VOL. 93, No. 3

866

SEPTEMBER, 1964

NEW OR LITTLE-KNOWN TIPULIDÆ FROM EASTERN ASIA (DIPTERA), LV

By CHARLES P. ALEXANDER
Amherst, Massachusetts

(Received for publication, February 11, 1963.)
FIVE PLATES

The present paper continues the consideration of the genus *Limonia* Meigen, the first part of which are treated species belonging to the single subgenus *Dicranomyia* Stephens. All materials discussed at this time are from India and were taken by the Swiss entomologist, Dr. Fernand Schmid, as has been discussed in various earlier papers that these treated species were secured by this remarkable collector. Parts XLIX and LIV of the present series of reports bear more particularly on the same subject and should be used in conjunction with this paper.

THE SUBGENERA OF THE GENUS LIMONIA MEIGEN

The vast genus *Limonia* includes far more than 1,500 described species that are distributed in some 25 subgenera, almost all of which were considered as representing valid genera until about 1930. At that time it became evident that the group, while including many apparently diverse elements, actually represented a single genus and that it would be inadvisable to attempt to maintain the various entities as representing more than subgenera [Alexander (1930) dates in parenthesis are cited in the list of References at the conclusion of this paper]. With the subsequent discovery of many hundreds of additional species it became further evident that several of these supposedly valid subgeneric groups were very closely allied and were becoming increasingly difficult to define and maintain. In the light of what has transpired during these years it is seen that the statement by Osten Sacken (1887) was remarkably prophetic. This pioneer student of the Tipulidæ had anticipated the difficulties that might result from the indiscriminate proposal of supposed new genera that were based on weak or insufficient grounds. He writes:

> To these successors I am free to give a piece of advice, as the result of more than 30 years experience with Tipulidæ, and this is, not to

introduce new genera prematurely: Large accessions of new forms, or of variations of already well-known forms must be expected from as yet unexplored, principally tropical regions; but these accessions, although large, will be slow in coming. Do not introduce new genera for every slight deviation from a well-known type, because you would soon have no end of new genera, and a growing difficulty in discriminating between them. But do not hesitate to establish a new genus for a form which cannot be forced into any of the existing genera, and which shows distinctive characters in more than one organ of its body. Such forms are not very common. I had to give up several of the subdivisions to hastily adopted by me in 1868; but since that year, having, grown in experience, I found necessary to establish only four new genera of *Tipulidæ brevipalpi* (only one in the present paper).

In the present discussion no attempt is made to repeat various statements and arguments that have been advanced *pro* or *con* upon this subject by Alexander, Bergoth, Edwards, and some others and these should be consulted for a fuller appreciation of the subject. Papers that concern the extent and general features of the genus include Alexander (1929, 1950); Edwards (1938); on venation, Alexander (1927a, 1929b, 1934, 1950); Edwards (1938).

Limonia is one of the more variable of Dipterous genera, showing an unusual range and diversity of structure in various organs, especially the mouthparts, antennæ, eyes, wing venation, and structure of the male hypopygium. Thus, as concerns the mouthparts, there are species having these exceedingly short to barely evident, with the maxillary palpi reduced to a single segment (as in *Limonia citrofocalis* Edwards, of Borneo), to other groups (as *Geranomyia*, *Limonia*, s.s., *Zelandoglochina*) where the mouthparts, comprised essentially of the labial palpi, are greatly elongated, in cases being equal to or exceeding the remainder of the body. As regards the antennæ, this while primitively being a simple 14-segmented organ, in certain subgenera (*Rhipidia*, *Zelandoglochina*, and less evidently *Idioglochina*) has the antennal flagellum produced into long branches that formerly appeared to provide unusually strong generic or subgeneric characters. In both cases cited, of elongated mouthparts and branched antennæ, it was found that while these were relatively stable and usable as characters in a restricted faunal area, such as Europe, Japan or eastern North America, when the world fauna was considered such characters broke dawn almost competely. Thus in *Geranomyia*, with typically lengthened mouthparts, various

species were found where these were very reduced, being no longer than the condition considered as being normal for the typical subgenus *Limonia*, while also in the same subgenus the species were discovered that showed a surprising range in number of segments of the maxillary palpi from a single segment to four, again indicating virtual uselessness for taxonomic work in maintaining groups higher than the species. Further, as regards elongation of the mouthparts, attention is called in the present paper to certain form in the typical subgenus *Limonia* where in a single restricted group, some species have the rostrum very small and quite normal (as *hostilis* Alexander) to others of moderate length (*brachylabis* sp. nov.), to still others showing progressive elongation, with the maximum as presently known occurring in the fly described as *Limonia tanyrhyncha* sp. nov., where the mouthparts are fully one-third as long as the remainder of the body. In all other regards these various species of the *hostilis* group are typical members of the restricted subgenus *Limonia* and must be referred thereto despite the conspicuous development of the mouthparts. Plate 3, figs. 31, 32, and 33 of this paper may be consulted.

In the subgenus *Rhipidia*, the conspicuous branches of the male antennæ had appeared to provide unusually strong characters for maintaining the group as a valid genus. However, quite as in the preceding example, species later were discovered where the flagellar branches were more and more reduced until finally there remained scarcely any basis for maintaining the group even as a subgenus. In the males of many species of *Rhipidia*, and in virtually all females, the flagellar branches are reduced in size to present a subpectinate condition, with the lower face of an individual segment only slightly to scarcely produced. The range and nature of branching of the antennæ in *Rhipidia* has been discussed in considerable detail in another paper [Alexander (1950) 195–198].

The relative size of the compound eyes, in comparison with the width of the intervening anterior vertex, especially in the male sex, has been considered as possibly providing characters sufficient for generic or subgeneric separation (as *Atypophthalmus* Brunetti). In some species, the eyes of the male are very large, contiguous both above and beneath to produce a holoptic condition; in other species the eyes are somewhat smaller, reducing the anterior vertex to a narrow or even

capillary line about equal in diameter to a single row of ommatidia of the eye. In other species gradually widened vertices occur, in extreme cases these being very broad, the eyes correspondingly small (as *Melanolimonia* subgen. nov.).

The shape of the thorax, such as the elongation of the pronotum (*Telecephala*) or the elevation of the præscutum into an erect cone (*Conorhipidia*), formerly were believed to represent characters of value sufficient to separate groups worthy of a name. The halteres and legs similarly show a considerable range in their relative length. The halteres may be short, as normal for the family, or they may be greatly lengthened, particularly in the more delicate aerial species. The extreme length of the halteres as presently known appears to be found in *Limonia* (*Limonia*) *lindbergi* Nielsen (1962) of Afghanistan, where they are described as being longer than the combined head and thorax. The legs may be of a length about normal for the family or, in cases, may be greatly lengthened and correspondingly slender, though not attaining the extreme condition found in various Tipulinæ, as *Dolichopeza*, some *Tipula*, and others. The nature of toothing of the claws has been discussed by Alexander, Edwards, and others, and seems to provide at least supporting characters in any attempt to define subgenera.

The wings, including shape, venation, and trichiation of the veins and cells, provide what are probably the most important taxonomic characters in subgeneric division. A characteristic wing shape and great development of the prearcular field is found *Peripheroptera*, *Thrypticomyia*, *Euglochina*, and some others. The relative length of the subcostal vein, Sc, had long been held to be of importance in separating *Dicranomyia* from *Limonia*, s.s. [Alexander (1927a, 1929a, 1934, 1950); Bergroth (1915); Edwards (1938)] but its importance in this regard must be held in question, as is considered later in this present discussion. In some cases, as in *Discobola*, the presence of supernumerary crossveins in certain of the cells had been held to be of importance, leading to a belief that comparable significance and importance obtained in other cases where such supernumerary elements were present (as *Dapanoptera*, *Dcgeneromyia*, *Geranomyia*, *Gressittomyia*, *Laosa*, and *Neolimnobia*). The arrangement of the veins Sc and R in the vicinity of the stigma, as found especially in *Limonia*, *Orimarga*; Cylindrotominæ, Tipulinæ, has received much

consideration in papers by the writer and need not be repeated here [Alexander (1927a, 1927b, 1934b, 1950, and others)]. The number and distribution of macrotrichia of the wing veins appear to be of importance in defining genera and subgenera but it should be noted that in certain species the variation in number and arrangement of these trichia is greater than had formerly been believed [Alexander; Edwards (1938) 20–29].

The details of structure of the male hypopygium provide invaluable characters for the separation of species in *Limonia*, as well as in virtually all other genera in the family. However, despite striking modifications produced by outgrowths, efflorescenses and the like of the various parts, there remains a basic uniformity in all structures that only confirms our belief that all of these apparently diverse groups actually are closely allied and that a single genus is involved. Typical *Limonia* and some others have the dististyle single and simple in structure. a condition that Edwards (1938) considered as not necessarily being primitive, as it is in *Trichocera* and other generalized groups, but possible to have been secondarily reduced. The division of this simple dististyle into two parts, the so-called dorsal and ventral styles, as found in virtually all other members of the genus, has been discussed in several of the papers already cited. In *Dicranomyia*, *Geranomyia*, and many others, the beaklike extension of the ventral style known as the rostrum or rostral prolongation commonly bears two spines or spinoid setæ. The various positions or locations where these spines may occur have been discussed in detail in another paper [Alexander (1934a)]. The number of such spines ranges from one (most *Melanolimonia*) through three or more, reaching the extreme of about ten in certain *Rhipidia* and *Dicranomyia* (as *multispina* Alexander, of New Zealand, which perhaps may be referred to *Rhipidia*, based on this condition). It may be noted further that certain species presently placed in *Rhipidia* (the *rostrifera* group, with numerous species in eastern Asia) have only two rostral spines and may well be found to belong to some other subgeneric division, as *Dicranomyia*, despite the branched antennæ. Other structures of the male hypopygium and of the ovipositor have been discussed in some detail in other papers [Alexander (1950); Edwards (1938); and others].

From the preceding summary of characters available in *Limonia* it is seen that several groups as presently maintained are based on relatively minor and unimportant features and are becoming difficult to separate. Of particular concern are the many species in all parts of the world that have been placed almost indiscriminately either in typical *Limonia* or in *Dicranomyia*, based solely on the relative lengths of veins Sc and Rs [Alexander, several papers; Bergroth (1915); Edwards (1938); and many others]. An alternative to the use of this admittedly unsatisfactory venational feature would be to use characters found in the male hypopygium, in itself a further unsatisfactory procedure, since it leaves still in question the subgeneric position of the females of the various species. At present or until a more exhaustive study of the problem can be made I am leaving such questionable species unplaced as to subgenus, including several in the present report. It seems very probable that still other subgeneric groups will be found necessary when certain of these unassigned species become better known and are critically studied.

In the first general attempt to summarize the subgenera of *Limonia* [Alexander (1929a)] had listed all such groups known to that time, indicating their known distribution by biotic world regions, and providing a supplementary list of such names that appeared to represent synonyms. In succeeding years some additions to the list have been made while the distribution by regions has been extended. It seems desirable to provide a revised list of the apparently valid subgenera, with their distribution, and to indicate the synonymy. Dates here provided, when not in parenthesis, indicate the year of proposal and are not necessarily cited in the list of references at the conclusion of the paper.

LIMONIA Meigen, 1803. **Holarctic, Ethiopian, Oriental, Australasian**

(Synonyms—*Amphinome* Meigen, 1800; *Limnobia* Meigen, 1818; *Unomyia* Meigen, 1818; *Ataracta* Loew, 1850; *Limnomyza* Rondani, 1856; *Taphrophila* Rondani, 1856.)

RHIPIDIA Meigen, 1818. **Cosmopolitan (excluding New Zealand)**

(Synonyms—*Ceratostephanus* Brunetti, 1911; *Monorhipidia* Alexander, 1912; *Arhipidia* Alexander, 1912; *Conorhipidia* Alexander, 1914).

DICRANOMYIA Stephens, 1829. **Cosmopolitan**

(Synonyms—*Furcomyia* Meigen, 1818; *Glochina* Meigen, 1830; *Siagona* Meigen, 1930; *Numantia* Bigot, 1854; *Telecephala Pierrei*, 1921; *Tedotea* Santos Abreau, 1923).

GERANOMYIA Halliday, 1833. Cosmopolitan (excluding New Zealand)

(Synonyms—*Limnobiorhynchus* Westwood, 1835 (in part); *Aporosa* Macquart, 1838; *Plettusa* Philippi, 1865; *Tetraphana* Skuse, 1890; *Triphana* Skuse, 1890; *Monophana* Edwards, 1912; *Parageranomyia* Santos Abreu, 1923; *Pseudaporosa* Alexander, 1924; *Proaporosa* Alexander, 1924 (lapsus for the last).

DISCOBOLA Osten Sacken, 1865. Holarctic, Neotropical, Oriental, Australasian

(Synonym—*Trochobola* Osten Sacken, 1869)

PERIPHEROPTERA Schiner, 1866. Neotripical

LIBNOTES Westwood, 1876. Eastern Palaearctic, Ethiopian, Oriental, Australasian (excluding New Zealand).

DAPANOPTERA Westwood, 1881. Australasian, especially Papuan.

THRYPTICOMYIA Skuse, 1890. Eastern Palaearctic, Ethiopian, Oriental Australasian (excluding New Zealand).

GONIODINEURA van der Wulp, 1895. Oriental, Australasian (excluding New Zealand)

ZALUSA Enderlein, 1906 (validity uncertain). Neotropical, extreme south.

ATYPOPHTHALMUS Brunetti, 1911. Eastern Palaearctic, Ethiopian, Oriental, Australasian (excluding New Zealand).

METALIMNOBIA Matsumura, 1911. Holarctic, Ethiopian, Oriental

DOANEOMYIA Alexander, 1921. Oriental, Australasian (excluding New Zealand).

EUGLOCHINA Alexander, 1921. Ethiopian, Oriental, Australasian (excluding New Zealand).

IDIOGLOCHINA Alexander, 1921. Marine, Pacific and Indian Oceans—all regions.

PSEUDOGLOCHINA Alexander, 1921. Ethiopian, Oriental, Australasian (excluding New Zealand).

ALEXANDRIARIA Garret, 1922. Nearctic; Eastern Palaearctic, Oriental and Australasian, these probably in error.

ZELANDOGLOCHINA Alexander, 1921. Neotropical (Chile), Australasian (New Zealand).

GRESSITTOMYIA Alexander, 1936. Australasian (Fiji).

LAOSA Edwards, 1926. Palaearctic, Oriental, Australasian (excluding New Zealand).

NEOLIMNOBIA Alexander, 1927. Neotropical.

GRESSITTOMYIA Alexander, 1936. Oriental (Hainan).

DEGENEROMYIA Alexander, 1956. Australasian (Fiji).

SIVALIMNOBIA Alexander (in press). Eastern Palaearctic, Oriental

MELANOLIMONIA subgen. nov. Holarctic, Oriental

LIMONIA (LIMONIA) DEVATA sp. nov. Plate 1, fig. 1; Plate 2, fig. 27.

Belongs to the *globithorax* group; general coloration of thorax yellowish brown; rostrum and palpi greatly reduced; legs brown; wings strongly infuscated, stigma lacking, Rs long; male hypopygium with ventromesal lobe of basistyle very long, gradually narrowed outwardly, terminating in a cylindrical point; genapophysis with mesal-apical lobe long and slender.

Male.—Length, about 4.5 millimeters; wing, 5; antenna, about 1.0.

Rostrum and palpi greatly reduced. Antennæ black; flagellar segments short-oval, with abrupt slightly paler apical pedicels; terminal segment smaller than the penultimate. Head dark brown; anterior vertex relatively broad, nearly twice the diameter of the scape.

