

NEW OR LITTLE-KNOWN TIPULIDAE FROM CHIRIQUI, PANAMA

(Order Diptera)¹

CHARLES P. ALEXANDER,
Amherst, Massachusetts

The crane-flies discussed herewith were collected in September, 1932, by Mr. W. K. A. Lawlor. They were taken not far from Boquete, chiefly at the Finca Parada (4,450 ft.), Finca Palo Alto (4,700 ft.) and Finca Lerida (5,300–7,000 ft.). Types and representatives of all species are preserved in my collection. In addition to the species discussed, a few other forms were included in the series, such material not being further identifiable at this time.

1. *Tanypremna opilio* O. S.

1 ♂, Finca Parada, September 12, 1932

2. *Limonia (Limonia) lawlori* sp. n.

General coloration of mesonotum and abdominal tergites dark brown; halteres obscure yellow, the knobs dark brown; femora brownish black, the bases paler; remainder of legs black; wings brownish yellow, variegated by clearer yellow and dark brown areas; vein $Sc_2 + R_1$ strongly arched opposite fork of R_s .

Female.—Length, about 9 mm.; wing, 10.5 mm.

Rostrum and palpi black. Antennae black throughout; terminal segment very elongate and strongly constricted at midlength, about twice as long as the penultimate; longest verticils of flagellum exceeding the segments, unilaterally arranged. Head black.

Pronotum and mesonotum uniformly dark brown, the surface weakly polished, the scutellum and postnotum weakly pruinose. Pleura chiefly obscure yellow, the pleurotergite brown. Halteres obscure yellow, the knobs brown. Legs with the coxae and trochanters yellow; femora brownish black, the bases restrictedly obscure yellow; remainder of legs black. Wings with the ground-color brownish yellow, variegated by clear pale yellow or whitish yellow and dark brown areas; the yellow markings occur before and beyond the stigma, along R_s and in cells R_5 , 1st M_2 , 2nd M_2 and M_3 ; the dark brown areas include the stigma and a confluent area on anterior cord, with smaller areas at origin of R_s , tip of Sc and as marginal clouds at ends of longitudinal veins, larger at

¹Contribution from the Entomological Laboratory, Massachusetts State College.

ends of veins R_3 and R_{4+5} ; narrow dark seams along cord and outer end of cell $1st M_2$; outer portions of cells R_2 and R_3 strongly infuscated, the extreme margin fading to obscure yellow. Stigmal area with about 30 trichia on membrane. Venation: Sc_1 ending just before three-fourths the length of R_s , Sc_2 at its tip; R_s angulated at origin; vein $Sc_2 + R_1$ strongly arched opposite level of fork of R_s ; free tip of Sc_2 strongly arcuated; $m-cu$ at fork of M ; inner cell of $1st M_2$ arcuated.

Abdominal tergites uniformly brownish black; sternites obscure brownish yellow, the bases with a narrow darker ring. Ovipositor with cerci small, slender, strongly upcurved.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Lerida, 5,300 ft., September 11, 1932 (Lawlor).

I take great pleasure in dedicating this fine species to the collector, Mr. W. K. A. Lawlor, who secured many notable Tipulidae in Chiriqui. The species is allied to *Limonia* (*Limonia*) *roraimæ* Alexander and *L. (L.) sanctæ-martæ* Alexander, of northern South America, differing very conspicuously in the details of coloration of body and legs. The wing-venation and pattern is rather similar in the three species and the affinities seem certain. The present fly differs from the other two species in the uniform dark brown mesonotum, uniformly darkened abdominal tergites and the darkened femora.

3. *Limonia* (*Limonia*) *ludibunda* Alex.

2 ♂♂, 1 ♀; Finca Lerida, 5,350–6,200 ft., September 14, 1932.

Condition poor. Smaller than the type from Chiapas, Mexico, but hypopygium identical. (*Male*.—Wing, 5.2–5.3 mm. *Female*.—Wing, 5.5 mm.).

4. *Limonia* (*Limonia*) *melaxantha* sp. n.

General coloration pale green; front and anterior vertex silvery; a narrow blackish median stripe on pronotum and most of praescutum; halteres green; middle and hind femora black except at extreme bases, with about the distal half yellow; posterior tibiae black with a broad, obscure yellow, subbasal ring; wings cream-yellow, the anterior border more saturated, the disk with restricted brownish black markings, including a common area at end of Sc and origin of R_s ; origin of R_s very sharply bent.

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

Rostrum moderately long, about one-half the remainder of head, black; palpi black. Antennae with scape black, pedicel brown; flagellum greenish; basal flagellar segments nearly globular, the outer passing to oval; terminal segment subequal to penultimate. Front and anterior

vertex silvery, the latter narrower than diameter of scape; remainder of head dark brown.

Pronotum black medially, greenish laterally. Mesonotum light green, the praescutum with a median black stripe that is gradually narrowed behind, at midlength of sclerite becoming capillary, obsolete before the suture. Pleura light green. Halteres pale green. Legs with coxae and trochanters green; femora with extreme bases yellow, more extensive on posterior pair; remainder of basal half of femora black, the entire outer half paling to yellow; fore and middle tibiae and tarsi black, posterior tibiae black, with an obscure yellow subbasal ring that includes about one-fourth the length of the segment; tarsi black. Wings pale cream-yellow, the prearcular region, costal border and narrow apical portion more saturated yellow; restricted but conspicuous brownish black marks, as follows: Arculus; a linear transverse area extends from *C* across tip of Sc_1 , Sc_2 and origin of *Rs*; a smaller area in stigmal field, including free tip of Sc_2 and R_2 ; a small spot at tip of R_3 ; narrow brown seams along cord, outer end of cell 1st M_2 , tips of outer medial veins and a broad seam on distal fourth of vein 2nd *A*; veins pale yellow, darker in the clouded areas; saturated yellow seams to anterior cord, vein *Cu* and the axilla. Venation: *Sc* very short, Sc_1 ending just beyond origin of *Rs*, Sc_2 not far from its tip; free tip of Sc_2 in approximate transverse alignment with R_2 ; *Rs* very sharply bent at origin, the extreme base lying slightly distad of the bend; *m-cu* subequal to distal section of Cu_1 , close to fork of *M*.

Abdomen pale green. Ovipositor with cerci slender, upcurved.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Lerida, 5,400 ft., September 13, 1932 (Lawlor).

