

**Taxonomic Study of the Planthopper Genus *Cedusa*
in the Americas
(Homoptera: Fulgoroidea: Derbidae)**

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and
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ABSTRACT. This study presents the first taxonomic revision of the planthopper genus *Cedusa* in the Americas. Ninety-one species are recognized. Thirty-eight are described as new species: *alexanderi* (Brazil), *arizonensis* (Arizona), *balli* (Louisiana), *balloui* (Cuba), *beameri* (Arizona), *blantoni* (Panama), *brazilensis* (Brazil), *bruneri* (Cuba), *caldwelli* (Mexico), *carolinensis* (North Carolina), *costaricensis* (Costa Rica), *cubensis* (Cuba), *dietzi* (Panama), *ecuadorensis* (Ecuador), *fennahi* (French Guiana), *fitchiella* (Brazil), *fowleri* (Mexico), *insularis* (Cuba), *isthmusensis* (Panama), *kulashi* (Mexico), *macatcei* (Brazil), *martini* (Mexico), *metcalfi* (North Carolina), *morrisoni* (British Guiana), *muii* (Costa Rica), *olseni* (New York), *panamensis* (Panama), *peruensis* (Peru), *plaumanni* (Brazil), *remetti* (Brazil), *sanctaecatharinae* (Brazil), *shawi* (Maryland), *simplex* (Brazil), *stali* (Brazil), *vanduzeei* (Texas), *whitei* (Guatemala), *woodsholensis* (Massachusetts), and *zeteki* (Panama). *C. tropicalis* Caldwell is synonymized with *funesta* Fowler, *santaclara* Myers with *inflata* (Ball), and *rubriventris* Fennah with *irengana* Fennah. The distribution of the genus in the Americas ranges from southern Canada to northern Argentina and the West Indies. Plant associations and biological observations are recorded. Remarks on relationships are included. A key is presented that is based largely on the characteristics of the male genitalia; these structures are described and illustrated.

Species of the derbid planthopper genus *Cedusa* are not rare insects, yet they are infrequently collected in the same abundance as many cicadellids or leafhoppers one might find in similar phytohabitats. The adults of *Cedusa* appear as small moth-like insects. Many are blackish in general ground color and often appear bluish black as a result of pruinosity on their forewings. Although recorded plant associations are all too meager, the leaves of various shrubs and trees seem to be important food sources for the adult stage. The immature stages are unknown, and it is assumed that they occur in some cryptic situation.

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We have assembled data concerning all of the species of *Cedusa* found in the New World with the object of providing a classification for this group of derbid planthoppers. As is the case for most of the auchenorrhynchous homopterans, the features of the male genital capsule, especially the aedeagus, provide the best characters for delimiting and distinguishing species. Fennah (1944) and Caldwell (1944a) were the first to illustrate the aedeagus of some of the species. We have provided figures of the critical features of the male genital capsule for all of the species and produced a key to species based largely on these features:

In the course of this work, approximately 1400 specimens were dissected and studied. The authors were able to study the aedeagus of a type or cotype of all the described species and subspecies except: *C. colona* Caldwell, *C. inflata dominicana* Fennah, *C. albolineata* Fennah, and *C. funesta* Fowler. However, specimens of the last two species that agreed with the published drawings were found in collections. Specimens of the first two species were not seen, and they are interpreted on the basis of previously published drawings. *C. venosa* Fowler is known only from the female holotype and was not studied. One species, *C. wolcottii* Muir, is not congeneric with the other members of the genus, but it is retained in *Cedusa* pending a complete generic revision of the Cenchreini (see Caldwell and Martorell, 1950:203).

Because the structural features of the male genitalia are of paramount importance in distinguishing species, a brief discussion of these parts is in order. The term aedeagal flagellum, as used by Fennah (1952), is the apical part of the elbowed intromittent structure that at rest is directed anteriorly and during copulation enters the female (Fig. 2c). The terms parameres, pygofer, and anal tube, are used in the same sense as in Kramer (1950). The parameres are a pair of rather large, horizontal structures found at the posterior lateroventral margins of the pygofer and are connected to each other by a narrow sclerotized structure between their mesal margins at the base. Each has a long, slender, blunt apodeme that extends anteriorly into the abdomen (Fig. 2b). During copulation, the parameres are separated and clasp the posterior portion of the female abdomen. The pygofer is the ninth abdominal segment that forms a complete ring around the abdomen (Fig. 2b). The anal tube is composed of the elongate, tubular, tenth abdominal segment and the small, semicircular, eleventh segment that rests in a dorsal anteapical, hollowed area of the tenth segment. The eleventh segment bears a single posterior projection termed the anal style. The anal tube projects from the posterior dorsal margin of the pygofer (Fig. 2b). The apodeme is that part of the aedeagus between the base of the shaft and the dorsoposterior margin of the pygofer. This portion of the aedeagus has two pairs of basal arms. The posterior pair articulate with the dorsoposterior margin of the pygofer and the anterior pair are attached to muscles (Fig. 2c). The abdomen is sealed posteriorly by a conjunctiva.

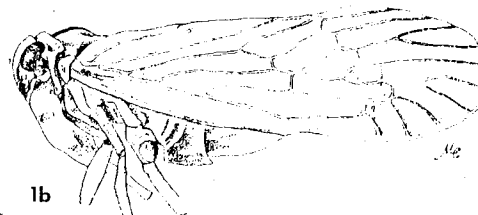
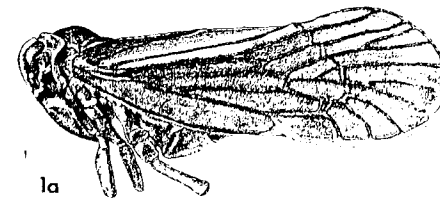


Fig. 1. Habitus drawings: a, *Cedusa vulgaris* (Fitch), male from Plummers Island, Maryland; b, *Cedusa maculata* (Van Duzee), male from Plummers Island, Maryland.

