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FIVE PLATES

In the present paper I am continuing the study of the various collections of Indian-crane flies that have been taken by Dr. Fernand Schmid, as discussed in Part XLIX of this series of reports and elsewhere. At this time I am beginning the consideration of the great genus *Limonia* Meigen, the paper being devoted entirely to species of one of the larger subgenera, *Dicranomyia* Stephens, greatly developed in Asia, including the Himalayas. A short preliminary discussion considers two subjects pertinent to the survey, these being treated under the following subheadings: (*1*) Himalayan subregions and life zones; (*2*) The *Rhododendron* associations. The various papers cited are listed in the references at the conclusion of this paper.

HIMALAYAN SUBREGIONS AND LIFE ZONES

In Part XLIX of these reports (Alexander, 1961) I presented a brief account of the apparent limits existing between the Oriental and Palæartic regions as found in the Himalayas. At this time it appears desirable to proceed with a discussion of the subordinate divisions of subregions and life zones.

Since the appearance of the above-mentioned report some noteworthy studies have been published, including a book by Mani (1962) and papers by Swan (1961) and by Swan and Leviton (1962), these adding materially to our previous knowledge. Mani's volume, on High Altitude Entomology, while being based on the northwest Himalaya, provides data on comparable conditions found in Europe and in North America.

The subregions.—The provinces or subregions concerned include for the Palæarctic region, the Mediterranean (Turanian and Iranian) on the west, the Tibetan or Turkmenian on the north, and the Indo-Chinese on the east. South of the Himalaya the Indian subregion in the east merges with the Indo-Chinese and Indo-Malayan areas. Mani, following Holdhaus, Uvarov

and others, recognizes an eastward extension of the Mediterranean subregion, the so-called Erimian Province, along the southern slopes of the main crestline of the Himalaya at least in the valley of Kashmir and parts of the Punjab. Based on his personal field work Mani considers that this eastward extension of the Mediterranean subregion extends about to the Sutlej River, at near longitude 75° East, or slightly, beyond. As regards the Tipulidæ, our present knowledge indciates that while several Palæarctic elements occur in Kashmir, or even farther to the east, all of these have a more extended range in the western Palæarctic and can scarsely be held as being representative of the Mediterranean subregion alone. In this same general area a comparable encroachment to the west of the Indo-Chinese fauna occurs, becoming markedly attenuated in Kashmir and West Pakistan. The report by Swan and Leviton (1962), based on the herpetology of Nepal, indicates far broader limits for the Mediterranean, this including not only Kashmir and West Pakistan but extending much farther east in southern Tibet, that is, to about 92° East Longitude or beyond Lhasa, where it makes contact with the West Chinese subregion of the Palæarctic. The reported places were all of Nepal with the exception of the higher Himalayas in the Indian subregion.

Life zones.—The conception of life zones first was proposed by Merriam (1890) and applied to North America north of Mexico. The theory was expanded and elaborated upon in a later paper by Merriam (1898) and since has received wide acceptance by botanists and zoologists in America and further has been applied in varying degree to all other major regions of the world. For North America there are hundreds of references, including many on the Tipulidæ by the writer, dating back to 1919 or earlier. Various adaptations and modifications of the life zone concept have been proposed, including that of Biotic Provinces [Dice (1943)], life belts, biomes and others, all having been briefly discussed by Dice.

The Himalaya.—Mani (1962) has given a satisfactory general account of zonal distribution of life in the Himalayas and has provided many pertinent references thereto, furnishing comparisons with the European Alps and with certain mountains in the United States. Mani's personal field studies on this subject have been chiefly in the northwest Himalaya and for this section he has provided a diagram [(1962) 24,

fig. 15] indicating the chief zones of plant and animal distribution from timber line to the highest point where life is known to exist. In his consideration of this part of the Himalaya the lowest indication is for the broad-leaved monsoon or wet forest, immediately above which occurs a zone of sclerophyll oak species, with rhododendron forests. Higher up the slopes is the taiga, comprised of a lower spruce-fir forest and a higher belt consisting especially of bush rhododendrons. The nival or snow zone begins at timber line, with dense growths of birch and juniper, followed progressively upward by montane tundra and finally the alpine zone. Mani's studies concern especially the insect life of the nival zone above timberline. In their studies on distribution of the amphibia and reptiles of Nepal, Swan and Leviton (1962) provide a diagram that shows the various zones in the Nepal Himalaya and their approximate altitudes and limits; lower monsoon forest (1,000 to 3,000 feet), middle monsoon forest (3,000 to 7,000 feet), upper monsoon forest (7,000 to 9,000 feet), deciduous and rhododendron forest (9,000 to 10,500 feet), conifer and rhododendron forest (10,500 to 13,500 feet), wet alpine zone (about 13,500 to 15,000 feet), with a dry alpine zone above about 15,000 feet.

Swan (1961) provides an account of physical conditions and existing life at very high altitudes. In his personal field work he found a sparse plant cover at about 17,000 feet, with two species of dwarf rhododendrons and a juniper being dominant, associated with a restricted flora comprising several other plant families. Above this general altitude the different plant species gradually thin out until at some 20,000 feet there remain only a scattering of species, including *Arenaria, Leontopodium,* and *Saussurea,* together with sparse grasses and sedges. The highest flowering plant noted was *Stellaria decumbens* (Caryophyllaceæ) at 20,130 feet. Associated with this sparse vegetation some arthropods occurred, including especially Collembola, but with a Machilid Thysanuran, a few butterflies, Diptera (Anthomyidæ), bumblebee, and a few others occurring almost to 20,000 feet. Salticid or jumping spiders were found even to some 22,000 feet. Swan proposes a new province or life zone to accommodate this highest existing life, a supra-alpine community that he designates the *Aeolian* zone, dependant on wind-blown organic debris, such as dust, pollen, plant seeds, and the like, that become lodged in protected crevices and

chinks in the rock with sufficient moisture to support the sparse fauna and flora indicated.

Up to some 16,000 feet or even higher many species of insects occur, representing a majority of the important orders. The highest altitude in the Himalaya at which a crane fly has been found is 17,000 feet in Sikkim, collected by Schmid [Alexander (1961)]. Mani states that in the Coleoptera representatives of the rove beetles, Staphylinidæ, attain 18,200 feet in the Himalaya, the highest altitude from which Coleoptera have been reported. This is the identical altitude at which Tipulidæ [*Limonia* (*Dicranomyia*) *perexcelsior* Alexander] were found by Walter Forster in the Bolivian Andes [Alexander (1962) 103].

THE RHODODENDRON ASSOCIATIONS

The genus *Rhododendron* Linnaeus (Ericaceæ) is a major group of plants of the northern hemisphere, widespread throughout the Holarctic and Oriental regions, with a single species extending into northeastern Australia. Some 800 species now are known, with the greatest concentration occurring in southern and eastern Asia, particularly in the eastern Himalaya and in the mountains of western China. Most of the species occur at moderate to high altitudes in mountainous regions, many species being eminently gregarious to produce vast groupings or associations that form tangles of twisted trunks and stems providing almost impenetrable thickets. In the southern Appalachian mountains of the eastern United States, particularly in North Carolina and Tennessee, only a few species are known but two of these, *Rhododendron maximum* Linnaeus and *R. catawbiense* Michaux, are extremely abundant, in places forming dense growths that are almost impassable by larger vertebrate animals. Locally such tangled thickets are known as "Hells." While making a study of the crane flies of these southern mountains in 1939 and 1940 it soon was realized that among a host of other plant and animal life such thickets supported a rich Tipulid fauna that was discussed in earlier papers [Alexander (1940, 1941)].

The vast development and dominance of the genus in the Himalayas has made it desirable to direct some attention to the occurrence of these flies in the *Rhododendron* associations and I am greatly indebted to Dr. Fernand Schmid for his particular interest in collecting the crane flies of such areas,

especially in 1959 in Sikkim where he was able to collect in a great range of altitudes that included numerous species of the genus, ranging from the tree rhododendrons of the lower altitudes to the dense growths of scrub-forming species in the higher regions.

In order to appreciate more the importance of these gregarious species of *Rhododendron* in providing shelter and habitats for a variety of life, such as the Tipulidæ, I am condensing information derived from several of the works of the late Frank Kingdon-Ward whose many expeditions to the eastern Himalaya gave him a personal knowledge and familiarity with probably hundreds of species of this genus. Some of these works are cited in the accompanying list of references [Ward (1941, 1949, 1956)] while others are included in Part XLIX of the present series of reports [Alexander (1961]. Most of Ward's observations were made in northeastern India and in Tibet and northern Burma. He indicates that species of *Rhododendron* occur at all altitudes between about 800 feet to above 16,000 feet. In the upper forest zones, at approximately 8,000 to 10,000 feet, the various species may form pure stands or even constitute a *Rhododendron* forest, with massive gnarled and twisted trees with a height of 40 to 50 feet or even more. Elsewhere they are associated with various other tree species, including conifers, such as *Pinus, Abies, Tsuga,* and *Larix.* At about 12,000 feet and above the limits of coniferous forests, the *Rhododendron* species become reducd in size and finally are dwarfed to form dense tangled scrub and eventually undershrubs and woven mats that comprise virtually all the undergrowth of the habitat. Ward estimates that in the eastern Himalaya the various species of *Rhododendron* in such habitats comprise probably one-half of the woody vegetation. He emphasizes the fact that here it is not the total number of species that is so impressive as is the number of specimens. Hundreds of square miles of mountain terrain become a seething mass of bloom and in the upper forest belt where fully fifty per cent of the growth consists of various rhododendrons that when the majority of these are in bloom the floral effect has no parallel elsewhere in th world. The dwarfing habit of species at high altitudes is caused by a variety of factors, particularly the wind, exposure and snow drifts. Ward emphasizes the fact that *Rhododendron* species found at the summit of a 12,000-foot mountain are not the same as those

found at this same altitude on a mountain 18,000 feet high in the same region. In the former case there has been an upward shift and compression of the zones while those on the more lofty ranges are more extended.

In the many papers presently being prepared by me considering the Schmid Indian Tipulidæ particular care has been given to indicate those species that were captured by him in these various *Rhododendron* associations.

NEW NAMES

Neophilippiana, n. n., for *Philippiana* ALEXANDER, Diptera Patagonia & S. Chile 1 (1929) 175; nec *Philippiana* WAGNER, Denkschr. Akad. Wiss. Wien 64 (1897) 569.

Longurio (*Macromastix*) *hudsonella*, n. n., for *Longurio* (*Macromastix*) *hudsoni* ALEXANDER, Ann. Mag. Nat. (9) 14 (1924) 306; nec *Longurio* (*Acracantha*) *hudsoni* HUTTON, Trans. N.Z. Inst. 32 (1900) 24.

Tipula (*Schummelia*) *venusticornis*, n.n., for *Tipula* (*Schummelia*) *picticornis* (Brunetti), Rec. Indian Mus. 15 (1918) 279; nec *Tipula picticornis* ZETTERSTEDT, Dipt. Scand. 12 (1855) 4899.

Tipula (*Microtipula*) *subtecta*, n.n., for *Tipula* (*Microtipula*) *tecta* ALEXANDER, Insec. Inscit. Menst. 14 (1926) 166; nec *Tipula tecta* SCUDDER, Bull. U. S., Geol. Survey, No. 4, 3, Art. 29 (1877) 752.

Tipula (*Oreomyza*) *leucopalassa*, n.n., for *Tipula* (*Oreomyza*) *leucosticta* ALEXANDER, Ann. Mag. Nat. Hist. (12) 6 (1953) 178; nec *Tipula leucosticta* ALEXANDER, Philip. Jour. Sci. 54 (1934)444.

Limonia (*Limona*) *inusitatella*, n.n., for *Limonia* (*Limonia*) *inusitata* ALEXANDER, Mem. Inst. Sci. Madagascar (E) 12 (1961) 214; nec *Limonia* (*Libnotes*) *inusitata* (Edwards), Ann. Mag. Nat. Hist. (9) 20 (1927) 234.

Limonia (*Limonia*) *neorepanda*, n.n., for *Limonia* (*Limonia*) *repanda* ALEXANDER, Ann. Ent. Soc. America 21 (1928) 637–638; nec *Limonia* (*Dicranomyia*) *repanda* EDWARDS, Trans. N.Z. Inst. 54 (1923) 278.

Limonia (*Libnotes*) *neopleuralis*, n.n., for *Limonia* (*Libnotes*) *pleuralis* EDWARDS, Jour. Fed. Malay St. Mus. 14 (1928) 82–83; nec *Limonia* (*Rhipidia*) *subpectinata pleuralis* ALEXANDER, Bull. Brooklyn Ent. Soc. 8 (1912) 12–13.

Limonia (*Libnotes*) *neovittata*, n.n., for *Limonia* (*Libnotes*) *vittata* EDWARDS, Treubia 6 (1925) 162–163; nec *Limonia* (*Matalimnobia*) *vittata* (Matsumura), Jour. Coll. Agr. Tokoku Imper. Univ. 4 (1911) 63–64.

Limonia (*Dicranomyia*) *schineriana*, n.n., for *Limonia* (*Dicranomyia*) *schineri* LACKSCHEWITZ, Ann. Naturhist. Mus. Wien 42 (1928) 223; nec *Limonia* (*Peripheroptera*) *schineri* (Osten Sacken), Berlin. Entomol. Zeitsch. 31 (1887) 177.

Limonia (*Idioglochina*) *tokunagana*, n.n., for *Limonia* (*Idioglachina*) *gloriosa* (TOKUNAGA, Annot. Zool. Japon. 17 (1938) 165–169; nec *Limonia* (*Dicranomyia*) *gloriosa* ALEXANDER, Canad. Ent. 14 (1912) 337–338; nec *Limonia* (*Laosa*) *gloriosa* EDWARDS, Encycl. Entomol.,

Diptera 3 (1926) 49 [re-named *Limonia* (*Laosa*) *iris* ALEXANDER (1952)].

Molophilus (*Molophilus*) *neofacinus*, n.n., for *Molophilus* (*Molophilus*) *facinus* ALEXANDER, Bol. Entomol. Venezolana 2 (1943) 140–142; nec *Molophilus* (*Molophilus*) *facinus* ALEXANDER, Philip. Jour. Sci. 71 (1940) 71–73.

LIMONIINI

LIMONIA (DICRANOMYIA) STERNOLOBATOIDES sp. nov.
Plate 1, fig. 1; Plate 2, figs. 25, 26.

Allied to *sternolobata;* head and thorax dark gray, præscutum with a brownish black central stripe; fore coxæ darkened, remaining coxæ yellowed; femora black, tibiæ and tarsi dark brown; wings subhyaline with a restricted brown pattern, base light yellow; abdomen with basal six segments light yellow, remainder, including the very large hypopygium, brownish black; hypopygium with tergite produced apically into a bi-lobed structure; dorsal dististyle a relatively stout nearly straight rod.

