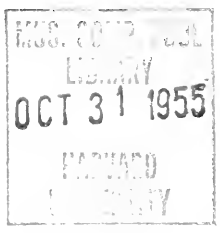
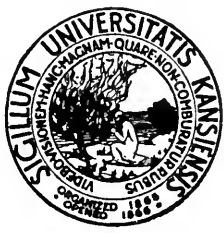


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Some Taxonomic and Morphological Studies of Two Genera of North American Dictyopharidae, (Fulgoroidea, Homoptera)

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ABSTRACT: This paper deals with the taxonomy of two genera, *Deserta* Ball and *Acinaca* Ball and Hartzell of the subfamily Orgerinae (Dictyopharidae, Homoptera). A key to the North American genera of the subfamily Orgerinae is given. In the genus *Deserta* four older species have been re-described and the genitalia of both sexes dissected and described in those species where material was available. Two species, *fuscata* and *pinturensis* are herein described as new. Two keys for identification of the six species of *Deserta* are given, one dealing with characters common to both sexes and one key for identification of male specimens only, based on characteristics of the male proctiger and genitalia. A synoptic table of the characteristics of the species of *Deserta* is also included. The genus *Acinaca* still remains, as far as our present knowledge goes, a monotypic genus. *Acinaca lurida* Ball and Hartzell has been re-described, the genitalia of both sexes described and illustrated and new distribution records from New Mexico and Arizona are added to the one state record, namely California.

The characters of most value for classification in these two genera of Orgerinae are the shape and length of the head process, the increased size and development as well as shape of the flaplike extension of the tenth segment, the anal flap.

The morphological aspects of the paper include mainly a study of the genitalia and terminal abdominal segments. It is expected that other features of morphology studied but not specifically described in this paper will contribute to a larger and more comprehensive morphological paper dealing with the comparative morphology of the entire family.

INTRODUCTION

Since a very excellent and complete bibliography for each species of the insects studied in this paper has been given by Z. P. Metcalf in the General Catalogue of the Hemiptera, Fascicle IV, Fulgoroidea, Part 8, Dictyopharidae, 1946 it was deemed unnecessary to

1. Contribution number 885 from the Department of Entomology, University of Kansas

repeat these references. Therefore only such references that have appeared since this date have been included under each species heading. At the end of the paper are cited the references which have been most useful in this study.

Because of the bizarre appearance of some of the Orgerinae a drawing of the entire insect has been made for at least one species in each genus. As regards characteristics of taxonomic significance each species has been extensively illustrated. All drawings have been made to the same scale for a given character so that difference in size of drawings is significant.

In making the keys and descriptions certain specific measurements, not easily described in words, have been used. To indicate these the plan was adopted of placing double letters with a line drawn between showing the extent of the distance, on the key diagrams on Plate I. In the keys the measurement was referred to by stating the letter combination, such as a-a, b-b, etc. Single letters on the diagrams represent particular points mentioned in a key or description.

KEY TO NORTH AMERICAN GENERA OF ORGERINAE
(Modified from Ball and Hartzell)

- 1. Callosity behind eye; vertex elongate or angulate 2
 No callosity behind eye; head rounded or if elongate, scimitar-shaped if seen from the side 5
- 2.(1) Vertex elongate, produced in front of eye more than one half its length 3
 Vertex angulate, produced in front of eye not more than one half its length *Orgerius* Stål
- 3.(2) Cephalic process truncate at the extremity; apical plate of process large, pentagonal, its length almost as wide as eye 4
 Cephalic process as seen from the side, beaklike, the apex obliquely rounding from above, the lower angle slightly produced; apical plate reduced, its length much less than width of eye *Deserta* Ball & Hartzell
- 4.(3) Cephalic process gradually tapering as seen from both top and side; apex as seen from side slightly rounded, *Orgomara* Ball
 Cephalic process parallel-margined; apex as seen from side squarely truncate and slightly enlarged, *Yucanda* Ball & Hartzell
- 5.(1) Vertex angulate, produced in front of the eyes at least one third its length 6
 Vertex broad and short, scarcely longer than its basal width; the lateral carina of the front closely margins the eye clear to its juncture with the lateral margin of the vertex 7

- 6.(5) Head twice the length of the eye; as seen from the side widening toward the truncate apex; eye and pronotum widely separated *Acinaca* Ball & Hartzell
 Head distinctly less than twice the length of the eyes; as seen from the side, distinctly narrowing and roundly truncate; eyes contiguous with pronotum *Aridia* Ball & Hartzell
- 7.(5) Fore and middle femora and tibiae broadly foliaceous, carinated *Loxophora* Van Ruzee
 Fore and middle femora and tibiae normal 8
- 8.(7) Lateral carinae of the frontal tablet uniting some distance below the apex of the head *Ticida* Uhler
 Lateral carinae of the frontal tablet converging but not uniting before joining the vertex *Timonidia* Ball & Hartzell

GENUS DESERTA Ball and Hartzell

Deserta Ball, E. D. and Hartzell, A., Ann. Ent. Soc. Amer., vol. 15, pp. 141-142, 1922. Genotype: *Orgamara bipunctata* Ball, by original designation.

ORIGINAL DESCRIPTION

"This genus resembles *Yucanda* and *Orgamara* since the head is produced into a definite snoutlike process. It differs by having the apex of this process beaked and curved downward instead of being truncate and rounded. Vertex with sharply carinate parallel sides until just before apex where the margins become elevated phlanges which converge to a triangular point. Genal area extended in front of eye as a lateral compartment conspicuously separated from the frons by a prominent carina, behind eye forming an oval callosity. Frons with conspicuous lateral intermediate carinae separating the central elevated tablet bearing a median carina down the entire length, from the two lateral depressed compartments in which occur numerous round pores. Pronotum collarlike, completely encircling mesonotum anteriorly and with a distinct central tablet set off by prominent lateral carinae; a median carina equally prominent. Prominent median and lateral carinae on mesonotum. Tegulae lacking. The elytra brachypterous, irregularly reticulate. Hind wings absent. Legs simple; hind tibiae with seven strong spines."

GENERAL MORPHOLOGY

The genus is a difficult genus to classify due to the fact that specific differences although numerous, are of smaller magnitude than in many taxonomic groups. Hence there are no obvious characters on which to base keys. Ball (1922) states that most of the species which he described have been beaten from species of *Artemisia* of the western states. The exception, known to date,

is *Deserta raptoria* Ball which was collected from rabbit brush (*Chrysothamnus*). This ecological information probably means that each species of *Deserta* has a different plant as a host. If these host plants are mostly of the same genus then the close similarity of the insect species is not too unexpected.

