *Tipula major* Meunier; Mon. Tipulidae Ambre Baltique, p. 392.

MATERIAL STUDIED. —Klebs Coll., No. K 1674, 231, ♂, selected lectotype. Additional specimens: Klebs Coll., No. K 1831, ♂; Geol. Inst., No. 16791, ♂, paratype; No. 2900 of the type-series is doubtfully *major*; No. 6420 is a distinct species (described in this paper as *T. spinistyla*, sp. n.).

Wings (Fig. 15) grayish subhyaline; stigma long-oval, rather dark brown; veins brownish black. Venation: Tip of R_1 beyond *r* short, approximately one-half *r* alone; R_{2+3} longer than the distal section of R_2 which is well-preserved; *m-cu* at the fork of M_{3+4}.

Male hypopygium (Fig. 17) moderately incrassated. Ninth tergite. (Fig. 16) with a broadly flattened median lobe, directed caudad, when viewed from the side (Fig. 18) appearing as a very depressed lobe, the

Fig. 13

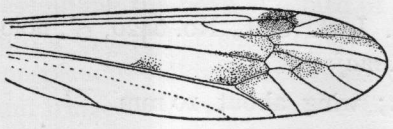
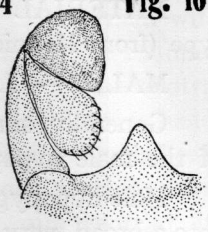


Fig. 14

Fig. 16



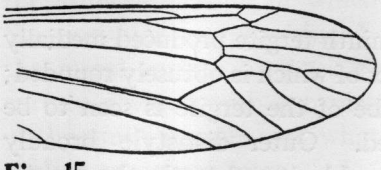


Fig. 18

Fig. 15

Fig. 17

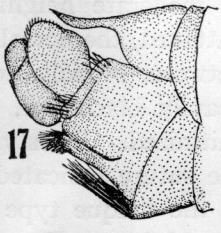


Fig. 20

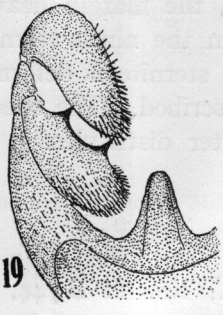


Fig. 19

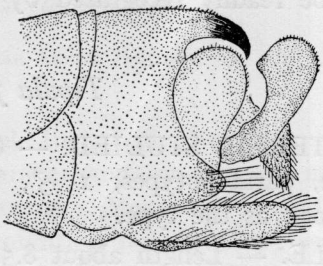


Fig. 22

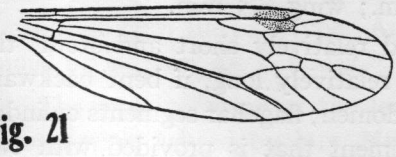


Fig. 21

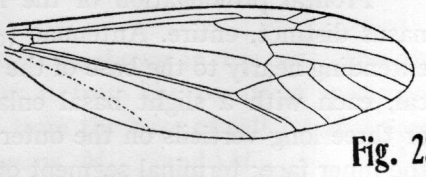


Fig. 23

apex acute and slightly upcurved. Basistyle massive, truncated apically, fused with the ninth sternite except beneath; caudal margin of ninth sternite beneath with numerous short setae. Outer dististyle (Fig. 17) large, broad, flattened, the margin fringed with short setae but not otherwise armed. Eighth sternite with a median tuft of setae that lie appressed to the ninth sternite.

Tipula major is distinguished from the related forms by the shape of the median lobe of the ninth tergite, the unarmed outer dististyle and the median brush of setae on the eighth sternite.

Tipula spinistyla, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 6420, ♂, holotype (from Meunier's type series of *T. major*).

MALE. — Length about 10 mm.; wing about 10 mm.

Generally similar to *T. major* Meun., differing in the structure of the male hypopygium.

Male hypopygium (Fig. 19) with the ninth tergite produced medially into a broad, very depressed lobe, the apex of which is obtusely rounded; viewed laterally (Fig. 20), the median lobe of the tergite is seen to be of moderate height, the apex truncated. Outer dististyle broadly flattened, the dorsal margin with two large blackened teeth, the margin between broadly rounded and heavily blackened. Inner dististyle heavily blackened, with short dense black setae, the margin heavily chitinized. Basistyle incompletely separated from the ninth sternite, the suture indicated ventrally and dorsally. The sternite is deformed in the unique type and cannot be accurately described. The species should be readily recognized by the spinous outer dististyles.

Tipula falco, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 11 B 744, ♂, holotype, paratopotypes, 1 ♂, 1 additional wing, preserved in the same block as the type.

MALE. — Length about 8.5 mm.; wing 8.5 mm.

Frontal prolongation of the head relatively short and stout, the nasus distinct, entire. Antennae (♂) relatively long, if bent backward extending nearly to the base of the abdomen; flagellar segments cylindrical, each with a slight basal enlargement that is provided with two or three long verticils on the outer face and one or two shorter ones on the inner face; terminal segment only one-third the length of the penultimate.

Wings (Fig. 21) whitish subhyaline, the stigma oval, brown; veins darker brown. Venation: Sc_2 ending before midlength of *Rs*, the latter short, gently arcuated; *r* with conspicuous macrotrichiae (about 8) on its entire length; tip of R_2 entirely preserved, all but the distal third with dense trichiae; cell M_1 about twice its petiole.

Male hypopygium (Fig. 22) with the eighth tergite very narrow, telescoped beneath the seventh tergite. Ninth tergite and sternite fused into a ring, the caudal margin of the former produced caudad into a

median chitinized beak, the extreme apex slightly decurved, acute, resembling the beak of a bird of prey. Eighth sternite produced caudad into a broad, flattened, tongue-like median lobe that is margined with conspicuous yellow setae. Basistyle complete, the caudal margin rounded and fringed with very short setulae. Dististyles arising from the ventral portion of the basistyle, flattened, the apex expanded into a head, the anterior margin of which is further produced into a blunt beak, the posterior margin fringed with short, inconspicuous setulae; from the mesal surface of these styli, a conical pale lobe juts ventrad, its surface covered with conspicuous setae. Caudal portion of the region of the ninth sternite somewhat triangularly produced, the apex provided with long coarse setae.

The rich representation of lower forms of Diptera that were contained in the single block of amber containing the types of *Tipula falco* has been discussed in the introduction to this paper.

Tipula graciosa, Meun.

1906. *Tipula graciosa* Meunier; Mon. Tipulidae Ambre Baltique, pp. 391—392, pl. 15, fig. 11 (antenna ♂), fig. 12 (wing).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 5600, ♂, selected as lectotype; the same block of amber contains a second more fragmentary ♂ that is made a paratype. Meunier's second number (Geol. Inst., No. 2667) is in poor condition but does not seem to be conspecific with the lectotype. Another ♂ (Geol. Inst., No. 5588), determined by Meunier as *T. media.*

The wing-venation of the lectotype is shown in Fig. 23. The abnormal wing figured by Mrs. Meunier is from the paratype specimen, a tiny adventitious cell being cut off from the base of cell *1st* M_2 by an adventitious crossvein connecting veins M_{1+2} and M_{3+4}.

Male hypopygium (Fig. 24) with the ninth tergite broad, the median area produced slightly caudad into a low, obtusely rounded lobe. Basistyle partially fused with the tergite, the suture straight but incomplete. Ninth sternite (Fig. 25) profoundly notched beneath, the basistyle separated from it by a long suture, almost as in the case of the tergite. Outer dististyle a pale, broadly flattened lobe, the apex shallowly emarginate; inner dististyle terminating in a slender, finger-like lobe that ends in about three slender pencils of bristles, the surface of the style with additional appressed setae.

Tipula handlirschiana, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♀, holotype.

FEMALE. — Length about 9 mm.; wing 11.5 mm.

Frontal prolongation of the head relatively stout, the nasus distinct. Last segment of palpi very long, more than one-half the length of the antenna. Antennae of moderate length, if bent backward extending about to the wing-root; flagellar segments subcylindrical, the outer segments slightly enlarged at base and here provided with four or five verticils, the longest exceeding the segment in length.

Legs long and slender; tibiae a little longer than the femora; tarsi about one-half longer than the tibiae; tibial spurs slender. Wings (Fig. 26) with a faint brownish tinge; stigma oval, darker brown. All of the cells in the distal two-fifths of the wing with conspicuous macrotrichiae, as indicated by dots in the figure; stigma hairy. Venation: R_{2+3} straight; basal section of R_2 longer than usual, nearly vertical; outer section of R_2 preserved; vein R_3 long, toward the tip directed rather strongly toward the wing-apex; petiole of cell M_1 short; *m-cu* on M_4 immediately beyond its origin; Cu_2 longer than in any other Tipulid known to the writer, paralleling vein Cu_1 for its whole length and attaining the wing-margin; cell *2nd A* of moderate width.

The type would seem to represent a female with the valves of the ovipositor short and fleshy as in certain groups of *Tipula* (as the *collaris* group) and in *Macromastix*. The tergal valves (Fig. 27) are short, cylindrical, fleshy, provided with conspicuous setae; sternal valves somewhat more compressed, the tips narrowly subacute. The species is dedicated to the distinguished authority on Palaeoentomology, Dr. Anton Handlirsch.

Tipula scudderiana, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype.

MALE. — Length about 8.5 mm.; wing 9 mm.; antenna nearly 4 mm.

Frontal prolongation of the head relatively short, the nasus long and slender. Antennae relatively long, if bent backward extending approximately to the base of the abdomen; flagellar segments with a conspicuous basal enlargement that is provided with about four long verticils; segments beyond the verticils a little constricted; surface of the segments with abundant erect pale setae.

Wings (Fig. 28) relatively long and narrow, the cells beyond the cord with conspicuous macrotrichiae, these becoming fewer in number

Fig. 24

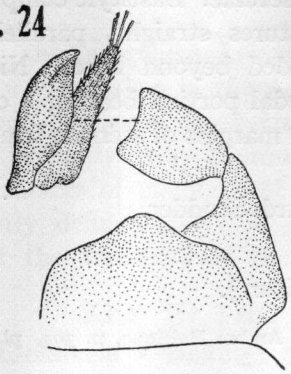
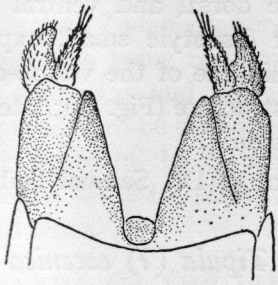


Fig. 25



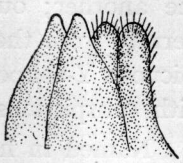


Fig. 27

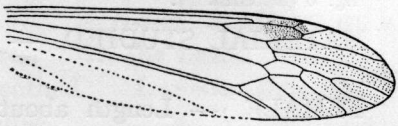


Fig. 28

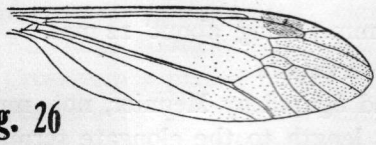


Fig. 26

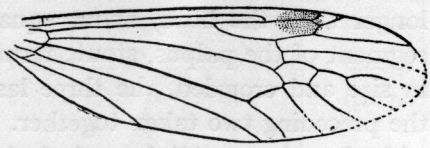


Fig. 31

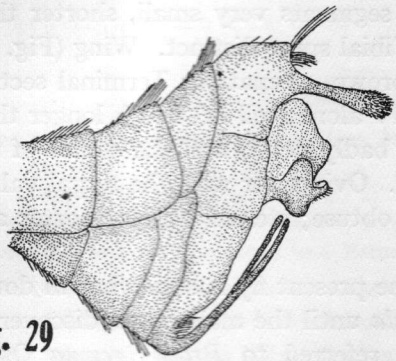


Fig. 29

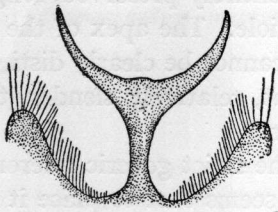


Fig. 30

in the medial cells where they are more abundant in the apical portions of the wing; no macrotrichiae in cells R_1, R or M. Venation: Sc_2 ending shortly beyond midlength of the relatively short Rs; cell *1st* M_2 somewhat variable in shape, the second section of M_{1+2} and the basal section of M_3 longest; m about one-fourth the length of the petiole of cell M_1.

Male hypopygium (Fig. 29) greatly incrassated, this enlargement involving abdominal segments seven to nine inclusive; apices of tergites five to nine with a brush of conspicuous setae near the median line. Lateral angles of ninth tergite produced caudad into relatively slender rods that are directed caudad, their tips slightly incurved and weakly

expanded, the apex of each with microscopic setulae. Basistyle complete or virtually so, the dorsal and ventral sutures straight, paralleling one another; outer dististyle small, expanded beyond base. Ninth sternite from the mid-line of the ventro-caudal portion bearing a conspicuous Y-shaped structure (Fig. 30); lateral margins of sternite fringed with conspicuous setae.

Named in honor of Dr. Samuel Hubbard Scudder.

Tipula (?) *eocenica* (Meun.).

1906. *Brachypremna eocenica* Meunier; Mon. Tipulidae Ambre Baltique, p. 394, pl. 16, fig. 6 (antenna ♀).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 7910, ♀, holotype.

FEMALE. — Length about 14 mm.; wing about 12 mm.

The fly is in a fair state of preservation.

The antennae are as described and figured by Meunier, not much longer than the head, about equal in length to the elongate terminal segment of the palpus, stout; terminal flagellar segments much reduced in size and crowded, the three last segments very small, shorter than the preceding two taken together. Tibial spurs distinct. Wing (Fig. 31) with the stigma well-defined, dark brown. Venation: Terminal section of R_2 entirely preserved, longer than r alone; cell M_1 much longer than its petiole. The apex of the wing is badly flexed and the course of the veins cannot be clearly distinguished. Ovipositor with the tergal valves straight, relatively slender, the tips obtuse; sternal valves shorter and stouter.

The strict generic reference of the present fly is somewhat in doubt but it seems best to place it in *Tipula* until the male sex is discovered. Under no circumstances can it be referred to *Brachypremna* Osten Sacken, as was done by Meunier.

Subfamily Limoniinae.

The Amber Limoniinae includes representatives of five tribes, the Limoniini (*Limonia*), Hexatomini (*Palaeopoecilostola, Tanysphyra, Trichoneura, Pseudolimnophila, Limnophila, Tanymera, Pilaria, Elephantomyia*), Pediciini (*Tricyphona*), Eriopterini (*Dasymolophilus, Ormosia, Erioptera, Empeda, Rhabdomastix, Gnophomyia*) and Styringomyiini (*Styringomyia*) being so represented. The generic names in parentheses indicate the most characteristic genera in the Amber.

Tribe Limoniini.

The four genera, *Limonia, Helius, Thaumastoptera* and *Dicranoptycha,* have been taken in the Amber, each being the type of a distinct subtribe. *Limonia* is especially abundant and characteristic, and there are probably many additional species to be discovered. The hypopygial characters of members of this genus in the Amber are in most cases poorly defined and chief reliance must be placed upon the venation and the structure of the antennae.

KEY TO THE GENERA OF THE LIMONIINI.

1. Cross-vein *r* lacking; rostrum of moderate length, approximately as long as the head. ..... *Helius* St. Farg. (p. 42)
   Cross-vein *r* present; rostrum shorter than the head. 2
2. Antennae 14-segmented; claws toothed. *Limonia* Meig. (p. 35)
   Antennae 16-segmented; claws simple. 3
3. Cross-vein *r* placed before midlength of R_{2+3}; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; *m-cu* more than its own length before the fork of *M*. *Thaumastoptera* Mik. (p. 41)
   Cross-vein *r* at near two-thirds the length of R_{2+3}; cell *1st* M_2 closed; *m-cu* beyond the fork of *M*. ..... *Dicranoptycha* O. S. (p. 40)

Limonia Meigen.

1800. *Amphinome* Meigen; Nouv. Class. Mouch., p. 15 (*nomen nudum,* preoccupied in Annelida).
1803. *Limonia* Meigen; Illiger's Mag., 2: 262.
1818. *Limnobia* Meigen; Syst. Beschr. Zweifl. Ins., 1: 116.
1850. *Ataracta* Loew; Bernstein und Bernsteinfauna, p. 38.

Besides the five species considered as valid and described below, two additional names have been proposed for Amber species of the genus. *Limonia deleta* (Giebel) (Ins. Vorwelt, p. 246; 1856) is unrecognizable and probably does not represent a true member of the genus. *Limonia grandis* (Meunier) (Miscell. Ent., 7: 172; 1899) must be held as being unrecognizable from Meunier's description although the type-specimen (Königsberg Mus., No. 14470 VI 8310) may still be extant and serve to validate the name. Loew (Bernstein, etc., p. 38; 1850) believed that he could differentiate eight distinct species of his supposed new genus *Ataracta,* a synonym of *Limonia.*

KEY TO THE AMBER SPECIES OF LIMONIA MEIGEN.

1. *Sc* elongate, ending beyond midlength and usually near two-thirds the length of *Rs*. 2

Sc relatively short, ending before midlength and usually near one-third the length of *Rs*. 4

2. Cross-vein *m-cu* long and sinuous; (male antennae with the basal two flagellar segments rounded, the succeeding segments oval; segments with short apical pedicels). *L. sinuata* (Meun.) (p. 39)
Cross-vein *m-cu* straight. 3

3. Flagellar segments short-oval to oval, with distinct apical pedicels; wings with *Rs* and the basal section of R_{4+5} in alignment. *L. lobata* (Meun.) (p. 37)
Flagellar segments elongate-oval to truncate-fusiform, without apical pedicels; wings with *Rs* and the basal section of R_{4+5} in oblique alignment. ..... *L. meunieri*, sp. n. (p. 36)

4. Flagellar segments all elongate-oval, without glabrous apical pedicels. *L. graciosa* (Meun.) (p. 39)
Flagellar segments one to six with the lower face strongly produced, each segment terminating in a short glabrous pedicel. *L. flagellata*, sp. n. (p. 38)

Limonia meunieri, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 451, ♂, holotype.

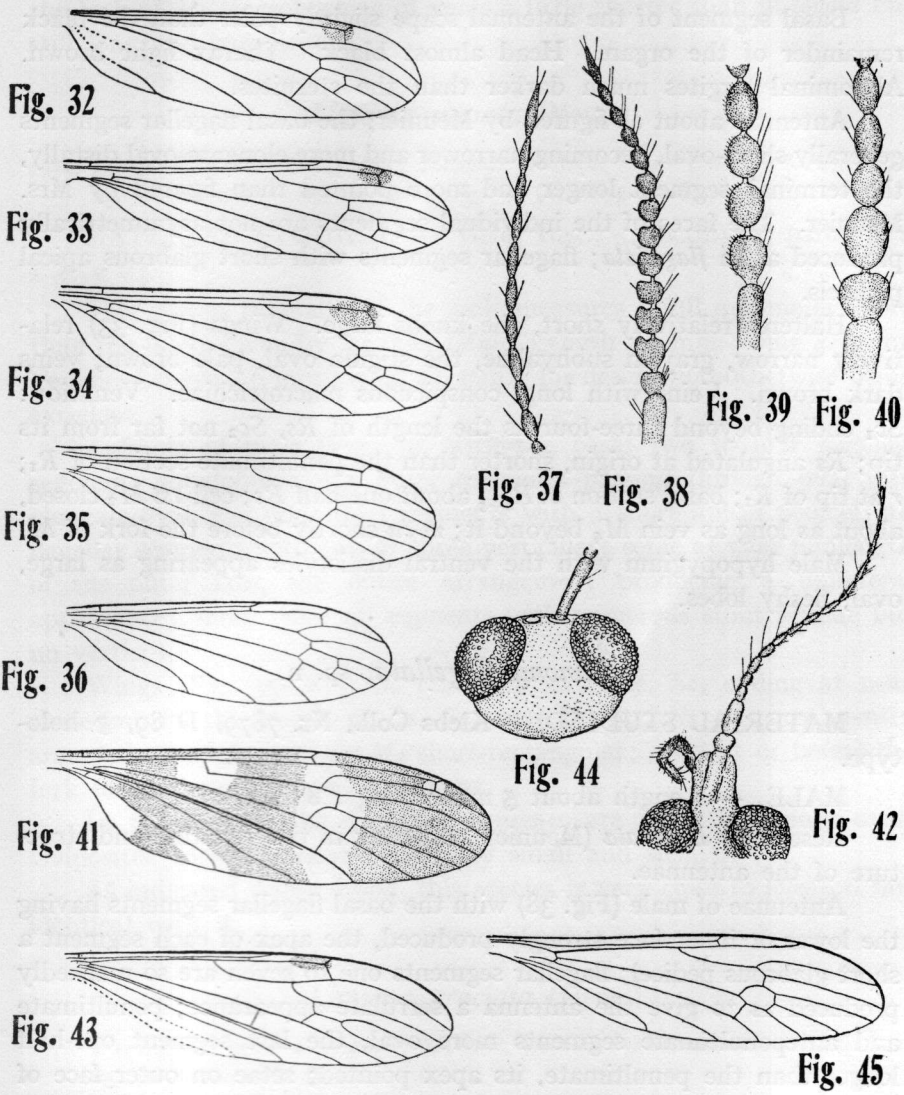
MALE. — Length about 6.8 mm.; wing 7.2 mm.

Antennae relatively long, the flagellar segments (Fig. 37) elongate-oval to truncate-fusiform, not at all produced laterally and without apical pedicels although the extremities of the segments are glabrous; segments gradually narrowed outwardly; flagellar segments four to eleven nearly equal to one another in length, the terminal segment one-half longer than the penultimate, strongly pointed at tip.

Wings (Fig. 32) subhyaline, the short-oval stigma brown; veins dark brown. Venation: *Sc* elongate, Sc_1 ending about opposite three-fourths the length of *Rs*, Sc_2 not far from its tip; *Rs* nearly in alignment with the basal section of R_{4+5} and more than twice the length of the latter; *r* at tip of R_1 and near one-third the length of R_{2+3}; cell 1*st* M_2 relatively short, the veins beyond it correspondingly elongated, all longer than the cell; *m-cu* at the fork of *M*.

Male hypopygium with the ventral dististyles elongate-oval.

Limonia meunieri is named in honor of Fernand Meunier, authority on the Amber Diptera. It is a large and vigorous species, nearly black in color, with the eyes of the male above contiguous or nearly so.



Limonia lobata (Meun.).

1906. *Dicranomyia lobata* Meunier; Mon. Tipulidae Ambre Baltique, p. 363, pl. 12, fig. 1 (antenna ♂), fig. 2 (hypopygium ♂).

MATERIAL STUDIED. — Klebs Coll., No. K 64, ♂, lectotype. All other specimens indicated by Meunier as being this species are uncertain; Klebs Coll., No. 2151; Geol. Inst. Coll., Nos. 2791, 5410, 6698 and 8015, all ♂♂. Most of these show the sinuous *m-cu* cross-vein of *L. sinuata* (Meun.) and are doubtfully identical with the lectotype.

Basal segment of the antennal scape slightly paler than the black remainder of the organ. Head almost black. Thorax light brown. Abdominal tergites much darker than the sternites.

Antennae about as figured by Meunier, the basal flagellar segments generally short-oval, becoming narrower and more elongate-oval distally, the terminal segment longer and more pointed than figured by Mrs. Meunier. The faces of the individual segments are not asymmetrically produced as in *flagellata*; flagellar segments with short glabrous apical pedicels.

Halteres relatively short, the knobs large. Wings (Fig. 33) relatively narrow, grayish subhyaline, the stigma oval, pale brown; veins dark brown. Veins with long, conspicuous macrotrichiae. Venation: Sc_1 ending beyond three-fourths the length of *Rs*, Sc_2 not far from its tip; *Rs* angulated at origin, shorter than the penultimate section of R_1; *r* at tip of R_1; basal section of R_{4+5} about one-half *Rs*; cell *1st* M_2 closed, about as long as vein M_4 beyond it; *m-cu* shortly before the fork of *M*.

Male hypopygium with the ventral dististyles appearing as large, oval, fleshy lobes.

Limonia flagellata, sp. n.

MATERIAL STUDIED. — Klebs Coll., Nr. 7879, D 89, ♂ holotype.

MALE. — Length about 5 mm.; wing 4.8 mm.

Resembles *L. lobata* (Meunier), differing in the venation and structure of the antennae.

Antennae of male (Fig. 38) with the basal flagellar segments having the lower or inner face strongly produced, the apex of each segment a short glabrous pedicel; flagellar segments one to seven are so markedly produced as to give the antenna a serrulate appearance; penultimate and antepenultimate segments more oval, the last segment one-half longer than the penultimate, its apex pointed; setae on outer face of flagellar segments paired, much longer than the single seta on the inner face. Rostrum produced, more than one-half the length of the head; head and its appendages dark throughout.

Wings (Fig. 34) subhyaline; stigma oval, pale brown; veins dark brown. Wings broader than in *L. lobata*, the cells being correspondingly wider. Venation: *Sc* relatively short, Sc_1 ending just before midlength of *Rs*, Sc_2 about one-half the length of Sc_1; *Rs* nearly three times the basal deflection of R_{4+5}; *r* at tip of R_1; cell *1st* M_2 short-rectangular, about two-thirds the length of vein M_4 beyond it; *m-cu* at or just beyond

the fork of *M*. Macrotrichiae of veins a little shorter than in *lobata* but still long and conspicuous.

Limonia sinuata (Meun.).

1916. *Dicranomyia sinuata* Meunier; Zeitschr. Deutsch. Geol. Gesell., 68: 490—491, fig. 30 (antenna ♂), fig. 31 (wing), fig. 32 (hypopygium ♂).

MATERIAL STUDIED. — Geol. Inst., ♂, lectotype; paratypes, 1 ♂, 2 ♀♀.

This species is small but the male measures a full millimeter more than the figure given by Meunier (Male, Length 3.5 mm.; wing 4.3 mm. Female, Length 4.6 mm.; wing 4.6 mm.), his description otherwise being excellent.

Antenna of male (Fig. 39) with the basal two to four flagellar segments subglobular, the outer segments passing through oval into elongate-oval, the individual segments with a short apical pedicel; all flagellar segments with two or three verticillate setae at near midlength of the outer face, the entire arrangement producing a unilateral appearance; inner face of segments with numerous stout setulae but no verticils.

Wings (Fig. 35) with *Sc* relatively elongate, Sc_1 ending at near three-fourths the length of *Rs*, Sc_2 near its tip; *Rs* elongate, gently arcuated at origin; cell *1st* M_2 short-rectangular; *m-cu* at or before the fork of *M*, long and gently sinuous.

In the female, the flagellar segments are more uniformly oval. Ovipositor with the valves relatively small and slender.

As indicated under *lobata*, this species is very close to *lobata* if not identical with it.

Limonia graciosa (Meun.)

1916. *Dicranomyia graciosa* Meunier; Zeitschr. Deutsch. Geol. Gesell., 68: 489—490, fig. 28 (antenna ♂), fig.. 29 (wing).

MATERIAL STUDIED. — Geol. Inst., ♂, holotype.

MALE. — Length about 6.5 mm.; wing 6.3 mm.

As in the case of the last-mentioned species, the present fly is larger than indicated by Meunier, the abdomen of the unique type being flexed back across the thoracic sternum.

Antennae (Fig. 40) with the basal flagellar segments subglobular, the remaining segments passing through oval to elongate-cylindrical, the segments not provided with terminal pedicels.

Wings (Fig. 36) with a strong brownish tinge, the veins dark brown. Venation: *Sc* relatively short, Sc_1 ending near one-third the length of *Rs*, Sc_2 about twice its length from the tip of Sc_1; *Rs* gently angulated at origin; *m-cu* straight, about equal to the distal section of Cu_1, placed shortly beyond the fork of *M*.

Dicranoptycha Osten Sacken.

1859. *Dicranoptycha* Osten Sacken; Proc. Acad. Nat. Sci. Philadelphia, for 1859: 217.

The genus *Dicranoptycha* includes a score of described recent species, of which 11 are Nearctic, 5 Ethiopian and 4 Palaearctic. The discovery of a species in the Amber was of exceptional interest.

Dicranoptycha electrina, sp. n.

MATERIAL STUDIED. — Geol. Inst., ♂, holotype (Ex Mus. Stantien & Becker, No. 428).

MALE. — Length about 8 mm.; wing 7.5 mm.

General coloration in Amber shiny black, in living individuals presumably with a pruinosity.

Rostrum and palpi black. Antennae 16-segmented (Fig. 42) the basal segments of the flagellum cylindrical, nearly as long as the succeeding two taken together, the remaining segments becoming more elongated; all segments with conspicuous verticils, the longest arranged unilaterally, approximately three times the length of the segment bearing them. Genae with conspicuous erect black setae.

Legs black; middle tibiae exceeding the middle femora; posterior tibiae shorter than the posterior femora. Wings (Fig. 41) dark brown with a restricted light yellow pattern, distributed as follows: Base of wing, both before and beyond the arculus but not including cell *C*; Anal angle of wing in the basal half of cell *2nd A*; wing-margin at end of vein *2nd A*; a large rectangular area at origin of *Rs*, including the space between veins *R* and *M*; a conspicuous cross-band at the cord, completely traversing the wing; a small circular spot beyond the stigma with *r* as a center; cell *C* somewhat paler than the remaining dark color of the wing; veins dark brown, paler in the yellowish areas. Macrotrichiae well-distributed on the veins but apparently lacking on vein *2nd A*. Venation: Sc_1 ending just before the fork of *Rs*, Sc_2 near its tip and about twice its length; *Rs* long, angulated to weakly spurred at origin, in alignment with R_{4+5}; R_{2+3} nearly perpendicular at origin; *r* less than its own length from the tip of R_1 and on R_{2+3} at near two-thirds the length; the latter vein beyond it bent toward the wing-tip;

vein R_{2+3} and the outer section of R_{4+5} generally parallel throughout their entire extent; *r-m* beyond midlength of cell *1st* M_2; basal section of M_{1+2} strongly arcuated; *m* only about one-third the length of the outer deflection of M_3, veins M_{1+2} and M_3 thus being approximated at origin; inner end of cell *1st* M_2 a trifle more proximad than the inner end of cell R_3; *m-cu* at near two-thirds the length of cell *1st* M_2; vein *1st A* with the distal third sinuous.

