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A Contribution to the Taxonomy of the Subfamily Issinae in America North of Mexico (Fulgoridae, Homoptera)

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PART III

ABSTRACT: This paper comprises the third part of a monograph dealing with the taxonomy of the subfamily Issinae (Fulgoridae, Homoptera) in America, North of Mexico. In Part I* the genus *Dictyssa* was discussed. In part II† a key to the genera was given and the following genera were discussed, *Euthiscia*, *Hysteropteron*, *Dictyonia*, *Dictyssonina*, *Dictyonissus*, *Neactus*, *Misodema*, *Ulixes*, *Tylana*, *Traxus*, *Thionia*, and *Picamnia*. In the present paper seven genera have been revised, namely *Dictyobia*, *Dictydca*, *Osbornia*, *Papagona*, *Bruchomorpha*, *Danepteryx* and *Tylanira*. *Tylanira* Ball is a monotypic genus to date. The genus *Papagona* has two species, as does *Osbornia*, although the latter has one color variety. The genus *Dictyobia* has four species, *Dictydca* seven, *Danepteryx* six, and *Bruchomorpha* twenty, making a total of forty-two species studied in this section of the work. Of this total number the following species are described as new: *Dictyobia varia*, *Dictydca valida*, *Dictydca uhleri*, *Dictydca nigrata*, *Bruchomorpha keidensia*, *Bruchomorpha rosca*, *Bruchomorpha beameri*, *Bruchomorpha nodosa*, *Bruchomorpha tenebrosa*, *Bruchomorpha bunnii*, *Danepteryx aduneta* and *Danepteryx robusta*. A color variety of *Osbornia arborca* was described and named var. *fusca*.

Some of the older species have been redescribed and comparative notes and drawings are given for all species except the following, which the writer has not seen: *Dictydca falcata* Van Duz., *Dictydca variegata* Van Duz., *Papagona papoosa* Ball, and *Tylanira bifurca* Ball. The male genitalia have been figured for all species except *Dictyobia combinata*, *Dictydca uhleri*, *Bruchomorpha nodosa*, *Bruchomorpha bunnii*, and the four listed above.

Synonyms in this paper, all of which are in the genus *Bruchomorpha*, are as follows: *B. nasuta* Stal = *B. oculata* Newman, *B. flavo-vittata* Stal = *B. dorsata* Fitch, *B. bicolor* Metcalf = *B. vittata* Metcalf and *B. bimaculata* Dozier = *B. jocosus* Stal.

The characters which have been of most value in classification of these species are the male genitalia, the shape and position on the body of the tegmina, the wing venation including the fineness or abundance of reticulation, the shapes and position of both the frons and the postclypeus.

* The University of Kansas Sci. Bull., Vol. XXIV, No. 17, 1936.

† The University of Kansas Sci. Bull., Vol. XXV, No. 20, 1938.

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THE GENUS *DICTYOBIA* Uhler 1889

Uhler, P. R. New Genera and Species of American Homoptera. Trans. Md. Acad. Sci. 1, p. 39, 1889.

Comparative notes. Tegmina opaque, dark brown to black, with vitreous spots and bands, abbreviated oblong in shape, broadest just at middle, held more or less horizontal to body and about same length as body; reticulation moderate, with cells of apex much larger than rest; venation tending to follow the following pattern: Vein Sc, present, setting off a broader costal margin than in *Dictydea*, vein Sc₂ and R branched near base, vein M branched posterior to apex of clavus, vein Cu divided before middle, each of these veins combining again before apex where they are all connected by an apical vein which circumscribes the corium and thus sets off a distinct apical membrane. Hind wings mere scales. Hind tibiae with two spines.

This genus resembles *Dictyssa*, *Dictydea*, *Dictyssonina* and *Neacethus* more than any others in the subfamily. From *Dictyssa* it is separated by its larger body size and much longer tegmina with an undulating surface. From *Dictydea* it is separated by its much broader wings with rounding costal border while in the latter the costal margin is straight and the tegmina are held vertically against body. It differs from *Neacethus* mainly by having the tegmina subangulately expanded before middle, ramosely reticulate and with the arcoles usually large and irregular. In *Dictyobia* the tegmina are horizontal to body, approximately same length as body, but each tegmen undulates between depressions and inflated areas, while in *Neacethus* the tegmina are usually distinctly vertical, longer than the body and flat.

HISTORY OF THE GENUS

Uhler (1889) described the genus with the species *permutata* as the type species. In 1910 Dr. E. D. Ball described *combinata*, and in 1914 Doctor Van Duzee described *atra*. In the present paper one new species is being added, namely, *Dictyobia varia*.

KEY TO SPECIES

1. A robust species, tegmina more than twice longer than width, veins very heavy and correspondingly greatly depressed cells; vertex nearly three times the length of one lateral margin..... *Dictyobia combinata* Ball, p. 86
- Smaller species; tegmina not quite twice longer than wide, veins less elevated, lighter colored with cells less concave; anterior margin of vertex less than two and one-half times the length of a lateral margin..... 2
2. (1) Tegmina less closely reticulated, the pale arcoles frequently large, especially near apex, or many united, with their margins studded with spurs of veins.
Dictyobia permutata Uhler, p. 85
- Tegmina closely reticulated, none of the pale arcoles much larger than others, 3

3. (2) Vertex narrower, its anterior margin not much over twice wider than one lateral margin, angulately produced forward beyond eyes; color of dark patches of tegmina variegated brown *Dictyobia varia* n. sp., p. 86
- Vertex somewhat broader, its anterior margin about two and one-half times the length of one lateral margin, not produced at all beyond anterior margin of eye, tegmina velvety black with pale areoles in sharp contrast.
Dictyobia atra Van Duzee, p. 85

Dictyobia permutata Uhler, 1889

Uhler, P. R. New Genera and Species of American Homoptera. Trans. Maryland Acad. of Sci. 1, p. 39, 1889.

Comparative notes. Uhler described the species from five females taken at Los Angeles, Cal., and for which he gave the size as being 5-6 mm. The writer had available for study one female specimen from the National Museum, collected by C. V. Riley at Los Angeles and two male specimens from Coquillett's collection taken at Los Angeles, and the length of these was 4.4-4.5 mm. The males showed the distinguishing characteristic mentioned by Van Duzee and Uhler of the pale areoles being fewer in number, larger towards the apex, but the female specimen showed more numerous pale cells with greater uniformity, although at several spots these smaller cells tended to join together to produce the larger hyaline spots. Frons with median carina prominent, the disk yellowish-tan spotted with dark brown.

Male genitalia. The harpago in flattened lateral view is distinguished by having a larger, more curved external hook than in other species as is seen in the drawings. The anal flap is approximately twice longer than wide and the eleventh segment bears a short stylus.

The aedeagal structure is distinctive. The basal fourth of the aedeagus is covered by the semimembranous theca which on the dorsal side extends caudad into a long, slender, sharply tapering flap which does not quite reach the apex of the aedeagus. The aedeagus is a sclerotized tube, bearing at approximate base of apical fourth a small spinelike process and near base, projecting beyond the posterior lateral margin of the theca, two sickle-shaped processes, of which the ventral one is a trifle the shortest.

Notes on distribution. Described by Uhler from specimens taken at Los Angeles, Cal. One additional specimen has been noted from Monrovia, Cal.

Dictyobia atra Van Duzee, 1914

Van Duzee, E. P. A Preliminary List of the Hemiptera of San Diego, Cal. Trans. of San Diego Soc. of Nat. Sci. 2 (1), p. 42.

Comparative notes. In the original description Mr. Van Duzee states that it is the size and form of *permutata*, presenting no really good structural characteristics, but that it may be distinguished by

its velvety black color, especially on the elytra. He gives the length as 4.5 mm., and points out that the elytra are closely reticulated with the pale vittae obscured by black veinlets and with none of the pale areoles materially larger as they are in *permutata*.

The differences noted above are the main distinguishing characters other than the male genitalia. The species of this genus are not easily separated.

Male genitalia. The anal flap seems comparatively shorter and broader than in *permutata*, its length being only one-third longer than its width. The eleventh segment is more conspicuous and bears a relatively longer stylus.

The harpago in flattened lateral view has its dorsal apical angle somewhat more produced and the external lateral hook is proportionally shorter.

The aedeagus differs from that of *permutata* by having the two curved basal hooks proportionally longer, by lacking the small stiletto process at base of apical fourth and instead having a sharply pointed longer process at about middle of aedeagus.

Notes on distribution. Described by Doctor Van Duzee from numerous examples taken on the chaparral from May to July at San Diego, Cal. Examples in the Snow Entomological Collection are from Idyllwild, San Jacinto Mountains, Big Bear Lake, Monrovia and Cajon, Cal.

Dictyobia combinata Ball, 1910

Ball, E. D. New Genera and Species of Issidae (Fulgoroidea). Proc. Biol. Soc. Wash., XXIII, p. 43.

Comparative notes. Doctor Ball points out in the original description that it is slightly longer than *permutata* with longer, less angled elytra. The author found the length of the female specimen studied to be 4.8 mm., and that the tegmina were over twice wider than long with the costal margin distinctly rounding. The vertex of this species is broader than in other species, six times wider than its median length.

Male genitalia. Only one female was available for study.

Notes on distribution. Described from five specimens taken at Colfax, Cal. The author had one specimen from San Jacinto Mountains, California.

Dictyobia varia n. sp.

ORIGINAL DESCRIPTION

Size. Greatest length varies between 3.5 mm. and 4.2 mm. Greatest width of tegmen 1.8 mm. This is the smallest species in the genus.

Color. General color lighter than in other species, being yellowish-tan marked with brownish-fuscous. Vertex fuscous except a median pale-yellow stripe and a thin pale border on all sides with, however, the carinalike edges brown. Eyes fuscous. Frons tan variegated with brown through disk, the brown marks becoming deeper just inside lateral margins where they set off circular yellow spots of varying sizes. Postelypeus light yellow, washed on each lateral disk with brown. Pronotum yellow, washed in fuscous, a light yellow median stripe and each lateral disk speckled with dark brown; mesonotum reddish-brown except extreme lateral corners, thin median line and posterior apex light yellow; venter at thorax light yellow. Abdomen light yellow near base, becoming reddish-brown toward apex, sometimes terga of 6th, 7th and 8th segments mottled with dark brown. Tegmina more variegated or speckled in appearance than other species; longitudinal veins, tannish-yellow, veinlets between dark brown in sharp contrast to the white areoles; the pale areoles forming a diagonal vitta from middle of clavus to the costa behind middle, somewhat constricted at middle, where it sends a branch to the inner apical angle so that a rough Y is marked off in the fuscous background, the fuscous areas mottled in fuscous and reddish-brown; on the costal margin is a pale spot consisting of several round pale spots and another row of pale spots near apex just anterior to apical vein, the entire costal and apical margins bordered with white spots which are smaller and more circular at base, becoming fewer and larger toward apex so that the brown spots between are greater in diameter than the white ones. Legs mostly light brown, except pale at tips of coxae, femora and tarsi and a longitudinal stripe down length of femur, claws black-tipped.

Structural characteristics. Vertex narrower in this species, being only twice wider along anterior margin than one lateral margin and the anterior margin roundly produced. Frons narrowed, with parallel sides and one lateral margin slightly more than one-fifth longer than the basal margin. Pronotum concave through disk, a crescent-shaped carina elevated against vertex, behind eyes narrowed to a slender arm, becoming knoblike at extreme side, after which it expands into a platelike flap below eye on ventral side. Mesonotum with two diverging distinct lateral carinae. Tegmina not extending beyond abdomen, with position on body and undulations characteristic of genus, longitudinal veins distinctly elevated, cross nervures less so, reticulation finer even than in *D. atra*, especially near base, cells less concave than in *combinata* or *atra*.

Male genitalia. Anal flap parallel-sided, truncate at apex, not quite twice longer than wide. Eleventh segment distinctly visible with a prominent fingerlike stylus.

Each harpago from flattened lateral view is distinctive from other species in that the apical dorsal angle is much less extended dorsad into a shorter apical hook and externally bears a longer, recurved hooklike process.

The aedeagal structure also differs distinctly by having the two curved basal hooks which protrude beyond posterior margin of the theca, much broader basally and thus proportionally much thicker and shorter than in other species while the aedeagus itself is proportionally much shorter.

Comparative notes. This species is distinguished from other species externally by its more mottled coloring of the tegmina with the distinctive light longitudinal veins, its finer reticulation, less concave cells and its narrow vertex. The male genitalia differ as mentioned above.

Distribution and types. Described from one male holotype, one female allotype and 8 female and 7 male paratypes taken at Big Bear Lake, California, on July 26, 1932, by Dr. R. H. Beamer. These types are in the Snow Entomological Museum at the University of Kansas.

The Genus Dictyodea, 1888

HISTORY OF THE GENUS

This genus was erected by P. R. Uhler in 1888 for two species, *angustata* Uhler and *intermedia* Uhler. Both are taken in California. In 1938 Dr. E. P. Van Duzee described two additional species, *variegata* and *falcata*. In the present paper three new species are being added, namely *D. valida*, *D. uhleri* and *D. nigrata*.

Comparative notes. This genus seems to be a transition between the genera *Danepteryx* and *Dictyobia*. Its distinguishing characteristics are a quadrangular vertex, depressed through disk, a hemispherical pronotum protruding forward between eyes with elevated anterior margins, becoming very abbreviated as a thin arm around eye, which again broadens into a flat, broad plate on side of head below and posterior to eye. Frons vertical to body, clypeus deflexed. Tegmina narrow, not usually so scimitar-shaped as in *Danepteryx*, although *falcata* and *variegata* approach this shape, much of the underside of body exposed below tegmina. Venation as follows: Vein Sc_1 close to costal margin, extending approximately halfway of tegmen; main longitudinal veins distinct, elevated, vein Sc_2 and R

branching somewhere around middle, M vein branching in the neighborhood of claval apex, sometimes four-branched. Hind wings short and folded once longitudinally. Hind tibiae with two spines.

KEY TO SPECIES

1. Tegmina broad, two and one-half to three times longer than greatest width; vertex broad, anterior margin more than twice length of lateral margin. 2
 Tegmina narrower, three and one-half to four times longer than greatest width; vertex narrower 5
2. (1) Tegmina greatly widened across ap x. considerably sloping; color yellow with fuscous and hyaline spots and bands. *D. valida* n. sp., p. 89
 Tegmina only moderately expanded across apex so that costal and anal margins are subparallel; color dark with whitish spots in sharp contrast. 3
3. (2) Tegmina uniform dark brown with hyaline spots only in the cellules along the border *D. angustata* Uhler, p. 91
 Tegmina dark brown, but with additional hyaline spots on corium or clavus, or both 4
4. (3) Body and tegmina almost black, uniform except for a few hyaline spots halfway of clavus, another small group along costal border at base of apical third; clavus long *D. nigrata* n. sp., p. 92
 Tegmina dark with many hyaline spots and a distinct transverse hyaline band across corium just posterior to apex of clavus. *D. intermediate* Uhler, p. 94
5. (1) Tegmina not so narrow, only about three and one-half times longer than greatest width; blackish-brown with white border marks, *D. uhleri* n. sp., p. 95
 Tegmina narrower, about four times or more longer than greatest width. 6
6. (5) Tegmen long, strongly decurved at apex, black with a sutural white spot beyond tip of the clavus, the margin sparsely spotted with white. Length, 6 mm. *D. falcata* Van Duzee.
 Tegmina parallel, with the apex lanceolate and the costa straight, the sutural margin white with fuscous veins; body varied with fuscous and pale. Length, 4-5 mm. *D. variegata* Van Duzee.

NOTE.—The writer did not have specimens of *D. falcata* or *D. variegata* for study. The characters given in the above key are taken directly from the key in Professor Van Duzee's paper (1938). The specimens of *D. nigrata* were compared by Doctor Beamer with the specimens in Professor Van Duzee's collection and found not to be the same.

Dictydea valida n. sp.

Size. One of the largest and most robust species in the genus. Length of female from apex of head to tip of tegmen, 5.2 mm. to 5.4 mm.; length of male, 4.8 mm. Greatest width of tegmen just back of claval apex, 1.7 mm.

Color. Color distinctive, having a general tan color marked with fuscous, whereas other species are piceous black. Upper body tan, marked with splashes of reddish-brown on disk of vertex, pronotum and mesonotum; a faint cream median line on vertex and pronotum, on each side of which, on pronotum, are two round, depressed spots. The thin carinate margins of frons, vertex, pronotum, dark brown. The carinae, lateral margins and apex of mesonotum lighter yellow tan. Frons golden tan with an irregular dark spot in center and numerous round, brown, depressed spots along each lateral margin. Clypeus golden tan with brown oblique bands on each lateral disk of postclypeus and each lateral half of anteclypeus mostly dark.

Eyes reddish-brown. Thoracic segments yellowish-brown. Legs golden brown with darker streaks on femora, carinae of tibiae and tarsal claws blackish-brown. Abdominal segments mostly yellow tan, the first few segments marked with round, brown spots across disks of venter and sometimes the lateral posterior margins dark brown. Tegmina splotted in cream, light and dark fuscous as follows: A large, irregular dark fuscous spot with base starting at apex of clavus and spreading over into corium; a smaller, dark spot in line with this on costal border from whence a lighter fuscous longitudinal band extends cephalad to base of tegmen; an indefinite brownish crescent across apex inside of membrane; these darker areas thus setting off an irregular light Y of creamy, semiopaque cells on each tegmen as viewed from the side; veins light yellowish-tan.

Structural details. Vertex deeply depressed across disk with lateral and anterior margins sharply carinate and elevated, its width along anterior margins three times greater than on lateral margins. Pronotum with anterior margin evenly, roundly protruded between eyes, each lateral part of this margin distinctly elevated, although not as much as in other species, disk depressed with a pair of round, sunken pits in middle. Mesonotum elevated up from sides, having a long anterior border through middle a deep crescent-shaped crease, on each side a lateral carina which extends from anterior border to posterior border, a less pronounced median carina present and the extreme apex set off by a shallow, depressed transverse line. Frons slightly longer than wide, the lateral margins outwardly rounded and somewhat elevated, and a well-pronounced median carina present. Clypeus in length equal to anterior margin, angulately produced into frons. Tegmina distinctive in shape because of its more evenly rounded claval and apical margin, giving the wing a hemispherical shape and a much greater slope to the costal margin. Venation prominent, vein M branching considerably anterior to middle and Sc_2 and R branching posterior to M.

Male genitalia. Anal flap rectangular in shape with posterior ventral margin of the tube truncate notched.

Each harpago from flattened lateral view rectangular with the ventral margin moderately curved outward and the dorsoventral angle extended cephalad into a tapering hook with an external ventrad curving process attached near this point.

The aedeagal structure is long and slender. The sleevelike theca does not quite cover half of the aedeagus on the lateral and ventral sides, is notched or split on the dorsal side, and then this dorsal part

extends caudad as a partially sclerotized flap which is slightly longer than the aedeagus itself.

The aedeagus is a sclerotized tube, bearing two sharply pointed hooks near the base, whose apices show beyond the caudal rim of the theca and a third, smaller, sharply pointed hook at about base of apical third.

Comparative notes. This species is readily distinguished from other species by the large, robust size, the light colored, variegated tegmina, and the semispherical shape of the latter.

Notes on distribution. Described from male holotype and female allotype taken in the Giant Forest, California, July 28, 1929, by R. H. Beamer, two female paratypes same data, one female paratype and one male paratype from Maria county, California, August 3, 1929, by Paul Oman. These types are in the Snow Entomological Museum, University of Kansas.

Dictydeca angustata Uhler, 1889

Uhler, P. R. New Genera and Species of American Homoptera. Transactions Maryland Academy of Sciences, Vol. I, p. 37, 1889.

Van Duzee, E. P. The Genus *Dictydeca* Uhler (Homoptera, Issidae). Pan-Pacific Entomologist, Vol. XIV, No. 1, pp. 33-35.

Comparative notes. This is a piceous black species with no hyaline spots on the tegmina except along the border, and measuring about 5 mm. in length from tip of head to apex of tegmen for female, and 4.5 mm. for male.

Uhler separates this species from *intermedia* by being less robust and with the wing covers not convex behind middle as in that species. Additional minor differences from other species noted by the writer are: The lateral margins of frons subparallel, venation of the tegmen tending to be that vein Sc and R branch at apex of apical third, and vein M at tip of clavus.

Male genitalia. Anal tube and flap larger than in *intermedia*, each lateral margin convex and both converging to a truncate apex where the extreme caudal margin of flap is slightly concave. The eleventh segment is visible as a short, but distinct annulus, and bears an extremely large stylus which is broad at base, then is bluntly pointed and almost reaches caudal margin of flap.

Each harpago in flattened lateral view is subrectangular in shape except for posterior dorsal angle which extends cephalad into a short, recurved hook and at base bears a blunt median hook on the inside and externally a much more sharply pointed hook which curves ventrad.

The aedeagal structure is similar to this process in *intermedia*. For a written description, see the discussion under the comparative notes for that species. A comparison of the drawings will show the differences in the two species. In the drawing of *angustata* the aedeagus has been raised slightly out of its normal position, so that the hooks point somewhat differently.

Notes on distribution. Uhler described the species from a pair taken at Los Angeles, Cal., by Coquillett. Additional specimens in the National Museum and Snow Entomological Collection have been taken at Saugus, Cajon and Mint Canyon, California.

Professor E. P. Van Duzee (1938) states that he has taken *angustata* in Mint Canyon, north of Saugus, California, and Dr. E. C. Van Dyke has taken at Lythe Creek, San Bernardino, California, a series of a form that does not seem to differ except in its larger size and darker color.

Dictydeca nigrata n. sp.

ORIGINAL DESCRIPTION

Size. Length of body from apex of head to tip of abdomen for female, 4.8 mm.; male, 4.6 mm. Length of tegmen, 4.4 mm. Greatest width of tegmen, 1.73 mm. Width of pronotum, female, 1.75 mm.; male, 1.6 mm.

Color. Blackest species in the genus. Vertex, pronotum and mesonotum brown-black except for a faint, median, light streak, the extreme lateroposterior angles of vertex and apex of mesonotum yellow. Eyes gray-brown. Frons dark brown, faintly mottled in light fuscous, clypeus yellow-brown, darker on extreme sides. Gena brown-black except the extreme lateral region back of eye and a spot below antennae. Antenna brown-black, except tip of pedicel and connecting conjunctivae of segments. Body segments brown-black mottled in lighter brown, connecting conjunctivae of legs white in sharp contrast to rest of dark body. Legs darkly infuscated except at the bases and apices of segments. Tegmina uniformly pitch brown except for sharply contrasting, semiopaque, white spots in the following places: On clavus a series of roundish spots along inner margin, a group of 3 to 4 spots across its middle, and another single spot toward apex, on corium round, rather uniform, spots scattered all around margin, one or two roundish spots located just anterior to base of apical third along costal margin, another one or two transversely in line with this, but lying between vein M_{3+4} and Cu_1 .