Each species of *Deserta* can only be identified by a combination of numerous small differences which are best followed by studying the following synoptic chart in combination with the accompanying illustrations.

For quick identification the length of the head process seems to be the best character for classification. Male specimens also are a little more readily identified because in addition to head process they show slight differences externally in the tenth or anal segment. A separate key for males has been made based on differences in this latter structure.

Genitalia for both sexes are described below. But due to the complexity of the male phallic structures, which seem to have a double-walled theca which hides most of the aedeagus, the small size of these genitalia and the difficulty of arranging dissected material of this type always in the same or a standard position, comparisons are not too reliable.

Chief variations in the male phallus are found in the curious, large, dorsal membranous lobes (protrusible glandlike structures) of the theca and also in the apices of the aedeagal hooks. The female genitalia are complex in that they show varying degrees of sclerotization interspersed with membranous areas. The size of the teeth of the dorsal sclerotized lobe of the first valvula seems to be the most useful character.

An attempt was made to use the number of lateral spines on the hind tibia as a specific character. For species identification it proved unsatisfactory as several species varied between six, seven, or eight on different specimens. In one case there were nine for one leg and six for the other leg of the specimen. Numerous cases occurred of this variability between the two legs of the same specimen. In generic identification, however, it may be useful to know that the spines vary from six to eight on each leg with the most frequently occurring number being seven.

Female Terminal Abdominal Segments and Genitalia. The eighth tergum is like the preceding terga. The eighth sternum is mostly membranous with a broad, extremely short, somewhat sclerotized median plate, the lateral edge of which forms a heavily sclerotized

slender curved arm attached to the anteromesal angle of each large first valvifer. These large bilobed valvifers occupy most of the sternal region but do not meet at midline; each is partially divided at base by a membranous wedge into two lobelike plates.

The ninth tergum is distinct and forms posteriorly a narrow ring which runs ventrad beneath the tenth segment.

The tenth segment forms a broad flaplike plate which extends over the dorsal margins of the third valvulae. The eleventh segment is tubular, fitting into a hollow area of the tenth segment and bearing an apical hollow closed process called the *anal stylus*.

The first valvula is broadly attached to the first valvifer and is bilobed, the ventral lobe being mostly membranous, the dorsal lobe strongly sclerotized and with the outer margins bearing six teethlike projections, the two apical ones large and the others diminishing in size toward the base. A lateral armlike extension or ramus of the first valvula extends from the anterolateral angle of the first valvula and articulates to the ninth tergum; ventrad it extends on to the dorsal lobe of the valvula for approximately half its length as a sclerotized grooved rod.

The second valvulae are two triangular lobes, united at base and deeply telescoped cephalad; the dorsal combined surfaces form a very broad, sclerotized, somewhat triangular plate which is extended forward at mid-line as a slender arm and whose lateral apices are articulated to the vertical barlike second valvifer; the combined ventral bases of the valves form a partially sclerotized rectangular broad plate lying under the triangular sclerotized dorsal plate. Dorsad the second valvifer bears the third valvulae and also gives off a small sclerotized extension which articulates to the ninth tergum just behind the articulation of the ramus of the eighth segment. Ventrad the second valvifer leads directly into the ramus of the second valvula (Bonhag and Wick, 1953) which appears as a sclerotized rod along the exposed lateral margin of the valvula for two thirds its length. This ramus of the 2nd valvula apparently moves on the concave surface of the ramus of the first valvula.

The third valvula is quadrangular in flattened position, posteriorly is deeply notched, thus separating a dorsal membranous lobe lying completely protected by the anal plate, from a ventral sclerotized lobe which partially conceals the first valvulae. The apical margin of the valve bears a cluster of prominent setae.

Male Terminal Abdominal Segments and Genitalia. The terminal segments of abdomen are strongly telescoped, especially

dorsally so that as viewed from the side only the posterior margin of the ninth segment shows as a somewhat triangular plate. When dissected out the ninth segment consists of a single sclerotized ring. Attached to the ninth segment posteroventrad are the large spoon-shaped freely movable gonostyli, each with a prominent recurved hook on the dorsal margin and another lateral hook near base. The tenth and eleventh segment form the proctiger (See Bonhag and Wick, 1953). The tenth segment is prominent, at base formed into a large tube, thus causing the eighth and ninth terga to be telescoped under the seventh, the ventral apical margin of the tube extended ventrad and caudad over the phallus as a flaplike plate (anal flap). The eleventh segment is a reduced ringlike segment attached by a conjunctiva to the caudal end of the upper margin of the tube. The eleventh segment bears a single posterior projection, the anal stylus.

Male Genitalia. Each gonostylus is attached by a conjunctiva to a slender, transverse, sclerotized bar, from the center of which arises a perpendicular heavily sclerotized rod (probably the fused gonocoxopodites); the dorsal terminus of the rod attaches firmly to the base of the aedeagus at the point where the ejaculatory duct extends into the aedeagus.

A complex phallic structure is protected dorsally and laterally by the enlarged proctiger and ventrad by the paired gonostyli. The aedeagus is greatly reduced and mostly hidden by a double-sleeved theca, with the outer sleeve shorter than the inner one so that the latter is exposed where it joins the aedeagus. The theca, probably formed as an extended fold of the conjunctiva of the ninth segment, is supported at its base by a sclerotized brace which is attached to the ninth segment. The apical two thirds of the dorsal outer sleeve wall of the theca consists of two pairs of membranous lobes, the outer pair being large and conspicuous, the inner pair smaller. In normal position these lobes collapse into accordion-pleatlike folds. When placed in certain fluids, such as caustic potash, followed by acetic acid they become first extended and then fold together again. The ventral surface of the outer thecal sleeve forms a partially sclerotized basal plate; in some species two well sclerotized bars form a track under each aedeagal hook and two median membranous, pointed lobes extend caudad. At base the aedeagus appears as a strongly, sclerotized tube and apically bears a pair of greatly, elongated sclerotized hooks, whose curved apices extend beyond the caudal margin of the theca.