Male.—Length, about 8 to 9.5 millimeters; wing, 9.5 to 10.5.

Female.—Length, about 8 to 10 millimeters; wing, 9 to 11.

Rostrum black, pruinose; palpi black. Antennæ black; basal flagellar segments oval, outer ones long oval, exceeding their verticils; terminal segment about one-third longer than the penultimate. Head dark gray; anterior vertex nearly twice the diameter of scape.

Pronotum dark brown. Mesonotal præscutum yellowish gray, with a conspicuous brownish black central stripe, lateral darkenings scarcely indicated; posterior sclerites of notum gray, scutal lobes and posterior half of mediotergite darkened. Pleura gray; dorsopleural membrane light cinnamon brown. Halteres with stem yellowed, knob dark brown. Legs with fore coxæ darkened, middle and posterior pairs light yellow; trochanters yellow; femora black, tibiæ and tarsi dark brown. Wings (Plate 1, fig. 1) subhyaline, with a restricted brown pattern, including narrow seams at origin of Rs, cord and outer end of cell 1st M_2, and the entire length of vein Cu; cell Sc darkened; stigma large, oval, darker brown; prearcular field light yellow; veins brown, those at wing base light yellow. Venation: not or scarcely indicated; Sc_1 ending just beyond origin of Rs, Sc_2 close to this origin; m-cu at or close to fork of M.

Abdomen of male light yellow, the large hypopygium and preceding two segments brownish black to black; in female, abdomen darker than in male, yellowish brown to light brown.

Ovipositor with valves long and slender, tips of cerci acute. Male hypopygium (Plate 2, figs. 25, 26) generally as in *sternolobata*, differing in details, especially the tergite and dorsal dististyle. Ninth tergite, *t*, very broad, the posterior border produced into a blackened bilobed extension; targal estæ arranged in three yellow separated groups. Basistyle, *b*, generally as in *sternolobata*, including the greatly developed ventromesal lobe which bears a compact brush of exceeding long strongly curved yellow setæ. Dorsal dististyle a relatively stout nearly straight rod, the tip an acute spine, base not strongly twisted as in *sternolobata*. Ventral dististyle, *vd*, with outer angle long-produced. Ædeagus strong, sinuous.

Habitat.—Sikkim.

Holotype, male, Sherabtang, 3,200 feet, in *Rhododendron* association, August 2, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 12 of both sexes, mostly in poor condition from Corrodentia, August 27–28, 1959. Paratypes, males and females. Tsomgo, 12,500 feet, in *Rhododendron* association, August 26, 1959; males and females, Tangshing, 14,100 feet, in *Rhododendron* association, October 5–6, 1959; females, Churong, 12,460 feet, in *Rhododendron* association, October 8, 1959 (*Schmid*).

The present fly is very similar to *Limonia* (*Dicranomyia*) *sternolobata* Alexander, described from the summit of Mount Omei, Szechwan, China [Philip. Jour. Sci. 60 (1936) 339—341, figs. 12, 35], differing chiefly in slight but significant structures of the hypopygium, particularly the tergite and dorsal dististyle. *L.* (*D.*) *clotho* sp. nov., likewise, is closely allied yet quite distinct.

LIMONIA (DICRANOMYIA) STERNOLOBATOIDES ALMORÆ subsp. nov.
Plate 2, fig. 25.

Very similar to typical *sternolobatoides* sp. nov., differing especially in details of structure of the male hypopygium (Plate 2, fig. 25, right hand series, shows comparisons of the two subspecies). Abdomen of female with basal segments more distinctly yellowed. Evident differences in the hypopygium include the following. Tergite, *t*, with median extension larger, the lateral lobes long-oval, median area produced into a slender sclerotized point. Basistyle, *b*, with the smaller lateral blade tipped with very long twisted pale setæ but not produced into a narrow pencil as in typical *sternolobatoides*. Ventral dististyle,

vd, with lower lobe beneath the rostral prolongation not truncated, produced into a narrow outer blade that slopes obliquely towards its base, provided with abundant setæ.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 6 females, with the types.

LIMONIA (DICRANOMYIA) CLOTHO sp. nov. Plate 2, fig. 27.

Male.—Length, about 8 to 8.5 millimeters; wing, 9 to 10; antenna, about 1.5.

Female.—Length, about 9 to 9.5 millimeters; wing, 9.5 to 10.

General appearance much as in *Limonia* (*Dicranomyia*) *sternolobatoides* sp. nov., differing as follows: Darkened wing pattern much heavier, including broad seams at origin of Rs, cord and outer end of cell 1st M_2; outer ends of cells R_2 and R_3 darkened; seam along vein Cu broader; outer ends of both anal veins clouded with paler brown. Some females have the dark pattern less extensive but seem to be referrable to the present species on other characters.

Abdomen uniformly dark brown, slightly pruinose. Male hypopygium (Plate 2, fig. 27) with the posterior border of tergite, *t*, convex, with long setæ, more concentrated on either side of the midline; tergal lobe gently expanded outwardly, the border with a pale central emargination. Basistyle, *b*, with basal lobe yellow, tufted with long yellow setæ; ventromesal lobe large, as in the *sternolobata* group of species, the brush or pencil of setæ at near midlength much shorter and broader than in *sternolobatoides*, appearing almost like a solid plate. Dorsal dististyle a relatively short straight pale rod, tip acute, base moderately enlarged. Ventral dististyle, *vd*, with an area only about one-fourth that of the entire basistyle; rostral prolongation with the spines at summit of a fleshy tubercle; rostum short, apex only slightly to scarely produced into two short points. Gonapophysis with mesal-apical lobe nearly straight, apex subcultriform. Ædeagus long and slender.

Habitat.—Sikkim.

Holotype, male, Tsomgo, 12,500 feet, in *Rhododendron* association, August 26, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, males and famales, with the types, August 25–26, 1959. Paratypes, males and females,

Sherabtang, 13,200 feet, in *Rhododendron* association, August 27–28, 1959 (*Schmid*).

The details of structure of the hypopygium are quite distinct from those of *Limonia* (*Dicranomyia*) *sternolobata* Alexander or *L.* (*D.*) *sternolobatoides* sp. nov., especially in the tergite, dorsal dististyle, rostral prolongation of the ventral dististyle, and the shorter compact brush of setæ on the ventromesal lobe of the basistyle.

LIMONIA (DICRANOMYIA) ANANTA sp. nov. **Plate 1, fig. 2; Plate 2, figs. 28, 29.**

Allied to *melleicauda;* general coloration of thorax brownish black, pruinose; wings subhyaline, stigma small, pale brown; male hypopygium very complex in structure, tergite transverse, lateral lobes truncate; basistyle with ventromesal appendage unequally bilobed; rostral prolongation of ventral dististyle deeply divided, upper blade terminating in a yellow spatula, lower lobe narrowed outwardly.

Male.—Length, about 5.8 to 6 millimeters; wing, 6.8 to 7.

Female.—Length, about 6.5 millimeters; wing, 7.

Rostrum light brown, sparsely pruinose; palpi black, first segment more yellowed. Antennæ black; proximal flagellar segments short-oval, outer segments more elongate, terminal segment slightly exceeding the penultimate. Head brown, anterior vertex light gray, from about twice to two and one-half times the diameter of the scape.

Pronotum dark brown, sparsely pruinose. Mesonotum brownish black, heavily pruinose; præscutum with a distinct dark brown central stripe, lateral stripes and centers of scutal lobes more obscured. Pleura gray; dorsopleural membrane and pleurotergite buffy. Halteres relatively long and slender, dark brown, base of stem narrowly yellowed. Legs with coxæ brownish yellow; trochanters yellow; femora brownish yellow, outwardly passing into darker brown; remainder of legs dark brown. Wings (Plate 1, fig. 2) subhyaline; stigma pale brown, small, subcircular; veins brown. Venation: Sc_1 ending opposite origin of Rs, Sc_2 at about one-third to one-fifth Rs; m-cu variable in position, at or before the fork of M, in cases to nearly one-half its own length.

Abdominal tergites dark brown, basal sternites and styli of the hypopygium more yellowed. Male hypopygium (Plate 2, figs. 28, 29) with the tergite, *t*, transversely rectangular, margins and median line thickened; lateral lobes and a small median

lobule provided with long conspicuous setæ. Basistyle, *b*, with ventromesal appendage larger than the body of style, elongate, near its base with a smaller fingerlike lobe; face of appendage with a lower lobe that is tipped with very long sinuous setæ. Dorsal dististyle unusually long and slender, curved to the acute tip. Ventral dististyle, *vd*, very complex including a large blackened clavate lobe and a more basal slender arm additional to the rostral prolongation; at base of major lobe with a smaller one bearing a dense brush of yellow setæ (this not shown in figure); rostral prolongation deeply divided, the apex of upper blade expanded into a yellow spatula with two stout spines; lower blade nearly as long, narrowed to the tip, surface with several strong darkened curved setæ, the terminal one more enlarged, straight. Gonapophysis, *g*, with mesal-apical lobe very short, tip acute, tumid laterally. Ædeagus, *a*, conspicuously setiferous.

Habitat.—Kashmir.

Holotype, male, Upper Yarkhun Valley, 12,500 feet, August 21–27, 1954 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 3 of both sexes, with the types.

In the Holarctic region there are numerous species of the subgenus having the male hypopygium unusually large and complicated in structure, all being most readily distinguished among themselves by the details of hypopygial structure. Virtually all such species are on the wing in the late summer or autumn. Such species in Europe include *Limonia* (*Dicranomyia*) *alpina* (Bangerter), *L.* (*D.*) *complicata* (de Meijere), *L.* (*D.*) (Kuntze), *L.* (*D.*) *halterella* Edwards, *L.* (*D.*) *klefbecki* Tjeder, *L.* (*D.*) *magnicauda* (Lundstrom), *L.* (*D.*) *murina* (Zetterstedt) (*platyrostra* Alexander), *L.* (*D.*) *stigmatica* (Meigen) and some others with less modified hypopygia. In North America, comparable species include *L.* (*D.*) *cramptonella* Alexander, *L.* (*D.*) *immanis* Alexander, *L.* (*D.*) *intricata* (Alexander), *L.* (*D.*) *melleicauda* (Alexander), *L.* (*D.*) *michigana* Alexander, and some others. In western China and the Himalayan region still further such species include *L.* (*D.*) *clotho* sp. nov., *L.* (*D.*) *kaurava* sp. nov., *L.* (*D.*) *pluricomata* sp. nov., *L.* (*D.*) *sternolobata* Alexander, *L.* (*D.*) *sternolobatoides* sp. nov., and several others awaiting description. Among all of the species above listed the present novelty is closest to *intricata* and *melleicauda*, differing evidently in the characters described.

LIMONIA (DICRANOMYIA) KAURAVA sp. nov. Plate 1, fig. 3; Plate 3, fig. 30.

General coloration black, pruinose, præscutum and scutum with polished black areas; antennæ and legs black; wings whitened, stigma dark brown, very large; Sc short, cell M_2 open by atrophy of m; male hypopygium very large and complex in structure, ventral dististyle profoundly divided into a small outer and a larger inner section, the long sickle-shaped dorsal style lying in the emargination between the two.

Male.—Length, about 6 to 6.5 millimeters; wing, 6 to 6.5; antenna, about 1.2 to 1.3.

Rostrum slightly produced, black; palpi black. Antennæ black; basal flagellar segments short-oval, becoming progressively longer outwardly, subequal in length to their verticils. Head light gray; anterior vertex broad, about three times the diameter of scape.

Pronotum dull brownish black. Mesonotal præscutum with three confluent polished black stripes, lateral borders gray; posterior sclerites of notum gray pruinose. Pleura black, heavily light gray pruinose. Halteres with stem brownish yellow, knob brownish black. Legs elongate; coxæ black; gray pruinose; trochanters brownish yellow; remainder of legs brownish black to black; claws with a long slender spine. Wings (Plate 1, fig. 3) whitened, base more yellowed; stigma very large, dark brown, with a paler suffusion posteriorly in base of cell R_3; cells Sc and Cu_1 (the narrow stripe between the cubital branches) darkened; veins very pale brown, prearcular veins light yellow. Veins unusually glabrous, including sparse trichia or Rs and veins R_3 to M_3 inclusive. Venation: Sc short, Sc_1 ending some distance before origin of Rs, the distance more than one-half Rs; cell M_2 open by atrophy of M, in one specimen with the basal section of M_3 likewise atrophied; m-cu beyond fork of M, in cases to about one-half m-cu, in others close to fork.

Abdomen, including the very large hypopygium, black. Male hypopygium (Plate 3, fig. 30) with the tergite, *t*, very large, posterior border obtuse, convexly rounded, fringed with abundant long yellow setæ. Basistyle, *b*, smaller in area than the ventral dististyle, at outer angle with a group of setæ; ventromesal lobe conspicuous, unequally trilobed, the longest lobe a conspicuous extension. Dorsal dististyle a long sinuous blackened sickle, basal half slender, thence dilated into a blade

that gradually narrows into a point, the style lying in the deep emargination of the ventral style. Ventral dististyle, *vd*, very unequally divided into a small outer and larger inner section, at base of latter with a conspicuous blackened lobe that narrows outwardly, tipped with sinuous blackened setæ; rostral prolongation relatively long, subcylindrical, tip obtuse; spines two, placed on face of style at base of rostrum; also on the major inner section is an elongate fingerlike lobe provided with very long setæ (not figured). Gonapophysis, *g*, with mesal-apical lobe slender, nearly straight, tip slightly curved. Ædeagus, *a*, long and slender, blackened, tip decurved.

Habitat.—Sikkim.

Holotype, male, Sherabtang, 13,200 feet, in *Rhododendron* association, August 27, 1959 (*Schmid*). Paratopotypes, 4 males August 27–28, 1959 (*Schmid*).

Limonia (*Dicranomyia*) *kaurava* is entirely different from all other known members of the subgenus that have cell M_2 of the wings open in the greatly enlarged and complicated male hypopygium.

LIMONIA (DICRANOMYIA) KAURAVA FACIFERA subsp. nov.

Virtually identical with typical *kaurava* sp. nov., except in the very different color of the thorax. Sides of mesonotal præscutum golden yellow pollinose, disk with three brown stripes, centers of scutal lobes darkened. Pleura light brownish yellow, conspicuously yellow pollinose to present a golden appearance. Legs pale, femora yellowish brown to light brown, tips vaguely darkened; tibiæ and tarsi pale brown. Ovipositor with valves elongate, cerci very slender, gently upcurved to the acute tips; hypovalvæ stouter, straight.

Habitat.—Sikkim.

Holotype, male, Tsomgo, 12,500 feet, in *Rhododendron* association, August 26, 1959 (*Schmid*). Allotopotype, female, with the type. Paratopotypes, 7 of both sexes, with the type, August 26–27, 1959 (*Schmid*).