Structural characteristics. Vertex somewhat narrower than in *angustata*, its anterior margin being about two and one-half times as

wide as one lateral margin. Frons approximately as in *angustata*, although a trifle narrower as compared side by side, with its median carina sharp and appearing even more elevated than the lateral margins. Pronotum much as in *angustata*, being four times wider than length at middle and the lateral arm behind eye elevated knoblike, after which it narrows again to surround eye before expanding into the characteristic flattened lobe on the extreme side of head. Tegmina of the broader type, its length about two and three-fourths times its greatest width, which is at base of apical third. Longitudinal veins distinct, but not as much as in some species, cross veins also distinct. Vein Sc_2 and R branching just before middle, vein M in line with apex of clavus, Cu_1 branching anterior to middle.

Male genitalia. Tenth abdominal segment extremely long, almost parallel-sided for two-thirds its length, then narrowing considerably to form the anal flap of which the apical margin is concave. Eleventh segment ringlike, visible beyond the dorsal posterior rim of the tenth segment, on its ventral margin bearing a broad stylus.

Each harpago from a flattened, lateral view is rather L-shaped, the dorsal posterior third extended into a triangular projection, at base of which on inside is a broad, pointed hook, another external to this with a slightly recurved apex.

The aedeagus is a long, slender, gooseneck tube covered on basal third by the more sclerotized, sleeve-like theca. The dorsal part of the latter is extended caudad as a pointed flap which does not quite reach to apex of aedeagus. No sclerotized hooks of the aedeagus are visible, but one is visible through the wall of the theca.

Comparative notes. This is one of the broader-winged species in the group, each tegmen at its greatest width being about two and three-fourths times longer than wide, while in *angustata* it is about two and one-half times longer than wide. In color it resembles *D. falcata* Van Duzee, but is separated from that species by the much broader tegmina.

Notes on distribution and types. Described from two specimens, holotype male and allotype female, taken at San Antonio Canyons, California, on August 4, 1938, by R. H. Beamer. Types are in the Snow Entomological Museum at the University of Kansas.

Dictydea intermedia Uhler, 1889

Uhler, P. R. New Genera and Species of American Homoptera. Transactions Maryland Academy of Sciences, Vol. 1, p. 38, 1889.

Van Duzee, E. P. The Genus *Dictydea* Uhler (Homoptera, Issidae). Pan-Pacific Entomologist, Vol. XIV, No. 1, pp. 33-35.

Comparative notes. This species was described from three females, of which the length was given as 5-6 mm., and the width across pronotum as 1.75 mm. The length of the males is around 4 to 4.6 mm., and the width of pronotum 1.6 mm.

The main distinguishing features of this species are that the lateral margins of frons are slightly convergent; the costal margin of tegmen is slightly convex behind tip of clavus; the vein Sc_2 and R usually branches at middle and M at middle or slightly posterior and the color pattern of tegmen is as follows: Ground color black piceous, with a large hyaline triangular spot spreading across the clavus upon the adjoining cells of corium, a band of the same color transversely crosses the corium behind tip of clavus, a similarly colored spot curves near the apex and the flattened border all around the wing cover is interruptedly brown and hyaline.

Male genitalia. Anal flap elongate, the ventral margin expanded only one-third of the total length, at apex only slightly concave. The eleventh segment is not visible except for fingerlike stylus.

Each harpago in flattened lateral view narrowed at base, greatly expanded across apex, its apical dorsal region extended into a slender, slightly cephalad curving hook, bearing just back of middle along dorsal margin two short hooks, a much shorter stout inner one and a slightly longer external one which curves downward and slightly cephalad.

The aedeagal structure is asymmetrical. From the left side the theca covers the basal third of the aedeagus like a membranous sleeve, then splits along the side, the ventral part then forming a bluntly pointed flap reaching only halfway of the total structure, the dorsal part extended caudad into a long, sharply pointed flap which is as long as the aedeagus itself. The exposed part of aedeagus between the split theca is tubular, ending in a sharply pointed spine and bearing in all four sclerotized processes, two located on the left side at the place where the theca is notched, and a small one near tip. On the right side is a larger, recurved process attached approximately at middle and extending to base of apical third of aedeagus.

Notes on distribution. Uhler gives the type locality as Los Angeles, California. The writer had a few specimens for study from

the following places in California: Saugus, Mint Canyon, Big Bear Lake and Cajon.

Professor E. P. Van Duzee (1938) states that this species is a common species in Mint Canyon on the holly-leaved cherry, *Prunus illicifolia*.

Dictydeca uhleri n. sp.

ORIGINAL DESCRIPTION

Size. Male, from apex of head to tip of tegmen, 4.7 mm. Greatest width of tegmen, 1.2 mm. Width across pronotum, 1.4 mm.

Color. Ground color fuscous brown. Vertex with a faint median streak and each lateroposterior corner yellow. Eyes gray-brown, head back of them yellow. Frons yellow, washed in longitudinal streaks of brown, a broad uninterrupted one on each side of median carina, and another mesad of each lateral carina which is interrupted lengthwise through middle by yellow spots. Postclypeus yellow with oblique brown stripes at side, anteclypeus yellow through middle, darker at sides. Gena yellow, a spot before antenna, and another before the eyes brown. Pronotum uniform brown except for a narrow median line of yellow and the yellow elevated margins which again are dark brown on extreme edge. Disk of mesonotum brown, crossed by a median longitudinal yellow line, rest yellow. Under-side of body cream yellow, becoming slightly darker on disks of the thoracic sclerites and at sides of the abdominal terga and tip of male harpagoes; a few round, dark spots at sides of first few abdominal sterna. Coxae yellow, infuscated with brown, rest of segments dark brown with carina or longitudinal streaks yellow. Tegmina uniform fuscous brown except for the entire border, which is yellowish-white crossed by numerous dark veinlets or broader dark bands, a small white spot on corium just inside of apex of clavus, a larger triangular area of several semiopaque white cells on corium just posterior to apex of clavus.

Structural details. This is a small, narrow-winged species. Vertex narrower than in several species, its anterior margin only twice wider than one lateral margin or four times its length through middle. Frons narrow, lateral margin one-third longer than its basal or posterior margin, its length through middle equal to length of clypeus, median carina sharp and complete for length of frons, the two lateral margins more or less parallel and greatly elevated. Pronotum roundly produced between the eyes, not quite to the anterior margin of eye, the margins moderately elevated, behind eye reduced to a characteristically narrow rim. Mesonotum depressed considerably through middle, so that lateral areas and apical third are elevated

somewhat knoblike. Tegmina narrow, being about three and one-half times longer than greatest width, which is at base of apical third, not much slope to the costal margin of tegmen in situ since the latter and elaval margins are subparallel. Longitudinal veins, thick and conspicuous, branching as follows: Vein Sc and R branching posterior to middle and vein M considerably anterior to middle.

Comparative notes. This species is easily distinguished structurally from other species by the width of the tegmina, being not as narrow as *falcata* and *variegata* nor as wide as the remaining species. It has a narrower vertex proportionally than the majority, has the pronotum much more reduced behind eyes, and a more elongate frons. In color the species is differentiated by the color pattern of the tegmina as can be noted by reading the descriptions of these structures for the various species or by looking at the drawings.

Notes on distribution. This species was described from one male specimen in the National Museum collection, designated P. R. Uhler collection on a printed label, above which is an ink label, bearing an illegible abbreviation Los Ang., which the writer has interpreted to be Los Angeles. No date is given for the specimen. Holotype specimen in the National Museum Collection.

THE GENUS OSBORNIA Ball, 1910

Ball, E. D. New Genera and Species of Issidae. Proc. Biol. Soc. of Washington XXIII, pp. 41-46.

Comparative notes. The distinctive features of this genus are the ovate, abbreviated tegmina, the elevated and triangularly extended, anterior margin and deeply concave disk of the vertex, the strongly inflated clypeus, tricarinate mesonotum, very rudimentary wings and posterior tibiae with one or two spines.

Wing venation. The venation in this genus is reduced. Vein Sc₁ is not distinct. Veins Sc₂, R, M, and Cu₁ are all single veins arising from the usual basal cell. Vein Cu₂ is found in the elaval suture. First and second A united at tip to form the usual y. The rest of the tegmen is traversed by an irregular network of fainter veins.

KEY TO SPECIES

1. Lateral carinae of vertex and frons meeting above eyes in an acute earlike horn, with anterior margin of vertex emarginate; much abbreviated truncate tegmina, exposing half the abdomen or more. *Osbornia cornuta* Ball, p. 97
- Vertex angularly produced cephalad, lateral angles above eyes not unusually produced; tegmina somewhat abbreviated, but not exposing more than two or three abdominal segments 2
2. (1) Body and tegmina yellow to green with fuscous markings usually only around apical margin of tegmen, sometimes a median brown band on pronotum and elaval margin fuscous. *Osbornia arborea* var. *arborea* Ball, p. 98
- Body and tegmina mostly fuscous or yellow with strong fuscous markings on tegmina *Osbornia arborea* var. *fusca* Doering, p. 99

Osbornia cornuta Ball, 1910

Ball, E. D. New Genera and Species of Issidae. Proc. Biol. Soc. of Washington XXIII, pp. 41-46.

Comparative notes. The distinctive features of this species are the acute outer angles of the vertex which are extended earlike above the eyes; the much abbreviated tegmina which are not much longer than broad, and roundly truncate at apex, expose at least half the abdominal segments and are usually slightly separated by the elevated abdomen; the somewhat compressed abdomen, most segments of which have distinct tuberculate median elevations.

The general body color of *cornuta* is dark brown, speckled and banded with light or reddish-yellow and for the tegmina light with veins and splotches darker.

This species when captured has very frequently already lost its wings or very soon does so after being taken in the net. For this reason many specimens in collections are wingless.

Male genitalia. Anal flap (10th abdominal segment) broad, parallel-margined for two-thirds its length, then tapering to a truncate apex. Eleventh segment typically reduced, bearing a long, slender genital stylus.

Harpagones (genital styli of authors) visible externally as two, long, tapering plates, whose inner margins are adjoined, and very little of abdomen showing beyond their apices. Each harpago as viewed from a flattened lateral view is rectangular and has its extreme dorsocaudal angle prolonged cephalad into a sharply pointed, recurved hook at the base of which is a flat, triangular, external hook. (See drawing 3a, plate XV.)

The aedeagus is asymmetrical. From the left side it appears as a long, slender, roundly curved tube, partially membranous, bearing at apical seventh a long caudad-projecting spine and near its base a pointed, heavily sclerotized hook, which shows only halfway beyond the thecal margin. On the right side the aedeagus shows an external, slender, pointed hook attached just slightly caudad of middle. The theca is membranous and therefore difficult to trace. It covers the basal fourth of the aedeagus as a tube, then on the left side has its caudal margin somewhat broadly notched through upper middle to allow the aedeagal hook to show, its margin ventrad of the notch prolonged caudad into a slenderly tapering, curved process and dorsad of notch as a short, blunt process. On the right side the ventrocaudal angle of the theca projects caudad as slightly

curved, pointed process, whose apex reaches to a point midway of the length of the aedeagus.

Notes on distribution. Doctor Ball described the species from 12 examples taken at St. George, Utah and Mojave, California. A large series is found in the Snow Entomological Collection, University of Kansas, collected by Dr. R. H. Beamer, from Mojave and Palmdale, California, in July, and two specimens from El Paso county, Texas, in July.

Osbornia arborca Ball, 1935

Ball, E. D. Some New Issidae with Notes on Others. Bull. Brook. Ent. Soc. XXX, p. 38.

Comparative notes. Resembling *cornuta* Ball in size and general body form. It differs from *cornuta* by not having the prolonged angles of vertex above the eyes, by its anterior margin of vertex triangularly produced cephalad, and by having much longer tegmina which in this species cover all but the last two or three apical segments of the abdomen, but in *cornuta* only the first two or three basal ones.

Other easily recognized characteristics are the uniform yellow and green color and the transverse depression through middle of tegmina.

Male genitalia. Anal flap (10th abdominal segment) a broad parallel-margined flap which tapers to a slightly emarginate, truncate apex. Eleventh segment not easily visible externally, bearing a short genital stylus.

Harpagones (genital styli of authors) visible externally as two pointed, slender plates, whose length is about three and one-half times their width. Each harpago as viewed from a flattened lateral view appears pear-shaped, but with its dorsocaudal angle prolonged dorsad as a broad, flat extension which is roundly emarginate at its apex. At the base of this extension is a triangular, flat, external hook whose apex is directed ventrad.

The aedeagus in this species is a curved semisclerotized tube with more of a bend in it than in *cornuta*. It is asymmetrical. On the left side it bears a short, thick, spinelike process near its apex and two others attached near base, the dorsal one of which is the longer, broader as it emerges from the theca and at the end forming a slender curved hook, both hooks covered at base by the theca. On the right side it is spineless. The theca is a semimembranous tube embracing about one-half of the aedeagus at base and which on the right side is truncate at its posterior end. On the left side the theca splits along the ventral side, allowing the aedeagus to emerge between the folds.

Notes on distribution. Doctor Ball described the species from about fifteen specimens taken at Patagonia, Arizona, on juniper. In the Snow Entomological Collection at the University of Kansas is a large series taken by R. H. Beamer in July and August at Red Lake, Santa Rita Mountains, Coconino county and Oak Creek Canyon in Arizona, and several specimens from Tucumcari, New Mexico. Mr. E. W. Davis took two specimens from St. George, Utah in August.

Osbornia arborea var. *fusca*

In its extreme color phase this variety is entirely fuscous bordered with black. Vertex smoky brown, except a median line and lateral margins creamy yellow to green. Eyes gray, washed in brown. Frons uniform fuscous except each laterobasal corner and a longer spot on each apical-lateral corner which is light yellow to green and a vertical row of small, dark, brown dots, usually in pairs extending the full length of the disk on each side of the lateral carinae. Clypeus light brown except dark, oblique lines across disk, a spot at the basolateral angle and the extreme lateral margin light. Labrum fuscous. Genae around eyes fuscous, below antennae greenish-yellow. Antennae fuscous. Pronotum from above dark fuscous except for a light spot back of eye in which are found a number of very round, uniform-sized brown dots, pleural flaps of pronotum greenish-yellow through middle, anterior and ventral margins brownish. Mesonotum dark brown, with a faint, light band indicated on each side and the extreme apex light. Tegmina shining brown to almost black, except for somewhat fainter indistinct spots at wing base, a transverse band just anterior to middle, and a roundish spot across apical dorsal cells. Dorsum of abdomen dark brown except for median lighter band, a broader one under the tegmina. Venter of thorax and abdomen blackish-brown, the pleural sclerites light green in sharp contrast. External genitalia of male brown with margins lighter. Female lighter than male. Tegmen yellow with clavus bordered in black, black splotches across middle of corium and apical margins black, a broad band of light across abdominal venters and most of ovipositor valves yellow, edged in black.

Some specimens of true *arborea* approach in color the females of *fusca* by having faint touches of dark on pronotum and border of corium. These, however, usually lack a spot across middle of corium and the black is not so pronounced.

Location of types. Holotype male, collected at Las Vegas, N. Mex., July 18, 1936, allotype female, same place and date, by R. H.

Beamer. Two paratype males, same date. Two paratype males, although lighter in color, from Tucumcari, N. Mex., collected by R. H. Beamer, June 23, 1929. Doctor Beamer states that these specimens were taken from juniper. These types are in the Snow Entomological Collection at the University of Kansas.

THE GENUS BRUCHOMORPHA

Newman, Edward. Ent. Mag. V, p. 399, 1838.

Stål, Carolus. Novae vel minus cognitae Homopterarum formae et species. Berl. Ent. Zeit. VI, p. 310, 1862.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38; 139-230. 1923.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149. 1926.

Ball, E. D. The Genus Bruchomorpha Newman (Homoptera-Fulgoridae) Bull. Brook. Ent. Soc. XXX, Nos., pp. 197-203. 1935.

Comparative notes. Head broad, the vertex approximately six times wider than its greatest length, the frons extended forward, sloping, from above triangular, bearing a less pronounced median carina, usually two well-pronounced lateral carinae which form an ovate or top-shaped central tablet between, the extreme lateral margins of frons elevated carina-like forming a sharp shelf over the genae. Postclypeus elongated, extended forward and parallel to body, together with the extended frons making up the so-called frontal process. Pronotum with anterior margin roundly produced between eyes, posterior margin only shallowly emarginate, at sides behind eyes so greatly reduced as to be practically hidden by eyes, then again expanding platelike at sides, around eyes and posterior to gena so that each gena is a deep pocket in which are located the antennae. Mesonotum is broad, triangular, with a median carina and two lateral, slightly converging carinae usually indicated. Tegmina usually brachyterous, occasionally macropterous forms in some species, snugly fitting but not covering abdomen, parallel at sides, cut off straight behind with the terminal corners rounded, parchmentlike, thickly reticulate venation. Hind wings of macropterous forms present and large although shorter than tegmina; entirely lacking in brachypterous forms. Abdomen globose, narrowed behind into a blunt tip. Legs short, hind tibiae with one spine.

Macropterous forms

Long-winged individuals have been found in collections for five species in this genus. In these five they are very rare. In a series of several hundred specimens of *B. oculata* two specimens only were found, in a large series of *B. keidensia* only one, and only one

each in *B. nodosa* and *B. pallidipes*. The writer did not have any specimens of *B. vittata* for study.

In all cases the nasal process and general coloring of body were identical in both brachyterous and macropterous forms, so that the species can be identified in the usual ways. In addition there seems to be specific differences in the color of the wings and slightly in the venation. *B. oculata* and *B. keidensia* both have fuscous front and hind wings, with very heavy dark-brown veins. The former tends to have a tendency of the veins of front wing, branching more than in *keidensia* although since the two wings of the same individual were different this cannot be relied upon as a distinguishing characteristic.

B. pallidipes had pale-colored wings, with less heavy, light-yellow veins. *B. nodosa* had fuscous or dark brown front wings and milky white hind wings with brown veins. This specimen was broken too badly to draw.

The venation of *B. oculata*, *B. keidensia*, and *B. pallidipes* is shown in the figures on plate XXI.

HISTORY OF THE GENUS

Newman described the genus and the species *oculata* in 1838. Fitch, in 1856, described *dorsata*. Stal, in 1862, described the following five species *jocosa*, *pallidipes*, *tristis*, *nasuta* and *flavo-vittata*. Through the courtesy of Mr. China of the British Museum and Doctor Lundblad of the Stockholm Museum, it seems quite certain that *nasuta* is a synonym of *oculata* Newman and, agreeing with Doctor Ball's opinion, the writer believes *flavo-vittata* to be a synonym of *dorsata* Fitch. In 1906 Melichar added *suturalis*, in 1907 Kirkaldy added *mormo*. This brought the genus down to the year 1923 when the first extensive account of the genus was made by Metcalf. In the Fulgoridae of Eastern United States Metcalf gives a key to twelve species of Bruchomorpha, five of which he describes as new. These five were *vittata*, *bicolor*, *minima*, *rugosa* and *decorata*. Doctor Ball and the present writer believe that *bicolor* is a synonym of *vittata*. In 1928, in his paper entitled the "Fulgoridae of Mississippi," Dozier gives a key to eleven species of which one, *bimaculata*, is described as new. Again this species has been placed in synonymy with *jocosa* by Doctor Ball and the present writer. In 1935 Dr. E. D. Ball published a revision of the genus. In his key and notes he lists eleven species, of which *triunata* is described as new. In addition to the synonymy given above he places *minima* Metcalf as a synonym of *mormo* Kirkaldy.

nasuta Stal as a color variety of *oculata* Newman, and he describes two new color varieties of *jocosa* Stal and three new color varieties of *oculata* Newman, two of which, namely *abrupta* and *extensa* the present writer believes to be good species. The present writer, after many years of study of the genus, believes in the validity of fourteen older species, to which is being added six new species, making a total of twenty species in the U. S. North of Mexico at the present time known to collections.