KEY TO THE SPECIES OF THE GENUS *DESERTA*

(For both sexes)

1. From above head process in front of eye (e-e, plate II, diagram 1) approximately three times length of eye (d-d); from sideview process extended to a narrowed beaklike apex due to upper margin bending suddenly at apex of laterofrontal carina (x, plate I, diagram 1) and acutely meeting the slightly angled lower margin (y); part of frons in front of eye (e-e, plate II, diagram 9) longer than part behind (f-f) 2
- From above head process not over 2½ times length at eye; from side view distance from origin of bend to apex shorter, upper margin (except *bipunctata*) gradually rounding to apex; part of frons in front of eye equal to or shorter than part behind 3
2. Lateral margins of vertex flaring but not greatly elevated at apex; apical plate of head process from cephalic view pentagonal but distinctly wider than long; uniform gray color, slightly irrorate *raptoria* (Ball) p. 209
- Lateral margins of vertex elevated and suddenly constricted at apex so lateral compartments of frons are distinct; apical plate of head process pentagonal but length and width equal; darker, fuscous dots more numerous, *fuscata* n. sp. p. 205
- 3.(1) From side view lower apical angle of head process produced into a rounded knob, the upper margin of process flared and abruptly bent ventrad *bipunctata* (Ball) p. 204
- From side view lower margin of head process straight or almost so, apex not forming a beak or knob, upper margin not flared, gradually rounded to meet lower margin 4
- 4.(3) Part of frons in front of eye (e-e) shorter than part behind (f-f); apical plate of head process from cephalic view pentagonal, its vertical length greater than its width, *obscura* (Ball) p. 207
- Part of frons in front of eye equal to part behind; apical plate broader than long 5
- 5.(4) Laterofrontal carina and genal compartment in front of eyes conspicuous, vertex flared at apex obscuring frontal compartments; central tablet of frons occupying most of apical portion *pinurensis* n. sp. p. 208
- Laterofrontal carina and genal compartment not conspicuous, lateral margins of vertex constricted anterior to eyes, narrowing to a pointed apex; central tablet of frons not distinctly widened at apex *obsca* (Ball) p. 206

KEY TO THE SPECIES OF THE GENUS DESERTA

(Key to Males, based on external genitalia)

1. Anal flap with upper surface bulbous at base, greatly produced caudad; measured from dorsal view its length at a-a (plate III, diagram 20) more than twice the length of anal tube at b-b; lateral margin distinctly notched just before apex and extended ventrad as a distinct phalange, 2
 Anal flap shorter, its length from a-a less than twice the length of anal tube at b-b; lateral margin at most only shallowly notched and slightly expanded ventrad. 3
- 2.(1) Anal flap more bulbous at base; apical margin rounded, ninth sternum without dark patch . . . *pintureusis* n. sp. p. 208
 Anal flap slightly bulbous; apical margin truncate, dark fuscous patch occupying center of 9th sternum, *bipunctata* (Ball) p. 204
- 3.(1) Anal flap shorter, its length less than 1½ times length of anal tube; apical margin of flap concave 4
 Anal flap length over 1½ times the length of anal tube; apical margin rounded 5
- 4.(3) Anal flap with upper surface flat, neither bulbous nor concave; apical margins shallowly and broadly concave; lateral margins parallel-sided, and not expanded, *obesa* (Ball) p. 206
 Anal flap with upper surface concave through middle; apical margin bilobed, lateral margins parallel, then converging before apex. *obscura* (Ball) p. 207
- 5.(3) Anal flap with upper surface flat, apex blunt, ventrad margin somewhat more deeply notched and expanded ventrad as in *bipunctata* *fuscata* n. sp. p. 205
 Anal flap with upper surface slightly concave at base, apex rounded, ventral margin not notched at side or expanded, *raptorica* (Ball) p. 209

The symbols used in table I require special explanation as follows:

EXPLANATION OF TABLE I

LINE 2. Species marked "—" have margins of vertex constricting slightly but without abruptly bending downward at apex, species marked "0" gradually constricting from eyes to apex; those marked "△" have the margins bulging outward between eyes, constricted through middle, then flaring broadly at tip.

LINE 3. Species marked "0" are only slightly elevated.

LINE 4. Species marked "—" have the anterior extremity of vertex pointed, exposing frons on either side.

LINE 5. Species marked "—" have the vertex less than one-half as wide as long at its mid-point.

LINE 6. The symbol "0" indicates that the suture and compartment is only moderately conspicuous; symbol "—" that the sutures are not elevated and prominent and the genal compartment does not even show.

TABLE I.—*Synopsis* of the Genus Deserta*

	rapatoria	fuscata	obscura	pinturensis	obesa	bipunctata
1. Length of head process in front of eye (e-c, Plate II diagram), as compared to length of eye at d.	x3	x3	x2	x2½	x2½	x2½
2. Lateral margins of vertex parallel margined for entire length, then abruptly bent ventrad.	+	+	0	0	0	0
3. Lateral margins of vertex elevated at apex of head.	—	0	—	—	+	0
4. Anterior extremity of vertex broadly rounded not exposing much of frons below.	+	—	+	+	—	—
5. Width of vertex through the middle one-half its length extended in front of eye.	+	+	+	+	+	—
6. Lateral frontal carinae elevated and genal compartments as viewed from above conspicuous.	0	—	0	+	0	0
7. Apical plate of head from cephalic view pentagonal but wider than long.	+	0	—	+	+	0?
8. Apical plate of head showing from above.	—	—	0	—	—	+
9. Lateral view of head showing ventral margin straight and apex not produced into knob or beak.	—	—	0	+	+	—
10. Shape of body hemispherical, length to tip of anal tube less than twice its length.	+	—	+	0	+	0
11. Part of frons in front of eye (e-c in diagram 9, Plate II) equal to part behind (f-f).	—	—	—	—	—	—
12. Central tablet of frons occupying most of apical portion with lateral compartments scarcely showing.	—	0	—	—	—	—
13. Lateral carinae of frons distinctly converging posteriorly.	+	—	+	+	+	+
14. Length of anal flap from dorsal view (a-a) longer than anal tube (b-b). (See diagram 20, Plate III).	—	—	—	+	+	+
15. Anal flap bulbous at base.	—	—	0	+	+	+
16. Apical margin of flap rounded.	+	+	—	+	0	—

+ Indicates agreement with statement at left; —, the opposite; 0, an intermediate condition.

LINE 7. Symbol "—" indicates longer than wide; symbol "0?" indicates mere trifle wider; symbol "0" indicates length and width equal.

LINE 9. Species marked "—" have the lower margin curved and apex of head produced beaklike; species marked "0" have the lower margin slightly angulate but not produced; species marked "△" have lower margin straight and apex distinctly produced as a knoblike process.

LINE 10. Symbol "—" indicates more slender body, its length twice its width; symbol "0" indicates body ovate, with length approximately one and three-fourths times its width.

LINE 11. Species marked "—" have the part of frons in front of eye distinctly longer than part behind; species marked "0" have the part in front of eye shorter than the part behind.

LINE 12. Symbol "0" indicates lateral carinae converging to a pointed apex with lateral compartments conspicuous, at tip each one equal to half the width of median compartment.

LINE 13. Symbol "—" indicates that the lateral carinae are parallel and central tablet before eyes is not so wide as in other species.

LINE 14. Symbol "—" indicates length of flap is equal to or slightly shorter than the tube.