Pronotum dark brown. Mesothorax almost uniformly yellowish brown, including four scarcely differentiated præscutal stripes. Halteres dark brown, base of stem restrictedly yellow. Legs with coxæ and trochanters obscure yellow; remainder of legs medium brown. Wings (Plate 1, fig. 1) strongly infuscated, unpatterned, stigma lacking; veins brown. Venation: Sc long, Sc_1 ending about opposite two-thirds the long straight Rs, Sc_2 longer than the transverse Sc_1; free tip of Sc_2 far basad of R_2, the element R_1 being more than three times R_2; cell 1st M_2 rectangular, subequal to vein M_3; m-cu shortly beyond fork of M.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 2, fig. 27) with the tergite, *t*, short-transverse, very gradually narrowed outwardly, posterior border broadly thickened, shallowly emarginate, lobes obliquely truncated. Basistyle, *b*, with ventromesal lobe very long, gradually narrowed outwardly, terminating in a slender cylindrical point; vestiture near apex of lobe including short retrorse setulæ additional to the scattered long setæ. Dististyle, *d*, subequal in area to body of basistyle, suboval, the outer half more narrowed, apex obtuse; a dense linear group of retrorse setæ on outer half. Gonapophysis, *g*, with mesal-apical lobe long and slender, near outer end more blackened, the acute tip gently curved. Ædeagus, *a*, terminating in two slender divergent blades, surface with numerous scattered slender setæ.

Habitat.—Assam.

Holotype, Male, Mawja, Khasi-Jaintia, altitude 550 feet, March 30, 1960 (*Schmid*).

Limonia (*Limonia*) *devata* is quite distinct from other members of the *globithorax* group in the hypopygial structure, especially the basistyle and gonapophysis. Other members of the group, additional to *L.* (*L.*) *globithorax* (Osten Sacken), include *L.* (*L.*) *canis* Alexander, *L.* (*L.*) *cynotis* Alexander, *L.* (*L.*) *globulithorax* Alexander, *L.* (*L.*) *melas* Alexander, and probably also *L.* (*L.*) *cneprosa* Alexander.

LIMONIA (LIMONIA) ACINACIS sp. nov. Plate 1, fig. 2; Plate 2, fig. 28

Size medium (wing of male 6.6 millimeters); general coloration of body brown, abdomen darker; antennæ relatively long; wings uniformly light brown, stigma darker brown, Sc_1 ending shortly beyond midlength of Rs; male hypopygium with body of dististyle very small, the prolongation very long and slender; apex of ventromesal lobe of basistyle shallowly bilobulate; gonapophysis with mesal-apical lobe a slender blackened rod.

Male.—Length, about 5.8 to 6 millimeters; wing, 6.6 to 7; antenna, about 1.3 to 1.4.

Rostrum and palpi black. Antennæ black, relatively long; basal flagellar segments short-oval, the outer ones more elongate, all longer than their verticils; terminal segment longest, abruptly narrowed on outer fifth. Head dark brown; anterior vertex reduced to a narrow stripe, scarcely wider than a single row of ommatidia.

Prothorax dark brown. Mesonotum medium brown, polished, scarcely patterned. Pleura medium brown, the dorsal pleurites darker to produce a diffuse darker stripe. Halteres with stem dusky, very narrowly yellowed at base, knob dark brown. Legs with coxæ brown, fore pair darker; trochanters brownish yellow; remainder of legs broken. (Wings Plate 1, fig. 2) uniformly light brown; stigma short-oval, darker brown; veins brown. Longitudinal veins beyond cord with macrotrichia, including also most of Rs and outer end of M, lacking on basal section of Cu_1 and the anals. Venation: Sc long, ending about opposite three-fifths Rs, Sc_2 near its tip; free tip of Sc_2 and R_2 in transverse alignment; cell 1st M_2 subequal to distal section of M_{1+2}; m-cu at fork of M.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 2, fig. 28) with the tergite, *t*, transverse, tapering laterally into slender rods, cephalic border very strongly produced, subtriangular; apical lobes low, each with seven or eight long setæ. Basistyle, *b*, at least four to five times as extensive as the dististyle; ventromesal lobe shallowly bilobulate at apex, the obtuse lobules with numerous setæ. Dististyle, *d*, with body very small, in area subequal to the lobe of the basistyle, provided with long setæ; rostral prolongation a gently curved elongate rod, narrowed at tip into an acute point, the prolongation about twice as long as the body of style, provided with a few long scattered setæ almost to tip. Gona-

pophysis, *g*, with mesal-apical lobe a slender blackened rod, the tip subacute. Ædeagus broad, terminating in two divergent points into which the genital tubes open.

Holotype, Male, Lachung, altitude 8,610 feet, July 9, 1959 (*Schmid*).

Habitat.—Sikkim.

Holotype, male, Lachung, altitude 8,610 feet, July 9, 1959 (*Schmid*).

Paratype, male, Zema, altitude 8,900 feet, June 11, 1959 (*Schmid*).

Limonia (*Limonia*) *acinacis* is generally similar to certain other small and medium sized regional members of the subgenus having unpatterned wings, such as *L.* (*L.*) *bilobulifera* Alexander, *L.* (*L.*) *decurvans* Alexander, *L.* (*L.*) *machidai* (Alexander), *L.* (*L.*) *tagax* Alexander, and others. It differs from all such species in the very small dististyle with the rostral prolongation greatly produced.

LIMONIA (LIMONIA) BIFARIA sp. nov. Plate 1, fig. 3; Plate 2, fig. 29.

Size small (wing of male up to 6 millimeters); thorax yellow, præscutum and dorsal pleura patterned with dark brown; antennæ black, flagellar segments short-oval with short abrupt apical pedicels; legs medium brown; wings strongly infuscated, stigma slightly darker brown, nearly circular; Sc ending about opposite two-thirds to three-fourths Rs; male hypopygium with the ventromesal lobe of basistyle bilobed; dististyle with body trilobed; gonapophysis with mesal-apical lobe a small acute spine.

Male.—Length, about 4.8 to 5 millimeters; wing, 5.5 to 6; antenna, about 1.1 to 1.2.

Rostrum black, labial palpi more yellowed, maxillary palpi black. Antennæ relatively long, black throughout; flagellar segments short-oval, with short abrupt apical pedicels, verticils shorter than the segments; terminal segment nearly twice the penultimate. Head brownish gray; eyes with coarse ommatidia, almost contiguous above.

Pronotum small, dark brown. Mesonotal præscutum brownish yellow, with a broad dark brown central stripe, scutal lobes similarly darkened; posterior sclerites of notum brown, more yellowed laterally. Pleura yellow, with a broad diffuse dorsal stripe in the type, ventral sternopleurite extensively paler brown; the Kumaon paratype has the pleura more uniformly yellowed. Halteres dark brown, base of stem narrowly

yellowed. Legs with coxæ yellow, the fore pair darker; trochanters yellow; remainder of legs medium brown; claws with a long slender basal spine: Wings (Plate 1, fig. 3) strongly infuscated, stigma nearly circular, slightly darker brown; veins brown. Venation: Sc_1 ending about opposite two-thirds to three-fourths Rs, Sc_2 either near its tip or slightly removed, cell 1st M_2 subequal to distal section of M_3; m-cu close to fork of M, in cases up to about one-fifth its length beyond.

Abdominal tergites and hypopygium dark brown, basal sternites slightly more yellowed. Male hypopygium (Plate 2, fig. 29) with the tergite, *t*, transverse, posterior border convexly rounded, slightly to scarcely emarginate; cephalic margin of tergite strongly produced into a triangular point; setæ sparse but long and conspicuous. Basistyle, *b*, with ventromesal lobe conspicuously notched at apex to appear bilobed, each lobe with relatively sparse long setæ. Dististyle, *d*, with body trilobed, the outer part of body with two larger lobes, the third more mesal in position at base of the long sicklelike rostral prolongation which narrows gradually into an acute point. Gonapophysis, *g*, with mesal-apical lobe a small acute spine, its tip blackened.

Habitat.—Assam, Kumaon.

Holotype, male, Sirhoi Kashong, Manipur, Assam, altitude 7,500 feet, July 12, 1960 (*Schmid*). Paratopotype, male, July 11, 1960. Paratype, 1 male, Kanol, Pauri Garhwal, Kumaon, altitude 8,530 feet, August 19, 1958 (*Schmid*).

In the hyopygial structure, as the lobing of the basistyle and dististyle, the present fly suggests *Limonia* (*Limonia*) *bilobulifera* Alexander of the Philippines, differing conspicuously in the venation and in all details of the hypopygium.

LIMONIA (LIMONIA) HOSTILIS Alexander. **Plate 2, fig. 30.**

Limonia (*Limonia*) *hostilis* ALEXANDER, Philip. Jour. Sci. 51 (1933) 533–534, plate 1, fig. 14 (venation). Philip. Jour. Sci. 58 (1935) 413–414.

The species was described from a specimen taken near Yien-Long-Shien, China-Tibet border, altitude 13,000 to 15,000 feet, August 3–6, 1930 (*Graham*).

Other materials have greatly extended the range of this particularly interesting fly.

Mount Omei, Szechwan, China, altitude 10,800 to 11,000 feet, August 16–20, 1934 (*Graham*).

Adung Valley, northeastern Burma, altitude 12,000 feet,

August 5, 1931 (*F. Kingdon Ward-Lord Cranbrook*); British Museum (Natural History).

Gey, Sikkim, altitude 12,000 feet, in *Rhododendron* association, May 20, 1959 (*Schmid*).

Bitzal Nullah, western Karakorams, Kashmir, altitude 14,000 feet, September 2, 1934 (*Miss Vivien Hutchinson*).

The hypopygium has not been described or figured. Male hypopygium (Plate 2, fig. 30) with the posterior border of tergite, *t*, very convexly rounded, the plate almost semicircular in outline; posterior margin narrowly thickened and sclerotized, with four low lobes, the larger intermediate pair separated by a small U-shaped emargination. Basistyle, *b*, with ventromesal lobe very extensive but not freely projecting, flattened and applied to the entire mesal face of style. Dististyle, *d*, only about one-fourth the size of the basistyle, not heavily blackened or sclerotized, gradually narrowed into a long slender point or beak. Gonapophysis, *g*, with mesal-apical lobe greatly reduced in size, triangular in outline. Ædeagus broad, especially at base, terminating in two small lobes; surface with a linear row of delicate setulæ.

Limonia (*Limonia*) *hostilis* may be identical with the still undescribed *L.* (*L.*) *latipennis* Edwards, a manuscript name that has appeared in print [Alexander, Philip. Jour. Sci. 51 (1933) 534]. It was the first described species of what now are known to represent a group of superficially similar forms living at high altitudes in the mountains of southern and eastern Asia. These species show strong hypopygial characters but are of interest primarily in the mouthparts, particularly the unusual range in development of the terminal segment of the labial palpus, as was briefly discussed in the introduction to the present paper. These structures are short and inconspicuous in *L.* (*L.*) *hostilis*, *L.* (*L.*) *brachylabis* sp. nov., and probably others, of intermediate length in *L.* (*L.*) *stenolabis* sp. nov., while reaching the extreme as known in *L.* (*L.*) *tanyrhyncha* sp. nov. (compare figures 31, 32, 33). It would appear that this modification of the mouthparts is an adaptation to feeding on nectar of various high alpine flowers, a condition obtaining in the allied subgenus *Geranomyia*. The recently described *L.* (*L.*) *lindbergi* Nielsen, briefly mentioned in the present introduction because of the unusual development of the halteres, may belong to this same group of species rather than being related to *L.* (*L.*) *macrostigma* Schummel, as was believed by Nielsen.

LIMONIA (LIMONIA) BRACHYLABIS sp. nov. Plate 1, fig. 4; Plate 3, figs. 31, 34.

Allied to *hostilis;* general coloration of body brown; terminal segment of labial palpus short and broad, the length not exceeding four times the diameter and about one-half as long as the maxillary palpus; legs dark brown, tips of femora concolorous; wings strongly infuscated, stigma only faintly indicated, costal border and axillary angle slightly darkened; Sc_1 ending about opposite three-fourths Rs, Sc_2 near its tip; male hypopygium with body of dististyle oval, with very long setæ, suddenly narrowed into the blackened beak; mesal-apical lobe of gonapophysis erect, unusually long and slender.

Male.—Length, about 11 to 12 millimeters; wing, 12 to 14; antenna, about 2.8 to 2.9; terminal segment of labial palpus about 0.6 to 0.7.

Female.—Length, about 11 to 12 millimeters; wing, 13 to 14.

Rostrum relatively long; terminal segment of labial palpus, *l*, short and broad, the length not exceeding four times the diameter or about one-half as long as the maxillary palpus, *m*, (Plate 3, fig. 31); rostrum and palpi brown. Antennæ relatively long, more than twice the maxillary palpus. Head dark brown; anterior vertex narrow.

Thorax almost uniformly dark brown; notal setæ relatively sparse but long. Halteres infuscated, extreme base of stem paler. Legs dark brown, tips of femora not or only vaguely brightened, in the paratypes the pale color barely evident; claws elongate, the cluster of basal spinules conspicuous, about five in number. Wing (Plate 1, fig. 4) strongly infuscated, stigma only slightly indicated, without a narrow marginal water mark; costal border and axillary angle slightly darker than the ground; a capilliary whitened streak in outer end of cell R; veins brown. Venation: Sc_1 ending m-cu at or shortly beyond the fork of M.

Abdomen brown, hypopygium, especially the dististyle, darker. Male hypopygium (Plate 3, fig. 34) with the tergite, *t*, gradually narrowed outwardly, outer margin truncate, with abundant long setæ across outer end, lower blackened scaffolding as illustrated. Basistyle, *b*, with ventromesal lobe very large but low and inconspicuous. Dististyle, *d*, with body oval, narrowed suddenly into a blackened beak, its apex obtuse; body of style with very long erect setæ, the longest exceeding the diameter of style. Gonapophysis, *g*, with mesal-apical lobe erect, unusually long and slender, straight, the extreme tip acute, curved

slightly laterad. Ædeagus relatively slender on outer half, terminating in two small lobes.

Habitat.—Sikkim.

Holotype, male, Chumzomoi Choka, altitude 11,800 feet, in *Rhododendron* association, July 8, 1959 (*Schmid*). Allotype, female Tangshing, altitude 14,100 feet, in *Rhododendron* association, October 6, 1959 (*Schmid*). Paratypes, males and females, with the allotype; male, Sherabtang, altitude 13,200 feet, in *Rhodordendron* association, August 27, 1959; one female, Karponang, altitude 9,900 feet, August 23, 1959 (*Schmid*).

Limonia (*Limonia*) *brachylabis* is quite distinct from *L.* (*L.*) *hostilis* Alexander, the only other generally similar species having the labial palpi unusually short. The distinctions between the two as shown by hypopygial structure are important, particularly the tergite, dististyle and gonapophysis.

LIMONIA (LIMONIA) STENOLABIS sp. nov. Plate 3, fig. 32.

Male.—Length, about 14 millimeters; wing, 12; antenna, about 2.9; terminal segment of labial palpus about 1.2.

Female.—Length, about 14 millimeters; wing, 16; terminal segment of labial palpus about 1.0.

Generally similar to *brachylabis*, sp.nov., differing specially in the mouthparts and in minor distinctions in the male hypopygium. Terminal segment of labial palpus, *l*, (Plate 3, fig. 32) long and slender, much shorter than in *tanyrhyncha*, longer than in *brachylabis;* palpus some 15 or more times as long as broad and slightly longer than the maxillary palpus, *m*, or somewhat less than one-half the antennæ. Femoral tips scarcely brightened. Wings with costal border and a seam along vein Cu in cell M slightly darker than the ground. Venation: Cell 1st M_2 relatively small, subrectangular, second section of vein M_{1+2} about one-half the distal section of M_3. Male hypopygium with mesal-apical lobe gonapophysis a little shorter and stouter than in *brachylabis*, the acute tip longer.

Habitat.—Sikkim, Kumaon.

Holotype, male Chamiteng, Sikkim, altitude 9,900 feet, August 24, 1959 (*Schmid*). Allotype, female, Gopetang, Sikkim, altitude 12,500 feet, in *Rhododendron* assocation, August 26, 1959 (*Schmid*); male, Rata, Pauri Garhwal, Kumaon, altitude 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*).

LIMONIA (LIMONIA) TANYRHYNCHA sp. nov. Plate 1, fig. 5; Plate 3, figs. 33, 35.

Allied to hostilis, size very large (wing of male up to 16 millimeters); general coloration of entire body dark brown; rostrum, especially the labial palpi, greatly lengthened, about equal to remainder of head and thorax; wings pale brown, variegated by large more whitened areas in many of the cells; male hypopygium with dististyle intensely blackened, the beak a slender rod, surface of body of style with abundant very long brownish yellow setæ.

Male.—Length, excluding rostrum, about 11 to 17 millimeters; wing, 10.5 to 16; labial palpus, about 3 to 5.2.