KEY TO SPECIES

1. As viewed from above head extending anteriorly beyond eye a distance equal or greater than the length of eye itself; nasal process distinctly pronounced, 2
As viewed from above head extending anteriorly a distance less than length of eye; nasal process moderately or not greatly produced..... 13
2. (1) From a side view length of postclypeus approximately equal to or only slightly longer than width of frontal process at a point in line with apex of frons, 3
Length of postclypeus at least one-third to three-fourths greater than width of frontal process 4
3. (2) Front in profile slightly elevated before apex; ventral margin of postclypeus straight; black with yellow stripe to end of tegmina; legs black.
B. suturalis Melichar, p. 103
Front not elevated before apex; ventral margin slightly concave; stripe to end of tegmina; yellow legs..... *B. beameri* n. sp., p. 106
4. (2) Nasal process very narrow, truncate; ventral margin of postclypeus straight; a yellow species with two lateral longitudinal dark stripes.
B. vittata Metcalf, p. 107
Nasal process rounded across apex; ventral margin of postclypeus concave; mostly dark species with sometimes a median light stripe..... 5
5. (4) Nasal process viewed from above centrally compressed; lateral carinae sinuate; frontal tablet narrow 6
Nasal process viewed from above not compressed; lateral carinae not sinuate; frontal tablet broader 9
6. (5) Nasal process bulbous, very long; length of postclypeus not quite twice greater than width of nasal process just anterior to apex of frons; lateral carinae of frons converging considerably posteriorly to apex of frons..... 7
Nasal process not bulbous, postclypeus only about one-fourth or one-third longer than width of process at apex of frons; lateral carinae of frons converging just before apex 8
7. (6) Nasal process distinctly bulbous, and rugged; lateral carinae of frons converging considerably before apex at about base of apical fifth; blackish-brown color; legs yellow, streaked with brown..... *B. nodosa* n. sp., p. 110
Nasal process not so bulbous, lateral carinae converging at about base of apical seventh or eighth; reddish in color..... *B. rosca* n. sp., p. 111
8. (6) Ventral margin of postclypeus deeply concave; nasal process slightly bulbous, with a distinct slant; a uniform dark species with only a trace of a median tawny or bronze stripe on head and thorax..... *B. oculata* Newman, p. 113
Ventral margin of postclypeus only slightly concave, reddish-brown in color; nasal process not inflated at tip, more truncate across apex; body black with dorsal yellow stripe fading out on abdomen..... *B. abrupta* Ball, p. 116
9. (5) Large species, black with a contrasting yellow dorsal stripe extending to apex of abdomen *B. extensa* Ball, p. 117
Smaller species, median dorsal stripe if present bronze, or reddish-tan and ending before the abdomen 10
10. (9) With yellow legs *B. keidensia* n. sp., p. 118
With black legs..... 11

11. (10) With ventral margin of postclypeus distinctly concave; light or rusty stripe on head, thorax and somewhat less across tegmina..... *B. bunni* n. sp., p. 119
 With ventral margin of postclypeus straighter; the light median dorsal band only on head and thorax 12
12. (11) Median dorsal light band narrow, usually only on frons and vertex; body with lateral margins parallel; venation not so distinct.... *B. minima* Metcalf, p. 121
 Median light band broad, distinct, the same width entirely to end of pronotum; venation very distinct *B. tenebrosa* n. sp., p. 122
13. (1) Nasal process short, but very broad, so that the length of the postclypeus is one-half or less than width of process across apex; genitalia with thecal flaps distinctly pointed 14
 Nasal process short but not so broad; postclypeus in length approximately equal to process across apex; genitalia with thecal flap rounded posteriorly or truncate; nervures of tegmina pale or yellow..... 16
14. (13) Spotted species with ground color light mottled with fuscous or brown; tegmina coarsely reticulate 15
 A large uniform, iridescent black species; ventilation obscure... *B. tristis* Stal, p. 123
15. (14) Slender insect *B. rugosa* Metcalf, p. 125
 Robust insect *B. decorata* Metcalf, p. 126
16. (13) Small species, being 2 mm. or less in length; black in color or with three white stripes; frons perpendicular to body so that nasal process across apex is equal to or less than length of postclypeus; anteclypeus long, equalling postclypeus in length 17
 Larger species, females at least over 2 mm. in length; either reddish-brown in color or black with yellow stripe down middle; postclypeus equalling or slightly longer than width of nasal process across apex; anteclypeus shorter than postclypeus 18
17. (16) Frontal tablet very broad, two-thirds as wide as long; body black, legs yellow and fuscous *B. mormo* Kirkaldy, p. 127
 Frontal tablet elongate, not as wide as long, species with three stripes. *B. triunata* Ball, p. 128
18. (16) Uniform reddish-brown color in females and males, with a dark lateral area on each tegmen, and a conspicuous dark spot on apex of postclypeus. *B. jocosa* Stal, p. 129
 Uniform black species with a broad dorsal light stripe either on head alone, head and thorax both, or extending also on abdomen; legs yellow..... 19
19. (18) Shining black, dorsal light stripe extending to tip of abdomen or on it; ventral margin of postclypeus rounded; length of postclypeus about three-fourths the width of nasal process and equal to length of anteclypeus. *B. dorsata* Fitch, p. 131
 Dull black, dorsal light stripe extending merely on head or thorax; ventral margin of postclypeus slightly concave; postclypeus as long as or longer than width of nasal process and at least twice longer than anteclypeus. *B. pallidipes* Stal, p. 134

Bruchomorpha suturalis Melichar, 1906

Melichar, Leopold. Abh. k. k. Zool. Bot. Ges. Wiener, p. 24. 1906.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38, pp. 139-230. 1923.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149. 1928.

Ball, E. D. The Genus *Bruchomorpha* (Fulgoridae-Homoptera). Bull. Brook. Ent. Soc. XXX, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

“Der *B. dorsata* Fitch ähnlich, jedoch kleiner und nur dadwisch verschieden dass her hellgelbe Mittelstreifen sich nicht auf den hinterleibsrücken fortsetzt, der Hinterleib ist daher schwarz, glanzend, höchstene treten zwei kleine hellgelbliche Längsotriche auf

de mersten von den Deckflügeln nicht bedeckten Rückensegmente als Fortsetzung des Mittelstreifens. Die hüften und Beine beim ♂ rötlichgelb, beim ♀ pechbraun. Die Schienen zur Spitze und die Tarsen dunkelbraun. Der unter der Stirne kammartig erhobene Kiel ist äusserst schwach gebuchtet, fast gerade, die übrigen Merkmale wie bei *B. dorsata* Fitch, vielleicht nur eine varietät von *B. dorsata*.

Länge: ♂ $2\frac{1}{2}$ mm., Breite $1\frac{1}{3}$ mm., ♀ $3\text{--}3\frac{1}{2}$ mm.

Nordamerika: Zwei Exemplare aus Texas und Zaalreiche.

Exemplare aus Colorado im Museum in Washington."

AUTHOR'S DESCRIPTION

Size. Length of body from apex of head to tip of abdomen, 1.8 mm. to 2.5 mm. Greatest width of body, 1 mm. to 1.4 mm. Length of tegmen, 1 mm. to 1.2 mm.

Color. General color pitch brown with a conspicuous dorsal contrasting pale-yellow stripe; this stripe narrowed at apex of frons, on vertex about one-third of total width, the same width on thorax as on vertex, again narrowing to half this wide on the combined claval margins. The abdomen pitch brown, occasionally with a faint indication of yellow on first abdominal segment, under side of body pitch brown except less sclerotized areas of thorax and sometimes the clypeus. Legs, especially of females, dark brown, sometimes yellow on apical half of coxae and basal half of tibiae.

Structural details. One of the short-nosed species in the genus with the frons extended cephalad a distance equal to length of one eye. A median carina present on frons, but less distinct than in some species; two outwardly curving lateral carinae which meet the median carina just posterior to apex; a series of round pits present between the lateral carinae and eyes, a row of eight just laterad of each lateral carina and a row of four against the eye. The frontal suture raised on a slight carina which is not so shelflike as in *oculata*. The antennae, therefore, not in such a deep pocket as in that species. The ventral margin of the postclypeus straight, its length as measured from anteclypeus to apex approximately equalling width of frontal process at its apex. Vertex short, about six times wider than long, transversely concave and with a median carina. Pronotum characteristic of the genus, practically covered at sides by the eye, arched forward between eyes for a distance about two-thirds length of eye, the median carina less distinct than in some species, each lateral dorsal third covered by approximately twenty-four round pits; the extreme sides of pronotum extended below eye

into the characteristic flap which in this species is distinctly angulate on ventral margin and bears two rows of circular pits. Mesonotum conspicuous, not as broad as in some species, less than twice wider than long, the median carina less distinct, two sharp laterally convex, lateral carinae present, laterad of which are numerous round pits, numbering between 14 and 20. Tegmina rugulose, a few longitudinal veins elevated more distinctly above the network, in length extending about three-fifths of the length of the abdomen. About four abdominal segments visible from above, a distinct carinae on lateral side of each segment just back of posterior margin, closely followed by two rows of circular pits.

Male genitalia. Tenth abdominal segment (anal flap) tubular at base, then with posterior ventral margin extended into a roundly pointed flap, which is slightly longer than the basal tube. A small portion only of the eleventh segment visible beyond the dorsal margin and bearing a short, pointed flap.

Each harpago, as viewed from a flattened lateral view, a rectangular plate with its basal fifth prolonged cephalad into a slender pointed handle and its apical two-fifths greatly prolonged as a sharply pointed process which curves directly cephalad.

The bilaterally symmetrical aedeagal process is characteristic for the genus. The theca covers the aedeagus through the middle as a snugly fitting membranous sleeve narrowed at base and with its ventral median region extended caudad as two truncate flat lobes which curve slightly cephalad, leaving a notch on each side from which protrudes a sharply pointed, well-sclerotized aedeagal process. The well-sclerotized aedeagus is hidden except at base and for this process mentioned above.

Comparative notes. This species resembles *B. minima* Metcalf and *B. beameri* n. sp. It is easily separated from either by its snub-nosed appearance, which is due to the frontal process being distinctly elevated at tip and by having the ventral margin of postclypeus straight. From *B. minima* it is furthermore separated by the median yellow stripe while *minima* is an entirely black species. From *B. beameri* it is separated in color by having black or darkish legs, while the latter has yellow legs.

Because of its black legs it might easily be confused with *B. bunni* and *B. tenebrosa*. For comparison with those species see notes under the descriptions of these species.

Notes on distribution. Melichar lists Colorado and Texas as the type localities. Dozier cites records of specimens taken in North

Carolina and Florida and states that he collected one specimen from Mississippi. The present writer has studied a series of specimens taken from the following places; in New Mexico from Portales, Silver City, Tucumcari, Vaughn, and Santa Fe; Wichita, North Fork, Oklahoma; Ashford and Flagstaff in Arizona.

Bruchomorpha beameri n. sp.

ORIGINAL DESCRIPTION*

Size. A medium sized species with a medium length nasal process. Length of body from apex of head to tip of abdomen, 2.4 mm. to 3.3 mm. Greatest width across abdomen, 1.6 mm.

Color. General color metallic black. A conspicuous, cream-colored median stripe extending across frons, thorax and to tip of tegmina on which it tends to fade out at apex. Legs of male yellow except for last segment of tarsi and tips of spines. Legs of female yellow with basal half of coxae washed in fuscous, and femora and tibiae striped on each side with reddish-brown.

Structural details. This species has a medium-length nasal extension. From above the frons extends a distance slightly greater than length of eye in male and about one and one-half times in female. A median carina is distinct on frons, pronotum and mesonotum. Frontal suture less elevated and antennae not so depressed in a socket as in other species. Ventral margin of postclypeus concave, its length as measured from anteclypeus to apex only slightly greater than width of frontal process at a point in line with the joining of lateral frontal carinae. The elevated lateral boundaries of head above eye not so shelflike as in *oculata*. Vertex broad, about eight times wider than median length. Median carina of pronotum distinct, pits in each lateral third indistinct, numbering approximately 19, at sides pronotum entirely superimposed by eye, below which it broadens into a slightly angulate flap which extends forward as far as antennae and anterior border of eye. Mesonotum with a median and two lateral carinae well pronounced, each lateral third bearing about twelve round pits. Tegmina rugulose, scarcely any longitudinal veins distinct.

Male genitalia. Tenth abdominal segment (anal flap) tubular at base, then with posterior ventral margin extended into a roundly pointed flap which is about twice longer than the tubular base. A tubular part of the eleventh segment only visible beyond the dorsal posterior margin of the tube.

* The writer is especially indebted to Mr. Ralph Bunn of the Bureau of Entomology for first recognizing this species as new, and who in preliminary manuscript form, which he bequeathed to the writer, had given this name to the species.

Each harpago as viewed from a flattened lateral view semicircular in outline, very broad through middle, and with its apical dorsal angle extended into a sharply pointed process which is more slender and shorter than in *suturalis*.

The bilaterally symmetrical aedeagal process is characteristic for the genus. The theca covers the aedeagus through the middle as a snugly fitting membranous sleeve somewhat narrowed at base and with the ventral median margin extended caudad as two truncate flat lobes, each of which is as long as the tubular sleeve of the theca. Between the lateral notch of the thecal process is visible a sclerotized, slender aedeagal process.

Comparative notes. Superficially this species resembles the *B. dorsata* Fitch group, but is separated from that group, which is a short-nosed group, by its longer nasal process. For comparison with *B. suturalis* Mel., which it closely resembles, see the notes under this heading in the description of that species.

Location of types and distribution. Holotype male and allotype female, collected by R. H. Beamer at Merritt, B. C., August 3, 1931. Paratypes from the following places, all collected by R. H. Beamer: 11 females and 9 males from Merritt, B. C., August 3, 1931; Hartney, Man., 2 males on July 31, 1937; Bozeman, Mont., four females on August 13, 1931; Missoula, Mont., 2 females and one male on August 11, 1931; Knox, N. Dak., one male and one female, on July 28, 1937; Hamar, N. Dak., 6 females and 6 males on July 27, 1937; Leonard, N. Dak., one female on July 25, 1937; from Nicolans, Cal., one female and one male on July 27, 1935; and Cochise, Ariz., 5 males on July 20, 1927. Mr. Paul Oman collected paratypes at Bringame, Cal., 2 females and 5 males on June 15, 1935, and C. L. Johnston 5 females at Hartney, Man., July 31, 1937.

Bruchomorpha vittata Metcalf, 1923

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jr. Elisha Mitchell Soc., p. 186, 1923. Includes *B. bicolor* Metcalf, 1923, which is the brachypterous form of the species.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149, 1928 as *B. bicolor* Metcalf.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203.

Comparative notes. In the original description Metcalf states that this species may be recognized by its shortly produced nasal process and elongate frons. The writer considers that this is slightly misleading in that the nasal process, although not as long as the *oculata* group, is much longer than the short-nosed group represented by *dorsata*. The frons itself is not so greatly lengthened, being only slightly longer than the length of the eye as viewed from

above, but the postclypeus is very elongate, its ventral margin being slightly over twice the length of either the anteclypeus or the width of the nasal process at apex. A distinctive feature of this species is the much narrowed nasal process which is distinctly truncate and not rounded at apex as in *oculata*. Other structural distinctions are the less elevated frontal sutures so that the genae are proportionally broader and not deeply sunken, the longer vertex, which is only four times wider than greatest length and through middle twice as long as at sides, due to the lateral fourths of the anterior margin sharply bending caudad, the lack of any well-pronounced median carina on frons and thorax, two lateral carinae present on mesonotum, the tegmina smoother with less reticulation of veins showing than in most species, a faint median carina present on each anterior abdominal segment.

Coloring distinctive, being a striped species with ground color yellow and two narrow brown stripes running lengthwise of body.

Notes on distribution. Type locality is Brownsville, Tex. Doctor Metcalf sent a paratype female to the writer for study, which bore the label "palm jungle sweepings." In addition the writer had eight specimens in all for study, of which seven were from Brownsville and one from Progress, Tex. Apparently this is an exceedingly rare species.

Notes on synonymy. Metcalf described *B. vittata* only from macropterous forms. These were taken at the same time and place as *B. bicolor* Metcalf. Since macropterous forms are comparatively scarce in either species, it is difficult to get comparisons on this species. Doctor Ball states that, "All long winged forms have practically the same dark color, and that they all have much enlarged mesonotal protuberances and consequently notched pronotums. The form of the nasal process is, however, distinctive." He therefore believes that *B. vittata* and *B. bicolor* are long and short-winged forms of the same species and that since *vittata* was listed first, the species becomes *vittata* with *bicolor* thrown into synonymy.

In support of this idea is the fact that they were taken together and that in the original descriptions Metcalf states that they have elongate fronts, and shortly produced truncate nasal processes. In comparing macropterous forms of other species the writer has found that the shape of the nasal process and coloring always follows closely that of the brachypterous forms. The situation became complicated by the fact that Doctor Metcalf sent the writer a brachypterous female specimen of *vittata* (hitherto only described from ma-

cropterous forms) which bears the label Medicine Hat, July, Alta. 24, F. S. Carr. This specimen evidently was subsequently determined by Doctor Metcalf as this species. It is entirely different in coloring and body structures from a type specimen of *bicolor*. Since it is a moderately long-nosed specimen, the present writer identifies this specimen as *B. beameri* n. sp. The original descriptions of Metcalf's two species are given below.

ORIGINAL DESCRIPTION OF *B. VITTATA* METCALF, 1923

"This species may be recognized by its elongate narrow front, short, nearly truncate nasal process.

"Vertex rather broad, the lateral margins converging to the intermediate carinae, the anterior margin nearly straight; frons rather elongate, narrow; the intermediate carinae slightly arched, the nasal process short, but little produced, nearly truncate anteriorly. Pronotum broadly rounded anteriorly, deeply, almost triangularly emarginate posteriorly. Mesonotum ecarinate, the disk broadly arched, the scutellar portion flat, produced. Macropterous wings narrow, elongate.

"*Color.* General color dull blackish fuscous; eyes grayish-brown; median frontal stripe evident, extending to the posterior border of the pronotum. Mesonotum and abdomen paler, median stripe narrower. Macropterous wings smoky hyaline; legs pale yellowish testaceous; all the femora and fore tibiae washed with brownish fuscous.

"Length, macropterous form, apex of head to apex of abdomen, 3 mm.; apex of wings, 4.20 mm.

"Holotype ♀, Brownsville, Tex., 1911. Paratypes 2 ♀ ♀, Brownsville, Tex., 1911. In the collection of Illinois State Lab. Nat. Hist."

ORIGINAL DESCRIPTION OF *BRUCHOMORPHA BICOLOR* METCALF

"This species may be recognized by its shortly produced nasal process, elongate frons, general pale yellow color and two broad, black stripes extending from the apex of the nasal process across the eyes to the apex of the abdomen.

"Vertex short, the anterior margin broad, nearly straight; frons elongate, the intermediate carina broadly arched basally, then converging straight to the apex of the frons; nasal process elongate, bluntly triangular, the ventral margin not sinuate. Pronotum broadly rounding anteriorly, broadly sinuate posteriorly, about half as long as the mesonotum; disk of the mesonotum broad, the

lateral carinae evident, the intermediate carina faint; male genital styles broad at base, gradually narrowed apically, the apex produced, short triangular teeth directed anteriorly.

Color. General color pale dull yellow, a broad blackish fuscous stripe on each side of the body extending from the apex of the nasal process across the compound eyes, the disk of the wings and then converging to the apex of the abdomen; meta-pleura black, a narrow, black stripe on the lateral ventral margins of the abdomen, spines and claws of the legs black; genitalia black.

"Length of male, 2 mm.; genitalia black.

"Holotype ♂, allotype ♀, paratypes 5 females, Brownsville, Tex., Nov. 2, 1911."

Bruchomorpha nodosa n. sp.

ORIGINAL DESCRIPTION*

Size. Larger than *B. oculata* New. Length of body from apex of head to tip of abdomen, 3.29 mm.; width across abdomen, 1.43 mm.

Color. Black with a metallic luster, head and thorax lighter, somewhat reddish-brown. A rusty-yellow stripe following median carina from tip of frons, across vertex to margin of mesonotum. Tip of nasal process black, rest of head at sides and below reddish-brown in sharp contrast to black body; anteclypeus and beak tan. Legs yellow and rusty-brown streaked.

Structural details. This species is characterized by the exceptionally long nasal process which is unusually inflated through apical region, giving it a knoblike appearance, and by the arched dorsal outline of body with the nasal process greatly deflected. As viewed from above the nasal process extends beyond eyes twice the length of the eye, approximately halfway of frons, being deeply depressed, and lateral margins conspicuously constricted, making the frontal plate violin-shaped and lateral carinae converging considerably before apex and about base of apical fifth. Median carina of frons through depressed area indistinct; carinae of pronotum and mesonotum distinct. Frontal suture less elevated, antennae not inserted in a particularly deep pocket. Ventral margin of postclypeus deeply concave, to length as measured from anteclypeus to apex approximately twice the width of frontal process at a point in line with the joining of the lateral frontal carinae above. Thorax

* The writer is especially indebted to Mr. Ralph Bunn of the Bureau of Entomology for first recognizing this species as new, and who in preliminary manuscript, which he bequeathed to the writer, had given this name to the species.

and abdomen evenly humped through middle, nasal process and tip of abdomen distinctly deflected, giving the body as viewed from the side a more pronounced, half-moon shape than in other species.

Comparative notes. Similar to *B. oculata* New., but differentiated by the elongate, inflated and greatly deflected nasal process, which is conspicuously depressed across middorsal region, and with the lateral carinae of frons meeting considerably caudad of apex of nasal process. Usually easily recognized, in addition, by the conspicuous red coloring on the ventral head region.

Location of types and notes on distribution. Male holotype taken at Peeler, Texas, June 26, 1938, by R. H. Beamer, and female allotype at Natchitoches Parish, Louisiana, August 16, 1938, same collector. The following paratypes taken by R. H. Beamer in Texas; four females, Peeler, June 26, 1938; three females at Sequin, June 26, 1938; one female at Karnes county, Texas, August 23, 1928; and one female at Victoria county, Texas, August 1, 1928. Other paratypes: Four females at Natchitoches Parish, Louisiana, August 16, 1928, by R. H. Beamer; and from Kansas, one female, Montgomery county, by Beamer and Lawson, August 3, 1923; one female in Cowley county, September 11, 1926, by E. P. Breakey; one female in Chautauqua county, same collector, September 9, 1926; two females in Phillips county, July 8, 1925, by R. H. Beamer; and one female, Scott county, August 23, 1928, by R. H. Beamer.

The types are in the Snow Entomological Collection at the University of Kansas.

Bruchomorpha rosca n. sp.

Size. Length of body from tip of head to apex of abdomen, 2 mm. to 3.2 mm. Greatest width of body as viewed from above, 1 mm. to 1.5 mm. Length of tegmen, 1 mm. to 1.2 mm.

Color. A reddish-tan species becoming darker at the sides, in general color closely resembling *jocosa*. Frons reddish-tan, lateral margins and carinae dark brown, an indefinite yellowish median streak which extends across the thorax where it widens somewhat. Underside of head reddish-brown with extreme tip of nasal process black. Eyes dark brown or black. Thorax from above reddish-brown, washed in fuscous at sides. Tegmina uniform reddish-brown except mesal margins fading to yellow. Abdominal segments tanish to reddish-brown with posterior margins edged in dark brown. Legs amber yellow.

Structural characteristics. A long-nosed species with head produced beyond eye, as viewed from above twice the length of the

eye. Frons centrally compressed through the middle, a median carina slightly indicated, two distinct lateral carinae which distinctly bend inwardly at middle. Nasal process as viewed from the side long; postclypeus three-fourths to twice the width of the process at a point in line with apex of frons, its ventral margin moderately concave. Pronotum from above short, its median length about two-thirds the length of the eye, laterally reduced behind eyes to a thin margin, then on sides broadening into spatulate earlike lobes which circumscribe the eyes; on each lateral dorsal disk sixteen or seventeen circular pits. Mesonotum large, about twice as wide as long, a median carina present and on each lateral disk about twelve circular pits present. The characteristically abbreviated tegmina shining semitranslucent, wing venation very obscure, giving only a pebbled appearance. Abdomen globose, about four segments visible from above; on the segments which are exposed a lateral carina indicated just posterior to anterior margin of segment; usually four round pits present just posterior to the carina.

Male genitalia. Tenth abdominal segment (anal flap) with a short, tubular base which is about one-fourth of the total length of the process. The posterior ventral margin of the tube is expanded caudad into a roundly pointed flap. The eleventh segment is ringlike and is scarcely visible beyond the dorsal posterior margin of the tube and bears a short dorsal stylus.