In lateral view, some processes of the aedeagal flagellum are visible, in whole or in part, from either side. They have usually been described as being on the side of their origin. However, exceptions have been made where it was advantageous to describe a given process or portions thereof from both the left and right lateral views.

The genital characters used to distinguish species were primarily the differences in the shape of the main lobe or lobes of the aedeagal flagellum and the presence, shape, location, and orientation of the various processes associated with the main lobe or lobes. Other features used were the shape of the aedeagal shaft and processes, if present, in its basal half, the shape of the inner ventral margin and apical hooks of the parameres, the presence of extraordinary processes on the laterodorsal margin of the paramere, and the width of the ventral surface of the parameres. Other supporting characters used were the shape of the apex of the anal tube, the presence of anal processes, the shape of the vertex in dorsal view, the process or processes at the posterior margin of the pygofer, and the shape of the connective between the parameres. The general color of the insect was also used as a supporting character.

The forewings proved to be of little specific value in this study as the number of branches of longitudinal veins often varied in the forewings of a single specimen. This is not an uncommon feature of fulgoroid species (Metcalf, 1923). The only female that can be identified with certainty is that of *Cedusa maculata* Van Duzee.

Two species were somewhat more variable than usual for the genus. These were *Cedusa vulgaris* (Fitch) and *Cedusa obscura* (Ball), but since two or more of the variations were found in the same locality and since

there is no evidence of ecological separation, these variations are not considered to be of subspecific value. Until rearing experiments are performed, it is advisable to consider the variants as one species.

At the present time, those species described in *Cedusa* from the Old World tropics are not considered to be congeneric with the New World species. We are following Fennah (1961:314) who referred all of the African species to the genus *Malenia* Haupt. Synave (1973:117-147) provided a revision of the African *Malenia* and recognized 27 species. The morphological differences between *Cedusa* and *Malenia* are slight but convenient in light of the zoogeographical considerations.

Specimens of *Cedusa* do not appear to occur in large numbers in any one locality at one time. Even though both sexes will come to both white and black lights, they are not often collected in large numbers. Nothing is known about the life cycle. Not one immature specimen was discovered in any of the collections. It is quite possible that the immatures live in the ground or in rotten logs and feed on fungi.

The species of the genus *Cedusa* seem to be ubiquitous, with specimens being taken from such diverse ecological habitats as: tropical rain forests, tropical swamps near the sea, tropical mountains at elevations as high as 6,000-6,500 feet, and tropical cotton fields. In North America, specimens have been taken from woods and forests, arid regions, both mountainous and plain, and from ornamental and cultivated plants. In one species, the range extends from California to Cuba.

Cedusa spp. have been associated with various plants. *Cedusa albolineata* Fennah was collected on cotton and sugar cane in Venezuela, and grass, cowpeas and in a citrus plantation in Panama. *Cedusa dietzi* n. sp. was netted from grass under papaya trees in Panama. *Cedusa peruensis* n. sp. was found on beans in Peru. *Cedusa mallochi* McAtee was taken on pecan leaves, *Carya ovata* (Mill.); black jack oak, *Quercus marilandica* Muench; linden, *Tilia americana* L., in North Carolina; and *Prunus angustifolia* Marsh in Alabama. *Cedusa edentula* (Van Duzee) was taken from mature pine in the Duke Forest, North Carolina. *Cedusa kedusa* McAtee was netted from aspen, *Populus* sp., and *Cedusa vulgaris* (Fitch) from white oak, *Quercus alba* L. in Illinois. *Cedusa chuluota* Ball has been found on *Vitis* sp. in Mississippi. *Cedusa inflata* Ball has been collected on coconut palm, *Cocos nucifera* L., in Florida and the Dominican Republic and has also been found on two other palms, *Veitchia merrillii* (Becc.) H.E. Moore and *Roystonea hispaniola* L.H. Bailey in the Dominican Republic. Unidentified females were taken from *Vanda* sp., *Quercus alba* L., *Quercus nigra* L., *Quercus virginiana* Mill., *Acer* sp., *Cattleya* sp., *Hydrangea quercifolia* Bartr., *Philodendron pertusum* H. Wendl., *Bidens bipinnata* L., and *Chrysalidocarpus lutescens* Kunth and Bouche in Florida. Other plants from which females were taken are *Fagus* sp. in North Carolina, *Pinus strobus* L. in Washington, D.C., *Quercus velutina* Lam. in Illinois, and a peach orchard in Georgia. All of the above information is from labels on the insect pins.

Knowledge of the distributional pattern of all species is very incomplete. For example, fifteen states in the United States were not represented by a single specimen in the collections studied. Canada was represented by only five species. The faunas of Mexico, the West Indies, and Central and South America have been only partially collected, and it is certain that many new species remain to be collected and described from the Neotropics.