Female.—Length, excluding rostrum, about 14 to 15 millimeters; wing, 16 to 17.5; labial palpus, about 3.5 to 4.

Rostrum and especially the labial palpi (Plate 3, fig. 33) greatly lengthened, about equal to the remainder of head and the thorax combined; brownish black basally, the labial palpi, *l*, paler brownish yellow, maxillary palpi, *m*, brownish black, about one-half as long as labial palpus. Antennæ relatively long, about two-thirds the rostrum, black; flagellar segments longer than their verticils. Head above brownish black, paler posteriorly; anterior vertex narrower than the diameter of scape.

Cervical region and prothorax elongate, dark brown. Mesonotum chiefly dark brown, more yellowed on the humeral and sutural regions of præscutum and on sides of mediotergite; vestiture of præscutum sparse and small, of the scutellum abundant, long, erect. Pleura dark brown. Halteres dark, knob elongate. Legs with coxæ and trochanters medium brown; femora light brown, tips vaguely to more evidently yellowed; tibiæ dark brown, tarsi black; claws long, gently curved, with three spines, the outer elongate, the others microscopic. Wings (Plate 1, fig. 5) with the ground color pale brown, variegated by large more whitened areas in many of the cells, stigma barely differentiated; veins brown. Venation: Sc_2 ending about opposite two-thirds to three-fourths Rs; branches of Rs generally parallel to one another, slightly approximated at ends so cell R_2 at margin is very extensive, nearly four times cell R_3; cell 1st M_2 shorter than any of the veins beyond it; m-cu at fork of M.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 3, fig. 35) with the dististyle, *d*, intensely blackened, oval, narrowed into a relatively short slender beak;

surface of body of style with abundant very long brownish yellow setæ, the longest equal to the diameter of the style. Gonapophysis, *g*, with mesal-apical lobe elongate, slightly widened outwardly.

Habitat.—Sikkim.

Holotype, male, Tsomgo, altitude 9,900 feet, in *Rhododendron* association, August 26, 1959 (*Schmid*). Allotype, female, Churong, altitude 12,460 feet, in *Rhododendron* association, October 8, 1959. Paratopotype, male, with type. Paratypes, male, Tangshing, altitude 12,200 feet, in *Rhododendron* association, October 5, 1959; female, Gopetang, altitude 12,200 feet, in *Rhododendron* association, October 10, 1959; male, Zomphuk, altitude 6,500 feet, October 1, 1959 (*Schmid*).

The paratype male from Zomphuk is very small, the smallest figures given under measurements, but appears to be conspecific. This outstanding fly is readily told from all other members of the *hostilis* group and all other species in the subgenus by the unusual elongation of the mouthparts.

LIMONIA (LIMONIA) ANTETERMINALSIS sp. nov. Plate 1, fig. 6; Plate 3, fig. 36.

General coloration of thorax dark brown, restrictedly patterned with obscure yellow; palpi brownish black, third segment yellowed; legs dark brown to brownish black, femora with a narrow yellow subterminal ring; wings pale brown with five darker brown costal areas, virtually all cells variegated by pale yellow marks, m-cu about one-third its length beyond fork of M; abdomen dark brown, basal segments with proximal ends narrowly yellowed; male hypopygium with the dististyle subterminal in position.

Male.—Length, about 10.5 to 13 millimeters; wing, 10.5 to 13; antenna, about 2.0 to 2.2.

Female.—Length, about 10 to 12 millimeters; wing, 11 to 13.

Rostrum dark brown; basal two segments of palpi brownish black, third yellowed, terminal segment brownish black. Antennæ relatively long; scape and pedicel yellow, proximal two flagellar segments brown, bases yellowed, outer flagellar segments brownish black, elongate, subequal to the longest verticils. Head with front and anterior vertex silvery, posterior vertex brownish black; paler brown behind; anterior vertex about one-half wider than the diameter of scape.

Pronotum dark brown. Mesonotal Præscutum and scutum dark brown, the humeral and anterior interspaces vaguely yellowed; central region of scutum and the scutellum obscure yellow; postnotum brown, broadly yellowed at the interpostnotal suture; notal vestiture black, erect, lacking on postnotum. Pleura dark brown. Halteres elongate, dark brown, base of stem and apex of knob obscure yellow. Legs with coxæ dark brown; trochanters yellow; femora dark brown to brownish black, with a single narrow yellow subterminal ring, this subequal to the darkened tip; remainder of legs brownish black to black; claws nearly straight, the outer spine at near one-third the length, basal spinules reduced. Wings (Plate 1, fig. 6) with the ground pale brown, with five darker brown costal areas, the second at origin of Rs, third at fork of Sc, fourth at stigma; numerous pale yellow areas in most cells, including about one-third to one-fourth the total area; cell C darkened at h and at outer end, with a further major area at near midlength; veins pale brown, more yellowed in the pale areas. Venation: Sc_2 ending a short distance before fork of Rs, much longer than the nearly transverse Sc_1; m-cu at near one-fourth the length of cell 1st M_2 or approximately one-third its own length.

Abdomen dark brown, bases of tergites two to four and stermites two to six narrowly yellowed; hypopygium yellowed outwardly. Male hypopygium (Plate 3, fig. 36) with posterior border of tergite, *t*, strongly convex, with a small apical emargination, subtended by low yellow lobes; tergal setæ abundant. Apex of basistyle, *b*, obtusely rounded. Dististyle, *d*, subterminal in position, its base oval, thence produced into a long straight yellow beak. Gonapophysis, *g*, with mesal-apical lobe pale. Ædeagus narrow.

Habitat.—Sikkim.

Holotype, male, Chumzomoi Choka, altitude 11,800 feet, in *Rhododendron* association, July 8, 1959 (*Schmid*). Allotype, female, Tanggu, altitude 12,800 feet, in *Rhododendron* association, June 19, 1959 (*Schmid*). Paratypes, male, Lachen, altitude 8,930 feet, May 23, 1959; males and females, Tangshing, altitude 14,100 feet, in *Rhododendron* association, October 5–6, 1959; male, Yagtang, altitude 11,650 feet, in *Rhododendron* association, June 17, 1959 (*Schmid*).

The most similar regional species is *Limonia* (*Limonia*) *kashmirica* (Edwards), described from a single female taken

at high altitudes in Kashmir. Later [Ann. Mag. Nat. Hist. (10) 1 (1928) 701-702], fig. 16 (wing) Edwards referred a male from Tibet to this species, perhaps in error. The type female has m-cu at midlength of cell 1st M_2 but the further male specimen has it at near one-third the cell length, not greatly different from the present fly. This latter is a much more uniformly darker fly, including the legs which are uniformly brownish black, with the exception of the abruptly yellow femoral ring.

LIMONIA (METALIMNOBIA) BRAHMA sp. nov. Plate 1, fig. 7; Plate 3, fig. 37.

Mesonotum chiefly black, præscutum with broad yellow intermediate areas, pleura brownish black; femora yellow with two black rings, the outer one narrow; wings pale yellow, conspicuously patterned with brown, including major areas in radial field, all veins behind R with series of brown dots, commonly located on both sides of the veins; Sc and Rs long; male hypopygium with rostral prolongation of ventral dististyle slender, with a long erect gently curved rod at its base.

Male.—Length, about 8.5 to 10 millimeters; wing, 10 to 13.

Female.—Length, about 8.5 to 9.5 millimeters; wing, 11.5 to 12.

Rostrum and palpi black. Antennæ relatively short, brownish black, pedicel more or less yellowed; proximal flagellar segments suboval to subcylindrical, with very short abrupt apical pedicels, more distinct in female; outer segments becoming more elongated, terminal segment long, narrowed on outer half; all flagellar segments with chiefly unilaterally distributed verticils that become single and very long on the outer seven or eight segments. Head blackened, vaguely more yellowed on the narrow anterior vertex and on occiput.

Prothorax brownish black. Mesonotal præscutum with the ground yellow, patterned with dark brown or brownish black, including a narrow central stripe that is more expanded at suture, lateral areas very broad, reaching the margins; scutum dark brown, narrowly pale silvery medially, more broadly yellowed on lateral parts of scutal lobes; scutellum brown; mediotergite brownish black, in cases slightly more yellowed on either side of midline. Pleura chiefly brownish black, extreme ventral sternopleurite yellowed. Halteres with stem yellow, knob dark brown to black. Legs with coxæ yellowed, mid pair more darkened; trochanters brownish yellow; femora yellow, with the black rings, basal one broad, outer ring very

narrow, about one-third the yellowed apex; tibiæ yellow, tips narrowly infuscated; tarsi brownish yellow, outer segments blackened; claws with about five long teeth on proximal third. Wings (Plate 1, fig. 7) with the ground pale yellow, conspicuously patterned with brown, including major areas in radial field, with narrow seams over cord and outer end of cell 1st M_2; all veins behind R with series of brown dots, commonly occurring on both sides of the veins, on Cu in cases only in cell M; cells of posterior half of wing with paler brown centers, these becoming darker and more conspicuous at margins of cells M_4, Cu and the anals; cells C and Sc almost uniformly yellow; veins pale brown, yellowed in costal region. Venation: Sc long, Sc_1 ending about opposite two-thirds to shortly before fork of Rs, Sc_2 near its tip; Rs long, angulated at origin, vaguely sinuous; cell 1st R_2 longer than any of the veins beyond it; m-cu shortly before fork of M.

Abdomen yellowed, more or less variegated with darker, especially on the narrow tergal borders and pleural membrane; subterminal sternites more blackened, hypopygium obscure orange. Ovipositor with cerci slender, gently curved. Male hypopygium (Plate 3, fig. 37) with the tergite, *t*, transverse, apex rounded, posterior border virtually truncate; setæ marginal, relatively short. Basistyle, *b*, with ventromesal lobe conspicuous; total area of style fully three time that of ventral dististyle. Dorsal dististyle a blackened slender gently curved sickle, very gradually narrowed into a slender spine. Ventral dististyle, *d*, bilobed, the outer lobe or body of style larger, with abundant long setæ; rostral prolongation slender, at its base on outer margin with an erect more slender gently curved rod of nearly equal length. Gonapophysis, *g*, with mesal-apical lobe slender, tip acute, narrower in the materials from Sikkim.

Habitat.—Sikkim, Assam.

Holotype, male, Yedang, Sikkim, altitude 10,600 feet, in *Rhododendron* association, June 5, 1959 (*Schmid*). Allotype, female, Chumzomoi Choka, Sikkim, altitude 11,800 feet, in *Rhododendron* association, July 8, 1959. Paratopotypes, two males with type. Paratypes, one female, Chachu, Sikkim, altitude 9,950 feet, in *Rhododendron* association, May 17, 1959; male, Zema, Sikkim, altitude 9,100 feet, June 14, 1959; males, Hkayam Boum, Manipur, Assam, altitude 7,500 to 8,500 feet, June 20–23, 1960 (*Schmid*); males and females, Sirhoi Kashong, Manipur, Assam, altitude 6,000 feet, June 6–8, 1960 (*Schmid*).

This attractive fly is readily told from all other described regional allies by the abundantly dotted and spotted wings and the pattern of the femora. *Limonia* (*Metalimnobia*) *hedone* Alexander has a few brown dots along vein Cu in cell M but these are lacking on the other veins. *L.* (*M.*) *jactator* Alexander and *L.* (*M.*) *biannulata* (Brunetti), which Edwards believed to be virtually identical with the Indonesian *L.* (*M.*) *annulifemur* (de Meijere), are quite different flies.

LIMONIA (METALIMNOBIA) XANTHOPTEROIDES ADONIS subsp. nov. Plate 1, fig. 8; Plate 3, fig. 38.

Size medium (wing of male 11 millimeters); mesothorax yellow, præscutum with four brownish black stripes; antennæ with scape and pedicel light yellow, flagellum brownish black; front and anterior vertex yellow, posterior vertex black; legs black, bases of fore femora yellowed, all femora with a narrow yellow subterminal ring; wings yellow, with a pale brown inconspicuous pattern that is virtually restricted to the outer three-fourths; male hypopygium with the body of ventral dististyle very small, rostrum elongated; mesal-apical lobe of gonapophysis very slender, at apex with a brush of long setæ.

Male.—Length, about 10 millimeters; wing, 11; antenna, about 2.2.

Female.—Length, about 9.5 millimeters; wing, 12.5.

Rostrum brownish black; palpi black. Antennæ with scape and pedicel light yellow, flagellum brownish black; basal flagellar segments oval, outer ones progressively more elongated; verticils long. Front and anterior vertex clear light yellow, posterior vertex abruptly black, genæ paler.

Pronotum brownish black medially, sides broadly yellow. Mesonotal præscutum yellow with four clearly defined brownish black stripes, the intermediate pair barely divided by a ground line; posterior sclerites of notum yellow, scutal lobes patterned with brownish black. Pleura yellow, dorsopleural membrane slightly darker; a very small brown spot before wing root. Halteres brownish yellow, base of stem clearer yellow, apex of knob infuscated. Legs with coxæ and trochanters yellow; femora blackened, with a narrow yellow subterminal ring; fore femora with about the proximal third yellowed, the other femora with this barely indicated; remainder of legs blackened; claws with about five teeth, the outermost largest. Wings (Plate 1, fig. 8) with the ground yellow, prearcular and costal fields clear saturated yellow; an-

inconspicuous pale brown pattern, including the large stigma, an area at origin of Rs, anterior cord and outer end of cell 1st M_2; further paler brown washes before wing tip and in outer ends of anal cells, outer ends of cells R_3 and R_5 slightly yellowed; veins brown, more yellowed in the brightened fields. Venation: Sc long, Sc_1 ending just beyond the fork of Rs, Sc_2 near its tip; cell 1st M_2 relatively small, shorter than any of the veins beyond it; m-cu shortly before fork of M.

Abdominal tergites fulvous brown, sternites more yellowed, subterminal segments blackened to form a narrow ring; genitalia of both sexes yellow. Ovipositor with cerci short, very slender. Male hypopygium (Plate 3, fig. 38) with the posterior border of tergite, *t*, nearly truncate, the lobes scarcely developed, each provided with about 20 strong setæ; proctigeral extension pale. Basistyle, *b*, elongate, ventromesal lobe rounded. Dorsal dististyle, *d*, a powerful flattened blade, the outer third narrowed into a slender decurved spine, basal half of blade with about 10 strong setæ; inner dististyle with body very small, with very long setæ; rostral prolongation narrow, subequal in length to the outer style, outer half a little dilated. Gonapophysis, *g*, with mesal-apical lobe very slender, apex with a brush of long pale setæ.

Habitat.—Sikkim.

Holotype, male, Yedang, altitude 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*). Allotopotype, female, pinned with type.

I am placing the present fly as a race of *Limonia* (*Metalimnobia*) *xanthopteroides* (Riedel), described from Formosa, with slightly differentiated other forms in western China. The species is quite distinct from the Palæarctic *L.* (*M.*) *bifasciata* (Schrank).

LIMONIA (LIBNOTES) PRAMATHA sp. nov. **Plate 1, fig. 9; Plate 4, fig. 39.**

General coloration of thorax almost uniformly light fulvous, unpatterned; rostrum yellow; legs pale yellowish brown; wings pale yellow, prearcular and costal borders clearer yellow, disk with a pale brown pattern; m only a little longer than basal section of M_3; male hypopygium with two pale rostral spines; mesal-apical lobe of gonapophysis pale, apex obtuse.

Male.—Length, about 8 millimeters; wing, 9; antenna, about 1.5.

Rostrum clear light yellow, subequal in length to the antennal scape; labial palpi yellow, more than one-half remainder

of rostrum; maxillary palpi with basal segment brownish yellow, outer segments black. Antennæ brownish black; basal flagellar segments short-oval, the outer ones more elongate; longest verticils exceeding the segments, unilaterally arranged. Front silvery; eyes nearly contiguous, the anterior vertex reduced to a capillary gray strip; posterior vertex obscure yellow.