LINE 15. Symbol "0" indicates flap is concave at base.

LINE 16. Symbol "—" indicates apical margins deeply indented; symbol "0" indicates margin broadly concave.

Deserta bipunctata (Ball)

Orgamara bipunctata. Ball, E. D. Proc. Biol. Soc. Washington, vol. 22: p. 199, 1909; Ball, E. D. and Hartzell, A. Ann. Ent. Soc. Amer., vol. 15, pp. 142-143, 1922.

Size: Length of female 6.5 mm, width, 2.6 mm.; length of male 6.25 mm., width 2.3 mm.

Color: This species is dull fuscous, irrorate with brown and has darker patches occurring on the wings. A large dark brown spot occupies the center of the ninth sternal plate.

In the original description Ball (1909) describes the species as having "a pair of round white spots just inside the apices of the abbreviate elytra and a pair of light stripes extending from these to the apex of the abdomen." In a revised description (1922) these markings were not mentioned. Perhaps less emphasis was placed on these light marks since the same pattern frequently occurs in most of the other species although in varying degrees of intensity. In *bipunctata* the markings are particularly conspicuous.

Structural Details: This species has a moderately long head process and the body distinctly irrorate. The proctiger of male is large with the anal flap (a-a) two and one-half times length of anal tube (b-b); the anal flap is bulbous at base, each lateral margin is greatly expanded caudad, and the apical margin is truncate, and deeply notched on each side. Other structural compari-

sons can be found in the synopsis chart, Table I, p. 203, and the illustrations on Plates I, II and III.

Types: Originally described from seven specimens, collected from St. George, Utah, by E. D. Ball, July 24, 1908. One male specimen from the syntype series is hereby designated lectotype and one female from the same series as lectoallotype. All types in the United States National Museum. Three homotypes, one male and two females, collected from Leeds, Utah, August 9, 1936, by R. H. Beamer in the Snow Entomological Museum.

Distribution: Leeds and St. George, Utah. Also recorded by Ball and Hartzell from Ravena, California, probably on *Artemisia tridentata*.

Deserta fuscata n. sp.

Size: Length of female 5.85 mm, width 2.2 mm.; length of male 6.3 mm., width 2.2 mm.

Color: General color much darker than other species, the female being darker than the male. Background yellowish-tan with greenish tinge in some areas. The entire body heavily irrorate with dark. The cells of the tegmina dark fuscous; in the female the mesal half of each tegmen darker than the lateral half. The female particularly resembles *bipunctata* by possessing a pair of conspicuous, elevated longitudinal cream-colored stripes, bordered mesad in each abdominal segment by a blackish-brown spot.

Structural Details: Resembling *D. raptoria* in size and form, somewhat longer and more slender with lateral margin of body at middle less rounding. Length and shape of head process similar to *raptoria*, narrowing to a raptorial beak, which is a trifle longer than in *fuscata*. Apical plate of head from cephalic view pentagonal, with length and width equal.

The anal flap of proctiger of male shorter than in *raptoria* or *bipunctata* with its length about one and one-half times the length of the tube; its ventral margin is flared and its caudal margin distinctly notched on each side.

For other differences consult the chart on p. 203 and the illustrations on Plates I, II, III and IV.

Genitalia: Male: The laterodorsal pair of membranous lobes of the theca are much larger than the mesal pair and both pairs are deeply pleated and capable of much expansion. The paired membranous apical lobes of the ventral thecal wall are prominent. The apices of the aedeagal hooks are bluntly pointed, sharply re-

curved and show a light colored bar and slight constriction at the base of the curved portion of the hook.

Female: The proportion of membranization and sclerotization of the valvulae is shown in the drawing on plate III. The dorsal lobe of the third valvula is more sclerotized than in *raptorica*, having several folds overhanging more membranous areas. On the dorsal lobe of the first valvula the second tooth from apex is smaller, the third tooth more slender and the sixth tooth larger than in *raptorica*.

Types: Described from holotype male, allotype female, eleven paratype males, and fourteen paratype females, Cajon Pass, California, August 6, 1936, collected by R. H. Beamer; additional paratypes identified as follows; one female paratype, Mojave, California, July 7, 1933, (R. H. Beamer); one female paratype, Monrovia, California, July 27, 1935, (R. H. Beamer); one female paratype, Los Angeles County, California, July, (Coquillett). These types are in the Snow Entomological Museum, University of Kansas.

Distribution: California.

Deserta obesa (Ball)

Orgamara obesa. Ball, E. D. Proc. Biol. Soc. Washington, Vol. 22, p. 199, 1909; Ball, E. D. and Hartzell, A. Ann. Ent. Soc. Amer., Vol. 15, pp. 142-143, 1922.

Size: Length of female 6 mm.; length of male 4.5 mm., width 1.95 mm.

Color: In the original description described by Ball as follows: "Pale straw, slightly washed with orange and sprinkled with smoky brown, giving the whole insect a dirty orange caste, Cephalic process pale, sparsely dotted with fuscous, about three pairs of heavier spots along the outer carinae just below the apex. Clypeus reddish orange. Pronotum and scutellum pale, sparsely dotted. Elytra with nervures pale straw, the cells smoky."

Structural Details: This species has a shorter head process than other species except *obscura*. From *obscura* it differs by the process being proportionately narrower. The proctiger of male is least developed in the species; length of anal flap is only one and one-fourth times the length of the anal tube, its dorsal surface is not bulbous or concave, sides are parallel and apex broadly concave.

Other structural details can be found in the synopsis chart, Table I, p. 203 and the illustrations on Plates I, II, and III.

Types: Originally described from three specimens from Parowan and American Fork, Utah, collected by E. D. Ball. One male

specimen from the syntype series, Parowan, Utah, July 21, 1908 is hereby designated lectotype. All types in the United States National Museum.

Distribution and Host Plant Records: Parowan and American Fork, Utah. Collected from sage brush in July and August (Ball and Hartzell, 1922).

Deserta obscura (Ball)

Orgamara obscura. Ball, E. D. Proc. Biol. Soc. Washington, Vol. 22, p. 199, 1909; Ball, E. D. and Hartzell, A. Ann. Ent. Soc. Amer. Vol. 15, pp. 142-143, 1922.

Size: Length of female 5.1 mm., width 2.5 mm.; length of male 4.8 mm., width 2.1 mm.

Color: General color yellowish gray. Described by Ball as being "white, finely sprinkled with dark points, giving the whole insect an ashy gray appearance. Front greenish, the clypeus rusty orange."

Structural Details: Head process short, part in front of eyes being only about twice length of the eye, stouter than in *obesa*. Proctiger of male less developed as in *obesa*, the anal flap only one and one-third times the length of the anal tube, its dorsal surface slightly concave instead of bulbous, the ventral margin scarcely expanded, the apical margin angulately concave and not notched at sides.