Each harpago, as viewed from a flattened lateral view, is somewhat crescent-shaped, broadest through approximate middle, with its basal part arm-shaped and its apical third greatly lengthened and projected dorsad as a sharply pointed, slightly recurved hook.

The aedeagus is nearly hidden by the less sclerotized theca, the latter fitting over the aedeagus through the middle as a tight sleeve which broadens apically and also has its ventral apical margin expanded caudad as two rounded flaps which bend somewhat dorsad, thus leaving a notch on each side, from which protrudes a pointed, slender, well-sclerotized aedeagal hook.

Comparative notes. Size and coloring of *jocosa* Stal, but easily recognized by its long nasal process as opposed to the very short one of *jocosa*. It is easily distinguished from all other species in the genus by its rosy coloring.

Notes on types and distribution. Holotype ♂ and allotype ♀ collected by R. H. Beamer at Castroville, Texas, on July 5, 1936. One other paratype female collected by Paul Oman at Faraway Ranch in Arizona, June 10, 1933. Thirty-three paratype males collected by R. H. Beamer from August 2 to 6, 1936, from the following places

in Texas: Pecos, Conean, Loyal Valley, Elmhendorf, Boerne and San Antonio. Two paratype males collected in August, 1935, by R. H. Beamer from Hereford and Cochise counties, Arizona. One male paratype collected by R. H. Beamer, June 4, 1933, at Tucumcari, New Mexico.

The types and most of the paratypes are deposited in the Snow Entomological Museum, University of Kansas.

Bruchomorpha oculata Newman, 1838

Newman, Edward. Ent. Mag. V, p. 399, 1838.

Stal, Carolus. Novae vel minus cognitae Homopterum formae et species. Berl. Ent. Zeit. VI, p. 310, 1862. As *B. nasuta*.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38:139-230. 1923. As *B. nasuta* Stal.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149. 1926. Also includes *B. nasuta* Stal.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935. As *B. oculata* var. *oculata*.

REVISED DESCRIPTION

Size. Length of body from tip of head to apex of abdomen, 1.8 mm. to 3 mm. Greatest width of body as viewed from above, .92 mm. to 1.4 mm. Length of tegmen, .9 mm. to 1.2 mm.

Color. A shiny, metallic, black species usually marked with rust. Frons as viewed from above blackish-brown except for a yellow to rust median stripe which borders the brown median carina; this same band and carina continued across vertex and pronotum. Eyes pitch brown, margined in rust. Clypeal region and posterior part of gena reddish-yellow in female; in male same pitch brown as rest of head. Thorax from above reddish-brown except for median light stripe and a faint lighter spot on pronotum behind each eye; lateral sclerites of thorax uniform black brown; membranous ventral parts yellow. Tegmina blackish-brown with a metallic lustre and a faintly lighter claval margin. Legs yellow to reddish-brown, washed in dark, especially near the base of each segment or in the form of dark, longitudinal bands. Abdomen from beneath pitch brown.

Structural characteristics. One of the moderately long-nosed species in the genus. As viewed from above the frons is produced anteriorly one and one-half to twice the length of the eye, its frontal tablet about two-thirds longer than its greatest width and a distinct median carina present laterad of which on each is a slightly less prominent, outwardly curving carina, frequently interrupted or at least constricted halfway from the apex at which place the frons is depressed; the frontal sutures forming the lateral boundaries of the head as viewed from above are elevated on a conspicuous carina

which extends shelflike over the gena, thus forming a pocket in which lies the antenna. The ventral margin of postclypeus is distinctly concave, its length at this point not quite twice the width of the nasal process just anterior to apex of frons. The labrum is abbreviated to a tiny triangular sclerite. Pronotum from above short, its median length about two-thirds the length of the eye, laterally so reduced behind the eyes that the posterior margin only shows at this point; each lateral disk with 16 round pits; on the extreme sides expanded into broad plates which curve around the eyes and end at the bases of the antennae and on each lateral plate a row of four circular pits following the posterior margin. Mesonotum large, about twice as wide as long, on each side bearing nine round pits, a thin median carina present. Tegmina abbreviated, extending only slightly beyond middle of abdomen. Venation obscure, the whole surface of the tegmen roughened by the indistinct veins, giving it a pebbled appearance. Abdomen globose, only about four segments showing from above; on the first few segments a lateral carina indicated just posterior to anterior margin of segment; usually three to four pits present just posterior to the carina.

Male genitalia. Tenth abdominal segment with ventral margin extended into a roundly pointed flap, its length about one-fifth longer than wide. Eleventh abdominal segment typically ringlike, only showing a slight distance beyond dorsal margin of the tenth segment and bearing a long fingerlike stylus.

Each harpago, as viewed from a flattened lateral view, roughly crescent-shaped, its basal fourth slenderly pointed, the median region with ventral margin greatly expanded, the apical fourth curving dorsad as a slenderly pointed elongate hook.

The bilaterally symmetrical aedeagal process is difficult to follow due to its minute size and the fact that it is covered so completely by the theca. The theca covers the aedeagus through the middle as a snugly fitting, membranous sleeve whose ventral margin is extended caudad into two flat, spatulate processes about equal in length to the basal collar and having their roundly pointed apices directed dorsad. The sclerotized tubular aedeagus is only visible between the collar and the lobes of the theca. At this point can be seen the bases of a sclerotized hook which is directed cephalad under the thecal collar and ends just inside the basal margin of the theca.

Synonymy. In the literature two species of *Bruchomorpha* from northeastern and central United States have always been listed in keys, namely *B. oculata* and *B. nasuta*. With large series of speci-

mens it was always difficult to try to distinguish these two species. Therefore, the writer endeavored to clear up this situation by studying the types. Through the efforts of Dr. H. B. Hungerford, Doctor Lundblad, of the Stockholm Museum, kindly sent the type of *B. nasuta* Stal for study. This proved to be the form which has usually been identified as *B. oculata* Newman. The writer sent a close homotype of *B. nasuta* Stal to Mr. China of the British Museum, hoping that he would be able to compare it with the *oculata* type. After studying the question Mr. China sent the following reply to the author:

"The type of *Bruchomorpha oculata* has been lost. It is not in our collection here nor at Oxford. According to Newman it was originally in the collection of the Entomological Club, but this collection was presented to the British Museum in 1844, so that the type should be here. I have been unable to trace it, however. We have under this name a single specimen labeled *Bruchomorpha oculata*, but it does not agree with the original description of *oculata* and was collected by E. Doubleday at St. Johns Bluff, East Florida, instead of by Foster at Mount Pleasant, in Ohio, as was Newman's specimen. Your specimen labeled *B. nasuta* agrees very well indeed with Newman's description and figures. The lateral carina of frons is pinched in and the ventral margin of the postclypeus is strongly concave. He describes the colour as 'shining greenish bronzy-black,' which would cover the metallic bluish black of your specimen since the green and blue metallic colours are interchangeable. Bronzy in this description really refers to the metallic sheen and not to the brown colour of bronze. I should not hesitate in identifying your *B. nasuta* as *oculata* Newman."

The writer believes, as does Mr. China, that Stal's *nasuta* is a synonym of *B. oculata*, and many difficulties can be cleared up with this solution. Metcalf's (1923) drawing of *B. nasuta* is correct for this species. It is not plain what his *B. oculata* is. Dozier's description of *B. oculata* is correct for this species. No specimens have shown up for his *B. nasuta* Stal as a distinct thing from *B. oculata*.

Comparative notes. This species resembles *B. nodosa* n. sp., *B. minima* Metcalf and *B. abrupta* Ball more than other species in the genus. For comparison with *nodosa* see the notes under this heading in the description of that species. From *minima* it is easily separated by having light colored legs instead of black ones as in *minima*.

For comparison with *abrupta* see notes in the description of that species.

Notes on distribution. Dozier (1926) states that this is the most common species of the United States, being widely distributed both in Canada and the United States. The writer has studied specimens from the following places: New Haven, Connecticut; Gary,

Indiana; Douglas county, Kansas; Naples, Maine; Thompson and Cedar River, Michigan; Cooley, Caso Lake and Shevlin, Minnesota; Columbus, Mississippi; Bretton Woods, Notchland, Crawford Notch and Bath, New Hampshire; Erie, Pennsylvania; Windsor, Vermont; Brule and Luxemburg, Wisconsin.

Bruchomorpha abrupta Ball, 1935

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203, as *B. oculata* var. *abrupta*.

Comparative notes. Doctor Ball described this species merely as a variety of the species *oculata* Newman. He states that this species has nearly the form of *nasuta* Stal (*beameri* n. sp. in this paper), but is larger, with a narrower, rounder nasal protuberance. In his key he separates this from *B. oculata* var. *oculata* by having a black body with a broad, white dorsal stripe, but in his description states that the stripe is definite but narrower and reddish, often not extending onto the abdomen.

The writer finds that this species more closely resembles *B. oculata* Stal than any other. From this species it is separated by having the nasal process more truncate and broader at apex at a point in line with end of frons while in *oculata* the end of the process is more sloping. The characteristic white stripe which Ball describes is not so apparent in the specimens which the writer studied. The dorsal stripe was more often, at least for the females, more dusky cream to rust, as in *oculata*, than white. It can be told, however, from *oculata* in color by having the postclypeus reddish-brown and the general body color being dull black rather than shining bluish-black, and also the dorsal stripe is much more in evidence than in *oculata*.

The size of the females from apex of head to apex of abdomen is about 2.8 mm. to 3 mm.

Male genitalia. Tenth abdominal segment (anal flap) tubular at base then extended on its ventral side into a roundly pointed flap which is not quite twice as long as the tube. The stylus of the eleventh segment is a fingerlike projection extending beyond the dorsal margin of the tube.

Each harpago as viewed from a flattened lateral view is broadest through the middle where its ventral margin is greatly curved. The basal third forms a slender arm and the apex is extended dorsad as a sharply curved, serrate and finely pointed process.

The aedeagus is typical for the genus. The theca covers the aedeagus itself through the middle as a tight membranous sleeve,

then on its ventral margin projects caudad as two roundingly spatulate processes which curve dorsad so that their dorsal margins are in line with the thecal margin.

Notes on distribution. Doctor Ball described the holotype ♀, allotype ♂ and eight paratypes from Sanford, Florida. He states that this is a fairly common summer form in the gulf region.

The writer studied specimens from Beeville, Castroville, Pecos, Alice, San Antonio and Boerne, Texas, and a few from Elmendorf, New Mexico.

Bruchomorpha extensa Ball, 1935

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203 as *B. oculata* var. *extensa*.

Comparative notes. Doctor Ball considered this merely as a variety of *oculata*. It is easily distinguished from this species, as he pointed out, however, by its larger size, the more foliaceous nasal process and the broad, creamy dorsal stripe which extends from apex of frons to apex of abdomen.

This species measures 2.8 mm. to 4 mm. in length from apex of head to apex of abdomen in females and 2.8 mm. for males.

The present writer considers that this species superficially resembles *B. dorsata* Fitch more than it does *oculata* because of the presence of the broad, creamy dorsal stripe. On closer examination it is easily distinguished from *dorsata* because the latter has an abbreviated nasal process.

Male genitalia. The tenth abdominal segment is very small, scarcely visible beyond the ninth segment. Each harpago as viewed from a flattened lateral view is broadest through the middle where its ventral margin is greatly curved. The basal third tapers to a bluntly pointed base. The dorsoapical angle is extended dorsad as a long slender, curved, sharply pointed process.

The aedeagus is the typical type for the genus. The theca covers the aedeagus through the middle as a tight sleeve, then is extended on the ventral apical region into two flat, spatulate lobes whose width is greater than their length.

Notes on distribution. Doctor Ball's type locality for the female was Granite Dell, Arizona, and for the male Ashfork, Arizona. He states that this species is found sparingly in the Gulf region and extends through to southern California and north into Utah.

The present writer studied specimens from Pecos, Castroville, Alice, Boerne and San Antonio, Texas, and from Elmendorf, New Mexico.

Bruchomorpha keidensia n. sp.

ORIGINAL DESCRIPTION

Size. Length of body from apex of head to apex of abdomen, ♀ 2.8 mm. and ♂ 2.2 mm.; greatest width of body, ♀ 1.6 mm. and ♂ 1.1 mm.; length of tegmen, ♀ 1.2 mm. and ♂ 1.2 mm.

Color. A black species similar to *B. oculata* in general color characteristics. From above all black, this black dull, brownish-black rather than the blue-black or bronze tone of *oculata*, except for a well-pronounced median stripe of yellowish-tan, starting on the frontal tablet, extending across thorax and somewhat indicated on the median margins of the tegmina, occasionally the stripe a duller reddish-brown or even almost lacking. Underside dark except postclypeus and legs, which are yellow, occasionally washed in fuscous.

Structural details. General appearance similar to *B. oculata* Newman. From above head protruding beyond eyes about one and one-half times the length of eye. Vertex depressed, exceedingly broad, about eight times wider than length. Frons from above with distinct median carina present and two distinct lateral carinae which are straight, not constricted through middle and frons not depressed as in *oculata*; the frontal tablet only approximately one-third longer than its greatest width. From side view nasal process long, the lateral carinae converging just posterior to apex, at this point the dorsal margin sloping downward, giving a narrowed look to apex not found in *oculata*. Ventral margin of postclypeus angulately concave, its length about twice the length of the anteclypeus. Pronotum and mesonotum with a distinct median carina, latter with additional pair of curved lateral carinae, the characteristic round pits on lateral disks of both segments. Tegmina with venation entirely obscured, heavily rugulose, in the female extending only slightly beyond the middle of abdomen, in the male a little longer. Abdomen characteristically globose, only about four segments visible from above; on the exposed segments, a carina indicated on each side, closely followed by a row of circular pits which usually consists of four or five by the median half of the carina and one or two at the extreme lateral edge.

Male genitalia. Tenth abdominal segment (anal flap) with ventral margin extended into a roundly pointed flap, the whole structure about twice longer than wide. Eleventh segment showing about the usual length beyond the dorsal edge of the tenth segment.

The shape of the harpago and the aedeagal structure with the slight variations and ways they differ from *B. oculata* and related forms can best be studied by looking at the drawings of these structures.

Comparative notes. This species resembles *B. oculata* and *B. bunni* more than any other species in the genus. In color it differs from *oculata* by being a dull brown-black rather than metallic bluish or copper-black and by having usually a well-pronounced median yellow-tan stripe across frons, thorax, and even on to the tegmina. In *oculata* this stripe is scarcely ever extended on to the mesonotum. Structurally it is distinguished in the following ways: The frontal process is narrowed due to the apical dorsal margin sloping more abruptly than in *oculata*; the lateral frontal carinae are not sinuate, the frons is not depressed and the frontal tablet is only approximately one-third longer than its greatest width while in *oculata* it is two-thirds or more.

For comparison with *bunni* see the discussion under this heading in the description of that species.

Types and distribution. Male holotype and female allotype collected by R. H. Beamer on August 8, 1937, at Keid, Manitoba. A series of thirty-five paratypes, both males and females, taken by R. H. Beamer and C. L. Johnston, same place, and a series of thirty, both sexes, taken by same parties at Mafeking, Manitoba, on August 3, 1938.

Bruchomorpha bunni n. sp.

ORIGINAL DESCRIPTION

Size. Length of body, 2.4 mm. to 3.2 mm.; width of abdomen, 1.1 mm. to 1.7 mm.

Color. Entire body and legs jet black, shiny with a metallic luster, except for a narrow, rusty-yellow stripe extending from just back of the apex of the frons, across the vertex, pronotum and mesonotum and continued as a very faint line across the inner margin of the elytra.

Structural details. Nasal process of median length. From a dorsal view, head extending beyond eye a distance equal to length of eye. Lateral carinae of frons not sinuate, shape of frons top-shaped. Median carina of frons, pronotum and mesonotum distinct. Tip of nasal process somewhat narrowed at apex, not extended beyond point where lateral carinae of frons converge. At this point the width of the frons is two-thirds the length of the ventral margin of

the postclypeus. Postclypeus deeply concave. Tegmina moderately long, no distinct longitudinal veins or cells, the entire surface pebbled.

Male genitalia. Each harpago as viewed from a flattened lateral view with both dorsal and ventral margins greatly curved outwardly, giving it a bulbous appearance, the apical dorsal angle extended into the usual sharply pointed recurved process, which is comparatively shorter than in many species.

The aedeagal structure is typical for the genus with the sleeve of the theca in this case almost square and the extended ventral flaps likewise subequal in length and width. The aedeagus bears two distinct, sharply pointed processes which are exposed through the narrow slit between the theca process and the thecal flap.

Comparative notes. A black species with median rusty stripe extending on to abdomen, usually to apex. Size: Length of body, 2.4 mm. to 3.2 mm.; width, 1.1 to 1.7 mm.

This species is similar in coloring and superficial appearance to the following species: *B. oculata*, *B. keidensia*, *B. tenebrosa*, *B. minima* and *B. suturalis*. From *oculata* it is distinguished by having black legs instead of yellow or light brown and by the carinae of the frons being straight instead of sinuate.

From *keidensia* it is separated again by its black legs.

From *tenebrosa* it is separated by the less distinct venation and rugose tegmina and by having the ventral margin of the postclypeus more concave.

From *minima* it is separated by its larger size, the median light stripe extending on to abdomen, its concave ventral margin of postclypeus and its body not so parallel-sided.

From *suturalis* it is easily distinguished by lacking the broad, turned-up nasal process of that species.

Location of types. Holotype male, taken at Grand Canyon, Arizona, on August 11, 1927, by R. H. Beamer; allotype female, Grand Canyon, August 11, 1927, by P. A. Radio. Two female paratypes and nine male paratypes, same data. One female paratype collected in Cochise county, Arizona, by R. H. Beamer, July 20, 1927, and one male at Taos, Taos county, New Mexico, by R. H. Beamer, August 20, 1927.

The types are in Snow Entomological Collection at the University of Kansas.

NOTE.—This species has been named in honor of Mr. Ralph Bunn, who for several years was interested in the revision of this genus. Although Mr. Bunn was unable to complete his studies due to pressing duties in other fields, he

made a valuable contribution to the present work by recognizing four new species for which he gave manuscript names, as has been pointed out elsewhere in this paper. The present writer is indebted to Mr. Bunn for turning over entirely for use in this paper all the data which he had completed to date.

Bruchomorpha minima Metcalf, 1923

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jr. of Elisha Mitchell Soc., p. 187.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203, 1935. As *B. mormo* Kirkaldy.

Comparative notes. A small, black species measuring from 1.9 mm. to 2.4 mm. in length and .93 mm. to 1.33 mm. in width across abdomen. This species very closely resembles *B. oculata* Newman. The two species are about the same size in actual measurements although in looking at a long series of both species *B. oculata* tends to run larger. In color *B. minima* is one of the darkest species in the genus, being entirely black with black legs, except occasionally a rusty stripe on frons and thorax. It closely resembles *B. oculata* in coloring and size, being separated mainly from the latter by having black legs instead of yellow. It closely resembles *B. bunni*, but is separated from it by lacking the distinct median yellowish-red stripe and by its narrower frontal process. The postclypeus in *minima* and *oculata* is one-third longer than the frontal process across apex in line with apex of frons, while in *bunni*, it is less than this. This species superficially resembles *B. mormo* Kirkaldy, but is separated very readily from that species by its much longer nasal process. It also might be confused with *B. suturalis* and *B. tenebrosa*. For comparison with these species see notes under this heading in the descriptions of these species.

Male genitalia. Tenth abdominal segment extended into a short but pointed flap; the whole segment being about equal in length and width. The eleventh segment scarcely visible beyond the tenth and bearing a short, blunt stylus.

Each harpago as viewed from a flattened lateral view roughly crescent-shaped, its basal fourth prolonged into a slender fourth, the median region roughly rectangular, the apical fourth extended dorsad as a sharply pointed, slender hook which is as long as the median portion.

The bilaterally symmetrical aedeagal process is characteristic for the genus. The theca covers the aedeagus through the middle as a snugly fitting membranous sleeve narrowed at base and with its ventral median region extended caudad as two flat spatulate processes which bend dorsad, thus making them appear twice wider than

long. The sclerotized aedeagus is completely hidden except for a slender, sclerotized hook which extends between the lobes and collar of the aedeagus and bends directly ventrad.

Notes on distribution. Metcalf gives the type locality as Southern Pines, N. C. The writer studied a large series from Yorkstown, Hilliard, and Branford, Fla.

Bruchomorpha tenebrosa n. sp.

ORIGINAL DESCRIPTION*

Size. Length of female from apex of head to tip of abdomen 2.75 mm. to 2.95 mm. Width of abdomen, 1.3 mm. to 1.35 mm.

Color. Body shiny jet black, a dusky brown stripe beginning at a point just back of apex of frons widens gradually, then narrows abruptly at the vertex, continues as a narrow stripe across the vertex and pronotum and widens out again slightly on the mesonotum. No trace of this stripe on the tegmina. The median carinae of the frons, pronotum, and mesonotum show darker on this light stripe. Legs and underside all black, except the membranous region around attachment of hind coxae.

Structural details. This species has a medium-sized nasal process. From a dorsal view the head extends beyond the eye a distance approximately equal to length of eye. The median carina is distinct on frons, pronotum and mesonotum. Ventral margin of postclypeus slightly concave on posterior half, the anterior half somewhat outwardly expanded; its length as measured from anteclypeus to apex slightly greater than width of frontal process at a point in line with the joining of the lateral carinae of frons which in this species converge near apex of head. Tegmina proportionally shorter than in many species, veins prominent forming distinct cells and with less of the pebbled appearance which other species have. Dorsal line of body not arched as in *nodosa*.

Comparative notes. This species in size, form and the presence of black legs resembles *B. bunnii*, *B. minima* and *B. suturalis* very closely. Of these four, *bunnii* and *suturalis* are southwestern species and *minima* and *tenebrosa* southeastern. In color these forms can usually be distinguished by the extent of the median, dorsal light stripe, although since these stripes vary somewhat within the species, they cannot be relied upon too greatly in separating the species definitely. In general, *suturalis* has the stripe extending to the apex

* The writer is indebted to Mr. Ralph Bunn of the Bureau of Entomology for first recognizing this species as new, and who in preliminary manuscript, which he bequeathed to the writer, had given this name to the species.

of the abdomen, *bunni* has it extended on thorax and even across tegmina although here it is narrowed somewhat, *tenebrosa* has a wide, distinct yellow stripe extending from head to tip of mesonotum, but not onto the tegmina, and *minima* has a narrow yellow band only on the frons or sometimes, in addition, faintly on the pronotum.

In addition to color, *tenebrosa* is separated from *bunni* by having more rugose tegmina with distinct venation and the ventral margin of postelypeus much less concave than in that species.