Limonia (Limonia) melaxantha is most nearly allied to species such as *L. (L.) osterhouti* Alex. (Panama) and *L. (L.) repanda* Alex. (Ecuador), with *Sc* so short as to end approximately opposite the origin of *Rs*; the latter is bent strongly at origin, in the present form and in *repanda*, the base being actually directed somewhat proximad, the origin lying just distad of the point of angulation. The rather remarkable leg-pattern will serve readily to separate the present fly from other allied species. It seems probable that the conspicuous pale green body tints of the type will fade to a straw-yellow as the specimen ages.

5. *Limonia (Limonia) pampoecila* Alex.

Described from Costa Rica. 1 ♀, Finca Parada, 4,450 ft., September 11, 1932. I have also seen the fly from the Lower Paramo Zone, Silla de Caracas, Venezuela, 2,300 meters, December 21, 1930 (J. G. Myers).

6. *Limonia* (*Limonia*) *perflaveola* Alex.

Described from Mexico. 1 ♂, Finca Parada, 4,450 ft., September 11, 1932. This is probably only subspecifically distinct from *L. (L.) alfaroi* (Alex.).

7. *Limonia* (*Neolimnobia*) *diva* (Schin.)

Widespread in the Neotropics. 1 ♂, Finca Palo Alto, 4,700 ft., September 12, 1932; 1 ♀, Finca Lerida, 5,400 ft., September 13, 1932. "This had green meso- and metapleura, green halteres, green abdomen. green coxae, brown femora, tibiae and tarsi."—W. K. A. Lawlor.

8. *Limonia* (*Peripheroptera*) *atrosignata* sp. n.

Mesothorax reddish orange, the praescutum with a black triangle on anterior part of praescutum; anterior lateral angle of scutum with a black spot; femora yellow, the tips blackened; wings with costal border blackened, this color continued to wing-tip or slightly beyond, cell *C* being uniformly darkened; narrow dark seams on cord and outer end of cell *1st M*₂.

Male.—Length, about 6.5 mm.; wing, 8.6 mm.

Female.—Length, about 6 mm.; wing, 6 mm.

Rostrum and palpi black. Antennae black throughout. Head black, the anterior vertex with a reddish spot on either side adjoining the eyes; occipital region tinged with reddish, in female more uniformly darkened; anterior vertex (♂) relatively wide, subequal to width of anterior end of pronotum.

Pronotum black dorsally, yellowish on sides. Mesonotum reddish orange, variegated with black, including a triangular median line on anterior part of praescutum and rounded spots at outer cephalic portion of scutal lobes. Pleura uniformly reddish orange. Halteres obscure yellow, the knobs darkened. Legs with coxae reddish orange; trochanters yellow; femora yellow, the tips narrowly but conspicuously blackened, the amount subequal on all legs; tibiae light brown to brown, the tips passing into brownish black; tarsi black. Wings showing the usual sexual differences of the subgenus; in both sexes, the ground-color is yellowish, the costal border to wing-tip blackened, cell *C* uniformly darkened; a conspicuous dark area at arculus and others in region of stigma, along cord and outer end of cell *1st M*₂; wing-border, as far caudad and basad as tip of vein of *Cu*₁ narrowly and vaguely darkened; cell *Sc* is largely brighter yellow, variegated by dark areas at end and by a conspicuous seam at *Sc*₂; in male, cell *R*₁ is similarly bright yellow, in female more suffused with brown; veins brownish yellow, darker in the clouded areas. Venation: Male with prearcular cells of moderate size, being about two-thirds the length of cell *R*; inner ends of cells *R*₃, *R*₅, *1st M*₂ and *M*₄ nearly in transverse alignment; cell *2nd A* very narrow; female with prearcular region much shorter; *Rs* short, much less than basal section of *R*₄₊₅; cell *2nd A* a little wider than in male.

Abdomen chiefly reddish yellow, the segments narrowly bordered laterally by brownish black; hypopygium with ventral dististyles dusky; subterminal segments of female blackened. Male hypopygium with rostral prolongation short, with two spines of moderate size.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor). *Allotopotype*, ♀.

The nearest ally of the present fly is *Limonia* (*Peripheroptera*) *eudoræ* (Alex.) of Peru, which is readily told by the broad dark caudal margin of the wing. By my key to the species of *Peripheroptera* (Ent. News, 24: 409; 1913) the species runs to *L. (P.) schineri* (O. S.) of Brazil, an entirely distinct fly. The present insect is further told from all previously described forms by the uniformly blackened costal cell of the wings.

9. *Limonia* (*Rhipidia*) *flabelliformis* sp. n.

General coloration yellow; antennae (♂) bipectinate, with ten long-branched segments; pleura obscure yellow, with a conspicuous dark brown longitudinal stripe; tarsi black; wings creamy, with a dark costal pattern, the areas subequal in extent to the interspaces; abdominal segments bicolorous; male hypopygium with the ventromesal lobe of basistyle long and conspicuous.

Male.—Length, 7.5–8 mm.; wing, 7–7.2 mm.; antenna, about 4 mm.

Female.—Length, 6.5–7.5 mm.; wing, 7–8 mm.

Male.—Rostrum and palpi black. Antennae elongate, the scape and pedicel, together with the basal enlargements and branches of the flagellar segments, black; apical pedicels of all flagellar segments light yellow; terminal segment uniformly blackened; flagellar segments two to eleven, inclusive, long-bipectinate, the longest branches (at near midlength of organ) a trifle more than one-third as long as entire antenna; terminal segment a little shorter than the branch of the penultimate segment. Eyes contiguous on anterior vertex; posterior vertex gray, more infuscated medially.

