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New and Little Known Hawaiian Delphacidae (Homoptera).

BY F. MUIR.

(Presented at the meeting of December 1, 1921.)

The present paper deals chiefly with Delphacidae from the island of Kauai collected by Mr. O. H. Swezey, and a few by Mr. J. A. Kusche. They are of interest, because much less collecting has been done on that island than on the others, and we were unable to state whether the few species known from there indicated a natural paucity or only the limited amount of collecting.

The present collection was over a wide enough area to give us some better idea, and the fact that all the known Kauai species except three, as well as nine species described as new, were taken indicate that it is fairly representative. It consists of nineteen species in all, the Leialoha group with ten, the Aloha group with eight, and one *Kelisia*. An equal amount of collecting in Oahu, Maui or Hawaii would have produced a much larger number of the Aloha group. I think we are justified in considering Kauai as poor in Delphacidae and having a higher proportion of the Leialoha group than the rest of the archipelago.

Mr. Swezey's collections were made at the following elevations: Alakai swamp, 4000 feet; Nualolo, 3000; Kalalau, Kumuwela, Kokee, Halemanu, and Kauaikinana, 3500 feet.

Types deposited in the H. S. P. Experiment Station Collection.

Leialoha Kirk.

The present collection contains some long series of species of this genus, the study of which has decided me to consider as species forms I have described as subspecies. The amount of evolution that has taken place in the Leialoha group is not near so great as in the Aloha group, and the differentiation of the male genitalia has not proceeded so far. We must not, therefore, expect the same amount of specific difference in these organs in the former as in the latter.

Leialoha lehuae Kirk.

Two male specimens from Kokee, Kauai, and one from Alakai swamp (*Swezey*, August, 1921).

Leialoha oceanides (Kirk.). Figure 1.

Aloha oceanides Kirk. Faun. Haw. II, 6, p. 580.

One male specimen that I identify as this species taken on Waialeale Trail, Kauai, elevation four thousand to five thousand feet (*J. A. Kusche*, May, 1920). One male Kalalau, Kauai, off *Osmanthus*, and one female from Alakai swamp (*Swezey*, August, 1921). The aedeagus is thin, cylindrical, very slightly curved, the apex produced into a curved spine; slightly basad of apex. There is a long, curved spine, and still more basad is another much shorter and slightly curved.

Leialoha suttoniae sp. n. Figure 2, 2a.

Male. Macropterous; length, 2.3 mm.; tegmen, 3 mm. Length of vertex equal to width, slightly broadest near apex, apex rounded or bluntly conical, base about middle of eyes. Length of face 1.6 times the width, widest in middle, sides slightly curved, two distinct median carinae. Antennae reaching to base of clypeus, first joint annulate, second three times the length of first.

Opening of pygofer subdiamond shape, wider than long, margins entire, anal emargination large, anal angles large, considerably produced and truncate at apex, surrounding about three-fourths of anal segment. Aedeagus long, cylindrical, thin, slightly curved, apex bent at right angle to form a crook which is fairly straight to near tip, which is curved and acute, with some minute teeth along it; slightly basad of the crook is a small spine.

Vertex and nota black or dark brown, clypeus lighter brown, face, genae, antennae, lateral portions of pronotum, tegulae and legs yellow or very light brown; abdomen dark brown with yellow pleura. Tegmina hyaline, a dark fuscous mark from base to apex over median and cubital area, including the apical radial cells, veins same color as membrane, tubercles small, numerous. Wings fuscous, veins dark.

Female. Macropterous; length, 2.7 mm.; tegmen, 3.5 mm. Similar to males but lighter in color, some specimens being reddish yellow, the fuscous on tegmen very faint and the veins reddish.

Described from five males and thirteen females from Kalalau, Kauai, off *Suttonia sandwicensis* (*Swezey*, August 20, 1921). There are also four males and two females from Nualolo, Kauai, off the same plant, which are all lighter in color with red veins, a dark spot at apex of clavus, and the hind femora and apex of tibiae black or dark fuscous. These specimens are not included in the type material. The nymphs vary in color, becoming darker as they increase in size, the larger

ones having the thorax and wing pads brown or mottled with brown. This species comes near to *L. kauaiensis*. Type No. 1049.