From *minima* it is separated by its larger size, body less parallel-sided and frontal process not so narrowed.

From *suturalis* it is distinguished by not having the turned-up broad, frontal process, which *suturalis* has and by the more concave ventral margin of postelypeus.

Location of types. Described from three females. Holotype, collected by L. D. Tuthill, Loughman, Fla., August 2, 1930. Two paratypes, same place and collector. The types are in the Snow Entomological Collection at Lawrence.

Bruchomorpha tristis Stal, 1862

Stal, Carolus. Novae vel minus cognitae Homopterum formae et species. Berl. Ent. Zeit. VI, p. 309, 1862.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38, pp. 139-230. 1923.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149, 1928.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

"Subcupreo-nigra, nitida; fronte clypeoque conjunctim parvum productis; venis tegminum distinctus. ♀ —Long. 3½. Lat. 2 mm. Wisconsin. Dom. Rumbien. Mus. Holm."

AUTHOR'S DESCRIPTION

Size. Length of body from tip of head to apex of abdomen, 2.6 mm. to 3.5 mm.; width of body at broadest point, 1.6 mm. to 2 mm. Length of tegmen, 1.2 mm. to 1.36 mm. This is one of the largest species of the genus.

Color. General color uniform iridescent black. Occasionally specimens show a narrow bronze stripe following the median carina on frons and vertex. Also some specimens occasionally dark red-brown on head and thorax instead of black, and eyes gray. The entire body very shiny. Underside of body the same dark brown to

black color, except the less sclerotized areas around the large coxae of hind legs and the extreme apices of the leg segments.

Structural details. This is a short-nosed species. Length of frons in front of eye as viewed from above less than the length of the eye; its width through middle greater than in many species due to the fact that the frontal sutures which form the lateral boundaries of the frons are carried outward on a wide, sharp carina which from a side view shows as a distinct shelf over eye and gena; the two lateral carinae greatly arched through middle, very close together at base so that the distance between the two is equal to or even less than the distance from one carina to eye. Postclypeus very short, as viewed from the side equal in length to anteclypeus and only approximately one-half as long as the nasal process across its apex, its ventral margin evenly, outwardly rounded. Vertex very short, about eight times wider than long, deeply transversely convex, its anterior and posterior margins sharply elevated. Pronotum proportionally shorter than in other species, approximately four times wider than length through middle; a transverse depression indicated just posterior to cephalic margin and a distinct median carina present, on each side of which on the disk are located 17 or 18 conspicuous circular pits. Mesonotum prominent, not quite twice wider than long, the median carina distinct, two outwardly curving lateral carinae more elevated than it, the space between the lateral and median carinae distinctly concave, each lateral fourth covered by usually eleven circular pits. Tegmina reaching to about middle of abdomen, the longitudinal vein elevated and distinct, but their course difficult to trace because of the deeply rugulose or pebbled surface between them. Abdomen very globose, the anterior segments expanded somewhat beyond the lateral margins of the tegmina.

Male genitalia. Tenth abdominal segment (anal flap) with a short, tubular base, from which its posterior ventral region is expanded caudad into a rounded flap with parallel lateral margins. The ringlike eleventh segment is visible beyond the dorsal margin of the tube and bears an elongate stylus.

Each harpago as viewed from a flattened lateral view is somewhat crescent-shaped, broadest through base of apical third, and has its apical third greatly lengthened into a slender, pointed, recurved hook.

The aedeagal structure is distinctly different from other members of the genus. The aedeagus itself is a sclerotized structure, bearing at least one slenderly pointed hook near its apex, but the entire structure is practically hidden by the membranous theca which is a

tubular sheath somewhat narrowed at base, but which broadens caudad and finally ends in two, elongate, pointed flaps.

Comparative notes. This species is not easily confused with other species. It is distinguished by the iridescent black coloring of body and black legs, its greater width of body, very short nasal process and elevated veins in the tegmina.

Notes on distribution. Apparently a well-distributed species. Doctor Ball states, "The writer's material is all from northern and mountainous regions from Ontario and New York through Wisconsin, Iowa, Dakota, Colorado, Montana and Oregon, south in California to Dunsmuir and in Arizona to Oak Creek Canyon. The writer did not take it in Florida and has not taken it in Arizona below the yellow Pine Belt."

Dozier lists in addition to above-mentioned states New Jersey, North Carolina, Florida, and Texas.

The present writer had additional specimens from Kansas and Minnesota.

Bruchomorpha rugosa Metcalf, 1923

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jr. Elisha Mitchell Soc., p. 185, 1923.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203.

Comparative notes. This is a slender, light-colored species, resembling superficially an *Aphelonema* and having the most slender nasal process in the genus. Greatest width of body, 1.2 mm. to 1.8 mm.; length of body, 1.8 mm. to 3 mm. It is easily recognized by the light coloring of the body with touches of fuscous to light brown on head and thorax, the cells of the tegmina between the reticulation washed in varying degrees of fuscous and a series of elongate spots on each half of the abdominal segments which are dark brown and stand out in sharp contrast to the yellowish-tan background. The distinguishing structural characteristics are as follows: The vertex is narrower than in most species, being approximately only three times wider than long; each lateral third of its anterior margin is equal to and at an angle to the median third between the curved lateral frontal carinae and no median carina is present; the frontal process anterior to the eye is shorter than in many species, making it appear to be a short-nosed species, but the nasal process across apex is so slender that the postclypeus is three times longer than the width of this process; the lateral carinae of the mesonotum are sharper than in the majority of species and the disk between is conspicuously concave.

Male genitalia. Tenth abdominal segment (anal flap) with a short, tubular base, from which its posterior ventral region is expanded caudad into a very short, rounded flap. The eleventh segment is ringlike and scarcely visible beyond the 10th and bears an elongate stylus that extends beyond the margin of the flap.

Each harpago as viewed from a flattened lateral view is somewhat crescent-shaped, broadest through approximate middle, has its basal third in the form of a pointed arm and the apical third greatly lengthened and projected dorsad as a sharply pointed, slightly recurved hook.

The aedeagus is nearly all hidden by the semisclerotized theca, the latter fitting over the aedeagus as a tight sleeve and then extending caudad as two truncate flaps which bend dorsad, leaving a notch on each side from which protrudes a pointed well-sclerotized, ventrad-curving, aedeagal hook.

Notes on distribution. The type locality is Brownsville, Texas. Doctor Metcalf kindly loaned the writer a specimen for study taken at Nogales, Arizona. A long series of this species has been taken in the Santa Rita Mountains by Dr. R. H. Beamer, University of Kansas. Doctor Ball states that he has taken it on range grasses in several places in southern Arizona.

Bruchomorpha decorata Metcalf, 1923

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jr. Elisha Mitchell Soc., p. 188. 1923.

Comparative notes. A medium-sized species varying in length from 2.25 mm. to 2.75 mm. As Metcalf states in the original description, it is easily recognized by "its very short nasal process, nearly vertical frons and strongly contrasted colors." As viewed from above, the head extends beyond the eyes only half the length of the latter and the lateral carinae of the frons are closer together at the base than the distance of one carina to each eye. The vertex is about four times wider than long. As viewed from the side the postclypeus is very short, equal in length to the anteclypeus and extending forward beyond latter a distance which is only about one-third width of nasal process across apex. The curved lateral carinae on mesonotum greatly elevated and very sharp.

Male genitalia. Tenth abdominal segment (anal flap) with a tubular base, from which its posterior ventral margin is expanded caudad into a truncate flap which is about the same length as the tube. The eleventh segment frequently not visible, bearing a pointed stylus.

Each harpago as viewed from a flattened lateral view is somewhat crescent-shaped, broadest through base of apical third, and has its apical third curved dorsad as a pointed process.

The aedeagal structure is similar to that of *B. tristis*. The aedeagus is a sclerotized tube entirely hidden by the theca, but bearing two sharply pointed, sclerotized hooks which protrude between the ends of the theca flaps. The theca is tubular at base, then caudad, expands into two elongate, ventral flaps whose apices point dorsad.

Notes on distribution. The type locality is given as Brownsville, Texas. Doctor Ball states that he has taken it also from the Baboquivari Mts. in Arizona and Cuernavaca, Mexico, and that he finds it strictly confined to a single species of grass, the Arizona foxtail (*Chaetochloa grisebachii*) as a food plant. The writer had a few specimens at hand from Laredo in addition to Brownsville, Texas, collected by Paul Oman.

Bruchomorpha mormo Kirk., 1907

Kirkaldy, G. W. Bull. Haw. S. P. A. Exp. Sta. IV, p. 64, 1907.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149. 1923.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203, 1935.

Comparative notes. This is one of the smallest species in the genus and black in color with yellow legs, washed in fuscous. The length of the body varies from 1.75 mm. to 2 mm. in length for specimens which the writer studied, although Kirkaldy states that it is 3 mm. long. In coloring it more closely resembles *B. tristis*, *B. minima*, *B. pallidipes* and *B. oculata*. From the latter it is easily separated by lacking any form of tan or rust median stripe on head and by its very short nasal process. From *B. tristis* it is easily separated by its much smaller size, its vertical head and its yellow and fuscous colored legs. From *B. minima* it is separated again by its short nasal process and yellow legs. For comparison with *B. pallidipes* see notes under that species.

In general the most distinctive characteristics of this species are: from above the head is produced less than half the length of eye, the nasal process is less prominent than in any other species so that the frons is more perpendicular and the frontal tablet is almost circular with the lateral carinae meeting well back of apex; from a side view the postclypeus is equal in length to the anteclypeus and also is about three-fourths of or not quite equal to width of nasal process across apex; the distance of the anterior margin of vertex between the lateral carina is slightly more than the distance from one carina

to the eye; median carina and the two lateral carinae of mesonotum distinct and equally raised; vertex very broad, at least six to seven times wider than long.

Male genitalia. The tenth abdominal segment with the tubular base parallel-sided and the flaplike extension of the ventral margin slightly longer and roundly pointed. The stylus of the eleventh segment broader than in many species.

The harpago crescent-shaped, broadest through middle, with its basal fourth in the form of a slender, pointed process and its apical fourth sharply pointed and curved dorsad. The aedeagal structure is one of the most peculiar for the genus. The aedeagus is entirely covered by the theca except for a slender sclerotized hook which from a lateral view partially shows between the apical flaps of the theca. The theca is a collarlike tube which is broad at base, then tapers toward the apex, finally ending in two truncate, flat, lateral lobes.

Notes on distribution. The type locality is given as Nogales, Arizona. Doctor Ball states that this species is common in southern Arizona.

Bruchomorpha triunata Ball, 1935

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. 30: 197, 1935.

ORIGINAL DESCRIPTION

"A small, shiny black species resembling *tristis*, but with three broad stripes and a very narrow front, widest in the middle. Length, 1.6 mm.

"Front a long oval abruptly pointed below. Much narrower than in *mormo* and not top-shaped as in most species; the disc flat or concave, the bounding carinae light, the median one faint. Nasal process even shorter and broader than in *dorsata*, strongly carinate. Color black, a broad, white stripe from apex of front across the first exposed abdominal segment, as wide as frontal carinae at the vertex. A pair of oblique white stripes broadly covering the lower half of clypeus and gradually narrowing to beyond the middle of the elytra. A pair of white crescents arising under the lateral margin of the elytra and curving around to the genitalia. The pustules and legs pale.

"Holotype ♂, Patagonia, September 10, 1933. Paratype male and a female nymph, Nogales, July 13, 1934. Taken by writer sweeping range grasses."

Comparative notes. Not easily confused with any species in the genus because of its striped body and very short nasal process.

Male genitalia. Anal flap short, truncate across apex. Harpago more slender than in many species, broadest right at middle, from thence abruptly tapering basally into a pointed base, the posterior half narrowed and finally becoming an elongate slender dorsal-directed hook.

Aedeagus almost completely hidden by the theca. The thecal flaps unique in shape, each flap being boot-shaped and broadest across their dorsal region.

Notes on distribution. This is a rare species to date. Doctor Ball gives the type localities as Patagonia and Nogales, Arizona. Dr. R. H. Beamer collected a female in the Santa Rita Mts., August 17, 1932, and a male at Ruby, Arizona, August 22, 1938.

Bruchomorpha jocosa Stal, 1862

Stal, Carolus. Novae vel minus cognitae Homoptera formae et species. Berl. Ent. Zeit., VI, p. 310. 1862.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jr. Elisha Mitchell Soc. 38, pp. 139-230. 1923.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149, 1928. Correct for female. Also = *B. bimaculata* (male of *jocosa*).

Ball, E. D. The Genus *Bruchomorpha* Newnan (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

"Dilute flavo-testacea; basi clypei, tegminibus, parte commissurali excepta, appendicibusque genitalibus nigris; fronte clypeoque conjunctim parum productus. ♂ Long. 3, Lat. $1\frac{1}{2}$ millim. Carolina meridionalis. Mus. Holm."

AUTHOR'S DESCRIPTION

Size. Length of body from tip of head to apex of abdomen, 1.8 mm. to 2.6 mm. Greatest width of body, .93 mm. to 1.3 mm. Length of tegmen, .8 to 1 mm. This is one of the smallest species in the genus.

Color. General color of female uniform reddish-yellow. Male reddish-yellow except the lateral two-thirds of each tegmen which is dark reddish-brown in sharp contrast to the general body color. Underside of body the same general reddish-tan color except for a sharply contrasting dark-brown spot on the median anterior two-thirds of postclypeus. Ovipositor of female sometimes washed in brown.

Structural characteristics. A short-nosed species. As viewed from above the head extends beyond anterior margin of eye only one-half the length of the eye. The frons is top-shaped with a dis-

tinnet median carina present and prominent lateral carina which converges at base where they join the anterior margins of vertex so that the distance of the vertex margin between them is equal to distance from one carina to the eye. The frontal sutures are not as greatly elevated in front of antenna as in other species.

A nasal process is hardly discernible since as viewed from the side the postclypeus is not bulbous, has an almost straight ventral margin and in length is not much longer than the anteclypeus and is about equal to width of the nasal process across apex. Vertex characteristically broad and short, about six times wider than length. Pronotum with a median carina and the usual round pits on each lateral half. Mesonotum with a median and two lateral outwardly curving carinae present which are of about equal distinctness. Rest of thorax and abdomen barrel-shaped. Tegmina less pebbled than in the majority of species.

Male genitalia. The tenth abdominal segment tubular at base and with its ventral margin extended caudad as a roundly pointed flap which is twice longer than the tube. The eleventh segment scarcely visible except for its stylus.

Harpagones more slender than in most species, typically crescent-shaped, with the broadest part at middle and at either end tapering to sharply pointed, slender processes.

The aedeagus is practically hidden by the theca which covers the aedeagus as a tubular sleeve and has its ventral posterior margin extended caudad as two spatulate processes.

Comparative notes. *B. jocosa* is readily distinguished from everything else in the genus by its short nasal process and the characteristic dark spot on apex of postclypeus.

Notes on distribution. Dozier records this from South Carolina, Florida, Kansas and Texas. Doctor Ball states that "this form is abundant throughout the Gulf region and is occasionally taken as far north as Virginia, Iowa and Nebraska."

KEY TO COLOR VARIETIES (Ball, 1935)

1. Females (and males) all dark or with only a trace of light stripes,
var. *obscura* Ball, p. 131
Females red or pale sometimes with a lateral dark stripe; males same, with the
usual dark area on each tegmen..... 2
2. (1) Female all reddish or pale..... var. *jocosa* Stal, p. 129
Female reddish or pale with a lateral dark stripe..... var. *craniata* Ball, p. 131

Bruchomorpha jocosa var. *craniata* Ball, 1935

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

Var. craniata Ball

"Resembling *jocosa* usually, but definitely larger and longer, with less of the 'barrel' shape. A broad, creamy, median stripe from tip to tip covering all the space between the lateral carinae on front and pronotum. Outside of this on either side a still broader pair of smoky or almost black stripes arising on the black 'nose' and usually omitting the margins of the abdomen. Legs and below reddish.

"Holotype ♀, allotype ♂, and seven paratypes, Onaga, Kan. (Crevec.); five paratypes, Stratton, Neb., and one each, Ames, Iowa, and Spring Green, Wis.; all except those from Kansas collected by the writer. This form might easily be confused with *vittata*, but the short nose will separate it."

Bruchomorpha jocosa var. *obscura* Ball, 1935

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

"Form and size of *jocosa*, almost uniformly dark, smoky or rusty brown, sometimes almost black with the legs and lower part reddish. The males often show a more or less definite dorsal light or reddish line.

"Holotype ♀, allotype ♂, and ten paratypes, Sanford, Fla., taken by the writer. This dark form is common in the winter period from Florida to Mississippi and has been taken as far north as New Jersey, D. C., and Virginia. It has, however, never before been recognized as a color phase of *jocosa*."

Bruchomorpha dorsata Fitch, 1856

Fitch, Asa. Trans. N. Y. St. Agric. Soc. XVI, p. 396. 1856.

Stål, Carolus. Novae vel minus cognitae Homopterum formae et species. Berl. Ent. Zeit. VI, p. 309. 1862. (As *flavo-vittata*).

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38, pp. 139-230. 1923. (His species is not *dorsata* Fitch but *extensa* Ball.)

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149, 1928.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

"This is black and shining, with a pale yellow stripe along the middle of its back from the front to the tip, its legs being also pale

yellow with a dusky stripe on the thighs. Length, 0.16. Mr. Robertson has discovered individuals having the wing covers and wings fully developed, showing that it is a pupa which is described by Mr. Newman. As it may be as Mr. Westwood suggests in a letter to me, that these insects, like some of the Nepidae and other species belonging to this order, attain to puberty and perish without acquiring wings, whilst other individuals of the same species become fully developed."

Synonymy. The writer agrees with Doctor Ball that *flavo-vittata* Stal is a synonym of this species. Stal's original description of *flavo-vittata* is as follows:

"Nigra, subcupreo-nitens; vitta utrimque angustata, ab apice frontis ad apicem abdominalis ducta pedibusque dilute flavescentibus, hic fusco-vittatis; fronte clypeoque conjunctim nodice productis. ♂ ♀ Long. 3, Lat. $1\frac{1}{2}$ millim. Wisconsin. Mus. Holm."

AUTHOR'S DESCRIPTION

Size. Length of body from tip of head to apex of abdomen, 2 mm. to 3 mm.; width, 1 mm. to 1.5 mm. Length of tegmen, .9 mm.

Color. Uniform dark shining species with a broad, yellow stripe down back. Frons, vertex and thorax a deep reddish-brown, with the median yellow band one-third the width of the vertex down to apex of mesonotum where it broadens a trifle. Tegmina and abdomen shining black with the yellow median stripe slightly broader throughout the length of tegmen, then becoming approximately same width as on frons and vertex and extending the full length of abdomen, including base of anal flap. Underside of body for the most part reddish-brown. Apex of postclypeus, all of anteclypeus and labrum, the beak, the less sclerotized areas around the coxal bases, and the caudal areas of the last few abdominal segments yellow to tan. Legs all yellow or with basal half of coxae and a lateral stripe on the tibiae fuscous.

Structural details. A short-nosed species. As viewed from above the frons extends beyond eye a distance less than the eye itself, a median carina distinct, two lateral carinae moderately, outwardly rounded, the distance between them at base about equal to the distance from one carina to each eye, the frontal sutures forming the lateral boundaries of the head and raised on a moderately sharp carina over each eye and gena. Postclypeus as viewed from the side very short, equal in length to anteclypeus, less than the width of the frontal process across apex. Vertex transversely con-

cave, about five times wider than length through middle. Mesonotum approximately three times wider than long, between the eyes roundly produced forward over half the length of eye, its lateral cover from above almost completely overlapped by eye, then on extreme sides again expanded into a roundly pointed flap which almost covers pleural region; the disk between mesal margin of eye and dorsal stripe covered with approximately sixteen round pits, a distinct median carina present. Mesonotum twice wider than long, a distinct median and two conspicuous lateral carinae present on each side of which in the disk are approximately eleven round pits. Tegmina approximately half the length of the abdomen with less rugulose appearance and less prominent longitudinal veins than in other species. Abdomen characteristically globose, showing five segments visible from above, on each side just back of anterior border a faint carina visible just back of which is a row of four round pits and one at extreme side.

Male genitalia. Tenth abdominal segment (anal flap) with a short tubular base, from which its posterior ventral region is expanded caudad into a pointed flap. The ringlike eleventh segment is only slightly visible and bears a moderately long styleus.

Each harpago is crescent-shaped, broadest through middle, its basal fourth forming a slender pointed arm and its apical fourth prolonged dorsad as a pointed process. The sclerotized aedeagus is covered through the middle by the tubular membranous theca which is somewhat narrowed at base and has its ventral posterior region projected caudad as two rounded spatulate lobes. Sclerotized aedeagal hooks are visible between the tubular part of the theca and the flaps.

Comparative notes. There are four species in the genus which are black with light cream, median longitudinal bands of considerable width. These are *B. dorsata*, *B. extensa*, *B. beameri* and *B. suturalis*. The latter two do not have the stripe extending across the abdomen to any extent. *Dorsata* is easily separated then, from *B. extensa* because of its very short nasal process.

Notes on distribution. Doctor Ball states that it is a northern species ranging from New York and North Carolina to Dakota and Kansas.

Dozier reports it from the following states: Arkansas, Colorado, Kansas, Iowa, Missouri, Ohio, North Carolina, New Jersey, New York, Texas, and Wisconsin.

Bruchomorpha pallidipes Stal, 1862

Stal, Carolus. Novae vel minus cognitae Homopterum formae et species. Berl. Ent. Zeit. VI, p. 309. 1862.

Metcalf, Z. P. The Fulgoridae of Eastern North America. Jour. Elisha Mitchell Soc. 38, pp. 139-230. 1923.

Dozier, Herbert. The Fulgoridae or Plant Hoppers of Mississippi. Miss. Agric. Exp. Sta. Bull. 14, pp. 3 to 149. 1928.

Ball, E. D. The Genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brook. Ent. Soc. XXX, No. 5, pp. 197-203. 1935.

ORIGINAL DESCRIPTION

Nigra; vitta media frontis, thoracis scutellique, margine commissurali nec non pedibus flavo-testaceis; fronte clypeoque conjunctim medice productis. ♀ Long. 3, Lat. 1½ millim. Carolina meridionalis. Dom. Belfrage. Mus. Holm.

AUTHOR'S DESCRIPTION

Size. Length of body from tip of head to apex of abdomen, 2.2 mm. to 2.6 mm.; width, 1.1 mm. to 1.36 mm. Length of tegmen, 1.06 mm. to 1.1 mm.