Mesonotal praescutum brown, broadly bordered laterally and anteriorly by obscure yellow; scutum and scutellum brown, with a common pale median line; mediotergite brown on anterior portion, obscure yellow behind. Pleura obscure yellow, with a narrow, dark brown, dorsal stripe extending from the propleura to the abdomen, passing beneath the root of haltere. Halteres obscure yellow. Legs with coxae and trochanters yellow; remainder of legs chiefly broken or detached; one posterior leg still remains intact; femora obscure yellow, with a vague brown subterminal ring; tibiae and tarsi black. Wings with ground-color of anterior half creamy, of posterior half more grayish, the disk with a restricted brownish gray pattern that is chiefly costal in distribution, the areas subequal in size to the pale interspaces, the largest area being the second, at mid-distance between arculus and origin of *Rs*; areas at origin of *Rs* and tip of *Sc* separate; stigmal area

small, separated from a cloud over fork of *Rs*; narrow seams along cord and outer end of cell *1st M*₂; faint gray streaks near distal ends of outer radial cells; longitudinal pale streaks in cells *M*, *1st A* and *2nd A*; veins brown, yellow in the costal interspaces. Venation: *Sc* extending to near two-thirds the length of *Rs*, *Sc*₂ at tip; free tip of *Sc*₂ and *R*₂ in transverse alignment; *m-cu* shortly before the fork of *M*.

Abdomen long, the segments bicolorous, obscure yellow, ringed on apical third of fourth with blackish. Male hypopygium with the tergite narrow, both cephalic and caudal margins convexly rounded, the lateral angles nearly acute; caudal margin very minutely and insensibly notched medially. Basistyle with the ventromesal lobe very long and conspicuous, dusky, terminating in two fasciculate setae. Rostral spines two, subequal to or shorter than rostrum, placed close together at near midlength of prolongation; rostrum terminating in a powerful spinous seta.

Female.—As in male, differing in sexual characters. Antennae subpectinate, the apical pedicels short, pale yellow, contrasting with the larger dark-colored basal enlargements. Mesonotal praescutum with three more or less indicated brown stripes, the interspaces evident. Ventral sternopleurite weakly infumed. Wing-pattern more contrasted, especially the clouds in outer radial cells, which here form an incomplete fascia in this field. The allotype has the halteres much darker, almost black.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Lerida, 5,400 ft., September 13, 1932 (Lawlor). *Allotopotype*, ♀. *Paratopotypes*, 1 ♂, 1 ♀, broken.

Limonia (Rhipidia) flabelliformis differs from *L. (R.) calverti* (Alex.) of Costa Rica in having the basal flagellar segment unbranched. The wing-pattern is somewhat as in *L. (R.) costaloides* (Alex.), an otherwise quite different fly. The branches of the male antennae of the present species are unusually long and graceful.

10. *Limonia (Rhipidia) variicosta* sp. n.

Allied to *costalis*; ground-color of mesonotal praescutum obscure orange-yellow, almost covered by dark brown stripes; rostrum, palpi and antennae black throughout; legs black, the femoral bases narrowly obscure yellow; wings blackish, the costal border variegated by narrow cream-colored interspaces.

Female.—Length, about 6 mm.; wing, 6 mm.

Rostrum and palpi black. Antennae black; flagellar segments more or less heart-shaped, with short, glabrous apical necks; terminal segment elongate, about twice the penultimate, narrowed outwardly. Head dark brown.

Mesonotal praescutum with the ground-color obscure orange-yellow, almost concealed by dark brown stripes that are confluent except for linear strips behind; lateral margins of sclerite darkened, restricting

the ground to sublateral brightenings; posterior sclerites of mesonotum brownish black. Pleura obscure, variegated by blackish, more noticeably so on the ventral anepisternum and meron. Halteres black, the base of stem obscure yellow. Legs with the femora black, the bases narrowly obscure yellow; tibiae and tarsi black. Wings very strongly suffused with black, the costal border cream-colored, variegated by five extensive, even darker costal areas, the last at stigma, the third at origin of *Rs*; on their posterior borders, these costal darkened areas merge into the dark ground-color of the disk, greatly restricting the pale costal spots; cord and outer end of cell *1st M*₂ narrowly bordered by blackish; veins brownish black. Macrotrichia of veins long and conspicuous. Venation: *Sc* long, *Sc*₁ ending about opposite two-thirds *Rs*, *Sc*₂ close to its tip; *m-cu* at fork of *M*.

Abdominal tergites brownish black, the sternites more bicolored, obscure yellow, the caudal margins narrowly dark brown, the outer sternites more uniformly darkened. Ovipositor with cerci slender and rather strongly upcurved.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor).

The nearest ally of the present fly would appear to be *Limonia (Rhipidia) costalis* (Will.), which differs conspicuously in the coloration of the body, legs and wings, more especially the opaque reddish mesonotum, the reddish abdomen, with the caudal borders of the tergites darkened, the yellow tips of the femora, the much paler wings and the details of venation, as the short *Sc*, which ends at or before midlength of *Rs*.

11. *Limonia (Geranomyia) cerberus* (Alex.)

1 ♂, 1 ♀, Finca Parada, 4,450 ft., September 11, 1932

12. *Limonia (Geranomyia) deliciosa* sp. n.

General coloration yellow, the praescutum with an intermediate pair of reddish brown stripes, the lateral praescutal borders broadly darker brown; rostrum and antennae black; femora obscure yellow, the tips clearer yellow, preceded by a dark brown ring; wings cream-yellow, with a chiefly marginal brown pattern, the third costal spot being a common one embracing the origin of *Rs* and end of *Sc*; vein *Sc* relatively short, *Sc*₁ ending just beyond origin of *Rs*; male hypopygium with the two rostral spines slender, gently curved, arising from the summit of a single rounded domelike tubercle.

Male.—Length, excluding rostrum, about 5.5 mm.; wing, 6.8 mm.; rostrum, about 3 mm.

Female.—Length, excluding rostrum, about 7–7.5 mm.; wing, 7 mm.; rostrum, about 3 mm.

Rostrum, palpi and antennae black, the latter in male approximately one-half as long as body. Head blackish, with a linear pale median stripe that is equal in width to the anterior vertex.

Mesonotal praescutum ochreous, with an intermediate pair of reddish brown stripes that are separated by a capillary line of the ground; lateral borders of praescutum broadly darker brown; scutum testaceous medially, the lobes extensively dark brown; scutellum chiefly brownish testaceous; mediotergite chiefly dark brown. Pleura with ventral portion yellow, the dorsal portions somewhat darker, with a conspicuous blackened area on anepisternum. Halteres greenish yellow, the knobs infuscated. Legs with the coxae and trochanters yellow; femora obscure yellow, the tips clearer yellow, preceded by a narrow dark brown ring; tibiae and tarsi chiefly pale brownish yellow, the outer tarsal segments infuscated. Wings with the ground-color strongly cream-yellow, the prearcular and costal areas more saturated yellow; a series of about eight marginal brown areas, of which five are on the costal border, the third at end of *Sc* and origin of *Rs*, the fourth at stigma, the last at end of vein *R*₃; the remaining clouds lie at ends of veins *Cu*, *1st A* and *2nd A*; cord and outer end of cell *1st M*₂ narrowly seamed with brown; tips of veins *R*₄₊₅ to *M*₄, inclusive, restrictedly darkened; veins yellow, darker in the clouded areas. Venation: *Sc* short, *Sc*₁ extending to a short distance beyond origin of *Rs*, *Sc*₂ not far from its tip; a supernumerary crossvein in cell *Sc*; *m-cu* close to fork of *M*.