Despite the very different general appearance, produced chiefly by the yellow color of the thorax, there seems to be no question but that these two flies pertain to a single species.

LIMONIA (DICRANOMYIA) PLURICOMATA sp. nov.

Plate 1, fig. 4; Plate 3, fig. 31.

General coloration of thorax yellow, pronotum and præscutum with a median dark brown stripe; wings pale yellow,

stigma small, pale brown; abdomen yellowish brown, outer segments darker; male hypopygium large and complex in structure, especially the basistyle and ventral dististyle, the latter on outer face near base with a dense concentration of long erect setæ; rostral prolongation of ventral style very large and complicated in structure; ædeagus with sparse setæ.

Male.—Length, about 8.5 millimeters; wing, 9.

Rostrum light yellow; palpi black. Antennæ black; basal flagellar segments oval, the outer ones elongate, terminal segment about one-third longer than the penultimate; verticils subequal to or exceeding the segments. Head dark gray; anterior vertex relatively broad, about two and one-half times the diameter of scape.

Pronotum brownish black dorsally, yellow on sides. Mesonotum yellow, præscutum with a broad brownish black central stripe, ending some distance before suture. Pleura yellow. Halteres relatively long, stem yellow, apex of knob dark brown. Legs with coxæ and trochanters yellow; femora and tibiæ yellow, tips narrowly darkened; basitarsi obscure yellow, tips narrowly blackened, outer tarsal segments black; claws with a long outer spine, obtuse at apex, and two very small more basal spinules. Wings (Plate 1, fig. 4) uniformly pale yellow; stigma small, oval, pale brown; veins light brown. Venation: Sc_1 ending opposite origin of Rs, Sc_2 retracted, Sc_1 subequal to basal section of R_{4+5}, m-cu at fork of M; vein 2nd A nearly straight.

Abdomen yellowish brown, fifth and succeeding segments darker brown; hypopygial basistyles dark brown. Male hypopygium (Plate 3, fig. 31) very complex in structure, especially the basistyle and rostral prolongation of the ventral dististyle. Ninth tergite, *t*, transverse, narrowed outwardly, posterior border with a very shallow emargination leaving low darkened lobes that are provided with relatively few long yellow setæ; median region black from border with about nine long pale setæ. Basistyle, *b*, with a concentration of strong setæ at inner apical angle; ventromesal lobe basal in position, long and conspicuous, with a smaller axillary lobule that is densely tufted with long yellow setæ. Dorsal dististyle narrowed beyond the dilated base, thence slightly widened and nearly straight to the acute tip. Ventral dististyle, *vd*, subequal in area to basistyle; body yellow, on outer face near base with a dense concentration

of long erect twisted yellow setæ, those of remainder of body of style shorter and scattered; rostral prolongation large, very complex, more darkened and sclerotized than remainder of style, including an outer compressed-flattened beak that bears two rostral spines near base; lower margin of beak with strong setæ, the opposite face with a long row of abundant more delicate setæ that extend into a pencil of long reddish bristles at end of row. Gonapophysis, *g*, with measal-apical lobe a slender rod, narrowed and curved to an acute point. Ædeagus relatively slender, margin with delicate sparse scattered setæ.

Habitat.—Sikkim.

Holotype, male, Sherabtang, 13,200 feet, in *Rhododendron* association, August 27, 1959 (*Schmid*).

In its general appearance the present fly is very different from other regional species having unusually complex male hypopygia. In the general coloration of body and wings it suggests species such as *Limonia* (*Dicranomyia*) *autumnalis* (Staeger), differing in the unique characters of the hypopygium. The specific name is suggested by the vestiture of the ventral dististyle.

LIMONIA (DICRANOMYIA) NIGROBARBATA sp. nov.
Plate 1, fig. 5; Plate 3, fig. 32.

General coloration gray, mesonotum dark brown posteriorly; antennæ black; knobs of halteres dark brown; legs obscure yellow, femora unpatterned; wings whitish subhyaline, with a conspicuous brown pattern, including four major costal areas, with further clouds over many of the veins; Sc_1 ending nearly opposite one-third the length of Rs, m-cu some distance before fork of M; male hypopygium with posterior border of tergite extended caudad into the proctigeral extension; basistyle with two lobes that bear conspicuous setæ; rostral prolongation of ventral dististyle short and stout, the cephalic margin fringed with conspicuous black setæ; rostral spines two, placed on face of prolongation; gonapophysis with apex of mesal-apical lobe triangular.

Male.—Length, about 7.8 to 8 millimeters; wing, 8 to 8.5; antenna, about 1 to 1.1.

Rostrum and palpi black. Antennæ black, scape more pruinose; flagellar segments oval, terminal longer than the penultimate; verticils shorter than the segments. Head gray; anterior vertex about two-thirds the diameter of scape.

Pronotal scutum light brown, scutellum and pretergites yellowed. Mesonotal præscutum yellowish gray, with darker ill-delimited stripes; scutal lobes dark brown, median area yellowish gray; scutellum and mediotergite dark brown, pleurotergite paler, light gray pruinose. Pleura brown, pruinose; dorsopleural membrane obscure yellow. Halteres with stem yellow, knob dark brown. Legs with coxæ yellow, fore pair slightly more darkened; trochanters yellow; remainder of legs obscure yellow, femora unpatterned, outer tarsal segments passing into brown; claws with a long basal spine. Wings (Plate 1, fig. 5) whitish subhyaline, prearcular field and subcostal interspaces more yellowed; a heavy brown pattern, including four major costal areas, placed above arculus, at midlength of cell Sc, origin of Rs and tip of Sc, and at stigma, the latter confluent with a large cloud over fork of Rs; further extensive darkenings over remainder of cord, outer end of cell 1st M_2, outer ends of cells R_2 and R_3, tip of vein 1st A and as long extensive paler brown seams over most of veins Cu_1 and 2nd A; axilla narrowly darkened; veins pale brown, darker in the costal areas, the interspaces yellow. Venation: Sc_1 ending about opposite one-third Rs, Sc_2 far retracted; m-cu about two-thirds its length before fork of M.

Abdominal tergites brownish yellow, incisures faintly darkened; basal sternites yellow, extreme bases pale brown; outer segments darker brown, ventral dististyle of hypopygium pale. Male hypopygium (Plate 3, fig. 32) with the tergite, *t*, imbedded between the basistyles, the posterior border extended outward into proctigeral membrane, without an emargination; immediately cephalad of a V-shaped pigmented area on this membrane at apex of the tergal plate on either side of the midline with a group of about 18 punctures that bear small weak setæ. Basistyle, *b*, smaller than the ventral dististyle, bearing an erect darkened cylindrical lobe on mesal face provided with setæ that are nearly as long as the lobe; apex of basistyle protruding mesad into a stouter darkened structure that bears strong setæ, including several on inner face. Dorsal dististyle a gently curved yellow rod gradually narrowed to the slender obtuse tip. Ventral dististyle, *vd*, fleshy, pale, narrowed into a short rostrum that is truncated at apex; cephalic margin of prolongation darkened and bearing a fringe of more than forty black setæ to present a bearded appearance, terminal two bristles yellow; rostral spines two, yellow, on face

of prolongation, arising close together from a small common tubercle. Gonapophysis, *g*, with mesal-apical lobe distinctive in shape, as shown, apex subtriangular in outline. Ædeagus long and slender, the simple tip curved.

Habitat.—Sikkim.

Holotype, male, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*). Paratopotypes, males, with the type. Paratypes, both sexes, Yagtang, 11,200 feet, in *Rhododendron* association, May 28, 1959 (*Schmid*).

The most similar regional species is *Limonia* (*Dicranomyia*) *baileyi* Edwards, which is discussed later in the present paper. The wing pattern of the two flies is somewhat the same but differ evidently in the color of the costal field which is uniformly darkened in *baileyi*.

LIMONIA (DICRANOMYIA) DRAUPADI sp. nov. Plate 1; fig. 6; Plate 3, fig. 33.

General coloration of thorax brownish black; femora light yellow, tips blackened; wings yellow, conspicuously patterned with brown; Sc_1 ending about opposite one-third to one-half Rs, Sc_2 far retracted, m-cu before fork of M; male hyopygium with dorsal dististyle a strongly curved sickle, its tip obtuse; rostral prolongation of ventral dististyle small, spines two, placed close together.

Male.—Length, about 6 to 6.5 millimeters; wing, 8 to 8.5; antenna, about 1.1 to 1.2.

Female.—Length, about 8 to 8.5 millimeters; wing, 9 to 10.

Rostrum and palpi black. Antennæ relatively short, black throughout; basal flagellar segments oval, outer ones more elongate, subequal in length to their longest verticils. Head dull dark brown; anterior vertex relatively narrow, subequal to the diameter of the scape.

Thorax almost uniformly dark brown to brownish black, præscutum still darker medially, surface subnitidous. Halteres with stem yellow, knob dark brown. Legs with coxæ blackened; trochanters brown; femora light yellow, tips extensively blackened; narrowest on fore pair where about the outer fifth is included, on middle and hind pairs approximately the outer fourth; remainder of legs brownish yellow, tips of tibiæ and the outer tarsal segments brownish black. Wings (Plate 1, fig. 6) with the ground yellow, prearcular and costal regions more saturated yellow; an extensive brown pattern, including costal areas at h, at one-third the length of Sc, origin

of Rs and fork of Sc, and stigma; further conspicuous seams over cord, outer end of cell 1st M_2, most of first section of Cu_1 in cell M and extensively at tips of both anal vens; less evident marginal cloudings at veins from R_2 to axilla; veins light yellow, darker in the patterned areas. Venation: Sc_1 ending about opposite one-third to one-half Rs, Sc_2 very far retracted, lying in the second darkened costal area; m-cu before fork of M. Two paratypes have cell M_2 open by atrophy of m in both wings.

Abdomen brownish black to black; ventral dististyles of male yellowed. Ovipositor with cerci very slender, hypovalvæ relatively short and stout. Male hypopygium (Plate 3, fig. 33) with the tergite, *t*, transverse, posterior border broadly emarginate, lobes thickened, low and obtuse, provided with very long yellow setæ. Basistyle, *b*, with ventromesal lobe rounded. Dorsal dististyle a strongly curved sickle, apex obtuse. Ventral dististyle, *vd*, relatively large, its area about twice that of the basistyle; rostral prolongation small, apex obtuse, rostral spines longer than the prolongation, placed close together. Gonapophysis, *g*, transverse, mesal-apical lobe long, slender, tip acute. Ædeagus terminating in a circular loop.

Habitat.—Sikkim.

Holotype, male, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*). Allotopotype, female. Paratopotypes, males and females, with the types.

Among the regional species, in wing pattern and venation the present fly most resembles *Limonia* (*Dicranomyia*) *nigrobarbata* sp. nov., differing most evidently in the brownish black body coloration and especially in the very different hypopygium, including the absence of blackened setæ on the ventral dististyle, as found in *nigrobarbata*.

LIMONIA (DICRANOMYIA) CHANDRA sp. nov. **Plate 1, fig. 7; Plate 3, fig. 34.**

Size medium (wing about 8 millimeters); general coloration of thorax dull yellow, pronotum and præscutum with a central brown stripe; legs yellow; wings very pale yellow, stigma pale brownish yellow; male hypopygium with ventromesal lobe of basistyle very large, with a slender lateral lobule; rostral prolongation of ventral dististyle sclerotized, triangular in outline, on face with two separated spines; ædeagus slender, outer end with microscopic squamose scales.

Male.—Length, about 6 to 6.5 millimeters; wing, 7 to 8.

Female.—Length, about 6.5 to 7 millimeters; wing, 8 to 8.5.

Rostrum short, testaceous yellow; palpi black. Antennæ black, scape more yellowed; basal flagellar segments oval, the outer ones more elongate, exceeding their verticils; terminal segment about one-fourth longer than the penultimate. Head gray; anterior vertex slightly exceeding the diameter of scape.

Thorax light yellow, surface opaque; central region of pronotum and median area of præscutum dark brown. Halteres relatively long, stem pale yellow, knob infuscated. Legs with coxæ and trochanters light yellow; remainder of legs yellow, the outer tarsal segments passing into black. Wings (Plate 1, fig. 7) very pale yellow, prearcular and costal regions slightly more saturated; stigma very pale brownish yellow; veins very light brown. Venation; Sc_1 ending opposite origin of Rs, Sc_2 removed Sc_1 alone from about one-half to four-fifths Rs; cell 1st M_2 variable in length, in cases subequal to distal section of M_{1+2} ; m-cu at or close to fork of M.

Abdominal tergites dark brown, basal sternites clear light yellow, outer segments and hypopygium darker. Male hypopygium (Plate 3, fig. 34) with the tergite, *t*, pale, transverse, posterior border with a shallow U-shaped emargination leaving broadly truncated lobes provided with long delicate setæ. Basistyle, *b*, with ventromesal lobe very large, darkened, subequal in length to body of style, on face with a fingerlike lobule provided with very long powerful curved setæ. Dorsal dististyle a slightly curved darkened rod, its tip acute. Ventral dististyle, *vd*, smaller than the basistyle; body oval, yellow; rostral prolongation large, more sclerotized, triangular in outline, narrowed to an acute beak; rostral spines two, in some specimens three, widely separated, placed on face of prolongation at near midlength; cephalic basal part of prolongation a low cushion with long yellow setæ. Gonapophysis, *g*, with mesal-apical lobe appearing as a slender hook, tip acute. Ædeagus slender, terminating in two small oval lobes; outer end with numerous appressed squamose scales.

Habitat.—Kumaon.

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

Allotopotype, female. Paratopotypes, 8 of both sexes.

In its general appearance *Limonia* (*Dicranomyia*) *chandra* suggests species such as *L.* (*D.*) *autumnalis* (Staeger) and

some other similar forms, differing conspicuously in hypopygial structure, especially the basistyle, ventral dististyle and ædeagus.

LIMONIA (DICRANOMYIA) PENTADACTYLA sp. nov. Plate 1, fig. 8; Plate 3, fig. 35.

General coloration of thorax yellow, central region of præscutum brownish gray; rostrum brownish yellow; antennæ black; wings faintly suffused with brownish yellow, stigma very pale brown; male hypopygium with posterior border of tergite broadly emarginate; ventromesal lobe of basistyle bilobed; dorsal dististyle a small nearly straight rod, its tip acute; ventral dististyle with rostral prolongation darkened, rostral spines elongate; near apex of prolongation with a sclerotized plate that terminates in five fingerlike spines.

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

Rostrum brownish yellow; palpi brown, terminal segment black. Antennæ black; flagellar segments oval, narrowed into very short apical necks; segments subequal to their verticils. Head light gray.