Other structural details can be found in the synopsis chart, Table I, p. 203 and the illustrations on Plates I, II, III and IV.

Genitalia: Male: The lateral membranous lobes of the dorsal thecal wall larger than in *raptoria* and proportionately larger than middle lobes. The sclerotized bars of the ventral thecal wall are roundly pointed and the paired membranous ventral apical lobes are longer than in *raptoria*. The aedeagal hooks taper to a fine point and have sharp finely pointed serrate subapical margins.

Types: Described from eight specimens, collected by E. D. Ball, from Nampa, Idaho. These types are in the United States National Museum.

Two homotypes, collected at Somerville, Utah, July 5, 1931, by R. H. Beamer. These specimens are in the Snow Entomological Museum.

Distribution and Host Plants Records: Collected from sagebrush. Recorded by Ball and Hartzell from the following localities: Nampa, Idaho; Wells, Nevada; Marysvale and Chadburn's, Utah; Doyle and Chilcoot, California. Somerville, Utah, is now added to this list.

These authors make the statement that this species seems to be confined to the state of Nevada and a narrow fringe of adjoining states and only on the higher levels where sagebrush grows. They reported that nymphs and adults were collected at lower altitudes during July with adults all out by July 20th but that in the mountains nymphs were still present up to early August and adults up to the last of the month.

Deserta pinturensis n. sp.

ORIGINAL DESCRIPTION

Size: Length of female 7 mm., width 3.1 mm., length of male 7 mm., width 2.7 mm.

Color: General color straw yellow, sparsely irrorate with light brown, especially on vertex between eyes. Mesal half of each tegmen clouded with fuscous. No sharply contrasting spots or stripes present on abdomen. The conspicuous brown patch in center of 9th sternal plate found in *bipunctata*, *obesa*, and *obscura* is lacking in this species.

Structural Details: Resembling *D. bipunctata* but head process from above shorter and stouter, the part in front of eye being approximately two and one-fifth times the length of the eye; from side view lower margin of head process straight and apical angle not produced as in *bipunctata*; apical plate of process broader than long.

Proctiger of male long as in *bipunctata*, the anal flap about two and one-half times the length of the anal tube, strongly bulbous at base, ventral margin distinctly expanded and caudal margin roundly pointed through middle and deeply notched on each side.

Genitalia: Male: The outer pair of lobes of the dorsal thecal wall are developed as long, tapering sacks which are capable of much expansion due to the deep accordion-pleatlike folds of their membranous walls and the helical twisting of their apices. The ventral thecal wall shows two pairs of membranous apical lobes instead of the usual one pair. The apices of the thecal hooks are drawn out into long, fine slightly recurved spines.

Female: The dorsal lobe of the third valvula is less membranous than in such species as *raptoria* and the ventral lobe is slightly more hirsute than in other species. The pattern of the teeth of the dorsal lobe of the first valvula shows the third tooth smaller than usual, thus making the third, fourth and fifth teeth approximately equal in size, and the sixth tooth only slightly smaller than these three.

Types: Described from holotype male, allotype female, seven male paratypes and eight female paratypes, all identified by the following data; Pintura, Utah, August 11, 1929, R. H. Beamer collector; additional paratypes identified as follows; one male paratype, Orderville, Utah, August 27, 1950, H. C. Severin, collector; one female paratype, Lone Pine, California, July 27, 1947, R. H. Beamer, collector. These types in Snow Entomological Museum, University of Kansas.

Deserta raptor Ball

Deserta raptor. Ball, E. D. Bull. Brooklyn Ent. Soc. vol. 32, p. 176, 1937.

Size: Length of female 6 mm., width 2.3 mm.; length of male 6.15 mm., width the same.

Color: A uniform, lighter gray species, sparsely irrorated, markings not so dark as in *fuscata*. Reticulations and apical portions of elytra light.

Structural Details: This species is distinguished from other species except *fuscata* by the longer, strongly hooked head process. From *fuscata* it is distinguished by its more ovate body shape, lighter color and apical head plate being wider than long.

The proctiger of male is moderately developed, the anal flap (at a-a) approximately $1\frac{1}{4}$ \times the length of the anal tube (b-b), not bulbous at base, ventral margin only slightly flared, apical margin broadly rounded, indistinctly notched on each side.

For other structural features see chart I, page 203 and illustrations on plates I, II, III and IV.

Genitalia: Male: The two pairs of membranous lobes from dorsal wall of theca subequal, with the lateral lobes not greatly larger than middle lobes and also much smaller than in *obscura*. Sclerotized bars of the ventral thecal wall truncate instead of pointed, the paired membranous apical lobes prominent but shorter than in *obscura*. The aedeagal hooks roundly truncate at apex, the apical fourth of each hook strongly bent back against the basal portion, the sub-apical serrations of outer margin blunt and inconspicuous.

Female: Variations in the degree of membranization and sclerotization of the three pairs of valves is best studied by an examination of drawings 1, 4, 6, 10, plate III. The chief differences between species seems to center around the teeth of the dorsal lobe of the first valvula. In this species the second tooth from apex is larger, the third tooth broader and the sixth tooth is more minute than in other species.

Types: Described from holotype female, allotype male and fourteen paratypes, collected by E. D. Ball, Tehachapi Pass, California, June 30, 1931. Ball failed to indicate, however, which female was the type. Therefore one female from the type series is herein designated as lectotype. One male, same data, is herein designated as lectoallotype. These types are in the United States National Museum. A large series of homotypes from Mint Canyon, California is in the Snow Entomological Museum, University of Kansas.

Distribution and Host Plant Records: California. Collected by Ball from a heavy stand of *Chrysothamnus* (Rabbit Bush).

Genus *Acinaca* Ball and Hartzell

Acinaca Ball, E. D. and Hartzell, A., Ann. Ent. Soc. of Amer., vol. 15, pp. 141-142, 1922.

Genotype: *Acinaca lurida* Ball and Hartzell, by original designation.

GENERIC DESCRIPTION

Closely resembling the palaearctic genus *Tigrahauda* Oshanin but apparently differing according to Ball and Hartzell by having the laterofrontal carina of the face curving abruptly upwards and ending in the dorsum, and vertex not furrowed, whereas in *Tigrahauda* the carina runs parallel to ventral margin of the cephalic process and vertex is furrowed.

Among nearctic genera *Acinaca* resembles *Yucanda* Ball and Hartzell in shape of head process as viewed from the side but is easily distinguished by the process being strongly compressed and much shorter than in *Yucanda*. From all other genera readily identifies by the scimitar shaped head process.