Abdominal tergites light to darker brown, the sternites clear yellow. Male hypopygium with the ventral dististyle relatively large and fleshy, the rostral prolongation unusually slender; rostral spines arising from a common dome-shaped tubercle that is placed at base of rostrum; spines subequal, slender, gently curved. Gonapophyses with mesal-apical lobe relatively slender, parallel-sided, at apex directed laterad into a small point or tubercle.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor). *Allotopotype*, ♀. *Paratopotypes*, 3 ♀ ♀.

The coloration and venation of wings of the present fly is much as in *Limonia (Geranomyia) eurygramma* (Alex.), but the thoracic pattern and structure of the male hypopygium is very different.

13. *Limonia (Geranomyia) eurygramma* Alex.

Known hitherto only from Mexico. 1 ♂, 1 ♀, Finca Parada, 4,450 ft., September 12, 1932.

14. *Limonia (Geranomyia) lachrymalis* (Alex.)

Known hitherto only from Ecuador and Peru. 1 ♂, Finca Parada, 4,450 ft., September 12, 1932.

15. *Helius (Helius) albitarsis* (O. S.)

Widespread in the Neotropics. ♂, ♀, Finca Parada, 4,450 ft., September 11, 1932.

16. *Helius (Helius) panamensis* sp. n.

Belongs to the *mirabilis* group; general coloration pale yellow; head light gray; femora yellow, the tips very narrowly and conspicuously blackened; mediotergite darkened; wings yellow-subhyaline, with a restricted pale brown pattern distributed as a broken fascia along cord and as a longitudinal cloud at near midlength of first section of Cu_1 ; *r-m* distinct.

Male.—Length, about 4.5 mm.; wing, 5.2 mm.

Female.—Length, about 5 mm.; wing, 5.3 mm.

Rostrum yellow. Antennae pale brown, the basal two segments a little brighter. Head light gray.

Mesothorax pale yellow, any reddish cast normally present poorly indicated; mediotergite darkened. Halteres pale throughout. Legs with coxae and trochanters yellow; femora yellow, the tips very narrowly but abruptly and conspicuously blackened; tibiae and tarsi yellow, the outer tarsal segments a little darker. Wings very pale yellow to yellowish subhyaline, with a restricted pale brown pattern, the stigma and a longitudinal cloud at near midlength of the first section of vein Cu_1 slightly darker brown than a more grayish brown seam along the anterior cord, fork of M and end of vein Cu_1 , the three last more or less interrupted and not forming a continuous band along cord; veins pale yellow, a little darker in the clouded areas. Venation: *r-m* distinct, subequal to basal section of R_{4+5} ; inner end of cell 1st M_2 strongly arcuated, the cell thus lying far basad of the elements of the outer radial field; *m-cu* a distance beyond fork of M about equal to *r-m* or less.

Abdomen of male almost uniformly yellow, of female bicolorous, the bases of the individual segments broadly and conspicuously ringed with brown, the remainder yellow.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor). *Allotopotype*, ♀.

The nearest ally is *Helius (Helius) rubicundus* (Alex.) of Paraguay, which has the tips of the femora more gradually and broadly infuscated rather than narrowly and abruptly blackened; the general coloration of body more reddish yellow; the dark abdominal markings in female more nearly continuous to form a broken longitudinal stripe, and other characters. This is the first record of a species of the group from North America, the other forms being widespread in tropical South America.

17. *Epiphragma (Epiphragma) circinata* O. S.

Described from a single female, Mt. Irazu, Costa Rica, 6,000–7,000 ft. (Rogers). A few specimens in the present series, including both sexes; Finca Parada, 4,450 ft., September

11, 1932; Finca Palo Alto., 4,700 ft., September 12, 1932; Finca Lerida, 5,300–7,000 ft., September 14, 1932.

The femora, broken in the unique type, offer distinctive features of pattern; basal third yellow, passing into brown, the latter ending abruptly at near two-thirds the length of the segment, the apical third with a black subterminal ring, the apex and an antepenultimate ring of slightly greater extent, bright yellow; tibiae brownish black, the extreme base and apex yellow; tarsi paling to brownish yellow. Abdominal sternites conspicuously yellow. The above characters are likewise found in the Mexican *E. (E.) oreonympha* Alex., which has the abdomen conspicuously hairy and the stigmal area of wing more uniformly darkened. The stigmal region in *circinata* is likewise distinctive, there being three or four small, isolated, dark spots in the region normally occupied by the single stigmal area.

18. **Epiphragma (Epiphragma) genualis** sp. n.

General coloration black; antennae (σ^7) elongate, black, the first flagellar segment pale; halteres elongate; femora and tibiae black, the genua conspicuously whitened; wings whitish, with a conspicuous reticulate and ocellate brown pattern; stigmal region uniformly darkened; abdomen brownish black, the caudal borders of the tergites narrowly pale, sternites black.

Male.—Length, about 9 mm.; wing, 10.5 mm.

Rostrum and palpi black. Antennae (σ^7) elongate, as in *circinata*, if bent backward extending about to one-third the length of abdomen; scape and pedicel black; flagellum black, the first segment more or less yellow, in one specimen entirely pale, in the type with only the base brightened; segments long-cylindrical, with a dense and very delicate pubescence and a few scattered verticils that are shorter than the segments. Head dark brown; anterior vertex very narrow, only about two-thirds the diameter of the scape.