Pronotum dark brown, yellowed laterally. Mesonotal præscutum broadly brownish gray medially, the sides extensively yellow, golden pollinose; posterior sclerites of notum chiefly yellow, scutellum and mediotergite slightly infuscated medially. Pleura and pleurotergite clear light yellow, with a vague more silvery sheen. Halteres with stem yellow at base, slightly darkened outwardly, knob infuscated. Legs with coxæ and trochanters light yellow; femora yellow, tips narrowly brown; tibiæ yellow, tips scarcely darker; tarsi passing from yellowish brown to black; claws with a single major spine. Wings (Plate 1, fig. 8) faintly suffused with brownish yellow, prearcular and costal fields clearer yellow, stigma very pale brown; veins light brown. Longitudinal veins beyond level of origin of Rs with macrotrichia, including also the outer ends of both anal veins, Sc glabrous. Venation; Sc_1 ending opposite origin of Rs, Sc_2 retracted, Sc_1 alone more than one-half Rs; free tip of Sc_2 lying slightly basad of R_2; cell 1st M_2 longer than distal section of M_3; m-cu shortly before fork of M; vein 2nd A scarcely arcuated at origin, the anal veins being generally parallel.

Abdominal tergites and hypopygium dark brown, sternites and ventral dististyles paler. Male hypopygium (Plate 3, fig. 35) with the tergite, *t*, transverse; posterior border broadly emarginate, lobes obtuse, their thickened margins narrow; ter-

gal setæ in three groups, long and abundant but inconspicuous, punctures pale. Basistyle, *b*, larger than the ventral dististyle, its ventromesal lobe very large, the area about two-thirds that of the remainder of style, conspicuously bilobed; outer lobe larger, darkened, with long delicate pale setæ; inner or axillary lobe more triangular, with numerous yellow setæ, about five of these stronger and more spinoid. Dorsal dististyle small, nearly straight, the outer two-thirds slightly dilated, thence extended into an acute point. Ventral dististyle, *vd*, yellow, rostral prolongation darkened, with two long slightly separated spines; near outer end of the truncated apex of prolongation with a sclerotized plate that is produced into five conspicuous fingerlike spines, suggesting the specific name, the three more cephalic spines larger; inner cephalic margin of style produced into a low lobe with numerous erect setæ. Gonapophysis, *g*, with mesal-apical lobe relatively small, straight. Ædeagus slender, glabrous, terminating in two small oval lobes.

Habitat.—Kumaon.

Holotype, male, Dakwani, Pauri Garhwal, 9,300 to 11,000 feet, August 5, 1958 (*Schmid*).

Limonia (*Dicranomyia*) *pentadactyla* is quite distinct from all other regional species in hypopygial structure, particularly the dorsal dististyle and the peculiar sclerotized five-pointed plate on the rostral prolongation of the ventral dististyle.

LIMONIA (DICRANOMYIA) NAKULA sp. nov. Plate 1, fig. 9; Plate 3, fig. 36.

Size above medium (wing of male 10 millimeters); thorax dull brownish yellow, pronotum and præscutum with a dark brown central stripe; legs yellowish brown; wings faintly tinged with brownish yellow, very inconspicuously patterned with pale brown; Sc_1 ending opposite origin of Rs, vein Cu_2 apparently lacking; abdomen dark brown; male hypopygium with ventromesal lobe of basistyle very low, directed cephalad; dorsal dististyle obtuse at apex; rostral prolongation of ventral dististyle with a few stout flattened spinoid setæ; ædeagus with abundant short delicate setulæ.

Male.—Length, about 8 millimeters; wing, 10; antenna, about 1.3.

Rostrum dark brown; palpi small, black. Antennæ black; flagellar segments oval, longer than their verticils; terminal segment about one-half longer than the penultimate. Head dark

gray; anterior vertex narrow, less than one-half the diameter of scape; genæ with long conspicuous black setæ.

Pronotal scutum dark brown, buffy laterally, scutellum yellowed. Mesonotum almost uniformly dull brownish yellow except for a broad dark brown central stripe on præscutum, this becoming obsolete at near midlength. Pleura yellowed, sternopleurite darker. Halteres relatively short, stem yellowed, knob infuscated. Legs with coxæ buffy; trochanters greenish yellow; remainder of legs yellowish brown, outer tarsal segments blackened. Wings (Plate 1, fig. 9) faintly tinged with brownish yellow, prearcular and costal fields clearer yellow, especially cell Sc; stigma and very faint restricted pale brown seams at origin of Rs, cord and other end of cell 1st M_2; veins yellowed. Venation: Sc_1 ending opposite origin of Rs, Sc_2 very faint to scarcely evident, its apparent position indicated in figure, very far retracted, Sc_1 longer than Rs; free tip of Sc_2 very short, R_2 correspondingly long, in transverse alignment; cell 1st M_2 about equal in length to distal section of M_3; m-cu about one-fourth to one-fifth its length before fork of M; vein Cu_2 (the delicate vein immediately behind vein Cu_1) apparently lacking; cell 2nd A broad.

Abdomen dark brown, contrasting with the brightened thorax. Male hypopygium (Plate 3, fig. 36) with the tergite, *t*, large, posterior border with two very broad obtuse lobes separated by a narrow V-shaped emargination; setæ small and delicate. Basistyle, *b*, with ventromesal lobe low and inconspicuous, directed cephalad instead of outwardly, as usual. Dorsal dististyle a strong curved sickle, the outer third long and straight, apex obtuse. Ventral dististyle, *vd*, yellowed, about equal in area to the basistyle, narrowed gradually into the rostral prolongation, the apex and lower margin of latter with a few stout flattened spinoid setæ, one larger; rostral spines two, straight, placed about their own diameter apart on face of style. Gonapophysis, *g*, with mesal-apical lobe small, curved to the subacute tip. Ædeagus slender, the entire surface with abundant short delicate setulæ.

Habitat.—Sikkim.

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

In its inconspicuously patterned wings the present fly agrees with species such as *Limonia* (*Dicranomyia*) *delicata* (Bru-

netti) and some others, differing from all in the hypopygial structure, especially the tergite, basistyle, rostral prolongation of the ventral dististyle, and ædeagus.

LIMONIA (DICRANOMYIA) BAILEYI (Edwards). **Plate 3, fig. 37.**

Dicranomyia baileyi EDWARDS, Ann. Mag. Nat. Hist. (10) 1 (1928) 702, fig. 18 (wing).

The type of *baileyi* is a female specimen taken in the Chumbi Valley, Tibet, 10,000 feet, on September 27, 1927, by F. M. Bailey. As indicated earlier, the fly is approximately similar in its general appearance to *Limonia* (*Dicranomyia*) *nigrobarbata* sp.nov., differing in the leg and wing pattern. I am here characterizing material taken at high altitudes in the mountains of western China as being subspecifically different from *baileyi*, under the name *Limonia* (*Dicranomyia*) *baileyi omeiana* subsp. nov.

Male.—Length, about 7.5 millimeters; wing, 8.

Femora clear yellow, with about the distal tenth brown; tibiæ and tarsi brownish yellow. Wings much as in typical *baileyi*, as shown in Edwards's figure, especially as concerns the costal border; darkened seams evidently paler brown, inconspicuous, those on veins M_3 and M_4 lacking or very narrow. Male hypopygium (Pate 3, fig. 37) entirely different from that of *nigrobarbata*. Ninth tergite, *t*, large, posterior border with a deep and narrow U-shaped emargination, the broad lobes obliquely truncated. Basistyle, *b*, on mesal face with a powerful ventromesal appendage directed caudad and a smaller more apical lobe directed mesad; basal appendage darkened, with long but inconspicuous setæ, outer lobe darkened, the vestiture shorter. Dorsal dististyle a curved sickle, its apex narrowly obtuse. Ventral dististyle, *vd*, subequal to or exceeding the basistyle in area; rostral prolongation pale and slender, with two spines on face near base; vestiture of prolongation consisting of a few long but inconspicuous marginal setæ, entirely without the black-bearded appearance of *nigrobarbata*. Gonapophysis, *g*, with mesal-apical lobe a slender hook. Ædeagus, *a*, long and slender, sides with abundant erect setulæ throughout the length as far proximad as the dilated base; apex a recurved flattened flap, its tip more or less emarginate to appear bilobed.

Holotype, male, Mount Omei, Szechwan, China, summit 11,000 feet, June 4, 1938 (*Tsen*).

LIMONIA (DICRANOMYIA) KUBERA sp. nov. **Plate 1, fig. 10; Plate 4, fig. 38.**

Allied to *laticellula* general coloration of thorax gray, præscutum with three brown stripes; halteres yellow; femora yellow, tips conspicuously black; wings whitened, with a conspicuous brown pattern; cell 1st M_2 long, m-cu close to fork of M; male hypopygium with the tergal lobes low and broad; ventromesal lobe of basistyle oval, with long setæ; rostral prolongation of ventral dististyle pendant.

Male.—Length, about 7 millimeters; wing, 8.3.

Female.—Length, about 8.5 millimeters; wing, 10.5.

Rostrum black, sparsely pruinose; palpi black. Antennæ black; flagellar segments long-oval, exceeding their verticils. Head gray, anterior vertex with darker areas, broad, nearly four times the diameter of the scape.

Pronotum brownish gray. Mesonotum of holotype discolored, of the allotype gray, præscutum with three conspicuous dark brown stripes; scutal lobes less evidently darkened. Pleura gray. Halteres yellow. Legs with coxæ brown, extreme tips yellowed; trochanters yellowed; femora yellow, tips narrowly but conspicuously black; tibiæ brownish yellow, tips very narrowly brownish black; tarsi brownish black; proximal ends of basitarsi paler. Wings (Plate 1, fig. 10) whitened, with a conspicuous brown pattern, the markings of the posterior cells only slightly paler than those of the anterior fields; a large dark cloud at near midlength of cell Sc, extending posteriorly to M, this mark lacking in the allotype; remainder of darkened pattern conspicuous; veins dark brown. Venation: Sc_1 ending about opposite midlength of Rs, Sc_2 near its tip; m-cu at or shortly before fork of M; cell 1st M_2 unusually long, exceeding in length any of the veins beyond it.

Abdomen dark brownish gray. Male hypopygium (Plate 4, fig. 38) with the tergite, *t*, transverse, lobes low and broad, separated by a smaller U-shaped notch; lobes thickened, with abundant long setæ; proctigeral extension depressed-flattened, apex shallowly emarginate, surface with abundant microscopic setulæ. Basistyle, *b*, with ventromesal lobe oval, the setæ of the lower surface very long, almost as long as the lobe itself. Dorsal dististyle only slightly curved, gradually narrowed to the slightly curved slender tip. Ventral dististyle, *vd*, pale, its area about two and one-half times that of the basistyle; rostral prolongation slender, pendant; rostral spines variable in number, in the type with three on one side, only one on the

other, the normal number presumably two, placed near the base of prolongation. Gonapophysis, *g*, with mesal-apical lobe long and very slender, narrowed gradually to the acute tip.

Habitat.—Kumaon.

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

Limonia (*Dicranomyia*) *kubera* is most readily told from other generally similar regional species, such as *L.* (*D.*) *yaksha* sp. nov., by the quite different hypopygial structure, including especially the tergite and basistyle.

LIMONIA (DICRANOMYIA) YAKSHA sp. nov. Plate 1, fig 11; Plate 4, fig. 39.

Allied to *laticellula;* general coloration of mesonotum gray, præscutum with three brown stripes, the central one broad; halteres with bases of knobs dark brown; femora yellow, tips narrowly and vaguely more darkened; wings whitened, with a pale brown pattern, the darker areas restricted; male hypopygium with lobes of tergite long and conspicuous; ventromesal lobe of basistyle large, with long setæ; rostral spines of ventral dististyle two.

Male.—Length, about 7 to 7.5 millimeters; wing, 8.5 to 9.

Rostrum brownish black; palpi black. Antennæ black; flagellar segments oval, terminal segment subequal to or slightly smaller than the penultimate. Head dark brown; anterior vertex narrow, about one-half the diameter of scape.

Pronotum dark brown. Mesonotal præscutum brownish gray, with three brown stripes, the central one broad; posterior sclerites of notum light gray, centers of the scutal lobes brown. Pleura dark brown, ventral sclerites paler brown. Halteres with stem whitened, bases of knobs dark brown, apices pale. Legs with fore coxæ weakly infuscated, the others more brownish yellow; trochanters yellow; femora yellow, tips narrowly and vaguely more darkened; tibiæ and tarsi whitened, the outer tarsal segments slightly infuscated. Wings (Plate 1, fig. 11) with the ground whitened, extensively but inconspicuously patterned with medium brown and paler posterior clouds; darker marks at origin of Rs, fork of Sc, stigma, cord and outer end of cell 1st M_2; paler clouds in the cubital and anal cells, with conspicuous whitened areas in cells Cu and 1st A before the veins; veins brown. Venation: Sc long, Sc_1 ending at near two-thirds Rs, Sc_2 near its tip; m-cu before fork of M, in

cases to fully its own length; vein 2nd A curved strongly to the margin.

Abdomen dark brown, the posterior borders of the segments obscure yellow. Male hypopygium (Plate 4, fig. 39) with the tergite, *t*, transverse, posterior border strongly produced into large lateral lobes provided with numerous long setæ. Basistyle, *b*, with ventromesal lobe very large, fringed beneath and at apex with very long setæ that exceed the diameter of the lobe in length. Dorsal dististyle gradually narrowed into a long point. Ventral dististyle, *vd*, larger than the basistyle; body with long slender setæ; rostral prolongation large, with two (three in abnormal cases) strong spines before midlength. Gonapophysis, *g*, with mesal-apical lobe very long and slender, narrowed very gradually to a nearly acute point. Ædeagus with apical lobes small, oval.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*). Paratopotypes, 2 males, pinned with type.

Limonia (*Dicranomyia*) *yaksha* is one of several Asiatic species that are generally similar to *L.* (*D.*) *laticellula* Alexander, of western China. It differs from other similar Himalayan species particularly in the structure of the hypopygium, especially the tergite and basistyles.

LIMONIA (DICRANOMYIA) NAGA sp. nov. **Plate 1, fig. 12; Plate 4, fig. 40.**

General coloration black, gray pruinose, conspicuously so on the pleura; præscutum with three blackened stripes; femora brownish black, fore pair paler; wings whitened, with a conspicuous spotted and dotted brown pattern; male hypopygium with the rostral spines arising from a common low darkened tubercle; gonaphysis with mesal-apical lobe very long and slender.

Male.—Length, about 7 millimeters; wing, 8.5.

Female.—Length, about 7.5 to 8.5 millimeters; wing, 9 to 11.5.

Rostrum and palpi black. Antennæ with scape and pedicel black, sparsely pruinose, flagellum dark brown; basal segments subglobular, outer ones passing into long-oval, the segments with short abrupt apical pedicels; verticils exceedingly small, only slightly longer than the dense white pubescence. Head dark brownish gray, center of vertex more infuscated.