Pronotum obscure yellow, scutellum clearer yellow. Mesonotum almost uniformly light fulvous, unpatterned, lateral præscutal borders narrowly more whitened. Pleura yellow, with a pale brown suffusion that includes the propleura and anepisternum. Halteres with stem yellow, knob dark brown. Legs with coxæ and trochanters yellow, free coxæ infuscated; remainder of legs uniformly pale yellowish brown, the outer tarsal segments dark brown. Wings (Plate 1, fig. 9) pale yellow, prearcular region and costal border clearer more saturated yellow; a pale brown pattern that is restricted to the veins, including a small cloud at origin of Rs, with more extensive areas over cord, outer end of cell 1st M_2, fork of Sc, and over R_2 and adjoining veins; outer third of vein 2nd A clouded with a further vague darkening at near basal fourth of cell Sc; veins clear light yellow, pale brown in the patterned areas. Venation: Sc long, Sc_1 ending beyond level of m-cu, Sc_2 close to its tip; Rs nearly straight, basal section of R_{4+5} short, less than m-cu; R_2 and free tip of Sc_2 in transverse alignment; vein R_3 very slightly decurved at tip, R_{4+5} virtually straight; cell 1st M_2 narrow, slightly widened outwardly, subequal in length to distal section of M_3, m only a trifle longer than the straight basal section of M_3; m-cu shortly before midlength of M_{3+4}; vein 2nd A convergent, gently arcuated to the margin.

Abdomen yellow, scarcely patterned, hypopygium yellow. Male hypopygium (Plate 4, fig. 39) with the tergite, *t*, transverse, posterior border very gently emarginate, borders narrowly thickened, provided with few moderately long delicate setæ. Basistyle, *b*, with ventromesal lobe oval, with abundant long pale brown setæ. Dorsal dististyle a long sinuous rod, its tip slightly decurved. Ventral dististyle, *d*, small, its area about two-thirds that of the basistyle; rostral prolongation a narrow yellow blade; rostral spines two, basal, elongate, pale, placed very close together; axillary lobule long, pale, tipped with the two powerful setæ. Gonapophysis, *g*, pale, body very small, mesal-apical lobe a flattened straight blade,

tip obtuse. Ædeagus stout, terminating in two large oval lobes.

Habitat.—Assam.

Holotype, male, Sirhoi Kashong, Manipur, altitude 6,000 feet, June 7, 1960 (*Schmid*).

This attractive fly is told from other regional species of the subgenus by the uniform fulvous coloration of the mesonotum, coloration of the legs and wings, venation, and details of the male hypopygium, particularly the ventral dististyle. The general structure of the hypopygium is much as in *Limonia* (*Libnotes*) *punctithorax* (Brunetti) and other allied species, but the details, as the number of rostral spines, are quite distinct.

LIMONIA (LIBNOTES) SHARVA sp. nov. **Plate 1, fig. 10; Plate 4, fig 40.**

Size medium (wing of male 9 millimeters); mesonotum almost uniformly yellowish brown, ventral pleura clearer yellow; femora yellow, with a very conspicuous black subterminal ring; wings brownish yellow, unpatterned except for the small pale brown stigma, Sc long; male hypopygium with tergite long, rostral prolongation of ventral dististyle with three spines that are conspicuously narrowed into hairlike points.

Male.—Length, about 8 millimeters; wing, 9; antenna, about 1.8.

Rostrum brownish black; palpi black. Antennæ brownish black, pedicel more yellowed; flagellar segments oval, longer than the verticils; terminal segment about one-third longer than the penultimate, strongly narrowed on outer third. Head dark grayish brown, with very conspicuous black setæ; eyes contiguous above, obliterating the anterior vertex.

Pronotum medium brown. Mesonotum almost uniformly yellowish brown, Præscutum with very faintly differentiated nearly concolorous stripes; præscutum and scutum with sparse erect black setæ. Pleura brownish yellow above, clearer yellow on sternopleurite, meron and metapleura. Halteres short, stem obscure yellow, knob more infuscated. Legs with coxæ and trochanters yellow, fore coxæ slightly darker; femora yellow, with a very conspicuous black subterminal ring, on fore legs subequal to the yellow tip, on middle and hind femora broader, nearly twice the tip; remainder of legs brownish black, bases of tibiæ narrowly more yellowed; claws with two major spines, the outer one appressed, its tip acute, basal spine erect, tip obtuse. Wings (Plate 1, fig. 10) brownish yellow, costal border clear yellow; no dark pattern excepting

the small obliquely oval pale brown stigma; veins brown, those in costal field more yellowed. Venation: Sc_1 ending about opposite fork of Rs, Sc_2 at its tip; cell 1st M_2 shorter than distal section of M_3; m-cu nearly one-half its length beyond fork of M.

Abdomen brown, hypopygium yellowed. Male hypopygium (Plate 4, fig. 40) with the tergite, *t*, unusually long, the length only a little less than the breadth across the base, gradually narrowed outwardly; posterior border with a shallow emargination, lobes low, oval, with relatively few long setæ. Basistyle, *b*, with ventromesal lobe oval, with long setæ. Dorsal dististyle a gently curved yellow rod, gradually narrowed into a long spine. Ventral dististyle, *d*, about three-fourths the area of basistyle; rostal prolongation slender, with a single long seta on outer margin at near midlength; spines three, placed close together in a row, stout on basal half, thence narrowed into a hairlike point; a conspicuous tubercle on mesal face of style near base, tipped with three or more strong setæ. Gonapopysis, *g*, with mesal-apical lobe pale, broad at base, narrowed into a subacute point. Ædeagus terminating in two small lobes.

Habitat.—Assam.

Holotype, male, Ilkayam Boum, Manipur, altitude 8,500 feet, June 21, 1960 (*Schmid*).

Limonia (*Libnotes*) *sharva* is quite distinct from other regional species that have unpatterned wings and a subterminal darkened femoral ring. The hypopygial structure shows it to be closer to *L.* (*L.*) *punctithorax* (Brunetti) and some allied species rather than to *L.* (*L.*) *indica* (Brunetti) and others. These latter flies will probably be placed in the subgenus *Goniodineura* van der Wulp.

LIMONIA (LIBNOTES) TARTARUS sp. nov. Plate 1, fig. 11.

Size large (wing of male 17.5 millimeters); general coloration of thorax yellow, conspicuously patterned with brownish black, including two pleural stripes; knobs of halteres blackened; legs beyond the trochanters black; tip of mid femur narrowly pale; wings light yellow, cell C extensively dark brown; veins with a series of paler brown spots; m at near three-fourths the length of cell 1st M_2; abdomen chiefly orange, narrowly lined laterally with black.

Male.—Length, about 14 millimeters; wing, 17.5.

Rostrum brown, palpi black. Antennæ with scape and pedicel black, flagellar segments weakly bicolored, bases slightly infuscated, tips paling to obscure yellow, the ninth and suc-

ceeding segments more uniformly darkened; flagellar segments oval, subequal to the longest verticil. Head brown in front, paling to obscure yellow on occipital region; anterior vertex very narrow to virtually eliminated by the eyes, tubercle of anterior vertex slightly developed.

Pronotum yellow. Mesonotal præscutum yellow, with a broad central brownish black stripe on posterior half, widened behind, divided at suture into narrower lines that extend parallel to one another to the abdomen, involving the inner parts of the scutal lobes, lateral margines of scutellum and broad blackenings on sides of postnotal mediotergite and dorsal pleurotergite, the latter confluent with a black dorsopleural stripe extending from the cervical region backward; remainder of pleura greenish yellow, with a further narrow ventral brownish black stripe extending from fore coxæ across the dorsal sternopleurite, above the posterior coxæ to abdomen, interrupted above the mid-coxæ. Halteres yellow, knob brownish black. Legs with coxæ greenish yellow, fore pair patterned with brownish black, as described; trochanters greenish yellow; remainder of legs black, the tips of middle femora narrowly greenish white, last tarsal segment of fore leg obscure yellow; claws with outer spine more than one-third as long as the apex, more basal spinules crowded. Wings (Plate 1, fig. 11) with the ground light yellow, conspicuously patterned with dark brown, including basal half of cell C; stigma dark brown; cord and outer end of vein 2nd A conspicuously seamed with dark brown; all veins excepting 2nd A with smaller paler brown spots, more extensive at end of vein M_{1+2}; veins yellow, dark in the patterned areas, including the entire cord. Venation: Free tip of Sc_2 lying far beyond R_2, vein Sc_2+R_{1+2} being about three times Sc_2 alone; anterior cord strongly oblique; all outer veins strongly decurved, R_{4+5} ending beyond the wing apex; m relatively short, less than three times the basal section of M_3, at near three-fourths the length of cell 1st M_2; m-cu oblique, about its own length beyond fork of M.

Abdominal tergites orange, basal seternites more yellowed; first tergite and extreme lateral borders of succeeding segments blackened; lateral margins of sternites with a narrow black area, disconnected on three proximal segments, on four to seven continuous and more extensive; hypopygium greenish yellow.

Habitat.—Assam.

Holotype, male, Rumkheng, Khasi-Jaintia, altitude 5,500 feet, March 26, 1960 (*Schmid*).

Limonia (*Libnotes*) *tartarus* is entirely distinct from *L.* (*L.*) *sicca* Alexander, the only other regional species that has at least the fore legs black and without a supernumerary crossvein in cell R_3. Species having the latter character are now placed by me in the subgenus *Laosa* Edwards, based on this feature, and includes *Limonia* (*Laosa*) *dolonigra* Alexander, which likewise has the legs similarly brownish black. *L.* (*L.*) *sicca* has the wing pattern and venation of the outer radial field quite different from the present fly.

LIMONIA ASPROPODA sp. nov. **Plate 1, fig. 12; Plate 4, figs. 41, 42.**

Size medium (wing about 5.5 millimeters); mesonotal præscutum light brown with a narrow darker central line; antennæ of male elongate, nearly two-thirds the wing; flagellar segments elongate cylindrical, with abundant setæ; anterior vertex broad, brilliant silvery; legs brownish black, outer ends of all tarsi snowy white; wings strongly blackened, Sc long; abdomen dark brown, posterior borders of segments broadly gray; male hypopygium with apex of rostral prolongation of ventral dististyle pendant, with two long straight rostral spines.

Male.—Length, about 5 to 6 millimeters; wing, 5.3 to 5.5; antenna, about 3.3 to 3.5.

Female.—Length, about 5.5 millimeters; wing, 5.6.

Rostrum and palpi small, brownish black. Antennæ of male elongate, black throughout; flagellar segments elongate-cylindrical, with very abundant erect black verticils and shorter more delicate setæ, the vestiture of outer segments somewhat longer. Anterior vertex broad, brilliant silvery; posterior vertex brownish black.

Pronotum dark brown. Mesonotal præscutum and scutum chiefly light brown, the former with a narrow darker brown central stripe; scutellum darker brown, narrowly more yellowed posteriorly; postnotum obscure yellow. Pleura yellow, propleura and dorsopleural region darker. Halteres blackened. Legs with fore coxæ pale brown, remaining coxæ and all trochanters yellow; femora and tibiæ brownish black, basitarsi the same, the tips and remainder of all tarsi snowy white. Wings (Plate 1, fig. 12) strongly blackened, the oval stigma and costal border still darker; veins dark brown. Longitudinal veins beyond general level of origin of Rs with strong macrotrichia. Venation: Sc long, Sc_1 ending about opposite two-thirds to three-fourths Rs, Sc_2 near its tip; free tip of

Sc_2 and R_2 in transverse alignment or the latter slightly more basal; m-cu at or before fork of M.

Abdomen dark brown, the posterior borders of segments pale gray to silvery, terminal segments black. Ovipositor with valves pale yellow, very slender. Male hypopygium (Plate 4, figs. 41, 42) with posterior border of tergite, *t*, convex, scarcely emarginate at apex, with long setæ on outer fourth. Basistyle, *b*, with ventromesal lobe large. Dorsal dististyle narrowed on about the outer fifth, the long tip acute. Ventral dististyle, *d*, of moderate size, its area somewhat greater than that of the basistyle; rostrum slender, the outer half pendant, before the bend with two closely approximated spines. Gonapophysis, *g*, with mesal-apical lobe slender. Ædeagus very narrow, especially on outer half.

Habitat.—Assam, Sikkim.

Holotype, male, Mawshun, Khasi-Jaintia, Assam, altitude 2,000 feet, January 24, 1960 (*Schmid*). Allotype, female, Laittyngkot, Khasi-Jaintia, altitude 4,800 feet, March 17, 1960. Paratypes, female, with the allotype, March 17, 1960; male, Lingdok, Sikkim, altitude 4,600 feet, May 7, 1959 (*Schmid*).

In the coloration of the body and wings *Limonia aspropoda* differs from *L. niveipes* (Brunetti), the only other regional species known to have the tarsi of all legs snowy white. The broad silvery anterior vertex suggests species of the subgenus *Melanolimonia* subgen. nov., but the reference to that group is impossible. The smaller and otherwise different *L. gentilis* Alexander likewise may be related to the present fly since it agrees in antennal structure and in general features of the hypopygium. The coloration of the legs in *gentilis* still is unknown but it very probably will be found to have white tarsi, as in this species. The Sikkim paratype has the mesal-apical lobe of the gonapophysis (Plate 4, fig. 42) shorter and the ædeagus narrower than in the type but appears to be conspecific.

LIMONIA BHIMA sp. nov. **Plate 1, fig. 13; Plate 4, fig. 43.**

Size large (wing of male 11 millimeters); mesonotum reddish brown, præscutum with a broad darker brown central stripe; femora yellow, tips very narrowly infuscated; wings very pale brown, restrictedly patterned with dark brown, with two whitened areas at ends of cells Cu and 1st A; Sc long, ending about opposite three-fourths Rs; male hypopygium

with the tergal lobes long and slender, basistyle with ventromesal lobe very large, with abundant long yellow setæ; ventral dististyle with rostral spines black, placed close together; gonapophysis with mesal-apical lobe very long and slender.

Male.—Length, about 9.5 millimeters; wing, 11; antenna, about 1.5.

Rostrum dark brown, palpi black. Antennæ black, pedicel brownish black; basal flagellar segments subglobular, gradually passing into oval, outer segments slightly exceeding their verticils. Head dark gray; anterior vertex slightly narrowed than the diameter of scape.

Pronotum reddish brown. Mesonotal præscutum reddish brown with a broad darker brown central stripe that narrows behind, not reaching the suture; scutum yellow, lobes suffused with brown; posterior sclerites of notum silvery yellow pollinose. Pleura light brownish gray, propleura, anepisternum and dorsal sternopleurite slightly infuscated. Halteres pale brown, base of stem yellowed, knob expanded, darkened apically, stem fringed with unusually long setæ. Legs with coxæ yellow, fore pair darkened; trochanters yellow; femora yellow, tips very narrowly and inconspicuously infuscated; tibiæ and proximal tarsal segments yellow, outer segments blackened. Wings (Plate 1, fig. 13) very pale brown, restrictedly patterned with dark brown, including small clouds at origin of Rs, Sc_2, stigma, cord and outer end of cell 1st M_2; conspicuous marginal areas in cells Cu and 1st A, adjoining the veins behind; veins brownish yellow, darker in the clouded areas, Sc clear yellow. Venation: Sc long, Sc_1 ending about opposite three-fourths Rs, Sc_2 close to its tip; basal section of R_{4+5} strongly arcuated at origin; cell 1st M_2 nearly equal in length to distal section of M_{1+2}; m-cu just before fork of M; vein 2nd A oblique at apex.

Abdomen cinnamon brown, vaguely clouded with darker, hypopygium more yellowed. Male hypopygium (Plate 4, fig. 43) with the tergite, *t*, transverse, posterior border produced into two unusually long and slender lobes that are separated by a deep U-shaped notch, the entire outer margin, including lobes, more sclerotized, with long setæ, these becoming more concentrated and numerous at apices of lobes. Basistyle, *b*, with ventromesal lobe very large, nearly equal in area to body of style, ventral surface and apex with abundant long yellow setæ. Dorsal dististyle a strong sickle, gradually narrowed

into a long spine. Ventral dististyle, *d*, large and fleshy, its area subequal to the total extent of basistyle; rostral prolongation triangular, almost glabrous, lacking the usual apical setæ; spines two, blackened, placed close together at summit of a dusky tubercle. Gonapophysis, *g*, with mesal-apical lobe very long and slender, gently curved. Ædeagus moderately stout, glabrous, apex bilobed.

Habitat.—Sikkim.

Holotype, male, Chumzomoi Choka, altitude 11,800 feet, in *Rhododendron* association, July 8, 1959 (*Schmid*).