Disk of mesonotal praescutum dull brown, sparsely pollinose, with two intermediate brown stripes; cephalic and lateral borders of the sclerite broadly and conspicuously blackened; anterior lateral pretergites restrictedly pale; posterior sclerites of notum infuscated. Pleura almost uniformly blackened, with a sparse gray pruinosity. Halteres elongate, blackened, the basal half of stem yellow. Legs with coxae black, sparsely pruinose; trochanters obscure yellow; femora obscure yellow basally, thence passing into black, the tips narrowly whitened; tibiae black, the bases narrowly white, subequal in amount to the femoral tips; tarsi paling to brownish yellow. Wings whitish, with a conspicuous brown pattern that is much as in *circinata*, being distributed in a reticulate and ocellate pattern; region of stigma uniformly darkened, not with a series of about four brown dots, as in *circinata*; outer end of cell *2nd A* variegated by a pale area; veins brown. Venation: *Rs* angulated and spurred at origin; R_{2+3+4} relatively short, less than one-half *Rs*, subequal to the petiole of cell *M*₁.

Abdomen brownish black, the caudal borders of tergites narrowly pale, the areas continued for a slight distance cephalad along the lateral

borders; transverse subbasal impressions black, little evidence against the ground; sternites black throughout.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Lerida, 5,300–6,200 ft., September 14, 1932 (Lawlor). *Paratopotype*, a fragmentary ♂, 5,400 ft., September 13, 1932.

Epiphragma (Epiphragma) genualis is readily told from the other regional allied species with elongate antennae in the male (as *circinata* O. S., *gracilicornis* Alex., *oreonympha* Alex.) by the pattern of the legs.

19. ***Limnophila dictyoptera*** Alex.

A pair, in copula, Finca Lerida, 5,300 ft., September 15, 1932.

20. ***Shannonomyia atroapicalis*** sp. n.

General coloration buffy yellow; front and anterior vertex silvery; legs yellow, the tips of all femora narrowly but intensely blackened; wings strongly tinged with brownish yellow, the outer radial field a little darkened; a restricted dark brown pattern, including the stigma, origin of R_s , cord and outer end of cell *1st M*₂; R_2 close to fork of R_{2+3+4} ; cell *1st M*₂ closed.

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

Rostrum yellow; palpi brownish black. Antennae with two basal segments yellow, the flagellum brownish black; flagellar segments oval. Front and anterior vertex broad, silvery; posterior vertex more infuscated.

Mesonotum light buffy yellow, the praescutum with vaguely darker stripes that are best-indicated behind; posterior border of scutellum conspicuously fringed with long yellow setae. Pleura testaceous yellow. Halteres chiefly pale. Legs with coxae, trochanters and femora yellow; tibiae light yellow, the narrow tips abruptly and intensely blackened, the amount subequal on all legs; tarsi obscure yellow, the very narrow tips of the basal three segments infuscated, the outer segments uniformly darkened. Wings strongly tinged with bright yellow, the costal border clearer yellow; outer radial cells slightly suffused with brownish; a restricted but very conspicuous dark brown pattern, as follows: Origin R_s , stigma, cord and outer end of cell *1st M*₂; veins yellow, darker in the infuscated areas. Venation: Sc_1 ending just before fork of R_s , Sc_2 at its tip; R_s of moderate length, angulated and spurred at origin; R_2 immediately beyond point of departure of R_4 , R_{2+3} thus reduced to a mere point; cell *1st M*₂ elongate, exceeding vein M_{1+2} beyond it; *m-cu* at just before two-fifths the length of cell *1st M*₂.

Abdominal tergites yellow, each with a conspicuous, transverse, impressed line beyond base, this suffused with brown to produce a vaguely bicolorous appearance; sternite and hypopygium more uniformly yellow. Male hypopygium with the gonapophyses appearing as very slender, strongly curved hooks.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor).

The nearest ally of this fly is *Shannonomyia argenticeps* Alex. (Ecuador), which differs very evidently in the uniformly yellow legs and much less distinct wing-pattern.

21. *Atarba* (*Atarba*) *apicispinosa* sp. n.

Mesonotum yellow; antennae bicolorous, the flagellar segments black with the bases narrowly yellow; legs yellow; wings pale gray, the costal region clear light yellow; stigma very faint; *Sc* short, cell *1st M*₂ narrowed outwardly; male hypopygium with the outer dististyle slender, blackened, with three or four slender spines on outer margin, the outermost some distance before the long curved apical spine; inner dististyle a little dilated at outer end.

Male.—Length, about 5 mm.; wing, 5 mm.

Rostrum yellow; palpi brownish black. Antennae with scape and pedicel yellow; flagellum bicolorous, each segment black with the extreme base yellow, the amount not involving more than the basal sixth or seventh, decreasing in amount on outer segments, the terminal five or six uniformly darkened; segments cylindrical, with verticils that are much shorter than the segments. Head yellow, very sparsely pruinose.

Mesonotal praescutum yellow, the posterior sclerites of notum somewhat more testaceous-yellow. Pleura yellow, more testaceous behind, the dorsopleural region dusky. Halteres pale, the knobs dusky. Legs yellow. Wings with a pale gray tinge, the costal region pale yellow; stigma very pale brown; veins pale. Venation: *Sc*₁ ending just beyond origin of *Rs*; outer end of cell *1st M*₂ conspicuously narrowed, *m* being much shorter than the basal section of *M*₃, in the type so short as to be virtually eliminated.

Abdominal tergites dark brown, the segments more or less brightened basally; subterminal segments uniformly darkened; sternites more yellow; hypopygium pale. Male hypopygium with the outer dististyle slender, blackened, with three or four slender, subappressed spines along outer margin, the apical spine elongate, curved; outermost spine removed to some distance back from apex. Inner dististyle subequal in length to outer, the distal end a little enlarged. Plate of ninth sternite a little longer than broad, the outer lateral angles produced laterad into acute spines.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Lerida, 5,400 ft., September 13, 1932 (Lawlor). *Paratopotype*, 6,200–7,000 ft., September 14, 1932 (Lawlor).

The present fly is well-distinguished from regional allies by the structure of the male hypopygium, especially the length of the apical spine of the outer dististyle and the position of the outermost lateral spine removed from apex. The nature of

antennal pattern likewise furnishes important specific characters. The species is most generally similar to *Atarba* (*Atarba*) *boliviana* Alex. (Bolivia) and *A.* (*A.*) *varicornis* Alex. (Peru), but is distinct from both.

22. *Hexatoma* (*Eriocera*) *interlineata* sp. n.