Pronotum brownish black, gray pruinose. Mesonotum gray, the præscutum with three blackened stripes, lateral borders clear gray, scutal lobes blackened, the central area and most of scutellum light gray pruinose; mediotergite black, central part gray. Pleura and pleurotergite black, extensively light gray pruinose. Halteres whitened, especially the knobs. Legs with coxæ black, pruinose; trochanters brown; femora brownish black, fore pair paler except at tips; tibiæ and tarsi light brown, outer tarsal segments black; claws with a stout nearly basal spine, with further very small and crowded more basal spinules. Wings (Plate 1, fig. 12) whitened, with a conspicuous spotted and dotted brown pattern; major dark areas at origin of Rs, fork of Sc, fork of Rs and less evidently at ends of anal veins; similar clouds near centers of cells R_2 and 2nd A, with narrow seams over cord and outer end of cell 1st M_2; virtually all cells with small brown dots; veins brown. Venation: Sc_1 ending about opposite one-third to two-fifths Rs, Sc_2 near its tip; m-cu before fork of M; vein 2nd A at end bent obliquely to margin.

Abdomen brown, posterior borders of segments pale gray, in most specimens these very broad and conspicuous. Ovipositor with cerci long and slender, nearly straight. Male hypopygium (Plate 4, fig. 40) with the tergite, *t*, transverse, posterior border gently emarginate, forming low lobes with abundant long setæ. Basistyle, *b*, less than one-half as extensive as the ventral dististyle; ventromesal lobe stout, simple, with long setæ. Dorsal dististyle gently curved, tip decurved into an acute spine. Ventral dististyle, *vd*, large, setæ numerous but small; rostral prolongation short, spines two, from a low darkened basal tubercle; apex of prolongation without large setæ, as commonly found in this subgenus. Gonapophysis, *g*, with mesal apical lobe very long and slender, gently curved to the narrowly acute tip. Ædeagus glabrous.

Habitat.—Sikkim.

Holotype, male, Sherabtang, 13,200 feet in *Rhododendron* association, August 27, 1959 (*Schmid*). Allotopotype, female. Paratypes, 7 of both sexes, Tsomgo, 12,500 feet, in *Rhododendron* association, August 25–26, 1959 (*Schmid*).

Limonia (*Dicranomyia*) *naga* is entirely different from other regional species. In the abundantly spotted and dotted brown wing pattern, as well as in the venation, the fly suggest the Nearctic *Limonia* (*Dicranomyia*) *defuncta* (Osten Sacken)

or *L.* (*D.*) *simulans* (Walker) which are entirely distinct in all other regards.

LIMONIA (DICRANOMYIA) RIXOSA sp. nov. Plate 1, fig. 13; Plate 4, fig. 41.

Allied to *goritiensis:* general coloration light gray, præscutum and scutal lobes patterned with brown; femora yellow, tips narrowly black; wings whitened, with a very heavy dark and paler brown dotted pattern, including numerous spots in all cells; male hypopygium with dorsal dististyle very slender, ventral style with a low lobe provided with short dense black setulæ.

Male.—Length, about 7 to 8 millimeters; wing, 8 to 10; antenna, about 1.3 to 1.4.

Female.—Length, about 8 to 9 millimeters; wing, 10 to 11.

Rostrum very short, black, gray pruinose; palpi black. Antennæ black; flagellar segments oval, subequal to their verticils, terminal segment subequal to the penultimate. Head dark gray; anterior vertex subequal to diameter of scape.

Pronotum elongate, black, heavily gray pruinose. Mesonotum light gray, præscutum with brown intermediate stripes, sublateral stripes ending far before suture, lateral borders narrowly darkened; scutal lobes darkened. Pleura light gray, dorsoplural region more buffy yellow. Halteres with stem whitened, outer end of knob dark brown. Legs with coxæ infuscated, pruinose; trochanters brownish yellow; femora yellow, tips abruptly blackened, preceded by a somewhat clearer yellow ring, on posterior the black color involving about the outer twelfth; tibiæ light yellow, tips very narrowly darkened; tarsi yellowish brown, passing into black; claws with the spine relatively short. Wings (Plate 1, fig. 13) with the ground whitened, with a very heavy dark and paler brown dotted pattern, the darker areas restricted to the veins, the paler dots in all cells; three larger darkened spots in costal field, smaller than the interspaces; similar larger clouds at fork of Rs, m-cu, outer end of cell 1st M_2 and at outer ends of cubital and anal veins; a series of dark brown dashes on many veins, including all outer ones, M_1 and both branches of Cu; veins yellow, dark brown in the patterned areas. Venation: Sc_1 ending opposite or shortly beyond origin of Rs, Sc_2 far retracted, Sc_1, alone being longer than Rs; cell 1st M_3 subequal in length to distal section of M_{1+2}; m-cu before fork of M, in cases to more than one-half its length. One paratype female, on one wing only, has the basal section of M_{1+2} atrophied.

Abdominal tergites dark brown, posterior borders paler, more pruinose; basal sternites more yellowed, the outer ones darker. Male hypopygium (Plate 4, fig. 41) with the tergite, *t*, subrectangular in outline, posterior border with a V-shaped emargination, lobes broadly truncate, with very long delicate yellow setæ. Basistyle, *b*, subequal in extent to ventral dististyle, ventromesal lobe relatively short and rounded. Dorsal dististyle very slender, strongly curved. Ventral dististyle, *vd*, with body oval, mesal face with short dense black setulæ as in *goritiensis;* a darkened oval area near base of prolongation provided with short dense setulæ; rostral prolongation long and slender, the two spines elongate, gently curved, very widely separated. Gonapophysis, *g*, with mesal-apical lobe very long and slender, curved gently to the subacute tip.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, 11,000 feet, in *Rhododendron* association, September 14, 1958 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 5 of both sexes, with the types.

Limonia (*Dicranomyia*) *rixosa* is readily told from the western Palæarctic *L.* (*D.*) *goritiensis* (Mik) by the abundantly dotted wing cells and in the structure of the male hypopygium. Both species have the short darkened setulæ on mesal face of the ventral dististyle, these being more slender and delicate than somewhat comparable setæ found in *L.* (*D.*) *modesta* (Meigen), with the wings unpatterned.

LIMONIA (DICRANOMYIA) MECOGASTRA sp. nov. Plate 1, fig. 14; Plate 4, fig. 42.

Thorax buffy yellow; pronotum and anterior end of præscutum with a central brown stripe; antennæ black; wings pale yellow, with a conspicuous brown pattern, including four costal areas; vein Sc_1 very long; abdomen elongate, especially in the male; hypopygium with ventromesal lobe of basistyle conspicuously provided with spinoid setæ; ventral dististyle elongate, its prolongation small; ædeagus broad, provided with dense long yellow setæ directed basad to present a skirtlike appearance.

Male.—Length, about 9.5 to 12 millimeters; wing, 10 to 11; abdomen alone 7 to 8.

Female.—Length, about 8 to 8.5 millimeters; wing, 9.5 to 10.

Rostrum black, about one-third the remainder of head; palpi black. Antennæ black; flagellar segments oval, the first longer,

narrowed at base; verticils shorter than the segments. Head brownish gray, clearer gray anteriorly; anterior vertex about equal to the diameter of scape.

Cervical region and the elongate pronotum yellow, infuscated medially. Mesonotum chiefly buffy yellow, præscutum with a broad brown central stripe, more intensely darkened anteriorly, ending far before the suture; mediotergite extensively darkened. Pleura and pleurotergite yellow, mesepisternum more or less darkened medially. Halteres with stem obscure yellow, clearer basally, knob infuscated. Legs elongate; coxæ and trochanters yellow; remainder of legs light yellowish brown; claws with a major outer tooth, with progressively smaller more basal denticles. Wings (Plate 1, fig. 14) with the ground pale yellow, conspicuously patterned with brown, including a series of four costal areas that are slightly smaller than the interspaces, placed at *h*, midlength of vein Sc, over Sc_2 end of Sc_1 and origin of Rs, and the stigma, the last connected with a spot at fork of Rs; other conspicuous brown seams on posterior cord, outer end of cell 1st M_2, ends of both anal veins, and the axillary angle; a brown seam along vein Cu in cell M, not attaining m-cu; veins yellow, brown in the patterned areas. Venation: Sc_1 ending about opposite one-third Rs, Sc_2 very retracted, Sc_1 alone about one and one-half Rs; m-cu before fork of M.

Abdomen very long, especially in the male, as shown by the measurements; brown; ventral dististyle of hypopygium yellow or brownish yellow. Male hypopygium (Plate 4, fig. 42) with the posterior border of tergite, *t*, convex, with two approximated rounded dusky lobes provided with long setæ. Basistyle, *b*, relatively small, its total area about one-half that of the ventral dististyle; ventromesal lobe large and distinctive; a row of setoid spines down face, closer to base with a dense mass of comparable spines directed distally. Dorsal dististyle a relatively small strongly curved sickle, tip obtuse. Ventral dististyle, *vd*, very large, elongate; rostral prolongation small, terminating in two unequal setæ, one longer than the prolongation; two long straight rostral spines, approximated at near midlength of prolongation. Gonapophysis, *g*, with mesal-apical lobe stout, at apex directed laterad into a strong spine. Ædeagus, *a*, distinctive, very broad, clothed with dense yellow setæ that are directed basad, giving to the structure a skirtlike appearance.

Habitat.—Sikkim.

Holotype, male, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 8 of both sexes. Paratypes, both sexes, Chachu, 11,500 feet, in *Rhododendron* association, June 29, 1959; male, Chumzomoi Choka, 11,800 feet, in *Rhododendron* association, July 8, 1959; males and females, Yagtang, 11,000 feet, in *Rhododendron* association, May 28, 1959; males and females, Yumtang, 12,140 feet, in *Rhododendron* association, June 27, 1959 (*Schmid*).

In its general appearance, especially the wing pattern, *Limonia* (*Dicranomyia*) *mecogastra* suggests the Palaearctic *L.* (*D.*) *didyma* (Meigen), differing conspicuously in the elongate abdomen and in all structures of the hypopygium, particularly the ventromesal lobes of the basistyle and the hula skirt appearance of the ædeagus.

LIMONIA (DICRANOMYIA) SKANDA sp. nov. Plate 1, fig. 15; Plate 4, fig. 43.

Allied to *mecogastra;* general coloration of thorax yellow, pronotum and præscutum narrowly darkened medially; wings pale yellow, scarcely patterned; abdomen long, brown; male hypopygium with the ventral dististyle greatly produced into a yellow flaplike extension; ædeagus with conspicuous yellow setæ.

Male.—Length, about 10 to 10.5 millimeters; wing, 10 to 11; abdomen, about 8 to 8.5.

Rostrum brown; palpi black. Antennæ with scape and pedicel dark brown, flagellum brownish black; flagellar segments long-suboval, terminal segment only a little longer than the penultimate, verticils shorter than the segments. Head gray, more infuscated on front and center of vertex; anterior vertex slightly broader than the diameter of scape.

Thorax yellow, central area of pronotum and anterior half of præscutum conspicuously dark brown. Halteres brown, bases yellowed. Legs very long; coxæ and trochanters yellow; remainder of legs obscure yellow, outer tarsal segments passing into black; claws nearly straight, with a single major spine, the more basal denticles very small. Wings (Plate 1, fig. 15) pale yellow, prearcular and costal regions slightly more saturated; stigma and very restricted areas on cord very slightly darker or scarcely evident; veins light yellow, scarcely darker than the ground. Venation: Sc_1 ending opposite or slightly beyond

origin of Rs, Sc_2 very far retracted but faint to appear scarcely evident; cell 1st M_2 nearly as long as outer section of M_{1+2} m-cu about one-third to one-fifth its length before fork of M.

Abdomen very long, as shown by the measurements; uniformly dark brown except for the obscure yellow ventral styles of the hypopygium. Male hypopygium (Plate 4, fig. 43) with the tergite, *t*, long, posterior margin with two obtuse darkened lobes with very abundant setæ. Basistyle, *b*, relatively small, its area about one-third that of the ventral dististyle; ventromesal lobe darkened, complex, bilobed, the low more basal lobe with abundant short spinoid setæ, the outer lobe with setæ sparse but long and stout, the marginal ones more conspicuous. Dorsal dististyle a slender sickle, narrowed to the obtuse tip. Ventral dististyle, *vd*, very long, narrowed outwardly into a long flaplike extension, tip narrowly obtuse; rostrum small, with two approximated straight spines; at base of rostrum with a slightly larger and stouter lobe. Gonapophysis, *g*, with mesal-apical lobe broad, extended lateral into a slender point. Ædeagus narrower than in *mecogastra*, clothed laterally with long delicate setæ, shorter and not producing a hula skirt effect, as in *mecogastra*.

Habitat.—Sikkim.

Holotype, male, Chumzomoi Choka, 11,800 feet, in *Rhododendron* association, July 8, 1959 (*Schmid*). Paratopotypes, 3 males on one pin.

The most similar regional species is *Limonia* (*Dicranomyia*) *mecogastra* sp. nov., which has the abdomen comparably elongated. The present fly is readily told by the virtually unpatterned wings and, especially, the structure of the hypopygium, particularly the ventral dististyle, gonapophysis and ædeagus.

LIMONIA (DICRANOMYIA) GRISHMA sp. nov. Plate 1, fig. 16; Plate 4, fig. 44.

General coloration of thoracic dorsum brownish gray, including three confluent præscutal stripes; femora brownish yellow, tips medium brown; wings very weakly darkened, restrictedly patterned with brown, Sc_1 long, nearly equal to Rs; male hypopygium with ventromesal lobe of basistyle bifid; dorsal dististyle a nearly straight rod; ventral dististyle with rostral prolongation very large and flattened, on outer margin with a small lobe that terminates in about five reddish spines; rostral spines long, widely separated, placed on face of prolongation.

Male.—Length, about 6.5 to 6.7 millimeters; wing, 7.6 to 8; antenna, about 1.2 to 1.3.

Rostrum brown; palpi black. Antennæ brownish black; proximal flagellar segments short-oval, with short apical necks; outer segments more elongate, terminal segment about one-fourth longer than the penultimate; segments a little longer than their verticils. Head brown.

Prothorax yellow. Mesonotal præscutum with disk covered by three confluent dark brownish gray stripes, humeral region yellowed; posterior sclerites of notum brownish gray, parascutella and pleurotergite yellow. Pleura yellowish gray, propleura clearer yellow. Halteres relatively long, stem pale brown, its base yellowed, knob dark brown. Legs with coxæ and trochanters yellow; femora brownish yellow, tips medium brown; tibiæ and proximal segments of tarsi light brown, outer segments dark brown; claw slender with a single major basal spine. Wings (Plate 1, fig. 16) relatively narrow, very weakly darkened, prearcular and costal fields more brownish yellow; stigma and very narrow seams at origin of Rs, cord and outer end of cell 1st M_2 darker brown; veins light brown. Venation: Sc_1 ending opposite origin of Rs, Sc_2 far retracted, Sc_1 subequal in length to Rs; cell 1st M_2 long, about equal to distal section of M_{1+2}; m-cu before fork of M.