The beautiful wing-pattern readily distinguishes the Amber *Dicranoptycha* from all of the existing species of the genus.

Thaumastoptera Mik.

1866. *Thaumastoptera* Mik; Verh. zool.-bot. Ges. Wien, 16: 302.

The only described living species of the genus is the type, *Thaumastoptera calceata* Mik, with a wide distribution in the Western Palaearctic Region. A second species, *undulata* Ckll. and Haines, is found in the Gurnet Bay beds. The fly described as *T. aldabrensis* Edwards (Trans. Linn. Soc. London, Zoology, 15, part 2:205; 1912) is not a member of the genus but belongs to the subgenus *Ptilostena* Bergroth of *Gonomyia* Meigen. The discovery of a species of *Thaumastoptera* in the Amber is of especial interest. *T. electra* differs from *calceata* in the uniformly darkened legs and details of venation.

Thaumastoptera electra, sp. n.

MATERIAL STUDIED. — Fritsch Coll., No. 43, ♀, holotype.

FEMALE. — Length about 4.5 mm.; wing 4.5 mm.

General coloration light yellowish brown, the legs uniformly infuscated.

Rostrum short, the palpi of moderate length, the terminal segment about one-half longer than the stouter third segment. Antennae short, the basal segment elongate-cylindrical; basal flagellar segments somewhat shortened and crowded, the terminal segments passing into oval, the last segment smaller than the penultimate; verticils of moderate length only, more numerous on the basal flagellar segments. Head (Fig. 44) short and broad; anterior vertex wide, only a little narrower than the eye; eyes beneath barely contiguous at a single point.

Legs with relatively long and conspicuous suberect setae; claws long, smooth. Wings (Fig. 43) subhyaline, the stigma present but small and narrow, pale brown; veins darker brown. Venation: *Sc* of moderate length, Sc_1 extending to about opposite two-thirds the length of *Rs*,

Sc_2 vaguely distinct, apparently lying near two-thirds the length of the distance beyond the origin of *Rs*; *Rs* gently arcuated, in alignment with R_{2+3}, the two taken together forming a long, sinuous curve to the wing-tip; *r* close to tip of R_1 and about one and one-half times its length beyond the fork of *Rs*; basal deflection of R_{4+5} sinuous; *r-m* a trifle shorter than the basal deflection of M_{1+2}; petiole of cell *2nd* M_2 relatively short, a little longer than *m-cu*; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; *m-cu* a little less than twice its length before the fork of *M*; Cu_2 extending to some distance beyond *m-cu*. The length of vein *2nd A* cannot be stated since the anal margin of the wing is badly folded but it is apparently much longer than in the case of the genotype, *T. calceata*.

Ovipositor with the tergal valves long and slender, acute.

Helius St. Fargeau.

1825. *Helius* St. Fargeau; Encycl. Meth., Ins., 10, Index: 831.
1830. *Rhamphidia* Meigen; Syst. Beschr. Zweifl. Ins., 6: 281.

Loew (Bernstein, etc., p. 37; 1850) recognized four species of this genus in the Amber, two of which he named but did not characterize sufficiently to validate the names. The larger species, *H. pulcher*, was later re-described by Meunier; the smaller, *H. minutus*, has not been re-discovered and is not considered further in the present report.

Helius pulcher (Meun.).

1906. *Rhamphidia pulchra* Meunier; Mon. Tipulidae Ambre Baltique, p. 364, pl. 12, fig. 3 (antenna ♂), fig. 4 (head ♂).
1906. *Antocha succinea* Meunier; *Ibid.*, p. 367, pl. 12, figs. 8—10.

MATERIAL STUDIED. — Klebs Coll., No. 4265, 253, ♂, lectotype. Other specimens, No. 7602, M 181; Geol. Inst., 29325, ♂. The type of *Antocha succinea* is in the Klebs Coll., No. 4557, 1696.

Rostrum about as long as the head, the palpi at apex; fourth segment of palpi nearly as long as the preceding three taken together and more slender. Anterior vertex narrow, only a trifle wider than the rostrum.

Venation (Fig. 45): Sc_1 ending opposite midlength of *Rs*, Sc_2 at its tip; *Rs* moderately elongated; cell *1st* M_2 variable in shape, in the lectotype shorter than in the other specimens, being more nearly circular in outline, but differing slightly in shape on the two sides; proximal end of the cell greatly arcuated to feebly angulated, *r-m* placed beyond midlength of the cell; veins issuing from the cell relatively long, the elements closing the cell subequal in length; *m-cu* placed from one-third to near midlength of cell *1st* M_2.

As stated above, *Antocha succinea* is a synonym of *H. pulcher*. The rostrum of the type is of normal length but the head is bent at such an angle that this length is not readily apparent unless the specimen is held at an angle. The basal segments of the antennae are not readily discernible in this type. As indicated before, the genus *Antocha* must be removed from the Amber fauna.

Tribe Hexatomini.

The Amber Hexatomini show a great range of primitive and extinct genera. All of the existing sub-tribes seem to occur with the exception of the Ularia and Gynoplistaria. The Epiphragmaria include certain types that did not survive the Oligocene (*Palaeopoecilostola, Electrolabis, Tanysphyra*), with others that occur at the present time (*Trichoneura, Phyllolabis, Austrolimnophila*). The Pseudolimnophilaria and Dactylolabaria are represented by their typical genera. The Limnophilaria includes *Limnophila, Tanymera* and *Pilaria*. The Hexatomaria includes *Eriocera* and *Hexatoma*. Besides the above, certain aberrant Hexatomine genera occur, as *Elephantomyia* and *Polymera*.

KEY TO THE GENERA OF THE HEXATOMINI.

1. Antennae with not more than 11 segments. 2
   Antennae with either 15 or 16 segments. 3
2. Cell *1st* M_2 open, only two branches of Media reaching the wing-margin. ..... *Hexatoma* Latr. (p. 84)
   Cell *1st* M_2 closed, three or four branches of Media reaching the wing-margin. ..... *Eriocera* Macq. (p. 85)
3. Rostrum elongate, more than one-half the length of the body. *Elephantomyia* O. S. (p. 87)
   Rostrum short, not exceeding the head in length. 4
4. Cell *1st* M_2 open by the atrophy of *m*. *Polymera* Wied. (p. 83)
   Cell *1st* M_2 closed 5
5. R_{2+3} elongate, as long as or longer than R_2 alone. 6
   R_{2+3} shorter than R_2 alone. 8
6. *m-cu* at the fork of *M*. ..... *Electrolabis*, g. n. (p. 58)
   m-cu beneath cell *1st* M_2. 7
7. *r* short, transverse. ..... *Palaeopoecilostola* Meun. (p. 44)
   r long, oblique in position. ..... *Trichoneura* Lw. (p. 54)
8. *m-cu* at the fork of *M*. 9
   m-cu beneath cell *1st* M_2. 10

9. Ovipositor with normal valves. ..... *Dactylolabis* O. S. (p. 59)
Ovipositor with lateral fleshy lobes.
Dactylolabis; Subg. *Idiolabis*, subg. n. (p. 59)

10. Anterior arculus lacking. 11
Anterior arculus preserved. 14

11. Cell M_1 and r lacking. ... *Phyllolabis* O. S. (p. 52)
Cell M_1 and r preserved. 12

12. Wings handsomely pictured. .....*Austrolimnophila* Alex. (p. 51)
Wings unmarked except for the stigma or scattered spots on the veins. 13

13. Antennae elongate, with scattered setae. *Tanysphyra* Lw. (p. 49)
Antennae short, with sparse verticillate setae.
Pseudolimnophila Alex. (p. 62)

14. *m-cu* near the outer end of cell *1st* M_2; lower face of the individual flagellar segments protuberant. ..... *Tanymera*, g. n. (p. 75)
m-cu not close to the outer end of cell *1st* M_2; flagellar segments not protuberant. 15

15. *Sc* short, ending before the fork of *Rs*; r at or close to the fork of R_{2+3}; flagellar segments with long, conspicuous verticils.
Pilaria Sint. (p. 80)
Sc generally longer, extending to opposite or beyond the fork of *Rs*; r on R_2 far beyond the fork; antennal verticils usually short. 16

16. Veins R_2 and R_3 generally short and not running parallel to one another for most of their length; R_2 straight or nearly so; cell R_2 at wing-margin wider than cell *2nd* R_1; where more nearly equal, cell R_2 is sessile or nearly so. .... *Limnophila* Macq. (p. 70)
Veins R_2 and R_3 long, running parallel for most of their length; R_2 more or less sinuous; cell R_2 at wing-margin equal to or narrower than cell *2nd* R_1. ..... *Pseudolimnophila* Alex. (p. 62)

Palaeopoecilostola Meun.

1899. *Palaeopoecilostola* Meunier; Bull. Soc. Ent. France, 1899: 334, fig. (wing).

In 1899, Meunier proposed the new generic term *Palaeopoecilostola* without describing or nominating a type-species. In his "Monograph" (1906) he sunk his name as a synonym of *Lasiomastix* Osten Sacken. I now propose to resurrect this name since the genus has nothing in common with *Lasiomastix*, falling, rather, in the subtribe Epiphragmaria. The various species of this group had apparently been placed by Loew in *Cylindrotoma*.

The characters upon which Meunier based his group are: (1) The lack of *r* which is apparent rather than real; (2) The elongate basal deflection of M_3, with a corresponding reduction to complete obliteration of *m*, which, when preserved, assumes an oblique rather than a transverse position, this shifting of veins giving the appearance of vein M_{1+2} leaving cell *1st* M_2 at the outer cephalic angle.

The group is a valid one, distinguished from related genera in the Epiphragmaria by the very extensive R_{2+3} which is longer than R_2 alone. The pre-arcular space is shorter than in the allied genus *Tanysphyra* Loew. In addition to the genotype, *P. longicornis* (Meun.), I place here two additional species (*speciosa, fastuosa*) that had been placed in *Limnophila* by Meunier. Moreover Meunier's *Limnophila robusta* is here held to be the female sex of *P. longicornis*. It may be stated that the genus *Palaeopoecilostola* is amply distinguished from *Lasiomastix*, wherein it was sunk by Meunier, by the lack of the anterior arculus (Fig. 47) and the glabrous apical cells of the wings.

Characters of the genus:

Antennae elongate (longest in *longicornis*, shorter in *speciosa* and *fastuosa*), 16-segmented (only 15-segmented in *fastuosa*). In the typical condition (*longicornis*), the segments are elongate-cylindrical, clothed with a delicate erect pubescence, and with two or three subbasal verticils; on flagellar segment one (Fig. 53), the longest verticil is beyond midlength of the segment, but on the succeeding segments all verticils are placed shortly beyond the base; terminal flagellar segment small. Wings (Figs. 46—52) with Sc_1 ending approximately opposite or slightly beyond the fork of *Rs*, Sc_2 close to its tip; *Rs* strongly arcuated to angulated and feebly spurred at origin; R_{2+3} elongate, in alignment with *Rs*, more or less arcuated to nearly straight; *r* at tip of R_1 and on R_2 shortly beyond its origin; inner ends of cells R_3, R_5 and *1st* M_2 in transverse or slightly oblique alignment; cell M_1 present, except in *fastuosa*; *m* short to entirely obliterated, the outer deflection of M_3 correspondingly lengthened; *m-cu* near or beyond midlength of cell *1st* M_2; anterior arculus lacking. Male hypopygium (*longicornis*, Fig. 54) with the ninth tergite large, narrowed distally, the caudal margin truncated, narrowly notched medially. Basistyles slender, the dististyles terminal in position; dististyle more or less dilated at apex, the outer margin fringed with conspicuous setae.

GENOTYPE. — *Palaeopoecilostola longicornis* Meun. (Lower Oligocene Baltic Amber).

KEY TO THE SPECIES OF PALÆOPŒCILOSTOLA MEUN.

1. Antennae 15-segmented; cell M_1 lacking.
P. fastuosa (Meun.) (p. 49)
Antennae 16-segmented; cell M_1 present. 2
2. Antennae (♂) relatively short, if bent backward extending about to the base of the abdomen. ..... *P. speciosa* (Meun.) (p. 48)
Antennae (♂) elongate, if bent backward extending to near midlength of the abdomen; in the ♀ extending to shortly beyond the base of the abdomen (*longicornis*). 3
3. Wings with R_2 shorter than R_{2+3}, veins R_2 and R_3 diverging, cells *2nd* R_1 and R_2 at wing-margin being approximately equal in width.
P. longicornis longicornis (Meun.) (p. 46)
Wings with R_2 long, approximately equal to R_{2+3}, veins R_2 and R_3 running generally parallel to the wing-margin, cell *2nd* R_1 at wing-margin approximately twice as wide as cell R_2.
P. longicornis parallela, subsp. n. (p. 48)

Palæopœcilostola longicornis (Meun.).

1899. *Palæopœcilostola* Meunier; Bull. Soc. Ent. France, 1899: 334, fig. (wing).
1906. *Lasiomastix longicornis* Meunier; Mon. Tipulidae Ambre Baltique, pp. 377—378, pl. 13, fig. 14 (antenna ♂).
1906. *Limnophila robusta* Meunier; *Ibid.*, pp. 383—384, pl. 14, fig. 8 (antenna ♀).

MATERIAL STUDIED. — Klebs Coll., No. 4511, 9, ♂, holotype of *longicornis*; No. 248; No. 1832, ♂, determined by Meunier as *robusta*. Geol. Inst. Coll., Nos. 4576 and 9594, 2 ♀♀, types of *robusta*; No. 6370, ♀.

The holotype of *longicornis* has the wings strongly infumed, the stigma not darkened, the veins a little deeper in color than the membrane (Fig. 46). Thoracic pleura darker than the notum. Abdominal tergites dark brown, the sternites bicolorous, the basal half or more of the individual segments being conspicuously paler than the tips. Antennae dark brown throughout, the structure as described under the genus (Fig. 53); antennae elongate, in the ♂ extending to opposite midlength of the abdomen, in the ♀ to the second abdominal segment.

Trichiation: Strong macrotrichiae on all the wing-veins beyond the cord and on the primary longitudinal veins except the angulated base of *Rs* and the basal portions of veins *M*, *Cu* and *A*.

Male hypopygium (Fig. 54) with the tergite as described under the generic characterization. Basistyles slender; outer dististyle slender, the inner style triangularly dilated, its apex produced into a slender, obtusely

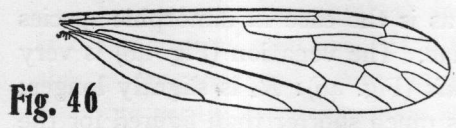


Fig. 46

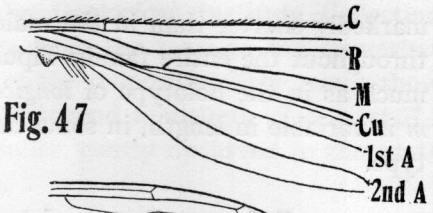


Fig. 47

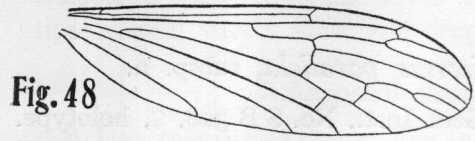


Fig. 48

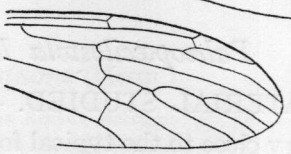


Fig. 49

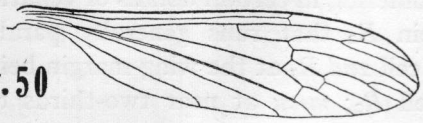


Fig. 50

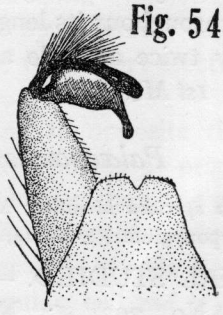


Fig. 54

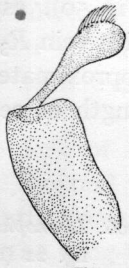


Fig. 55

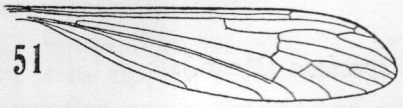


Fig. 51

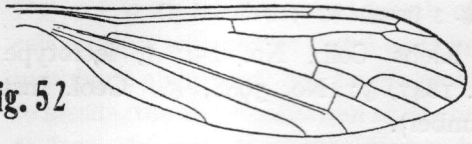


Fig. 52

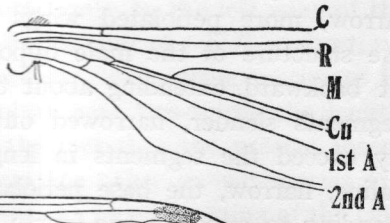


Fig. 57

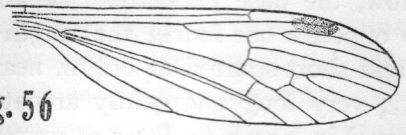


Fig. 56


Fig. 53

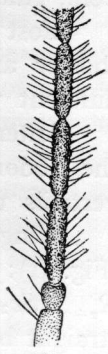


Fig. 58

pointed beak, the outer margin with a dense brush of long yellowish setae.

The female, No. 6370 (Fig. 49) is very interesting in the petiolated cell *2nd* M_2, the outer deflection of M_3 completely closing cell *1st* M_2 and fusing for a short distance with the penultimate section of M_{1+2}, the petiole of cell *2nd* M_2 thus being the fused vein $M_{1+2+}M_3$.

Limnophila robusta must be considered as being the female of *longicornis*. In the lectotype of *robusta* (No. 4576) the antennae are

markedly shorter than in the male, as is the case in dimorphic species throughout the entire family Tipulidae. The venation (Fig. 48) is very much as in the holotype of *longicornis* (Fig. 46): R_2 is slightly longer; *m* is variable in length, in some cases much shorter than figured for the type.

Palæopœcilostola longicornis parallela, subsp. n.

MATERIAL STUDIED. — Geol. Inst., No. S B 328, ♀, holotype.

Very close to the typical form, differing in certain details of venation (Fig. 50), especially the longer vein R_2 that runs generally parallel with vein R_3 throughout its length, cell *2nd* R_1 at the wing-margin being approximately twice as wide as cell R_2; *m-cu* at near two-thirds the length of cell *1st* M_2.

Palæopœcilostola speciosa (Meun.).

1906. *Limnophila speciosa* Meunier; Mon. Tipulidae Ambre Baltique, p. 384, pl. 13, fig. 22 (hypopygium ♂), pl. 14, fig. 3 (wing), fig. 4 (antenna ♂).

MATERIAL STUDIED. — Klebs Coll., No. 25, ♂, lectotype; No. 263, ♂; No. 293, ♂; No. 1847, ♂; No. 3988, ♂. Geol. Inst. Coll., Allotype ♀; ♂ (without number).

Most closely allied to *P. longicornis* (Meun.), differing in the shorter antennae, the narrow, more petiolated wings with slightly different venation, and the structure of the male hypopygium.

Antenna of ♂, if bent backward, extending about to the base of the abdomen; flagellar segments slender, narrowed outwardly, with verticils that very slightly exceed the segments in length.

Wings grayish subhyaline, narrow, the base petiolate. Venation (Fig. 51): *Sc* long, Sc_1 extending to opposite one-fourth the length of R_{2+3}, Sc_2 at its tip; *Rs* angulated and short-spurred at origin, nearly straight beyond this angulation; R_{2+3} very long and gently arcuated, longer than R_2 and approximately equal in length to R_3; *r* at extreme tip of R_1 and at midlength of the short R_2; R_3 with the distal two-fifths deflected strongly toward the wing-tip; inner ends of cells R_3, R_5 and *1st* M_2 in approximate alignment; cell M_1 a trifle shorter than its petiole; *m-cu* near midlength of cell *1st* M_2; cell *2nd A* long and narrow.

Abdomen relatively long and slender. Male hypopygium (Fig. 55) somewhat as shown by Meunier; outer dististyle longest, narrowed at base, at apex dilated into a broad, flattened spatula, the outer margin of which is provided with long setae; inner dististyle small and apparently simple, not bifid as shown by Meunier.

The female (no number) in the Geological Institute Collection is designated as allotype. It differs from the male in the somewhat shorter antennae and the structure of the ovipositor. The wings show *Rs* more gently arcuated; *m-cu* at or beyond midlength of cell *1st* M_2. Ovipositor with the tergal valves slender, gently upcurved to the acute tips; sternal valves short and deep.

Palæopœcilostola fastuosa (Meun.).

1906. *Limnophila fastuosa* Meunier; Mon Tipulidae Ambre Baltique, pp. 384—385, pl. 14, fig. 5 (antenna ♂), fig. 6 (wing apex), fig. 7 (hypopygium ♂).

MATERIAL STUDIED. — Klebs Coll., No. 90, ♂, holotype.

Antennae 15-segmented, as stated by Meunier; flagellar segments subcylindrical, a little enlarged basally, with short erect setae and subbasal verticils.

Wings (Fig. 52) with Sc_1 extending to opposite the fork of *Rs*, Sc_2 at its tip; *Rs* angulated and weakly spurred at origin, beyond the angulation nearly straight and a little longer than the gently arcuated R_{2+3}; *r* at tip of R_1; apical fourth of R_3 deflected toward the wing-tip, cell R_2 thus widened at distal end; inner ends of cells R_3, R_5 and *1st* M_2 in oblique alignment; cell *1st* M_2 rectangular; cell *2nd* M_2 short-petiolate to sessile, the outer deflection of M_3 fusing with M_{1+2} for a short distance to form this petiole, obliterating *m* in its course (compare also Fig. 49, *longicornis* variation). In the left wing of the type there appears at the wing-margin in the apex of cell R_5 a short, persistent portion of vein M_1, indicating that the fly, in some specimens if not normally, may retain cell M_1; *m-cu* at near two-thirds the length of cell *1st* M_2.

Despite the fact that the present insect has but 15 antennal segments, whereas the other known species of the genus possess 16 such segments, there can be no question of the close affinities of all the species concerned. Meunier placed this species in Loew's group *Tanymera* which is certainly incorrect. Meunier states and figures *fastuosa* as lacking *r* which is likewise incorrect. Mrs. Meunier's figure of *fastuosa* is curiously faulty in showing *two* subcostal veins, a condition unknown in any insect and not indicated in any manner by the holotype.

Tanysphyra Loew.

1850. *Tanysphyra* Loew; Bernstein und Bernsteinfauna, p. 36.

The genus *Tanysphyra* is here credited to Loew, who briefly indicated the generic characters in the key and mentioned by name the type species, *gracilis* (l. c., p. 38). Meunier placed this group in the synonymy of *Limnophila*, by which action the type-species, *gracilis*,

became a homonym of *L. gracilis* Wiedemann (1828). Because of this apparent conflict, Cockerell (1909) proposed a new name, *L. meunieri*, for the Amber species. Strictly speaking there is no good basis for the latter name if the genus *Tanysphyra* is recognized as valid. However, since this confusion in specific names occupied the literature for so long a period, it seems best to adopt the last-proposed name.

Characters of the genus:

Antennae (Fig. 58) 16-segmented, elongate in the ♂; flagellar segments elongate-cylindrical, with conspicuous erect setae scattered over the surface of the segments, the setae arising from small tubercles; flagellar segments gradually decreasing in size and length outwardly; terminal segment small, dilated at apex, less than one-third the length of the penultimate. Antennae of ♀ shorter, the verticils a little more conspicuous among the erect surface setae. Head relatively broad, not conspicuously narrowed behind.

Pronotum not conspicuously enlarged. Wings (Fig. 56) relatively narrow; all longitudinal post-arcular veins with conspicuous macrotrichiae. Venation: *Sc* relatively short, Sc_1 ending opposite the fork of *Rs*, Sc_2 at its tip; *Rs* moderately elongate, arcuated to feebly angulated at origin; *r* at tip of R_1 and shortly beyond one-third the length of the long R_2; R_{2+3} equal to or shorter than the basal section of R_2; veins R_2 and R_3 elongate, generally parallel for their entire length; inner ends of cells R_3, R_5 and *1st* M_2 in transverse alignment; cell M_1 deeper, usually much deeper than its petiole, in some cases the latter shorter than *m-cu*; *m-cu* at or beyond midlength of the lower face of cell *1st* M_2; anterior arculus lacking; prearcular region (Fig. 57) relatively extensive, *h* lying far before the arculus.

Ovipositor with the tergal valves elongate, gently upcurved to the acute tips; sternal valves shorter and deeper, the tips fimbriate.

GENOTYPE. — *Tanysphyra meunieri* (Cockerell) (*gracilis* Lw., preoccupied). (Lower Oligocene — Baltic Amber).

Tanysphyra meunieri (Ckll).

1850. *Tanysphyra gracilis* Loew; Bernstein und Bernsteinfauna, p. 38.

1906. *Limnophila gracilis* Meunier; Mon. Tipulidae Ambre Baltique, pp. 382—383, pl. 14, fig. 9 (antenna ♂).

1909. *Limnophila meunieri* Cockerell; Amer. Journ. Sci., (4) 27: 58.

MATERIAL STUDIED. — Klebs Coll., No. 236, 138; No. 262; No. 245, ♀, allotype; No. 365; No. 1848, etc. Geol. Inst. Coll., No. 2322, ♂; No. 4068, 2 ♂♂, in a single block; No. 16800, ♂; No. 27455, ♀; etc.

This interesting crane-fly is common in the Amber.

Allotype, ♀, — Length about 5.5 mm.; wing 5.3 mm.

Antennae of male elongate, equal to or a little shorter than the abdomen alone; flagellar segments (Fig. 58) cylindrical, segments two and three subequal in length, the following segments gradually and insensibly shortened to the end of the organ; segments with dense erect setae and sparse, slightly stouter verticils, over the whole surface. In the female, the antennae are shorter, not much longer than the combined head and thorax; flagellar segments fusiform, gradually decreasing in length and diameter outwardly, the long, coarse setae present but not over-topping the verticils which are slightly longer; terminal segment about one-third the penultimate. Vertex broad.

Wings (Figs. 56, 57) with a faint brownish tinge; stigma elongate-oval, brown. Macrotrichiae of veins long and abundant. Venation: Sc_1 ending just opposite the fork of Rs, Sc_2 at its tip; Rs about one-half longer than the less arcuated R_{2+3}; cell *1st* M_2 gently widened distally; M in alignment with M_{3+4}.

Ovipositor with the tergal valves darker than the sternal valves.

No. 365 is a male with paler wings and slightly shorter antennae but is apparently conspecific.

Austrolimnophila Alex.

1865. *Polymoria* Philippi; Verh. zool.-bot. Ges. Wien, 15: 608 (in part).
1920. *Austrolimnophila* Alexander; Arkiv för Zoologi, 13, Nr. 6: 4—5.

The genus *Austrolimnophila*, originally proposed for a Patagonian species, is now known to be extensively developed in Australia and New Zealand. A single Amber species, *A. elegantissima* (Meun.), is referred to this genus with some hesitation, although the location is probably correct.

Austrolimnophila elegantissima (Meun.).

1906. *Limnophila* (*Dactylolabis*) *elegantissima* Meunier; Naturaliste, 28: 104, fig.

MATERIAL STUDIED. — Klebs Coll., No. 375, ♂, holotype. Zool. Mus., Berlin, a fragmentary ♂.

A strikingly beautiful fly with a wing-pattern that reverses the usual pattern of the Epiphragmaria; the cord, origin of Rs, outer end of cell *1st* M_2, tip of R_1 and other regions of the wing that are usually surrounded by a dark pattern are here surrounded by the pale ground-color. A similar condition is found in the case of *Dicranoptycha electrina*.

Antennae pale yellow, short, if bent backward not attaining the wing-root; flagellar segments subcylindrical with elongate verticils that exceed in length the segments that bear them.

Legs rather uniformly darkened, the segments with rather conspicuous elongate setae. Wings (Fig. 59) ample, whitish subhyaline, with a handsome brown cross-banded pattern that is darker in the costal, subcostal and radial fields: a subbasal spot in cells *C* and *Sc* just beyond *h*; a cross-band before the origin of *Rs* and another beyond this origin, these connected in cells *M* and *Cu*, to form an H-shaped figure before the cord; beyond the cord a broad dark band that leaves an oval pale area at the outer end of cell *1st* M_2, this broad band narrowly connected in cell R_3 and along vein M_3 with a narrow transverse subapical dark band; wing-apex broadly pale. Venation: *Sc* long, Sc_1 ending opposite the fork of R_{2+3}, Sc_2 longer than Sc_1; *Rs* moderately long, angulated at origin; R_{2+3} a trifle longer than *m-cu*; *r* at the extreme tip of R_1 and beyond midlength of the long R_2; cell M_1 longer than its petiole; *m-cu* about one-half its length beyond the fork of *M*; vein *2nd A* terminating shortly before the origin of *Rs*; anterior arculus apparently weakly preserved.

The second specimen mentioned above differs from the type in a few minor details. In the venation, Sc_1 is fully three times the length of Sc_2 and strongly curved; R_2 more strongly arcuated at origin; inner end of cell *1st* M_2 more strongly arcuated; *m-cu* more than its length beyond the fork of *M*.

Phyllolabis O. S.

1850. ? *Calobamon* Loew; Bernstein und Bernsteinfauna, p. 36.
1877. *Phyllolabis* Osten Sacken; Bull. U. S. Geol. Surv., 3: 202.

The discovery of a species of *Phyllolabis* in Baltic Amber is of great interest. The only described species are four from Western North America and a fifth from Northern Europe. Mr. Edwards informs me that he has seen another undescribed species from the Himalayas. It seems highly probable that the name *Calobamon*, proposed by Loew, pertained to this genus but since no type species was described or mentioned the name must be considered as being a *nomen nudum*.