Color. General color resembling *oculata* and *nasuta*. Head and thorax from above a rich brown to blackish, but usually a lighter shade than tegmina and abdomen. A median testaceous yellow to bronze median longitudinal band on frons, vertex and pronotum, which in width is about one-fifth the width of vertex. On mesonotum and claval margins of tegmina this broadens somewhat and at sides indistinguishably blends into the darker coloring of the sides. Eyes dark brown, margined in light and frequently spotted with light. Tegmina and abdomen deep brown to pitch, usually quite shining. Underside of body shining dark brown to black except the less sclerotized areas of the thorax. Legs usually testaceous yellow with the coxae and sometimes the bases of other segments somewhat darker, or sometimes legs are all fuscous except at apices of the segments.

Structural characteristics. A short-nosed species. Frons, as viewed from above, extending beyond eye a distance slightly less than length of eye, its lateral carinae at base placed closer to median carina so that the distance between the two lateral carinae is equal to the distance from one carina to the median margin of eye, united just before apex; frontal suture elevated in a sharp carina which hangs shelflike over the gena on which is situated the antenna; ventral margin of postclypeus only slightly convex, its length at this point approximately equal to width of nasal process across its apex. Vertex approximately six times wider than long, transversely concave and a faint median carina present. Pronotum characteristic

of the genus in shape, with a distinct median carina and about 18 or 19 pits on each lateral dorsal disk; its extreme lateral third extended around and under eye as a short collar, not visible from above, but which again broadens at the side into a pointed ventrad projecting flap, bearing four round pits just cephalad of its posterior margin. Mesonotum not as long as in some species, approximately twice wider than long; a distinct and sharp median carina present; two lateral carinae only faintly indicated, if at all. Tegmina extending to slightly over half length of abdomen, longitudinal veins indistinct, their entire surface more pebbled than in other species. Abdomen barrel-shaped, with five segments visible, lateral carinae present on anterior margin of each segment just back of which are single rows of four to five round pits.

Male genitalia. Tenth abdominal segment (anal flap) with a short tubular base, from which its posterior ventral region is extended caudad as a bluntly pointed flap. The ringlike eleventh segment shows beyond the dorsal margin of the tube and bears a blunt, fingerlike stylus.

Each harpago, as viewed from a flattened lateral view, is somewhat crescent-shaped, broadest at apex of basal third and has its apical third greatly lengthened into a slender, sharply pointed, dorsad curving hook.

The aedeagal structure is bilaterally symmetrical. The sclerotized aedeagus is covered through middle by the tubular membranous theca which is somewhat narrowed through middle and has its ventral posterior region projected caudad as two rounded spatulate lobes. Sclerotized aedeagal hooks are visible between the tubular part of the theca and the flaps.

Comparative notes. Size and form of *B. minima* and *B. mormo*. Also resembles *B. suturalis* and *B. oculata*. From both *B. suturalis* and *B. minima* it is separated by its extremely short nasal process and yellow legs. From *B. oculata* it is separated by its smaller size and short nasal process. From *B. mormo* it is separated by having an indication of a dorsal median stripe on head and thorax, a shorter postclypeus, an elongate top-shaped frontal tablet instead of the circular one as in that species.

Notes on distribution. Dozier states that this species is recorded from Virginia, South Carolina, Florida, Kansas, Colorado, and adds Mississippi. In addition to these states the writer studied specimens from Alabama, Louisiana, and a large series from Washington, D. C.

THE GENUS *DANEPTERYX*

Uhler, P. R. New Genera and Species of American Homoptera. Trans. Maryland Acad. Sci. 1, p. 42, 1889.

Melichar, Leopold. Monographie der Issiden (Homoptera). Abh. k. k. Zool. Bot. Ges. Wien, III, pt. 4, 1906.

Kirkaldy, G. W. A Brief Note on Three (Two New), Californian Fulgorid Hemiptera. Proc. Haw. Ent. Soc. II, p. 23, 1908.

Van Duzee, E. P. A Preliminary List of the Hemiptera of San Diego county, California. Trans. of San Diego Soc. of Nat. Sci. 2 (1), p. 42, 1914.

Comparative notes. This genus is recognized by having narrow, strap-shaped wing covers, somewhat triangularly widened at base and tapering at tip, where they become acutely rounded; contracted angulate head with an oblong quadrangular vertex having acutely prominent angles; front oblong, with sides and middle line prominently carinate; pronotum transverse, short, depressed on the disk, the anterior angle subacute, with the sides narrow and curved downward; scutellum triangular, carinate, acute at tip; wings rudimentary; hind tibiae with four laterally placed spines; abdomen obese, carinated above.

HISTORY OF THE GENUS

The genus was described by P. R. Uhler in 1889 with *manca* as the haplotype. In 1906 Melichar added an additional species, *lurida*. Kirkaldy in 1908, with no reference to *lurida*, described two new species, *barbarae* and *artemesiae*, which he compared to *manca* only.

Since Kirkaldy states that the tegmina vary in length in *barbarae*, also, Van Duzee, in collecting *manca*, states that this species varies from a fulvous brown to dark fuscous with sometimes a dorsal stripe and the elytra whitish or grey, and since on outward appearance the present writer as well as coworkers have found them to be difficult to separate, it makes the status of the named species somewhat dubious. Moreover, the types of none of the three latter species have been available for study. Yet by means of the male genitalia and certain minute, yet distinct external characters, the writer believes that these four species can be differentiated, with perhaps *lurida* remaining as the most doubtful.

To the four named species are being added two new species, *D. adiuncta* and *D. robusta*. These are sufficiently different in shape of tegmina and genitalia from the older species involved to warrant describing them as new.

KEY TO SPECIES

1. Tegmina wider, not more than five times longer than greatest width, greatly widened through basal third so that claval margins touch or are almost adjacent 2
- Tegmina narrow, distinctly straplike, over five times longer than greatest width, not greatly widened at base; claval margins not approaching each other. . . 3

2. (1) Short, stout-bodied; costal margin of tegmina almost straight, reticulation much less pronounced, only one conspicuous median longitudinal vein,
robusta n. sp., p. 143
 Larger insects; basal third of costal margin greatly expanded, the tegmen at this point almost twice wider than at apical third, reticulation coarse,
adiuncta n. sp., p. 141
3. (1) Frons wider, outer margins outwardly curved, greatest length at sides about twice median length of postclypeus, dorsal margin concave, at the point not greatly narrowed; larger, 5-5½ mm. long..... *barbarae* Kirk., p. 149
 Frons more wedge-shaped, considerably narrowed dorsad, one lateral margin over twice the length of postclypeus at middle..... 4
4. (3) Tegmina with one prominent middle vein, cells posterior to this smaller, forming a finer reticulation *artemesiae* Kirk., p. 139
 Tegmina with longitudinal veins and crossveins all coarse, greatly elevated above the cells 5
5. (4) Dorsal margin of frons deeply notched; very dark body coloring, *lurida* Mel., p. 138
 Dorsal margin of frons almost straight; light tan, mottled with dark,
manca Uhl., p. 137

Danepteryx manca Uhler, 1889

(Plate XVIII, Figures 6, 11, 16)

Uhler, P. R. New Genera and Species of American Homoptera. Trans. Maryland Acad. Sci. 1, p. 42, 1889.

Van Duzee, E. P. A Preliminary List of the Hemiptera of San Diego county, California. Trans. of San Diego Soc. of Nat. Sci. 2 (1), p. 42, 1914.

ORIGINAL DESCRIPTION

"Grayish fuscous, pubescent, tinged with white, pale yellowish-brown when immature. Upper surface and wing covers scabrous. Head rough, a little hairy, the carinate lines blackish, interrupted with white; lower part of cheeks and epistoma pale testaceous. Legs and tarsi spotted with fuscous. Pronotum a little pale about the margins. Pectus hairy, unevenly fuscous, marked with a white spot above the orifice of the mesothoracic spiracle. Underside chiefly paler than above, sometimes testaceous, or white on the posterior coxae. Wingcovers ashen gray, with chiefly black veins, the veins of the costal and inner border coarsely interrupted with white, while those of the discal portion are minutely speckled with white. Anal and genital segments more or less rusty yellow. Length to tip of wing covers, 4½ to 5 mm.; to end of venter, 3½ to 4½ mm.; width of pronotum, 1¾ to 2 mm. This insect has thus far been reported only from Los Angeles, Cal., from which place several specimens have been referred to me for examination by Mr. D. W. Coquillett.

"It is the most remarkable insect of the order which has yet been discovered in North America. The wing covers lack the membranous area which is so often present in the insects of this group, while the form of these organs and their type of venation lead to the Orthoptera of the group Acrididae, and thus give us an ancestral

type which might well be a remnant of the old Fauna prevalent in the Rocky Mountain region during the Tertiary period."

Comparative notes. This species is not readily separated from *D. barbarae* Kirk., *D. artemesiae* Kirk., or *D. lurida* Mel. By close comparison it is separated by the following characteristics: Pronotum and vertex through middle of equal length, vertex more tapering anteriorly, the rounded anterior margin of pronotum distinctly wider than vertex at base, dorsal and ventral margins of frons not noticeably different in width, the former being only one-fourth greater; cells of the tegmina more evenly rectangular than in other species; tegmina narrow, but usually not much longer than tip of abdomen.

Male genitalia. Anal flap moderately emarginate at apex. Each harpago, as seen from a flattened lateral view, has its ventral margin outwardly rounded and its dorsoapical angle extended cephalad as a sharply pointed projection at base of which is an abbreviated, sharp mesal spine and on the outside a recurved hook.

The aedeagus is tubular with its extreme apex somewhat flattened, then narrowing into a blunt point. The tubular theca covers the approximate basal fifth. Attached near the base of the aedeagus and projecting beyond the posterior margin of the theca are two, thick, slightly curved hooks which are shorter than those in other species, while a second larger pair arise just caudad of middle, one on either side, whose apices are sharply pointed and project cephalad.

Distributional notes. Described from Los Angeles, Cal. Van Duzee (1914) states that it is "abundant everywhere on *Adenostoma* and *Artemisia* and comes to maturity about April 1, but specimens may be occasionally found throughout the autumn and winter."

Specimens are at hand for study from the following places in California: Alameda county, Claremont, Del Mar, Lempoe, Monterey, Mt. Diablo, Newton, Nipomo, San Diego, Santa Cruz Mt., Stimson Beach and Ventura.

Danepteryx lurida Mel.

(Plate XVIII, figs. 2, 9, 10)

Melichar, Leopold. Monographie der Issiden (Homoptera). Abh. k. k. Zool. Bot. Ges. Wien III, 1906.

ORIGINAL DESCRIPTION

"Von der vorhergehenden Art durch die kleinere Gestalt und die stark dunkle, äusserst dicht schwarz gesprenkelte Färbung des Körpers unterschieden. Der Aberrand des Stirne ist stärker winkelig

ausgeschnitten. Das Basalsegment des Bauches ist blassgelblich, mit zwei Längsfurchen versehen, zwischen denselben und an den Seiten Gruppen von schwarzen Punkten, die Beine sehr dicht und fein schwarz gesprenkelt, ein schwarzer Ring vor der Spitze der Schenkel. ♂ ♀ Länge, $3\frac{1}{2}$ -4 mm.

"Nordamerika, Claremont, Cal. Zwei Exemplare von Baker in meiner Sammlung."

Comparative notes. This species is very difficult to separate from *D. manca*. This brings out two problems. Since the type cannot be located, it is not at all certain that the author has recognized the proper form as *lurida*, and, secondly, if the forms classified as *lurida* in this paper are correctly named, it still might be debatable as a valid species since the characters for separation are not very obvious.

It differs from *manca* by having the dorsal margin of the frons deeply angled instead of being truncate as in *manca*, by having the lateral margins of frons straighter and converging at base, by having the tegmina slightly wider at base than in *manca* with the longitudinal veins beyond middle converging at various points, making the apical half more reticulated and not such uniform rectangular cells present as in *manca*. The aedeagus is quite distinct from *manca*, as can be seen in the drawings.

Male genitalia. The anal flap of this species seems to be more deeply emarginate than in *artemesiae*. The harpago, as viewed in flattened lateral view, has the posterior, ventral margin angulate, while in other species it is rounded at this point.

The aedeagus differs from other species in the genus, mainly by having the left hook of the posterior pair angulately bent, forming a boot-shaped structure, whose apex is directed caudad. The basal hooks of the theca are longer than in *manca* and less curved, extending at least to apex of basal third of theca.

Notes on distribution. Claremont, California, is given as the type locality. The series of specimens studied for this paper are from San Jacinto Mts., Stimson Beach, San Francisco, and Montara, California.

Danepteryx artemesiae Kirk. 1908

Kirkaldy, G. W. A Brief Note on Three (Two New), Californian Fulgorid Hemiptera. Proc. Haw. Ent. Soc. II, p. 23, 1908.

ORIGINAL DESCRIPTION

"Smaller and much darker than the last, but the head structure is very similar; the frons is narrower, though at the same time it is distinctly wider than in *D. manca*. The general ground color is dark fuscous, the legs more heavily and darkly sprinkled than in

D. barbarac. Antennae dark fuscous. Tegmina piceous or blackish (instead of yellowish-brown), with paler markings. The tegmina are narrower and the pronotum is shorter than in *D. barbarae*, more so even than in *D. manca*. Length, ♀ $4\frac{1}{2}$ mm.

"Hab. California, Alameda (Perkins) on *Artemesia*."

Comparative notes. This species is very similar to *D. manca* and *D. lurida*. It differs from *manca* mainly by the longer pronotum, which is approximately twice the length of the vertex, while in *manca* the two are the same length; the frons narrowed considerably at dorsal margin, at this point being half again as wide as at ventral area; the tegmina has usually a prominent middle vein from which it seems the others tend to branch off rather than the parallel longitudinal veins of *manca*.

From *lurida* it is separated by not having the basal margin of the frons angled as in *lurida* and again by the prominent middle vein of the tegmen.

Male genitalia. The anal flap of this species seems to be more truncate at apex than in *manca* or *lurida*, with its lateral margins parallel. The harpago is larger with its apical fourth narrowing into an elongate, dorsal recurved arm.

The aedeagal structure is distinct. The theca itself is proportionally longer. The distal portion of the aedeagus is broadened considerably, much curled under the shaft part and finally ends in a sharp, recurved spine. The basal hooks of the aedeagus are much longer than in any other species, reaching at least to middle. The posterior lateral hooks are greatly reduced to mere prongs.

Geographical distribution. Described from Alameda, California. Specimens were on hand for study from the following places in California: Cajon, Del Mar, Lempoc, Mint Canyon, Nipomo, Topango Canyon, and Ventura.

Danepteryx barbarac Kirk, 1908

Kirkaldy, G. W. A Brief Note on Three (Two New), Californian Fulgorid Hemiptera. Proc. Haw. Ent. Soc. II, p. 23, 1908.

ORIGINAL DESCRIPTION

"This is close to *D. manca* Uhler, but differs by the basally truncate frons, which is also much wider in proportion, widening towards the apex. The vertex is shorter and wider, the lateral margins parallel (converging very slightly anteriorwards, if anything), the anterior margin very obtuse-angled. The pronotum is rather more produced anteriorly, its lateral margins more arched. Antennae yellowish-testaceous. The tegmina vary in length.

"Length, ♀ 5½ mill.

"Hab., Cal., Santa Barbara foothills, July (Gifford)."

Comparative notes. This species seems to be a slightly larger species with longer tegmina than the other species in the genus. It is separated from other species externally by having a broad frons, with lateral margins outwardly curving, across ventral area being only one-sixth wider than at dorsal margin; by having long pronotum, being one and one-half times longer than vertex through middle; by having a wide vertex, with its anterior margin one-third wider than one lateral margin; wing venation forming an uneven network.

Male genitalia. Harpago as viewed from a flattened lateral view, crescent-shaped, larger than in other species and with the dorsoapical corner projecting dorsad as a sharply pointed projection, at base of which is the usual recurved spine, which in this species is more fingerlike and longer than it is in the closely related species.

The aedeagus is distinctly different. The theca is proportionally longer, with the ventrad portion longer than the ventral. The basal hooks of the theca broad across the base, sharply narrowing to the pointed apex, which is about at middle. The two lateral hooks are more reduced than in *artemesiae*, being reduced to mere pointed extensions of the lateral margins.

Distributional notes. The type locality is given as Santa Barbara, California. Specimens were on hand for study from the San Jacinto Mountains, California.

Danepteryx adiuncta n. sp.

ORIGINAL DESCRIPTION

Size. Length of body from tip of head to apex of tegmen, 3.5 to 3.7 mm.; greatest width of body, 1.5 mm. to 1.75 mm.

This is a robust species with broader, shorter tegmina than in the older species, but not quite as short stature as in *robusta* n. sp.

Color. Characteristically mottled as are all the members of the genus. General body color from above reddish-brown mottled with tan, earinae yellow or light tan, extreme carinate edges of vertex and pronotum dark brown followed immediately by a thin border of light tan. Eyes mottled dark brown. Segments of abdomen shaded with dark on posterior margins. Underside of body lighter, mottled with dark. Legs light tan with irregular splashes of brown, spines on tibiae and tarsi dark brown to black. Tegmina with dark-brown background, veins light yellow and margin all around bordered with uniform roundish light yellow spots.

Structure. Vertex broad, one lateral margin and anterior margin twice the length at middle from apex to occipital declivity. Frons broad, margins distinctly outwardly bowed, greatest width at base of ventral third, at this point approximately one-fourth wider than across dorsal margin. Pronotum typical, with the arched central region with the sharply defined carinae extending forward into head region only half the distance of the eyes. Mesonotum with sharply elevated carinae. Abdominal segments carinated at middle. Tegmina short, through basal third almost twice wider than apical third, the claval region short, with inner margins almost touching, the basal third of costal margin greatly expanded, then suddenly constricted at middle from which point it gently curves to the rounded apex. Tegmina with one prominent longitudinal vein at middle, the rest of veins forming an irregular network, all veins conspicuous and greatly elevated.

Male genitalia. Anal flap short, parallel-sided, the apical margin deeply, roundly emarginate. Eleventh abdominal segment showing as a broad, short, ringlike segment, the stylus moderately long.

The harpago, as viewed from flattened lateral view, has its ventral and apical margin greatly rounded, the apical dorsal extension is moderately long, sharply pointed and bears at its base on the outside a medium sized, recurved external hook.

The aedeagus is a semicircular tube which is concave ventrad and at apex ends as a truncate flap. Attached near its base and projecting slightly beyond the posterior margin of the theca are two slender, curved hooks. Just posterior to the apex is another pair of small hooks whose apices are directed cephalo-dorsad. These hooks are placed much nearer the apex than in other species. The theca is more abbreviated in this species than in the others.

Comparative notes. This species is easily distinguished from the other older species by the broadened tegmina which have their claval margins adjacent. It is more similar to *D. robusta* n. sp. because of this condition, but is separated from this species because the apical half of the tegmen is greatly narrowed again and by having a coarser reticulation and less pronounced median longitudinal vein.

Location of types and distribution. Holotype male, collected by R. I. Sailer, at Monterey, Cal., August 10, 1938; holotype female, same place and collector. Four paratypes, same data.

Danepteryx robusta n. sp.

ORIGINAL DESCRIPTION

Size. Small, robust species; length of body from tip of head to apex of tegmen, 3 to 3.5 mm.; width of body through thorax, 1.4 mm.

Color. Color tan, general color lighter than in other species. Vertex and pronotum yellowish-tan with outer carinate margins brown. Eyes reddish-brown mottled with dark. Pronotum tan with carinae light yellow. Frons and postclypeus mottled with minute irregular splashes of reddish-brown, the thin carinate edges dark brown. Thorax yellowish-tan. Legs yellow splashed with irregular specks of dark brown, tips of tibial spines, claws, and last segment of tarsi dark brown. Thorax yellow. Abdomen yellow, with some of the segments at the sides and towards posterior margins darker, the disks of first abdominal segments dotted with round brown spots. Tegmina mostly yellowish-tan, dimly mottled lengthwise through middle with fuscous, the veins standing out distinctly yellow against this darker background.

Structure. Vertex broad, anterior margin and lateral margin equal, almost twice the length at middle from apex to occipital declivity. Frons narrow as in *manca*, being about one-third wider through ventral third than across dorsal margin which is truncate or only very slightly angulate. Pronotum short, length through middle not more than one-third longer than median length of vertex. Mesonotum with three sharp carinae. Tegmina short, broad, with claval margins adjacent, rest of inner margins almost touching due to the fact that the costal margins and entire inner margins are parallel and that the base of the wing is not expanded as in *adiuncta*. Wing venation similar to that of *artemesiae* with a prominent middle vein, posterior to which the cells are small and the veins are not greatly elevated.

Male genitalia. Anal flap (tenth abdominal segment) long, with the ventral region extended into a deeply, roundly notched flap which is about again as long as the tube itself. The ringlike eleventh segment conspicuous with an exceptionally long fingerlike flap.

The harpago small, having no greatly extended apical dorsal hook and a short external hook just anterior to apex.

The aedeagus is a semicircular tube which is concave on the ventral side and at apex bluntly pointed. Attached somewhere near the base of the aedeagus and projecting beyond the posterior margin of the theca are two thick, slightly curved pointed hooks, which are sickle-shaped and of median length. A second pair of aedeagal

hooks arises just caudad of middle whose sharp-pointed apices are directed cephalad. The sleeve-like theca covers the approximate basal third.

Color phase. A few specimens, taken at the same time and place as the typical form show a variation in color by having the fuscous markings much more pronounced, thus, in general, being much darker in coloring.

Comparative notes. This species resembles more closely *D. adiuncta* and *D. artemesia*. Like *artemesia* it has the prominent median longitudinal vein beyond which the cells are small due to finer reticulation. It differs from this species by having the shorter, broader tegmina which adjoin along claval and inner margins. It is similar to *adiuncta* by the adjoining of the tegmina, but differs from this species by having the costal and claval margins parallel and the basal region of the tegmen not expanded as in *adiuncta*. Also, *adiuncta* does not have the pronounced middle vein with the cells posterior to it small and the veins fine, but all veins are coarse.

Location of types and geographical distribution. Holotype male and allotype female from Ventura, Cal., collected by R. H. Beamer, July 20, 1933. A series of forty males and thirty-eight female paratypes, same data. Four males and four female paratypes from Gaviota, Cal., collected by R. H. Beamer, July 19, 1933. One male and nine female paratypes taken at Palm Beach, Cal., July 27, 1938. Eight males and six females taken at Palm City, Cal., July 27, 1938, by R. H. Beamer. Types are in Snow Entomological Collection at the University of Kansas.