REVIEW OF LITERATURE

This review is based partly on the General Catalogue of the Hemiptera, Fascicle IV Fulgoroidea, Part 4 Derbidae by Z.P. Metcalf (1945). Fowler (1904) erected the genus with two included species, *Cedusa funesta* Fowler from Mexico and Guatemala and *Cedusa venosa* Fowler from Mexico. Muir (1913) designated *Cedusa funesta* Fowler as the type-species and moved *Lamenia vulgaris* (Fitch) into the genus. McAtee (1924) added thirteen nominal species: *Cedusa bedusa*, *C. cedusa*, *C. fedusa*, *C. gedusa*, *C. hedusa*, *C. kedusa*, *C. ledusa*, *C. mallochi*, *C. medusa*, *C. pedusa*, *C. redusa*, *C. tedusa*, and *C. vedusa*. He also transferred six species: *Lamenia californica* Van Duzee, *Herpis incisa* Metcalf, *Lamenia inflata* Ball, *Lamenia maculata* Van Duzee, *Lamenia obscura* Ball, and *Lamenia praecox* Van Duzee into the genus and (incorrectly) placed *Herpis australis* Metcalf in synonymy with *Cedusa praecox* (Van Duzee). Muir (1924a) transferred *Herpis lugubrina* Stål and (1924b) (incorrectly) assigned a new species *Cedusa wolcottii* Ball, in 1928, added the new species *C. chuluota* Ball, *C. minuenda* Ball, and (incorrectly) synonymized *C. hedusa* McAtee and *C. tedusa* McAtee; but correctly synonymized *C. fedusa* McAtee with *C. obscura* (Ball). Fennah added *C. irengana* (1944), *C. cyanea* and *C. rubriventris* (1945), and *C. albolineata* and subspecies *C. inflata dominicana* (1952). Caldwell, in two papers in 1944, added *C. neodigitata* in the first and twenty-one species, *C. apicata*, *C. brunnea*, *C. carranzensis*, *C. dampfi*, *C. delongi*, *C. dubiata*, *C. elongata*, *C. furcata*, *C. fuscata*, *C. mexicana*, *C. mutilata*, *C. nedusa*, *C. lineata*, *C. plummeri*, *C. serrata*, *C. neomaculata*, *C. tincta*, *C. pseudomaculata*, *C. similis*, *C. zedusa*, and *C. tropicalis* in the second. Caldwell, in Caldwell and Martorell 1950, added the new species, *C. caribbensis* and *C. colona*. The parameres of several species were illustrated by Metcalf (1923), McAtee (1924), and Myers (1928). The first adequate illustrations of the aedeagus of any species were made by Fennah (1944) and Caldwell (1944a and 1944b). In Fennah's 1952 paper, the aedeagus of *Cedusa funesta* Fowler was illustrated from a drawing by China (Fennah, 1952).

GENUS *CEĐUSA* FOWLER

Cedusa Fowler 1904:112. Type-species *Cedusa funesta* Fowler by subsequent designation of Muir (1913:35).

The venation of the forewing varies very little from that of *Cedusa funesta* Fowler (Fig. 2a). However, a given specimen may exhibit some variation in the branching of the longitudinal veins.

The length of the males of the various species ranges from 3.5 to 6.0 mm. The vertex in dorsal view varies from narrowly to broadly trapezoidal and in one species to square; the apical margin varies from smoothly rounded to markedly elevated, and it may be straight, convex, or concave and may or may not be rounded at the sides. Sometimes, it is depressed in the middle. The disc of the vertex may be shallowly depressed to strongly depressed and with or without small pits. The frons is usually narrowest between the eyes except when the sides are parallel. The widest portion of the frons may vary in its distance from the vertex and the margins are usually concave above and convex or convergent below the widest portion. The disc of the frons is usually depressed in its entire length and a feeble median carina may be present occasionally. The genal ridge between the frontogenal carina and the subantennal plate may vary from feeble to greatly elevated, it may be straight or sinuate, complete or incomplete. The subantennal plate, originating from the side of the head, may be oriented from almost a right angle to the gena to an acute angle to the gena. The antennae are usually one-half as long as the subantennal plate with the sensory areas often in rows. Lateral ocelli usually are closer to the frontogenal carina than to the adjacent eye. The apical segment of the labium is usually longer than wide, usually darker than the preapical segment.

The median length of the pronotum is usually a little longer than that of the vertex, with the anterior margin usually convex between the eyes, and emarginate behind the eyes. The length of the pronotum behind the eyes is usually greater than the median length. However, when they are about equal the pronotum is strap-like. The posterior margin varies from broadly rounded to acute. The median and lateral longitudinal carinae of the pronotum are usually feeble or slightly elevated. The oblique transverse carinae of the pronotum are usually greatly elevated, each reaching to and overlapping the margin somewhat, curved and merging with the lateral margin below the level of the tegula.

The mesonotal median longitudinal carina is usually slightly elevated. The longitudinal lateral carinae usually are feeble or very slightly elevated, often represented by a narrow band of small, shallow pits.

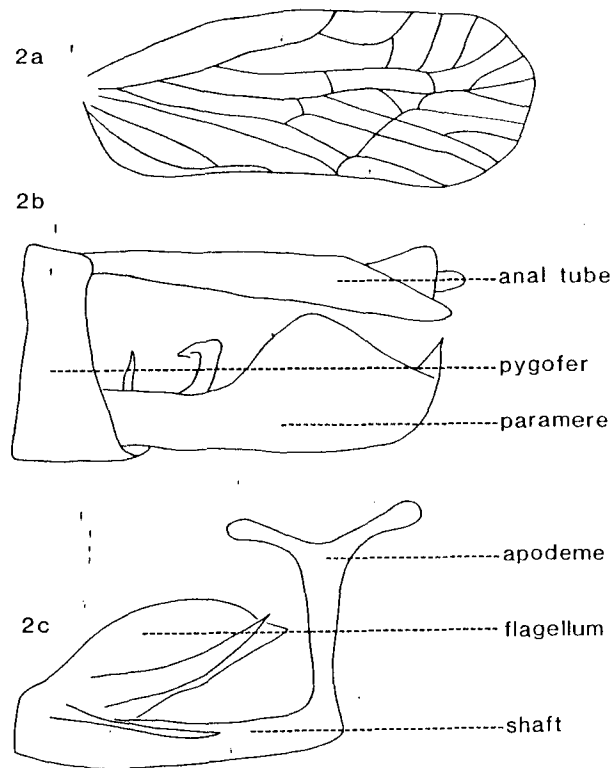


Fig. 2. Anatomy: a, *Cedusa funesta* Fowler, right forewing; b, generalized male genital capsule, left lateral view; c, generalized aedeagus, right lateral view.