Abdominal tergites yellowish brown, sternites more yellowed, outer segments, including hypopygium, brownish black; ventral dististyle chiefly yellow. Male hypopygium (Plate 4, fig. 44) with the tergite, *t*, transverse, posterior border shallowly emarginate, lateral lobes very low, obtuse, with numerous long but very delicate setæ. Basistyle, *b*, slightly more extensive than the ventral dististyle; ventromesal lobe large, conspicuously bilobed, the large cephalic part with long delicate setæ, the smaller axillary lobe tipped with long yellow setæ. Dorsal dististyle a nearly straight rod, apex narrowed into a straight spine. Ventral dististyle, *vd*, with rostral prolongation very large, flattened, on outer margin at near midlength with a small lobe that terminates in about five stout reddish spinoid setæ; rostral spine very long, on face of prolongation, widely separated by a distance about equal to one-half their length. Gonapophysis, *g*, with mesal-apical lobe gently curved to the acute tip.

Habitat.—Sikkim, Kumaon.

Holotype, male, Yedang, Sikkim, 10,600 feet, in *Rhododendron* association, June 9, 1959 (*Schmid*). Paratypes, male, Saran, Almora, Kumaon, 7,200 feet, September 17, 1958; male, Simra, Pauri Garhwal, Kumaon, 5,800 feet, October 2, 1958 (*Schmid*).

Limonia (*Dicranomyia*) *grishma* is most similar to *L.* (*D.*) *veternosa* Alexander, occurring at high altitudes in the mountains of western China, differing in the general coloration, patterned wings, and in the hypopygial structure, especially the ventral dististyle.

LIMONIA (DICRANOMYIA) DACTYLOPHORA sp. nov.
Plate 1, fig. 17; Plate 4, fig. 45.

Allied to *grishma;* general coloration of thorax buffy yellow, pronotum and præscutum dark brown medially; antennæ dark brown; head light gray; femora yellow, tips pale brown, claws simple; wings faintly suffused with brown, stigma pale brown; male hypopygium with the tergite very broad, posterior border shallowly emarginate; basistyle with ventromesad lobe very large, unequally bilobulate; rostral prolongation with the two closely approximated spines, placed on face of prolongation.

Male.—Length, about 6.5 to 6.8 millimeters; wing, 7 to 7.8.

Female.—Length, about 7 millimeters; wing, 7.5.

Rostrum light brown; palpi black, Antennæ dark brown; flagellar segments long-oval, slightly exceeding their verticils; terminal segment longer than the penultimate. Head light gray; anterior vertex nearly three times the diameter of scape.

Ponotum dark brown above, sides yellowed. Mesonotum buffy yellow, præscutum with a conspicuous dark brown central stripe, lateral pair much paler, reddish brown; scutal lobes with reddish brown centers; mediotergite slightly more yellowed. Pleura fulvous, heavily buffy or whitish pruinose. Halteres with stem pale yellow, knob dark brown. Legs with coxæ and trochanters yellow; femora yellow, tips pale brown; tibiæ and basitarsi yellow, outer tarsal segments black; claws simple, hairy. Wings (Plate 1, fig. 17) faintly suffused with brown, stigma pale brown; veins brown. Venation; Sc_1 ending opposite origin of Rs, Sc_2 removed, Sc_1 alone about one-half Rs; cell 1st M_2 closed or open by atrophy of m; m-cu subequal to or longer than distal section of Cu_1, near fork of M.

Abdominal tergites brown, sternites and hypopygium more yellowed. Male hypopygium (Plate 4, fig. 45) with the tergite, *t*, very broad, its width about four times the length at middle; lobes very low, with numerous long setæ. Basistyle, *b*, smaller

than the conspicuous ventromesal lobe or appendage, the latter unequally bilobulate, there being a small outer lobule distad of the major lobe, both with conspicuous setæ. Dorsal dististyle gently curved, tip acute. Ventral dististyle, *vd*, smaller than the basistyle; body subhyaline, rostral region extensive, triangular, narrowed outwardly, rostral spines arising close together on face of prolongation near base; outer margin of prolongation with a long slender fingerlike lobe tipped with a dense brush of setæ that are nearly one-half as long; inner margin of style at base with a low setiferous lobule. Gonapophysis, *g*, with mesal-apical lobe gently curved to the acute tip.

Habitat.—Kashmir.

Holotype, male, Dalti, 9,000 feet, along mountain torrents, September 7, 1954 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, males and females, with the types.

In the general structure of the male hypopygium, *Limonia* (*Dicranomyia*) *dactylophora* suggests *L.* (*D.*) *grisma* sp.nov., and *L.* (*D.*) *veternosa* Alexander, differing evidently in coloration of the body and wings and in the details of structure of the hypopygium, particularly the tergite, basistyle, and rostral prolongation of the ventral dististyle.

LIMONIA (DICRANOMYIA) EUERNES sp. nov. Plate 1, fig. 18; Plate 5, figs. 46, 47.

Belongs to the *tristis* (*liberta*) group; general coloration gray, præscutum with a dark brown central stripe, the lateral areas smaller; fore and hind claws of male conspicuously modified; wings faintly suffused with gray, base more whitened; abdomen long, brownish black; male hypopygium with posterior border of ninth tergite convexly rounded; outgrowth of basistyle unusually long; apex of rostral prolongation stout and very obtuse, spines arising from a common tubercle, directed strongly basad.

Male.—Length, about 6.5 to 7 millimeters; wing, 8.5 to 8.8; antenna, about 1.2.

Female.—Length, about 7 to 7.2 millimeters; wing, 7.5 to 8.

Rostrum, palpi and antennæ black; flagellar segments oval, passing into long-oval, outer segments longer than their verticils. Head brownish gray.

Pronotum dark brown. Mesonotal præscutum gray, with a central dark brown stripe, lateral areas small to subobsolete; scutal lobes darkened; scutellum brownish gray, posterior border obscure yellow; postnotum light gray, pleurotergite paler gray. Pleura gray, sternopleura darker. Halteres with stem yellow, knob dark brown. Legs with coxæ and

trochanters dark brown, posterior pair paler brown; fore legs brownish black; middle femora brown, tips more blackened, posterior femora yellowed; tips darkened; tibiæ dark brown, tarsi black. In the male, tarsi strongly modified, outer segments dilated, especially the last, its outer apical angle produced; claws of male (Plate 5, fig. 46) modified, on fore and hind legs with one claw long and slender, bearing a strong lateral spine, the second claw expanded into an oval pale brown leaflike blade, this slightly larger and more dilated on posterior legs, terminating in a long spine; surface of modified claw with numerous longitudinal rows of delicate setulæ, claws of middle legs and all claws in female normal. Wings (Plate 1, fig. 18) with a faint grayish tinge, prearcular field and especially the extreme base, more whitened; stigma very small, pale brown; very narrow to scarcely apparent darkened seams over cord and outer end of cell 1st M_2; veins brown, more brownish yellow in costal and prearcular fields. Venation; Sc_1 ending nearly opposite origin of Rs, Sc_2 near its tip; m-cu close to or shortly before the fork of M.

Abdomen long, brownish black, including the hypopygium. Male hypopygium (Plate 5, fig. 47) complex; tergite, *t*, transverse, posterior border evenly convex, setigerous punctures very reduced, about six in number. Basistyle, *b*, subequal in total area to ventral dististyle, the modified lobes much developed; ventromesal lobe or appendage narrow, at and near apex bearing two unequal lobules, the shorter subterminal one tipped with very long setæ; face of style near base with a very long and slender lobe, its length exceeding ten times the diameter at midlength, apex with about two elongate setæ; lobe at inner apex of style about one-fourth as long, dilated at base, tipped with five or six long setæ that are only a little shorter than the lobe. Dorsal dististyle long and slender, nearly straight, before apex slightly dilated, narrowed into a long straight spine. Ventral dististyle, *vd*, with rostrum large, apex broad, nearly truncate; rostral spines at about midlength of outer margin of prolongation, directed strongly basad or cephalad, arising from a small common tubercle. Gonapophysis, *g*, narrowed outwardly, terminating in a small blackened hook. Apex of ædeagus simple, as in the group.

Habitat.—Manipur, Sikkim, Kumaon.

Holotype, male, Sirhoi Kashong, Manipur, Assam, 7,500 feet, July 12, 1960 (*Schmid*). Allotopotype, female, pinned with

type. Paratopotypes, several of both sexes, on 20 pins, taken with the type, July 1–13, 1960. Paratypes, males and females, Lachung, Sikkim, 8,610 feet, July 10, 1959 (*Schmid*); males and females, Chumzomoi Choka, Sikkim, 11,800 feet, in *Rhododendron* association, July 8, 1959 (*Schmid*); male, Dakwani, Pauri Garhwal, Kumaon, 9,300 to 11,000 feet, August 5, 1958; males and females, Pana, Pauri Garhwal, 8,200 feet, August 10, 1958 (*Schmid*).

In its hypopygial structure, *Limonia* (*Dicranomya*) *euernes* is quite distinct from other generally similar species in southeastern Asia, including western and southern China, such as *L.* (*D.*) *kinensis* Alexander, *L.* (*D.*) *rhinoceros* Alexander, *L.* (*D.*) *sordida* (Brunetti), *L.* (*D.*) *subtristis* Alexander, *L.* (*D.*) *tenuifilamentosa* Alexander, and several others. Particular attention is directed to the modified claws of the fore and hind legs of the male, as described.

LIMONIA (DICRANOMYIA) FUGAX sp. nov. Plate 2, fig. 19; Plate 5, figs. 48, 49.

Belongs to the *tristis* (*liberta*) group; general coloration gray, mesonotum patterned with brown; legs dark brown, outer segments brownish black; claws of male unmodified, wings faintly tinged with grayish yellow, prearcular and costal fields clearer yellow; a very restricted darker pattern, including the subcircular stigma; male hypopygium with posterior border of tergite convexly rounded, margins thickened, setæ pale and inconspicuous, arranged in three groups; accesory lobule of basistyle very stout, tipped with very long setæ; ventral dististyle relatively small, the rostral prolongation very long, pale, spines two, straight.

Male.—Length, about 6.5 millimeters; wing, 7.

Rostrum brownnish gray; palpi dark brown. Antennæ black throughout; flagellar segments oval, the outer ones more elongate; terminal segment about one-fourth longer than the penultimate. Head brownish gray; anterior vertex narrow, about equal to the diameter of scape.

Thorax of type discolored, evidently gray, the præscutum striped with darker. Halteres with stem yellowed, knob infuscated. Legs with coxæ dark brown, sparsely pruinose; trochanters reddish brown; femora dark brown, passing into black outwardly; outer segments black; claws unmodified, each with a long straight spine. Wings (Plate 2, fig. 19) faintly tinged with grayish yellow, prearcular and costal fields clearer yellow, especially cell Sc; stigma subcircular, very pale excepting a narrow darkened included seam over R_2; cord and outer end

of cell 1st M_2 not or scarcely darkned; veins brown, C, Sc and R, together with the prearcular field, more yellowed. Venation; Sc_1 ending opposite origin of Rs, Sc_2 at its tip; cell 1st M_2 subequal to distal section of M_{1+2}; m-cu close to fork of M.

Abdomen dark brown, outer ends of styli of hypopygium slightly paler. Male hypopygium (Plate 5, fig. 48) with the tergite, *t*, transverse, posterior border convex, all margins thickened; each lateral portion with about five pale setæ, the central area with a further scattered group of seven or eight. Basistyle, *b*, more extensive than the ventral dististyle; ventromesal lobe oval, with very long pale setæ; a single broad and obtuse lobule on face of style, this about as long as its breadth at base, tipped with three or four very long pale setæ. Dorsal dististyle large, very gently curved, slightly more constricted beyond midlength, thence narrowed to a long acute point. Ventral dististyle, *vd*, with the body oval, small; rostral prolongation unusually long, pale; spines two, placed close together, about equal in length to the prolongation beyond their insertion. Gonapophysis, *g*, blackened, mesal-apical lobe very slender, narrowed outwardly, the tip slightly decurved. Apex of ædeagus bilobed, the lobules large.

Habitat.—Sikkim.

Holotype, male, Lathong, 6,560 feet, May 15, 1959 (*Schmid*).

Limonia (*Dicranomyia*) *fugax* is most similar to *L.* (*D.*) *sordida* (Brunetti), among the regional species. The latter has a wide range in southern and eastern Asia. For comparison I am showing a figure of the hypopygium (Plate 5, fig. 49), based on a homotypical specimen collected by Senior-White and determined by Edwards. Attention is called to the more convex and scarcely margined tergite, *t*, the lobes of the basistyle, *b*, including the ventromesal appendage, and the quite distinct rostral prolongation of the ventral dististyle, *vd*.

LIMONIA (DICRANOMYIA) TYRRANICA sp. nov. Plate 2, fig. 20; Plate 5, fig. 50.

Belongs to the *tristis* (*liberta*) group; general coloration gray, præscutum with a broad brown central area; fore legs brownish black; femoral bases narrowly yellowed, remaining femora extensively pale; claws of male unmodified; wings brownish gray, very restrictedly patterned with darker; male hypogygium with posterior border of tergite strongly convex; rostral prolongation of ventral dististyle truncated at apex, the outer blackened spine almost terminal in position.

Male.—Length, about 6.5 to 7 millimeters; wing, 7.3 to 8.5.

Rostrum brownish gray; palpi black. Antennæ black; flagellar segments oval, slightly shorter than their verticils; terminal segment about one-third longer than the penultimate. Head light gray; anterior vertex very narrow, about one-third the diameter of scape.

Prothorax brownish gray. Mesonotal præscutum light gray, with a broad medium brown central stripe that is darker in front, sublateral stripes more or less confluent with the central area; posterior sclerites of notum dark brown, heavily gray pruinose, scutal lobes more evidently darkened. Pleura gray, more infuscated ventrally. Halteres relatively long, stem whitened, knob infuscated. Legs with coxæ light brown; trochanters obscure yellow; fore legs brownish black to black, femoral bases narrowly yellowed, fore and middle femora more yellowed, tips narrowly darkened; tibiæ and tarsi black; claws with a strong basal spine but symmetrical, not modified as in *cuernes*. Wings (Plate 2, fig. 20) weakly brownish gray, prearcular region more yellowed; stigma very small, pale brown, very inconspicuous; very narrow to scarcely evident pale brown seams over cord and outer end of cell 1st M_2; veins brown, restrictedly yellowed at wing base. Venation: Sc_1 ending opposite or close to origin of Rs, in cases slightly beyond; m-cu shortly before fork of M.