***Leialoha scaevolae* sp. n.** Figure 3.

Male. Macropterous; length, 2.6 mm.; tegmen, 3 mm. Vertex slightly longer than broad, broadest at apex which is rounded or broadly conical. Length of frons nearly twice the width, broadest in middle, sides slightly curved, two distinct median carinae. Antennae reaching slightly beyond base of clypeus, first segment annuliform, second nearly four times the length of first.

Shape of pygofer similar to *L. suttoniae*, but the anal angle not so broadly truncate, more angular; genital styles slightly more acute at apex than in *L. suttoniae*. Aedeagus somewhat similar, but the apex more rounded and the crook at apex thinner, more curved and without teeth, the small subapical spine slightly curved.

Vertex, median portion of pronotum, the mesonotum, dorsum of abdomen and the pygofer dark brown; face, clypeus, antennae, legs, lateral portions of pronotum and ventral surface of thorax and abdomen yellow. Tegmina hyaline, milky white, a small black mark at apex of clavus, the apical cells and the apical margin slightly fuscous, veins and tubercles same color as membrane, tubercles very minute. Wings hyaline, milky white, veins slightly fuscous.

Female. Macropterous; length, 3 mm.; tegmen, 3.6 mm.

Similar to male, but slightly lighter in color; the ovipositor dark brown. Many of the females are uniformly yellow or with a slight infuscation on thorax; the ovipositor is always darker.

Described from thirteen males and thirteen females from Kumuwela, Kauai, off *Scaevola chamissoniana* (Swezey, August 28, 1921). There are also two females from Kalalau, Kauai, one off *Osmanthus* and the other off *Coprosma*, neither of which do I consider as food plants. Type No. 1050.

***Leialoha kauaiensis* Muir.**

Two males and one female from Alakai swamp off Ohia lehua; one male from Kalalau off *Suttonia*; one male and two nymphs from Nualolo off Ohia lehua; one male and two females from Kokee off Ohia lehua. The one on *Suttonia* is evidently accidental, Ohia lehua being the food plant.

***Nesodryas* (*Nesothoë*) *hula* (Kirk.).** Figure 4.

Six males and two females from Kokee off *Sideroxylon* (Swezey, August 28, 1921); six males and five females from Kalalau off *Osmanthus sandwicensis* (Swezey, August 20,

1921); one male from Nualolo off *Phyllostegia*, and one female off *Pelea* and two females off *Suttonia*.

These all conform to the original description. The aedeagus has the crook at the apex at about 45° , with its apex expanded and curved.

Nesodryas (Nesothoë) seminigrofrons sp. n. Figure 5.

Male. Macropterous; length, 2.8 mm.; tegmen, 2.9 mm. Vertex distinctly broader than long, apex slightly rounded, produced beyond eyes but slightly, same width as base, base anterior to middle of eyes. Length of face 1.8 times the width, sides slightly curved, median carina slightly obscure at base. Antennae reaching to base of clypeus, first segment as wide as long, second three times the length of first.

Anal angle of pygofer rounded, slightly produced. Genital styles the typical subsickle-shape. Aedeagus tubular, thin, slightly curved and recurved, apex produced into a long, acute process and from its base, on margin of orifice, a T-shape process arises, the cross-piece at apex curved, crescent shape.

Face except apical third, genae except apical half, clypeus and thorax dark brown or nearly black, pronotum with a series of light dots along lateral carinae to behind lateral angles, vertex and frons with light dots, three pairs of dots on face slightly raised and showing signs of forming transverse bands, apical portions of face and genae creamy white; legs light with fuscous marks; first segment of antennae dark, second segment light. Tegmina hyaline slightly stramineous, slightly fuscous at base, an irregular curved fuscous mark from middle of clavus to near base of costa extending irregularly along radial cell to apical, median and cubital cells, a small dark mark at apex of clavus; veins same color as membrane except the apical veins which are dark; tubercles minute, mostly same color as veins, but some on the darker veins of corium are light. Wings hyaline, slightly fuscous, veins dark.