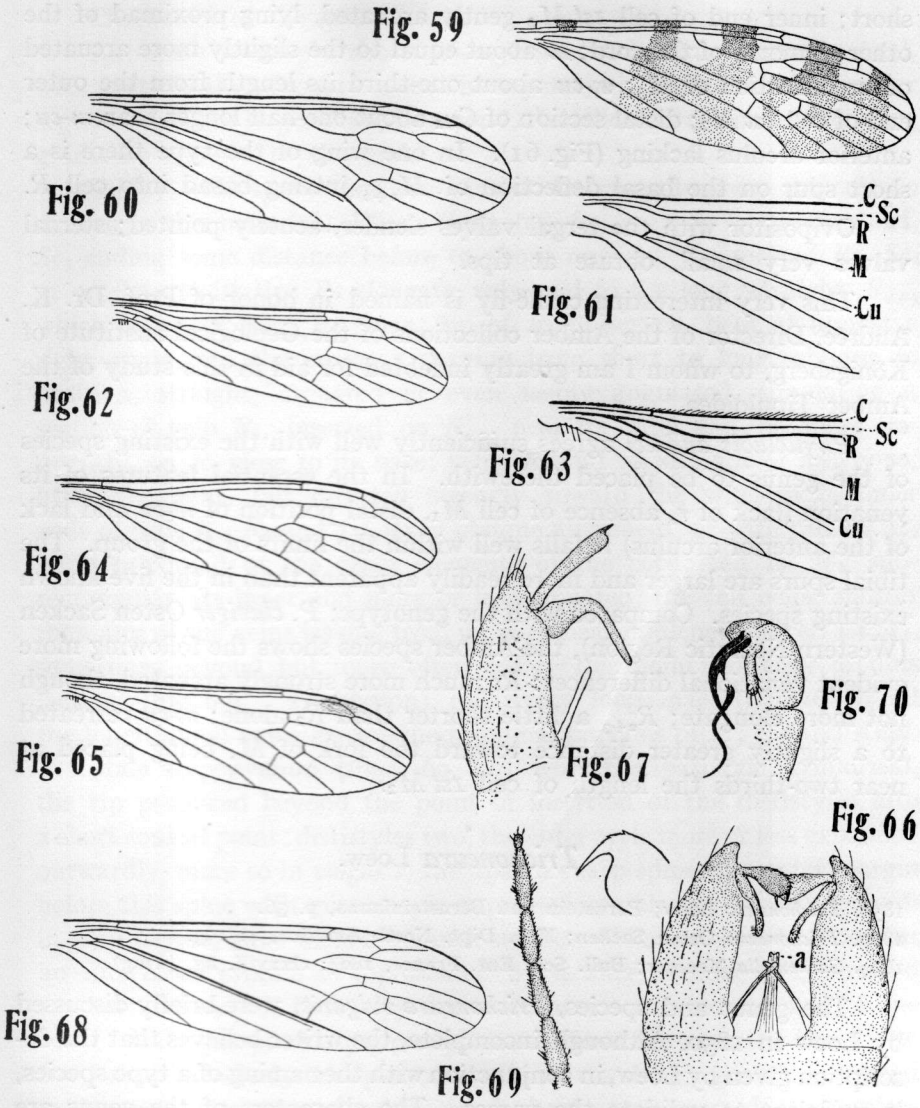
Phyllolabis andréei, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 27433, ♀, holotype.

Female. — Length 6 mm.; wing 7 mm.

General coloration in amber brownish black, including the legs and antennae; halteres paler. Wings with a whitish tinge, the stigma oval, pale brown; veins darker brown.

Antennae (♀) relatively short, if bent backward extending to about mid-distance between the roots of the wing and the halteres; flagellar



segments cylindrical, the first segment longest, the remaining segments gradually decreasing in length and diameter to the last; verticils short, placed near midlength of the segment, shorter than the segment bearing them.

Tibial spurs short but distinct. Wings (Fig. 60) with *Sc* long, Sc_1 ending near midlength of R_{2+3}, Sc_2 at near one-third the length of R_{2+3}; *Rs* short, strongly arcuated, about equal in length to the less arcuated R_{2+3}; R_2 and R_3 generally parallel; basal deflection of R_{4+5}

short; inner end of cell *1st* M_2 gently arcuated, lying proximad of the other elements of the cord; *m* about equal to the slightly more arcuated outer deflection of M_3; *m-cu* about one-third its length from the outer end of cell *1st* M_2; distal section of Cu_1 about one-half longer than *m-cu*; anterior arculus lacking (Fig. 61). In one wing of the type there is a short spur on the basal deflection of M_{1+2} jutting basad into cell *R*.

Ovipositor with the tergal valves slender, acutely pointed; sternal valves very small, obtuse at tips.

This very interesting crane-fly is named in honor of Prof. Dr. K. Andrée, Director of the Amber collections of the Geological Institute of Königsberg, to whom I am greatly indebted for aid in this study of the Amber Tipuloidea.

Phyllolabis andréei agrees sufficiently well with the existing species of the genus to be placed therewith. In the essential features of its venation (lack of *r*, absence of cell M_1, distal position of *m-cu* and lack of the anterior arculus) it falls well within the limits of the group. The tibial spurs are larger and more readily apparent than in the five known existing species. Compared with the genotype, *P. claviger* Osten Sacken (Western Nearctic Region), the Amber species shows the following more evident venational differences: *Rs* much more strongly arcuated, though not more elongate; R_{2+3} a little shorter than R_2 alone; *m-cu* retreated to a slightly greater distance toward the fork of *M*, being placed at near two-thirds the length of cell *1st* M_2.

Trichoneura Loew.

1850. *Trichoneura* Loew; Bernstein und Bernsteinfauna, p. 36.
1869. *Trichoneura* Osten Sacken; Mon. Dipt. North America, 4: 193.
1894. *Sackeniella* Meunier; Bull. Soc. Ent. France, 1894: clxxviii, fig. (wing).

The genus and species, *Trichoneura vulgaris*, were briefly discussed by Loew in 1850. Although incomplete, the writer believes that the description given by Loew, in conjunction with the naming of a type species, is sufficient to validate the names. The characters of the genus are well-defined, with some of the features pointing toward *Palaeopoecilostola* Meunier and *Phyllolabis* Osten Sacken, especially the elongate R_{2+3} and the broken arculus. Until very recently the genus was supposed to be confined to the Baltic Amber but Edwards (Rec. Ind. Mus., 26: 301; 1924) has made the surprising discovery that *Lechria nepalensis* Brunetti is a member of the genus, still living in the Himalayas of Nepal. The venation, as interpreted by Edwards, is certainly correct and was described briefly but clearly by Osten Sacken in his paper above cited.

Characters of the genus:

Antennae relatively short, 16-segmented; flagellar segments oval, with verticils that do not exceed the segments in length; basal flagellar segment one-half larger than the second, the following segments becoming gradually smaller to the end.

Tibiae with spurs that are present but usually very difficult to discern in this material. Wings (Figs. 62—65) with *Sc* relatively short, Sc_1 ending some distance before to about opposite the fork of *Rs*, Sc_2 at or close to its tip; *Rs* elongate, subequal to the long, straight R_{2+3} which is longer than R_2 alone; tip of R_1 preserved, bent at almost a right angle into the costa; *r* varying from short to long, oblique in position, straight, arcuated or even feebly angulated, simulating a section of vein R_1, inserted on R_{2+3} near its outer end, or, more frequently, on R_2 close to its base; veins R_2 and R_3 straight or nearly so, little divergent, but directed strongly toward the wing-apex; inner ends of cells R_3, R_5 and *1st* M_2 in oblique alignment, or with cell *1st* M_2 lying proximad of the other elements of the cord; cell *1st* M_2 subrectangular, its inner end more or less arcuated, the cell being shorter than any of the veins issuing from it; *m-cu* near midlength of cell *1st* M_2, sometimes beyond but more often before this point; anterior arculus lacking (Fig. 63). Trichiation: Relatively long macrotrichiae on all the longitudinal veins except the proximal portions of *M*, *Cu* and *Anal*.

Male hypopygium (Figs. 66, 67) with the basistyle cylindrical, the tip produced beyond the point of insertion of the dististyles into a short conical point; dististyles two, the outer style more or less expanded outwardly, more so in *vulgaris*, the apex a sharp spine, the outer margin before this spine with microscopic appressed spinulae in *vulgaris*, smooth in *gracilistylus*; inner dististyle much smaller. What appears to represent an interbasal process is represented by a long, slender rod, directed caudad and mesad, their tips decussate across the median line of the body. Aedeagus protruding conspicuously from between the basistyles. Ovipositor relatively elongate; tergal valves long, gently upcurved to the acute tips; sternal valves much shorter, compressed, their apices subacute.

GENOTYPE. — *Trichoneura vulgaris* Loew (Lower Oligocene — Baltic Amber).

KEY TO THE AMBER SPECIES OF TRICHONEURA LOEW. (MALES ONLY.)

1. Male hypopygium with the outer dististyle expanded at tip, terminating in an acute appressed spine, the outer margin microscopically

serrulate; inner dististyle not angularly bent near midlength. *T. vulgaris* Loew (p. 56)

Male hypopygium with the outer dististyle more slender, only slightly widened outwardly, terminating in an erect spine, the outer margin of the style smooth; inner dististyle angularly bent near midlength, the apex elongate. ..... *T. gracilistylus*, sp. n. (p. 57)

Trichoneura vulgaris Loew.

1850. *Trichoneura vulgaris* Loew; Bernstein und Bernsteinfauna, p. 37.
1906. *Trichoneura* (*Sackeniella*) *vulgaris* Meunier; Mon. Tipulidae Ambre Baltique, pp. 386—387, pl. 14, fig. 13 (antenna ♂), fig. 14 (hypopygium ♂), pl. 15, fig. 4 (wing).
1906. *Trichoneura* (*Sackeniella*) *decipiens* Meunier; *Ibid.*, p. 387, pl. 15, fig. 5 (antenna).
1916. *Trichoneura vulgaris* Meunier; Deutsch. Geol. Gesell., 68: 492—493, fig. 35 (wing).
1916. *Trichoneura vulgaris prolifica* Meunier; *Ibid.*, 68: 492—493, fig. 36 (wing).

MATERIAL STUDIED. — Among the hundreds of specimens seen, the following are indicated, with their present location: Klebs Coll., Nos. 3, 16, 18, 21, 28, 31, 43, 49, 79, 80, 93, 121, 215, 242, 243, 271, 290, 292, 294, 325, 452, 541, 543, 564, 672, 951, 1818, 1822, 1825, 1829, 1838, 1840, 1845, 1849, 2572, 2764, 3890, 3973, 3983, 5601, 5602, 5745. Fritsch Coll., numerous specimens of both sexes. Geol. Inst. Coll., Nos. 324, 1068, 1638, 1646, 2071, 2232, 2348, 2625, 2633, 3033, 3855, 4350, 4392, 6117, 6429, 6453, 6796, 6821, 8670, 8771, 8805, and numerous additional unnumbered specimens. Geol. Inst. Coll., No. 3632, type of *decipiens* Meunier.

Crane-flies of this species are by far the commonest in the Amber fauna. The great majority of the specimens caught in the gum were males which were evidently entrapped while swarming beneath the succiniferous pines. In one small block of Amber (Klebs Coll., No. 543), measuring 18 × 12 × 6 mm., four males of this species were found.

The chief morphological features of *vulgaris* have been discussed under the generic characterization. Among the extensive series available for study, the following variations in venation are especially noteworthy:

Klebs, No. 80, a very large ♀ (wing, 5.4 mm.), has two adventitious crossveins in cell R_3, one near midlength of vein R_{2+3}, the other on R_3 just beyond its origin; a third crossvein in cell *2nd* M_2 near two-thirds the length; cell *1st* M_2 is shorter than is usual in the species.

Klebs, No. 290, ♂, adventitious crossvein near outer end of cell R_2 of right wing.

Klebs, No. 5745, ♂, in the left wing, cell *1st* M_2 is open by the atrophy of the outer deflection of M_3, the right wing being normal; *Sc* shorter than usual, Sc_1 ending some distance before the fork of *Rs*.

In the Geol. Inst. Coll. (ex Phys. Oek. Gesell., No. 14120 VI 8077) is a ♀ specimen that appears to have a faint brownish cloud on the basal deflection of R_{4+5} on both wings. More material of this fly would be of great interest.

Meunier proposed the name *decipiens* for a large female that shows no evident differences from other large females of the typical form. Still more recently he has proposed a new subspecies, *prolifica*, the type of which has not been seen by the writer. Meunier figures this race as differing from typical *vulgaris* in its venation, especially in having the tip of R_1 preserved, cell R_2 longer, being about equal to its petiole, cell *1st* M_2 slightly longer, and other minor details. The writer can detect no tangible differences between the two that hold in the great series available for study and has accordingly placed *prolifica* in the synonymy of the species. If the race is valid it must be defined in more exact terms. Loew (Bernstein, etc., p. 38; 1850) believed that he could recognize three additional varieties or species among his specimens and it is possible that such varieties exist. The range in all characters is so great that it has been impossible to fasten firmly upon definite characters for the separation of the species. In Figs. 62, 64 and 65, the range in the venation of the species is shown: Fig. 62 shows typical *vulgaris* with the small cell *1st* M_2, Fig. 64, the so-called variety *prolifica* with a longer cell. It may be noted that the character of the presence or absence of the tip of vein R_1, as used by Meunier, is more apparent than real.

Trichoneura gracilistylus, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 25, ♂, holotype. Geol. Inst. Coll., ♀, allotype; ♀, paratype.

MALE. — Length 5 mm.; wing 4.5 mm.

FEMALE. — Length 6 mm.; wing 6 mm.

Generally similar to *T. vulgaris* Loew, differing in the details of venation and the structure of the male hypopygium.

Wings (Fig. 65) nearly hyaline, the stigmal spot oval, brown, possibly accentuated by its preservation in Amber; veins slender, dark brown. Venation: Tip of R_1 preserved; *r* slightly angulated; inner end of cell *1st* M_2 greatly arcuated, lying far proximad of the other elements of the cord; *m-cu* beyond midlength of cell *1st* M_2.

Male hypopygium (Fig. 67) with the outer dististyle relatively slender, terminating in a small straight spine that lies along the axis of the style, not appressed to its tip; outer margin of style before this tip unarmed; inner dististyle long, strongly bent near midlength, the long apex straight.

Electrolabis, gen. n.

This new group is proposed for a curious fly from the Amber. The position of *m-cu* at the fork of *M* would seem to place this insect in the vicinity of *Dactylolabis*, from which it differs conspicuously in the venation of the radial field. The tibial spurs seem to be lacking but the position of the genus in the Hexatomini seems to be the correct one.

Characters of the genus:

Palpi moderately long, the third segment broad; terminal segment slender, about one-third longer than the penultimate. Antennae (Fig. 69) 16-segmented, stout, in the male with the flagellar segments subcylindrical, a little swollen basally, with short, stiff, inconspicuous verticils, arranged in a whorl just before midlength of the segment, on the more distal segments becoming more basal in position; terminal segment minute, button-like. Anterior vertex narrow.

Tibial spurs apparently lacking. Wings (Fig. 68) with *Sc* long, Sc_1 at or near the tip of Sc_2; *Rs* in alignment with R_{4+5}; R_{2+3} elongated, arcuated at origin, in direct alignment with R_3; R_2 relatively short, not longer than R_{2+3}, diverging widely from R_3, *r* placed at from one-fourth to one-third its length and about its own length from the tip of R_1; inner end of cell R_3 lying far proximad of the other elements of the cord, that of cell *1st* M_2 far before cell R_5; basal section of M_{1+2} strongly arcuated to feebly angulated; cell M_1 lacking; *m-cu* oblique in position, gently sinuous, at the fork of *M*; anterior arculus lacking, the posterior arculus at union with *M* rectangular.

Male hypopygium (Fig. 70) with the basistyles short and stout. Outer dististyle a slender, chitinized, needle-like spine, the tip acute, on the inner face before midlength with a smaller acute spine. Inner dististyle small, fleshy, claviform. What would appear to represent gonapophyses occur as slender, sinuous rods directed cephalad within the body, the two together appearing lyriform.

GENOTYPE. — *Electrolabis extincta*, sp. n. (Lower Oligocene — Baltic Amber).

Electrolabis extincta, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 308, ♂, holotype. Geol. Inst. Coll., ♂, paratype.

MALE. — Length about 6.5 mm.; wing 6.2 mm.

General coloration brown, the antennae dark brown; legs somewhat paler. Wings subhyaline; stigma very pale brown to almost lacking; veins pale brown.

Antennae moderately elongate, in ♂, if bent backward, extending to shortly beyond the base of the abdomen; first scapal segment cylindrical; flagellar segments gradually decreasing in size outwardly, the intermediate segments subequal in length; terminal segment (Fig. 69) reduced to a tiny button; penultimate segment a trifle longer than the antepenultimate.

Venation as discussed under the genus (Fig. 68): Sc_1 extending to opposite two-fifths the length of R_{2+3}, ending far before *r-m*; basal section of R_{4+5} nearly straight, one-third to one-half longer than *m-cu*.

Abdomen elongate. Male hypopygium moderately incrassated.

Dactylolabis Osten Sacken.

1859. *Dactylolabis* Osten Sacken; Proc. Acad. Nat. Sci. Philadelphia, 1859: 240.

No true members of the genus *Dactylolabis* had been described from the Amber. Meunier (Monograph, etc., 1906) described four species (*brevipetiolata, continuata, pulchripennis* and *concinna*) that he placed in *Dactylolabis* but with a wholly erroneous conception of the characters of the group. Any attempt to divide the various groups of *Limnophila* and allies on the relative lengths of cells R_2 and M_1, especially the latter, shows a very insufficient knowledge of the group. The basic character of the venation of *Dactylolabis* lies in the proximal position of the *m-cu* crossvein, at or close to the fork of *M*, a character quite ignored by Meunier. The four species above mentioned are distributed in the following groups in the present treatment: *brevipetiolata* and *pulchripennis* in *Limnophila, continuata* and *concinna* in *Pseudolimnophila*. An apparently true species of *Dactylolabis*, described below as *D. vetusta*, and a peculiar type that is characterized as a new subgenus, *Idiolabis*, were detected in Amber during the present study.

Idiolabis, subgen. n.

Characters nearly as in *Dactylolabis*, s. s., but distinguished by the very peculiar structure of the ovipositor.

Antennae 16-segmented, in the female, if bent backward, extending nearly if not quite to the base of the abdomen; flagellar segments elongate-oval, gradually decreasing in length outwardly, the terminal segment a little shorter than the penultimate; verticils relatively short and inconspicuous, the longest not equalling the segment that bears it. Last segment of the palpus a trifle longer than the third.

Tibiae spurred. Venation (Fig. 71): *Sc* long, Sc_1 extending to opposite two-thirds the length of R_{2+3}, Sc_2 nearly three times its own

length from the tip; *Rs* very long, in alignment with R_{2+3}, which, in turn, is in alignment with R_3; R_2 arising at an angle; *r* not far from tip of R_1 and shortly before midlength of R_2; *m-cu* at fork of *M*; cell *1st* M_2 large, *m* gently arcuated, outer deflection of M_3 nearly straight; cell M_1 a little longer than its petiole; vein *2nd A* ending shortly beyond the origin of *Rs*; anterior arculus preserved.

Ovipositor (Fig. 79) with the tergal valves gently upcurved, slender, the tips acute, laterally at base of the ninth segment subtended by a conspicuous fleshy lobe, these latter directed caudad and provided with conspicuous erect setae.

TYPE OF SUBGENUS. — *Dactylolabis* (*Idiolabis*) *terebrella*, sp. n. (Lower Oligocene — Baltic Amber).

Dactylolabis (*Idiolabis*) *terebrella*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 2779, ♀, holotype. Geol. Inst. Coll., No. S B 376, ♀, paratype.

FEMALE. — Length about 7 mm.; wing about 8 mm.

Antennae dark brown throughout, the segments separated by deep constrictions. Head strongly narrowed behind. Eyes with coarse ommatidia. General coloration, in Amber, of the head and thorax shiny black.

Wings ample, with a clear pale yellow tinge, the stigma apparently darker; veins delicate, dark brown. Venation as described under the subgeneric characterization. Short delicate macrotrichiae on all the longitudinal veins except near the wing-base. Costal and anal fringes of nearly equal length.

The peculiar ovipositor is diagnostic of the present species. Meunier had earlier examined the type-specimen and commented upon the peculiar genitalic structure but did not describe the species.

Dactylolabis, sensu strictu.

Dactylolabis (*Dactylolabis*) *vetusta*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 1830, ♀, holotype; No. 7811, 175, ♂, allotype. Geol. Inst. Coll., No. B 6649, ♀, paratype. Zool. Mus., Berlin, ♂, paratype.

MALE. — Length about 5 mm.; wing 6 mm.

FEMALE. — Length about 5.7 mm.; wing 6.3 mm.

General coloration brownish black, including the legs.

Antennae of moderate length, if bent backward extending to shortly beyond the wing-root; basal segment cylindrical; flagellar segments

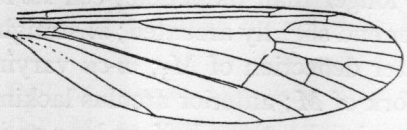


Fig. 71

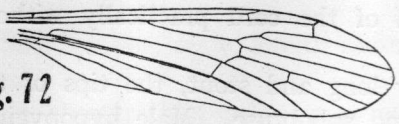


Fig. 72

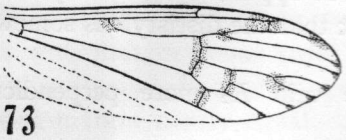


Fig. 73

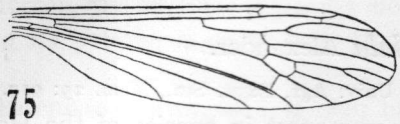


Fig. 75

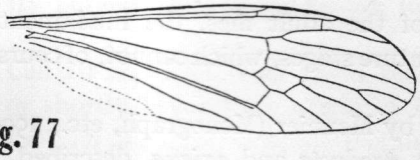


Fig. 77

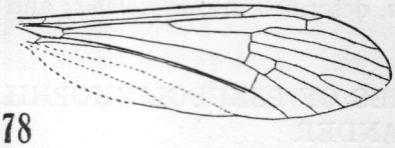


Fig. 78

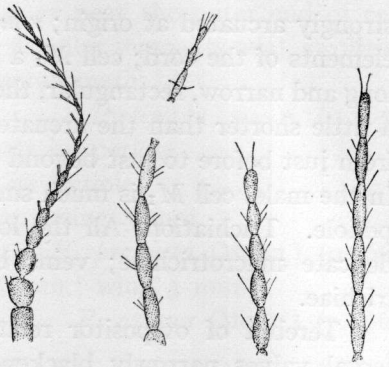


Fig. 81 Fig. 82 Fig. 83 Fig. 84

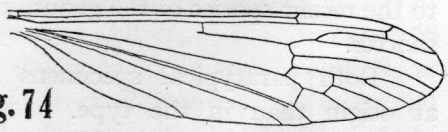


Fig. 74

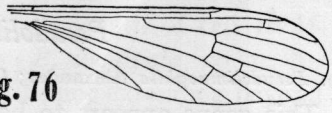


Fig. 76

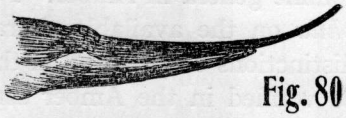


Fig. 80

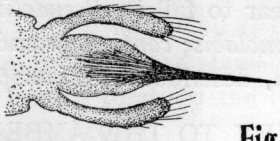


Fig. 79

oval, gradually decreasing in diameter to the end of the organ, the terminal segment one-half longer than the penultimate, pointed at the end; flagellar verticils relatively short and inconspicuous.

Tibial spurs relatively short and stout. Wings (Fig. 72) relatively long and narrow, subhyaline, the stigma not darker; veins pale brown. Venation: *Sc* long, Sc_1 extending to just before the end of R_{2+3}, Sc_2 a short distance from its tip; R_{2+3} nearly twice r, gently arcuated; r close to the tip of R_1 and just before midlength of R_2, the latter very

strongly arcuated at origin; *r-m* lying slightly more distad of the other elements of the cord; cell M_1 a little longer than its petiole; cell *1st* M_2 long and narrow, rectangular, the inner end slightly arcuated; *m* straight, a little shorter than the arcuated outer deflection of M_3; *m-cu* varying from just before to just beyond the fork of M; anterior arculus lacking. In the male, cell M_1 is much smaller, only about one-half as long as its petiole. Trichiation: All the longitudinal veins beyond the cord with delicate macrotrichiae; veins basad of the cord practically without trichiae.

Terebra of ovipositor relatively long and stout, the tips of the tergal valves narrowly blackened and subobtuse. Male hypopygium little visible in the available material but apparently generally similar to the recent species of the genus, except that the dististyle is somewhat shorter.

Both paratypical specimens have vein R_2 more perpendicular at origin than in the type.

Meunier had earlier determined the type as "*Prionolabis* n. sp.".

Pseudolimnophila Alexander.

1919. *Pseudolimnophila* Alexander; Cornell Univ. Agr. Expt. Sta., Mem. 25: 917.

This genus appears to be the commonest in species of the Hexatomine genera in Amber. *Pseudolimnophila* runs very close to *Limnophila* on the available characters of the adult flies, the fundamental distinctions being found in the immature stages, which cannot, of course, be verified in the Amber series.

The following species described by Meunier (Monograph, etc., 1906) appear to fall in *Pseudolimnophila*: *producta* and *exigua*, described in *Prionolabis*; *continuata* and *concinna*, described in *Dactylolabis*; and *vulcana*, described in *Limnophila*.

KEY TO THE AMBER SPECIES OF PSEUDOLIMNOPHILA ALEXANDER

1. Wings with conspicuous spots at the forks and crossveins.
P. loewiella, n. n. (p. 63)

   Wings without markings, other than the stigma when this is present. 2
2. *Rs* angulated and short-spurred at origin. 3

   Rs arcuated at origin. 4
3. Cell M_1 considerably longer than its petiole; *m-cu* near midlength of cell *1st* M_2; male antennae with basal flagellar segments elongate; terminal segment shorter than the penultimate.
P. vulcana (Meun.) (p. 64)

Cell M_1 about equal to its petiole; *m-cu* near the outer end of cell *1st* M_2; male antennae with the basal flagellar segments oval, swollen; terminal segment longer than the penultimate.

P. timida, sp. n. (p. 65)

4. Cell M_1 very small, less than one-half its petiole. 5
   Cell M_1 longer, more than one-half its petiole. 6
5. Size large; male, length about 5 mm.; wing 5 mm.

   P. producta (Meun.) (p. 66)

   Size smaller; male, length about 2.5 mm.; wing 3 mm.

   P. exigua (Meun.) (p. 66)
6. Sc_1 shorter than either *m-cu* or R_{2+3}. 7
   Sc_1 longer than either *m-cu* or R_{2+3}. 9
7. Veins R_2 and R_3 elongate, parallel for their entire length, cell *2nd* R_1 at wing-margin about twice as wide as cell R_2. 8
   Veins R_2 and R_3 shorter, gently diverging, cells *2nd* R_1 and R_2 at wing-margin nearly equal. ..... *P. pinicola*, sp. n. (p. 67)
8. Antennae elongate, in ♀, if bent backward, extending to base of abdomen, the flagellar segments elongate-fusiform; cell M_1 about equal to its petiole; *m-cu* at near two-thirds the length of cell *1st* M_2.

   P. inculpata, sp. n. (p. 68)

   Antennae shorter, in ♀, if bent backwards, not extending beyond the wing-root, the flagellar segments long-oval; cell M_1 about one-half its petiole; *m-cu* at or before midlength of cell *1st* M_2.

   P. continuata (Meun.) (p. 68)
9. Cell *1st* M_2 small; vein *2nd A* relatively short, ending about opposite or shortly beyond the origin of *Rs*. *P. continuata* (Meun.) (p. 68)
   Cell *1st* M_2 large, elongate-rectangular; vein *2nd A* elongate, extending to near midlength of *Rs*. .. *P. ambigua*, sp. n. (p. 70)

Pseudolimnophila concinna (Meunier) is omitted from the above key because of insufficient data. The writer was unable to study the type and cannot give any supplementary details of structure.

Pseudolimnophila loewiella, n. n.

1916. *Limnophila* (*Dactylolabis*) *concinna maculata* Meunier; Zeitschr. Deutsch. Geol. Gesellsch., 68: 491—492, fig. 33 (antenna, ♂), fig. 34 (wing); *nec Limnophila* (*Ephelia*) *maculata* (Meigen); *nec L.* (*Idioptera*) *maculata* (Macquart).

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype; ♀, allotype; ♂, No. 14897 VI 8662, ♂ No. 4446.

MALE. — Length about 7 mm.; wing about 7 mm.

FEMALE. — Length about 6 mm.; wing about 5.6 mm.

The wings (Fig. 73) are light yellow, with a conspicuous brown spotted pattern, distributed as follows: Tip of Sc_2, stigma, origin of *Rs*, along cord, fork of R_{2+3}, outer end of cell *1st* M_2 and fork of M_{1+2}; a series of marginal spots at ends of all the longitudinal veins, becoming progressively smaller posteriorly. Venation: *Rs* long, strongly arcuated at origin; R_{2+3} about one-half longer than the basal deflection of R_{4+5}; veins R_2 and R_3 long, running generally parallel to one another for their entire length; inner ends of cells R_3, R_5 and *1st* M_2; in transverse alignment; *m-cu* beyond midlength of the short-rectangular cell *1st* M_2; cell M_1 subequal to shorter than its petiole.

Male hypopygium with the dististyle appearing as a long, slender, chitinized rod, gently curved, the extreme tip shallowly bifid.

In the allotype ♀, cell *1st* M_2 is more elongate-rectangular than in the type. In No. 4446, the right wing shows an adventitious crossvein near the outer end of cell *2nd* M_2, connecting veins M_2 and M_3.

This fly, which is evidently specifically distinct from *P. concinna* (Meunier), is named in honor of the memory of Dr. Hermann Loew, eminent Dipterologist and pioneer student of the Amber Tipulidae.

Pseudolimnophila vulcana (Meun.)

1906. *Limnophila vulcana* Meunier; Mon. Tipulidae Ambre Baltique, p. 381, pl. 14, fig. 10 (antenna ♂).

MATERIAL STUDIED. — Klebs Coll., No. 4501, 191, ♂, holotype. Fritsch Coll., No. 7, ♂.

MALE. — Length about 6.5 mm.; wing about 6.6 mm.

Antennae (Fig. 82) of moderate length, if bent backward extending to shortly beyond the wing-root; flagellar segments subcylindrical, the ventral face of the individual segments a trifle more bulging, the verticils placed in a whorl shortly before midlength of the segment, the verticils shorter than the segments; terminal flagellar segment shorter than the penultimate.