Abdomen brownish black, including the hypopygium. Male hypopygium (Plate 5, fig. 50) with the tergite, *t*, semicircular in outline, the posterior border strongly convex, all margins narrowly thickened; setæ long and pale, from inconspicuous punctures. Basistyle, *b*, with a tuft of strong dark setæ at inner apical angle but lacking a tubercle; lobule on face of style elongate, terminating in few very long setæ; ventromesal lobe long and slender, at apex with strong chiefly yellowed setæ, one of which is very long, before apex of lobe with a cluster of long dark-colored setæ. Dorsal dististyle very long and slender, terminating in a long straight spine. Ventral dististyle, *vd*, large and fleshy, its area about one-half greater than the total extent of basistyle; rostral prolongation stout, apex truncated; spines slightly separated, black, the outer one close to apex. Gonapophysis, *g*, with mesal-apical lobe slender, black, tip curved. Ædeagus slender.

Habitat.—Sikkim, Kumaon.

Holotype, male, Tarak Tal, Pauri Garhwal, Kumaon, 7,510 feet, August 14, 1953 (*Schmid*). Paratopotype, male, pinned

with type. Paratypes, male, Chumzomoi Choka, Sikkim, 11,800 feet, in *Rhododendron* association, July 8, 1959; males and females, Lachung, Sikkim, 8,610 feet, July 10, 1959 (*Schmid*).

The most similar regional species is *Limonia* (*Dicranomyia*) *euernes* sp. nov., which is readily distinguished by the peculiar modification of the claws in the male and in all details of hypopygial structure.

LIMONIA (DICRANOMYIA) UMBONIS sp. nov. Plate 2, fig. 21; Plate 5. fig. 51.

Belongs to the *tristis* (*liberta*) group; general coloration gray, præscutum with four pale brown stripes; wings brownish gray, stigma very pale brown, scarcely darker than the ground; male hypopygium with the ventromesal and other lobes of basistyle unusually developed; rostral prolongation of ventral dististyle stout, apex broadly obtuse, spines small, gently curved, with a small outer tubercle beyond their bases; gonapophysis with mesal-apical lobe a small subsessile hook.

Male.—Length, about 6.5 millimeters; wing, 7.5.

Female.—Length, about 7.5 millimeters; wing, 8.

Rostrum and palpi black. Antennæ black; flagellar segments oval. Head light gray; anterior vertex very narrow, slightly carinate, this possibly due in part to drying, about one-fourth the diameter of scape.

Pronotum gray. Mesonotal præscutum light gray with four pale brown stripes, the intermediate pair almost confluent; posterior sclerites of notum gray, scutal lobes pale brown. Pleura gray. Halteres with stem yellow, knob infuscated. Legs with fore coxæ infuscated, the remaining coxæ brownish yellow; trochanters yellow; remainder of legs yellowish brown to light brown; claws unmodified. Wings (Plate 2, fig. 21) brownish gray, prearcular and costal fields more yellowed; stigma small, very pale brown, scarcely darker than the ground. Venation: Sc_1 ending nearly opposite origin of Rs, Sc_2 close to its tip; cell 1st M_2 a trifle longer than vein M_4; m-cu at fork of M.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 5, fig. 51) with posterior border of tergite, *t*, gently convex, the thickened margins narrow; setæ few, delicate, median in position. Basistyle, *b*, with body small; ventromesal lobe very long, narrowed outwardly, tipped with long yellow setæ, before apex on posterior face with a low tubercle bearing stouter setæ; lobe at inner apical angle of style small, the ter-

minal setæ longer; lobe on face of style very long and slender, gently curved, tipped with very long yellow setæ. Dorsal dististyle a gently curved blackened rod, its tip acute. Ventral dististyle, *vd*, relatively small, its area nearly twice that of the basistyle; setæ sparse, very small and weak; rostral prolongation distinctive, very stout, blackened, apex broadly obtuse, without marginal setæ; rostral spines on posterior border of an elevated tubercle that is produced into a small slender lobe; spines relatively short, gently curved. Gonapophysis, *g*, with mesal-apical lobe terminating in a small subsessile hook. Ædeagus terminating in a single small point.

Habitat.—Kumaon.

Holotype, male, Wan, Pauri Garhwal, 7,880 feet, August 20, 1958 (*Schmid*). Allotopotype, female, pinned with type.

Limonia (*Dicranomyia*) *umbonis* is readily told from all other regional members of the the *tristis* group by the hypopygial structure, especially the tergite, basistyle, ventral dististyle and gonapophysis. Other such regional species include *L.* (*D.*) *euernes* sp. nov., *L.* (*D.*) *fugax* sp. nov., *L.* (*D.*) *sordida* (Brunetti), and *L.* (*D.*) *tyrranica* sp. nov.

LIMONIA (DICRANOMYIA) SUBLIMIS Alexander.

Limonia (*Dicranomyia*) *sublimis* ALEXANDER, Philip. Jour. Sci. 49 (1932) 381-385, pl. 1, fig. 8 (venation), pl. 2, fig. 37 (male hypopygium).

This attractive crane fly was described from Mount Omei, Szechwan, China, 11,000 feet, taken July 17–18, 1931 by G. M. Franck. There are now available various records extending the range far to the west.

South East Tibet—Rong To Valley, Putsang, 7,000 feet, November 11, 1933, on a wet night (F. Kingdon-Ward); British Museum (Natural History).

Northeast Burma—Adung Valley, 12,000 feet, September 28, 1931 (Kingdon-Ward and Lord Cranbrook); British Museum (Natural History).

Sikkib—Chamiteng, 9,900 feet, August 24, 1959; Tangshing, 12,200 feet, in *Rhododendon* assocation, October 5–6, 1959; Tsomgo, 12,500 feet, in *Rhododendron* association, August 26, 1959; Sherabtang, 13,200 feet, in *Rhododendron* association, August 27, 1959 (*Schmid*).

LIMONIA (DICRANOMYIA) MALINA sp. nov. **Plate 2, fig. 22; Plate 5, fig. 52.**

General coloration yellow, thorax, halteres and bases of legs with strong persistent green coloration; wings whitish, cells C

and Sc weakly infuscated, Sc_2 far retracted, m-cu before fork of M; male hypopygium with apex of dorsal dististyle strongly recurved; rostral prolongation of ventral style very obtuse; cephalic border of tergal plate concave.

Male.—Length, about 6.5 to 7 millimeters; wing, 8 to 8.5.

Female.—Length, about 7.5 to 8 millimeters; wing, 9 to 9.5.

Rostrum and palpi black. Antennæ black, with greenish tints; flagellar segments long-oval, exceeding their verticils. Head greenish gray, front and narrow anterior vertex more silvery.

Cervical region dark brown. Thorax yellowed, with strong green tints, central region of præscutum and scutal lobes light brown. Halteres green. Legs with coxæ and trochanters light green; remainder of legs brownish yellow, with faint green tints; claws nearly straight, basal spine large. Wings (Plate 2, fig. 22) whitish, the base clearer white, cells C and Sc weakly infuscated; stigma and small cloud at fork of Rs paler brown; veins pale brown. Venation; Sc_2 far retracted, Sc_1 alone exceeding Rs; m-cu shortly before fork of M.

Abdomen light brown, posterior borders of segments paler; hypopygium greenish, ventral dististyle yellowed. Ovipositor with valves light green; cerci very slender, gently upcurved. Male hypopygium (Plate 5, fig. 52) with the tergite, *t*, transverse, posterior border shallowly but broadly emarginate, the low lobes with several long dark setæ; tergal plate narrowed toward base, the cephalic border gently concave. Basistyle, *b*, with ventromesal lobe low, with abundant delicate setæ. Dorsal dististyle a strongly curved sickle, strongly narrowed on outer third, the tip recurved. Ventral dististyle, *vd*, about two and one-half times as extensive as the basistyle; rostral prolongation very short and stout, apex obtuse; rostral spines longer than the prolongation, subequal in length to one another, outer spine from a low basal tubercle. Gonapophysis, *g*, pale, the mesal-apical lobe nearly straight, separated from the large platelike body of the apophysis by a narrow emargination. Ædeagus apparently terminating in a single lobe.

Habitat.—Kumaon.

Holotype, male, Rata, Almora, 11,000 feet, in *Rhododendron* association, September 14, 1956 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, 4 males and females on two pins, with the types.

Limonia (*Dicranomyia*) *malina* is most nearly related to species such as *L.* (*D.*) *chorea* (Meigen) and *L.* (*D.*) *mitis*

(Meigen), differing especially in the coloration of the wings and structure of the male hypopygium, particularly the tergite, both dististyles and the gonapophysis. The specific name is derived from the persistent apple green body coloration.

LIMONIA (DICRANOMYIA) MICROENTMEMA sp. nov. Plate 2, fig. 23; Plate 5, fig. 53.

General coloration fulvous yellow; legs obscure yellow, outer tarsal segments more infuscated; wings whitened, costal border infuscated, stigma lacking; inner end of cell 1st M_2 arcuated; male hypopygium with posterior border of tergite virtually truncate; ventromesal lobe of basistyle constricted beyond midlength; rostral prolongation of ventral dististyle stout, blackened, apex microscopically notched; gonapophysis with mesal-apical lobe very small, blackened, strongly curved.

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

Rostrum yellow, palpi black. Antennæ black; flagellar segments short-oval, a little shorter than their verticils. Head obscured in mounting, apparently yellowed.

Thorax almost uniformly fulvous yellow. Halteres relatively long, stem yellow, knob infuscated. Legs with coxæ and trochanters yellow; remainder of legs obscure yellow, outer tarsal segments more infuscated; basal spine of claw long and slender. Wings (Plate 2, fig. 23) whitened, including the undifferentiated stigma; cells C and Sc evidently infuscated; veins very pale brownish yellow, those of basal half of wing paler, darker in costal region. Anal veins without trichia. Venation; Sc Short, Sc_1 ending some distance before origin of Rs, Sc_2 shortly removed from tip; Rs strongly arcuated at origin; cell 1st M_2 subequal to distal section of M_{1+2}, inner end of cell conspicuously arcuated; m-cu at or shortly beyond fork of M.

Abdomen with tergites weakly darkened, especially medially, sternites and hypopygium more yellowed. Male hypopygium (Plate 5, fig. 53) with the tergite, *t*, transverse, cephalic border broadly thickened, gently narrowed outwardly, apex virtually truncate; setæ long and pale, well-distributed over the plate, more numerous outwardly. Basistyle, *b*, with ventromesal lobe relatively small, constricted beyond midlength, delimiting a larger basal area and a small oval outer part, setæ pale, delicate. Dorsal dististyle on outer margin of ventral style, darkened, broad at midlength, outer third narrowed into a long black spine. Ventral dististyle, *vd*, relatively small, subequal in area to the basistyle, narrowed into a stout black prolongation, the apex of which is microscopically notched to form an obtuse outer projection and a more acute lower tooth; rostral spines

long and slender, gently curved, placed close together, the lower one in an oval pale area. Gonapophysis, *g*, with the plates large, mesal-apical lobe very small, blackened, strongly curved to the acute tip. Ædeagus with apical lobes conspicuous, inner genital tubes darkened, contiguous along midline.

Habitat.—Kumaon.

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

Limonia (*Dicranomyia*) *microcentmema* is most similar to species such as *L.* (*D.*) *synclera* Alexander, differing conspicuously in the darkened costal border of the wing and in the structure of the male hypopygium, particularly the tergite, ventromesal lobe of basistyle, and the rostral prolongation of the ventral dististyle.

LIMONIA (DICRANOMYIA) RAVANA sp. nov. Plate 2, fig. 24; Plate 5, fig. 54.

General coloration of præscutum gray, with three nearly confluent brown stripes; rostrum light yellow, antennæ black; legs light brown; wings subhyaline, stigma very slightly darker, cell M_2 open by atrophy of m; male hypopygium with rostral spines separated, placed on face of prolongation near base.

Male.—Length, about 5.8 to 6 millimeters; wing, 6.5 to 7.

Female.—Length, about 6.5 to 7 millimeters; wing, 7 to 7.5.

Rostrum light yellow, palpi black. Antennæ black; basal flagellar segments oval, with short apical necks; outer segments becoming elongate, with dense white setulæ. Head brown, orbits gray; anterior vertex broad, about three times the diameter of scape.

Pronotum dark brown. Mesonotum with disk of præscutum almost covered by three brown stripes that are virtually confluent, lateral borders light gray; posterior sclerites brownish yellow, scutal lobes dark brown. Pleura grayish white, ventral sternopleurite darker. Halteres with stem yellow, knob infuscated. Legs with coxæ and trochanters yellow; remainder of legs yellowish brown to light brown, tarsi darker. Wings (Plate 2, fig. 24) subhyaline or faintly tinged with brown, stigma very slightly darker; veins light brown. Venation: Sc_1 ends opposite origin of Rs; cell M_2 open by atrophy of m.

Abdominal tergites dark brown, incisures very restrictedly pale, the light pattern more extensive on outer sternites; hypopygium brown. Male hypopygium (Plate 5, fig. 54) with the tergite, *t*, transverse, lobes conspicuous, rounded, with abundant long dark setæ. Basistyle, *b*, with ventromesal lobe oval. Dorsal dististyle relatively slender, gently curved, slightly more

dilated before the long straight apex. Ventral dististyle, *vd*, in area subequal to or slightly more extensive than the basistyle; rostrum decurved, spines two, placed on face of style near base, widely separated. Gonapophysis, *g*, with mesal-apical lobe slender, gently curved.

Habitat.—Ceylon.

Holotype, male, Nuwara Eliya, 6,000 feet, February 26, 1954 (*Schmid*). Allotype, female, Ambawela, 6,000 feet, March 4, 1954 (*Schmid*). Paratopotypes, males and females, with the holotype. Paratypes, 2 males with allotype; males and females, Horton Plains, 6,000 to 7,000 feet, March 6, 1954 (*Schmid*).

Among the regional species, *Limonia* (*Dicranomyia*) *ravana* is most similar to *L.* (*D.*) *innocua* Alexander, differing most evidently in hypopygial structure, especially the ventral dististyle and its prolongation. The general appearance of the fly is much like that of various Holarctic species including *L.* (*D.*) *immodesta* (Osten Sacken), *L.* (*D.*) *immodestoides* (Alexander) and others.

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ILLUSTRATIONS

[Legend: *a*, ædeagus; *b*, basistyle; *d*, dististyle; *dd*, dorsal dististyle; *g*, gonapophysis; *t*, tergite; vd. ventral dististyle.]