Female. Macropterous; length, 3.3 mm.; tegmen, 3 mm. Similar in color to male.

This species comes next to *N. perkinsi* (Kirk.), the aedeagus of which I figure (Figure 6) for comparison; the apex of the T-piece is much smaller, and the spine at apex shorter and more obtuse.

Described from one male and one female from Kumuwela off *Campylotheca* (Swesey, August 28, 1921). Type No. 1052.

Nesodryas (Nesothoë) alboguttata sp. n. Figure 7.

Male. Macropterous; length, 2.2 mm.; tegmen, 2.6 mm. Length of vertex subequal to width, apex broader than base, slightly rounded, base behind middle of eyes; length of face 1.7 times the width, one distinct median carina. Antennae reaching to base of the clypeus, first segment wider than long, second segment more than four times the length of first.

Anal angle of pygofer very slightly produced. Aedeagus thin, cylindrical, apex narrowly rounded with the crook about 45° to stem and slightly expanded at apex, a small spine slightly below apex. Genital styles of the normal subcylindrical shape, characteristic of the genus.

Vertex brown mottled with lighter brown; face brown with three semi-transverse marks and a few small light spots on side, clypeus darker brown. Antennae light brown. Pronotum light brown in middle, darker on sides with small light marks; mesonotum dark brown; legs brown, lighter on hind tibiae. Tegmina hyaline, milky white with brown markings as follows: Extreme base, a broad V-shape mark from costa near base to near apex of clavus and back to costa before stigma, a broad mark from hind margin beyond clavus to apex of radius, the apical veins fuscous, tubercles small, white, bearing white hairs. Wings hyaline, milky white with darker veins.

Described from one male from Kokee off *Antidesma* (Swezey, August 19, 1921). This species I consider near to *N. gulicki*, but is distinguishable by tubercles being white instead of brown, the apex of aedeagus is rounded instead of acute, and the shape of the crook is somewhat different. Type No. 1051.

Nesodryas (Nesothoë) semialba sp. n. Figure 8.

Male. Macropterous; length, 2.6 mm.; tegmen, 3.0 mm. Length of vertex subequal to width, apex subequal to base, base about middle of eyes; length of face 1.7 times the width, sides slightly curved, median carina distinct, the lateral carinae curved inward and meet together before the apex of face.

The genitalia are near to those of *N. alboguttata*, but the crook of the aedeagus stouter, the apex broadened out on the inner corner; there is no small spine on the side.

Head and thorax dark brown or black, first segment of antennae brown, second yellow, legs brown, hind tarsi and apex of tibiae lighter. Basal half of tegmina similar to *N. alboguttata* in color, extreme base dark brown, then a narrow light mark, then a broad V-shape mark reaching from costa to hind margin at apex of clavus; the apical half of tegmina milky white; veins same color as membrane, apical veins and apical margin slightly fuscous, tubercles small, same color as veins or slightly darker on apical veins. Wings hyaline, slightly fuscous with darker veins.

Described from one male from Kalalau off *Osmanthus sandwicensis* (Swezey, August 20, 1921), and one female from Alakai Swamp (Swezey, August 22, 1921). This species comes next to *N. alboguttata*. Type No. 1057.

Nesodryas (Nesothoë) dodonaeae Muir.

Three males and nine females, and a nymph from Kokee

off *Dodonaea*; one male from Kalalau off *Suttonia*; one male and five females from Halemanu off *Alphitonia* (Swezey, August 31, 1921).

One male from Kaholuamano, Kauai, elevation four thousand feet (*J. A. Kusche*, April, 1920).

Aloha swezeyi Muir.