Wings (Fig. 74) with a strong brownish tinge. The wings of the type are so badly folded and flexed in the Amber block that it is very difficult to note all the details of venation, which of necessity are here described in general terms only. Venation: *Sc* relatively elongate, Sc_1 ending approximately opposite the fork of *Rs*, Sc_2 at the tip of Sc_1; *Rs* elongate, angulated and spurred at origin, this spur fully half the length of the basal section of *Rs*; R_{2+3} relatively short, equal to or a trifle longer than *m-cu*; cell M_1 longer than its petiole; *m-cu* near midlength of cell *1st* M_2; anterior arculus *apparently* lacking.

The second male from the Fritsch Collection is apparently conspecific and furnishes us with a better view of the venation: Here veins R_2 and R_3 are more divergent than shown for the type, cell R_2 as a result being wider at the margin; *m-cu* at near three-fifths the length of cell *1st* M_2; cell M_1 about equal to its petiole; vein *2nd A* more strongly sinuous than figured; anterior arculus distinctly preserved.

The present species shows some features that suggest the genus *Tanymera*, discussed later.

Pseudolimnophila timida, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype; No. 2750, ♀, allotype.

MALE. — Length about 6 mm.; wing 6.2 mm.

FEMALE. — Length about 7 mm.; wing about 6 mm.

Antennae (Fig. 81) short, if bent backward scarcely attaining the wing-root; basal four or five flagellar segments oval, gradually decreasing in diameter, passing into the more cylindrical segments of the flagellum, these outer segments with long, conspicuous verticils; terminal flagellar segment tipped with three long setae, elongated, fully one-half longer than the penultimate segment.

Wings (Fig. 75) with *Sc* relatively short, Sc_1 ending opposite the fork of *Rs*, Sc_2 subequal to Sc_1; *Rs* angulated and short-spurred at origin, beyond the spur straight and in alignment with R_{2+3}, the latter straight, the slightly shorter basal deflection of R_{4+5} very gently arcuated; *r* about twice its length from the tip of R_1 and at near two-fifths the length of R_2; veins R_2 and R_3 elongate, gently diverging, especially the latter vein which is deflected rather strongly toward the wing-tip, cell R_2 being a little wider at wing-margin than cell *2nd* R_1; cell M_1 a trifle shorter than its petiole; cell *1st* M_2 small, subrectangular, *m-cu* at near three-fourths its length; anterior arculus entirely preserved.

Male hypopygium with the dististyles simple, the outer style narrowed to the gently curved apex; inner dististyle near midlength bent at about a right angle, the long apical portion gradually narrowed to tip. Ovipositor with the tergal valves long, gently upcurved.

P. timida agrees with *P. vulcana* (Meunier) in the angulated and spurred *Rs*, but differs conspicuously in the structure of the antennae and in the details of venation, especially the small cell *1st* M_2 and the relative length of cell M_1. Like the last species, *P. timida* shows certain features of the genus *Tanymera*, but seems to be placed better in *Pseudolimnophila*.

Pseudolimnophila producta (Meun.)

1906. *Prionolabis producta* Meunier; Mon. Tipulidae Ambre Baltique, pp. 376—377, p. 14, fig. 1 (wing).

MATERIAL STUDIED. — Klebs Coll., No. 93, ♂, holotype; No. 71, a pair *in copula*; No 1824, ♂. Geol. Inst. Coll., No. 2910, ♂; No. 8558 VI 5498, ♂.

Coloration of the body shiny polished black. Legs black throughout.

Antennae as described by Meunier, the verticils longer than the segments, conspicuous.

Wings (Fig. 76) grayish subhyaline, the stigma poorly defined; veins brownish black. Venation: Sc_1 ending from about opposite midlength of the short R_{2+3} to opposite the fork of *Rs*, Sc_2 at or slightly removed from the tip; *Rs* long, strongly arcuated at origin; *r* on R_1 from one to two times its length from the tip and on R_2 at from one-third to one-half the length; veins R_2 and R_3 long, generally parallel, weakly diverging apically; basal deflection of R_{4+5} varying from a little shorter to a little longer than *r-m* (the right wing of the holotype has this reduced to a length about equal to *m*, not completely obliterated as shown by Mrs. Meunier); inner ends of cells R_3, R_5 and *1st* M_2 in alignment; cell *1st* M_2 small, gently widened distally (in the right wing of the type somewhat smaller and deformed); cell M_1 very small, only about one-third its petiole; *m-cu* shortly before midlength of cell *1st* M_2; anterior arculus faintly indicated.

Klebs No. 71 shows a pair still *in copula*, agreeing well with the type except in the following regards: *Sc* ending opposite the fork of *Rs*, Sc_1 and Sc_2 subequal; inner ends of cells R_3, R_5 and *1st* M_2 in oblique alignment, the basal deflection of R_{4+5} being longer than the other elements, much longer than in the type; vein *2nd A* gently sinuous.

Klebs No. 1824 shows a male with the hypopygium well exposed: Basistyles elongate, subcylindrical; dististyles two, the outer slender, heavily blackened, the tip split into two acute points; inner dististyle longer and broader, appearing as a sparsely setiferous fleshy lobe.

The structure of the male hypopygium entirely precludes the placing of this species in *Prionolabis* Osten Sacken.

Pseudolimnophila exigua (Meun.)

1906. *Prionolabis exigua* Meunier; Mon. Tipulidae Ambre Baltique, p. 377, pl. 13, fig. 12 (antenna ♀), fig. 13 (wing).

1917. *Limnophila* (*Dactylolabis*) *exigua* Meunier; Neues Jahrb. Mineral., 1917: 98—99, pl. 15, fig. 17 (hypopygium ♂).

No specimens have been seen by the writer.

The type (♀) calls for a very small fly (length 2.5 mm.; wing 3 mm.). In his 1917 paper above cited, Meunier describes what he takes to be the male of the same species. He gives this as being considerably larger (Length 4 mm.) and there is much doubt as to the correct association of the sexes, or else his measurements as given for the female are too low. Cell M_1 of the wings is extraordinarily small, the petiole being some four to five times the length of the fork. In two males studied by Meunier, *r* was described as lacking. The hypopygium has the basistyles relatively stout; outer dististyle long and slender, gently curved, the extreme tip shallowly bifid; inner dististyle much stouter, fleshy.

Pseudolimnophila pinicola, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 22, ♀, holotype. Included by Meunier (Monograph, etc. p. 382; 1906) in the type series of *Pilaria elongata* (Meun.).

FEMALE. — Length about 8.8 mm.; wing about 7.3 mm.

General coloration dark, the abdominal tergites bicolorous, the apices of the segments being broadly pale. Antennae dark brown throughout. Wings with a strong brownish tinge; stigma scarcely darker; a very indistinct cloud at *r-m*; veins darker brown.

Antennae relatively short, if bent backward extending to shortly beyond the wing-root; basal segment cylindrical; flagellar segments oval, soon passing into elongate-oval; segments beyond the fourth or fifth slender; terminal segment a little longer than the penultimate; verticils of the basal flagellar segments short, becoming longer on the outer segments, on the intermediate segments being about one-half longer than the segments.

Pronotum massive. Venation (Fig. 77): Sc_1 ending opposite the fork of *Rs*, Sc_2 about twice its own length from the tip; *Rs* elongate, gently arcuated at origin; R_{2+3} short, varying from subequal to about one-third longer than the basal deflection of R_{4+5}; *r* about one and one-half times its length from the tip of R_1 and on R_2 at near one-third the length; vein R_2 long, gently sinuous; R_3 at apex directed strongly toward the wing-apex; inner ends of cells R_3, R_5 and *1st* M_2 in transverse alignment; cell M_1 approximately equal to its petiole; *m-cu* at near two-thirds the length of cell *1st* M_2; anterior arculus preserved.

In its general appearance, *P. pinicola* is closest to *P. vulcana* (Meunier), which differs in the spurred *Rs* and the positions of Sc_2 and *r*.

Pseudolimnophila inculpata, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 3080, ♀, holotype. Included by Meunier (Monograph, etc., p. 382; 1906) in the type series of *Pilaria elongata* (Meunier).

FEMALE. — Length about 7.5 mm.; wing 7.5 mm.

Antennae (Fig. 84) elongate, in the female, if bent backward, extending about to the base of the abdomen; basal flagellar segments elongate-oval, the remainder elongate-fusiform, the distal segments elongate-cylindrical, the verticils shorter than the segments.

Legs with conspicuous setae, especially the tibiae. Wings (Fig. 78) with *Sc* relatively short, Sc_1 ending shortly beyond the fork of *Rs*, Sc_2 some distance before this fork, Sc_1 alone shorter than either *m-cu* or R_{2+3}; *Rs* elongate, arcuated at origin; R_{2+3} short, a trifle longer than the basal deflection of R_{4+5}; veins R_2 and R_3 elongate, running generally parallel for their entire length; *r* rather faintly indicated, about twice its length or a little less from the tip of R_1 and before one-third the length of R_2; cell *2nd* R_1 at wing-margin very wide, more than twice R_2; *r-m* arcuated; cell *1st* M_2 relatively small, rectangular, *m-cu* near two-thirds its length; cell M_1 about equal to its petiole; anterior arculus preserved. The course or length of the Anal veins cannot be accurately determined in the unique type.

Ovipositor (Fig. 80) with the valves very long, especially the tergal valves which are gently upcurved to the subacute tips.

Pseudolimnophila continuata (Meun.).

1906. *Limnophila* (*Dactylolabis*) *continuata* Meunier; Mon. Tipulidae Ambre Baltique, p. 379, pl. 13, fig. 17 (antenna ♂), pl. 15, fig. 1 (hypopygium ♂).

MATERIAL STUDIED. — Klebs Coll., No. 4385, ♂, holotype. Geol. Inst. Coll., ♀, No. 3069, allotype.

The head and thorax appear to be of a polished black, any bloom that might have been present in the living insect having been destroyed.

Antennae (Fig. 83) as figured by Meunier except that the verticils are considerably longer, exceeding the segments in length.

Venation (Fig. 85): Sc_1 ending opposite the origin of R_2; *Rs* relatively elongate, gently arcuated at origin; R_{2+3} a trifle longer than the basal deflection of R_{4+5}, both comparatively short; basal section of R_2 a little longer than the terminal section of R_1; veins R_2 and R_3 long, generally parallel, vein R_2 tending to be slightly arcuated beyond midlength; inner ends of cells R_3, R_5 and *1st* M_2 in alignment; cell *1st* M_2

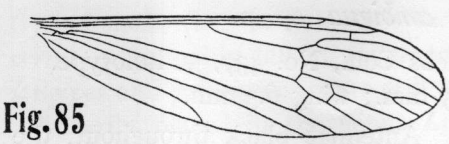


Fig. 85

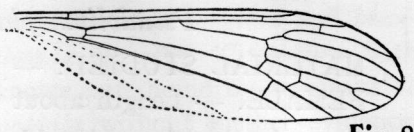


Fig. 86

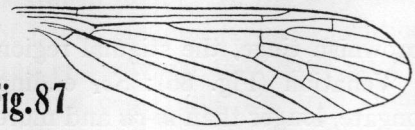


Fig. 87

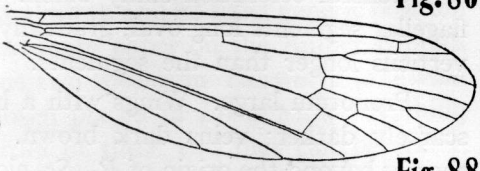


Fig. 88

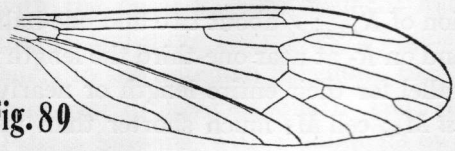


Fig. 89

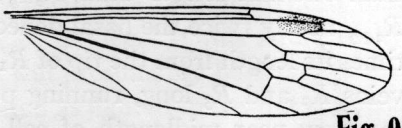


Fig. 90

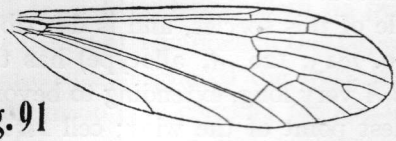


Fig. 91

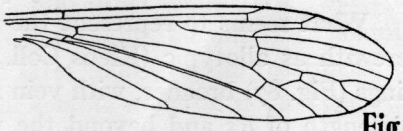


Fig. 92

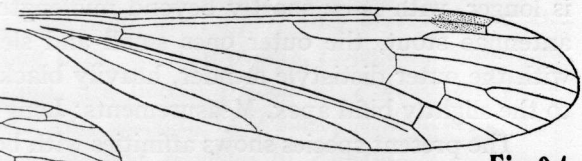


Fig. 94

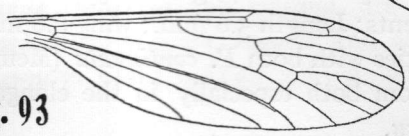


Fig. 93

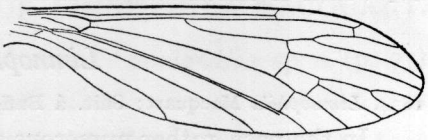


Fig. 95

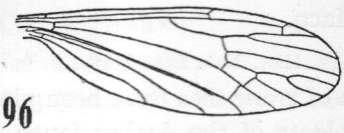


Fig. 96

small, a little widened distally; cell M_1 a little less than two-thirds its petiole; *m-cu* near midlength of cell *1st* M_2; anterior arculus lacking.

The allotype is quite like the type except that Sc_1 is considerably longer, exceeding *m-cu*, Sc_2 being immediately before the fork of *Rs*; *r* is very indistinct, placed more than twice its length from the tip of R_1 and a little less than this distance beyond the base of R_2. The allotype offers the following measurements: Length, 5.5 mm.; wing 5.3 mm.

Pseudolimnophila ambigua, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 437, ♀, holotype.

FEMALE. — Length about 6.5 mm.; wing 6.3 mm.

General coloration shiny black. Antennae black throughout, the flagellar segments long-oval, gradually decreasing in size outwardly, the verticils longer than the segments.

Pronotum large. Wings with a brownish tinge, the stigmal region scarcely darker; veins dark brown. Venation (Fig. 86): Sc_1 ending shortly beyond the origin of R_2, Sc_1 elongate, longer than *m-cu* and more than one-half longer than R_{2+3}; *Rs* only slightly arcuated at origin; R_{2+3} nearly twice the basal deflection of R_{4+5}; *r* about two and one-half times its length from the tip of R_1 and on R_2 at near one-third the length; veins R_2 and R_3 long, running parallel for their entire length or nearly so; *m-cu* near midlength of cell *1st* M_2; cell M_1 much shorter than its petiole; anterior arculus weakly preserved.

What seems to represent the male of this species, and is described herewith as allotypic (Klebs Coll., No. 7813, 126, ♂, allotype) has the wings (Fig. 87) broader, with vein *2nd A* very long, extending to beyond midlength of *Rs* and beyond the widest point of the wing; cell *1st* M_2 is longer, with *m-cu* shortly beyond midlength. Basal segments of the antennae stout, the outer ones small and slender. Male hypopygium with the outer dististyle slender, heavily blackened, gradually narrowed to the slightly bifid apex. Measurements: Length 5.8 mm.; wing 6.8 mm.

The present species shows affinities with both *P. continuata* (Meun.) and *P. pinicola*, sp. n., differing from both especially in the elongate Sc_1 which is much longer than *m-cu*.

Limnophila Macq.

1834. *Limnophila* Macquart; Suit. á Buffon, vol. 1, Hist. Nat. Ins., Dipt., p. 95.

In the past, rather numerous species of crane-flies have been placed in the genus *Limnophila* by various students of the Amber fauna but relatively few belong to this genus as now restricted. Osten Sacken considered that certain of the names proposed by Loew (Bernstein, etc., 1850) were synonyms of *Limnophila* (as *Critoneura*, *Tanymera*, *Tanysphyra*). However, the last two are now held as valid while the first still remains unknown to the writer. From its characters (cells R_2 and M_1 present; *r* lacking) *Critoneura* would likewise seem to represent a good genus. Of the specific names mentioned by Loew in the above paper and placed by Handlirsch (1908) and other writers in the synonymy of *Limnophila*, the following disposition is made in the present paper:

Cylindrotoma (l.c., p. 37), with *succini, longicornis, longipes* and *brevicornis*, presumably fall in *Palaeopoecilostola* Meunier. *Critoneura*, with *longipes* and *pentagonalis*, are still unknown but should by no means be arbitrarily placed in the genus *Limnophila* without further evidence. *Limnophila furcata* Giebel (1856) is unknown and its strict generic position is still in doubt. In his very unfortunate paper on the Amber Diptera of Loew, Meunier (1899 b) mentions two species in *Tanymera* (*annulata* and *crassicornis*) that have later been placed in *Limnophila*. Nothing definite concerning the true affinities of these two flies can be stated until their types are studied; *crassicornis* is shown (l.c., pl. 3, fig. 16) with the basal flagellar segment longer than the combined head and thorax and more resembling a segment of the leg. If this figure really refers to the antennal flagellum, the fly will presumably be found to fall in or near *Eriocera* Macquart. The venation as figured somewhat suggests *Pilaria* Sintenis, with *r* about its own length beyond the fork of R_{2+3}, cell M_1 a little longer than its petiole, and other characters. Since all the names of Tipulidae in this paper are unrecognizable and since Meunier himself quite ignored the work in his later monographic treatment, all one can do is to consider the species as *nomina nuda* until the types can be later examined and redescribed. Of the thirteen species placed in *Limnophila* by Meunier (Monograph, etc., 1906) only *brevipetiolata* and *pulchripennis* seem to belong here. Of the others, *concinna, continuata, exigua, producta* and *vulcana*, are herein placed in *Pseudolimnophila*; *longicornis, fastuosa, robusta* and *speciosa* in *Palaeopoecilostola*; *gracilis* (*meunieri* Ckll.) in *Tanysphyra*; and *elongata* in *Pilaria*.

KEY TO THE AMBER SPECIES OF LIMNOPHILA MACQUART.

1. Cell M_1 lacking ..... *L. samlandica*, sp. n. (p. 73)
   Cell M_1 present. 2
2. Cell R_2 sessile or with a very short petiole that is shorter than *r*. 3
   Cell R_2 petiolate, the petiole being longer than *r*; (*Phylidorea* Bigot). 4
3. Wings with cell R_2 short-petiolate; *m-cu* at near two-thirds the length of cell *1st* M_2; trichiation of veins relatively sparse, *Rs* and *M* being nearly if not quite devoid of setae.
   L. brevipetiolata Meun. (p. 74)
   Wings with cell R_2 sessile; *m-cu* at near midlength of cell *1st* M_2; trichiation of veins more abundant, occurring on the distal two-thirds of *Rs* and on vein *M* almost to the base.
   L. skwarræ, sp. n. (p. 74)

4. Legs brown; *Rs* angulated and short-spurred at origin; *r* slightly removed from the tip of R_1; veins beyond cell *1st* M_2 relatively short. *L. pulchripennis* Meun. (p. 72)

Legs black; *Rs* arcuated at origin; *r* close to the tip of R_1; veins beyond cell *1st* M_2 elongated. ..... *L. servilis*, sp. n. (p. 72)

Limnophila (*Phylidorea*) *pulchripennis* Meun.

1906. *Limnophila* (*Dactylolabis*) *pulchripennis* Meunier; Mon. Tipulidae Ambre Baltique, p. 380, pl. 13, fig. 16 (antenna ♀).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 8804, ♀, lectotype.

FEMALE. — Length 7 mm.; wing about 7.2 mm.

Antennae with the flagellar segments subcylindrical, the verticils about as long as the segments.

Wings (Fig. 88) pale yellow, the veins a little darker. Venation: *Sc* relatively short, Sc_1 ending shortly beyond the fork of *Rs*, Sc_2 at its tip; *Rs* long, angulated and short-spurred at origin; R_{2+3} about equal to the basal deflection of R_{4+5}; veins R_2 and R_3 elongate, diverging outwardly, cell R_2 at margin nearly twice as wide as cell R_3; *r* about one and one-half times its own length from the tip of R_1 and near midlength of R_2; cell *1st* M_2 rectangular, gently widened distally, *m-cu* near the middle of its length; cell M_1 a little shorter than its petiole; anterior arculus preserved; *h* oblique, placed shortly before the level of the arculus.

Ovipositor with the tergal valves strongly upcurved to the subacute tips, the sternal valves short and stout.

Limnophila (*Phylidorea*) *servilis*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 3519, ♂, holotype.

MALE. — Length about 9 mm.; wing about 8.5 mm.

General coloration black, including the antennae and legs. Wings brownish yellow, the stigma faintly indicated; veins darker brown.

Antennae with the second scapal segment subglobular; basal flagellar segments oval, with short basal pedicels, at near midlength of the organ passing into cylindrical, the terminal segment longer than the penultimate; verticils a little longer on the outer segments, the longest approximately as long as the segments.

Venation (Fig. 89): *Sc* moderately long, Sc_1 extending to about opposite one-third the length of R_{2+3}, Sc_2 longer than Sc_1 and close to

its tip; *Rs* strongly arcuated at origin; R_{2+3} shorter than *m-cu* but longer than the slightly more arcuated basal deflection of R_{4+5}; *r* at tip of R_1 and shortly before midlength of R_2; veins R_2 and R_3 divergent, cell R_2 at margin much wider than cell *2nd* R_1 and nearly three times as wide as cell R_3; cell M_1 small, about two-thirds its petiole; cell *1st* M_2 relatively small, the shortest element enclosing it being *m*; *m-cu* near midlength of the cell; vein *2nd A* strongly sinuous; anterior arculus preserved.

The present species is closely allied to *L.* (*P.*) *pulchripennis* (Meun.), differing in the details of venation, especially the longer Sc_2, arcuated *Rs*, R_{2+3} longer than the basal deflection of R_{4+5}, position of *r* at the tip of R_1, the more elongate veins issuing from cell *1st* M_2 and the sinuous vein *2nd A*.

Limnophila samlandica, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. X 250, ♀, holotype.

FEMALE. — Length about 6 mm.; wing 4.8 mm.

General coloration pale brown, the antennae and legs darker.

Palpi with the terminal segment one-half longer than the penultimate, slender. Antennae moderately elongate, if bent backward extending to beyond the wing-root; basal segment elongate-cylindrical; flagellar segments long-oval, passing into fusiform, the verticils a little shorter than the segments. Head somewhat narrowed behind.

Pronotum large. Legs relatively long and slender; tibial spurs distinct. Wings (Fig. 90) subhyaline, the stigma oval, pale brown; veins pale. Venation: *Sc* relatively short, Sc_1 ending before the fork of *Rs*, Sc_2 longer than Sc_1; *Rs* long, weakly angulated and spurred at origin; R_{2+3} relatively long but shorter than R_2; *r* at tip of R_1 and before midlength of the relatively short R_2; R_3 sinuous, the tip slightly deflected toward the wing-apex, cell R_2 at wing-margin wider than either cell *2nd* R_1 or R_3; inner ends of cells R_3 and *1st* M_2 lying far proximad of cell R_5; basal deflections of R_{4+5} and M_{1+2} strongly arcuated to feebly angulated; veins issuing from cell *1st* M_2 relatively elongate; cell M_1 lacking; *m-cu* at near one-third the length of cell *1st* M_2; vein *2nd A* relatively short and straight; anterior arculus preserved; prearcular region relatively extensive. Macrotrichiae relatively sparse and scattered, occurring at even intervals along veins R_2, R_3, R_{2+3}, R_{4+5} and distal sections of M_{1+2}, M_3 and M_4, lacking on the other veins.

Ovipositor with the tergal valves long, slender, gently upcurved to the acute tips.

L. samlandica is an isolated species that may be found to represent a new generic type when more material becomes available. The details of venation and the sparse trichiation of the wing-veins are noteworthy.

Limnophila brevipetiolata Meun.

1906. *Limnophila* (*Dactylolabis*) *brevipetiolata* Meun.; Mon. Tipulidae Ambre Baltique, p. 378—379, pl. 13, fig. 15 (antenna ♀), pl. 14, fig. 2 (wing).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 1281, ♀, holotype.

FEMALE. — Length about 5.5 mm.; wing 5.5 mm.

Wings (Fig. 91) with cell R_2 short-petiolate, the petiole being less than one-half *m*; *m-cu* placed at or beyond two-thirds the length of cell *1st* M_2; *Rs* a little longer than in *L. skwarrae*, sp. n. Trichiation: The veins beyond the cord provided with numerous inconspicuous trichiae, especially veins R_2, R_3, R_{4+5}, the second and third sections of vein M_{1+2}, M_1, M_2, and the outer sections of M_3 and M_4. *Rs* and *M* seem to be nearly if not quite devoid of trichiae.

The figure of the wing of this species, as given by Meunier, is erroneous in the omission of crossveins *r* and *m-cu* and the forking of vein M_3 instead of vein M_{1+2}, a condition not found in the Tipulidae and not indicated in any manner by the holotype.

Limnophila skwarræ, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 273, ♂, holotype.

MALE. — Length about 5 mm.; wing 6 mm.

General coloration brownish black, the antennae and legs dark brown; male hypopygium light brown; caudal margins of the abdominal segments very narrowly and indistinctly ringed with yellow. Body with abundant erect short setae that are very numerous on the head.

Antennae short, if bent backward not attaining the wing-root; flagellar segments oval, with verticils of moderate length, the longest only a trifle longer than the segments; flagellar segments gradually decreasing in size outwardly.

Pronotum massive. Legs relatively short and stout, with conspicuous semi-erect setae; tibial spurs conspicuous. Wings (Fig. 92) subhyaline, the stigma barely darker; veins brown. Venation: *h* lying immediately before the level of the arculus; Sc_1 ending about opposite the proximal end of the basal deflection of R_{4+5}, Sc_2 not far from its tip; *Rs* relatively elongate, in alignment with R_3, gently arcuated at origin; cell R_2 narrowly sessile, R_{2+3} being obliterated; R_2 arcuated

at origin, thence nearly straight, R_3 diverging slightly; *r* about twice its length from the tip of R_1 and at near midlength of R_2; inner ends of cells R_3, R_5 and *1st* M_2 in transverse alignment; cell M_1 a trifle longer than its petiole; *m* about one-half the outer deflection of M_3; *m-cu* shortly beyond midlength of the lower face of cell *1st* M_2; anterior arculus present. Macrotrichiae present on all the longitudinal veins except near the wing-base and on the Anal veins where they occur only on the distal fourth of vein *1st A*.

Abdomen relatively short and stout, the hypopygium massive. Basistyles powerfully constructed, short and stout, provided with long, coarse setae. Dististyle broadly flattened, the outer apical angle produced into a gently curved chitinized rod; remaining details of structure not visible in the unique type.

This interesting crane-fly is named in honor of Dr. Elisabeth Skwarra, to whom I am indebted for invaluable co-operation in the study of the Amber Collections belonging to Frau Klebs and the Geological Institute of Königsberg.

Tanymera, gen. n.

1850. *Tanymera* Loew; Bernstein und Bernsteinfauna, p. 38 (*nomen nudum*).

Loew proposed the generic term *Tanymera* for four unnamed species of Amber Tipulidae. The writer here retains the name for a group of Limnophilaria that agree well with Loew's brief and insufficient diagnosis of the genus (l.c., p. 36). Meunier (1899) discussed two species under this generic name (*annulata* and *crassicornis*), the status of which have been considered under the genus *Limnophila*.

Characters of the genus:

Antennae of male relatively short (*terminans*) to very long (*arguta*), the segments clothed with dense erect pubescence and sparse verticils, the longest of which are unilaterally arranged; basal flagellar segments generally cylindrical but with the lower face slightly more protuberant; terminal flagellar segment varying in length with the different species, sometimes longer but usually smaller than the penultimate, in cases abruptly smaller, button-like.

Wings with *Sc* relatively short, Sc_1 ending opposite or before the fork of *Rs*, Sc_1 close to its tip; *Rs* relatively short, gently to strongly arcuated at origin, in alignment with the moderately long R_{2+3}; *r* close to the tip of R_1 and at or near midlength of R_2; veins R_2 and R_3 gently divergent; inner ends of cells R_3, R_5 and *1st* M_2 in nearly transverse alignment; cell M_1 longer than its petiole, except in *berendti*; *m-cu* lying

far distad, usually near the outer end of cell *1st* M_2; anterior arculus preserved.

Male hypopygium with two dististyles; outer style weakly bifid at apex. Aedeagus elongate, strongly decurved. Ovipositor with elongate valves.

GENOTYPE. — *Tanymera fritschi* sp. n. (Lower Oligocene-Baltic Amber).

Some of the species run close to *Pseudolimnophila* and it is possible that certain of the species here considered as being members of this genus will later be found to be more correctly referable to *Tanymera*. Such species are *P. vulcana*, *P. timida*, and possibly others.

KEY TO THE SPECIES OF TANYMERA, gen. n.