Some of the species are a dark yellowish brown, many are near black, and several are maculate with dark yellowish-brown blotches on a light brownish-yellow background. The carinae and margins of the head and pronotum, subantennal plate, legs, and venter are usually lighter in color and the abdomen may be tinged with red. Many of the specimens are covered with a whitish bloom that often contributes to a bluish appearance.

The pygofer, the ninth abdominal segment, forms a ring around the abdomen, and it is sealed posteriorly by the conjunctiva IX-X, through which the aedeagus and parameres protrude. The pygofer may have a pair of posterior laterodorsal processes or a single posterior mediocentral process or, as in most cases, may lack processes. The anal tube is usually convex at its apex, but several species have an anal tube that is concave at the apex; others have small lateral preapical processes, and in others the apex may be flared. The eleventh segment is usually on the

dorsum anteapically and may, in a few species, extend beyond the apex of the tenth. The tenth segment may be slightly expanded in its basal portion. The parameres are usually somewhat asymmetrical with the inner ventral margins variously produced, lobed, incised or notched, or they may be entire and sometimes convex, concave, or subparallel to the outer ventral margin. There is usually a pair of processes basally on the laterodorsal margin, and in two species an additional process is found that is directed posteriorly. The aedeagus varies greatly between species and usually consists of a basal apodeme, a shaft with or without processes in its basal half, and a flagellum at the apex of the shaft consisting of one or more large lobes with additional lateral processes. This flagellum enters the female during copulation. The gonopore is very difficult to see.

Specimens of the genus *Cedusa* can be easily separated from the rest of the derbids by the presence of the subantennal plate on the gena and the lack of an antennal fovea on the pronotum. It should be noted that one of the characters ("apical segment of labium short, about as wide as long") used by Metcalf (1923) to distinguish the Derbidae from other Fulgoroidea is not valid for *Cedusa*. In almost all of the species of *Cedusa*, the apical segment of the labium is longer than wide.

KEY TO THE AMERICAN SPECIES OF *CEDUSA* BASED ON MALES
(Those marked with an asterisk (*) occur within the United States.)

- 1 Forewings maculate, background light brown, near white, with darker yellowish-brown blotches 2
- Forewings uniformly black or yellowish brown 5
- 2(1) Vertex in dorsal view nearly square; aedeagal flagellum with a long, broad, sinuate process from base on left with ventral margin dentate (Fig. 3) **1. maculata***
- Vertex in dorsal view markedly trapezoidal or rectangular; aedeagus not as above 3
- 3(2) Vertex in dorsal view narrowly trapezoidal; pygofer with paired lateral posterior processes; aedeagus as in Fig. 4 **2. neomaculata***
- Vertex in dorsal view broadly trapezoidal; pygofer without paired lateral posterior processes; aedeagus not as above 4
- 4(3) Aedeagal flagellum with a large lobe on the right, the vertical portion of which is scoop-shaped, the dorsal portion produced into a slender, erect process; paramere with inner ventral margin convex, apical hook small (Fig. 5) **3. costaricensis**
- Aedeagal flagellum with several slender processes and one stout process at base, with an elongate, horizontal lobe with its apex astride the shaft and bearing an acute process on the left; paramere with inner and outer ventral margins subparallel, apical hook large (Fig. 6) **4. pseudomaculata**
- 5(1) Vertex in dorsal view almost square; aedeagus as in Fig. 7 **5. cyanea**
- Vertex in dorsal view narrowly or broadly trapezoidal; aedeagus not as above 6
- 6(5) Vertex in dorsal view broadly trapezoidal 7
- Vertex in dorsal view narrowly trapezoidal 20
- 7(6) Pygofer with a single posterior median ventral process (Figs. 8 and 9) 8
- Pygofer without a single posterior median ventral process ... 9
- 8(7) Pygofer process with apex concave; aedeagus as in Fig. 8 **6. plaumanni**
- Pygofer with process slender and blunt, aedeagus as in Fig. 9 **7. muiri**
- 9(8) Aedeagal shaft with two processes from dorsum at base on left, two at midlength on right; aedeagus as in Fig. 10 **8. beameri***
- Aedeagal shaft without process from dorsum; aedeagus not as above 10

- 10(9) Aedeagal flagellum with an erect bifid process from base on right (Figs. 11 and 12)..... **11**
 — Aedeagal flagellum without an erect bifid process from base on right **12**
- 11(10) Paramere with inner ventral margin convex; apical hook small, acute; aedeagus as in Fig. 11 **9. furcata**
 — Paramere with inner ventral margin regularly concave at midlength; apical hook absent; aedeagus as in Fig. 12 **10. morrisoni**
- 12(10) Aedeagal flagellum with a long scoop-like process extending almost to apodeme (Figs. 13 and 14)..... **13**
 — Aedeagal flagellum without scoop-like extending almost to apodeme **14**
- 13(12) Aedeagal scoop-like process with apex entire; aedeagus as in Fig. 13 **11. hedusa***
 — Aedeagal scoop-like process with apex vertically incised; aedeagus as in Fig. 14 **12. shawi***
- 14(12) Aedeagal flagellum with three bifid processes on left side; aedeagus as in Fig. 15 **13. bruneri**
 — Aedeagal flagellum without three bifid processes on left side; aedeagus not as above **15**
- 15(14) Aedeagal flagellum with a cap-like process from base on left side (Fig. 16) **14. pedusa**
 — Aedeagal flagellum without a cap-like process from base on left side **16**
- 16(15) Aedeagal flagellum consisting essentially of two lobes, the anterior angular in right lateral view, the posterior with a flat process arising from basal portion the apex of which is acutely concave; the apical portion terminating in a slender acute process (Fig. 17) **15. martini**
 — Aedeagal flagellum not consisting essentially of two lobes, not as above **17**
- 17(16) Paramere with inner ventral margin shallowly concave at midlength **18**
 — Paramere with inner ventral margin convex or slightly lobate at apical third **19**
- 18(17) Aedeagal flagellum with a large process from base extending to apodeme and with its apex expanded and produced laterally on the right, lying astride the shaft (Fig. 18) **16. vanduzeei***
 — Aedeagal flagellum not as above (Fig. 19) **17. kulashi**
- 19(17) Paramere with inner ventral margin smoothly convex, apical hook large; aedeagus as in Fig. 20 **18. caribbensis**
 — Paramere with inner ventral margin somewhat abruptly convexly lobed at apical third, apical hook absent; aedeagus as in Fig. 21 **19. carolinensis***