Allied to *zonata*; general coloration of mesonotal praescutum golden-yellow, with three black stripes, the median one split by a capillary pale line; femora yellow, the tips narrowly blackened; wings with apical and posterior cells extensively suffused with pale brown; abdomen yellow, the subterminal tergites blackened.

Female.—Length, 25–27 mm.; wing, 18–20 mm.

Rostrum and palpi dark brown. Antennae with scape and pedicel reddish brown; basal two flagellar segments yellow, the succeeding segments black. Head obscure orange, deeper orange on sides of posterior vertex.

Mesonotal praescutum golden-yellow, with three conspicuous black stripes, the median one narrowly but conspicuously divided by an obscure yellow vitta; humeral region restrictedly blackened; posterior sclerites of mesonotum obscure yellow, the centers of the scutal lobes extensively blackened; mediotergite with a conspicuous depressed quadrate blackened area at each cephalic lateral angle; a smaller linear black mark at posterior lateral region of mediotergite. Pleura blackened dorsally beneath the wing-root and on meral region, the sternopleurite golden-yellow pollinose. Halteres yellow, the knobs black. Legs with coxae somewhat infuscated, especially the posterior pair; trochanters yellow; femora yellow, the tips narrowly and abruptly blackened, the amount subequal on all legs; tibiae yellow, the tips even more narrowly blackened; tarsi obscure yellow basally, the outer segments passing into black. Wings yellow, the prearcular and costal regions somewhat more saturated yellow; stigma pale brown; even paler brown clouds along R_s , in cells beyond cord and in Cubital and Anal fields, these appearing chiefly as broad seams to the veins, leaving the centers of the cells somewhat paler; veins brown, yellow in the flavous areas. Venation: Sc_1 lying some distance before the tip of Sc_2 , the latter stout and angulated; R_{2+3} a little longer than R_2 alone; basal section of R_5 shorter than $r-m$; $m-cu$ just beyond fork of M , slightly exceeding the distal section of Cu_1 .

Abdomen yellow, the fifth and sixth tergites chiefly black; sternites more uniformly pale. Ovipositor with long straight cerci; hypovalvae terminating in a hairlike point.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor). *Paratopotype*, ♀.

The nearest allies of the present fly are *Hexatoma* (*Eriocera*) *ohausiana* (End.), of Ecuador and Peru, and *H.* (*E.*) *zonata* (O. S.) of Mexico and Guatemala, both of which have the same peculiar venation of the subcostal field, the sunken areas on the

mediotergite, and the tips of the femora narrowly blackened. The present fly differs from the others in the virtually complete division of the median praescutal stripe by a pale line, the different wing-pattern, and the slightly different ovipositor.

23. *Hexatoma* (*Eriocera*) *stolida* sp. n.

Allied to *macrocera* Alex.; mesonotal praescutum obscure yellow, with three vaguely indicated darker stripes; knobs of halteres dark brown; femora obscure yellow, the tips narrowly infuscated; wings with a brownish yellow suffusion, the costal region brighter yellow; stigma brown, short-oval; abdomen yellow, the incisures of segments narrowly but conspicuously brownish black.

Female.—Length, about 11 mm.; wing, 10 mm.

Rostrum reduced, obscure yellow; palpi short, brownish black. Antennae with scape obscure yellow, the succeeding segments brownish black to black. Head obscure yellow.

Mesonotal praescutum obscure yellow, with three vaguely indicated slightly darker brown stripes; posterior sclerites of notum concealed by mounting medium. Pleura grayish brown, the sternopleurite a little brighter. Halteres obscure yellow, the knobs infuscated. Legs with coxae and trochanters testaceous-yellow; femora obscure yellow, the tips narrowly infuscated; tibiae brown; tarsi black. Wings with a brownish yellow suffusion, the costal region somewhat brighter yellow; stigma brown, short-oval; narrow to scarcely evident brown seams along veins, including the cord; veins brown, more yellow in the flavous areas. Venation: R_{1+2} and R_2 subequal; R_{2+3} about one-half longer than R_2 alone; cord moderately oblique; *m-cu* immediately beyond fork of *M*, in virtual alignment with the anterior cord; cell M_1 lacking; distal section of Cu_1 a trifle shorter than *m-cu*.

Abdomen yellow, the incisures of the segments narrowly but conspicuously brownish black, the color involving the narrow apices of the segments, together with the slightly wider bases of the succeeding segments. Ovipositor with elongate valves.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Parada, 4,450 ft., September 11, 1932 (Lawlor).

The present species finds several allies in the Neotropics, but seems readily separable therefrom in the diagnostic features indicated, notably the coloration of the body, pattern of wings and conspicuously fasciate abdomen. No approximately similar species was known to Osten Sacken or Williston at the time of preparation of the Diptera volumes for the *Biologia Centrali-Americana* (1886–1901).

24. *Trentepohlia* (*Paramongoma*) *chiriquiana* sp. n.

General coloration light reddish brown, the praescutum with three slightly darker brown stripes; basal antennal segments brown, flagellum

black, leg black, the narrow tips of femora and slightly wider bases of tibiae dirty white, the femoral bases broadly pale; wings yellow, only the small longitudinal stigmal area darker; veins yellow.

Female.—Length, about 11.5 mm.; wing, 9.5 mm.

Rostrum yellow; palpi brownish black. Antennae with scape and pedicel brown; flagellum black; flagellar segments long-cylindrical, with short inconspicuous verticils. Head light reddish brown, carinate on the narrow anterior vertex.

Mesonotal praescutum light reddish brown, with three very slightly darker brown stripes, the median one faintly divided by a pale vitta; posterior sclerites of notum brown, the scutal lobes darkened, the median area more yellowish. Pleura chiefly yellow, the dorsal sclerites darker. Halteres pale yellow, the knobs infuscated. Legs with coxae brownish yellow; trochanters yellow; femora obscure yellow basally, at or near midlength passing into black, the tips very narrowly and abruptly yellowish white; tibiae black, the bases narrowly dirty yellowish white, the amount about twice as extensive as the femoral tips; tarsi black. Wings strongly tinged with yellow, the costal region more saturated; stigma small, dark brown, longitudinal in position, involving only the cephalic half of vein R_2 ; veins yellow. Venation: R_{2+3+4} elongate, about two-thirds the long, gently arcuated R_5 ; R_{3+4} short, less than R_{1+2} ; in the left wing of type, cell *1st M*₂ is open by atrophy of outer Medial veins, the condition undoubtedly abnormal.