1. Antennae (♂) very long, extending to near midlength of the abdomen. *T. arguta*, sp. n. (p. 76)
   Antennae (♂) shorter, not extending to beyond the base of the abdomen. 2
2. Terminal segment of antenna longer than the penultimate. *T. terminans*, sp. n. (p. 78)
   Terminal segment of antenna smaller than the penultimate. ... 3
3. Terminal segment of antenna very small, only about one-third the penultimate. ..... *T. fritschi*, sp. n. (p. 78)
   Terminal segment of antenna larger, only a little smaller than the penultimate. ..... *T. berendti*, sp. n. (p. 79)

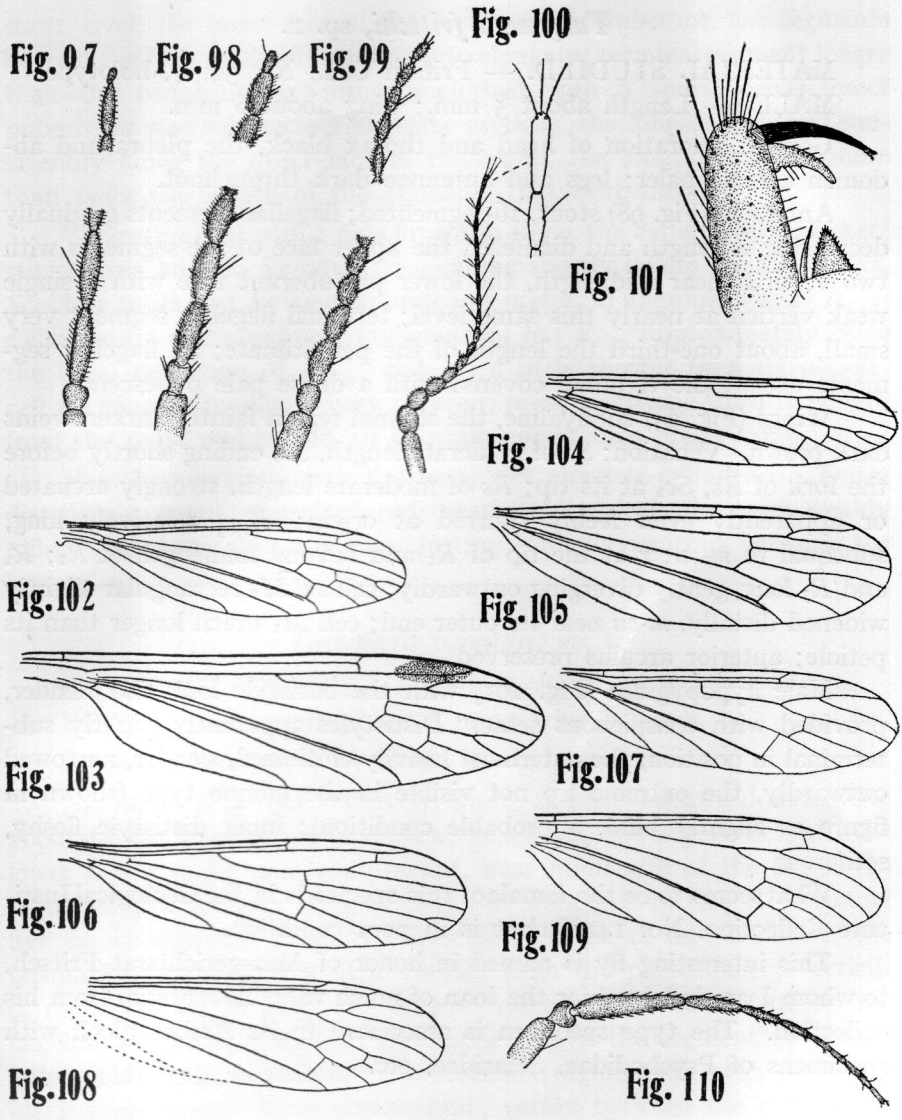
Tanymera arguta, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype.

MALE. — Length 4.5 mm.; wing 4.8 mm.; antenna 3.5 mm.

General coloration shiny coal-black, including the antennae and legs. Antennae (Fig. 97) elongate, if bent backward extending to near midlength of the abdomen; flagellar segments elongate-cylindrical, a little narrowed at the incisures, the surface clothed with an abundant erect pubescence; verticils apparently only one to each segment, elongate, but still somewhat shorter than the segment, arranged unilaterally on the dorsal surface of the antenna; flagellar segments gradually decreasing in length and diameter outwardly, the terminal segment reduced to an oval button that is not more than one-fourth the length of the penultimate segment.

Wings (Fig. 93) with a faint yellowish tinge, the veins slightly more



brownish yellow. Venation: Sc_1 ending just before the fork of *Rs*, Sc_2 close to its tip; *Rs* relatively long, strongly arcuated at origin; R_{2+3} nearly straight, a little longer than *m-cu*; veins R_2 and R_3 long, diverging rather strongly, R_3 being deflected toward the wing-tip; *r* near the tip of R_1 and shortly before midlength of R_2; inner ends of cells R_3, R_5 and *1st* M_2 in oblique alignment; cell M_1 a little longer than its petiole; cell *1st* M_2 relatively short-rectangular, wider outwardly, *m-cu* far out toward its outer end; anterior arculus preserved.

Tanymera fritschi, sp. n.

MATERIAL STUDIED. — Fritsch Coll., No. 59, ♂, holotype.

MALE. — Length about 5 mm.; wing about 6 mm.

General coloration of head and thorax black, the pleura and abdomen a little paler; legs and antennae dark throughout.

Antennae (Fig. 98) stout, 16-segmented; flagellar segments gradually decreasing in length and diameter, the upper face of the segments with two verticils near midlength, the lower protuberant face with a single weak verticil at nearly this same level; terminal flagellar segment very small, about one-third the length of the penultimate; all flagellar segments except the terminal covered with a dense pale pubescence.

Wings (Fig. 94) subhyaline, the stigmal region faintly darker; veins dark brown. Venation: *Sc* of moderate length, Sc_1 ending shortly before the fork of *Rs*, Sc_2 at its tip; *Rs* of moderate length, strongly arcuated or apparently even feebly spurred at origin; R_{2+3} relatively long, subequal to *m-cu*; *r* at the tip of R_1 and beyond midlength of R_2; R_2 and R_3 long, gently diverging outwardly; cell *1st* M_2 rectangular slightly widened distally, *m-cu* near its outer end; cell M_1 much longer than its petiole; anterior arculus preserved.

Male hypopygium (Fig. 101) with the basistyle long and slender, provided with conspicuous setae. Dististyles apparently slightly subterminal in position, the outermost heavily chitinized, slender, narrowed outwardly, the extreme tip not visible in the unique type (shown in figure as slightly bifid, a probable condition); inner dististyle fleshy, setiferous.

What seems to be the female of this species is in the Geological Institute Collection, No. 14188, but is in poor condition.

This interesting fly is named in honor of Amtsgerichtsrat Fritsch, to whom I am indebted for the loan of much valuable material from his collection. The type specimen is associated in its Amber block with specimens of Psychodidae, Sciaridae, etc.

Tanymera terminans, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype.

MALE. — Length about 6 mm.; wing 6.5 mm.

General coloration dark brown, including the antennae and legs.

Palpi short, the last segment only a trifle longer than the penultimate and slightly more slender. Antennae (Fig. 100) relatively short, if bent backward extending about to the wing-root; basal segment of scape elongate, the second oval; basal four or five flagellar segments

short, oval, the lower face of the first more protuberant, the segments beyond the fifth gradually passing into elongate; terminal segment longer than the penultimate; segments clothed with a short, dense, erect pubescence and moderately elongate verticils, the longest arranged unilaterally along the outer face of the organ, the longest verticils more than twice the length of the segments that bear them.

Wings (Fig. 95) with a pale brownish tinge, the veins slightly darker; stigma pale brown. Venation: Sc_1 ending shortly before the fork of *Rs*, Sc_2 close to its tip; *Rs* long, arcuated at origin, in alignment with R_{2+3}; *r* close to tip of R_1 and near midlength of R_2; R_{2+3} approximately twice the basal deflection of R_{4+5}; cell M_1 a little shorter than its petiole; cell *1st* M_2 rectangular, *m* very reduced; *m-cu* about one-third its length from the outer end of cell *1st* M_2; anterior arculus preserved.

Male hypopygium with the basistyles elongate-cylindrical. Outer dististyle a small, chitinized rod, nearly cylindrical, the apex weakly bifid. Aedeagus very elongate, jutting strongly ventrad between the basistyles.

Tanymera berendti, sp. n.

MATERIAL STUDIED. — Klebs Coll., No x 32, ♀, holotype.

FEMALE. — Length about 6 mm.; wing 6.4 mm.

General coloration shiny black, the palpi paler.

Antennae (Fig. 99) relatively short, if bent backward extending about to the base of the abdomen; basal flagellar segments oval, the lower face a trifle more protuberant, near midlength of the organ the segments passing into elongate-oval and subequal in length; terminal five or six segments gradually decreasing in length and diameter, the terminal segment only a little smaller than the penultimate; verticils of moderate length only, the longest found on the basal four or five flagellar segments, placed on the upper face of the segment at or just before midlength; verticils of the subterminal segments shorter. Antennae black throughout. Eyes protuberant; vertex between the eyes wider than the diameter of a single eye.

Legs relatively short and stout, tibiae shorter than the femora; tarsal segments gradually decreasing in length outwardly, the last two subequal; tibial spurs distinct. Wings (Fig. 96) broad, with a faint brownish tinge, the stigma barely darker; veins dark brown. Venation: *Sc* relatively short, Sc_1 ending before the fork of *Rs*, Sc_2 at its tip; *Rs* relatively short, arcuated at origin, in alignment with R_{2+3} which is nearly one-half the length of *Rs*; R_2 gently sinuous; *r* pale, at the tip

of R_1 and at midlength of R_2; veins R_2 and R_3 of moderate length, gently diverging; inner ends of cells R_3, R_5 and *1st* M_2 in oblique alignment; cell M_1 about one-third longer than its petiole; *m* very short; *m-cu* far out toward the outer end of cell *1st* M_2, at or very shortly before the fork of M_{3+4}; Anal veins sinuous; anterior arculus preserved. Macrotrichiae on all the longitudinal veins beyond the cord, on the veins before the cord restricted to the distal ends of the cubital and anal veins.

Ovipositor with the valves elongate.

An additional female that seems to belong here is in the Fritsch Collection, No. 56. In this, *m-cu* is slightly more proximad in position but still beyond two-thirds the length of cell *1st* M_2.

Named in honor of Georg Carl Berendt, pioneer student of the organic remains in the Amber.

Pilaria Sint.

1888. *Pilaria* Sintenis; Sitzber. Nat.-Ges. Dorpat, 8: 398.
1919. *Eulimnophila* Alexander; Cornell Univ. Agr. Expt. Sta., Mem. 25: 917.

The genus *Pilaria* includes a rather small number of recent forms, mostly with a Holarctic distribution. Four species from the Amber are herewith refered to the group, including two species that had earlier been described in *Limnophila*, i. e., *P. elongata* (Meun.) in 1906 and *P. electrina* (Ckll. & Clark) in 1918.

KEY TO THE AMBER SPECIES OF PILARIA SINT.

1. Cell M_1 lacking. ..... *P. baltica*, sp. n. (p. 82)
   Cell M_1 present. 2
2. *r* on R_{2+3} at nearly its own length before the fork; cell M_1 small, only about one-half its petiole. ..... *P. batheri*, sp. n. (p. 81)
   r on R_{2+3} at or very close to the fork or on R_2 beyond the fork; cell M_1 approximately equal in length to its petiole. 3
3. *r* on R_2 at approximately its own length beyond the fork.
   P. elongata (Meun.) (p. 81)

   r on R_{2+3} or on R_2 very close to the fork.
   P. electrina (Ckll. & Clark) (p. 82)

The true ranking of some the above species must be considered as still uncertain due to the venational variations often found. The shifting of crossvein *r* along cell R_1 makes the character one of somewhat doubtful value but one which must be retained until better characters are discovered.

Pilaria batheri, sp. n.

MATERIAL STUDIED. — Brit. Mus. Coll., No. 18704 (ex Dr. R. Klebs coll., No. 430; Stantien & Becker, No. XIII B 513), ♂, holotype.

MALE. — Length about 5.5 mm.; wing 6.2 mm.

Antennae of moderate length, the flagellar segments elongate-cylindrical, with long verticils, those on the outer face greatly exceeding the segments in length.

Wings (Fig. 102) with a pale brownish yellow tinge, the veins darker brown. Macrotrichiae present on all the longitudinal veins beyond the cord and on the primary longitudinal veins proximad of the cord except at the extreme base. Venation: *Sc* relatively short, Sc_1 ending opposite or slightly beyond midlength of *Rs*, Sc_2 near its tip; *Rs* angulated and short-spurred at origin; *r* on R_{2+3} nearly its own length before the fork; cell R_2 relatively short, vein R_2 being considerably shorter than R_{2+3} alone and approximately three-fifths the length of vein R_3; cell *1st* M_2 large, *m-cu* at near two-thirds its length; cell M_1 small, only about one-half its petiole.

Named in honor of Dr. F. A. Bather, Keeper of the Geological Collections of the British Museum, to whom I am indebted for the loan of the Amber collection of Tipulidae.

Pilaria elongata (Meun.).

1906. *Limnophila elongata* Meunier; Mon. Tipulidae Ambre Baltique, pp. 381—382, pl. 13, fig. 20 (palpus ♂).

MATERIAL STUDIED. — Klebs Coll., No. 124, ♂, holotype. Of the other specimens mentioned by Meunier in the original description, his ♀♀ specimens pertain to two different species of *Pseudolimnophila*, No. 22 being the type of *P. pinicola*, sp. n., No. 3080 being the type of *P. inculpata*, sp. n. A female in the Klebs Coll., No. X 456, is doubtfully *elongata*.

The holotype shows a true *Pilaria*, allied to *P. tenuipes* (Say).

Antennae as described by Meunier. Wings (Fig. 103) with a conspicuous elongate-oval brown stigma that is shown in the figure, is indicated equally in both wings, but, since it is not shown by other material identical with or very close to *elongata*, is probably due to an artifact. Venation: *Sc* relatively short, Sc_1 ending some distance from the fork of *Rs*, Sc_2 at its tip; *Rs* elongate, in alignment with the straight R_{2+3}; R_{2+3} a little longer than *m-cu*; *r* somewhat removed from the tip of R_1 and on R_2 shortly beyond its origin; cell R_2 widened outwardly,

vein R_2 being straight but R_3 deflected rather markedly toward the wing-tip; cell *1st* M_2 large, hexagonally-rectangular, gently widened distally, *m-cu* at near midlength; cell M_1 approximately equal in length to its petiole; vein *2nd A* elongate.

The Klebs Coll., ♀, No. X 456, mentioned above, may possibly belong to another species. The coloration is darker and *r* is on R_{2+3} just before the fork.

Pilaria electrina (Ckll. & Clark).

1918. *Limnophila electrina* Cockerell & Clark; Can. Ent., 50: 115—116, fig. 1 (antenna), fig. 2 (wing).

MATERIAL STUDIED. — Klebs Coll., No. 7844, D 42, labelled by Meunier "*Prionolabis producta*", a ♂. The holotype is stated to be in the American Museum of Natural History but has not been seen by the writer.

This fly is close to *elongata* but presumably distinct. The specimen studied has *r* close to the fork of R_{2+3}; cell M_1 a little larger than figured by Cockerell but agreeing with his measurements; distal section of Cu_1 about equal to *m-cu*. Wings (Fig. 104) a little narrower than indicated by the type; veins pale brown. The specimen shows the lateral margins of the mesonotum and the pleura pale but with a broad, conspicuous, brownish black longitudinal stripe extending from the cervical sclerites to the abdomen. The fly does not show a stigmal spot as was discussed under *P. elongata*.

In the Fritsch Collection, No. 98, is another specimen that I refer to *electrina* with some doubt. The true affinities of *elongata* and *electrina* are still in doubt. Meunier's comparison of his species *elongata* with *P. quadrata* (O. S.) was pertinent but he overlooked the fact that *quadrata* has cell M_1 lacking, while his own type of *elongata* has it present.

Pilaria baltica, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ex Phys.-Oek. Gesell., No. 1451 VI 281, ♂, holotype; previously named by Meunier as "*Haploneura*"! Paratype, ♂, No. 14118 VI 8075.

MALE. — Length about 4.5 mm.; wing 5.5 mm.

Antennae of moderate length, if bent backward extending to shortly beyond the wing-root; flagellar segments elongate-oval with abundant long erect verticils that are a little longer than the segments.

Wings (Fig. 105) with a faint brownish tinge, the membrane further discolored by artificial blackening, especially toward their tips; veins

slightly darker than the ground-color. Venation: Sc_1 ending at near four-fifths the length of the long *Rs*, Sc_2 close to its tip; *Rs* long, nearly straight, in alignment with R_{2+3}, which, in turn, is virtually in alignment with R_3; cell R_2 moderately deep; *r* on R_2 shortly beyond its origin; inner ends of cells R_3, R_5 and *1st* M_2 in alignment; cell M_1 lacking; cell *1st* M_2 very large, approximately as long as the longest vein (M_{1+2}) issuing from it; *m-cu* just before two-thirds the length of the cell.

The paratype has cell *1st* M_2 slightly smaller than as described and figured for the type but agrees well in all other regards.

Pilaria baltica is very distinct from all other Amber species of the genus, although closely allied to the recent *P. quadrata* (O. S.) of Eastern North America, and somewhat more remotely the genotype, *P. pilicornis* (Zett.) (equals *meridiana* Staeg.) of Northern Europe.

Polymera Wied.

1821. *Polymera* Wiedemann; Dipt. Exot., 1: 40.

The genus *Polymera* includes more than a score of living species, confined to the tropical and subtropical regions of America. The discovery in the Amber of a true species of this group is a matter of the greatest interest and importance.

Polymera (*Polymera*) *magnifica* Meun.

1906. *Polymera magnifica* Meunier; Mon. Tipulidae Ambre Baltique, pp. 385—386; pl. 14, fig. 11 (antenna ♂), fig. 12 (wing), pl. 15, fig. 2 (palpus ♂), pl. 16, fig. 1 (entire fly).

MATERIAL STUDIED. — Klebs Coll., No. 5450, ♂, holotype. Fritsch Coll., No. 92, an additional ♂.

The antennae of the male are simply nodulose, there being only the basal enlargement of the segments, this provided with long erect verticils.

The posterior tarsi appear to be of a slightly paler color than the other tarsi. Venation (Fig. 106): Sc_1 ending shortly before the fork of *Rs*, Sc_2 at its tip; *Rs* about three-fourths longer than R_{2+3}, arcuated; *r* distinct; basal section of R_2 about equal to the terminal section of R_1; *m-cu* shortly beyond the fork of *M*. Trichiation: Macrotrichiae of moderate length on all the longitudinal veins beyond the cord (including R_{2+3} and R_2, shown by Mrs. Meunier as glabrous); basad of the cord a series of trichiae on *M* and *1st A* almost to the base. Mrs. Meunier's figure omits crossveins *r* and *m-cu*.

The Fritsch specimen agrees well with the type in all essentials of structure (Length, about 3 mm.; wing 3.3 mm.).

Hexatoma Latr.

1809. *Hexatoma* Latreille; Gen. Crust. et Ins., 4: 260.
1818. *Anisomera* Meigen; Syst. Beschr. Zweifl. Ins., 1: 210.

The genus *Hexatoma* includes a small assemblage of Holarctic forms that run very close to *Eriocera*, despite the striking differences in venation. The presence of the genus in the Amber was first indicated by Loew (Bernstein, etc., p. 37; 1850) who mentioned but did not describe the species, *succini*. Meunier (1906) described a species under this name and the fly is accordingly credited to him. No specimens of *H. succini* have been seen by the writer and it is not further considered in the present paper (for a consideration of this fly, see Meunier, 1906, pp. 388—389, pl. 15, fig. 7, antenna, fig. 8, wing, ♂).

KEY TO THE AMBER SPECIES OF HEXATOMA LATR.

1. Size smaller (wing, ♂, less than 3.5 mm.); wings with R_{2+3} longer than the basal deflection of R_{4+5}; *m-cu* before the fork of *M*.
H. minuta, sp. n. (p. 84)

Size larger (wing, ♂, 4.5 mm.); wings with R_{2+3} shorter than the basal deflection of R_{4+5}; *m-cu* at the fork of *M*.
H. succini (Meun.) (p. 85)

Hexatoma minuta, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype (ex Mus. Stantien & Becker).

MALE. — Length about 3.3 mm.; wing 3.4 mm.; antenna about 6 mm.

General coloration dark brown, including the legs and antennae.

Antennae (♂) very long, nearly twice as long as the body; first flagellar segment a little more than one-half the length of the second; third flagellar segment about one-half longer than the second; fourth flagellar segment a little longer than the third; what appears to be an additional (fifth) flagellar segment is cut off from the apex as a small cylindrical segment, tipped with four long setae.

Wings (Fig. 107) with *Sc* rather long, Sc_1 ending opposite the fork of *Rs*, Sc_2 a short distance from the tip; in cases, Sc_1 a little longer than *r-m*; *Rs* long, approximately square at origin; *r* close to the fork of R_{2+3}; veins R_2 and R_3 divergent, cell R_2 at wing-margin wider than cell *2nd* R_1; R_{2+3} fully one-half longer than the more arcuated basal deflection of R_{4+5}; *m-cu* approximately one-fourth its length before the fork of *M*.

I cannot reconcile the present fly with *H. succini* (Meun.) because of the small size and differences in the venation. The venation of the latter, as figured by Meunier, is obviously inaccurate (as in the omission of vein *2nd A*); the figure shows *Sc* ending closer to the fork of R_{2+3} than to *Rs*; R_{2+3} shorter than the basal deflection of R_{4+5} and *m-cu* at the fork of *M*.

Eriocera Macq.

1838. *Eriocera* Macquart; Dipt. exot., 1: 74.

The great genus *Eriocera* includes an abundance of recent species, especially in the tropical and subtropical regions of the World. Perfectly typical members of the genus are found in the Amber. Following Osten Sacken, all later authors have placed Loew's Amber genus, *Allarithmia*, in the synonymy of *Eriocera*. A careful study of the relatively few characters cited by Loew (Bernstein, etc., p. 36, 38; 1850) requires me to remove the genus from the synonymy and isolate it, until more material can be discovered or Loew's types described. In Loew's key, the genus calls for an insect with 14-segmented antennae, having the flagellar segments non-cylindrical; R_{2+3} unforked and *r* lacking, characters not possessed by any species of *Eriocera*. Under his discussion of the only species mentioned, *palpata* (l. c., p. 38), however, Loew mentions the antennae as being 10-segmented and thus conforming with our conception of *Eriocera*. Meunier (1899: 174) mentions his inability to locate the Loew types of *Allarithmia*. In his Monograph (1906), Meunier re-describes what he takes to be Loew's *palpata* and this is certainly a true *Eriocera*. According to my interpretation of the problem, *Allarithmia* Loew is not a synonym of *Eriocera*, unless Loew was quite in error in arranging his genus in the table of genera; Loew's species *palpata* is, on the same premises, entirely distinct from Meunier's *Eriocera palpata*. It is the latter species that is discussed at this time under the present genus.

1. Antennae (♂) 9-segmented; cell *1st* M_2 relatively small, shorter than the veins beyond it. *E. palpata* (Meun.) (p. 85)
   Antennae (♂) 11-segmented; cell *1st* M_2 relatively large, longer than the veins beyond it. *E. plastica*, sp. n. (p. 86)

Eriocera palpata Meun.

1906. *Eriocera palpata* Meunier; Mon. Tipulidae Ambre Baltique, pp. 387—388, pl. 14, fig. 15 (wing apex), pl. 15, fig. 6 (antenna ♀).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 8223, ♀, holotype.

FEMALE. — Length 7 mm.; wing 6 mm.

Palpi moderately stout, the terminal segment abruptly smaller. Antennae 9-segmented (as figured by Mrs. Meunier; in the text, it is stated that there are 13 segments); first flagellar segment long and stout basally, narrowed to the apex; second flagellar segment about twice the third; terminal four flagellar segments small, gradually decreasing in size, the terminal a little longer than the penultimate.

Wings (Fig. 109) with *Sc* of moderate length, Sc_1 ending shortly beyond the fork of *Rs*; *Rs* long, strongly arcuated at origin, in alignment with R_{2+3}; *r* present, approximately its own length from the tip of R_1 and nearly twice its length beyond the origin of R_2; veins R_2 and R_3 long, gently divergent distally; basal deflection of R_{4+5} forming an acute angle with R_{2+3}, as common in the genus; cell M_1 lacking; *m-cu* in approximate alignment with *r-m* but more oblique in position; cell *1st* M_2 short-rectangular, shorter than the veins beyond it; distal section of Cu_1 at an angle with the long basal section, shorter than *m-cu*.

Valves of ovipositor chitinized, elongate, acutely pointed.

Eriocera plastica, sp. n.

MATERIAL STUDIED. — Brit. Mus. Coll., No. 18699, ♀, holotype; (ex Klebs Coll., 425, Mus. Stantien & Becker, No. XIII B 518).

FEMALE. — Length about 6 mm.; wing 4.9 mm.

Palpi relatively long, the third segment a little shorter and narrower than the second; fourth segment slender, a trifle longer than segments three and four combined. Antennae (Fig. 110) relatively short, 11-segmented; first flagellar segment elongate; second longer and narrower than the third; second and third together a trifle shorter than the first; fourth segment nearly equal to the third; segments five to seven gradually decreasing in length, segments eight and nine again a little longer, about as long as the sixth; all flagellar segments provided with delicate and inconspicuous setae.

Wings (Fig. 108) with a pale brown tinge, the stigma oval, slightly darker brown; veins pale brown. Venation: *Sc* long, ending slightly beyond the fork of *Rs*, the latter long, very gently angulated near extreme origin; *r* on R_2 about twice its length beyond origin; cell *1st* M_2 large, the inner end arcuated, the cell as long as vein M_{1+2} beyond it and much longer than vein M_4 beyond it; distal section of vein M_3 of the unique type atrophied beyond a basal spur, the latter about as long as *m*; *m-cu* less than half its length beyond the fork of *M*; both sections of Cu_1 in approximate alignment; *m-cu* longer than the distal section of Cu_1.

Ovipositor with the valves chitinized, elongate, especially the long, slender tergal valves which are gently upcurved to the tips.

Elephantomyia O. S.

1850. *Toxorhina* Loew; Bernstein und Bernsteinfauna, p. 36 (*nomen nudum*).
1851. *Toxorhina* Loew; Linnaea Ent., 5: 400 (in part).
1859. *Elephantomyia* Osten Sacken; Proc. Acad. Nat. Sci. Philadelphia, 1859: 220.
1906. *Elephantomyia* Meunier; Mon. Tipulidae Ambre Baltique, p. 365.

Species of *Elephantomyia* are relatively common in and very characteristic of the Amber fauna. The majority of the species are much smaller than the existing members of the genus but *E. baltica*, sp. n., in notably larger than the others, equal in stature to the genotype, *E. westwoodi* O. S.

The imbroglio[1]) that has involved the use of the name *Elephantomyia* for these Amber flies and the restriction of the original name *Toxorhina* to an entirely distinct group of insects, has been discussed by the writer in an earlier paper (Proc. Acad. Nat. Sci. Philadelphia, 1921: 90) and will be only briefly discussed at this time. In his 1850 paper, above cited, Loew mentioned but *did not describe* in any manner the three species pertaining thereto. It is the writer's opinion that the genus *Toxorhina*, as proposed in this paper, is a *nomen nudum*, with approximately the same status as the names given by Meigen in his much-cited 1800 paper. If only a single species of the genus occurred in the Amber, the brief diagnosis of the genus might be held to validate both the generic and the specific name, an interpretation which I have followed elsewhere in the present paper where but a single specific name was mentioned in connection with the genus (*Macrochile, spectrum*; *Trichoneura, vulgaris*; *Tanysphyra, gracilis*). In all these cases, the genus and species has been credited to Loew. In those cases, however, where a generic name was proposed without mention of a species (*Calobamon, Haploneura, Tanymera*) or where more than a single species was mentioned but no distinctions between the species themselves given (*Toxorhina, Critoneura*), the names are considered herein as being *nomina nuda*. In 1851, Loew re-defined his genus more fully, discussed and figured in the briefest possible manner the three Amber species, and described and figured in detail a recent fly from Porto Rico under the name *Toxorhina fragilis*. In 1910, Coquillett designated *fragilis* as genotype of *Toxorhina*, a course in which he seems fully justified.

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[1]) Other literature pertaining to this controversy: Schiner, J. R. Reise Novara, Dipt., p. 33; 1868. — Bergroth, Ewald. Ann. Mag. Nat. Hist., (8) 11: 580; 1913. — Brunetti, E. Rec. Indian Mus., 15: 300—304; 1918.

The three Amber species of Loew were soon discovered to be non-congeneric with *fragilis* and fall within the limits of the group described in 1859 by Osten Sacken, as *Elephantomyia*. There is some question in the writer's mind as to whether the extremely brief notes and figures of Loew are sufficient to justify crediting the Amber species to him. In 1906, Meunier re-described these three species but since he did not have access to Loew's types (1899b: 174), it is almost certain, in one case, at least, that he did not correctly identify Loew's species. I have been unable to locate Loew's types and they may be lost, together with most of the other material upon which the 1850 paper was based. In such a case, the species as discussed by Loew must always remain more or less in doubt and it may be better to apply the names as re-defined by Meunier.

KEY TO THE AMBER SPECIES OF ELEPHANTOMYIA O. S.

1. Size large (wing, ♂, 8.5 mm.); *Rs* relatively short, only about twice the length of the basal deflection of R_{4+5}. *E. baltica*, sp. n. (p. 88)
   Size smaller (wing, ♂, not exceeding 6 mm.); *Rs* long, arcuated to feebly angulated at origin, more than three times the length of the basal deflection of R_{4+5}. 2
2. Antennae 14-segmented; palpi very short, less than one-half the glossal lobes of the rostrum; Sc_1 opposite midlength of *Rs*. *E. brevipalpa* (Loew) (p. 90)
   Antennae 13-15-segmented; palpi longer than the glossal lobes of the rostrum; Sc_1 extending to beyond midlength of *Rs*. 3
3. Rostrum nearly as long as the entire body; cell *1st* M_2 very short, *m-cu* before midlength. ..... *E. longirostris* (Loew) (p. 90)
   Rostrum shorter than the abdomen; cell *1st* M_2 long-rectangular, *m-cu* at midlength. ..... *E. pulchella* (Loew) (p. 91)

Elephantomyia baltica, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 282, ♂, holotype.

MALE. — Length (excluding rostrum) 9.5 mm.; wing 8.5 mm. General coloration brown, the rostrum and legs black.

Rostrum elongate, if bent backward extending to about opposite midlength of the abdomen, the palpi relatively long, the terminal segment elongate-oval, more than four times as long as broad. Antennae small, the basal flagellar segments short and crowded, as in the genus; terminal segments passing into elongate-cylindrical, with long verticils.