THE GENUS TYLANIRA Ball, 1936

Ball, E. D. Some New Issidae with Notes on Others (Homoptera-Fulgoridae). Proc. Biol. Soc. Wash. 49: 155-158, 1936.

The writer has not seen specimens of the species described by Doctor Ball for this genus. For this reason the original description only of the genus and the species *bifurca* is given in this paper.

ORIGINAL DESCRIPTION OF THE GENUS

"Resembling *Tylana* Stal (as represented by *ustulata* Uhl.) and *Ulides* Stal in general form and structure, but with a much narrower and more acutely angled head which is produced into two long, divergent processes extending obliquely forward and upwards, two and one-half times the length of the eye. Superficially resembling *Lusanda* Stal from Ceylon, but in that genus the head is broad, and the projections point obliquely downwards. Vertex one and one-half

times as long as its basal width, nearly that much longer than the pronotum, the disc with a deep angular trough, the two projections triangular in shape, inclined upward, the angle between them acute and extending down to expose the earina of the front. Pronotum and mesonotum as in *Tylana* except that there are three large tubercles in the lateral compartments on each side of the latter. Elytra longer and more definitely angled behind with a longer inflated bulla than in *Tylana*. Venation reticulate and similar to that in *T. ustulata*. Front one-half longer and no wider than in *Tylana*, 5-carinate, the intermediate carina rounding in above and not extending onto the projections. The whole insect clothed with long stiff bristles.

"Type of the genus *T. bifurca*, n. sp."

Tylanira bifurca, Ball

"Form of the genus, resembling *Tylana ustulata* Uhl., larger with a much longer, narrower head and pronotum giving the insect a wedge-shaped appearance anteriorly and a blunt wedge posteriorly. Length, ♀ 8 mm., or ♂ 7 mm.

"General color lighter brown than in *ustulata* with a definite grayish cast, the cinnamon chevrons of *ustulata* reduced to pale ovals while there are two smaller spots behind connected by a broken line. Holotype ♀, allotype ♂, and a pair of paratypes, Benson, Ariz., June 7, 1930, and one female, Fort Hancock, Texas, June 9, 1930. All taken by J. O. Martin and received through the kindness of E. P. Van Duzee of the California Academy of Sciences. Types in that museum, a paratype ♀ in the author's collection.

"This is the largest and most striking Issid yet recorded from the United States."

THE GENUS PAPAGONA Ball, 1935

Ball, E. D. Some New Issidae with Notes of Others. Bull. Brook. Ent. Soc., 30:40, 1935.

ORIGINAL DESCRIPTION OF THE GENUS

"Allied to *Aphelonema*, but much more elongate in form, with the vertex as long as wide, the eyes enclosing only about half the pronotum and the front triangular, broadest below.

"Vertex flat, long and narrow, longer than pronotum, equaling the mesonotum, as long as its basal width. Head with the eyes definitely narrower than the pronotum which is constricted on the anterior half and enclosed by the eyes and then widened and laterally carinate posteriorly, but again exceeded in width by the elytra and abdomen. (In *Aphelonema* the insect is barrel-shaped, the head almost as wide

as the body. Pronotum extremely long and narrow, almost as long as wide, the lateral margins carinate and broadly pustulate, mesonotum elongate, the lateral carinae extremely high and enclosing a tablet that is much longer than wide. Elytra brachypterous, covering over one-half the abdomen, the sutural line depressed in middle, the posterior margin rounding with an inflated area in front on either side. Venation as in *Aphelonema*. Hind tibiae with a single stout spine. Face elongate, retreating, forming a 30° angle with vertex. Front the shape of a rather long flatiron. Truncate with two pustules below. The lateral pustulate areas extremely wide above.

"Type of genus: *Papagona papoosa* n. sp.

Comparative notes. The present writer has not seen the type species of the genus. Doctor Ball very kindly donated a paratype of *P. succinea*. This species shows all the differences between this genus and *Aphelonema*, as pointed out in the original description given above.

KEY TO SPECIES

1. Vertex short, flat, mesonotum depressed, amber colored without median stripe,
P. succinea Ball, p. 147
2. Vertex long, concave, mesonotum flat, gray and brown in color with a broad median,
white stripe *P. papoosa* Ball, p. 146

ORIGINAL DESCRIPTION

"A gray and brown species with a long vertex, a broad median white stripe and three pairs of white spots. Length: ♂, 2.6 mm.

"Vertex long, tapering, deeply concave, the postocular carina of the pronotal flaps rounding, only a little higher than the carinate lower margin. Mesonotum with the median portion flat. Front much longer than its apical width. The lateral margins of the pustulate areas very weakly carinate.

"Color, pale straw, a broad median white stripe to the apex of the mesonotum narrowing posteriorly. The outer inflated portion of elytra and the median inflated portion of abdomen piceous, a pair of round, waxy spots back of the hinge on the elytra, a smaller pair in the saddle, a large pair on outer portion of the first exposed segment and often three approximate dots along the median line. Below and legs dark brown, shading out to straw on the front. The coxae and venter pale blue.

"Holotype ♂, taken from bluffs of the Santa Cruz river near Tubac, Ariz., August, 1932. Paratype ♂ in the same spot, May, 1932. Both swept by the author from a clump of joint grass (*Mahlenbergii porteri*)."

Papayona succinea Ball, 1935

(Plate XV, figs. 2, 2a, 2b)

Comparative notes. Doctor Ball states that this species is separated from *papoosa* by the following differences: By having a shorter head and vertex definitely shorter with apex more bluntly rounding and the disc almost flat with the marginal carinae raised instead of disc being deeply concave as in *papoosa*; by having the frontal tablet definitely broader and more rapidly narrowing than in *papoosa*; by having a depressed mesonotum, and by being a rich amber color without the median stripe.

Notes on distribution and location of types. The types were collected by Doctor Ball in the Tucson Mountains, Arizona, and Sabino Canyon of the Santa Catalina Mountains in April on small clump grass, *Triodia mutica* Benth.

PLATE XIII

1. Dorsal view of head and thorax of *Dictydeca nigrata* n. sp.
2. Lateral view of *Dictydeca nigrata* n. sp.
3. Lateral view *Dictydeca uhleri* n. sp.
4. Lateral view of *Dictydeca intermedia* Uhler.
5. Dorsal view of head and thorax of *Dictydeca uhleri*.
6. Lateral view of *Dictydeca angustata* Uhler.
7. Dorsal view of *Dictydeca intermedia* Uhler.
8. Dorsal view of head and thorax of *Dictydeca valida* n. sp.
9. Dorsal view of *Dictydeca angustata* Uhler.
10. Lateral view of *Dictydeca valida* n. sp.

PLATE XIII

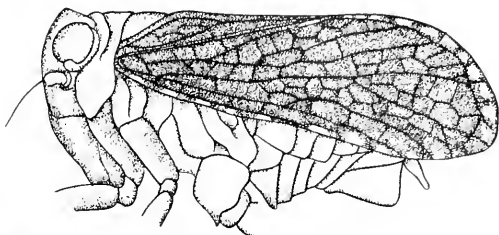
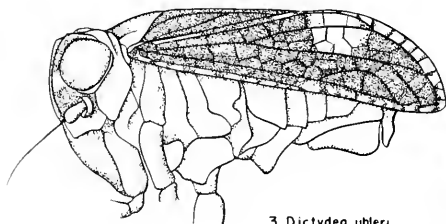
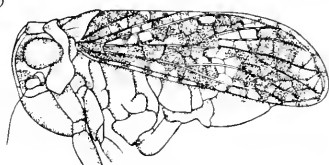
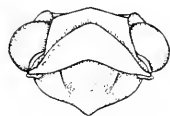
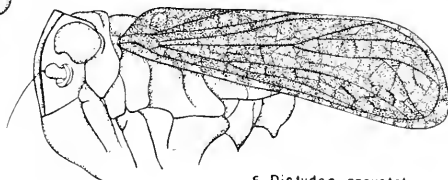
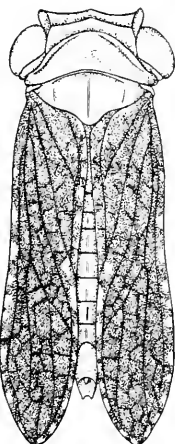
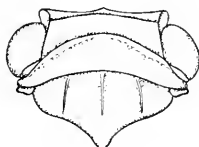
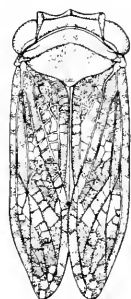
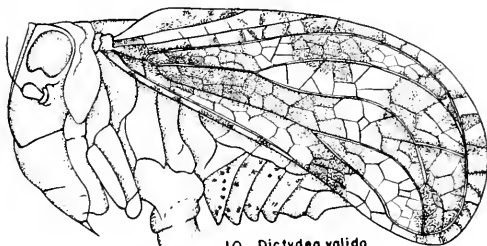
1 *Dictydea nigrita*2. *Dictydea nigrita*3 *Dictydea uhleri*4 *Dictydea intermedia*5. *Dictydea uhleri*6. *Dictydea angustata*9. *Dictydea angustata*8. *Dictydea valia*7. *Dictydea intermedia*10 *Dictydea valida*

PLATE XIV

1. Cephalic aspect of head of *Dictydeca angustata* Uhler.
2. Cephalic aspect of head of *Dictydeca intermedia* Uhler.
3. Cephalic aspect of head of *Dictydeca valida* n. sp.
4. Cephalic aspect of head of *Dictydeca nigrata* n. sp.
5. Cephalic aspect of head of *Dictydeca uhleri* n. sp.
6. Cephalic aspect of head of *Dictydeca intermedia* Uhler.
7. Lateral view of harpago of *Dictydeca angustata* Uhler.
8. Anal flap of *Dictydeca intermedia* Uhler.
9. Lateral view of aedeagus and theca of *Dictydeca angustata* Uhler.
10. Anal flap of *Dictydeca angustata* Uhler.
11. Lateral view of aedeagus and theca of *Dictydeca intermedia* Uhler.
12. Lateral view of harpago of *Dictydeca nigrata* n. sp.
13. Anal flap of *Dictydeca nigrata* n. sp.
14. Anal flap of *Dictydeca valida* n. sp.
15. Lateral view of *Dictydeca valida* n. sp.
16. Lateral view of harpago of *Dictydeca valida* n. sp.
17. Lateral view of aedeagus and theca of *Dictydeca nigrata* n. sp.

PLATE XIV

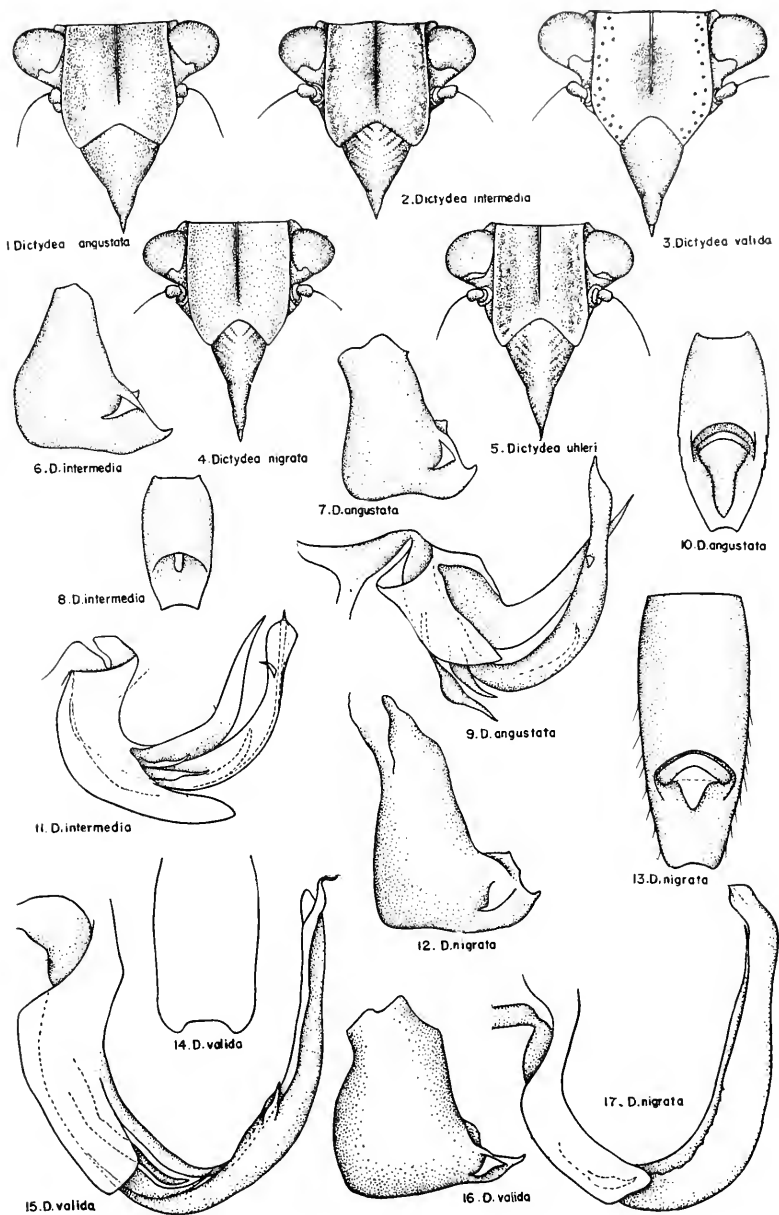


PLATE XV

1. Anal flap of *Osbornia arborca* Ball.
- 1a. Lateral view of harpago of *Osbornia arborca* Ball.
2. Dorsal view of *Papagona succinea* Ball.
- 2a. Cephalic aspect of head of *Papagona succinea* Ball.
- 2b. Lateral aspect of head of *Papagona succinea* Ball.
3. Lateral aspect of *Osbornia cornuta* Ball.
- 3a. Lateral aspect of harpago of *Osbornia cornuta* Ball.
- 3b. Anal flap of *Osbornia cornuta* Ball.
- 3c. Cephalic aspect of head of *Osbornia cornuta* Ball.
4. Dorsal aspect of *Osbornia arborca* Ball.
- 4a. Cephalic aspect of head of *Osbornia arborca* Ball.
5. Dorsal aspect of *Osbornia cornuta* Ball.

PLATE XV

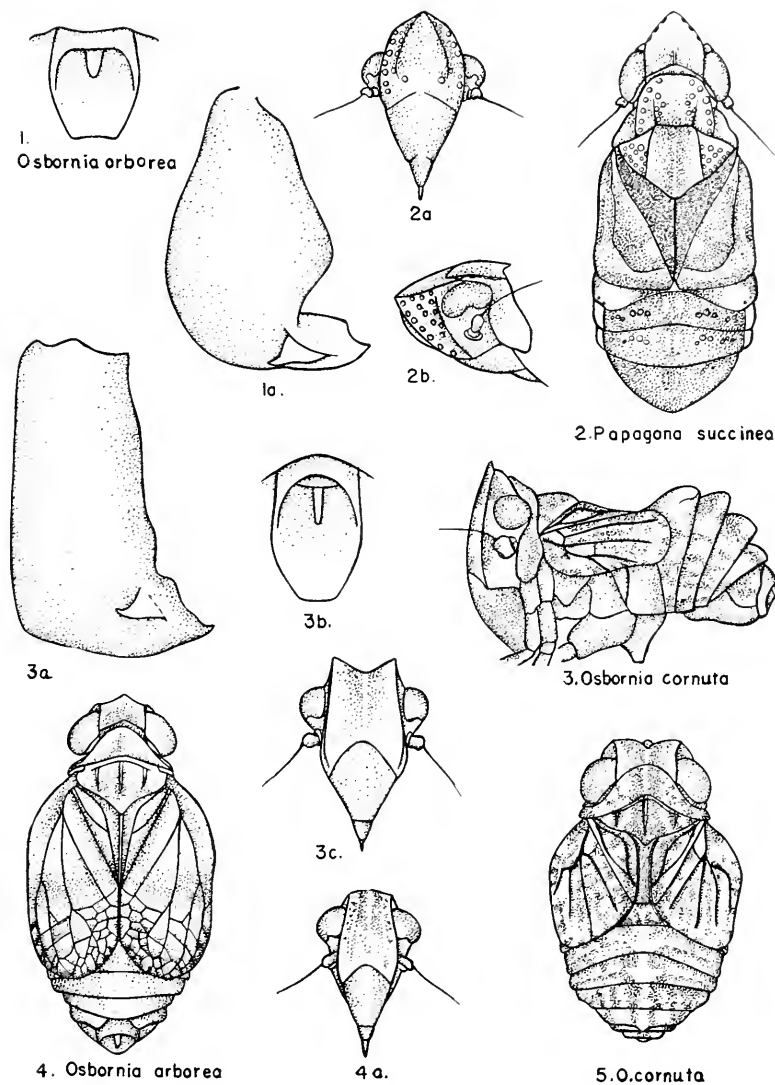


PLATE XVI

1. Left view of aedeagus and theca of *Osbornia cornuta* Ball.
- 1a. Right view of aedeagus and theca of *Osbornia cornuta* Ball.
2. Left view of aedeagus and theca of *Osbornia arborca* Ball.
- 2a. Right view of aedeagus and theca of *Osbornia arborca* Ball.
3. Anal flap of *Dictyobia varia* n. sp.
4. Lateral view of harpago of *Dictyobia varia* n. sp.
5. Lateral view of harpago of *Dictyobia permutata* Uhler.
6. Lateral view of harpago of *Dictyobia atra* VanDuz.
- 6a. Anal flap of *Dictyobia atra* VanDuz.
7. Left view of aedeagus and theca of *Dictyobia varia* n. sp.
8. Left view of aedeagus and theca of *Dictyobia permutata* Uhler.
- 8a. Anal flap of *Dictyobia permutata* Uhler.
9. Anal view of aedeagus and theca of *Dictyobia atra* VanDuz.

PLATE XVI

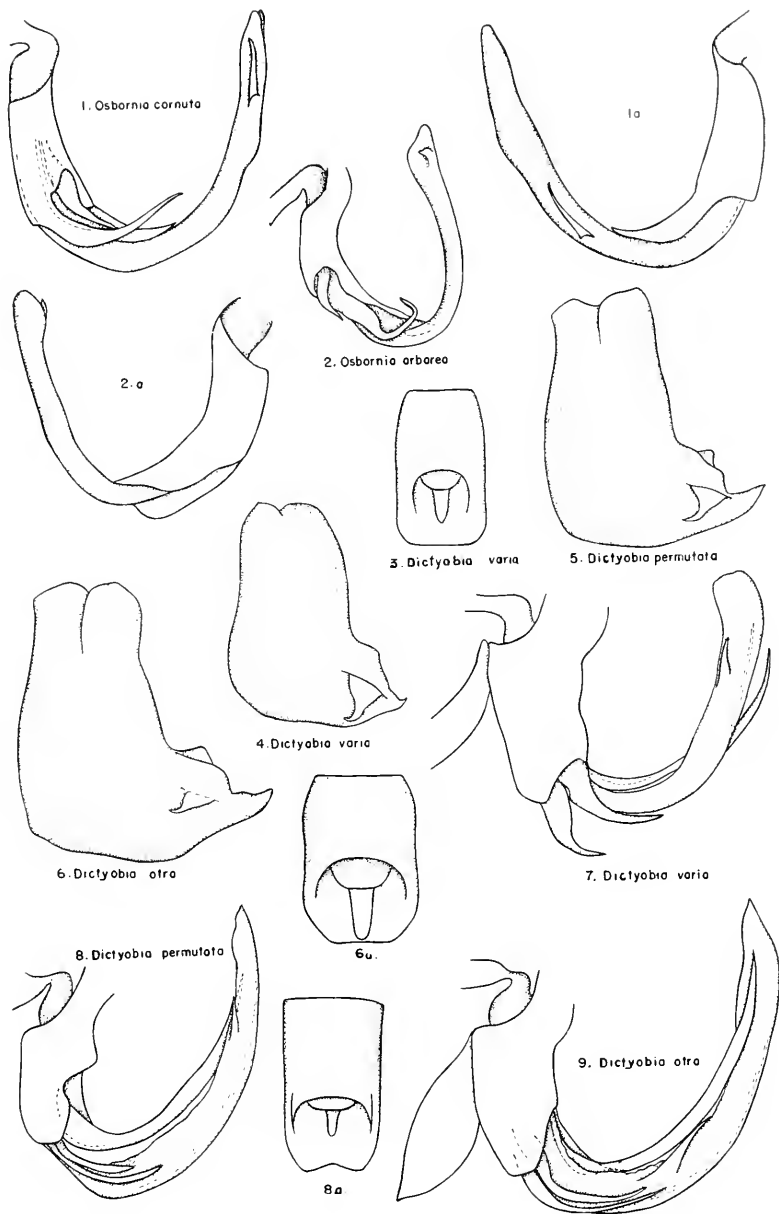
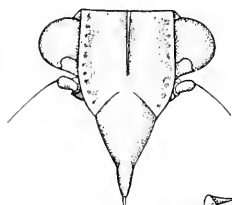
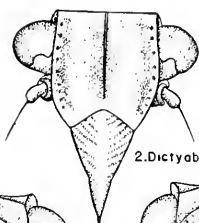
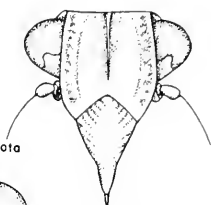
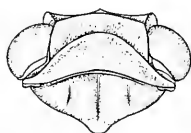


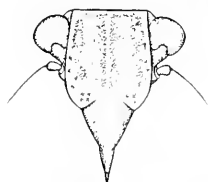
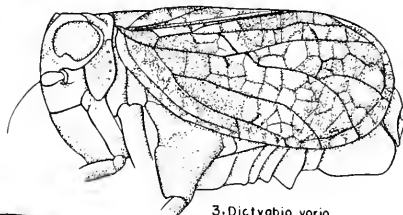
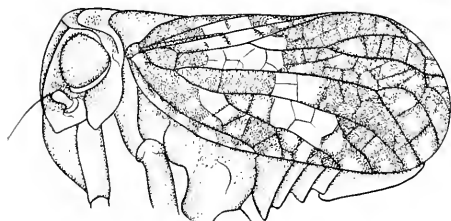
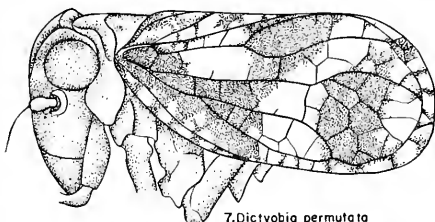
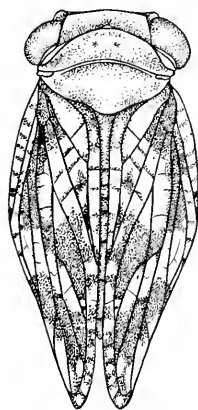
PLATE XVII

1. Cephalic aspect of head of *Dictyobia atra* VanDuz.
- 1a. Dorsal view of head of *Dictyobia atra* VanDuz.
2. Cephalic aspect of head of *Dictyobia combinata* Ball.
3. Cephalic aspect of head of *Dictyobia permutata* Uhler.
4. Cephalic aspect of head of *Dictyobia varia* n. sp.
- 4a. Dorsal aspect of head of *Dictyobia varia* n. sp.
5. Lateral aspect of *Dictyobia atra* VanDuz.
6. Dorsal aspect of head of *Dictyobia combinata* Ball.
7. Lateral aspect of *Dictyobia permutata* Uhler.
- 7a. Dorsal aspect of *Dictyobia permutata* Uhler.
8. Lateral aspect of *Dictyobia combinata* Ball.