- 20(6) Paramere with finger-like process arising near midlength on outer dorsal margin, in addition to processes normally present in other species, directed posteriorly **21**
 — Paramere without finger-like process arising near midlength and directed posteriorly on outer dorsal margin **22**
- 21(20) Aedeagal shaft with a long, thin, acute process arising on right side at base of a bifid process near apodeme and passing beneath shaft, directed posteriorly (Fig. 22) **20. digitata**
 — Aedeagal flagellum not as above (Fig. 23) **21. neodigitata**
- 22(20) Aedeagal shaft with process or processes in basal half **23**
 — Aedeagal shaft without processes in basal half **31**
- 23(22) Aedeagal shaft with an omega-like process at dorsum only in basal half near apodeme as in Fig. 24 **22. medusa**
 — Aedeagal shaft not as above **24**
- 24(23) Aedeagal shaft with process in basal half on each side **25**
 — Aedeagal shaft with process in basal half on one side only **27**
- 25(24) Aedeagal shaft with a large bifid process on right side (Fig. 25) **23. olseni***
 — Aedeagal shaft without a large bifid process on right side **26**
- 26(25) Aedeagal flagellum with main lobe at dorsum spatulate; paramere with inner ventral margin without an angular lobe in apical half (Fig. 26) **24. bedusa***
 — Aedeagal flagellum with main lobe acute, not spatulate; paramere with an angular lobe in apical half (Fig. 27) **25. woodsholensis***
- 27(24) Aedeagal shaft with process in basal half on right side only **28**
 — Aedeagal shaft with process in basal half on left side only **30**
- 28(27) Paramere with apical hook large; aedeagus with main lobe hood-like (Fig. 28) **26. delongi**
 — Paramere with apical hook small or absent; aedeagus not as above **29**
- 29(28) Aedeagal shaft with process arising from dorsum on right side and curving antepically, with its apex acute (Fig. 29) **27. balli***
 — Aedeagal shaft with process on right side directed posteriorly, its apical portion scoop-like with its apex dentate (Fig. 30) **28. metcalfi***
- 30(27) Paramere with inner ventral margin with two small angular lobes, apical hook large, stout (Fig. 31) **29. whitei**
 — Paramere with inner ventral margin with a very acute lobe at apical fifth, apical hook small or long, never stout (Fig. 32) **30. nedusa**

- 31(22) Aedeagal flagellum consisting of two nearly spheroid lobes (Figs. 33 and 34) 32
 — Aedeagal flagellum not as above 33
- 32(31) Aedeagal flagellum with left lobe with a small anterior process, the right lobe with two ventral processes (Fig. 33) 31. *mutilata*
 — Aedeagal flagellum with ventral margin of left lobe produced and thickened, right lobe with one anterior process (Fig. 34) ... 32. *fuscata*
- 33(31) Left paramere with inner ventral margin notched before mid-length, right paramere with inner margin twice lobed near base (Fig. 35) 33. *zeteki*
 — Paramere not as above 34
- 34(33) Paramere with inner ventral margin concavely emarginate in basal half or shallowly emarginate in apical half (Figs. 36 and 37) 35
 — Paramere not as above 36
- 35(34) Paramere with inner ventral margin concavely emarginate in basal half (Fig. 36) 34. *inflata dominicana*
 — Paramere with inner ventral margin shallowly emarginate in apical half (Fig. 37) 35. *lugubrina*
- 36(34) Paramere with inner ventral margin not distinctly lobed (may be broadly convex) or angular, and not incised or notched (Figs. 38, 48, and 58) 37
 — Paramere with inner ventral margin distinctly lobed or angular, incised or notched 65
- 37(36) Paramere with a clear transparent area on ventral surface at base of apical hook (Fig. 38) 36. *macateei*
 — Paramere without a clear transparent area on ventral surface at base of apical hook 38
- 38(37) Aedeagal flagellum essentially a simple elongate tube with a few basal processes (Figs. 39 and 40) 39
 — Aedeagal flagellum essentially not a simple elongate tube with a few basal processes 40
- 39(38) Aedeagal flagellum long, straight, abruptly tapered at apical third, apex acute, with two small processes at base on right and one at base on left (Fig. 39) 37. *simplex*
 — Aedeagal flagellum usually "V"-shaped, apex blunt with one long curved, slender, acute process at base on each side (Fig. 40) 38. *tincta*
- 40(38) Aedeagal flagellum with a prominent bifid process at base on the left (Figs. 41, 42, 43, 44, 45, and 46) 41
 — Aedeagal flagellum without a prominent bifid process at base on the left 46
- 41(40) Bifid process with rami of about equal length 42
 — Bifid process with upper ramus distinctly longer than lower ramus 43
- 42(41) Bifid process with rami curved, directed dorsally, parallel to each other, the posterior ramus stouter (Fig. 41) 39. *vulgaris**
 — Bifid process with rami directed anterodorsally, the dorsal ramus slender, more horizontal, passing mesad of ventral ramus which is stouter (Fig. 42) 40. *lineata*
- 43(41) Bifid process with portion basad of the rami relatively broad (Figs. 43 and 44) 44
 — Bifid process with portion basad of the rami relatively narrow, stem-like (Figs. 45 and 46) 45
- 44(43) Bifid process at posterior margin with the rami relatively far apart and directed dorso-anteriorly; paramere with apical hook blunt (Fig. 43) 41. *remetti*
 — Bifid process horizontal from base of flagellum with the upper ramus decurved; paramere with apical hook very acute (Fig. 44) 42. *caldwelli*
- 45(43) Bifid process with ventral ramus very short, straight, upper ramus straight; paramere with apical hook long, slender (Fig. 45) 43. *cubensis*
 — Bifid process with ventral ramus stouter than dorsal, anterior margin between the two rami semicircular; paramere with apical hook short, stout, blunt (Fig. 46) 44. *insularis*
- 46(40) Aedeagal flagellum with bifid process at base on right 47
 — Aedeagal flagellum without bifid process at base on right 50
- 47(46) Paramere with apical hook large (Figs. 47 and 48) 48
 — Paramere with apical hook small or absent 49
- 48(47) Aedeagal flagellum broad, elongate, lying alongside shaft, apex roundly convex (Fig. 47) 45. *redusa**
 — Aedeagal flagellum with apex produced laterally into two acute processes which are directed posteriorly (Fig. 48) 46. *australis**
- 49(47) Aedeagal flagellum with a scoop-like process directed forward along right side of shaft and with its apex dentate (Fig. 49) 47. *zedusa*
 — Aedeagal flagellum not as above, without a scoop-like process directed forward along right side of shaft (Fig. 50) 48. *apicata*
- 50(46) Aedeagal flagellum with a large trifurcate process on the left side (Figs. 51 and 52) 51
 — Aedeagal flagellum without a large trifurcate process on the left side 52
- 51(50) Paramere with apical hook large; aedeagal flagellum with a large cleaver-like process on left (Fig. 51) 49. *praecox**
 — Paramere with apical hook small; aedeagal flagellum without a cleaver-like process on left (Fig. 52) 50. *elongata*