Body oval, head conspicuous, posterior region behind eyes considerably lengthened and narrowed into a pseudo-neck, thus widely separating eye and pronotum. No callosity behind eye. Vertex narrow, median carina on basal half only, lateral margins carinate, erect, at base constricted, dilated between eyes, then beginning at eye angle converging to a pointed apex; a deep transverse bend across vertex just anterior to eye, which tilts the head process upward. Head process as seen from the side flat, length and width subequal, apex truncate, whole process strongly inclined upward. Central tablet of frons narrow, almost linear, tricarinate, carinae sharply delineated; lateral compartments of frons bearing large, round pores. Laterofrontal carina joining the vertex at a point one third the distance from apex of vertex to eye line. Apical plate

of head from cephalic view four-angled, widest near ventral surface where it is one-fourth as wide as its length.

Pronotum greatly narrowed anteriorly with middle third angularly produced forward, lateral thirds reduced to an extremely short collar, numerous round pores occurring on each side of a distinct median carina; no central tablet or lateral carinae present. Mesonotum small, an arcuated carina present following posterior line of pronotum, a short lateral carina on each side branching from this arc and a faint median carina indicated. Elytra brachyterous, finely and irregularly reticulated with veins scarcely raised. Pores on abdominal segments large and extending less than half way to median line. Femora and tibiae of the first and second pairs of legs somewhat compressed and edges slightly dilated; hind legs with three or four lateral spines on each tibia.

Acinaca lurida Ball and Hartzell

(Plates I and III)

Acinaca lurida. Ball, E. D. and Hartzell, A. Ann. Ent. Soc. Amer., vol. 15, p. 146, 1922.

Size: Length of female 3.5 to 3.8 mm., width 1.9 to 2.2 mm.; length of male 3.3 mm., width 1.9 mm.

Color: A strikingly bicolored species with all of head except clypeus and labium, as well as the central third of pronotum and the anterior third of mesonotum light greenish yellow, rest of body including tegmina uniformly reddish-brown or bright testaceous. Anterior and middle femora red-testaceous, striped with pale yellow lines; hind legs with tips of tibial spines dark. Central tablet of frons with two narrow dark brown stripes separated by the pale, elevated median carina. All facial carinae, except latero-frontals etched in dark brown, including the extreme apical margins of the head process.

Structural Details: A small, globose species; with prominent head and reduced thorax. Cephalic process extending in front of eye a distance equal to length of head. Dorsal plate of head process triangular, at base abruptly inclined dorsad at an acute angle to basal part of vertex. From side view head process appears as a broad scimitar-shaped blade with blunt truncate apex. Frons narrowed and central tablet between eyes strongly elevated, all carinae sharply accented. Clypeus with distinct median and lateral carinae.

Posterior margin of ninth segment of the male projected ventro-posteriorly as an angulate armlike plate. Proctiger of male moder-

ately developed, the ventral extension of the tenth segment (anal flap) not much longer than dorsal length of the segment; upper surface of anal flap concave or hollowed almost to apex, its lateral margins not flared as in *Deserta* and its apical margin slightly notched through middle.

Genitalia: Male: Ventral wall of theca bilobed at apex, dorsal wall ending in two pairs of membranous lobes, which are capable of a certain amount of pleating and extension. Exposed portion of thecal hooks are bulbous at base, then suddenly are constricted just before apex into a slender recurved finger, and on each side bear a row of five minute short spines.

Female: The ventral lobe of first valvula is triangular, semi-membranous and fused with first valvifer; the dorsal lobe has its basal half which is bordered mesad by the rodlike ramus, folded under the sclerotized toothed portion, the three apical teeth broad, flat, approximately equal in size, the fourth tooth from apex much smaller and the basal tooth reduced to a minute spine.

The second valvulae are united at base as in other genera; the ramus of each valve is projected along the outer edge of the valve as a broad, heavily sclerotized bar while the basal half of the free mesal border appears as a membranous triangular area; the rest of the valve is moderately sclerotized.

The third valvula is quadrangular in flattened position, posteriorly is deeply notched, thus separating a dorsal fingerlike lobe from the broader rectangular ventrolateral lobe; the posterior third of the latter lobe is covered by prominent setae.

Types: Described from three pairs from Mojave, California, July 30, 1912, E. D. Ball, collector. These types in the National Museum, Washington, D. C. Two homotypes, male and female, compared by Ball with the types are in the Snow Entomological Museum. These specimens bear the following data; Prescott, Ariz. Aug. 7, 1932, R. H. Beamer collector. Also in the latter collection are two topotype females, bearing the data, Mojave, California, July 7, 1933, R. H. Beamer collector.

Distribution: Specimens have been collected from Arizona, California and New Mexico.

For this study specimens were on hand from Arizona as follows; Prescott, 5 females and 6 males, same data as homotypes above, from Prescott on July 29, 1933, 5 females and 7 males, two females from Miami, Aug. 6, 1944, one female from Indian Hot Springs,

Aug. 6, 1941, one female, Kingman, July 29, 1936, all specimens collected by R. H. Beamer.

From California specimens were on hand as follows: one male, Aug. 1, 1935 and one female Aug. 6, 1936, Cajon Pass, two males and three females July 18, 1940, Campo, R. H. Beamer collector; in addition Ball and Hartzell state that they studied specimens from Ravena, California. In New Mexico a large series of 15 males and 26 females was collected on July 22, 1936 from Silver City by R. H. Beamer.

LITERATURE CITED

BALL, E. D.

1937. Some new Fulgoridae from the western United States. Bull. Brooklyn Ent. Soc., vol. 32, pp. 171-183, 1937.

1922. Review of the Desert Leafhoppers of the Orgerini. (Rhynchota, Fulgoridae). Ann. Ent. Soc. Amer., vol. 15, pp. 137-152, 1922.

BONDIAG, PHILLIP, and WICK, JAMES R.

1953. The functional anatomy of the male and female reproductive systems of the milkweed bug, *Oncopeltus fasciatus* (Dallas), (Heteroptera, Lygaeidae). Jour. Morph., vol. 93, pp. 177-284, 1953.

FENNAH, R. G.

1945. The external male genitalia of Fulgoroidea. Proc. Ent. Soc. Washington, vol. 47, pp. 217-226, 1945.

KRAMER, SOL

1950. The Morphology and Phylogeny of Auchenorrhynchous Homoptera. Illinois Biol. Monographs, vol. 20, (no. 4), pp. 1-109, 1950.

MARKS EDWIN P.

1951. Comparative Studies of the Male Genitalia of the Hemiptera (Homoptera-Heteroptera). Jour. Kansas Ent. Soc. vol. 24, pp. 134-141, 1951.

METCALF, Z. P.