A series of four males and eight females; six from Kumuwela off *Campylotheca*; one from Kokee; four from Nualolo off *Campylotheca*; one from Kauaikinana off *Lipochaeta*. The former figure of the aedeagus* was incorrect, so a more correct one is given herewith (Figure 9).

Ilburnia ipomoeicola (Kirk.).

A long series of both sexes and young off *Lythrum*, *Polygonum*, *Pipturus* and *Rumex* from Kokee (Swezey, August, 1921).

Ilburnia koae-phyllodii (Muir.).

Three males and one female from Halemanu, and one male and one female from Kumuwela off *Acacia koa* (Swezey, August, 1921).

Ilburnia rubescens (Kirk.).

A series from Kaholuamano and Waialae falls, four thousand feet elevation (*Kusche*, April, 1920).

Ilburnia kuschei sp. n. Figure 10.

Male. Brachypterous; length, 2.5 mm.; tegmen, 1.7 mm. Length of vertex about equal to the width at base, apex considerably narrower than base, projecting in front of eyes, straight with median carina of face projecting, base about middle of eyes. Length of face 2.6 times the width, sides very slightly curved, widest on apical half, median carina simple, but the base thickened with an obscure appearance of a fork. Antennae reaching to near middle of clypeus, second segment 2.2 times the length of first. Tegmina reaching to apex of sixth abdominal tergite.

Opening of pygofer a little longer than wide, margins entire, round, anal emargination wide, shallow, anal angles slightly produced, diaphragm fairly long, dorsal margin rounded with a slight indentation in middle, armature standing out as a rounded projection in the middle. Anal segment moderate size, anal spines flattened laterally, median size, broad at base, near together. Genital styles not reaching to anal segment, apex truncate, corners rounded, slightly narrowed in middle, basal angle large, rounded, forming half the inner margin. Aedeagus thin,

* Pro. Haw. Ent. Soc., III, 3 (1916). Plate 2, fig. 21.

subcylindrical, curved slightly dorsad, broadest at base where it is produced on dorsal aspect, a few minute spines about middle.

Ochraceous, black or dark brown between carinae of face, vertex and nota, front and middle coxae dark, some scattered fuscous marks on abdomen. Tegmina hyaline, slightly ochraceous, a dark mark at apex of clavus, veins slightly fuscous in middle, tubercles minute, sparse, bearing black macrotrichia.

Female. Brachypterous; length, 3 mm.; tegmen, 1.9 mm. Lighter in color than the male, the black between carinae of head and thorax much reduced.

Described from two males and two females from near Waialae falls, Kauai, four thousand feet elevation (*J. A. Kutsche*, April, 1920). There are also three females and three nymphs, not included in the type series from Kokee, off *Cyrtandra* (*Swezey*, August, 1921), which I consider to belong to this species. This species I place near *I. boehmeriae*. Type No. 1056.

***Ilburnia campylothecae* sp. n.** Figure 11.

Male. Brachypterous; length, 2.1 mm.; tegmen, 1.3 mm. Length of vertex 1.2 times the width, apex projecting beyond eyes, rounded, base about middle, or slightly in front of middle, of eyes; length of face 2.4 times the width, sides slightly curved, median carinae obscurely furcate at base. Antennae reaching slightly beyond base of clypeus, second segment twice the length of the first. Tegmina reaching to posterior margin of seventh abdominal tergite.

Opening of pygofer a little longer than wide, round, margins entire, anal emargination wide, shallow, anal angle rounded, not produced; dorsal margin of diaphragm produced in the middle, the armature running down to the orifice and studded with minute spines. Anal segment on same plan as in *Aloha ipomoeae*, the anal spines large, in full view, strongly diverging to apex, wide at base. Genital styles reaching to anal segment, truncate and broad at apex, inner angle produced, narrowed in middle, anal angle large and quadrate. Aedeagus cylindrical, apex acute, orifice on ventral aspect at apex, five or six spines along ventral aspect, a few on right side and a few on left. Black between carinae of head and pronotum, carinae and antennae light brown or yellow, mesonotum black with the hind apex yellow, coxae black, legs sordid yellow, the femora with a faint longitudinal fuscous mark. Abdomen dark, yellow at base with small light marks on pleura and in the middle on apical tergites, anal segment sordid yellow. Tegmina hyaline, light sordid yellow with a large subtriangular fuscous mark in middle, the base of the triangle is slightly concave and extends along the nodal line from apex of costal cell to apex of clavus, the apex is near base, one side running parallel with Sc + R and the other across to near apex of clavus; veins

same color as membrane, tubercles very sparse, minute and bearing black macrotrichia.