Limonia bhima is entirely different from other regional members of the genus having a so-called *'Dicranomyia'* type of hypopygium, in the elongate vein Sc. Peculiar features of the hypopygium include the slender tergal lobes and the unusually large ventromesal lobe of the basistyle.

LIMONIA INDEFESSA sp. nov. **Plate 1, fig. 14; Plate 4, fig. 44.**

General coloration of thorax light brown, pleura darker; head behind dark brown, anterior vertex broad, clear light silvery; antennæ moderately long, about one-fourth the wing; legs brown; wings strongly tinged with brown, stigma darker, Sc long; male hypopygium with posterior border of tergite convex; basistyle with ventromesal lobe unequally bilobulate; rostrum of ventral dististyle with two long gently curved spines.

Male.—Length, about 5 millimeters; wing, 6; antenna, about 1.5.

Rostrum obscure yellow, palpi black. Antennæ dark brown, relatively long; flagellar segments oval to subcylindrical, much exceeding the verticils, with short abrupt apical pedicels; terminal segment slender, about one-third longer than the penultimate. Anterior vertex broad, clear light silvery, very conspicuous; posterior vertex dark brown.

Pronotum small and compact, dark brown. Mesonotum chiefly light brown, scutal lobes darker brown, central region of scutum, scutellum and postnotum more yellowed. Pleura dorsally dark brown, ventral sclerites more yellowed. Halteres with stem infuscated, knob darker. Legs with coxæ and trochanters obscure yellow, fore coxæ slightly darker; remainder of legs brown, tarsi very slightly paler. Wings (Plate 1, fig. 14) strongly tinged with brown, prearcular field paler; stigma oval, darker brown. Macrotrichia on longitudinal veins beyond general level of origin of Rs, including outer two-

thirds of Sc, lacking on anals and most of basal section of Cu_1. Venation: Sc long, Sc_1 ending opposite three-fifths Rs, Sc_2 near its tip; free tip of Sc_2 and R_2 pale, in transverse alignment, R_{1+2} extended beyond as a strong setiferous spur; m-cu before fork of M; cell 2nd A long.

Abdomen dark brown. Male hypopygium (Plate 4, fig. 44) with the tergite, *t*, transverse, without sclerotized margins; posterior border convex, central area with nine or ten long setæ, with two or three smaller lateral setæ. Basistyle, *b*, subequal in area to the ventral dististyle, the large ventromesal lobe divided into two unequal lobules, both tipped with long setæ; more numerous shorter setæ on mesal face of style. Dorsal dististyle a long slender rod, outer end gently curved into a long spine. Ventral dististyle, *d*, fleshy, prolongation relatively small, on outer margin with two long pale slightly unequal gently curved spines. Gonapophysis, *g*, with mesal-apical lobe a slender curved darkened spine. Ædeagus slender, glabrous.

Habitat.—Assam.

Holotype, male, Pynter, Khasi-Jaintia, altitude, 1,700 feet, January 20, 1960 (*Schmid*).

Limonia indefessa is still another species that has the venation generally as in the subgenus but with the male hypopygium more as in *Dicranomyia*. I know of no close relative. The broad silvery anterior vertex is much as in the various species of the subgenus *Melanolimonia* but there seems to be no close relationship between the two groups.

LIMONIA LUTEIPOSTICA sp. nov. **Plate 1, fig. 15; Plate 4, fig. 45.**

General coloration of notum brown, præscutal margins broadly yellow; legs light brown, second tarsal segment of posterior legs yellowish white; wings light brown, very restrictedly patterned with darker brown; Sc long, Sc_1 ending about opposite two-thirds Rs, Sc_2 near its tip; abdominal tergites medium brown, sternites light yellow; male hypopygium with the ventral dististyle elongate-oval, narrowed outwardly into a sclerotized point, rostral spines on face of style at near two-thirds the length.

Male.—Length, about 5.5 millimeters; wing, 6.5; antenna, about 1.

Rostrum very short, palpi black, moderately long, outer two segments oval, subequal. Antennæ with scape brown, remainder black; relatively short, basal flagellar segments

short-oval, outer ones more elongate, the lower faces of segments short-oval, outer ones more elongate, the lower faces of segments not produced, as in *luteitarsis;* terminal segment about one-third longer than the penultimate. Front yellow, remainder of head light brown, restrictedly patterned with darker brown, anterior vertex light gray pruinose, very broad, about three times the diameter of scape.

Pronotal scutum brownish yellow, sides of scutellum darker brown, anterior pretergites very pale yellow. Disk of præscutum almost uniformly dark chestnut brown, lateral borders broadly yellow, remainder of notum chestnut brown; setæ of præscutum and scutum sparse but long and conspicuous, scutellum and postnotum glabrous. Pleura with a medium brown dorsal stripe, ventral sclerites light yellow, ventral sternopleurite vaguely darkened. Halteres brownish black. Legs with coxæ and trochanters light yellow, fore coxæ weakly darkened at bases; remainder of fore and middle legs light brown, posterior legs light brown, the second tarsal segment yellowish white, third and fourth very pale brown, terminal segment darker. Wings (Plate 1, fig. 15) tinged with very light brown, restrictedly patterned with darker brown, including narrow vague seams at origin of Rs, fork of Sc, cord and outer end of cell 1st M_2; stigma short-oval, slightly darker brown; veins very pale brown. Venation: Sc long, Sc_1 ending about opposite two-thirds Rs, Sc_2 near its tip; free tip of Sc_2 and R_2 in trasverse $_{1+2}$ alignment; cell 1st M_2 nearly as long as distal section of M_{1+2}; m-cu about one-fourth its length before fork of M.

Abdominal tergites medium brown, sternites light yellow; hypopygial dististyles paler. Male hypopygium (Plate 4, fig. 45) with tergite, *t*, transverse, posterior border very shallowly emarginate, all borders thickened, especially the posterior one which bears relatively few but long setæ. Basistyle, *b*, with ventromesal lobe unmodified. Dorsal dististyle a slender pale rod, nearly straight, the blackened tip acute, gently decurved. Ventral dististyle, *d*, long and narrow, its area less than one-half that of the basistyle; body oval, narrowed outwardly, terminating in a sclerotized point, with numerous strong setæ near apex; rostral spines two, placed close together far back on face of style at near two-thirds the length; spines long and slender but inconspicuous. Gonapophysis, *g*, with mesal-apical lobe stout, inner apical angle slightly produced, blackened, the

adjoining margin inconspicuously roughened or erose. Ædeagus, *a*, broad, glabrous, terminating in two truncated lobes.

Habitat.—Sikkim.

Holotype, male, Yedang, altitude 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*).

Superficially, the most similar regional species is *Limonia luteitarsis* sp. nov., which differs in the structure of the antennæ and palpi, coloration of the thorax, wings and legs, and especially in the very different male hypopygium.

LIMONIA LUTEITARSIS sp. nov. Plate 1, fig. 16; Plate 4, fig. 46.

General coloration of mesonotal præscutum polished chestnut brown, yellow on sides; rostrum, including the palpi, greatly reduced; antennæ with proximal flagellar segments transverse-subglobular, their lower faces rounded, slightly produced; legs yellow; wings fulvous brown, unpatterened except for the pale brown stigma; Sc long, inner end of cell 1st M_2 arcuated; male hypopygium with rostral prolongation elongate, the two spines very long and slender, basal in position, directed cephalad.

Male.—Length, about 6.5 millimeters; wing, 7.2; antenna, about 1.3.

Mouthparts greatly reduced, maxillary palpi apparently a single segment. Antennæ short, brownish black, extreme base of scape obscure yellow; basal flagellar segments transversely-subglobular, the lower face slightly produced, rounded; outer segments oval, the terminal one about one-third longer than the penultimate, narrowed outwardly; verticils shorter than the anterior vertex yellow, the remainder polished chestnut; anterior vertex broad, nearly three times the diameter of scape.

Pronotum obscure yellow. Mesonotal præscutum with disk polished chestnut brown, lateral borders broadly more yellowed; scutal lobes polished brown, median region and scutellum more yellowed; postnotum light brown. Pleura and pleurotergite polished yellow. Halteres light brown, knob darker brown. Legs with coxæ and trochanters yellow; remainder of legs obscure yellow to brownish yellow, second tarsal segment of all legs conspicuously yellowish white, including the vestiture, on posterior legs more extensive, including outer end of segment one and basal half of segment three; remaining tarsal segments brown, the last darker; claws long, gently curved, with a long straight basal spine. Wings (Plate 1, fig. 16) strongly fulvous brown, stigma slightly darker, pale brown;

veins very pale brown. Trichia of anal veins virtually lacking, reduced to one or two near tips. Venation: Sc long, Sc_1 ending about opposite four-fifths Rs, Sc_2 not far removed; free tip of Sc_2 slightly basad of R_2; cell 1st M_2 elongate, subequal to distal section of M_3; inner end arcuated; m-cu at fork of M.

Abdomen dark brown, hypopygium a trifle more yellowish brown. Male hypopygium (Pate 4, fig. 46) with the posterior border of tergite, *t*, truncate or very shallowly emarginate. Basistyle, *b*, with ventromesal lobe large, obtuse. Dorsal dististyle a delicate nearly straight yellow rod. Ventral dististyle, *d*, small, its total area about one-half that of the basistyle; body of style oval, with long setæ; rostral prolongation a long gently curved glabrous yellow blade; rostral spines at extreme base of prolongation, long and very slender, appearing almost as long curved setæ, placed close togteher, directed cephalad or ventrad instead of outwardly, as usual in the genus. Gonapophysis, *g*, yellow, narrowed gradually to the obtusely rounded apex, the lateral border very inconspicuously produced. Ædeagus glabrous, apex bilobed.

Habitat.—Kumaon.

Holotype, male, Kanol, Pauri Garhwal, altitude 8,530 feet, August 19, 1958 (*Schmid*).

Limonia luteitarsis is still another of the many species that have the venation generally as in *Limonia* while having the male hypopygium quite as in *Dicranomyia*, as discussed in the introduction. The closest ally seems to be *Limonia citrofocalis* (Edwards), of Borneo, which has the antennal structure and mouthparts approximately as in the present fly, differing in all other features of coloration and venation.

LIMONIA PERNODOSA sp. nov. **Plate 1, fig. 17; Plate 5, fig. 47.**

Size small (wing of male up to 5 millimeters); antennæ black throughout, in male the flagellar segments very conspicuously nodose, the abrupt apical pedicels longer than the basal enlargements; mesonotal præscutum brownish yellow with a broad central dark brown stripe; femora brown, extreme tips whitish; wings weakly tinged with brown, stigma pale brown, subcircular; m-cu at or beyond midlength of M_{3+4}; male hypopygium with ventral dististyle conspicuously trilobed, the intermediate arm with a comb of about ten flattened peglike spines.

Male.—Length, about 4.5 to 5.5 millimeters; wing, 4.5 to 5; antenna, about 2.4 to 2.6.

Female.—Length, about 5.5 millimeters; wing, 5.5.

Rostrum black, relatively long and slender, only a little shorter than remainder of head, palpi, black. Antennæ relatively long, black throughout, scape more pruinose; flagellar segments of male nodose, the basal swellings oval, abruptly narrowed into slender apical pedicels that slightly exceed the bases, terminal segment elongate, simple; basal swellings each with a single very elongate black verticil and more abundant delicate pale setæ that are about one-half as long. Head brownish black, sparsely pruinose; anterior vertex light gray, very narrow.

Pronotum brown. Mesonotal præscutum brownish yellow, with a broad central dark brown stripe and a small marginal brown cloud behind the humeri; posterior sclerites of notum brownish yellow, scutal lobes and scutellum brown. Pleura pale brown, dorsal sternopleurite and the posterior pleurites yellowed. Halteres with stem yellow, knob large, brownish black. Legs with coxæ and trochanters yellow; fenora brown, base vaguely paler, extreme tip whitened; tibiæ and tarsi light brown; claws small, denticles basal, inconspicuous. Wings (Plate 1, fig. 17) weakly tinged with brown; stigma pale brown, subcircular; veins brown, with long conspicuous black macrotrichia on virtually all longitudinal veins, lacking on base of M and 1st A. Venation: Sc long, Sc_1 opposite fork of Rs, Sc_2 near tip; free tip of Sc_2 about its own length before R_2; cell 1st M_2 rectangular, a little shorter than vein M_4; m-cu at midlength to about two thirds M_{3+4}.

Abdominal tergites brownish black, basal and ninth sternite more yellowed. Male hypopygium (Plate 5, fig. 47) with the tergite, *t*, narrowed outwardly, posterior border with a V-shaped emargination, lobes rounded, each with about eight long setæ. Basistyle, *b*, elongate; ventromesal lobe small, oval, with long setæ. Dorsal dististyle a stout darkened blade, narrowed to a long acute point. Ventral dististyle, *d*, relatively small, its area about two-thirds that of the basistyle, conspicuously trilobed, the lower lobe terminating in a strong point; intermediate arm smaller, its margin with a comb of about ten slattened peglike spines. Gonapophysis, *g* blackened, smooth. Ædeagus long and straight.

Habitat.—Assam.

Holotype, male, Ronghongkung, Khasi-Jaintia, altitude 200 feet, December 9, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 2 males.

The very strongly nodose antennæ of the present fly readily distinguish it from all other regional species. *Limonia monilis* Alexander and *L. multinodulosa* Alexander of the Philippines have somewhat similar antennæ but differ conspicuously in the venation and hypopygial structure. The distal position of m-cu in the present fly suggests the condition found in the subgenus *Libnotes* Westwood.

LIMONIA USHAS sp. nov. **Plate 1, fig. 18; Plate 5, fig. 48.**

Mouthparts unusually long; thorax obscure yellow, præscutum with a central brown stripe, pleura yellowed, with a broad brownish black longitudinal stripe; wings brownish yellow, patterned with brown, including cell C; male hypopygium with tergite extended directly into the proctigeral region, without a defined posterior border; rostral spines short; mesal-apical lobe gonapophysis darkened, elongate.

Male.—Length, about 5.8 millimeters; wing, 6.8; antenna, about 1.2.

Female.—Length, about 6 millimeters; wing, 6.8.

Mouthparts brown, elongate, rostrum and labial palpi together subequal in length to remainder of head; labial palpi about four-fifths as long as the black maxillary palpi. Antennæ black, outer flagellar segments paler; basal flagellar segments short-oval, outer segments longer; terminal segment about one-half longer than the penultimate. Head blackened, sparsely pruinose; anterior vertex narrow, about one-third the diameter of scape.

Pronotum dark brown. Mesonotal præscutum obscure yellow with a broad central brown stripe, the lateral borders of latter still darker; scutal lobes brown, margined internally by darker, median region and base of scutellum obscure yellow, the latter darkened behind; mediotergite light brown, obscure yellow posteriorly. Pleura and pleurotergite yellowed, with a broad brownish black longitudinal stripe extending from cervical region to abdomen, passing beneath the halteres. Halteres short, stem yellow, knob light brown. Legs with coxæ yellow, the fore pair with a narrow brown line that is continued across the sternopleurite; trochanters yellow; femora yellowed basally, tips dark brown, broadly so on fore legs, more narrowly on the remainder; tibiæ obscure yellow; tarsi brown, darker outwardly. Wings (Plate 1, fig. 18) brownish yellow, con-

spicuously patterned with brown, including cell C beyond h; darkened seams at origin of Rs, cord and outer end of cell 1st M_2; a restricted seam on vein 2nd A; very weak clouds in centers of outer cells and basal half of R; prearcular field light yellow; veins yellowish brown, darker brown in the patterned fields, Cu more yellowed. Venation: Sc long, Sc_1 ending about opposite three-fourths Rs, Sc_2 near its tip; m-cu before fork of M.

Abdominal tergites and subterminal sternites brown, basal sternites yellow. Male hypopygium (Plate 5, fig. 48) with the tergite, *t*, transverse, narrowed outwardly, the posterior end extended into the proctigeral area, without lobes, the thickened margins narrow. Basistyle, *b*, with ventromesal lobe oval. Dorsal dististyle slender, the acute tip strongly decurved. Ventral dististyle, *d*, slightly larger than the basistyle; rostral prolongation conspicuous, spines two, slightly separated, shorter than the prolongation beyond their insertion. Gonapophysis, *g*, with mesal-apical lobe darkened, slender, gently curved, tip subacute. Ædeagus glabrous, terminating in two oval lobes.