1946. General Catalogue of the Hemiptera, fasc. IV Fulgoroidea: part 5 Dictyopharidae, pp. 118-119 and 219, 1946.

PLATE I

1. Lateral view of head process of *Deserta raptoria* Ball (paratype male).
2. Same view of *Deserta fuscata*, n. sp. (holotype male).
3. Same view of *Deserta obesa* (Ball), (male lectotype).
4. Same view of *Deserta pinturensis*, n. sp. (holotype male).
5. Same view of *Deserta obscura* (Ball), (homotype male).
6. Same view of *Deserta bipunctata* (Ball), (male lectotype).
7. Cephalic view of head process of *Deserta obscura* (Ball).
8. Same of *Deserta bipunctata* (Ball).
9. Same of *Deserta fuscata* n. sp.
10. Same of *Deserta obesa* (Ball).
11. Same of *Deserta raptoria* Ball.
12. Same of *Deserta pinturensis* n. sp.
13. Dorsal view of *Deserta bipunctata* (Ball).
14. Dorsal view of *Acinaca lurida* Ball and Hartzell.
- 14a. Ventral view of head of *Acinaca lurida* Ball and Hartzell.
- 14b. Lateral view of head of *Acinaca lurida* Ball and Hartzell.
- 14c. Dorsal view of head of *Acinaca lurida* Ball & Hartzell.
- 14d. Dorsal view of second valvulae of ovipositor of *Acinaca lurida* Ball & Hartzell.
- 14e. Flattened view of first valvula of ovipositor of *Acinaca lurida* Ball & Hartzell.
- 14f. Flattened view of third valvula of ovipositor of *Acinaca lurida* Ball & Hartzell.
- 14g. Dorsal flattened view of male proctiger of *Acinaca lurida* Ball & Hartzell.
- 14h. Foreleg of *Acinaca lurida* Ball & Hartzell.
- 14i. Cephalic view of head process of *Acinaca lurida* Ball & Hartzell.
- 14j. Ventral view of male genitalia of *Acinaca lurida* Ball & Hartzell.
- 14k. Lateral view of male genitalia of *Acinaca lurida* Ball & Hartzell.
- 14l. Lateral view of apical segments and male genitalia of *Acinaca lurida* Ball & Hartzell.

PLATE I

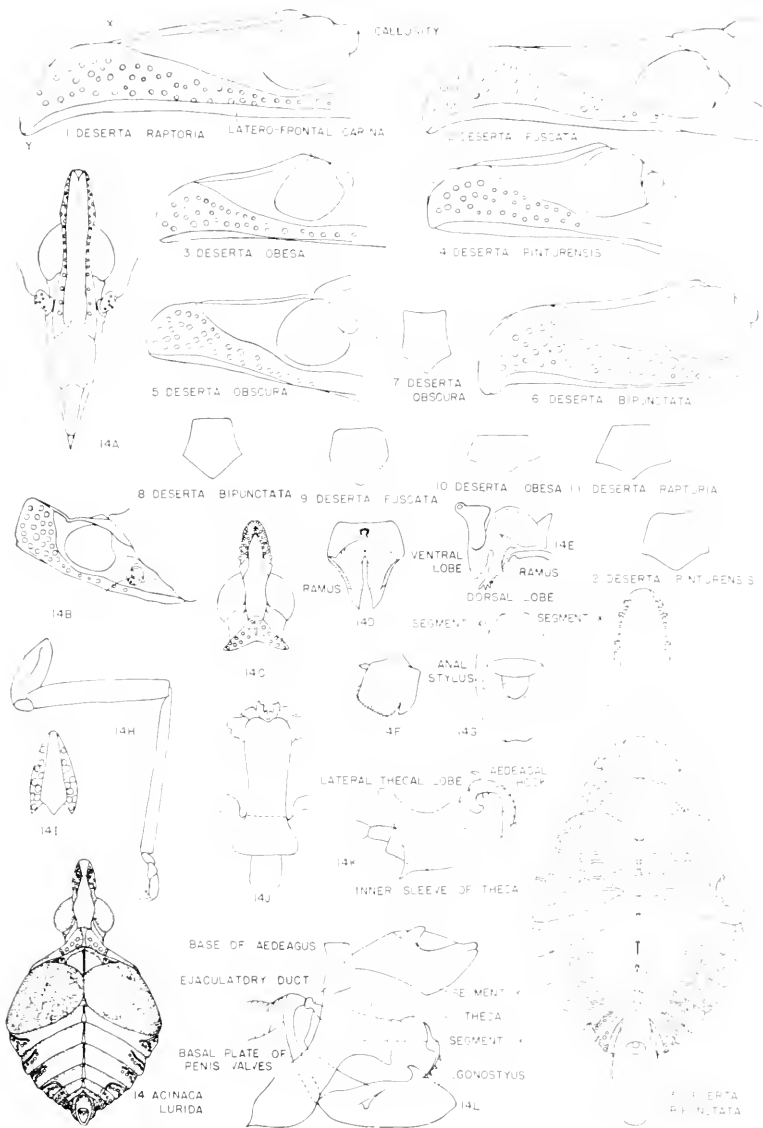


PLATE II

1. Dorsal view of head of *Deserta pinturensis*, n. sp. (holotype male).
2. Same view of *Deserta obesa* (Ball). (male lectotype).
3. Same view of *Deserta bipunctata* (Ball), (male lectotype).
4. Same view of *Deserta raptoria* Ball. (paratype male).
5. Same view of *Deserta obscura* (Ball), (homotype male).
6. Same view of *Deserta fuscata* n. sp. (holotype male).
7. Ventral view of frons of *Deserta obscura* (Ball).
8. Same view of *Deserta obesa* (Ball).
9. Same view of *Deserta raptoria* Ball.
10. Same view of *Deserta bipunctata* (Ball).
11. Same view of *Deserta fuscata* n. sp.
12. Same view of *Deserta pinturensis* n. sp.