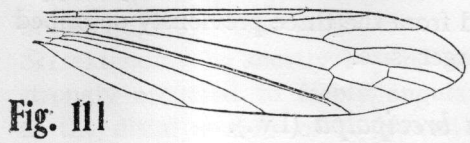


Fig. 111

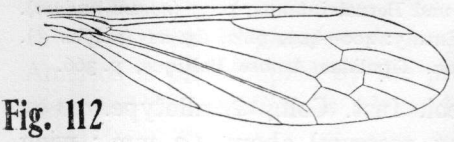


Fig. 112

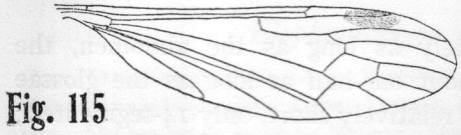


Fig. 115

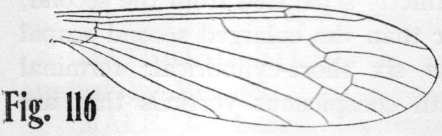


Fig. 116

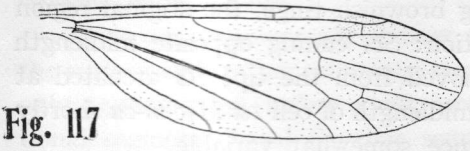


Fig. 117

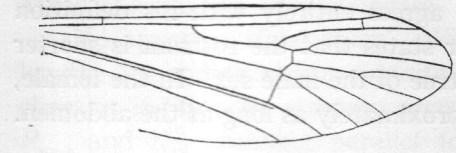


Fig. 119

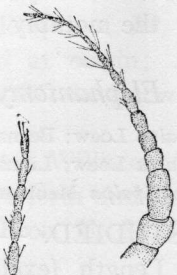


Fig. 113

Fig. 114

Fig. 120

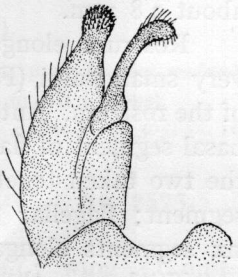


Fig. 121

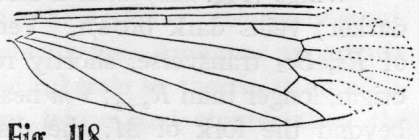


Fig. 118

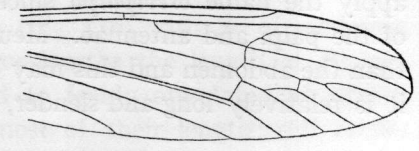


Fig. 122

No tibial spurs apparent in the unique type. Wings (Fig. 111) subhyaline, the stigma not darkened; veins black. Venation: *Sc* of moderate length, Sc_1 extending to opposite two-thirds the length of *Rs*, Sc_2 a short distance from its tip; *Rs* gently arcuated, only a little more than twice as long as the basal section of R_{4+5}; R_{2+3} relatively elongate, about equal to the distal section of R_{4+5}; inner ends of cells R_3 and *1st* M_2 lying far proximad of cell R_5; cell *1st* M_2 nearly as long as vein M_{1+2} beyond it; *m-cu* about one-third its length beyond the fork of *M*.

Elephantomyia baltica bears a marked resemblance to the genotype, *E. westwoodi* O. S. It is readily told from the three previously described Amber species by the notably larger size.

Elephantomyia brevipalpa (Lw.).

1850. *Toxorhina brevipalpa* Loew; Bernstein und Bernsteinfauna, p. 37 (*nomen nudum*).
1851. *Toxorhina brevipalpa* Loew; Linnaea Ent., 5: 400—401, pl. 2, fig. 21 (palpus ♂).
1906. *Elephantomyia brevipalpa* Meunier; Mon. Tipulidae Ambre Baltique, p. 366.

MATERIAL STUDIED. — Geol. Inst. Coll., ♀, allotype.

FEMALE. — Length (excluding rostrum) about 4.2 mm.; wing about 3.8 mm.

Rostrum elongate, approximately as long as the abdomen, the very small palpi (Fig. 114) only about one-half as long as the glossae of the rostrum. Antennae (Fig. 113) relatively short, only 14-segmented; basal segment of flagellum only indistinctly separated from the second, the two taken together a little longer than the enlarged second scapal segment; flagellar segments three to six short-cylindrical; terminal six segments elongate-cylindrical, with conspicuous verticils that are a trifle longer than the segments.

Wings (Fig. 112) with a strong brownish tinge, the stigmal region darker; veins dark brown. Venation: Sc_1 ending opposite midlength of *Rs*, Sc_2 transverse, shortly removed from the tip; *Rs* arcuated at origin, longer than R_{2+3}; *r-m* near midlength of cell *1st* M_2; *m-cu* shortly beyond the fork of *M*, the distance somewhat variable.

I am satisfied that this is the species to which Loew intended to apply the name *brevipalpa* since it agrees entirely with his definition of the palpi and antennae. Meunier states that the rostrum is shorter than the abdomen and this may be true of the male sex. In the female, it is relatively long and slender, approximately as long as the abdomen.

Elephantomyia longirostris (Loew).

1850. *Toxorhina longirostris* Loew; Bernstein und Bernsteinfauna, p. 37 (*nomen nudum*).
1851. *Toxorhina longirostris* Loew; Linnaea Ent., 5: 400, pl. 2, figs. 20, 23 (palpi).
1906. *Elephantomyia longirostris* Meunier; Mon. Tipulidae Ambre Baltique, pp. 365—366, pl. 12, fig. 7 (wing).

MATERIAL STUDIED. — Klebs Coll., No. 5100, 4080, studied by Meunier; No. X 87, ♂; No. 232, ♂. Geol. Inst. Coll., No. 2911, No. 4877, etc. Fritsch Coll., No. 95.

Rostrum only a little shorter than the entire body, brownish black throughout. Antennae with the basal segments of the flagellum crowded, as in the genus.

Wings (Fig. 115) subhyaline, with a conspicuous elongate-oval brown stigma; veins dark brown. Venation: *Sc* of moderate length, Sc_1 extending to shortly beyond midlength of *Rs*, Sc_2 at its tip; *Rs* strongly arcuated to feebly angulated at origin; R_{2+3} fully as long as the distal section of R_{4+5}; cell *1st* M_2 large, *m-cu* a little before midlength.

The name *Elephantomyia longirostris* Williston (1896) from Middle America is pre-occupied by the present form and the species was later re-named *E. meridionalis* Alexander (Proc. U. S. Nat. Mus., 44: 489; 1913).

Elephantomyia pulchella (Loew).

1850. *Toxorhina pulchella* Loew; Bernstein und Bernsteinfauna, p. 37 (*nomen nudum*).
1851. *Toxorhina pulchella* Loew; Linnaea Ent., 5: 400, pl. 2, fig. 19 (palpus).
1906. *Elephantomyia pulchella* Meunier; Mon. Tipulidae Ambre Baltique, p. 365, pl. 12, fig. 5 (antenna ♂), fig. 6 (tarsus ♂).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 2575, ♂, studied by Meunier.

MALE. — Length (excluding rostrum) 4.5 mm.; wing 4.6 mm.; rostrum alone 2.4 mm.

Rostrum conspicuously shorter than the abdomen, relatively stout, the surface with rather numerous semi-erect setae. Antennae apparently only 13-segmented, unless a microscopic tubercle at the tip is an additional segment; basal flagellar segment longer and stouter than the next segment and undoubtedly a composite segment; verticils on all flagellar segments very elongate.

No apparent tibial spurs. Wings (Fig. 116) with *Sc* of moderate length, Sc_1 ending about opposite three-fourths the length of *Rs*, Sc_2 close to its tip; *Rs* strongly arcuated to feebly angulated at origin; R_{2+3} and R_{4+5} running parallel for most of their length; cell *1st* M_2 relatively elongate, rectangular, *m-cu* at midlength, about equal to the distal section of Cu_1.

This specimen had been identified by Meunier as *E. pulchella* (Loew). It does not agree in certain important regards with Loew's brief diagnosis and the determination must therefore be considered as being tentative.

Tribe Pediciini.

The tribe Pediciini is herein considered as including two subtribes, the Adelphomyaria, with the single known genus *Adelphomyia* Bergr., and the more extensive group, Pedicaria, with a relatively large number

of generic and subgeneric groups which show a chiefly Holarctic distribution. In the Amber, a single genus of each subtribe, *Adelphomyia* and *Tricyphona*, have been discovered.

Adelphomyia Bergr.

1891. *Adelphomyia* Bergroth; Mitteil. Naturf. Gesell. Bern, 1890: 134.
1899. *Haploneura* Meunier (*nec* Osten Sacken, Loew); Bull. Soc. Ent. France, 1899: 393—394, fig.
1919. *Gonomyiella* Kuntze; Deutsch. Ent. Zeitschr., 1919: 141.

The genus *Adelphomyia* includes about a dozen described species, with a distribution that is notably broken, four species being found in Europe, four in Eastern North America, one in Japan, two in tropical Africa, and one in the high mountains of Costa Rica. The genus was made the type of a sub-tribe, the Adelphomyaria, in an earlier paper by the writer (Cornell Univ., Agr. Expt. Sta., Mem. 38: 895; 1920) and was placed with the Pediciini rather than with the Hexatomini, where it had usually been placed. This assignment was made largely upon the larval structure, the adult flies having retained most of the characters of the Hexatomini. No matter whether the group is placed at the end of the Hexatomini, or at the beginning of the Pediciini, as is done in this paper, it forms a connecting link between the two tribes that is not shown by other groups.

The single species known from the Amber, *Adelphomyia hirtipennis* (Meun.), has undergone a considerable range of generic assignments. Loew (Bernstein, etc., p. 36; 1850) proposed the generic term *Haploneura* for four related forms that he did not name. From Loew's key, and from a named species in the British Museum, I have no doubt but that he intended the name *Haploneura* for the group of Amber Tipulidae that is herein discussed as *Rhabdomastix*, subgenus *Palaeogonomyia* Meunier, in the tribe Eriopterini. Later, Osten Sacken saw in Loew's collection a fly that Loew had designated *Haploneura hirtipennis*, but which Osten Sacken unhesitatingly placed in *Ula*. However, neither the genus, nor the species, *hirtipennis*, were validated by a figure or description until 1906 when Meunier (Mon., etc., p. 389) discussed what he considered to be the same species as mentioned by Loew and Osten Sacken. Meunier's species, the type of which I have seen, proves to be an *Adelphomyia*, which places the name *Haploneura* in its synonymy in the sense of this author.

Cockerell (Entomologist, 54: 83; 1921) has described a different species of *Adelphomyia* (*disjunctula*) from the Gurnet Bay Oligocene. He does not mention the diagnostic generic feature of the wing-trichiation and the generic reference is inconclusive, although very possible.

Adelphomyia hirtipennis (Meun.).

1899. *Haploneura* Meunier; Bull. Soc. Ent. France, 1899: 393—394, fig. (*nomen nudum*).
1906. *Ula hirtipennis* Meunier; Mon. Tipulidae Ambre Baltique, pp. 389—390, pl. 15, fig. 9 (antenna ♀), fig. 10 (wing).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 8481, ♀, lectotype. Klebs Coll., No. 5734, 1480, ♀, paratype of Meunier.

Venation (Fig. 117): Sc_1 ending shortly before the fork of *Rs*, Sc_2 about three times its own length from the tip; *Rs* long, arcuated or gently angulated near extreme origin; R_{2+3} gently arcuated; veins R_2 and R_3 gently divergent; *r* on R_2 shortly beyond the origin and a little more than twice its length from the tip of R_1; inner ends of cells R_3, R_5 and *1st* M_2 in transverse alignment; *r-m* slightly arcuated; cell *1st* M_2 relatively small; *m-cu* at near midlength of the cell but in one wing of the paratype examined it is placed just before the fork of M_{3+4}. Trichiation: The macrotrichiae of the cells of the wing are represented by dots in the figure; they do not occupy all of the cells of the wing, as indicated by Meunier but are more nearly confined to the cells beyond the level of the origin of *Rs*.

Tricyphona Zett.

1837. *Tricyphona* Zetterstedt; Isis von Oken, p. 65.
1856. *Amalopis* Haliday; Ins. Brit., Dipt., 3: 15.

Three species of *Tricyphona* are now known from the Amber, two falling in the same general group as the genotype, *T. immaculata*, the third being very different and more closely allied to *T. inconstans*. The genus, as represented in the recent fauna, is essentially one of cold climates, predominant in the Holarctic region, with a few isolated species in Australia and New Zealand.

KEY TO THE AMBER SPECIES OF TRICYPHONA ZETT.

1. Cell R_3 sessile; Sc_2 far before the origin of *Rs*, the distance approximately equal to the length of the latter. 2

   Cell R_3 petiolate; Sc_2 only a short distance before the origin of *Rs*, the distance less than one-half the length of the latter.
   T. electrina, sp. n. (p. 95)

2. Antennae 15-segmented; *Rs* short; *m-cu* near midlength of *M*.
   T. succinea, sp. n. (p. 94)

   Antennae 12-segmented; *Rs* longer; *m-cu* immediately beyond the fork of *M*. ..... *T. sepulchralis*, sp. n. (p. 94)

Tricyphona succinea, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 207, ♂, holotype.

MALE. — Length about 7 mm.; wing to just beyond the level of the cord, 5.2 mm., giving a total wing length of about 6 mm.

General coloration of the fly, including the legs, dark brown.

Eyes hairy. Antennae 15-segmented; basal segment of flagellum longer than the second; segments oval, gradually decreasing in length and diameter outwardly, provided with relatively short verticils.

Tibial spurs distinct. Wings (Fig. 118) with a pale brownish tinge, the apex of the unique type destroyed. Venation: *Sc* far before the origin of *Rs*, the distance about one-third longer than *Rs*, the latter weakly angulated at origin; elements of cord in generally oblique alignment; from the position of the spurs of the veins beyond the cord, the probable general type of venation has been reconstructed and is shown in the figure by dots; petiole of cell M_3 shorter than *m-cu*, about equal to the basal section of M_{3+4}; Anal veins divergent.

Male hypopygium (Fig. 121) with both the basistyle and the single dististyle relatively slender; basistyle narrowed apically to a small rounded knob that is set with abundant microscopic spines. Dististyle arising from a cleft on the dorso-mesal face of the basistyle, slender, the apex a little enlarged and provided with several long setae. Ninth tergite deeply emarginate medially.

Tricyphona sepulchralis, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. B 903, ♀, holotype.

FEMALE. — Length 9 mm.; wing 7.5 mm.

General coloration dark brown, including the antennae and palpi. Legs paler brown, the tips of the femora, and especially of the tibiae, narrowly darkened.

Antennae (Fig. 120) only 12-segmented; flagellar segments cylindrical, gradually decreasing in size outwardly.

Wings (Fig. 119) with a grayish tinge, the stigma lacking; veins a little darker than the ground-color. Venation: Sc_1 ending about opposite the fork of R_{4+5}, Sc_2 far before the origin of *Rs*; *Rs* moderately long, arcuated at origin; cell R_3 sessile; *r-m* placed at near midlength of R_{4+5}, cell R_4 thus being very deep; cell M_2 open by the atrophy of *m*; *m-cu* close to the fork of *M*, lying slightly basad of the level of *r-m*; cell M_3 deep.

Ovipositor large and powerful, the tergal valves gently upcurved.

Tricyphona electrina, sp. n.

MATERIAL STUDIED. — Zool. Mus., Berlin, ♀, holotype.

FEMALE. — Length (imperfect) about 9 mm.; wing 9.5 mm.

The type is in relatively poor condition, except the wings which are beautifully preserved.

Wings (Fig. 122) large and ample, pale yellowish with dark brown veins. Macrotrichiae of veins long and conspicuous. Venation: Sc_1 ending shortly beyond the origin of R_{2+3} (note this interpretation of the venation of the Pediciini. — See Alexander, Ent. News, 29: 201—205, pl.; 1918), Sc_2 far from its tip, lying a short distance basad of the origin of *Rs*; *Rs* long, strongly arcuated to weakly angulated at origin, near midlength appearing gently convex, in direct alignment with R_5; R_{2+3+4} arising from the end of *Rs*, subequal to and interstitial with *r-m*; cell R_3 deep; basal deflection of R_2 (the *apparent* radial crossvein in the Pediciaria) only about one-half as long as the combined R_1 and R_2 beyond it; cell *1st* M_2 closed, large, *m* transverse in position; petiole of cell M_1 nearly twice *m*; *m-cu* a short distance beyond the fork of *M*.

Ovipositor with the valves stout, the tips broken in the unique type.

Tricyphona electrina is very distinct from the other Amber species so far made known. The venation is much as in *T. inconstans* (O. S.), *T. tipulina* (Egg.) and allied forms.

Tribe Styringomyini

This group includes only the genus *Styringomyia* Loew, with more than 30 described recent species having a tropicopolitan distribution, the great majority of the forms occurring in the Ethiopian and Oriental Regions. The genus is very isolated and was made the type of a distinct tribe by the writer in an earlier paper (Cornell Univ. Agr. Expt. Sta., Mem. 38: 957; 1920). Whether the group can be maintained as distinct from the Eriopterini must be decided upon future studies, especially of the structure of the early stages.

Styringomyia Loew.

1845. *Styringomyia* Loew; Dipt. Beitr., 1: 6.
1845. *Styringia* Berendt; Org. Reste, 1: 57.

The genus *Styringomyia* was first detected in Copal and Amber but was later found to be still living in the tropics of both the New and Old Worlds. The genus was based on *S. venusta* Lw., from Copal. In his 1850 paper, Loew (Bernstein, etc., p. 38) mentions *venusta*, and

also speaks of the occurrence of a species in the Amber, to which he gives the name *gracilis*, known to him only from a single male. The species was not described in any manner and the species, *gracilis*, must be considered as being a *nomen nudum*. In a later paper, Loew (Über die Dipterenfauna des Bernsteins, 1861; reprinted in English by Osten Sacken, Amer. Journ. Sci., (2) 37: 315; 1864) inadvertently gives the name of the Copal species as *S. pulchella*. Edwards (Trans. Ent. Soc. London, 1914: 206—207; 1914) mentions the great rarity of specimens of the genus in Amber, the only one ever taken apparently being the specimen mentioned by Loew. Meunier (1899: 174) was unable to locate Loew's *gracilis* and the type is apparently lost.

Tribe Eriopterini.

The tribe Eriopterini of the Amber includes a limited number of genera with a notable abundance of species. A survey of these genera indicates some interesting comparisons with the recent distribution of some of the groups.

A single species of the limited genus *Dasymolophilus* has been taken but to date not a single species of the great genus *Molophilus* of which more than 200 species have now been made known from the Antipodal regions which would thus appear to be the center of distribution for this group.

Ormosia, a characteristic Holarctic genus, shows a few well-defined species, of which one (*beurleni*) shows some decided points of resemblance to the New Zealand species of *Amphineurus*.

Erioptera has only two known species of the typical subgenus but an abundance of *Empeda* which must have been strikingly developed in Northern Europe during the Oligocene.

Rhabdomastix is represented by the extinct subgeneric group *Palaeogonomyia*, curiously intermediate in characters between the two recent subgenera, *Rhabdomastix* and *Sacandaga*. *Gonomyia*, one of the dominant Eriopterine genera in the recent fauna is here very insufficiently represented, there being only the extinct subgenus *Electrogonomyia* and a single nearly normal member of the typical subgenus.

To the genus *Gnophomyia* are referred a small group of species that do not agree exactly with this genus, as now restricted, or with *Trimicra*, with which some had been placed in the past.

Two noteworthy tropicopolitan genera have been added to the Amber fauna since the appearance of Meunier's Monograph (1906). The first of these, *Trentepohlia*, is represented by the typical subgenus,

which in the recent fauna is restricted to the palaeotropical regions of the World. *Ceratocheilus* had been discussed as occurring in the Amber by Meunier in his latest paper on the subject (1917).

KEY TO THE GENERA OF THE ERIOPTERINI.

1. Rostrum elongate, approximately as long as the body.
Ceratocheilus Wesché (p. 124)
Rostrum short, not exceeding the head. 2
2. Vein R_2 short, approximately equal to or shorter than R_{2+3}. .. 3
Vein R_2 longer than R_{2+3}. 8
3. *r* present. 4
r lacking. 6
4. Veins Cu_1 and *1st A* fused for a distance back from the wing-margin; vein *Sc* long, Sc_1 and R_1 not widely separated at wing-margin.
Trentepohlia Bigot (p. 123)
Veins Cu_1 and *1st A* entirely separate at wing-margin; vein *Sc* short, Sc_1 and R_1 widely separated at wing-margin. 5
5. Sc_2 close to the tip of Sc_1; veins R_2 and R_3 extending generally parallel to the wing-margin; *m-cu* before the fork of *M*.
Erioptera; subg. *Empeda* O. S. (p. 105)
Sc_2 removed to nearly twice its own length from the tip of Sc_1; vein R_2 oblique in position, diverging from vein R_3; *m-cu* beyond the fork of *M*. ..... *Rhabdomastix* (*klebsi*, sp. n.) (p. 113)
6. Antennae (♂) a little shorter than the entire body; vein R_2 short and straight, subperpendicular to the fork of R_{2+3}.
Rhabdomastix; subg. *Palaeogonomyia* Meun. (p. 111)
Antennae (♂) shorter, if bent backward not extending beyond the wing-root; vein R_2 oblique in position. 7
7. Cell *1st* M_2 open by the atrophy of the outer deflection of M_3; Sc_2 at the tip of Sc_1; *m-cu* at the fork of *M*; male hypopygium with the apex of each basistyle produced into a long, sword-like point.
Gonomyia; subg. *Electrogonomyia*, subg. n. (p. 118)
Cell *1st* M_2 closed; Sc_2 removed from the tip of Sc_1; *m-cu* beyond the fork of *M*; male hypopygium with the apices of the basistyles not so produced (not known for the only Amber species).
Gonomyia; subg. *Gonomyia* Meig. (p. 119)
8. Cell R_2 sessile. ..... *Dasymolophilus* Goetgh. (p. 98)
Cell R_2 petiolate. 9
9. Membrane of wing with abundant macrotrichiae.
Ormosia Rond. (p. 99)
Membrane of wing without macrotrichiae. 10

10. Cell *1st* M_2 open by the atrophy of *m*; vein *2nd A* strongly sinuous. *Erioptera*; subg. *Erioptera* Meig. (p. 103)

Cell *1st* M_2 closed; vein *2nd A* straight or only feebly sinuous. *Gnophomyia* O. S. (p. 119)

Dasymolophilus Goetg.

1920. *Dasymolophilus* Goetghebuer; Bull. Soc. Ent. Belgique, 2: 132.

The genus *Dasymolophilus* is represented in the recent fauna by four or five species, all Holarctic in distribution. The species are distinguished from *Molophilus* by the small size; structure of the male hypopygium, especially the single, nearly terminal dististyle; the venation, especially the abrupt or nearly perpendicular base of R_{2+3}; and, in all of the species, the presence of macrotrichiae in the cells of the wing. This latter character tends to be the most variable, since some species of *Molophilus* from New Zealand have the apical cells of the wing provided with such trichiae, and, conversely, one *Dasymolophilus* (*subnudus* Alexander) from Western North America has most of the cells beyond the cord without macrotrichiae, although the basal cells are normal. The structure of the hypopygium points strongly toward the isolated Australasian genus *Tasiocera* Skuse. The Amber species, *circumcinctus*, agrees closely with the genotype, *murinus* Meigen.

Dasymolophilus circumcinctus (Meun.).

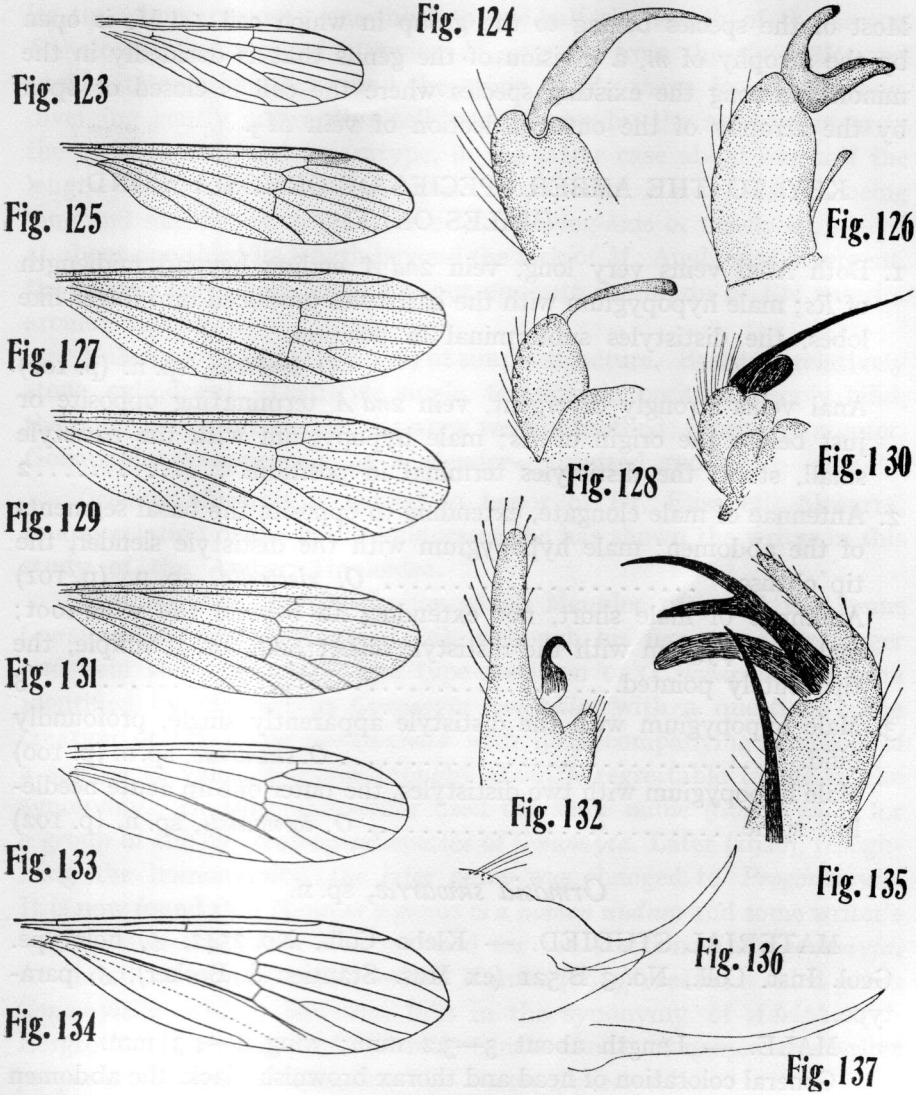
1906. *Erioptera* (*Hoplolabis*) *circumcincta* Meunier; Mon. Tipulidae Ambre Baltique, pp. 368—369, pl. 12, fig. 12 (antenna ♂), fig. 13 (palpus ♂), fig. 14 (hypopygium ♂).

MATERIAL STUDIED. — Klebs Coll., No. 3934, 26, ♂, lectotype. No. 1850, ♀; No. 3967, ♂.

Antennae as figured by Meunier; second scapal segment very large, subglobular; flagellar segments oval, becoming more slender and elongated outwardly.

Wings (Fig. 123) of the characteristic shape of the genus, the anal angle being virtually lacking, the anal fringe of setae very long and delicate. Venation: *Sc* short, ending just beyond *r*; *r* and the perpendicular base of R_{2+3} in transverse alignment; *m-cu* at or close to the fork of *M* (♂) or slightly more than its own length before this fork (♀).

Male hypopygium (Fig. 124) large and relatively conspicuous. Basistyle cylindrical, the apex rounded, the single dististyle placed immediately before the tip, long and slender, tapering to the acute tip. Elements of the phallosome projecting caudad between the basistyles.



Ormosia Rond.

1856. *Ormosia* Rondani; Dipt. Ital. Prodr., 1: 180.
1860. *Rhypholophus* Kolenati; Wien. Ent. Monatschr., 4: 393.
1899. *Gonomyiella* Meunier; Bull. Soc. Ent. France, pp. 334—335, fig. (*nomen nudum*).

The genus *Ormosia* has been found to be rather numerously represented in the Baltic Amber. All of the specimens seen by the writer are males, this peculiarity being readily explainable by the habit of this sex of occurring in small dancing swarms beneath the shade of the amber-producing pines and thus becominge enmeshed and imbedded.

Most of the species belong to the group in which cell *1st* M_2 is open by the atrophy of *m*, a division of the genus that is decidedly in the minority among the existing species where the cell is closed or open by the atrophy of the outer deflection of vein M_3.

KEY TO THE AMBER SPECIES OF ORMOSIA ROND. (MALES ONLY)

1. Both Anal veins very long, vein *2nd A* ending beyond midlength of *Rs*; male hypopygium with the basistyles produced into finger-like lobes, the dististyles subterminal in position.
O. beurleni, sp. n. (p. 102)

   Anal veins strongly divergent, vein *2nd A* terminating opposite or just before the origin of *Rs*; male hypopygium with the basistyle small, stout, the dististyles terminal in position. 2

2. Antennae of male elongate, extending to opposite the basal segments of the abdomen; male hypopygium with the dististyle slender, the tip obtuse. ..... *O. electrella*, sp. n. (p. 101)

   Antennae of male short, not extending to beyond the wing-root; male hypopygium with the dististyle either bifid, or, if simple, the tip acutely pointed..... 3

3. Male hypopygium with the dististyle apparently single, profoundly bifid. ..... *O. skwarrae*, sp. n. (p. 100)

   Male hypopygium with two dististyles, the outer one an acute needle-like spine. ..... *O. tornquisti*, sp. n. (p. 102)

Ormosia skwarræ, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 2542, ♂, holotype. Geol. Inst. Coll., No. 3 B 521 (ex Mus. Stantien & Becker), ♂, paratype.

MALE. — Length about 3—3.2 mm.; wing 4—4.3 mm.

General coloration of head and thorax brownish black, the abdomen paler; antennae and legs dark brown.

Antennae if bent backward extending about to the wing-root; flagellar segments oval, gradually decreasing in size outwardly, the terminal segment a trifle longer than the penultimate; verticils elongate, especially those of the inner face, the longest more than twice the segment.

Wings (Fig. 125) subhyaline; stigma distinct, oval, pale brown; veins dark brown. All cells of wing with conspicuous macrotrichiae. Venation: Sc_1 extending to shortly beyond the fork of *Rs*, Sc_2 far from

its tip, about opposite one-third to one-half the length of the sector, Sc_1 alone being more than twice R_{2+3}; *r* far from the tip of R_1 and nearly its own length beyond the origin of R_2; veins R_2 and R_3 long, diverging gently outwardly; cell *1st* M_2 open by the atrophy of *m* in the type, closed in the paratype, in the latter case about one-half the length of the more arcuated outer deflection of M_3, cell *1st* M_2 being long and narrow; *m-cu* transverse to the wing-axis or nearly so, placed at about one-third its length beyond the fork of *M*; Anal veins divergent, the second very short, ending about opposite the origin of *Rs*; anterior arculus lacking.