Female. Brachypterous; length, 2.2 mm.; tegmen, 1.5 mm. Similar in structure and color to male, but the mark on tegmina greatly reduced.

Described from two males and one female from Kumuwela from which the holotype and allotype are selected, and two males from Nualolo, which have the mark on tegmina reduced and faint (*Swezey*, August, 1921), off *Campylotheca*. Type No. 1055.

***Ilburnia naenae* sp. n.** Figure 12.

Male. Brachypterous; length, 2.4 mm.; tegmen, 1.8 mm. Length of vertex 1.7 times the width, apex rounded, projecting slightly in front of eyes, base considerably behind the middle of eyes; length of face 2.2 times the width, widest in middle, sides slightly curved, median carina simple or slightly thickened at base, but not furcate. Antennae reaching to near middle of clypeus, second segment double the length of first. Tegmina reaching to base of pygofer.

Opening of pygofer slightly longer than wide, margins entire, rounded, anal emargination large, anal angle not produced. Dorsal margin of diaphragm U-shape with a median armature projecting in middle and continuing to near orifice, the armature with a row of very fine spines on each side. Anal segment medium size, spines flattened laterally, bases well apart. In some specimens the anal spines are more acute than in the one figured. Genital styles reaching to anal segment, flat, apex truncate with the apical corners produced, the inner one more so than the outer, outer margin slightly concave, inner margin concave on apical half, convex on basal half, basal angle obscure. Aedeagus subtubular, slightly flattened laterally, slightly curved, a large, broad-based, flattened spine arises about the middle of the ventral aspect slightly on the right side, the base extending about one-third the length; on the left side there is a small spine and a couple of minute ones on apical dorsal and apical ventral aspect, orifice at apex on ventral aspect.

Prothorax and mesothorax, head between carinae, front and middle coxae black or dark brown. Antennae, carinae of head, legs and hind coxae yellow, abdomen black or dark brown with base and small marks at side, along posterior margin of segments and the anal segment, yellow. Tegmina hyaline with a brown mark at apex of costal cell and another at apex of clavus with a very slight infuscation stretching between them; veins same color as membrane, tubercles sparse, minute, same color as veins, bearing black macrotrichia.

Female. Brachypterous; length, 3.1 mm.; tegmen, 2.4 mm. In color somewhat lighter than male, the carinae of thorax light.

Described from nine males and seven females from Alakai swamp (*Swezey*, August, 1921), off *Dubautia* sp. The native

name of the various species of this plant, as well as of some of the larger *Raillardiae*, is "naenae."

There is considerable variation in color from the darker to the lighter forms in both sexes, in some the dark mark on tegmen is distinct and runs basad along Sc + R. This species I place near *I. geranii*. The aedeagus recalls that of *Nesores-tias nimbata*. Type No. 1054.

***Ilburnia viridis* sp. n.** Figures 13, 13a.

Male. Brachypterous; length, 2.1 mm.; tegmen, 1.5 mm. Length of vertex subequal to width, base slightly behind the middle of eyes, apex rounded, produced slightly in front of eyes, carinae obscure; length of frons 1.8 times the width, widest slightly on apical third, median carina obscure. Antennae reaching near to middle of clypeus, second joint double the length of first. Tegmina reaching to base of pygofer.