Abdominal tergites brown, the sternites more yellowish.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Parada, 4,450 ft., September 12, 1932 (Lawlor).

Trentepohlia (Paramongoma) chiriquiana is very different from all other described species of *Paramongoma* in the combination of blackened tarsi and tibial tips and the uniformly yellow wings, with only the narrow stigma dark brown. The pale, scarcely marked wings are much as in *T. (P.) leucoxena* (Alex.) of Mexico, and *T. (P.) sororcula* (Alex.) of Panama, which have the tarsi snowywhite. Of all the known Neotropical species of the genus, the present fly has a leg-pattern similar only to that of *T. (P.) geniculata* (Alex.), of British Guiana and Brazil, the latter species differing conspicuously in the venation and heavily patterned wings.

25. *Teucholabis (Teucholabis) leridensis* sp. n.

Mesothorax polished black, variegated only on praescutum, and more extensively on meral region, by pale color; antennae moniliform; head reddish brown; prothorax yellow; knobs of halteres yellow; fore legs black, the remaining femora yellow; wings whitish subhyaline, with a restricted darker pattern, including a pale brown apex and a major oval cloud at near midlength of first section of vein Cu_1 ; abdominal tergites and hypopygium black, the sternites ringed with yellow.

Male.—Length, about 4.8–5 mm.; wing, 5.6–5.8 mm.

Rostrum reddish brown; palpi a little darker. Antennae with basal segments obscure brownish yellow, the outer segments black; flagellar segments subglobular, with short pedicels that are placed slightly on one side of the segments, not in the exact central portion, this giving the organ a weakly serrate appearance. Head reddish brown.

Pronotum yellow. Mesonotum polished black, variegated only by restricted yellowish areas at cephalic portion of praescutum, on either side of midline, and at midregion of the suture. Pleura chiefly blackened, the propleura and meral region yellowish, the latter area extensive, connected along suture between sternopleurite and pteropleurite with a larger area at wing-root and on dorsopleural region. Halteres black, the knobs yellow. Legs with coxae and trochanters yellow; fore legs black, only the femoral bases narrowly obscure yellow; middle and hind legs with femora obscure yellow, the tips vaguely darker; tibiae and tarsi more brownish black to black; posterior tibiae, before tips, with a small cushion of delicate erect setulae, the segments a trifle dilated at this point; proximal end of posterior basitarsus slightly dilated and modified. Wings whitish subhyaline, with a restricted darker pattern; stigma and proximal two-thirds of cell *Sc* brownish black; wing-tip, back to level of outer end of cell *1st M*₂, a large oval cloud at near mid-length of first section of vein *Cu*₁ and a weak cloud at end of vein *1st A*, paler brown. Venation: *Sc* short, *Sc*₁ ending opposite or before one-fourth the length of *Rs*, *Sc*₂ usually before the origin of the latter, never far beyond this point; *R*₂ at or just beyond the end of *Rs*; *m-cu* close to fork of *M*.

Abdominal tergites, including hypopygium, black; sternites two to four, inclusive, narrowly ringed with yellow on posterior portions, the subterminal segments more uniformly yellow; sternal pocket blackened. Male hypopygium much as in *nigrosignata*; inner dististyle with apical beak not bidentate.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Lerida, 5,350–6,200 ft., September 14, 1932 (Lawlor). *Paratopotypes*, 8 ♂♂.

The wing-venation is much as in *Teucholabis* (*Teucholabis*) *hilaris* Alex. (Peru) and *T. (T.) nigrosignata* Alex. (Cuba), but the wing-pattern, notably the large oval spot on vein *Cu*, together with the body-coloration, readily separate the fly from all described allies.

26. *Gonomyia* (*Lipophleps*) *gillottæ* Alex.

Known hitherto only from the type, taken in Costa Rica. One fragmentary ♂, Finca Parada, 4,450 ft., September 12, 1932.

27. *Gonomyia (Lipophleps) peracuta* Alex., var.

One ♂, 3 ♀ ♀, Finca Parada, 4,450 ft., September 12, 1932. Somewhat larger than the type from Chiapas, Mexico, and with slight differences in the male hypopygium, which may later provide subspecific characters.

28. *Cryptolabis (Cryptolabis) luteicosta* sp. n.

Mesonotum brownish black, the dorsopleural region conspicuously pale; head obscure yellow; halteres pale yellow; tips of femora and coxae blackened; wings pale gray, the costal border conspicuously light yellow; macrotrichia in all cells beyond cord, lacking only in the extreme bases of cells R_3 to R_5 ; R_s very oblique.

Female.—Length, about 3 mm.; wing, 3.6 mm.

Rostrum and palpi brown. Antennae brown throughout; flagellar segments subcylindrical, becoming smaller outwardly, the verticils much longer than the segments. Head obscure yellow.

Mesonotum above chiefly brownish black, the praescutal interspaces paler; sides of praescutum, anterior lateral pretergites and dorsopleural membrane pale yellow. Pleura chiefly brownish black. Halteres pale yellow. Legs with the fore coxae blackened, remaining coxae pale; trochanters obscure yellow; femora brownish yellow, the tips narrowly brownish black; tibiae pale yellow, the extreme base and broad tips blackened; tarsi black, the proximal end of basitarsus paler. Wings with a pale gray tinge, the costal border clear light yellow; cord very narrowly seamed with brown; axilla more or less darkened; veins brown, C , Sc and R yellow. Macrotrichia in all cells beyond cord, lacking on basal third of R_2 and extreme bases of R_3 , R_4 and R_5 ; a few trichia in outer ends of cells Cu and $1st A$. Venation: R_s very oblique, sinuous, cell R_1 roughly equilateral, with R_s slightly the longest element; R_s in direct alignment with R_5 , the basal deflection of the latter obliterated; R_2 a little longer than R_{2+3} and in nearly transverse alignment with it; cell M_3 deep.

Abdomen dark brown, the ovipositor a trifle brighter.

HABITAT: Panama (Chiriqui). *Holotype*, ♀, Finca Parada, 4,450 ft., September 11, 1932 (Lawlor).