- 52(50) Aedeagal flagellum with a trifid or quadrifid process at base on the right; with a long process from beneath the main lobe bearing five, sometimes four, projections (Fig. 53) **51. californica***
 — Aedeagal flagellum not as above **53**
- 53(52) Aedeagal flagellum with a large scoop-like process from base lying alongside and on shaft with a decurved process from base of main lobe at left (Fig. 54) **52. isthmusensis**
 — Aedeagal flagellum not as above **54**
- 54(53) Aedeagal flagellum with a large elongate lobe from base at left (Figs. 41, 55, 56, 57, and 58) **55**
 — Aedeagal flagellum not as above **59**
- 55(54) Aedeagal flagellum with anterior margin of elongate lobe convex, entire, not dentate or produced (Fig. 55) **53. stali**
 — Aedeagal flagellum not as above **56**
- 56(55) Paramere with apical hook small (Figs. 56 and 57) **57**
 — Paramere with apical hook large (Figs. 41 and 58) **58**
- 57(56) Aedeagal flagellum with a broad, elongate, curved, acute process from beneath the main lobe with a sagittate structure on right side at apex (Fig. 56) **54. brazilensis**
 — Aedeagal flagellum not as above (Fig. 57) **55. sanctaecatharinae**
- 58(56) Aedeagal flagellum with main lobe large, semitubular, open anteriorly, with the left dorsal and anterior margins produced into a hook-like structure (Fig. 41) **39. vulgaris***
 — Aedeagal flagellum with main lobe cowl-like (Fig. 58) **56. flavida**
- 59(54) Paramere with apical hook large, acute (Figs. 59, 60, and 61) **60**
 — Paramere with apical hook small or absent **62**
- 60(59) Aedeagal flagellum with a long process from beneath main lobe lying astride shaft, apical portion with dorsal margin dentate and acutely produced laterally on the right (Fig. 59) **57. alexanderi**
 — Aedeagal flagellum not as above **61**
- 61(60) Aedeagal flagellum essentially a hook-like lobe the right anterodorsal margin of which is produced into an acute process (Fig. 60) **58. obscura***
 — Aedeagal flagellum not as above (Fig. 61) **59. dubiata**
- 62(59) Paramere with inner ventral margin shallowly concave at midlength; aedeagal flagellum with main lobe elongate, apex acutely produced, with a large structure lying astride the shaft, its apex acutely produced and directed posteriorly (Fig. 62) **60. ledusa**
 — Paramere with inner ventral margin convex; aedeagus not as above (Figs. 63, 64, and 65) **63**