Habitat.—Assam.

Holotype, male, Nongrim, Khasi-Jaintia, altitude 3,000 feet, March 28, 1960 (*Schmid*). Allotype, female, Mawkhap, Khasi-Jaintia, altitude 2,000 feet, Mrach 19, 1960 (*Schmid*).

Limonia ushas superficially suggests species such as *L. punctacosta* (Brunetti) which actually is quite distinct, especially in the male hypopygium which has four rostral spines.

LIMONIA VIBHISHANA sp. nov. **Plate 2, fig. 19; Plate 5, fig. 49.**

Allied to *flavocincta;* general coloration of thorax yellow and black; front broad, silvery; legs brownish black; posterior tarsi pale yellow; wings weakly infuscated, restrictedly patterned with brown; abdomen black, posterior borders of segments pale yellow; male hypopygium with ventral dististyle having a single rostral spine; gonapophysis slender, unequally bidentate.

Male.—Length, about 6 millimeters; wing, 6.8; antenna, about 2.0

Rostrum and papli black, relatively short. Antennæ relatively long, black; basal flagellar segments oval, outer ones more elongate, all with short abrupt apical pedicels, terminal segment elongate, about one-third longer than the penultimate. Front and broad anterior vertex silvery, the latter about four times the diameter of scape. Head dull black.

Pronotum reduced, brownish black. Mesonotal præscutum with disk covered by a confluent shield, brown in front, blackened posteriorly, continued laterad to border and thence as a slightly interrupted transverse band across the mesepisternum; posterior sclerites of notum yellowed, including the narrow posterior border of præscutum adjoining the suture; central region of scutum, scutellum and broad central area of mediotergite yellowed; scutal lobes and sides of postnotum blackened; surface of præscutum microscopically reticulate. Pleura yellow, with almost continuous brownish black areas on anepisternum and ventral sternopleurite. Halteres blackened. Legs with coxæ and trochanters yellow, the fore coxæ weakly infuscated; remainder of legs brownish black, posterior tarsi pale yellow, involving segments two to four, the pale color vaguely indicated on fore and middle tarsi. Wings (Plate 2, fig. 19) weakly infuscated; stigma oval, dark brown; very narrow and inconspicuous brown seams at origin of Rs, cord, outer end of cell 1st M_2 and along vein Cu; veins brown. Venation: Sc long, Sc_1 ending nearly opposite midlength of Rs, Sc_2 near its tip; free tip of Sc_2 and R_2 nearly in transverse alignment, R_{1+2} projecting beyond as a subequal spur that is provided with three trichia; m-cu shortly beyond fork of M, longer than distal section of Cu_1.

Abdomen, including hypopygium, black posterior borders of segments broadly pale yellow, more conspicuous on sternites. Male hypopygium (Plate 5, fig. 49) with the tergite, *t*, transverse, narrowed outwardly, posterior border almost truncate, margins scarcely thickened; surface with abundant setulæ, the setæ numerous across disk, lacking on border. Basistyle, *b*, with ventromesal lobe oval, with abundant setæ. Dorsal dististyle stout, gently curved to the acute tip. Ventral dististyle, *d*, small, its area only about one-third that of the basistyle; rostral prolongation slender, sclerotized, with a single strong spine from a stout basal tubercle; tip beyond the spines produced into a pendant point, with two strong setæ on outer margin. Gonapophysis, *g*, with mesal-apical lobe slender, unequally bifid, there being a small lateral spine additional to the much longer apical point. Ædeagus narrow, terminating in two short-tubular points.

Habitat.—Ceylon.

Holotype, male, Ambawela, altitude 6,000 feet, March 6, 1954 (*Schmid*).

The most similar species is *Limonia flavocincta* (Brunetti) (*whitei* Alexander) which differs in details of hypopygial structure, especially the ædeagus and gonapophyses.

LIMONIA (RHIPIDIA) CRASSIROSTRIS sp. nov. Plate 2, fig. 20; Plate 5, fig. 50.

General coloration gray; antennæ of male with six short-branched flagellar segments, longest branches subequal to the segments; legs pale yellowish brown; wings subhyaline, with an abundant but inconspicuous dotted gray pattern, Sc_1 ending about opposite one-fifth Rs; male hypopygium with rostral prolongation of ventral dististyle stout, tip short and obtuse, seven to nine very long curved spines.

Male.—Lengths, about 6.5 millimeters; wing, 7.3; antenna, about 1.5

Rostrum relatively long, especially the labial palpi, nearly equal to remainder of head. Antennæ dark brown, the apical pedicels of the flagellar segments paler; flagellar segments two to seven bipectinate, the branches very short, the longest subequal to the segment; first flagellar segment merely produced, eighth segment with a single branch that is nearly as long as the segment, ninth segment merely produced; outer three segments simple, the tenth and eleventh subglobular, terminal segment strongly narrowed apically. Head brown; anterior vertex narrow.

Pronotum light brown. Mesonotum gray, the præscutum and scutum of type discolored, apparently patterned with brown. Pleura gray, posteriorly with a narrow darker longitudinal stripe. Halteres with stem obscure yellow, knob a little darker. Legs with coxæ and trochanters testaceous yellow; remainder of legs pale yellowish brown, outer tarsal segments darker; claw with a single well-developed spine. Wings (Plate 2, fig. 20) subhyaline, with an abundant but very inconspicuous dotted gray pattern, the dots oval to circular, not evidently confluent; very small darker spots in cell Sc at near midlength; veins pale brown. Venation: Sc relatively short, Sc_1 about opposite one-fifth Rs; cell 1st M_2 long, subequal to distal section of M_3, the tip of the latter atrophied in both wings of type; m-cu about one-third its length before fork of M.

Abdomen brown. Male hypopygium (Plate 5, fig. 50) with the tergite, *t*, transverse, posterior border very shallowly emarginate, lobes low with thickened borders; setæ long, pale. Basistyle, *b*, with ventromesal lobe oval, all setæ pale and inconspicuous. Dorsal dististyle a stout rod, slightly more

expanded before the straight apical spine. Ventral dististyle, *d*, fleshy, its total area about one-half greater than that of the basistyle, setæ pale; rostral prolongation stout, apex obtusely rounded; from seven to nine very long curved rostral spines arranged in a compact group, longest spines only a little shorter than the prolongation, all much longer than the part beyond their insertion. Gonapophysis, *g*, with mesal-apical lobe blackened, nearly straight, tip curved laterad.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, altitude 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*).

Limonia (*Rhipidia*) *crassirostris* may be told from the most similar regional species, *L.* (*R.*) *subtesselata* (Brunetti) and *L.* (*R.*) *synspilota* Alexander, by the structure of the male antennæ and hypopygia. The short obtuse apex of the rostral prolongation of the ventral dististyle and the numerous elongate rostral spines provide strong characters for the recognition of the species.

LIMONIA (RHIPIDIA) HARIOLA sp. nov. Plate 2, fig. 21; Plate 5, fig. 51.

Belongs to the *rostrifera* group; mesonotal præscutum with three dark brown stripes, pleura yellow, with two conspicuous longitudinal blackened stripes; knobs of halteres brownish black; extreme tips of femora yellowed; wings cream yellow, with a heavy brown pattern, basad of cord without darkenings except at arculus and origin of Rs; abdomen obscure yellow, posterior borders of segments silvery gray, more evident on the sternites; male hypopygium with the two rostral spines from a conspicuous basal tubercle.

Male.—Length, about 5.5 to 6.5 millimeters; wing, 5.5 to 6; antenna, about 14 to 1.5.

Female.—Length, about 5.5 to 6 millimeters; wing, 6.

Rostrum moderately elongate, subequal to remainder of head, black throughout; palpi black. Antennæ in male with scape and pedicel obscure yellow, flagellar segments yellowed, branches black, on outer segments the basal enlargements similarly blackened; flagellar segments one to eleven each with two long branches, the longest exceeding twice the segment, terminal segment simple. In female, antennæ simple, flagellar segments entirely black, with very short apical pedicels, terminal segment nearly twice the penultimate. Head dark brown, yellowish gray pruinose; anterior vertex broad, about four times the diameter of scape.

Cervical region and pleura of prothorax blackened. Mesonotal præscutum yellow pollinose, with three dark brown stripes; scutal lobes darkened, median region and scutellum brownish yellow, with pale pollen; postnotum brownish black. Pleura yellow pollinose, with two conspicuous blackened longitudinal stripes, the dorsal one extending from cervical region to dorsal postnotum, lower stripe on ventral sternopleurite. Halteres with stem light yellow, knob brownish black. Legs with coxæ and trochanters yellow; femora yellow, with a broad brown nearly terminal ring, extreme tip yellow; tibiæ brown, tips narrowly darker; tarsi yellowish brown; claws with a single major spine. Wings (Plate 2, fig. 21) cream yellow, prearcular and costal fields more saturated yellow; a conspicuous brown pattern, including arculus, Sc_2, tip of Sc_1 and origin of Rs, stigma, this confluent with a band at cord, fork of M_{3+4} a major darkening in outer ends of cells R_2 and R_3; weak marginal clouds on medial veins; veins yellow, pale brown in the patterned areas. Outer longitudinal veins from R_3 to M_3 with trichia. Venation: Sc_1 ending just beyond origin of Rs, Sc_2 far retracted; cell M_2 open by atrophy of m; m-cu just beyond fork of M.

Abdominal tergites obscure yellow, lateral borders narrowly brown, posterior margins paler; sternites obscure yellow, lateral borders brown, posterior margins of segments two to six broadly silvery gray; hypopygium brownish yellow. Ovipositor with genital segment light brown, bases of hypovalvæ black; cerci and hypovalvæ horn colored, the former very slender, gently upcurved to the acute tips. Male hypopygium (Plate 5, fig. 51) with tergite, *t*, transverse, posterior border with a shallow V-shaped emargination, lobes broadly obtuse. Basistyle, *b*, with ventromesal lobe large, about one-half the body of style. Dorsal dististyle a slender rod, outer half slightly curved, terminating in a long spine. Ventral dististyle, *d*, in area about one-third to one-half greater than that of basistyle; rostral prolongation relatively short, apex obtuse, on outer margin with a stout tubercle tipped with two slender spines, these about twice the length of the tubercle. Gonapophysis, g, with mesal-apical lobe slender. Ædeagus narrow, apical lobes small, oval.

Habitat.—Assam.

Holotype, male, Serrarim, Khasi-Jaintia, altitude 5,500 feet, October 7, 1960 (*Schmid*). Allotype, female, Dympap, Khasi-

Jaintia, altitude 6,000 feet, October 1, 1960. Paratopotype, one male; paratypes, one male, one female, Mawrap, Khasi-Jaintia, altitude 4,800 feet, October 2, 1960; one male, Umsawnot, Khasi-Jaintia, altitude 4,500 feet, October 5, 1960 (*Schmid*).

Limonia (*Rhipidia*) *hariola* is quite distinct from all previously described members of the *rostrifera* group in its wing pattern, being about intermediate between *L.* (*R.*) *rostrifera* (Edwards) and *L.* (*R.*) *garrula* Alexander and allied species. As suggested earlier in this paper, the structure of the male hypopygium is much as in species of the subgenus *Dicranomyia* Stephens, having only two rostral spines, presuming a separate origin from the typical members of the subgenus, the *lecontei* group.

LIMONIA (RHIPIDIA) UGRA sp. nov. Plate 2, fig. 22; Plate 5, fig. 52.

Mesonotum brown and gray, thoracic pleura with a broad darker brown longitudinal stripe; antennal flagellum of male short-unipectinate; femora blackened outwardly, the fore pair more extensively so; wings with the whitened ground very restricted, the surface with extensive confluent brown clouds and spots; costal region yellowed, with four more extensive brown areas, including the stigma; male hypopygium with rostral prolongation of ventral dististyle slender, with three relatively short spines.

Male.—Length, about 7 millimeters; wing, 8; antenna, about 1.3.

Rostrum and palpi black. Antennæ black, apical pedicels of intermediate flagellar segments yellow; flagellar segments two to ten each with a single short branch, the longest scarcely exceeding the segment, obtuse at tip; outer five segments with the branch gradually reduced in size, finally merely produced; terminal segment about one-half longer than the penultimate. Head brownish gray; anterior vertex narrow, less than the diameter of the scape.

Pronotum dark brown. Mesonotal præscutum extensively medium brown, lateral borders broadly light gray; posterior sclerites brown, central portions dusted with gray. Pleura brown, with a broad darker brown longitudinal stripe extending from the cervical region to base of abdomen; dorsopleural region light yellow, ventral sternopleurite more obscure yellow. Halteres yellow, knobs vaguely suffused. Legs with coxæ yellowish brown; trochanters yellow; fore femora blackened,

bases narrowly yellowed, remaining femora extensively yellowed, tips narrowly darkened, remainder of legs dark brown; claws with a single well-developed spine. Wings (Plate 2, fig. 22) with the restricted ground whittened, appearing as small dots between the extensive brown spots and clouds, the latter chiefly confluent; costal border more yellowed, with four very extensive brown areas that reach vein M behind, the yellow interspaces very restricted; veins brown, C, Sc and R light yellow. Venation: Sc_1 ending about opposite one-fourth to one-fifth Rs; cell 1st M_2 subequal in length to vein M_4; m-cu shortly before fork of M.

Abdominal tergites brown, narrowly darker laterally, basal sternites obscure brownish yellow; ventral dististyle of hypopygium yellowed. Male hypopygium (Plate 5, fig. 52) with tergite, *t*, transverse, very gradually narrowed outwardly, posterior border very shallowly emarginate, all borders thickened; tergal setæ about 15 on each lobe. Basistyle, *b*, with ventromesal lobe obtuse, with long setæ. Dorsal dististyle blackened, gradually narrowed to the long acute tip. Ventral dististyle, *d*, subequal in area to the basistyle; rostral prolongation elongate, with three small spines, these shorter than the prolongation beyond their insertion. Gonapophysis, *g*, with mesal-apical lobe blackened, straight, terminating in a small rounded lobe. Ædeagus with apical lobes small, divergent.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, altitude 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*).

Other regional members of the subgenus having unipectinate flagellar segments, such as *Limonia* (*Rhipidia*) *monophora* Alexander, differ conspicuously in the coloration of the body, legs and wings, as well as the structure of the male hypopygium. The lengthened rostral prolongation of the ventral dististyle, with three short spines, is suggestive of the condition in the otherwise very different *L.* (*R.*) *choprai* Alexander, with the male flagellum bipectinate.

LIMONIA: MELANOLIMONIA subgen. nov.

General coloration of thorax commonly polished black, more rarely (as in *fulvomorio, kongosana, lakshmi, spinifera*) polished brown or fulvous, pleura extensively silvery pruinose. Anterior vertex very broad, bright silvery, the width approximately four times the diameter of the antennal scape. Antennæ with terminal segment commonly elongate, more or

less constricted at near midlength. Wings with vein Sc_1 very long, approximately one-half Rs or more; cell 1st M_2 closed. Male hypopygium with the tergite variable, ranging from having the posterior border nearly truncate, without evident lobes, to profoundly emarginate, forming slender fingerlike lobes. Dorsal dististyle commonly a simple curved sickle, its tip acute, in cases (*pseudomorio* and several others) with the apex expanded, more or less bispinous. Ventral distitsyle commonly with a single pale cylindrical or peglike spine placed in a membranous area, somewhat as in *Discobola;* in cases (including *morio*) without a rostral spine. Ninth sternite a distinct oval or semicircular plate with several strong marginal setæ, somewhat as in *Geranomyia* and some other subgenera. Ædeagus conspicuously expanded, outer end with abundant scabrous points and setæ.

Type of subgenus: *Limonia* (*Melanolimonia*) *morio* (Fabricius). Palaearctic.