Male hypopygium (Fig. 126) of simple structure. Basistyle relatively stout, cylindrical. Dististyle single, terminal in position, deeply bifid, the outer arm more slender, its apex weakly toothed; inner arm stouter. Gonapophysis appearing as a slender chitinized rod.

Ormosia skwarræ is named in honor of Dr. Elisabeth Skwarra, in appreciation of the many kindnesses she has shown the writer in this study of the Amber Tipuloidea.

This is evidently the fly for which Meunier proposed the genus *Gonomyiella* (1899: 334—335, fig.), although his figure has *Rs* longer and vein *2nd A* shorter. The type-specimen of *O. skwarrae* had been identified by Meunier as *Gonomyia pulchella*, with a question. The creation of the name *Gonomyiella* with no accompanying mention of a species to validate it has brought about a regrettable tangle in the synonymy. In 1917, the writer used the same name (*Gonomyella*) for a group of chiefly Neotropical species of *Gonomyia*. Later (1920), recognizing the homonymity, the later name was changed to *Progonomyia*. It is now found that Meunier's genus is a *nomen nudum* and some writer's might claim that there was no need for the erection of *Progonomyia*. At about this same general period, Kuntze (1919) created a third genus *Gonomyiella*, which, however, falls in the synonymy of *Adelphomyia* Bergroth. In the light of this unfortunate tangle of names, the writer proposes to entirely abandon the name *Gonomyiella*.

Ormosia electrella, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. B 4511 (ex Mus. Stantien & Becker), ♂, holotype.

MALE. — Length about 3.5 mm; wing 4.2 mm.; antenna 1.9 mm. General coloration dark brown, including the legs.

Antennae elongate, if bent backward extending about to the base of the third abdominal segment; flagellar segments elongate-oval,

the apex of each narrowed into a short neck; segments clothed with a dense erect pubescence that is shorter than the segment, with occasional scattered verticils of slightly greater length; flagellar segments decreasing very gradually in length and diameter to the end.

Wings grayish subhyaline, the veins pale, badly crumpled in the unique type and the details of venation difficult of observation (Fig. 127): *Sc* ending opposite the fork of R_{2+3}, Sc_2 far from its tip; *Rs* relatively short; R_{2+3} a little longer than *m-cu*, much longer than the other elements of the cord; *r* on R_2 about its own length beyond the origin; vein *2nd A* short, ending about opposite the origin of *Rs*.

Male hypopygium (Fig. 128) of simple structure, the basistyle short and stout, the outer face provided with long setae. Dististyle apparently single, terminal in position, a slender chitinized rod with the apex a little expanded, subtruncated, the margin narrowly blackened.

Ormosia tornquisti, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 5217 VI 3244, ex Phys.-Oek. Gesell., ♂, holotype.

MALE. — Length about 3.3 mm.; wing 3.2 mm.

General coloration dark brown, including the legs and antennae.

Antennae short, if bent backward not attaining the wing-root; basal flagellar segments subglobular to short-oval, gradually passing into oval, the last segment a trifle longer than the penultimate; flagellar segments with coarse erect pubescence and a few longer verticils. Wings (Fig. 129) with a faint brownish tinge, the veins darker brown. Venation: Sc_1 immediately before the fork of R_{2+3}, Sc_2 far from its tip, at near one-fourth the length of *Rs*; *r* at the fork of R_{2+3}; veins R_2 and R_3 diverging, cell R_2 at wing-margin being more than one-half wider than cell R_3; cell *1st* M_2 open by the atrophy of *m*; cell M_3 more than twice the length of its petiole; *m-cu* at the fork of *M*; Anal veins divergent.

Male hypopygium (Fig. 130) with the basistyle short and stout, the outer face and especially the caudal portion with long conspicuous setae; dististyles terminal in position, two in number, the outermost a long, straight, chitinized needle, the apex acute; inner dististyle a small oval heavily blackened obtusely rounded lobe.

The species is named in honor of Professor W. Tornquist.

Ormosia beurleni, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype. Fritsch Coll., No. 90, ♂, paratype.

MALE. — Length 3.6 mm.; wing 4.6 mm.

General coloration brownish black, including the legs.

Antennae of moderate length, if bent backward extending to about opposite the wing-root; flagellar segments subcylindrical, a little more dilated beyond the base and here provided with verticils that are about one-half longer than the segments.

Wings (Fig. 131) with a grayish tinge, the stigmal region a little darker; veins pale brown. Venation: Sc_1 ending opposite the fork of R_{2+3}, Sc_2 far from its tip, at near one-third the length of Rs; Rs long and straight; R_{2+3} very short, not exceeding the basal section of R_2; r on R_2 a little more than its own length beyond the fork; veins R_2 and R_3 long and parallel; elements of the cord in zigzag alignment; cell *1st* M_2 open by the atrophy of m; *m-cu* immediately beyond the fork of M; both Anal veins very long, running generally parallel, at wing-margin separated from one another by a distance that is only a little greater than the corresponding space between veins Cu_1 and *1st A*; vein *2nd A* ending beyond four-fifths the length of the long Rs.

Male hypopygium (Fig. 132) with the basistyle much as in *Amphineurus*, extending caudad beyond the insertion of the basistyle into a long, digitiform lobe. Outer dististyle a small, strongly curved black hook, the basal half strongly dilated.

Named in honor of Dr. Beurlen of the Geological Institute of Königsberg.

The structure of the male hypopygium is very like certain New Zealand species of *Amphineurus* Skuse, but the structure of the basal dististyle and the gonapophyses cannot be further studied in the material available.

Erioptera Meig.

1800. *Polymeda* Meigen; Nouv. Class. Mouch., p. 14 (*nomen nudum*).
1803. *Erioptera* Meigen; Illiger's Mag., 2: 262.

In the Amber fauna, the great genus *Erioptera* has been found to include a limited number of forms referrable to the typical subgenus and a much greater abundance of the subgenus *Empeda* Osten Sacken. Loew (Bernstein, etc., p. 37; 1850) believed that he could recognize at least eight species in the abundant material available to him. Loew did not mention any of these species in his own writings but Meunier (1899b: 172—173) from a study of Loew's types, attempted to validate two of the names (*gracilis* and *minuta*). The former species is entirely unrecognizable from the brief diagnosis of Meunier but the latter is validated by a figure and is herein considered as being the same species that Meunier later (Mon, etc., p. 375; 1906) described as *Empeda prolifica*,

the name being credited to Meunier. In his monographic treatment, just mentioned, Meunier described a species, *perspicillata*, that belongs to the typical subgenus.

Subgenus Erioptera Meig.

The typical subgenus includes but two species so far made known but many more species will probably be differentiated when more and better preserved male specimens become available.

KEY TO THE AMBER SPECIES OF THE SUBGENUS ERIOPTERA. (FEMALES ONLY)

1. Ovipositor with the valves elongate, only slightly arcuated; wings with Sc_2 near midlength of *Rs*; veins beyond the cord of moderate length, the cells thus being relatively short.
E. (*E.*) *perspicillata* Meun. (p. 104)

Ovipositor with the tergal valves short, strongly arcuated; wings with Sc_2 near one-third the length of *Rs*; veins beyond the cord elongate, the cells being deep. ... *E.* (*E.*) *arcuata*, sp. n. (p. 105)

Erioptera (*Erioptera*) *perspicillata* Meun.

1906. *Erioptera perspicillata* Meunier; Mon. Tipulidae Ambre Ba[1]tique, p. 368, pl. 12, fig. 11 (antenna ♂).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 4257, ♂, holotype. Fritsch Coll., No. 18, a block containing six ♂♂ and one ♀, the latter described herewith as the allotype.

General coloration black, including the legs and antennae.

Wings subhyaline, the stigma a little darker; veins dark brown. Venation (Fig. 133): Sc_1 ending opposite *r*, Sc_2 at or near midlength of *Rs*, the latter long, nearly straight; R_{2+3} a little longer than the basal section of R_2; *m-cu* shortly beyond the fork of *M*, the petiole of cell M_3 shorter than *m-cu*; veins beyond the cord relatively short, the cells thus being comparatively shallow; vein *2nd A* strongly sinuous, cell *1st A* being wider at middle.

Male hypopygium (Fig. 135) with the basistyles relatively long and slender, the outer dorsal apical angle produced caudad and slightly mesad into a slender, finger-like lobe that is sparsely setiferous. Outer dististyle stout basally, the apical portion deeply bifid, the two arms slender, unequal, divergent, their tips acute, the outer arm longer and slightly more slender than the inner arm. Inner dististyle a stout, gently arcuated rod. Gonapophyses long and conspicuous, appearing as gently curved needle-like rods. Ovipositor with the tergal valves (Fig. 137) very long and slender, only gently upcurved to the acute tips.

Erioptera (Erioptera) arcuata, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 3993, ♀, holotype.

Very close to *E. perspicillata,* differing chiefly in the structure of the ovipositor, the tergal valves (Fig. 136) of which are short and strongly upcurved to the acute tips. Wings (Fig. 134) with a strong brownish tinge, the veins still darker. Venation: Very much as in *perspicillata* but with Sc_2 lying farther basad, vein Sc_1 thus being longer, and with the veins beyond the cord somewhat more elongate, the cells being deeper.

Subgenus Empeda O. S.

1869. *Empeda* Osten Sacken; Mon. Dipt. N. Amer., 4: 183.
1913. *Erioptera (Empeda)* Alexander; Proc. U. S. Nat. Mus., 44: 512.

Species of the subgenus *Empeda* appear to have been very abundant in the Lower Oligocene of northern Europe. The species that have been discovered to date all agree closely in their general appearance but are readily separated by the details of structure of the male hypopygium. Since the males are common in the Amber and are often so preserved that the hypopygium lies well exposed, their exact determination is not rendered impossible. It is very certain that many additional species remain to be discovered in Amber. The eight that are discussed at this time are all very well defined upon the structure of the hypopygium.

The wings of all the Amber species agree in having crossvein *r* retained and connecting R_1 with R_{2+3}; cell *1st* M_2 closed by the retention of *m* (the latter lacking only in very abnormal cases); *m-cu* usually close to the fork of *M*.

The fundamental plan of structure of the male hypopygium is the same in all of the known fossil species. The basistyle is cylindrical and generally terminates in small, fleshy lobes. The two dististyles are terminal in position or nearly so, the outer always profoundly bifid, the inner style simple or forked, depending on the species concerned. It is still impossible to differentiate isolated females in this difficult group.

KEY TO THE AMBER SPECIES OF EMPEDA O. S. (MALES ONLY)

1. Male hypopygium with the arms of the outer dististyle expanded into broad leaf-like blades. .... *E.* (*E.*) *platyphylla,* sp. n. (p. 107)
Male hypopygium with the arms of the outer dististyle slender. 2

2. Male hypopygium with the inner dististyle a long, chitinized rod, at near one-third the length with a small lateral spine or tooth. *E.* (*E.*) *subabortiva*, sp. n. (p. 110)
Male hypopygium with the inner dististyle not as above.....3
3. Inner dististyle deeply bifid; outer dististyle without an axillary spinous tubercle. 4
Inner dististyle simple; if with a small lateral spine (in *axillaris*), the outer dististyle bearing an axillary spinous tubercle.....5
4. Male hypopygium with the inner dististyle unequally bifid, the stem bearing a large flattened spine before midlength; phallosome massive, heavily chitinized, cruciform.....*E.* (*E.*) *duplicata*, sp. n. (p. 108)
Male hypopygium with the inner dististyle nearly equally bifid, the terete spines slender, acute; elements of the genital chamber (gonapophyses?) appearing as needle-like spines.
E. (*E.*) *diacantha*, sp. n. (p. 109)
5. Male hypopygium with the inner dististyle a short, straight rod, the tip acute ..... *E.* (*E.*) *rectistyla* sp. n. (p. 111)
Male hypopygium with the inner dististyle not a short, straight rod, as above 6
6. Male hypopygium with the outer dististyle deeply bifid, the arms without branches; inner dististyle a relatively slender, strongly sinuous, simple rod.....7
Male hypopygium with the outer dististyle deeply bifid, the inner arm expanded and bearing a small, blackened, spinulose tubercle in its axil; inner dististyle expanded outwardly, the inner margin near the base of the dilated portion with a small pale spine.
E. (*E.*) *axillaris*, sp. n. (p. 110)
7. Antennae (♂) relatively short, if bent backward not extending to the wing-root; male hypopygium without spines on the arms of the outer dististyle. ..... *E.* (*E.*) *minuta* (Meun.) (p. 106)
Antennae (♂) relatively long, nearly as long as the combined head and thorax; male hypopygium with the outer arm of the outer dististyle with a small spine on the inner face before midlength.
E. (*E.*) *schummeli* (Meun.) (p. 107)

Erioptera (*Empeda*) *minuta* Meun.

1899. *Erioptera minuta* Meunier; Miscell. Ent., 7: 173, pl. 2.
1906. *Empeda prolifica* Meunier; Mon. Tipulidae Ambre Baltique, pp. 375—376, pl. 13, fig. 7 (antenna ♂), fig. 8 (hypopygium ♂), fig. 9 (wing apex).
1906. *Empeda elongata* Meunier; *Ibid.*, p. 376, pl. 13, fig. 6 (antenna ♀).

MATERIAL STUDIED. — Klebs Coll., No. 1695, 3736, ♂, designated as lectotype; Nos. 33, 261. Geol. Inst. Coll., ♂♂, Nos. 977, 1578, 4628, 6160, 7529, 7946, 8426, 8429, 8729, 8852. 9571; ♀♀, Nos. 2584, 3795, 4052, 4967, 5000, 5665, 6087, 6539, 6608, 8759, 9023. Fritsch Coll., several of both sexes.

E. (*E.*) *minuta* is apparently the most abundant species of the subgenus in Amber. It is possible that some of the ♀♀ here referred to *minuta* may pertain to some one or other of the related species.

Antennae of male with the second scapal segment enlarged, oval; basal flagellar segments a little larger than the others, crowded, the sutures between them not well-defined; segments with elongate verticils, as in this sex of *Empeda*.

Wings (Fig. 138) with *Sc* relatively short, Sc_1 ending about opposite midlength of *Rs*, Sc_2 not far from its tip; *Rs* of moderate length, arcuated at origin; *r* on R_{2+3} at or before midlength, far removed from the tip of R_1; cell *1st* M_2 small, closed; *m-cu* shortly before the fork of *M*; anterior arculus broken.

Male hypopygium (Fig. 140) about as shown by Mrs. Meunier's figure; however the tips of the inner dististyles are concealed in this drawing; they are heavily chitinized and acutely pointed. This species is told by the simple, slender inner dististyle, taken in connection with the slender arms of the outer style.

The variety *elongata* discussed by Meunier was based on a single isolated female that is not distinguishable from typical *minuta*.

Erioptera (*Empeda*) *schummeli* (Meun.).

1917. *Empeda schummeli* Meunier; Neues Jahrb. Mineral., 1917: 98, pl. 15, fig. 69 (wing), pl. 16, fig. 73 (antenna ♂), fig. 74 (hypopygium ♂).

Meunier's type has not been seen by the writer. His description and figures indicate a fly with much longer antennae than in the other species of the genus, in the ♂ being almost as long as the head and thorax taken together, the second scapal segment very large. The hypopygium agrees closely with that of *minuta* in the simple inner dististyle but differs in having a small acute spinous tooth on the inner margin of the outer arm of the outer dististyle shortly before midlength.

Erioptera (*Empeda*) *platyphylla*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 1821, ♂, holotype.

MALE. — Length about 3 mm.; wing about 3 mm.

Characters as in *minuta*, differing as follows:

Wings (Fig. 139) subhyaline, the stigma lacking. Venation: R_{2+3} elongate, longer than R_2 alone, r not much more than its own length beyond the fork of Rs; R_1 beyond r elongate, longer than R_2 alone.

Male hypopygium (Fig. 141) with the basistyle produced caudad into three lobes, a fleshy dorsal lobe with sparse long setae; an intermediate lobule that is densely set with setiferous tubercles, and a ventral subglabrous beak-like lobe, the point of which is directed mesad. Dististyles two; outer style as in the subgenus, each arm expanded into a broad leaf-like structure, the dorsal lobe on outer face near base subtended by a small, gently curved black spine. Inner dististyle a long, simple chitinized rod, strongly curved and cylindrical at base, the long straight apical portion dilated into a narrow blade, thence gradually narrowed to the acute tip. Aedeagus or phallosome produced into two pale fleshy lobes, separated from one another by a deep median split, the outer lateral angle of each lobe produced caudad and mesad into a gently curved, slender black spine, the tip of which is obtuse.

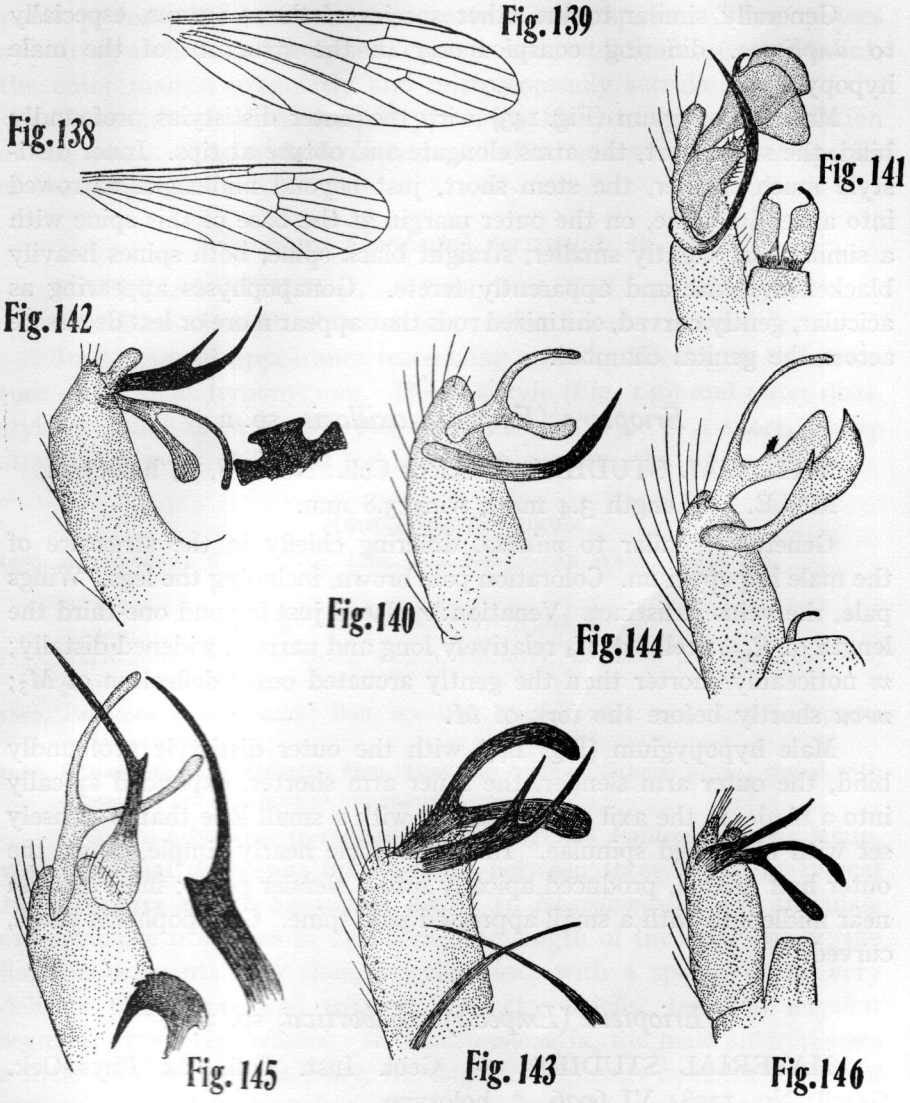
Erioptera (*Empeda*) *duplicata*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 301, ♂, holotype; No. 261, ♂, paratype. Geol. Inst. Coll., Nos. 1021, 6792 and 8056, 3 ♂♂, paratypes, removed from Meunier's series of *minuta* (as *prolifica*).

MALE. — Length about 2.1—2.5 mm.; wing 2.3—2.8 mm.

General coloration pale brown. Wings pale. Venation: Sc_1 extending from one-half to two-thirds the length of Rs, Sc_2 slightly removed from its tip; cell *1st* M_2 more or less elongate, in extreme cases more than one-half the length of vein M_{1+2} beyond it; *m-cu* at or before the fork of M.

Male hypopygium (Fig. 142) of rather complicated structure. Basistyle large, cylindrical, the ventral apical angle produced slightly caudad, the dorsal apical angle produced caudad and slightly mesad into a fleshy lobe. Dististyles two, subterminal in position, both bifid. Outer style larger, the stem much shorter than the arms, the outer arm slender, gently curved to the narrow apex; inner or cephalic arm nearly straight, a little shorter than the outer, its apex expanded into a small spatulate blade. Inner style more heavily chitinized, extended into a long, darkened spine, shortly beyond the base bearing a similar but smaller flattened spine that is nearly straight. Phallosome a massive cruciform structure, heavily chitinized, the lateral arms short to of moderate length, their apices weakly expanded, truncate. Ninth tergite a projecting, flattened, spatulate lobe.



The present species is readily told from *minuta* by the structure of the male hypopygium, especially the bifid inner dististyle and massive phallosome.

Erioptera (*Empeda*) *diacantha*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll. No. 9151, ♂, holotype; removed from the Meunier series of *minuta* (as *prolifica*).

MALE. — Length about 2.6 mm.; wing 3.2 mm.

Generally similar to the other species of the subgenus, especially to *duplicata*, differing conspicuously in the structure of the male hypopygium.

Male hypopygium (Fig. 143) with the outer dististyles profoundly bifid, the stem short, the arms elongate and obtuse at tips. Inner dististyle much smaller, the stem short, just beyond midlength narrowed into a slender spine, on the outer margin at the base of this spine with a similar but slightly smaller, straight black spine, both spines heavily blackened, acute and apparently terete. Gonapophyses appearing as acicular, gently curved, chitinized rods that appear more or less decussate across the genital chamber.

Erioptera (*Empeda*) *axillaris*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 278, ♂, holotype.

MALE. — Length 3.4 mm.; wing 3.8 mm.

Generally similar to *minuta*, differing chiefly in the structure of the male hypopygium. Coloration pale brown, including the legs. Wings pale, the veins indistinct. Venation: *r* placed just beyond one-third the length of R_{2+3}; cell *1st* M_2 relatively long and narrow, widened distally; *m* noticeably shorter than the gently arcuated outer deflection of M_3; *m-cu* shortly before the fork of *M*.

Male hypopygium (Fig. 144) with the outer dististyle profoundly bifid, the outer arm slender, the inner arm shorter, expanded apically into a blade, in the axil on the margin with a small lobe that is densely set with blackened spinulae. Inner dististyle nearly simple, stout, the outer half dilated, produced apically into a slender point; inner margin near midlength with a small appressed pale spine. Gonapophyses small, curved.

Erioptera (*Empeda*) *subabortiva*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ex Phys.-Oek. Gesell, No. 11584 VI 6926, ♂, holotype.

Allied to *minuta*, in its general appearance, differing chiefly in the structure of the male hypopygium.

Antennae short, if bent backward extending about to the wing-root. Male hypopygium (Fig. 145) with the outer dististyle pale, profoundly bifid, as in the subgenus; outer arm relatively broad and flattened, ribbon-like, the inner arm a little shorter. Inner dististyle heavily chitinized beyond the expanded base, the basal third a little stouter and bearing a short spur on the mesal face; apex of style beyond this

point prolonged into an acute, gently curved spine. Gonapophyses appearing as heavily blackened, curved rods, ending in an acute point, the outer margin irregularly and microscopically serrulate.

The condition of the unique type is insufficient to give a description of the wings. The male hypopygium indicates a very distinct species of the subgenus.

Erioptera (*Empeda*) *rectistyla*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., ♂, holotype.

MALE. — Length about 2 mm.; wing about 2.2 mm.

In its general appearance resembling *minuta*, differing in the structure of the male hypopygium. The basistyle (Fig. 146) and outer dististyle is much as in *minuta* but the inner dististyle is a short, nearly straight, heavily chitinized rod, the base swollen, the tip acute.

Rhabdomastix Skuse.

1889. *Rhabdomastix* Skuse; Proc. Linn. Soc. New South Wales, (2) 4: 828.

Subgenus *Palaeogonomyia* Meun.

1850. *Haploneura* Loew (*nec* Osten Sacken, Meunier); Bernstein und Bernsteinfauna, p. 36.

1899. *Palaeogonomyia* Meunier; Bull. Soc. Ent. France, 1899: 359, fig.; no species mentioned.

1906. (*Palaeogonomyia* Meunier); Mon. Tipulidae Ambre Baltique, p. 372; placed with *Gonomyia*; no type-species designated.

It seems advisable to recognize the subgenus *Palaeogonomyia* Meun. with antennal characters intermediate between those found in typical *Rhabdomastix* and in *Sacandaga* Alex. In *Rhabdomastix*, s.s., the male antennae are from two to four times the length of the entire body, the flagellar segments very elongate-cylindrical, with a sparse, erect, very delicate pubescence and without distinct verticils; terminal flagellar segment extremely reduced. In *Palaeogonomyia*, the male antennae are a little shorter than the body, the flagellar segments cylindrical, with a coarse erect pubescence that is very evident, the verticils present but inconspicuous among the coarse pubescence; terminal flagellar segment reduced, except in *elegantula*, the male of which is still unknown and which may be found to pertain to still another subgeneric group. In *Sacandaga*, the male antennae are short, not exceeding the combined head and thorax, and, in most species, not passing beyond the wing-root.

The wings of *Palaeogonomyia* have a characteristic venation (Figs. 148, 149, 150, 151): *Sc* of moderate length, always ending some distance beyond the origin of *Rs*; R_2 short, straight, subperpendicular; cell

1st M_2 closed, the veins issuing from it tending to be arcuated, especially the distal section of M_{1+2}; *m-cu* at or near midlength of cell *1st* M_2, oblique. Trichiation: Normally with no trichiae on veins *Rs*, R_{2+3} or R_2 of the wings; a series of from 6 to 15 trichiae distributed along vein R_3 for most of its length; numerous trichiae on the distal section of R_{4+5} and on the distal section of M_{1+2} except at proximal end. In a few cases, one to few trichiae on vein R_{2+3}. In *R. klebsi*, there are abundant macrotrichiae on veins *Rs*, R_{2+3}, R_2 and R_3; since, moreover, this species retains *r*, it is highly probable that this, too, will be removed from typical *Palæogonomyia* when the male is made known.

Type of subgenus. — *Rhabdomastix* (*Palæogonomyia*) *pulcherrima* (Meun.), by present designation (Lower Oligocene — Baltic Amber).

In his Monograph (1906: 372—375), Meunier proposed six new species of these flies. A study of his types enables me to maintain as distinct but three of these species, with one additional subspecies of doubtful value.

In the British Museum Collection (No. In. 22099) is a female of a species allied to *elegantula* to which Loew had affixed the manuscript name *Haploneura terminalis*. This proves what was already indicated by Loew's key (Bernstein, etc., p. 36; 1850) that he intended the name *Haploneura* for these species of *Rhabdomastix*, and not for the genus *Ula*, as believed by Osten Sacken, nor for the genus *Adelphomyia*, as must now be held, the complicated situation being discussed under the consideration of *Adelphomyia*.

KEY TO THE SPECIES OF PALAEOGONOMYIA MEUN.

1. Crossvein *r* present; macrotrichiae on veins *Rs* and R_2.
R. (*P.*) *klebsi*, sp. n. (p. 113)

Crossvein *r* lacking; no macrotrichiae on veins *Rs* or R_2. 2

2. Terminal segment of antenna elongate-cylindrical, exceeding one-half the length of the penultimate; vein *2nd A* short, cell *1st A* being very wide. ..... *R.* (*P.*) *elegantula* (Meun.) (p. 114)

Terminal segment of antenna reduced to a small oval or subglobular button, much less than one-half the length of the penultimate; Anal veins of normal length, cell *1st A* being of moderate width only. 3

3. Flagellar segments (♀) elongate-cylindrical to long-fusiform, the antenna extending to shortly beyond the base of the abdomen; macrotrichiae on vein R_3 rather numerous, ten or more.
R. (*P.*) *pulcherrima* (Meun.), and subsp. *graciosa* (Meun.) (p. 114)

Flagellar segments (♀) oval to elongate-oval, the antenna barely

attaining the base of the abdomen; macrotrichiae on vein R_3 scanty, six or seven in number. 4

4. Antenna (♀) extending about to the base of the abdomen; cell R_2 of wings at margin about twice as wide as cell R_3, this due to a notably greater length of vein R_3.

R. (*P.*) *borussica* (Meun.) (p. 117)

Antenna (♀) not extending beyond the root of the halteres; cell R_2 of wings small, at wing-margin not much wider than cell R_3.

R. (*P.*) *brevis*, sp. n. (p. 117)

Rhabdomastix klebsi, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 142, 53, ♀, holotype.

FEMALE. — Length about 7 mm.; wing 6.5 mm.

General coloration dark brown, including the legs and antennae; more blackened areas on the anterior praescutum, on the postnotal mediotergite and on the anepisternum.

Antennae relatively short, if bent backward scarcely attaining the wing-root; flagellar segments subcylindrical, gradually decreasing in size outwardly, the terminal segment only a trifle shorter than the penultimate, the terminal eight segments taken together about equal in length to the preceding six taken together.

Legs stout and relatively short, the basitarsi longer than the remaining segments taken together; terminal segment a little longer than the fourth. Wings (Fig. 147) large and ample, with a faint brown tinge; stigma oval, pale brown; veins darker brown. Trichiation: Macrotrichiae on veins very numerous, including veins *Rs*, R_{2+3} (about 17), R_2 (about 8) and other veins where they are quite lacking in the typical species of *Palaeogonomyia*; no trichiae on bases of veins *M* and *Cu*. Venation: Sc_1 extending to nearly opposite two-thirds the length of *Rs*, Sc_1 some distance from its tip, Sc_1 alone being a little longer than the distance between the origin of *Rs* and Sc_2; *r* present, placed just beyond one-third the length of R_{2+3} and a little less than twice its length from the tip of R_1; cell *1st* M_2 rectangular, a very little widened outwardly, the veins beyond it elongate; *m-cu* placed before the proximal third of cell *1st* M_2; vein *2nd A* gently bicurved.