- 63(62) Aedeagal flagellum with two very long, slender, acute processes from base directed anteriorly over remainder of flagellum (Fig. 63) **61. panamensis**
 — Aedeagal flagellum not as above **64**
- 64(63) Aedeagal flagellum with a large rectangular lobe at base on left; main lobe of flagellum a semitubular process open anteriorly (Fig. 64) **62. arizonensis***
 — Aedeagal flagellum not as above (Fig. 65) **63. edentula***
- 65(36) Paramere with inner margin convexly lobed at base (Figs. 66 and 67) **66**
 — Paramere with inner margin not as above **67**
- 66(65) Aedeagal flagellum with apex of main lobe acute (Fig. 66) **64. carranzenis**
 — Aedeagal flagellum with apex of main lobe produced into two acute processes (Fig. 67) **65. dietzi**
- 67(65) Paramere with inner ventral margin angularly lobed at basal fourth (Figs. 68 and 69) **68**
 — Paramere with inner margin not as above **69**
- 68(67) Aedeagal flagellum with apex of main lobe produced laterally into two broad opposing rami; with a long, slender, acute process from base at left with many microspines ventrally (Fig. 68) **66. blantoni**
 — Aedeagal flagellum with main lobe produced into two short acute processes; with a long, broad, truncate process from base on right with many microspines basoventrally (Fig. 69) **67. vedusa**
- 69(67) Paramere with inner ventral margin distinctly incised (Figs. 70, 71, 72, 73, and 74) **70**
 — Paramere with inner ventral margin distinctly notched or lobed in midlength or beyond **74**
- 70(69) Paramere with apical hook small (Figs. 70 and 71) **71**
 — Paramere with apical hook large (Figs. 72, 73, and 74) **72**
- 71(70) Paramere with inner ventral margin acutely, obliquely incised at midlength (Fig. 70) **68. fowleri**
 — Paramere with inner ventral margin truncately incised at apical two-fifths (Fig. 71) **69. ecuadorensis**
- 72(70) Paramere with inner ventral margin truncately incised at basal fifth (Fig. 72) **70. cedusa***
 — Paramere with inner ventral margin acutely incised in basal portion **73**
- 73(72) Paramere with inner ventral margin convex beyond incision; apical hook tapered, acute (Fig. 73) **71. mexicana**
 — Paramere with inner ventral margin shallowly concave beyond incision; apical hook not tapered, somewhat blunt (Fig. 74) **72. mallochi***

- 74(69) Paramere with inner ventral margin notched (Figs. 75, 76, 77, 78, 79, 80 and 81) **75**
 — Paramere with inner ventral margin acutely lobed at midlength or beyond (Figs. 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, and 92) **81**
- 75(74) Paramere with apical hook large (Figs. 75, 76, 77, and 78) .. **76**
 — Paramere with apical hook small (Figs. 79, 80, and 81) **79**
- 76(76) Aedeagal flagellum with a large bifid process at base on right side (Figs. 76, 77, and 78) **77**
 — Aedeagal flagellum without a large bifid process on right side (Fig. 75) **73. irengana**
- 77(76) Apex of horizontal ramus of bifid process swollen antepically; horizontal lobe at base of flagellum on left side with a small process from ventroposterior margin (Fig. 76) **74. gedusa***
 — Aedeagal flagellum not as above **78**
- 78(77) Apex of horizontal ramus of bifid process with two to several teeth; horizontal lobe at base of flagellum on left side with a vertical process at dorsum (Fig. 77) **75. kedusa***
 — Apex of horizontal ramus of bifid process angularly emarginate sometimes with a small median tooth; horizontal lobe at base of flagellum on right side without a process (Fig. 78) **76. incisa***
- 79(75) Paramere with inner ventral margin shallowly, regularly notched at midlength; long aedeagal flagellar process lying along and astride shaft produced laterally into two acute projections which are directed posteriorly (Fig. 79) **77. dampfi**
 — Paramere with basal portion of notch at a right angle to main axis of paramere; aedeagus not as above (Figs. 80 and 81) **80**
- 80(79) Aedeagal flagellum with apex of lobe on right side at base produced into an erect elbowed process (Fig. 80) **78. minuenda***
 — Aedeagal flagellum not as above, with three elongate lobes from base along right side of shaft (Fig. 81) **79. funesta**
- 81(74) Parameres with apical hook large (Figs. 82, 83, 84, and 85) **82**
 — Paramere with apical hook small (Figs. 86, 87, 88, 89, 90, 91, and 92) **85**
- 82(81) Aedeagal flagellum with a bifid process at base on left **83**
 — Aedeagal flagellum without a bifid process at base on left **84**
- 83(82) Bifid process with the lower ramus broader and one-half as long as upper ramus (Fig. 82) **80. inflata***
 — Bifid process with the lower ramus much smaller than upper ramus (Fig. 83) **81. balloui**

- 84(82) Paramere with inner ventral margin acutely lobed at midlength; aedeagus as in Fig. 84 **82. serrata**
 — Paramere with inner ventral margin with a small, convex lobe at midlength; aedeagus as in Fig. 85 **83. colona**
- 85(81) Paramere with inner ventral margin with a small, blunt lobe at about apical two-fifths parallel to main axis of paramere (Figs. 86, 87 and 88) **86**
 — Paramere with inner ventral margin not as above (Figs. 89, 90, 91, and 92) **88**
- 86(85) Paramere with inner margin acutely lobed above lobe at apical fifth (Figs. 87 and 88) **87**
 — Paramere with inner margin weakly lobed above small process at inner margin (Fig. 86) **84. peruensis**
- 87(86) Paramere with inner ventral margin with acute lobe pendent at its apex (Fig. 87) **85. similis**
 — Paramere with inner ventral margin not as above (Fig. 88) **86. albolineata**
- 88(85) Aedeagal flagellum with a large process from beneath main lobe extending almost to apodeme and bearing a large oval process preapically in left lateral view (Fig. 89) **87. fitchiella**
 — Aedeagal flagellum not as above (Fig. 90, 91, and 92) **89**
- 89(86) Aedeagal flagellum with a long, thin process from beneath main lobe on left extending to apodeme then turning to the right and the posterior with many preapical microspines (Fig. 90) **88. plummeri**
 — Aedeagal flagellum not as above (Figs. 91 and 92) **90**
- 90(89) Aedeagal flagellum with a process from beneath main lobe of flagellum and bearing a row of four acute processes directed posteriorly (Fig. 91) **89. fennahi**
 — Aedeagal flagellum not as above (Fig. 92) **90. chuluota***

1. *Cedusa maculata* (Van Duzee)
 (Fig. 3)

Lamenia maculata Van Duzee 1912:503.

Herpis maculata (Van Duzee), Metcalf 1923:165.

Cedusa maculata (Van Duzee), McAtee 1924:181.