Pygofer considerably wider than long, ventral margin shallowly and roundly emarginate and thickened; lateral margins round, entire; anal emargination moderate, enclosing slightly more than half the circumference of anal tube, anal angles rounded, not prominent. Diaphragm fairly long, dorsal margin biconcave, the middle produced into a point, the armature forming a thin plate from dorsal margin to orifice, which in lateral view has three or four irregular serrations. Anal segment moderately large, anal spines moderately large, broad, flattened laterally. Genital styles narrow, long, reaching to anal segment, diverging, inner margin sinuate, outer margin concave in middle, apex truncate, basal angle moderately developed. Aedeagus long, slender, subcylindrical, the apical half straight, basal half slightly curved upward, a row of small teeth along the ventral aspect of apical half or two-thirds, and three or four on dorsal aspect in middle, a few small teeth on left side near apex; orifice on left side at apex.

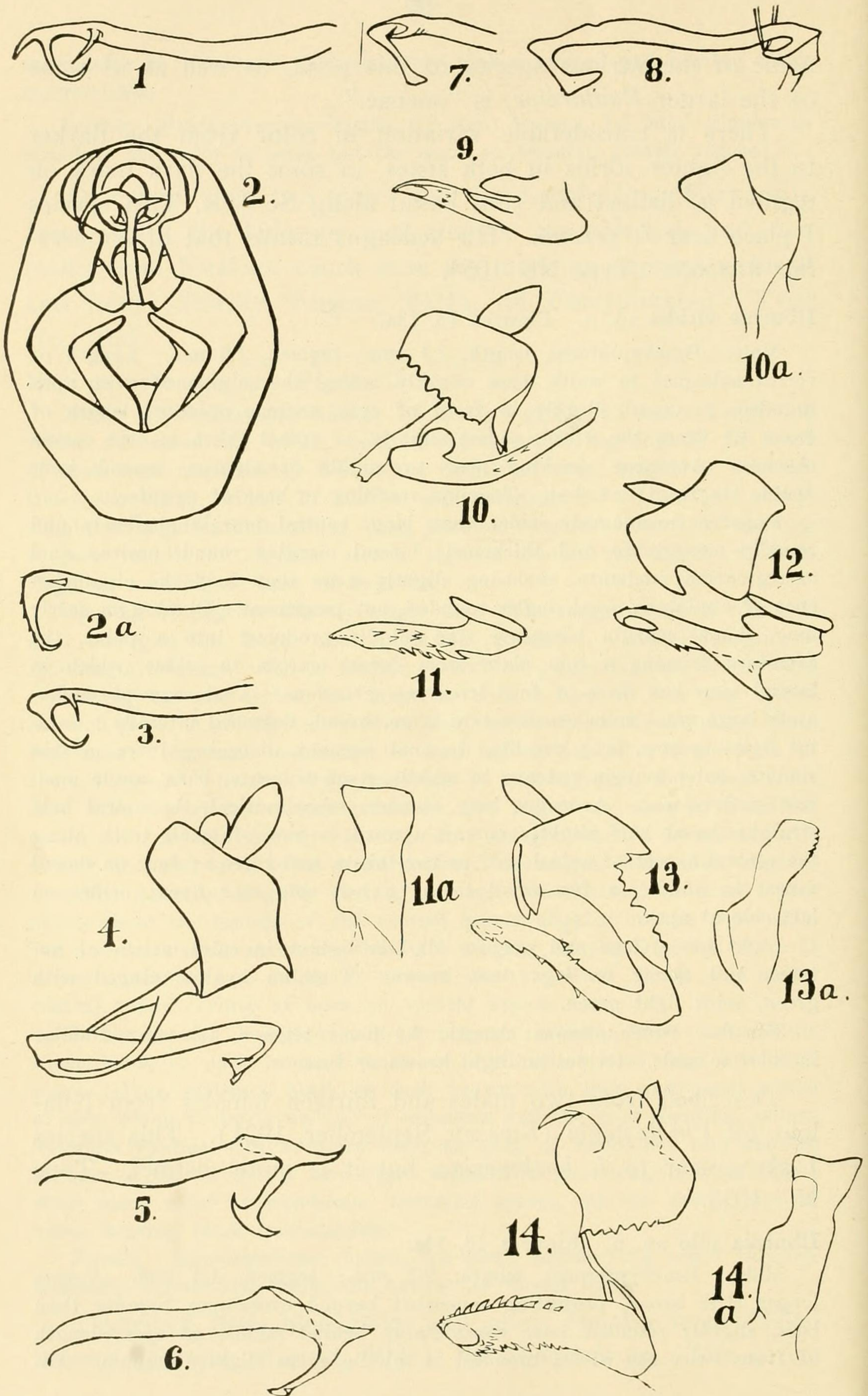
Light green, legs and pygofer slightly lighter in color, arista of antenna and spines on legs dark brown. Tegmina hyaline tinged with green, veins light green.