Other species include *L.* (*H.*) *morioides* (Osten Sacken), *L.* (*M.*) *neomorio* (Alexander), *L.* (*M.*) *nycteris* (Alexander), *L.* (*M.*) *spinifera* (Alexander), Nearctic; *L.* (*M.*) *caledonica* Edwards, *L.* (*M.*) *hamata* (Becker), *L.* (*M.*) *occidua* Edwards, *L.* (*M.*) *rufiventris* (Strobl), *L.* (*M.*) *stylifera* (Lackschewitz), *L.* (*M.*) *tyrrhenica* (Edwards), Western Palaearctic; *L.* (*M.*) *aurita* Alexander, *L.* (*M.*) *benguetensis* Alexander, *L.* (*M.*) *emodi* Alexander, *L.* (*M.*) *fulvomorio* Edwards, *L.* (*M.*) *fulvonigrina* sp. nov., *L.* (*M.*) *kansuensis* Alexander, *L.* (*M.*) *kongosana* Alexander, *L.* (*M.*) *lakshmi* Alexander, *L.* (*M.*) *moronis* Alexander, *L.* (*M.*) *nankaidoensis* Alexander, *L.* (*M.*) *nesomorio* (Alexander), *L.* (*M.*) *nigrithorax* (Brunetti), *L.* (*M.*) *nitidithorax* (Senior-White), *L.* (*M.*) *pacifera* Alexander, *L.* (*M.*) *paramorio* (Alexander), *L.* (*M.*) *paramorio platysoma* Alexander, *L.* (*M.*) *parviloba* Alexander, *L.* (*M.*) *penita* Alexander, *L.* (*M.*) *pernigrita* sp.nov., *L.* (*M.*) *pseudomorio* (Alexander), *L.* (*M.*) *subaurita* Alexander, *L.* (*M.*) *submorio* (Alexander), eastern Palaearctic and Oriental.

The present group is proposed for members of the so-called *morio* group, hitherto placed in *Dicranomyia,* but long realized to be unusually distinct. The range of the various species includes the Holarctic region, with rather numerous forms ranging south into the Oriental, with several occurring in Formosa, Luzon, Mindanao, and Borneo.

LIMONIA (MELANOLIMONIA) FULVONIGRINA sp. nov. **Plate 2, fig. 23; Plate 5. fig. 53.**

Size large (wing of male over 8 millimeters); mesonotum obscure yellow, præscutum with three confluent polished black stripes; femora yellow, tips rather narrowly brown; wings strongly brownish yellow, stigma elongate, brown; Rs long, nearly two and one-half times R_{2+3}; abdominal tergites brownish black, posterior borders yellowed; male hypopygium with tergal lobes broader than the intervening emargination, setæ relatively short; ventral dististyle apparently without a rostral spine; ædeagus broad.

Male.—Length, about 8 millimeters; wing, 8.5.

Rostrum and palpi dark brown. Antennæ brown; basal flagellar segments oval, the outer ones progressively more elongate; terminal segment very long, nearly twice the penultimate, constricted at near midlength; longest verticils exceeding the segments. Head brown.

Pronotum blackened medially, brownish gray pruinose on sides. Mesonotal præscutum with sides broadly obscure yellow, disk with three confluent polished black stripes, the central one vaguely divided medially in front, ending far before suture; posterior sclerites of notum obscure yellow, scutal lobes brownish black. Propleura dark brown, remainder of pleura yellowed, faintly silvery pruinose. Halteres with stem yellow, knob brownish black. Legs with coxæ and trochanters yellow; femora yellow, tips rather narrowly dark brown; tibiæ and proximal segments of tarsi obscure yellow, outer segments blackened; claws elongate with a slender basal spine. Wings (Plate 2, fig. 23) strongly suffused with brownish yellow, stigma elongate, brown; veins brown, those of proximal third more yellowed. Venation: Sc_1 ending opposite origin of Rs, the latter long, nearly straight, about two and one-half time R_{2+3}.

Abdominal tergites brownish black, posterior borders conspicuously yellow; sternites more uniformly brownish yellow; hypopygium brown, basistyles black. Male hypopygium (Plate 5, fig. 53) with lobes of tergite, *t*, darkened, stout, broader than the intervening emargination, setæ relatively short and stout (as compared with *nigrithorax*). Basistyle, *b*, with ventromesal lobe large, obtusely rounded. Dorsal dististyle slightly widened before the acute tip. Ventral dististyle, *d*, subequal in area to basistyle; rostral prolongation slender, apparently without a spine, as in *nigrithorax;* if this normally is present, the type specimen has lost it on both styles. Gona-

pophysis, *g*, pale, mesal-apical lobe curved, tip subacute. Ædeagus broad, margins and subapical lobes with abundant microscopic scabrous points, with small interpolated setæ.

Habitat.—Sikkim.

Holotype, male, Lachung, altitude 8,610 feet, July 9, 1959 (*Schmid*).

The closest ally is *Limonia* (*Melanolimonia*) *nigrithorax* (Brunetti) which has the mesonotum uniformly blackened and differs in other colorational and slight hypopygial features.

LIMONIA (MELANOLIMONIA) PERNIGRITA sp. nov. **Plate 2, fig. 24; Plate 5, fig. 54.**

Size small (wing of male 6 millimeters); general coloration of mesonotum intense polished black, pleura extensively silvery; fore legs black, middle and hind femora paler; wings weakly infuscated, base yellowed, stigma brown, conspicuous; abdomen black; male hypopygium with tergal lobes very slender, widely separated; ventromesal lobe of basistyle blackened, narrowed to a point, with the strong apical bristles; no resortal spine; gonapophysis blackened, very broadly triangular.

Male.—Length, about 5.5 millimeters; wing, 6.

Rostrum, palpi and antennæ black; proximal flagellar segments subglobular, shorter than the verticils, outer segments longer, terminal segment about one-third longer than the penultimate. Anterior vertex broad, light silvery, posterior part of head black.

Thoracic dorsum intense polished black, scutellum slightly more opaque, pleura black, mesopleura and meron silvery. Halteres with stem brownish yellow, base clearer yellow, knob brownish black. Legs with coxæ blackened, posterior pair more pruinose, tips narrowly yellowed; trochanters obscure yellow; fore legs black; middle femora dark brown, posterior femora yellow, slightly darkened at tip; tibiæ brown, tarsi passing into black; claws with a long straight basal spine and smaller denticles. Wings (Plate 2, fig. 24) weakly infuscated, base yellowed; stigma oval, darker brown, conspicuous; veins brown, prearcular veins and Sc yellowed. Veins Rs, outer radial veins and distal section of M_3 with long black trichia, with about two others at end of vein 2nd A. Venation: Sc short, Sc_1 ending a short distance before origin of Rs, Sc_1 shorter than Rs; m-cu shortly before fork of M.

Abdomen, including hypopygium, black. Male hypopygium (Plate 5, fig. 54) with tergite, *t*, large, very gradually narrowed

outwardly, posterior border produced into two widely separated fingerlike lobes that are provided with a few long setæ, the emargination between lobes very broad. Basistyle, *b*, with ventromesal lobe elongate, basal in position, narrowed outwardly to a point, with a strong apical bristle and a second immediately before tip. Dorsal dististyle a strongly curved, black sickle, very gradually narrowed to an acute tip. Ventral dististyle, *d*, with body small, provided with very long coarse bristles; rostrum elongate, slightly widened outwardly, with sparse setæ, lacking the rostral spine. Gonapophysis, *g*, blackened, very broadly triangular. Ædeagus, *a*, broad, outer part with abundant long pale setæ.

Habitat.—Sikkim.

Holotype, male, Yedang, altitude 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*).

Limonia (*Melanolimonia*) *pernigrita* is quite distinct from other generally similar regional species, such as *L.* (*M.*) *lakshmi* Alexander and *L.* (*M.*) *nigrithorax* (Brunetti), particularly in the structure of the male hypopygium. The very slender tergal lobes are generally similar to those found in certain other Asiatic species, as *L.* (*M.*) *aurita* Alexander and *L.* (*M.*) *pseudomorio* (Alexander), but the further hypopygial structures are quite distinct.

LIMONIA (PSEUDOGLOCHINA) APICIALBA sp. nov. Plate 2, fig. 25.

General coloration of mesonotum brown, with a conspicuous pale central stripe that is widened behind, pleura chiefly whitened; femora black, tips narrowly whitened, tibiæ white, with a single very narrow dark ring beyond midlength; wings pale yellow, conspicuously patterned with brown.

Male.—Length, about 4.8 millimeters; wing, 5.2.

Rostrum obscure yellow, mouthparts and palpi black. Antennæ black; flagellar segments strongly nodulose, with conspicuous apical pedicels; each segment with a single unilaterally distributed verticil and numerous coarse setæ that are nearly as long; proximal flagellar segments oval, outer ones more elongate, terminal segment a little shorter than the penultimate. Front and anterior vertex yellowed, dark brown between the eyes, posterior part of head extensively brownish yellow; anterior vertex relatively broad, a little less than the diameter of scape.

Prothorax and pretergites whitened, the pronotum weakly suffused with pale brown. Mesonotum brown, lateral præscutal border narrowly darker brown; a conspicuous pale central stripe from posterior part of præscutum, widened posteriorly, including most of mediotergite, the sides adjoining the wing root darker brown. Pleura with a very broad whitened stripe that include the dorsopleural membrane, ventral sternopleurite blackened. Halteres with stem light yellow, knob brownish black. Legs with fore coxæ pale yellow, middle and hind coxæ dark brown, bases pale; all trochanters black; femora black, the tips narrowly whitened, with only a microscopic darkening at extreme apex; tibiæ white with a single very narrow brown ring just beyond midlength; tarsi white; claws long, setiferous on outer face at base, with a long hairlike basal spine. Wing (Plate 2, fig. 25) very yellow, prearcular and costal margins slightly more yellowed, including the costa; a conspicuous dark brown pattern that includes the large oval stigma and a major area at origin of Rs and tip of Sc; slightly paler brown areas at fork of Rs, cord, outer medial fork and a marginal cloud at end of R_3; less evident paler suffusions along Cu, R_{4+5} and at tip of Cu_1; veins light brown, scarcely darker in the patterned areas, yellow in the brightened fields. Longitudinal veins beyond cord with very abundant relatively short trichia, with a few others at ends of M and basal section of Cu_1, lacking on Sc and the anals. Venation: Sc_1 ending nearly opposite fork of Rs, Sc_2 near its origin; Rs and basal section of R_{4+5} subequal; cell 2nd M_2 nearly twice its petiole; m-cu close to fork of M; vein 2nd A strongly sinuous, its base not confluent with posterior border of wing.

Abdominal tergites brownish yellow, basal sternites yellow, intermediate sternites with a large brown area on either side at base, subterminal segments more uniformly pale; hypopygium small, pale brown.

Habitat.—Assam.

Holotype, male, Singkap, Manipur, altitude 3,800 feet, August 16, 1960 (*Schmid*).

The only other regional member of the subgenus having a single darkened tibial ring is *Limonia* (*Pseudoglochina*) *periscelis* Alexander, of Nepal, readily told by the blackened femoral tips and unpatterned wings. No other member of the subgenus so far discovered has this combination of characters.

LIMONIA (PSEUDOGLOCHINA) EURYMELANIA sp. nov Plate 2, fig. 26.

Mesonotal præscutum light cinnamon brown, scutal lobes dark brown, posterior sclerites of notum testaceous yellow, pleura almost uniformly pale yellow, ventral sternopleurite very narrowly dark brown; fore femora black, tibiæ snowy white with two broad black rings, the wider outer band nearly twice the white tip, tarsi snowy white; abdomen dark brown, posterior disks of segments more yellowed.

Female.—Length, about 7.5 millimeters; wing, 6.9.

Rostrum and papli black. Antennæ black; flagellar segments long-oval, with long apical pedicels, longest verticils exceeding the segments, shorter proportionally than in *bilatior* or *bilatissima*. Head with center of posterior vertex light fulvous, anterior vertex and orbits light gray; anterior vertex broad.

Pronotum and cervical region yellow. Mesonotal præscutum light cinnamon brown, only the lateral borders slightly darker; scutal lobes dark brown, the median area, scutellum and central part of mediotergite testaceous yellow, the last slightly darker on sides. Pleura almost uniformly pale yellow, only the ventral sternopleurite dark brown. Halteres dark brown. Fore legs with coxæ yellow, trochanters blackened; femora black, bases narrowly brightened; tibiæ snowy white, with two broad black rings, the basal one only about one-third as wide as the outer, the latter about twice the white apex and one-third more extensive than the white interspace; tarsi snowy white; middle and hind legs with coxæ and trochanters yellow, remainder broken. Wings (Plate 2, fig. 26) very faintly tinged with brown, stigma oval, dark brown; veins dark brown. Longitudinal veins beyond cord with abundant long macrotrichia; basad of cord trichia on more than outer third of M, with one or few at end of Cu_1; no trichia on Sc or anals. Venation: Sc_1 ending immediately beyond origin of Rs, Sc_2 retracted, Sc_1 nearly as long as Rs; cell 2nd M_2 nearly three times its petiole; m-cu at fork of M; vein 2nd A arched.

Abdomen dark brown, the disks of outer parts of segments more yellowed. Ovipositor with cerci very slender, almost straight.

Habitat.—Assam.

Holotype, female, Phaileng, Lushai Hills, Mizo District, altitude 3,500 feet, September 14, 1960 (*Schmid*).

The present fly is very different from other regional species in the unusually broad and conspicuous black tibial rings, in this respect being more like the Philippine *Limonia* (*Pseudoglochina*) *bilatior* Alexander and *L.* (*P.*) *bilatissima* Alexander, which differ evidently in the details of coloration of the body and legs and in the structure of the antennæ.

REFERENCES

ALEXANDER, C. P. The interpretation of the radial field of the wing in the Nematocerous Diptera, with special reference to the Tipulidæ. Proc. Linn. Soc. New South Wales **52** (1927) 42–72, 92 figs.; 1927a.

ALEXANDER, C. P. The Oriental Tipulidæ in the collection of the Indian Museum. Part 1. Rec. Indian Mus. **29** (1927) 167–224, 1 pl., 23 figs.; 1927 b.

ALEXANDER, C. P. New or little-known Tipulidæ from the Philippines (Diptera), V. Philip. Jour. Sci. **40** (1929) 239–273, 1 plate with 18 figs.; 1929 a.

ALEXANDER, C. P. A comparison of the systems of nomenclature that have been applied to the radial field of the wing in the Diptera. IV. Internat. Congress Ent. **2** (1929) 700–707, 3 pls.; 1929 b.

ALEXANDER, C. P. New or little-known Tipulidæ from eastern Asia (Diptera), XXI. Philip. Jour. Sci. **55** (1934) 19–60, 3 pls. (reference pp. 38–39); 1934 a.

ALEXANDER, C. P. In C. H. Curran's The families and genera of North American Diptera (1934), refs. pp. 38–39; 1934 b.

ALEXANDER, C. P. New or little-known Tipulidæ from Eastern Asia Diptera), XXXII. Philip. Jour. Sci. **61** (1936) 113–149 (subgenus *Gressittomyia* Alexander).

ALEXANDER, C. P. Notes on the tropical American species of Tipulidæ (Diptera), VI. The tribe Limoniini, genus Limonia; subgenera Limonia, Neolimnobia, Discobola and Rhipidia. Rev. de Entomologia **21** (1950) 161–221, 42 figs.

ALEXANDER, C. P. New or little-known Tipulidæ (Diptera). CI. Oriental-Australasian species. Ann. Mag. Nat. Hist. (12) **9** (1956) 145-163 (subgenus Degeneromyia Alexander).

BERGROTH, E. Some Tipulid synonymy. Psyche **22** (1915) 54–55.

EDWARDS, F. W. British short-palped craneflies. Taxonomy of adults. Trans. Soc. Brit. Ent. **5** (1938) 1–168, 5 pls. 31 figs.

OSTEN SACKEN, C. R. Studies on Tipulidæ. Part II. Review of the published genera of Tipulidæ brevipalpi. Berlin. Entomol. Zeitschr. **31** (1887) 163–242.

ILLUSTRATIONS

[Legend: *a*, ædeagus: *b*, basistyle; *d*, dististyle; *g*, gonapophysis; *l*, labial palpus; *m*, maxillary palpus; *t*, tergite.]