PLATE II

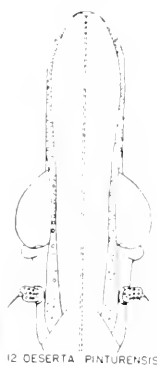
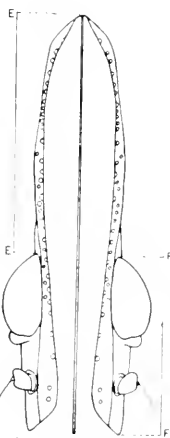
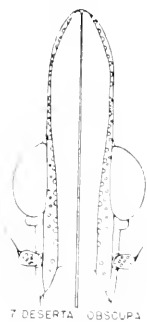
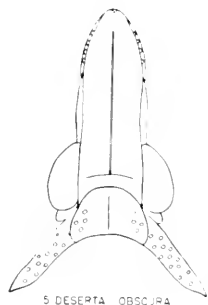
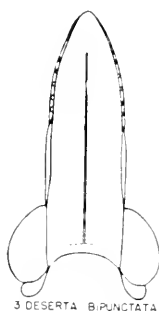
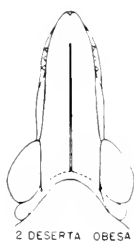
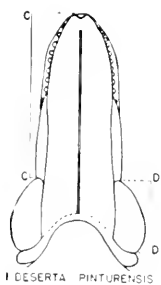


PLATE III

1. Lateral view of apical segments and female genitalia of *Deserta raptoria* Ball.
2. Ventral view of terminal abdominal segments and ovipositor of *Deserta raptoria* Ball.
3. Lateral view of terminal abdominal segments and ovipositor of *Acinaca lurida* B. and H.
4. Flattened view of third valvula of ovipositor of *Deserta raptoria* Ball.
5. Dorsal view of second valvulae of ovipositor of *Deserta pinturensis* n. sp.
6. Flattened view of first valvula of ovipositor of *Deserta raptoria* Ball.
7. Flattened view of third valvula of ovipositor of *Deserta fuscata* n. sp.
8. Flattened view of first valvula of *Deserta pinturensis* n. sp.
9. Dorsal view of second valvulae of *Deserta fuscata* n. sp.
10. Same view of *Deserta raptoria* Ball.
11. Flattened view of third valvula of ovipositor of *Deserta pinturensis*.
12. Dorsal flattened view of male proctiger of *Deserta fuscata* n. sp.
13. Lateral view of apical abdominal segments of the male of *Deserta fuscata* n. sp.
14. Flattened view of first valvula of ovipositor of *Deserta fuscata* n. sp.
15. Lateral view of apical abdominal segments of the male of *Deserta pinturensis* n. sp.
16. Dorsal view of male proctiger of *Deserta pinturensis* n. sp.
17. Lateral view of apical abdominal segments of the male of *Deserta obscura* (Ball).
18. Same view of *Deserta raptoria* Ball.
19. Same view of *Deserta bipunctata* (Ball).
20. Dorsal view of male proctiger of *Deserta obscura* (Ball).
21. Same view of *Deserta raptoria* Ball.
22. Lateral view of apical abdominal segments of the male of *Deserta obesa* (Ball).
23. Dorsal view of male proctiger of *Deserta obesa* (Ball).
24. Same view of *Deserta bipunctata* (Ball).

PLATE III

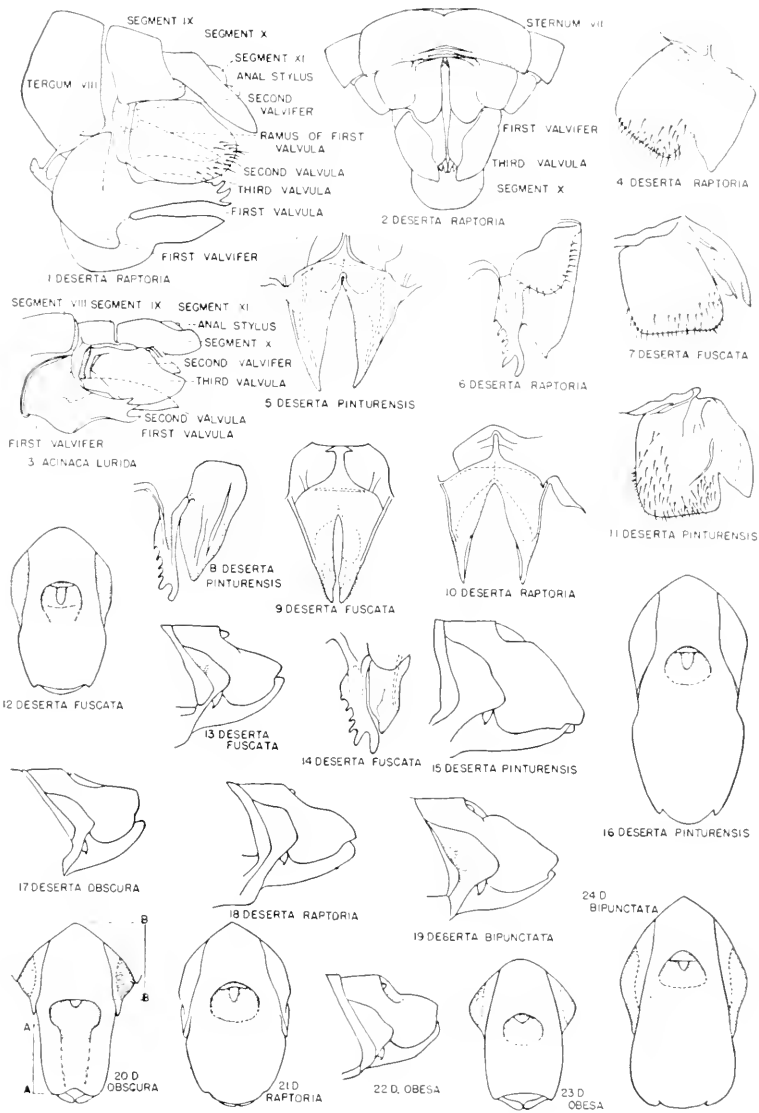


PLATE IV

1. Dorsal view of ninth segment and male genitalia which have been pulled forward and laid out flat of *Deserta pinturensis* n. sp.
2. Lateral view of apical segments and male genitalia of *Deserta pinturensis* n. sp.
3. Lateral view of male genitalia, showing membranous dorsal lobes of the theca distended, of *Deserta pinturensis* n. sp.
4. Foreleg of *Deserta pinturensis* n. sp.
5. Lateral view of male genitalia with dorsal lobes of theca collapsed of *Deserta obscura* (Ball).
6. Lateral view of apical segments and male genitalia of *Deserta fuscata* n. sp.
7. Lateral view of male genitalia of *Deserta raptoria* Ball.
8. Dorsal view of terminal abdominal segments of female of *Deserta raptoria* Ball.
9. Same view of *Deserta pinturensis* n. sp.
10. Dorsal view of phallus of *Deserta fuscata* n. sp.
11. Ventral view of phallus of *Deserta obscura* (Ball).
12. Same view of *Deserta raptoria* Ball.
13. Dorsal view of terminal abdominal segments of female of *Deserta fuscata* n. sp.
14. Dorsal view of phallus of *Deserta raptoria* Ball.
15. Ventral view of phallus of *Deserta fuscata* n. sp.
16. Same view of *Deserta pinturensis* n. sp.

PLATE IV