Plate 1

Fig. 1. *Limonia* (*Dicranomyia*) *sternolobatoides* sp. nov.; venation.
2. *Limonia* (*Dicranomyia*) *ananta* sp. nov ; venation.
3. *Limonia* (*Dicranomyia*) *kaurava* sp. nov.; venation.
4. *Limonia* (*Dicranomyia*) *pluricomata* sp. nov.; venation.
5. *Limonia* (*Dicranomyia*) *nigrobarbata* sp. nov.; venation.
6. *Limonia* (*Dicranomyia*) *draupadi* sp. nov.; venation.
7. *Limonia* (*Dicranomyia*) *chandra* sp. nov.; venation.
8. *Limonia* (*Dicranomyia*) *pentadactyla* sp. nov.; venation.
9. *Limonia* (*Dicranomyia*) *nakula* sp. nov.; venation.
10. *Limonia* (*Dicranomyia*) *kubera* sp. nov.; venation.
11. *Limonia* (*Dicranomyia*) *yaksha* sp. nov.; venation.
12. *Limonia* (*Dicranomyia*) *naga* sp. nov.; venation.
13. *Limonia* (*Dicranomyia*) *rixosa* sp. nov.; venation.
14. *Limonia* (*Dicranomyia*) *mecogastra* sp. nov.; venation.
15. *Limonia* (*Dicranomyia*) *skanda* sp. nov.; venation.
16. *Limonia* (*Dicranomyia*) *grishma* sp. nov.; venation.
17. *Limonia* (*Dicranomyia*) *dactylophora* sp. nov.; venation.
18. *Limonia* (*Dicranomyia*) *cuernes* sp. nov.; venation.

Plate 2

Fig. 19. *Limonia* (*Dicranomyia*) *fugax* sp. nov.; venation.
20. *Limonia* (*Dicranomyia*) *tyrranica* sp. nov.; venation.
21. *Limonia* (*Dicranomyia*) *umbonis* sp nov.; venation.
22. *Limonia* (*Dicranomyia*) *malina* sp. nov.; venation.
23. *Limonia* (*Dicranomyia*) *microcntmema* sp. nov.; venation.
24. *Limonia* (*Dicranomyia*) *ravana* sp. nov.; venation.
25. *Limonia* (*Dicranomyia*) *sternolobatoides* sp. nov.; and *Limonia* (*Dicranomyia*) *sternalobatoides almoræ* subsp. nov.; male hypopygium.
26. *Limonia* (*Dicranomyia*) *sternolobatoides* sp. nov.; male hypopygium.
27. *Limonia* (*Dicranomyia*) *clotho* sp. nov.; male hypopygium.
28. 29. *Limonia* (*Dicranomyia*) *ananta* sp. nov.; male hypopygium.

Plate 3

Fig. 30. *Limonia* (*Dicranomyia*) *kaurava* sp. nov.; male hypopygium.
31. *Limonia* (*Dicranomyia*) *pluricomata* sp. nov.; male hypopygium.
32. *Limonia* (*Dicranomyia*) *nigrobarbata* sp. nov.; male hypopygium.
33. *Limonia* (*Dicranomyia*) *draupadi* sp. nov.; male hypopygium.
34. *Limonia* (*Dicranomyia*) *chandra* sp. nov.; male hypopygium.
35. *Limonia* (*Dicranomyia*) *pentadactyla* sp. nov.; male hypopygium.
36. *Limonia* (*Dicranomyia*) *nakula* sp. nov.; male hypopygium.

37. *Limonia* (*Dicranomyia*) *baileyi omeiana* subsp. nov.; male hypopygium.

FIG. 38. *Limonia* (*Dicranomyia*) *kubera* sp. nov.; male hypopygium.
39. *Limonia* (*Dicranomyia*) *yaksha* sp. nov.; male hypopygium.
40. *Limonia* (*Dicranomyia*) *naga* sp. nov.; male hypopygium.
41. *Limonia* (*Dicranomyia*) *rixosa* sp. nov.; male hypopygium.
42. *Limonia* (*Dicranomyia*) *mecogastra* sp. nov.; male hypopygium.
43. *Limonia* (*Dicranomyia*) *skanda* sp. nov.; male hypopygium.
44. *Limonia* (*Dicranomyia*) *grishma* sp. nov.; male hypopygium.
45. *Limonia* (*Dicranomyia*) *dactylophora* sp. nov.; male hypopygium.

PLATE 5

FIG. 46. *Limonia* (*Dicranomyia*) *cuernes* sp. nov.; tarsus of male.
47. *Limonia* (*Dicranomyia*) *cuernes* sp. nov.; male hypopygium.
48. *Limonia* (*Dicranomyia*) *fugax* sp. nov.; male hypopygium.
49. *Limonia* (*Dicranomyia*) *sordida* (Brunetti); male hypopygium.
50. *Limonia* (*Dicranomyia*) *tyrranica* sp. nov.; male hypopygium.
51. *Limonia* (*Dicranomyia*) *umbonis* sp. nov.; male hypopygium.
52. *Limonia* (*Dicranomyia*) *malina* sp. nov.; male hypopygium.
53. *Limonia* (*Dicranomyia*) *microcentmema* sp. nov.; male hypopygium.
54. *Limonia* (*Dicranomyia*) *ravana* sp. nov.; male hypopygium.


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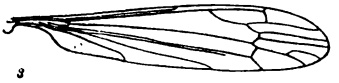
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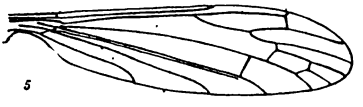
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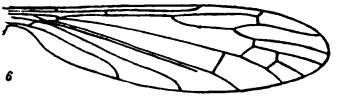
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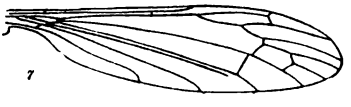
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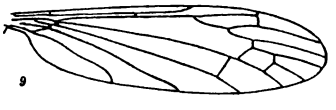
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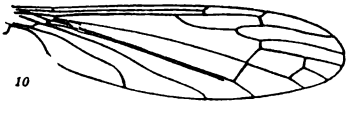
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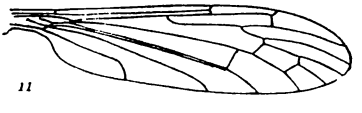
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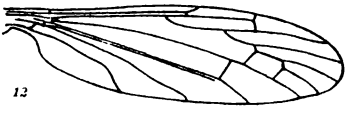
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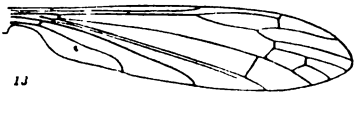
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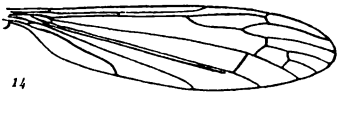
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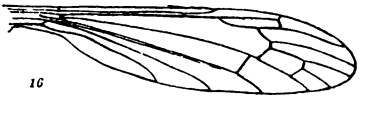
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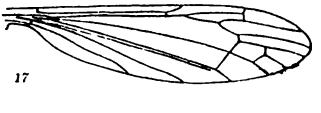
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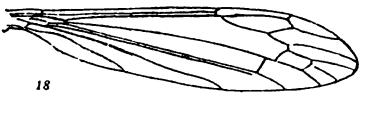
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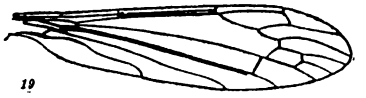
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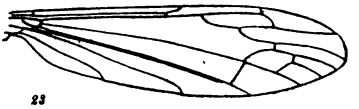
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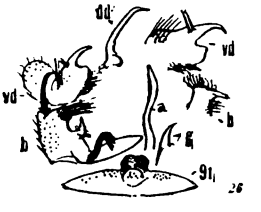

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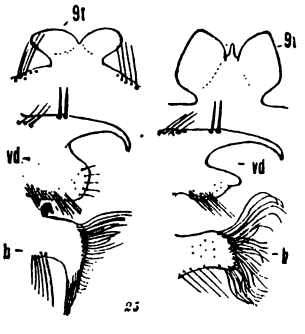

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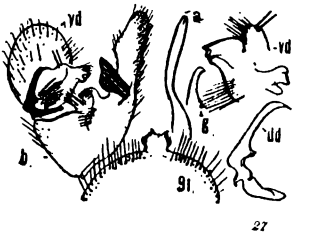

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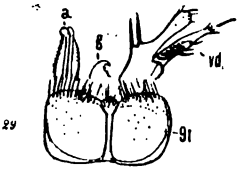

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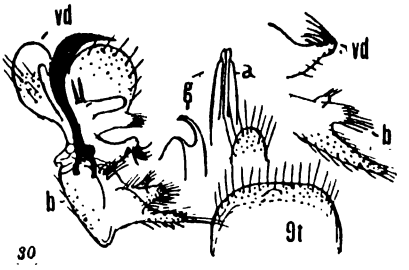

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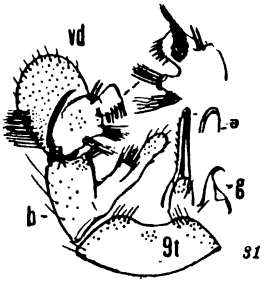

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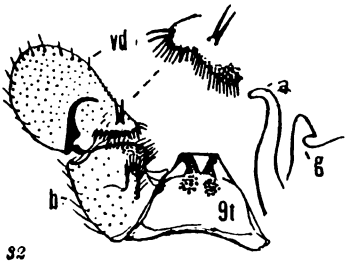

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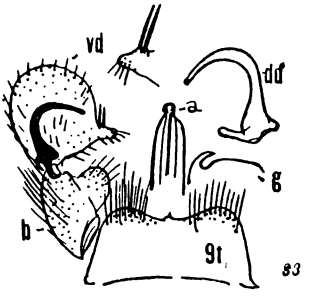

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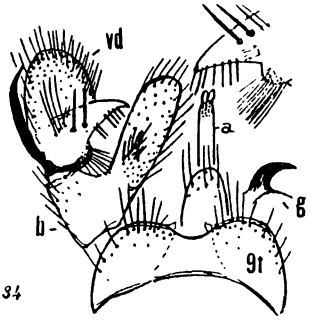

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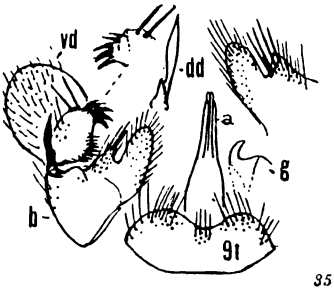

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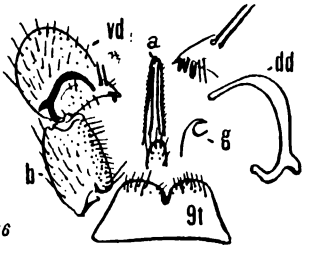

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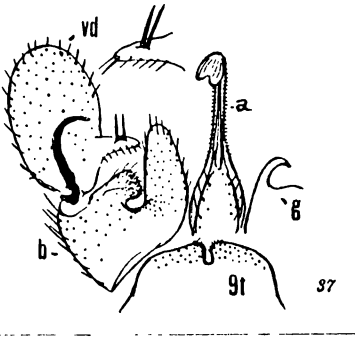

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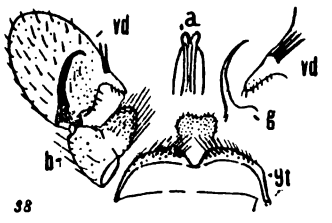

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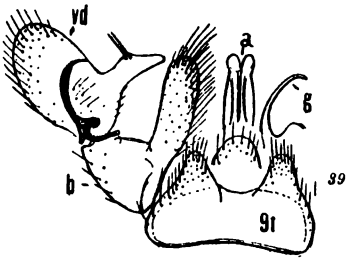

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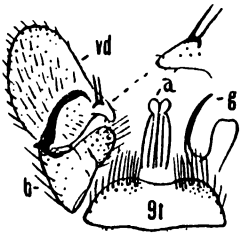

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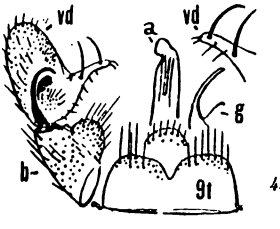

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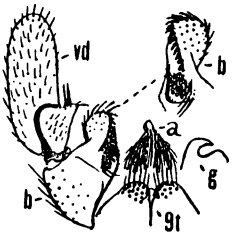

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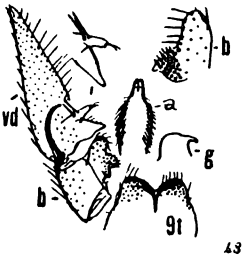

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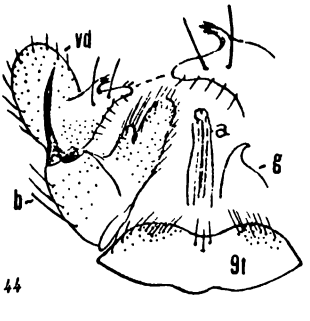

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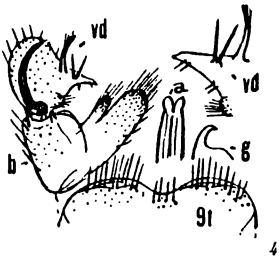

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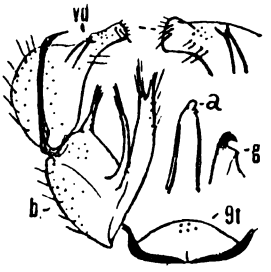

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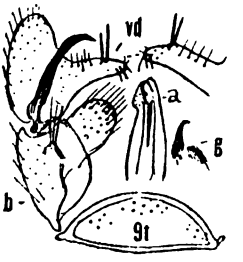

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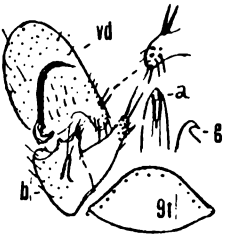

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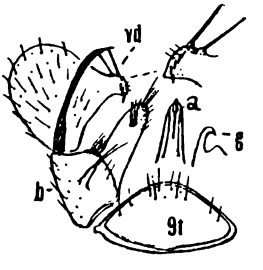

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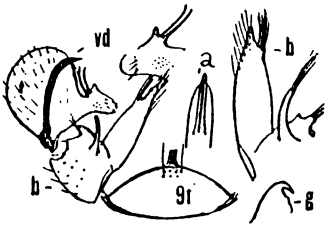

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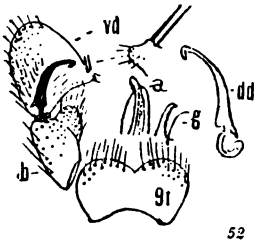

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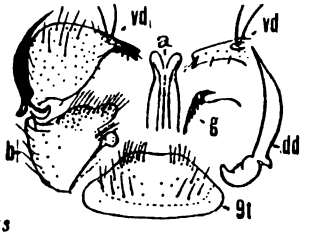

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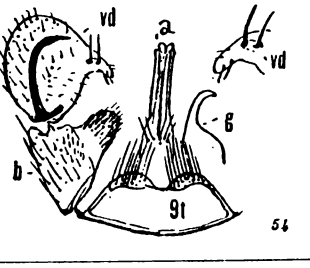

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PLATE 5