Closest to *Cryptolabis (Cryptolabis) luteiceps* Alex. (Chiapas, Mexico), differing especially in the larger size and more abundant trichia in the cells beyond cord. In *luteiceps*, these are much more sparse, lying only in the centers of the cells and occupying the distal two-thirds or less. In addition, cell R_1 in *luteiceps* is longer, so vein R_1 is the longest element of the nearly equilateral triangle.

29. *Molophilus (Molophilus) anerasta* sp. n.

Belongs to the *plagiatus* group; general coloration brownish black; antennae (♂) elongate, nodulose; halteres pale; male hypopygium with

the basal dististyle a simple slender rod, narrowed gradually to the acute apex, the surface smooth except for small punctures on basal half.

Male.—Length, about 4 mm.; wing, 4.2 mm.; antenna, about 1.6 mm.

Female.—Length, about 4.5 mm.; wing, 4.6 mm.

Rostrum and palpi black. Antennae black, the basal two segments and apices of the succeeding two or three segments paler; antennae (σ^7) relatively long and strongly nodulose, the dilated parts of the segments with long outspreading setae. Head dark brown.

Mesonotum and pleura dark brown, sparsely pruinose, the anterior lateral pretergites restrictedly whitish. Halteres pale, the knobs with yellow setae. Legs black, the trochanters and extreme bases of femora a trifle paler. Wings strongly tinged with blackish, the prearcular region a little more yellowish; veins and macrotrichia blackish. Venation: R_2 lying distad of $r-m$; vein 2nd A long, ending opposite the basal fourth of petiole of cell M_3 .

Abdomen, including hypopygium, black. Male hypopygium with the apical beak of basistyle very slender. Basal dististyle a simple rod, slender, gradually narrowed to an acute point, the basal half with small scattered setigerous punctures and tubercles, but without setulae as in *subtenebricosus*.

HABITAT: Panama (Chiriqui). *Holotype*, σ^7 , Finca Palo Alto, 4,700 ft., September 12, 1932 (Lawlor). *Allotype*, ♀ , Finca Parada, 4,450 ft., September 12, 1932 (Lawlor).

The nearest allies, *Molophilus tenebricosus* Alex. and *M. subtenebricosus* Alex., both of Colombia, are readily told by the much stouter basal dististyle, with the surface roughened and setulose, and with the basal portion much enlarged.

30. *Molophilus (Molophilus) chiriquiensis* sp. n.

Belongs to the *plagiatus* group; general coloration dark brownish gray; halteres yellow; wings pale grayish, with two conspicuous pale brown fasciae; male hypopygium with the outer dististyle bifid at apex; basal dististyle with a row of about nine spines on outer margin beyond midlength and a group of more slender spinous setae on inner face at near one-third the length.

Male.—Length, about 3.8 mm.; wing, 4.5 mm.

Rostrum and palpi black. Antennae broken. Head gray.

Mesonotum brownish gray to plumbeous, the anterior lateral pretergites very narrowly and inconspicuously paler; median region of scutum and base of scutellum more testaceous. Pleura plumbeous. Halteres pale yellow. Legs with the coxae brownish yellow; trochanters yellow; femora brown, the bases extensively obscure yellow; trochanters obscure yellow, darkened at tips; tarsi brown; vestiture of legs chiefly denuded. Wings pale grayish, with two conspicuous pale brown fasciae, the first transverse, at level of R_s , the second more oblique, at level of cord; veins pale brown, darker in the shaded areas. Venation: R_2 lying about twice its length beyond level of $r-m$, R_{2+3} thus being nearly

three times R_{4+5} ; vein 2nd *A* ending about opposite the cephalic end of *m-cu*.

Abdomen, including hypopygium, dark brown. Male hypopygium with the apical beak of basistyle slender. Outer dististyle bifid at apex, the inner arm a little longer and more acute at tip. Basal dististyle relatively slender, gradually narrowed to a long straight point; outer margin just beyond midlength with a crest of nine conspicuous spines arranged in a chiefly single row; at about the basal third of style on inner face with a group of more slender spinous setae, the uppermost shorter and more spinelike.

HABITAT: Panama (Chiriqui). *Holotype*, ♂, Finca Lerida, 6,700 ft., September 16, 1932 (Lawlor).

The structure of the basal dististyle of the male hypopygium is generally similar to that of *Molophilus perseus* Alex. (Colombia), but in other regards the two flies are quite distinct. I do not have a male of *perseus* and must trust the original figures as made by myself a score of years ago (Jour. N. Y. Ent. Soc., 21; Pl. 6, Figs. 4, 5; 1913). If these latter are correct, the simple U-shaped outer dististyle of *perseus* is entirely different from the forked condition in the present fly. In general appearance, *chiriquiensis* is darker in color, smaller in size, and is readily told by the two dark-colored fasciae traversing the wing-disk.

BOOK NOTICE

INSECTS AND DISEASES OF ORNAMENTAL TREES AND SHRUBS,
by E. P. FELT AND W. H. RANKIN. Pages i-xix and 1-507, 243 text figures.
1932. Published by the Macmillan Company, New York. Price, \$5.00.

"This volume is a combination of the senior author's 'Manual of Tree and Shrub Insects' and the junior author's 'Manual of Tree and Shrub Diseases,' entirely rewritten and brought down to date. The book is divided into two parts. The whole arrangement is as follows: Part I (pp. 1-131), General: Insects, Fungi, Injuries and Treatments. Chapter I, Insects and Their Depredations; II, Fungi and Their Depredations; III, Insecticides and Fungicides; IV, Injuries other than those caused by Organisms. Part II (pp. 133-484), Alphabetic Arrangement of Trees and Shrubs with Accounts of the Associated Insects and Fungi. In Part II seventy-two trees and shrubs are listed under each of which its pests and diseases are described. The index covers pages 485-507. The volume has been planned as a horticulturalists handbook and is without bibliography or footnote references.

A survey of the book impresses one with the mere smattering of effective remedies available for the treatment of trees and shrubs affected by insects and disease. Applied forest entomology and phytopathology have not made the advances that these sciences have made in other fields.

Emphasis is put on the various problems peculiar to raising trees and shrubs in city parks and yards, such as pruning injuries, gas injuries, etc. The whole problem of city forestry has such an artificial setting that the problems are many of them very different from those with the same species in their natural habitats and much more baffling because of the unnaturalness of the set up.

The illustrations are excellent. The cloth binding gives a book that can stand the hard usage meted out to a field-man's guide.—C. H. K.