Female. Brachypterous; length, 2.4 mm.; tegmen, 1.8 mm. Similar in color to male. Ovipositor light brown or fuscous.

Described from two males and thirteen females from Nualolo, off *Phyllostegia* (Swezey, September, 1921). This species I place near to *I. boehmeriae*, but it is quite distinct. Type No. 1053.

***Ilburnia pilo* sp. n.** Figures 14, 14a.

Male. Brachypterous; length, 2.1 mm.; tegmen, 1.4 mm. Vertex longer than broad, projecting somewhat beyond eyes, apex broader than base, slightly rounded, base considerably behind middle of eyes; length of frons twice the width, broadest in middle, sides slightly arcuate. An-



Male genitalia of Delphacidae.

tennae reaching to near middle of clypeus, length of second segment nearly twice the first. Tegmina reaching to base of pygofer.

Opening of pygofer longer than broad, margins entire, ventral margin very slightly emarginate; anal emargination large, anal angle angular but not produced; diaphragm fairly long, dorsal margin broadly U-shape, armature forming a broad ridge from dorsal margin to orifice, but not greatly produced, surface slightly shagreen. Anal segment large, spines large, wide apart, their bases greatly enlarged in lateral view, similar to the spines in *Aloha ipomoeicola*. Genital styles reaching to dorsal margin of diaphragm, apex truncate, basal angle not greatly produced, slightly narrowed in middle. Aedeagus subtubular, slightly flattened laterally, very slightly curved; in the dorsal aspect of the apical half there is a row of about ten teeth, on the ventral apical half a row of about two irregular teeth, with a few on the right side.

Dark brown or nearly black, carinae of head and thorax lighter, antennae lighter, legs lighter, coxae and femora fuscous; abdomen dark, with posterior margin light. Tegmina hyaline, slightly fuscous except apical cells and base of clavus, the veins in fuscous area darker, tubercles minute, bearing black macrotrichia.

Female. Brachypterous; length, 2.7 mm.; tegmen, 1.7 mm. Similar in color to the male. Tegmina reaching to base of eighth abdominal tergite.

Macropterous; length, 2.7 mm.; tegmen, 2.6 mm. Similar in color to the brachypterous form; the tegmina hyaline with brown veins and no fuscous mark.

PLATE III.

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Described from twenty-two males, twenty females, and a number of nymphs from Haleakala, 5800 feet elevation, off *Coprosma ernodeoides* (Timberlake, July, 1919), the native name of all the species of this genus being "pilo."

This species is near *I. coprosmicola* of Hawaii, but differs distinctly in the genitalia. In *I. coprosmicola* the pygofer is more excavate on the ventral margin and the genital styles more exposed, longer, apex oblique and reaching to the anal segment; the armature of diaphragm is much larger, and projects as a thin flange; the aedeagus is more slender, and the spines not so stout. Type No. 1058.

***I. ahinahina* n. n.**

Ilburnia pulla Muir Pro. Haw. Ent. Soc. IV, p. 98 (1919), pre-occupied by *I. rubescens* var. *pulla* (Muir). Pro. Haw. Ent. Soc. III, p. 186 (1916).

***Kelisia swezeyi* Kirk.**

A small series from Halemanu off *Eragrostis* (Swezey, August, 1921).