PLATE XVII

1. *Dictyobia ostra*2. *Dictyobia caminata*3. *Dictyobia permutata*

4a.

4. *Dictyobia varia*3. *Dictyobia vario*5. *Dictyobia ostra*6. *Dictyobia caminata*7. *Dictyobia permutata*

7a.

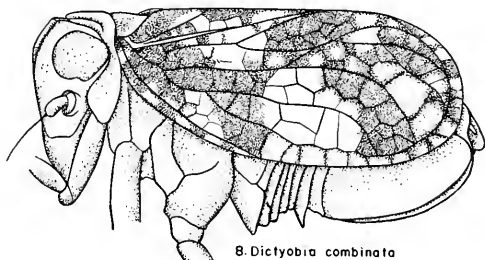
8. *Dictyobia caminata*

PLATE XVIII

1. Right view of aedeagus and theca of *Danapteryx adiuncta* n. sp.
2. Right view of aedeagus and theca of *Danapteryx lurida* Mel.
3. Right view of aedeagus and theca of *Danapteryx artemesia* Kirk.
4. Right view of aedeagus and theca of *Danapteryx barbarae* Kirk.
5. Right view of aedeagus and theca of *Danapteryx robusta* n. sp.
6. Right view of aedeagus and theca of *Danapteryx manca* Uhler.
7. Dorsal view of *Danapteryx adiuncta* n. sp.
8. Cephalic aspect of head of *Danapteryx adiuncta* n. sp.
9. Cephalic aspect of head of *Danapteryx lurida* Mel.
10. Dorsal view of *Danapteryx lurida* Mel.
11. Cephalic aspect of head of *Danapteryx manca* Uhl.
12. Dorsal view of *Danapteryx robusta* n. sp.
13. Cephalic aspect of head of *Danapteryx robusta* n. sp.
14. Dorsal aspect of *Danapteryx barbarae* Kirk.
15. Cephalic aspect of head of *Danapteryx barbarae* Kirk.
16. Dorsal view of *Danapteryx manca* Uhler.
17. Cephalic aspect of head of *Danapteryx artemesia* Kirk.
18. Dorsal view of *Danapteryx artemesia* Kirk.

PLATE XVIII

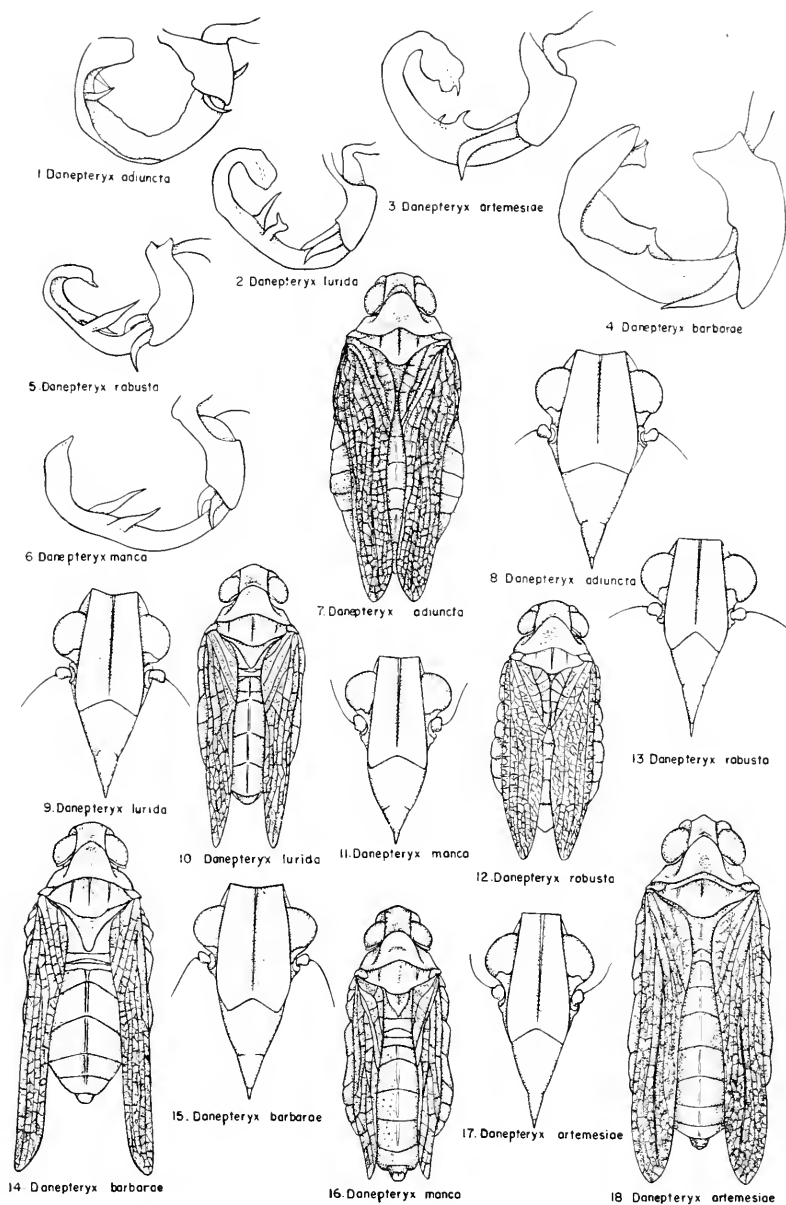


PLATE XIX

1. Lateral view of harpago of *Dancpteryx artemesia* Kirk.
- 1a. Anal flap of *Dancpteryx artemesia* Kirk.
2. Anal flap of *Dancpteryx lurida* Mel.
- 2a. Lateral view of harpago of *Dancpteryx lurida* Mel.
3. Lateral view of harpago of *Dancpteryx adiuncta* n. sp.
- 3a. Anal flap of *Dancpteryx adiuncta* n. sp.
4. Lateral view of harpago of *Dancpteryx manca* Uhler.
- 4a. Anal flap of *Dancpteryx manca* Uhler.
5. Lateral view of harpago of *Dancpteryx robusta* n. sp.
- 5a. Anal flap of *Dancpteryx robusta* n. sp.
6. Dorsal view of *Bruchomorpha abrupta* Ball.
7. Dorsal view of *Bruchomorpha nodosa* n. sp.
8. Dorsal view of *Bruchomorpha oculata* Newman.
9. Dorsal view of *Bruchomorpha rosea* n. sp.
10. Dorsal view of *Bruchomorpha beameri* n. sp.
11. Dorsal view of *Bruchomorpha extensa* Ball.

PLATE XIX

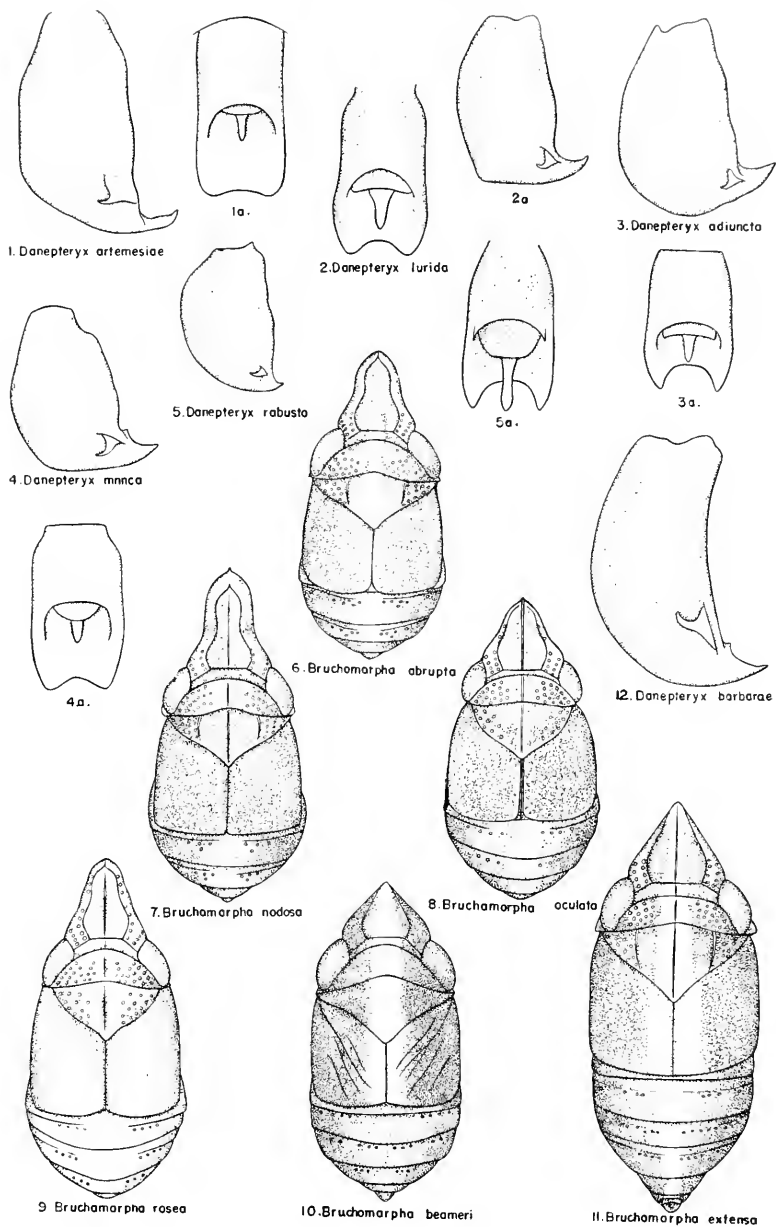


PLATE XX

1. Dorsal view of *Bruchomorpha triunata* Ball.
2. Dorsal view of *Bruchomorpha mormo* Kirk.
3. Dorsal view of *Bruchomorpha bunnii* n. sp.
4. Dorsal view of *Bruchomorpha minima* Metc.
5. Dorsal view of *Bruchomorpha suturalis* Mel.
6. Dorsal view of *Bruchomorpha pallidipes* Stal.
7. Dorsal view of *Bruchomorpha rugosa* Metc.
8. Dorsal view of *Bruchomorpha tenebrosa* n. sp.
9. Dorsal view of *Bruchomorpha dorsata* Fitch.
10. Dorsal view of *Bruchomorpha keidensia* n. sp.
11. Dorsal view of *Bruchomorpha vittata* Metc.
12. Dorsal view of *Bruchomorpha jocosa*, female.
13. Dorsal view of *Bruchomorpha jocosa*, male.
14. Dorsal view of *Bruchomorpha decorata* Metc.
15. Dorsal view of *Bruchomorpha tristis* Stal.

PLATE XX

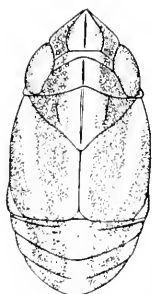
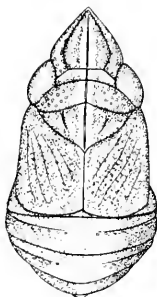
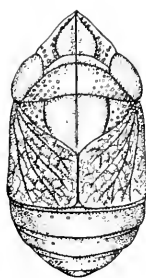
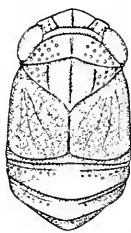
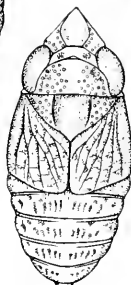
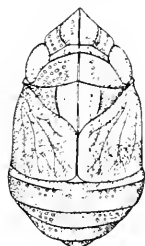
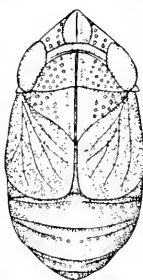
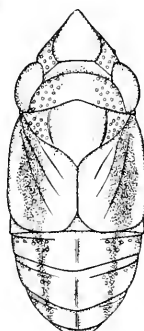
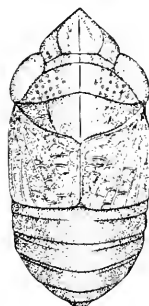
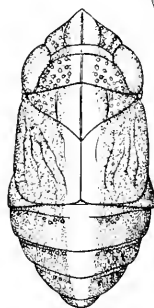
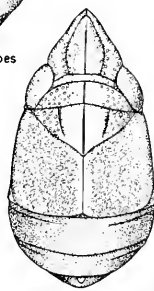
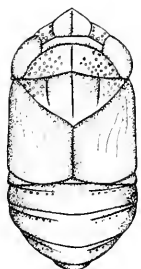
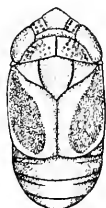
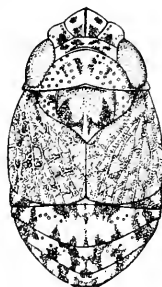
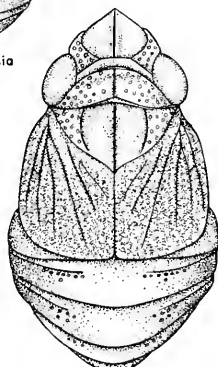
1. *Bruchomorpha triunota*3. *B. bunni*4. *B. minima*2. *B. mormo*7. *B. rugosa*5. *B. suturalis*6. *B. pallidipes*11. *B. vittata*8. *B. tenebrosa*9. *B. dorsata*10. *B. keidensia*12. *B. jacosa* female13. *B. jacosa* male14. *B. decorata*15. *B. tristis*

PLATE XXI

1. Lateral view of head of *Bruchomorpha pallidipes* Stal.
2. Lateral view of head of *Bruchomorpha decorata* Mete.
3. Lateral view of head of *Bruchomorpha extensa* Ball.
4. Lateral view of head of *Bruchomorpha keidensia* n. sp.
5. Lateral view of head of *Bruchomorpha vittata* Mete.
6. Lateral view of head of *Bruchomorpha jocosa* Stal.
7. Lateral view of head of *Bruchomorpha beameri* n. sp.
8. Lateral view of head of *Bruchomorpha tenebrosa* n. sp.
9. Lateral view of head of *Bruchomorpha rugosa* Mete.
10. Lateral view of head of *Bruchomorpha dorsata* Fitch.
11. Lateral view of head of *Bruchomorpha abrupta* Ball.
12. Lateral view of head of *Bruchomorpha oculata* Newman.
13. Lateral view of head of *Bruchomorpha triunata* Ball.
14. Lateral view of head of *Bruchomorpha minima* Mete.
15. Lateral view of head of *Bruchomorpha bunnii* n. sp.
16. Lateral view of head of *Bruchomorpha nodosa* n. sp.
17. Lateral view of head of *Bruchomorpha mormo* Kirk.
18. Lateral view of head of *Bruchomorpha suturalis* Mel.
19. Lateral view of head of *Bruchomorpha tristis* Stal.
20. Lateral view of head of *Bruchomorpha rosca* n. sp.
21. Wing of *Bruchomorpha oculata* Newman.
22. Wing of *Bruchomorpha keidensia* n. sp.
23. Wing of *Bruchomorpha pallidipes* Stal.

PLATE XXI

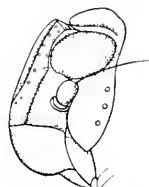
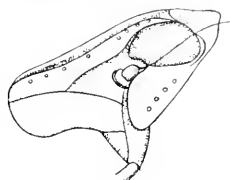
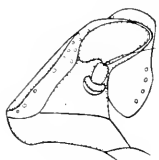
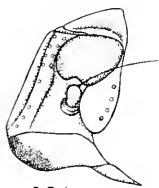
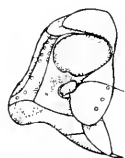
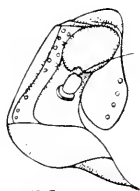
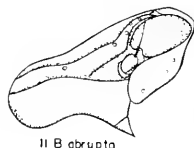
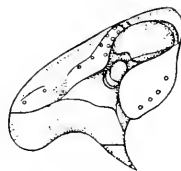
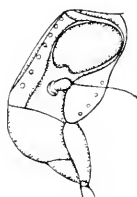
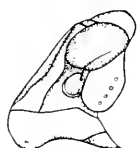
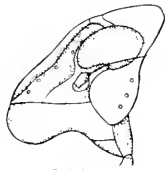
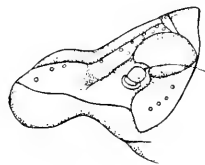
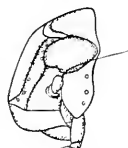
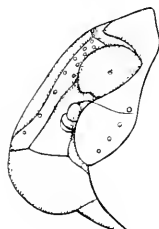
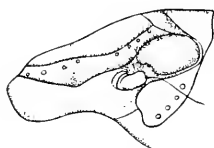
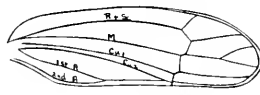
1. *Bruchomorpha pallidipes*2. *Bruchomorpha decorata*3. *B. extensa*4. *B. keidensia*5. *B. vittata*6. *B. jocosus*7. *B. beameri*8. *B. fenebrosa*9. *B. rugosa*10. *B. dorsata*11. *B. abrupta*12. *B. oculata*13. *B. triunata*14. *B. minima*15. *B. bunnyi*16. *B. nadosa*17. *B. mormo*18. *B. suturalis*21. *B. oculata*19. *B. tristis*20. *B. rosea*22. *B. keidensia**B. pallidipes*

PLATE XXII

1. Lateral view of aedeagus and theca of *Bruchomorpha extensa* Ball.
- 1a. Lateral view of harpago of *Bruchomorpha extensa* Ball.
2. Lateral view of aedeagus and theca of *Bruchomorpha triunata* Ball.
- 2a. Lateral view of harpago of *Bruchomorpha triunata* Ball.
- 2b. Anal flap of *Bruchomorpha triunata* Ball.
3. Lateral view of aedeagus and theca of *Bruchomorpha suturalis* Mel.
- 3a. Lateral view of harpago of *Bruchomorpha suturalis* Mel.
- 3b. Anal flap of *Bruchomorpha suturalis* Mel.
4. Lateral view of aedeagus and theca of *Bruchomorpha bunni* n. sp.
- 4a. Lateral view of harpago of *Bruchomorpha bunni* n. sp.
5. Lateral view of aedeagus and theca of *Bruchomorpha keidensia* n. sp.
- 5a. Lateral view of harpago of *Bruchomorpha keidensia* n. sp.
- 5b. Anal flap of *Bruchomorpha keidensia* n. sp.
6. Lateral view of aedeagus and theca of *Bruchomorpha dorsata* Fitch.
- 6a. Lateral view of harpago of *Bruchomorpha dorsata* Fitch.
- 6b. Anal flap of *Bruchomorpha dorsata* Fitch.
7. Lateral view of aedeagus and theca of *Bruchomorpha mormo* Kirk.
- 7a. Lateral view of harpago of *Bruchomorpha mormo* Kirk.
- 7b. Anal flap of *Bruchomorpha mormo* Kirk.
8. Lateral view of aedeagus and theca of *Bruchomorpha abrupta* Ball.
- 8a. Lateral view of harpago of *Bruchomorpha abrupta* Ball.
- 8b. Anal flap of *Bruchomorpha abrupta* Ball.
9. Lateral view of aedeagus and theca of *Bruchomorpha pallidipes* Stal.
- 9a. Lateral view of harpago of *Bruchomorpha pallidipes* Stal.
- 9b. Anal flap of *Bruchomorpha pallidipes* Stal.
10. Lateral view of aedeagus and theca of *Bruchomorpha jocosa* Stal.
- 10a. Lateral view of harpago of *Bruchomorpha jocosa* Stal.
- 10b. Anal flap of *Bruchomorpha jocosa* Stal.
11. Lateral view of aedeagus and theca of *Bruchomorpha vittata* Metc.
- 11a. Lateral view of harpago of *Bruchomorpha vittata* Metc.
- 11b. Anal flap of *Bruchomorpha vittata* Metc.
12. Lateral view of aedeagus and theca of *Bruchomorpha decorata* Metc.
- 12a. Lateral view of harpago of *Bruchomorpha decorata* Metc.
- 12b. Anal flap of *Bruchomorpha decorata* Metc.
13. Lateral view of aedeagus and theca of *Bruchomorpha minima* Metc.
- 13a. Lateral view of harpago of *Bruchomorpha minima* Metc.
- 13b. Anal flap of *Bruchomorpha minima* Metc.
14. Lateral view of aedeagus and theca of *Bruchomorpha rugosa* Metc.
- 14a. Lateral view of harpago of *Bruchomorpha rugosa* Metc.
- 14b. Anal flap of *Bruchomorpha rugosa* Metc.
15. Lateral view of aedeagus and theca of *Bruchomorpha rosea* n. sp.
- 15a. Lateral view of harpago of *Bruchomorpha rosea* n. sp.
- 15b. Anal flap of *Bruchomorpha rosea* n. sp.
16. Lateral view of aedeagus and theca of *Bruchomorpha tristis* Stal.
- 16a. Lateral view of harpago of *Bruchomorpha tristis* Stal.
- 16b. Anal flap of *Bruchomorpha tristis* Stal.
17. Lateral view of aedeagus and theca of *Bruchomorpha beameri* n. sp.
- 17a. Lateral view of harpago of *Bruchomorpha beameri* n. sp.
- 17b. Anal flap of *Bruchomorpha beameri* n. sp.
18. Lateral view of aedeagus and theca of *Bruchomorpha oculata* Newman.
- 18a. Anal flap of *Bruchomorpha oculata* Newman.
- 18b. Lateral view of harpago of *Bruchomorpha oculata* Newman.

PLATE XXII