PLATE 1

FIG. 1. *Limonia* (*Limonia*) *devata* sp.nov.; venation.
2. *Limonia* (*Limonia*) *acinacis* sp.nov.; venation.
3. *Limonia* (*Limonia*) *bifaria* sp.nov., venation.
4. *Limonia* (*Limonia*) *brachylabis* sp.nov., venation.
5. *Limonia* (*Limonia*) *tanyrhyncha* sp.nov.; venation.
6. *Limonia* (*Limonia*) *anteterminalis* sp.nov.; venation.
7. *Limonia* (*Metalimnobia*) *brahma* sp.nov.; venation.
8. *Limonia* (*Metalimnobia*) *xanthopteroides adonis* subsp.nov.; venation.
9. *Limonia* (*Libnotes*) *pramatha* sp.nov., venation.
10. *Limonia* (*Libnotes*) *sharva* sp.nov.; venation.
11. *Limonia* (*Libnotes*) *tartarus* sp.nov.; venation.
12. *Limonia aspropoda* sp.nov.; venation.
13. *Limonia bhima* sp.nov.; venation.
14. *Limonia indefessa* sp.nov.; venation.
15. *Limonia luteipostica* sp.nov.; venation.
16. *Limonia luteitarsis* sp.nov.; venation.
17. *Limonia permodosa* sp.nov.; venation.
18. *Limonia ushas* sp.nov.; venation.

PLATE 2

FIG. 19. *Limonia vibhishana* sp.nov.; venation.
20. *Limonia* (*Rhipidia*) *crassirostris* sp.nov.; venation.
21. *Limonia* (*Rhipidia*) *hariola* sp.nov.; venation.
22. *Limonia* (*Rhipidia*) *ugra* sp.nov.; venation.
23. *Limonia* (*Melanolimonia*) *fulvonigrina* sp.nov.; venation.
24. *Limonia* (*Melanolimonia*) *pernigrita* sp.nov.; venation.
25. *Limonia* (*Pseudoglochina*) *apicialba* sp.nov.; venation.
26. *Limonia* (*Pseudoglochina*) *curymelania* sp.nov.; venation.
27. *Limonia* (*Limonia*) *devata* sp.nov.; male hypopygium.
28. *Limonia* (*Limonia*) *acinacis* sp.nov.; male hypopygium.
29. *Limonia* (*Limonia*) *bifaria* sp.nov.; male hypopygium.
30. *Limonia* (*Limonia*) *hostilis* Alexander; male hypopygium.

PLATE 3

FIG. 31. *Limonia* (*Limonia*) *brachylabis* sp.nov.; mouthparts.
32. *Limonia* (*Limonia*) *stenolabis* sp.nov.; mouthparts.
33. *Limonia* (*Limonia*) *tanyrhyncha* sp.nov.; mouthparts.
34. *Limonia* (*Limonia*) *brachylabis* sp.nov.; male hypopygium.
35. *Limonia* (*Limonia*) *tanyrhyncha* sp.nov.; male hypopygium.
36. *Limonia* (*Limonia*) *anteterminalis* sp.nov.; male hypopygium.
37. *Limonia* (*Metalimnobia*) *brahma* sp.nov.; bale hypopygium.
38. *Limonia* (*Metalimnobia*) *xanthopteroides adonis* subsp.nov.; male hypopygium.

031610——11

PLATE 4

FIG. 39. *Limonia* (*Libnotes*) *pramatha* sp.nov.; male hypopygium.
40. *Limonia* (*Libnotes*) *sharva* sp.nov.; male hypopygium.
41, 42. *Limonia aspropoda* sp.nov.; male hypopygium.
43. *Limonia bhima* sp.nov.; male hypopygium.
44. *Limonia indefessa* sp.nov.; male hypopygium.
45. *Limonia luteipostica* sp.nov.; male hypopygium.
46. *Limonia luteitarsis* sp.nov.; male hypopygium.

PLATE 5

FIG. 47. *Limonia pernodosa* sp.nov.; male hypopygium.
48. *Limonia ushas* sp.nov.; male hypopygium.
49. *Limonia vibhishana* sp.nov.; male hypopygium.
50. *Limonia* (*Rhipidia*) *crassirostris* sp.nov.; male hypopygium.
51. *Limonia* (*Rhipidia*) *hariola* sp.nov.; male hypopyguim.
52. *Limonia* (*Rhipidia*) *ugra* sp.nov.; male hypopygium.
53. *Limonia* (*Melanolimonia*) *fulvonigrina* sp.nov.; male hypopygium
54. *Limonia* (*Melanolimonia*) *pernigrita* sp.nov.; male hypopygium.

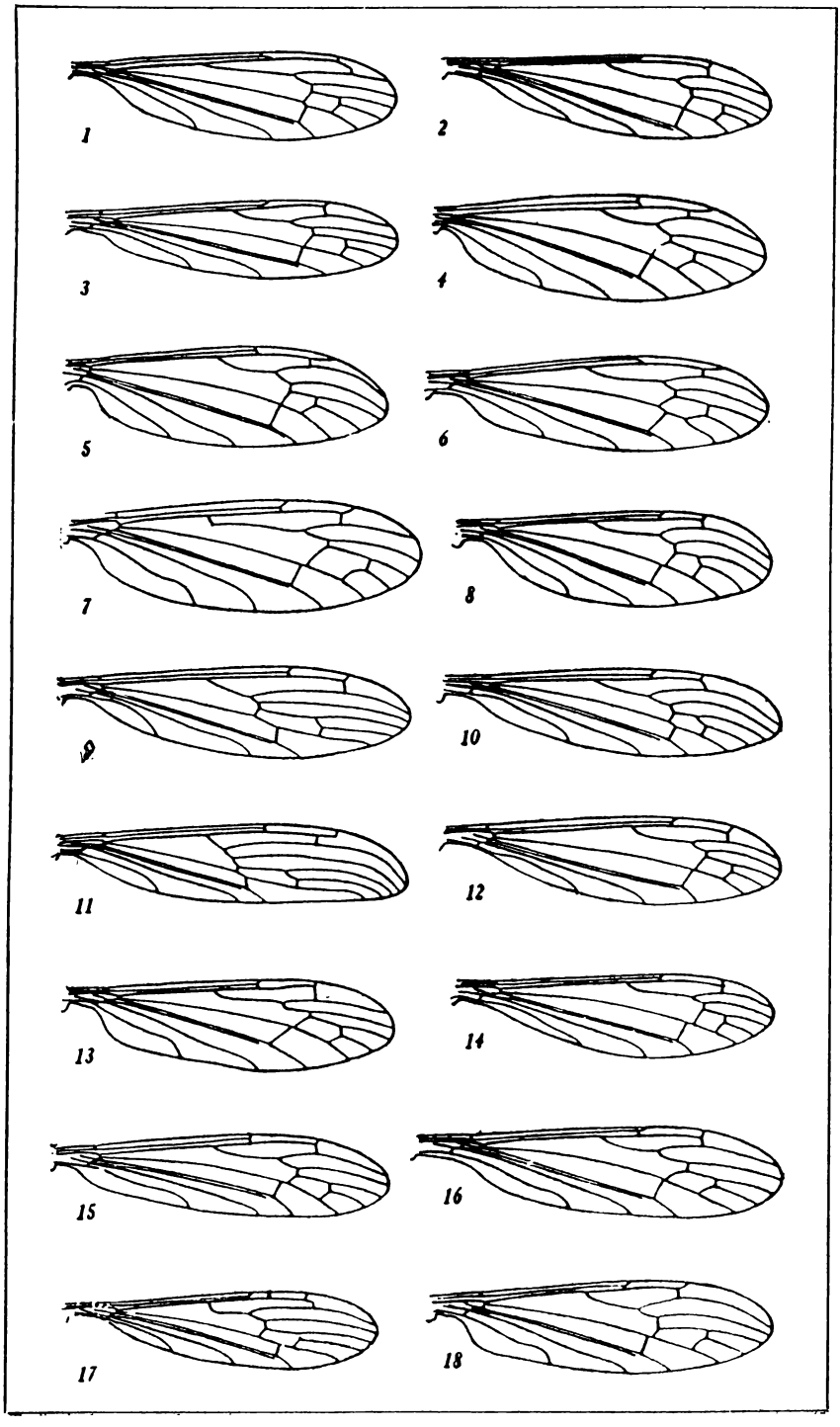
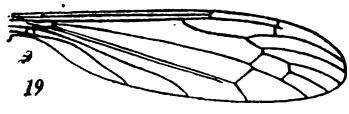
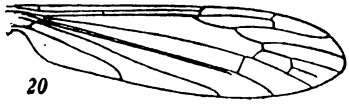
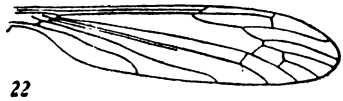


PLATE 1

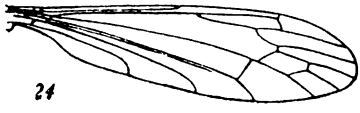

19

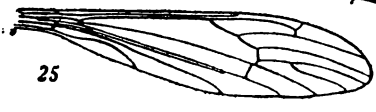

20

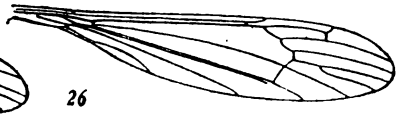

21

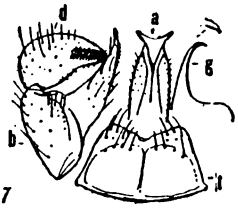

22


23

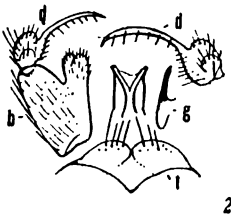

24


25

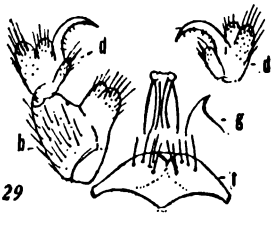

26



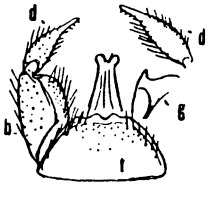
27



28

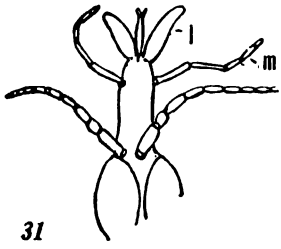


29

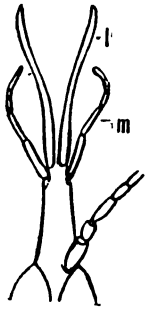


30

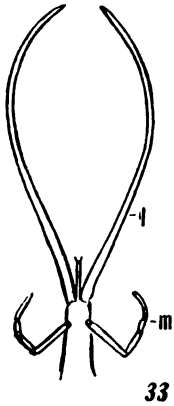
PLATE 2.



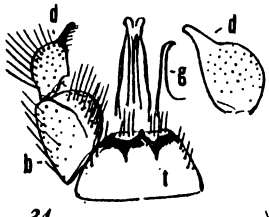
31



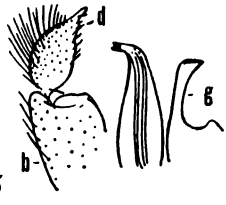
32



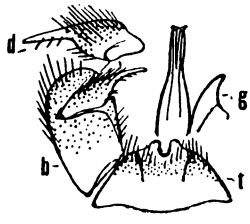
33



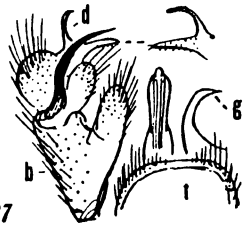
34



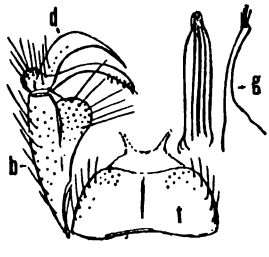
35



36

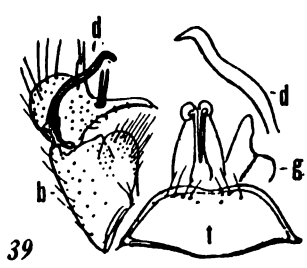


37

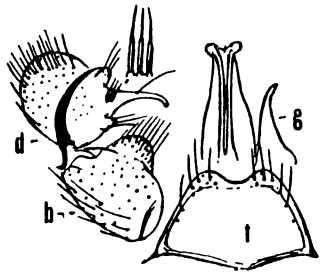


38

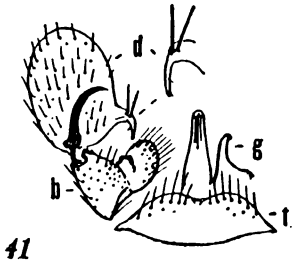
PLATE 3.



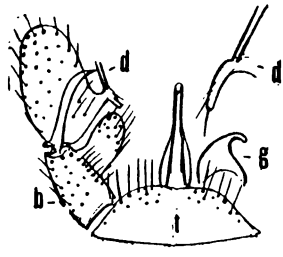
39



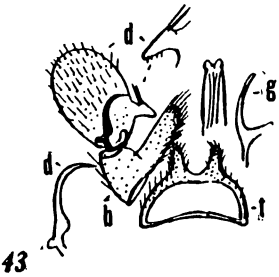
40



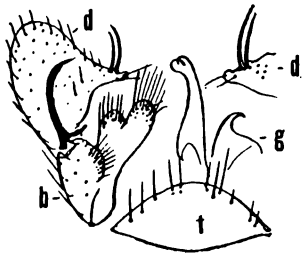
41



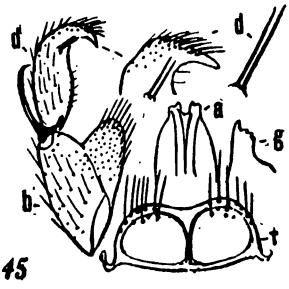
42



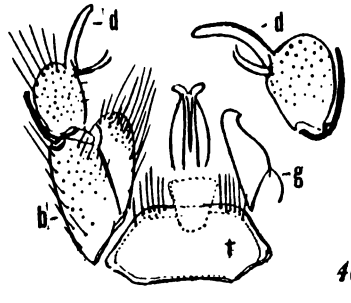
43



44

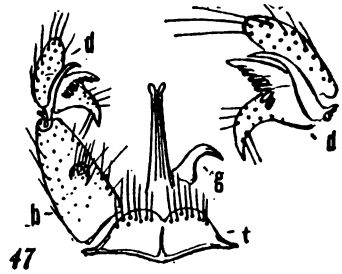


45

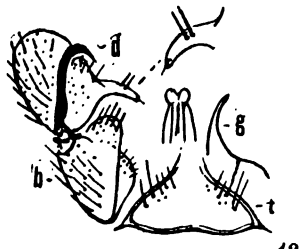


46

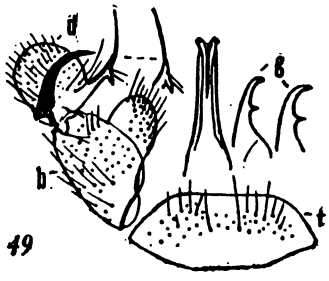
PLATE 4.



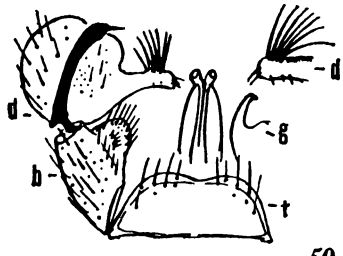
47



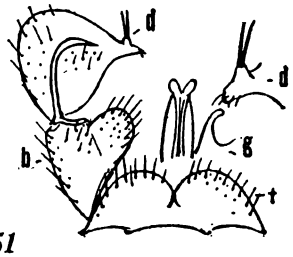
48



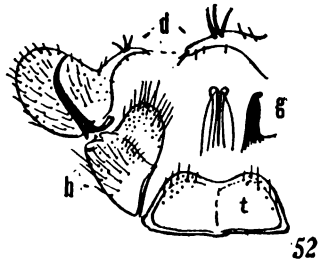
49



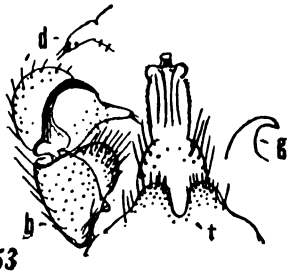
50



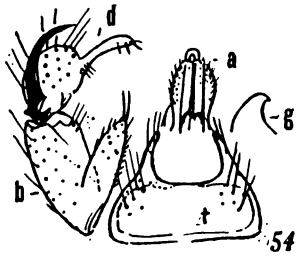
51



52



53



54

PLATE 5.