Terebra of ovipositor slender, their tips acute.

Rhabdomastix klebsi is named in honor of the distinguished student of the Amber insects, the late Prof. Dr. Richard Klebs. The type-specimen had been examined by Meunier and been determined by him

as being his *R. elegantula*, which is an entirely different species. The present fly is notable in the Amber fauna by its large size, ample wings and the retention of the radial crossvein.

Rhabdomastix elegantula (Meun.)

1906. *Gonomyia (Palæogonomyia) elegantula* Meunier; Mon. Tipulidae Ambre Baltique, p. 372, pl. 13, fig. 3 (antenna ♁).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 5055, ♀, holotype. One additional ♀ in the same collection, without number.

FEMALE. — Length about 4.8—5.2 mm.; wing 4.3—5 mm.

The type is in poor condition, especially as regards the flagellar segments of the antennae and the anal field of the wing. The second specimen mentioned above is in much better condition in the two respects noted. The figure of the wing, given herewith, is based on the holotype with the exception of the anal field which is corrected from the second specimen.

General coloration shiny coal black.

Antennae relatively elongate, if bent backward extending to some distance beyond the wing-root; basal two or three flagellar segments short and more incrassated; remaining flagellar segments passing into elongate-cylindrical, the terminal segment (Fig. 153) elongate, at least one-half the length of the penultimate.

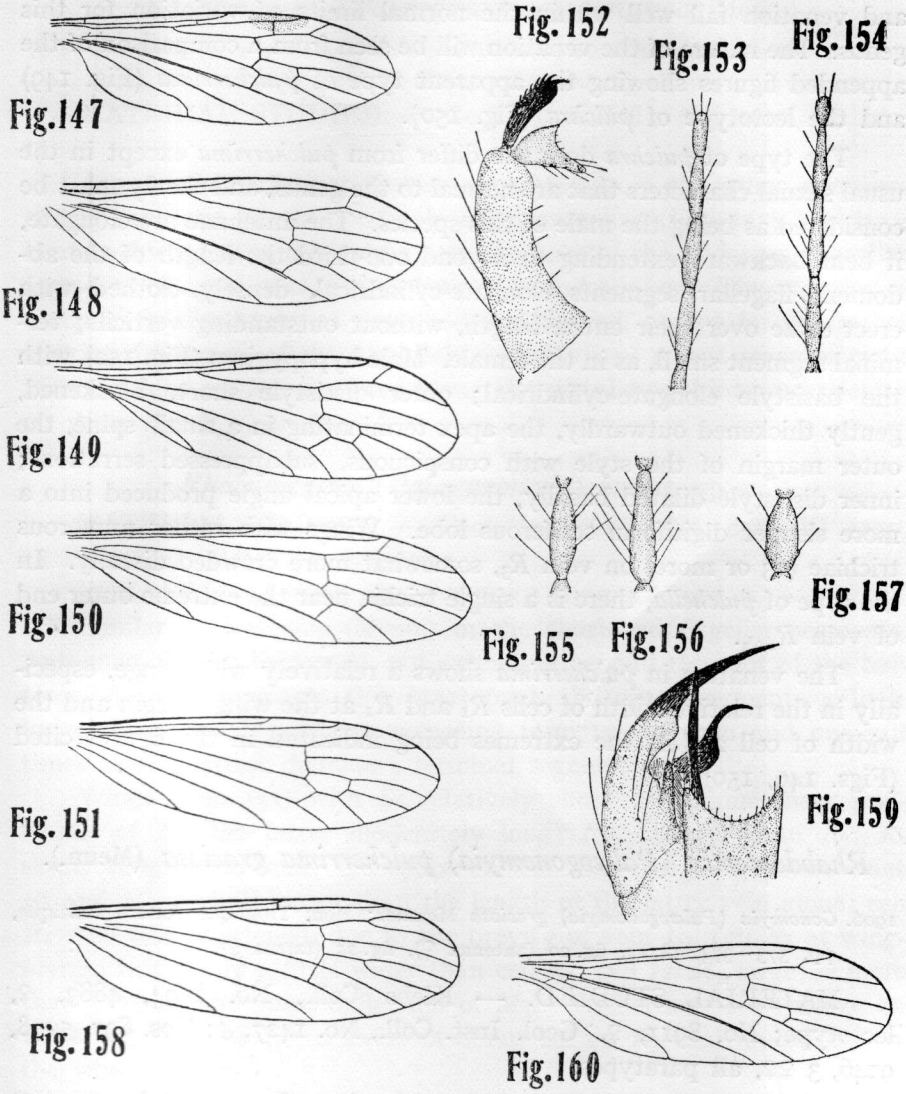
Wings (Fig. 148) subhyaline, the stigma vaguely darker; veins pale brown. Venation: *Sc* relatively short, Sc_1 ending before midlength of *Rs*, *Sc* indistinguishable in the material available; R_2 nearly perpendicular, the distance on the wing-margin between veins R_1 and R_2 being a little less than the length of the latter; R_{2+3} a little shorter than the gently arcuated R_3; distal section of M_{1+2} arcuated; in the type, the second section of M_{1+2} is nearly straight, as figured, but in the second specimen, this section of the vein is likewise gently arcuated; *m-cu* a little less than its length beyond the fork of *M*, oblique; vein *1st A* on basal half running close to *Cu* and subparallel with it, then diverging strongly from it; vein *2nd A* very short, cell *1st A* thus being unusually broad; anterior arculus lacking. Trichiation of type: About 10 trichiae on R_3, none on *Rs*, R_{2+3} or R_2.

Rhabdomastix (Palæogonomyia) pulcherrima (Meun.).

1906. *Gonomyia (Palæogonomyia) pulcherrima* Meunier; Mon. Tipulidae Ambre Baltique, pp. 372—373, pl. 12, fig. 22 (antenna ♀).

1906. *Gonomyia (Palæogonomyia) pulchella* Meunier; *Ibid.*, p. 373, pl. 12, fig. 23 (palpus ♀), pl. 13, fig. 2 (antenna ♀).

1906. *Gonomyia (Palæogonomyia) pulchra* Meunier; *Ibid.*, pp. 374—375, pl. 13, fig. 4 (antenna ♂), fig. 5 (hypopygium ♂).



MATERIAL STUDIED. — Klebs Coll., No. 168, ♀, probably the holotype of *pulcherrima*, although Meunier says No. 68; No. 477, ♀, holotype of *pulchella*. Geol. Inst., No. 3177, ♂, lectotype of *pulchra*; No. 4828, paratype ♂.

I cannot find characters to separate these three supposedly different species of *Palæogonomyia*. Meunier attempted to validate them on the relative lengths and stoutness of the antennae but this character is more apparent than real in his various types. The differences in body size

and venation fall well within the normal limits of variation for this genus. The nature of the venation will be seen from a comparison of the appended figures showing the apparent type of *pulcherrima* (Fig. 149) and the lectotype of *pulchra* (Fig. 150).

The type of *pulchra* does not differ from *pulcherrima* except in the usual sexual characters that are normal to the genus, and the fly must be considered as being the male of this species. The antennae are elongate, if bent backward extending to beyond one-third the length of the abdomen; flagellar segments elongate-cylindrical, densely clothed with erect setae over their entire length, without outstanding verticils; terminal segment small, as in the female. Male hypopygium (Fig. 152) with the basistyle elongate-cylindrical; outer dististyle short, blackened, gently thickened outwardly, the apex terminating in a small spine, the outer margin of the style with conspicuous, subappressed serrations; inner dististyle dilated basally, the lower apical angle produced into a more slender digitiform setiferous lobe. Wings with rather numerous trichiae (13 or more) on vein R_3, somewhat more crowded distally. In the type of *pulchella*, there is a single trichia near the extreme outer end of vein R_{2+3}.

The venation in *pulcherrima* shows a relatively wide range, especially in the relative width of cells R_1 and R_2 at the wing-margin and the width of cell *2nd A*, the extremes being indicated in the figures cited (Figs. 149, 150).

Rhabdomastix (*Palæogonomyia*) *pulcherrima graciosa* (Meun.).

1906. *Gonomyia* (*Palæogonomyia*) *graciosa* Meunier; Mon. Tipulidae Ambre Baltique, pp. 373—374, pl. 12, fig. 20 (antenna ♀), fig. 21 (tarsus ♀).

MATERIAL STUDIED. — Klebs Coll., No. 1694, 4883, ♀, lectotype; No. 8911, ♀. Geol. Inst. Coll., No. 1427, ♂; Nos. 837, 5058, 9146, 3 ♀♀, all paratypes.

Although very close to typical *pulcherrima*, the present form seems to be separable as a race or subspecies. The antennae of the female (Figs. 154, 156) are slightly shorter than in typical *pulcherrima*, if bent backward extending to very shortly beyond the base of the abdomen. The wings and their venation show no constant differences in the two forms. Trichiation: In the lectotype, the macrotrichiae on vein R_3 are numerous, as in typical *pulcherrima*, exceeding 10 in number. Paratype No. 837 has four strong macrotrichiae on the distal half of R_{2+3} but seems to represent the same subspecies.

Rhabdomastix (*Palæogonomyia*) *borussica* (Meun.).

1906. *Gonomyia* (*Palæogonomyia*) *borussica* Meunier; Mon. Tipulidae Ambre Baltique, p. 374, pl. 13, fig. 10 (antenna ♀), fig. 11 (palpus ♀).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 2600, ♀, holotype.

Apparently a distinct species, separated from the other members of the subgenus by the relatively short antennae (Fig. 155), which, if bent backward, would barely attain the base of the abdomen; flagellar segments elongate-oval, not so long as in *pulcherrima*. The venation is much as in *elegantula*, as described and figured, except for the rather striking differences of the Anal field. Trichiation: About seven or eight macrotrichiae on R_3, scattered along the distal two-thirds; no trichiae on veins *Rs*, R_{2+3} or R_2.

Rhabdomastix (*Palægonomyia*) *brevis*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 8122 VI 5110, ex Phys.-Oek. Gesell., ♀, holotype.

FEMALE. — Length about 3 mm.; wing 2.8 mm.

Similar to *borussica* (Meun.) in the shortened flagellar segments. Antennae, if bent backward, not extending beyond the root of the halteres; flagellar segments (Fig. 157) oval, the outer segments a little longer but their length not exceeding from two to two and one-half times their greatest diameter; terminal segment small.

Wings (Fig. 151) with *Sc* relatively short, Sc_1 ending near mid-length of *Rs*, the latter moderately long; R_{2+3} longer than R_3; R_2 short, subperpendicular, the space on the wing-margin between veins R_1 and R_2 one-half longer than the length of the latter vein alone; cell R_2 unusually shortened, due to the brevity of vein R_3, cell R_2 at wing-margin being only a little wider than cell R_3; cell *1st* M_2 large; *m* more than one-half the outer deflection of M_3. Trichiation: No trichiae on veins *Rs*, R_{2+3} or R_2; a series of about six on R_3, distributed almost the whole length.

Gonomyia Meig.

1818. *Gonomyia* Meigen; Syst. Beschr. Zweifl. Ins., 1: 146.

Only two species of crane-flies so far discovered in the Amber appear to be true members of the genus *Gonomyia*, and one of these, *pinetorum*, is herewith made the type of a new subgeneric group. The second species, *oligocenica*, is a more normal type. The six species placed in *Gonomyia* by Meunier (Mon., etc., pp. 372—375; 1906) belong more properly to *Rhabdomastix* Skuse, and are discussed under that genus.

Electrogonomyia, subg. n.

Characters very similar to *Progonomyia* Alex., differing chiefly in venational details.

Antennae 16-segmented; flagellar segments elongate-oval to fusiform, with verticils that exceed the segments in length. Venation (Fig. 158): *Sc* long, Sc_1 ending just beyond midlength of *Rs*, Sc_2 at its tip and a little longer; *Rs* long, gently arcuated; R_{2+3} a little shorter than R_2 alone; R_2 and R_3 gently diverging; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; *m-cu* at the fork of *M*. Male hypopygium (Fig. 159) with the tergite flattened, the caudal margin broadly emarginate. Basistyle produced at apex into a long, sword-shaped point, decussate in a position of rest with its mate of the opposite side.

Type of subgenus. — *Gonomyia* (*Electrogonomyia*) *pinetorum*, sp. n. (Lower Oligocene — Baltic Amber).

The new group, *Electrogonomyia*, appears to represent the most generalized subgenus of *Gonomyia* as yet made known. The group falls very near *Progonomyia* Alex., where, however, Sc_2 is always removed from the tip of Sc_1 and the veins R_2 and R_3 are shorter and more divergent, much as in typical *Gonomyia*. The structure of the male hypopygium is very different from that found in *Progonomyia*.

Gonomyia (*Electrogonomyia*) *pinetorum*, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. X 74, ♂, holotype.

MALE. — Length about 4.5 mm.; wing 4.4 mm.

General coloration brown, including the legs and antennae.

Antennae of moderate length, if bent backward extending about to the wing-root; flagellar segments decreasing gradually in size to the end. Terminal segment of palpus one-half longer than the penultimate.

Wings (Fig. 158) with a pale brownish tinge, the stigma scarcely darker; veins dark brown. Venation: Cell *2nd* M_2 deep, about twice its petiole.

Male hypopygium (Fig. 159) with the ninth tergite conspicuous, arched, the caudal margin evenly emarginate, fringed with setae, the lateral angles narrow; dorsum of tergite with conspicuous setae. The basistyle appears to be produced apically into a slender acute spine, sharply pointed and lying decussate across the midline of the body; on dorso-mesal face of basistyle a slender, finger-like lobe. What seems to represent a dististyle is a heavily blackened polished arm, the sickle-shaped apex conspicuous. What would appear to represent a gonapophysis is a long, slender, chitinized rod, gently curved, the tips acute, directed caudad.

Subgenus Gonomyia Meig.

Gonomyia (Gonomyia) oligocenica, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 6963 VI 4990, ex Phys.-Oek. Gesell., ♀, holotype. Determined by Meunier as a *Haploneura.*

FEMALE. — Length about 4 mm.; wing 3.3 mm.

Antennae relatively short, if bent backward extending to shortly beyond the wing-root; basal flagellar segments oval, the outer segments cylindrical; terminal segment two-thirds the length of the penultimate; flagellar segments with scattered stout setae, including longer ones near the base.

Wings (Figs. 160) with *Sc* moderately long, Sc_1 ending shortly before midlength of *Rs*, the latter subsinuous; R_{2+3} elongate, about one-third longer than R_2; space on costa between tips of R_1 and R_2 equal to a little more than one-half of R_{2+3}; cell *1st* M_2 relatively narrow, gently widened distally, *m* and the outer deflection of M_3 subequal; veins issuing from cell *1st* M_2 elongate, gently divergent; *m-cu* just before midlength of cell *1st* M_2.

Ovipositor with the tergal valves slender, rather strongly upcurved to the acute tips; sternal valves nearly straight, the tips pale.

The species appears to be referable without question to *Gonomyia* rather than to *Rhabdomastix.*

Gnophomyia O. S.

1859. *Gnophomyia* Osten Sacken; Proc. Acad. Nat. Sci. Philadelphia, 1859: 223.

The Amber species that are here referred to *Gnophomyia* present certain problems. In certain regards, some of the species suggest *Trimicra* O. S. but this resemblance seems to be superficial only. The various species show a conspicuous range in the relative size of the body, the comparative length of Sc_1 and the position of *m-cu* in relation to the fork of *M*.

Two of the species described herewith were earlier placed in this genus by Meunier (Mon., etc., pp. 370—372; 1906), but his third species, *minuta,* had been placed by him in *Trimicra.* All three species are obviously congeneric and, as previously stated, appear to agree better with *Gnophomyia.*

KEY TO THE AMBER SPECIES OF GNOPHOMYIA O. S.

1. Sc_2 opposite the fork of *Rs.* ..... *G. magna* Meun. (p. 120)
   Sc_2 before the fork of *Rs,* usually at or before midlength of *Rs.* 2

2. Vein *2nd A* elongate, ending beyond two-thirds the length of *Rs*, the distal third strongly sinuous, deflected toward the wing-tip. *G. minuta* (Meun.) (p. 121)

   Vein *2nd A* short, nearly straight, ending opposite the origin or before the basal third of *Rs*. 3

3. *m-cu* at or close to the fork of *M*. ..... *G. inferna*, sp. n. (p. 122)

   m-cu at or near midlength of cell *1st* M_2. 4

4. Wings broad; cell *1st* M_2 very small; Sc_1 shorter than *Rs*. *G. parvicellula*, sp. n. (p. 122)

   Wings narrower; cell *1st* M_2 of normal size; Sc_1 and *Rs* subequal in length. ..... *G. procera* Meun. (p. 120)

Gnophomyia magna Meun.

1906. *Gnophomyia magna* Meunier; Mon. Tipulidae Ambre Baltique, pp. 371—372, pl. 12, fig. 19 (antenna ♀), pl. 13, fig. 1 (head ♀).

MATERIAL STUDIED — Klebs Coll., No. 234, 85, ♀, determined by Meunier as *magna* but not the type (which is given as No. 645).

FEMALE. — Length about 7.5 mm.; wing about 6 mm.

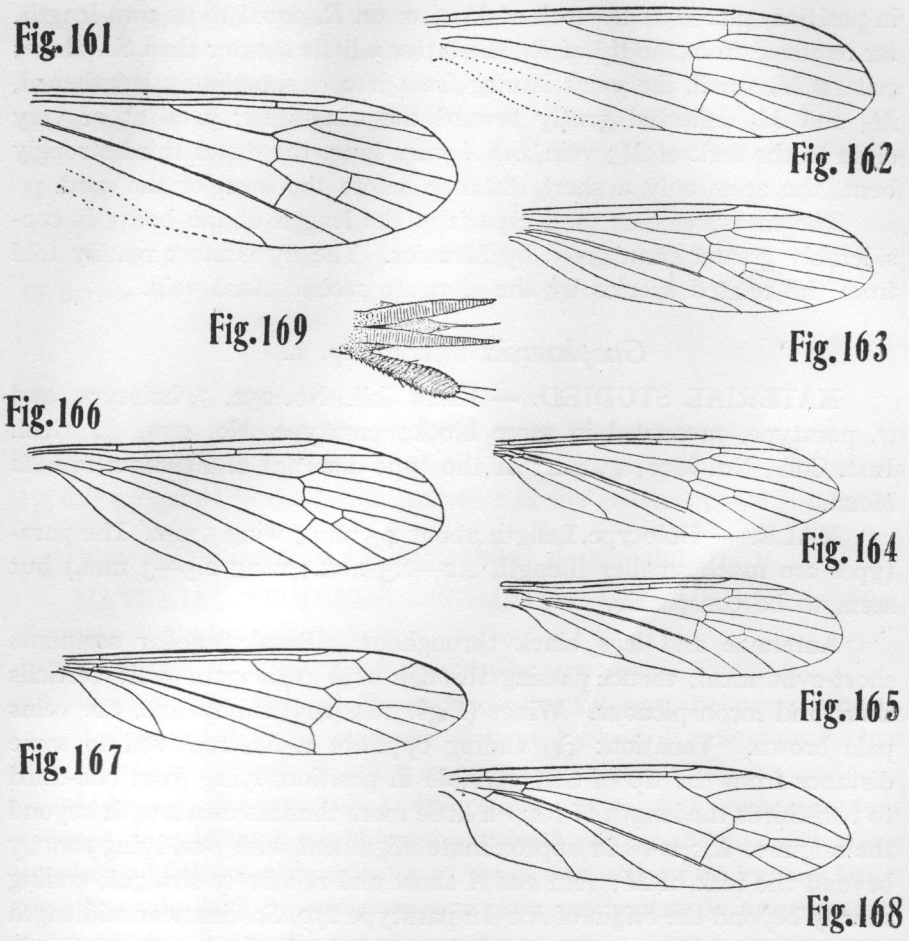
Wings (Fig. 161) with a pale brown tinge, the veins dark brown, clearly defined. Venation: Sc_1 ending opposite or just before *r*, Sc_1 about one-half longer than *m-cu*, Sc_2 placed opposite the fork of *Rs*; R_{2+3} straight, diverging rather strongly from R_{4+5}; basal section of R_2 a little shorter than *m-cu*; basal deflection of R_{4+5} very short to almost lacking; cell *1st* M_2 large, *m-cu* at near one-third its length.

Gnophomyia procera Meun.

1906. *Gnophomyia procera* Meun.; Mon. Tipulidae Ambre Baltique, pp. 370—371, pl. 12, fig. 17 (antenna ♀), fig. 18 (tarsus ♀).

MATERIAL STUDIED. — Klebs Coll., No. 4792, IIII, ♀, selected as lectotype. Geol. Inst. Coll., Meunier's paratype, No. 7540, ♀, seems to be more correctly referable to *G. parvicellula*, sp. n.

Venation (Fig. 162): *Sc* long, Sc_1 ending just beyond *r*; Sc_2 very far removed from the tip of Sc_1, placed about opposite one-fourth the length of *Rs*, Sc_1 alone thus being fully as long as *Rs*; *r* on R_2 less than its own length beyond the origin, and far from the tip of R_1, the distal section of R_1 being more than one-half the length of *Rs*; cell *1st* M_2 small, gently widened outwardly, *m-cu* near midlength; veins issuing from cell *1st* M_2 elongate, gently diverging, M_3 toward its tip slightly deflected toward wing-apex.



Gnophomyia minuta (Meun.).

1906. *Trimicra minuta* Meunier; Mon. Tipulidae Ambre Baltique, pp. 369—370, pl. 12, fig. 15 (wing), fig. 16 (antenna ♀).

MATERIAL STUDIED. — Geol. Inst. Coll., No. 9088, ♀, chosen as lectotype; No. 1312, ♀, a paratype. Meunier's third specimen, No. 8828, ♂, is discussed under *inferna*, sp. n.

FEMALE. — Length 3.2—3.5 mm.; wing 3.4—3.6 mm.

Antennae with the flagellar segments oval, passing through elongate-oval to cylindrical, with conspicuous verticils that exceed the segments in length.

Wings (Fig. 163) with Sc_1 ending opposite the fork of R_{2+3} or just beyond, Sc_2 far from its tip, placed near one-third the length of *Rs*; *Rs* relatively short, about two-thirds the distal section of R_2; *r* variable

in position, placed at the fork of R_{2+3} or on R_2 equal to its own length, far removed from the tip of R_1, the latter a little shorter than Sc_1 alone; cell *1st* M_2 small, the veins issuing from it correspondingly lengthened, M_3 and M_4 deflected gently toward the wing-apex; *m-cu* at or very close to the fork of M; vein *2nd A* very long, the distal third strongly bent, the apex only a short distance before the level of the cord.

The measurements, and especially the length of the body, is considerably greater than given by Meunier. The fly is most readily told from the related species by the elongate second Anal vein.

Gnophomyia inferna, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 252, ♂, holotype, and ♂, paratype, preserved in same block; paratype, No. 279, ♂. Geol. Inst. Coll., No. 8828, ♂, part of the type material of *Trimicra minuta* Meun.

MALE. — Holotype, Length about 4.5 mm.; wing 5 mm. The paratypes are much smaller (Length 2.2—2.5 mm.; wing 2.5—3 mm.) but seem to be conspecific.

Antennae and legs black throughout. Basal flagellar segments short-cylindrical, thence passing through oval to elongate-oval; verticils short and inconspicuous. Wings (Figs. 164, 165) subhyaline, the veins pale brown. Venation: Sc_1 ending opposite *r*, Sc_2 removed to some distance from the tip of Sc_1, variable in position, lying from one-third to two-thirds the length of *Rs*; *r* a little more than its own length beyond the origin of R_2; *m-cu* in approximate alignment with *r-m*, lying shortly beyond the fork of M; vein *2nd A* short and relatively straight, ending shortly beyond the origin of *Rs*. In paratype 279, Sc_2 lies near midlength of *Rs*, in the holotype (Fig. 164) near two-thirds the length of *Rs*; in paratype No. 252, opposite one-third this length.

Gnophomyia inferna is distinguished from the other small species in Amber, *G. minuta*, by the short, nearly straight second Anal vein.

Gnophomyia parvicellula, sp. n.

MATERIAL STUDIED. — Klebs Coll., No. 1844, ♂, holotype. Earlier determined by Meunier as "*Prionolabis* n. sp.".

MALE. — Length about 4.5 mm.; wing 4.5 mm.

General coloration dark brown, the legs paler, with relatively conspicuous suberect setae.

Antennae relatively slender and of moderate length, if bent backward extending to shortly beyond the wing-root; flagellar segments

relatively elongate. Wings (Fig. 166) broad, subhyaline, the stigma pale brown, faintly indicated; veins rather paler brown. Venation: Sc_1 ending immediately before *r*, Sc_2 far from its tip, Sc_1 alone being about three-fourths the length of *Rs*; *r* on R_2 shortly beyond the fork; cell *1st* M_2 very small, the veins issuing from it relatively long, the tip of M_3 very gently deflected toward the wing-apex; *m-cu* near midlength of cell *1st* M_2; cell *2nd A* elongate, vein *2nd A* being long and gently sinuous.

One of Meunier's paratypes of his *procera* (Geol. Inst. Coll., No. 7540, ♀) agrees better with *parvicellula* than with *procera*.

Trentepohlia Big.

1854. *Trentepohlia* Bigot; Ann. Soc. Ent. France, p. 474.

The genus *Trentepohlia* includes more than 60 known species, all being tropicopolitan in distribution. The discovery of a species of the typical subgenus in the Baltic Amber is of the greatest possible interest.

Trentepohlia (*Trentepohlia*) *dampfiana*, sp. n.

MATERIAL STUDIED. — Geol. Inst. Coll., No. 451, ex Mus. Stantien & Becker), ♀, holotype.

FEMALE. — Length 5.8 mm.; wing 4.5 mm.

General coloration pale brown, including the legs, the tarsi not paler.

Antennae relatively elongate, if bent backward extending to just beyond the wing-root; flagellar segments cylindrical.

Legs with the armature of the recent species of the subgenus very reduced, that of the femoral bases not developed, of the posterior tibiae consisting of three subterminal erect setae that are not or scarcely larger than the abundant appressed setae of the same region. Wings (Fig. 167) pale yellowish subhyaline, the stigmal region somewhat more yellowish; veins pale brown. Venation: *Sc* long, as in the genus, Sc_1 ending about opposite one-third the length of the basal section of R_{2+3}; *Rs* angularly arcuated; distal section of R_1 about equal to the second section of R_{2+3}; both sections of R_{2+3} in approximate alignment; basal section of R_{2+3} a little longer than the petiole of cell R_5; fusion of Cu_1 and *1st A* slight.

Ovipositor with the tergal valves somewhat longer than in the recent species, strongly upcurved to the acute tips; sternal valves short and stout, straight.

Trentepohlia dampfiana is dedicated to my friend and colleague, Dr. Alfons Dampf, State Entomologist of Mexico, to whom I express my sincere thanks and gratitude for encouragement and aid in this study of the Amber Tipuloidea, and for continued co-operation in making known the fauna of Mexico.

The two Gurnet Bay species of *Trentepohlia* described by Cockerell. — *T. cruciferella* (Ckll.) (Proc. U. S. Nat. Mus., 52: 373—374, pl. 31, fig. 3; 1917) and *T. pallescens* (Ckll.) (Ann. Mag. Nat. Hist., (9) 7: 460, fig. 11; 1921) both seem to refer to the subgenus *Mongoma* rather than to *Trentepohlia*. The figure of *pallescens* indicates that cell *1st* M_2 is closed.

Ceratocheilus Wesché.

1910. *Ceratocheilus* Wesché; Journ. Linn. Soc., Zool., 30: 358.
1912. *Neostyringomyia* Alexander; Can. Ent., 44: 85.
1918. *Conithorax* Brunetti; Rec. Ind. Mus., 15: 298—299.

Ceratocheilus runs very close to *Toxorhina*, differing in the retention of R_{2+3}. Like the last, the genus is a very characteristic one in the Tropics of both the New and Old Worlds. The discovery of a perfectly typical species adds still another tropicopolitan genus to the fauna of the Amber.

Ceratocheilus eridanus Meun.

1917. *Ceratocheilus eridanus* Meunier; Neues Jahrb. Mineral., 1917: 96—97, pl. 15, fig. 67 (wing), fig. 68 (hypopygium ♂), pl. 16, fig. 72 (antenna).

MATERIAL STUDIED. — Klebs Coll., No. 2532, ♂. Geol. Inst. Coll., No. 6964 VI 4991, ex Phys.-Oek. Gesell., ♂. Zool. Mus. Berlin, ♂.

MALE. — Length (excluding rostrum) 6 mm.; wing about 4.8 mm.; rostrum 4 mm.

Meunier gives the female as 7 mm. long, the male only 4.5 mm.

General coloration brown, the antennae and rostrum dark brown; median area of mesonotal praescutum and scutal lobes darker than the remainder of the thoracic notum. Head black.

Rostrum elongate, approximately equal in length to the abdomen alone; palpi relatively slender, apparently 2-segmented but with the suture ill-defined (Fig. 169); surface of palpus with appressed squamose ridges. Antennae as in the genus; second scapal segment large; basal segments of the flagellum short and crowded, the segments with long verticils that become very long and conspicuous toward the end of the organ. Vertex between the eyes a little wider than the second antennal segment.

Cervical sclerites elongate. Wings (Fig. 168) subhyaline, the veins pale, slightly darker than the ground-color. Venation: *Sc* relatively short, ending about opposite midlength of the short *Rs*, Sc_2 lying just proximad of the origin of *Rs*; *Rs* and basal section of R_{4+5} subequal in length, nearly straight, in alignment; R_{2+3} relatively long, more than twice *Rs*; cell R_3 at wing-margin very wide; cell *1st* M_2 closed; *m-cu* at the fork of *M*; anal angle prominent.

Appendix.

The data on which the present report are based may be considered as being completed on the date of submitting the paper for publication, October 20, 1926. Since that date, an important modification of the interpretation of the radial field of the wing in the Diptera has been adopted by the writer. The following papers discuss this modification in detail:

Alexander, C. P.

1927. The interpretation of the radial field of the wing in the Nematocerous Diptera, with special reference to the Tipulidae.
Proceedings of the Linnean Society of New South Wales, 52: 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.
IV. International Congress of Entomology, 2: 700—707, 3 pls.

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