Description. Length of male 5.0 mm. Vertex in dorsal view square; apical margin with carina feeble, concave, obsolete at sides; basal margin slightly concave; disc shallowly depressed. Frons width at base less than width at apex; widest at distance five-sixths its length from vertex, lateral margins moderately concave above and rectilinear, slightly convergent below widest portion; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex;

length behind eyes less than median length; disc with median carina slightly elevated. Labium with apical segment longer than wide, dark. General color brownish yellow maculate with dark yellowish spots.

Male genitalia. Aedeagal shaft curved, slender. Flagellum, left side, consisting of an elongate, somewhat horizontal lobe from base extending to apodeme (somewhat like a broad inverted V), the apex convexly truncate, the ventral margin angularly concave at base; with a long, recurved process from base, the ventral margin of which is dentate; with a long, slightly curved, tapered, acute process arising from median portion of base; with a shorter, broad, acute process arising at base on posterior margin, its apex slightly upturned, the three preceding processes directed anterodorsally; with a short process at base, the base broad, the apex acute and hooked. Flagellum, right side, with the elongate lobe bearing a rounded flap-like structure from dorsal margin at apical third directed ventrolaterally and with the anterior and ventral margins produced into a moderately long, blunt process directed dorso-laterally; with a long, broad, twisted, acute, horizontal process from base, directed anteriorly; with a bifid process arising from base, its upper ramus curved, acute, its apical half tapered and at almost a right angle to basal half, the lower ramus stouter, longer, acute horizontal, directed anteriorly; with a small acute, dorsally directed process at base of preceding. Paramere with inner ventral margin concave in basal half, straight to convex apical half; apical hook slender, acute, directed mesad.

Discussion. *Cedusa maculata* (Van Duzee) was described from the male holotype taken at Trenton, Ontario. Additional specimens have been dissected from Minnesota (1), Indiana (1), North Carolina (5), Honduras (1), and Costa Rica (1) from the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum collection.

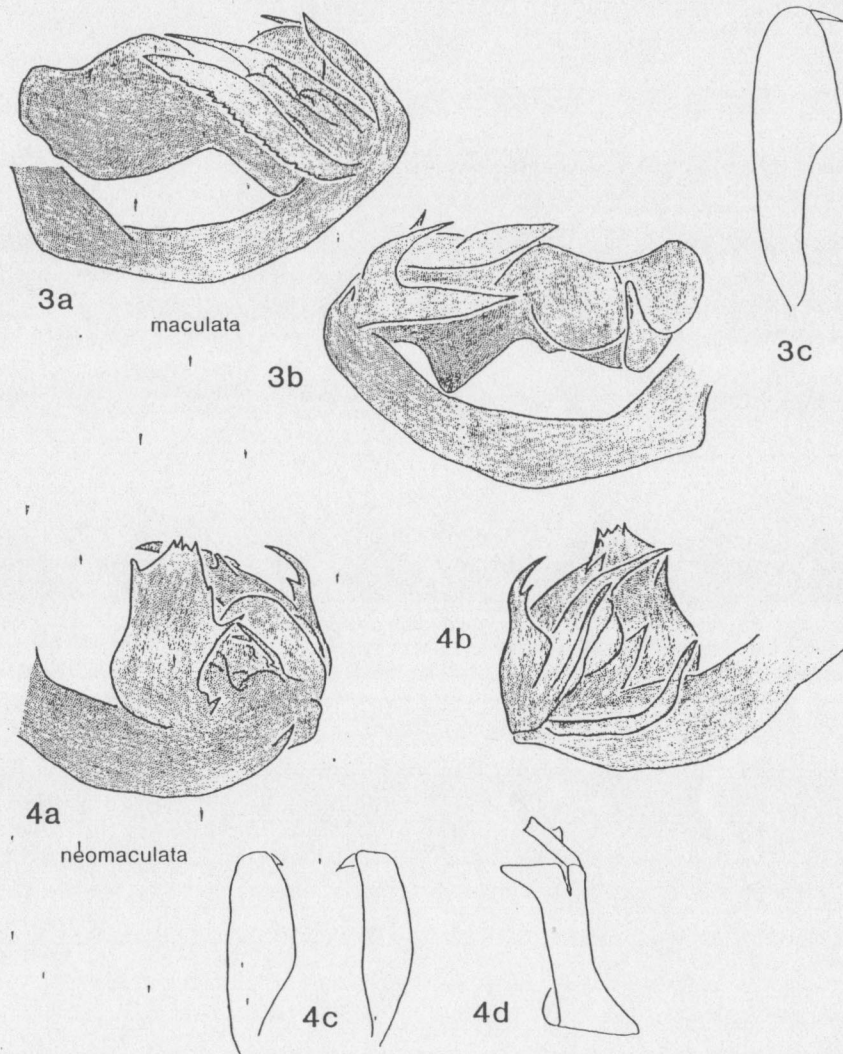
This species can be distinguished from all other species in the genus by the shape of the aedeagus, especially by the long curved, broad, dentate process from the base on the left side and by the shape of the paramere. This species appears to be closely related to *Cedusa pseudo-maculata* Caldwell and *Cedusa vanduzeei*, n. sp. It can readily be distinguished from both by the process mentioned above. All nine specimens examined are similar to the illustration.

2. *Cedusa neomaculata* Caldwell

(Fig. 4)

Cedusa neomaculata Caldwell 1944b:447.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated straight, obsolete at sides; depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths



Figs. 3-4. Male genitalia. 3, *C. maculata* Van Duzee, holotype. 4, *C. neomaculata* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view; d, pygofer, right lateral view.

its length from vertex. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes

slightly greater than median length; disc with median and lateral carinae slightly elevated. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina moderately elevated. General color brownish yellow maculate with dark brown blotches.

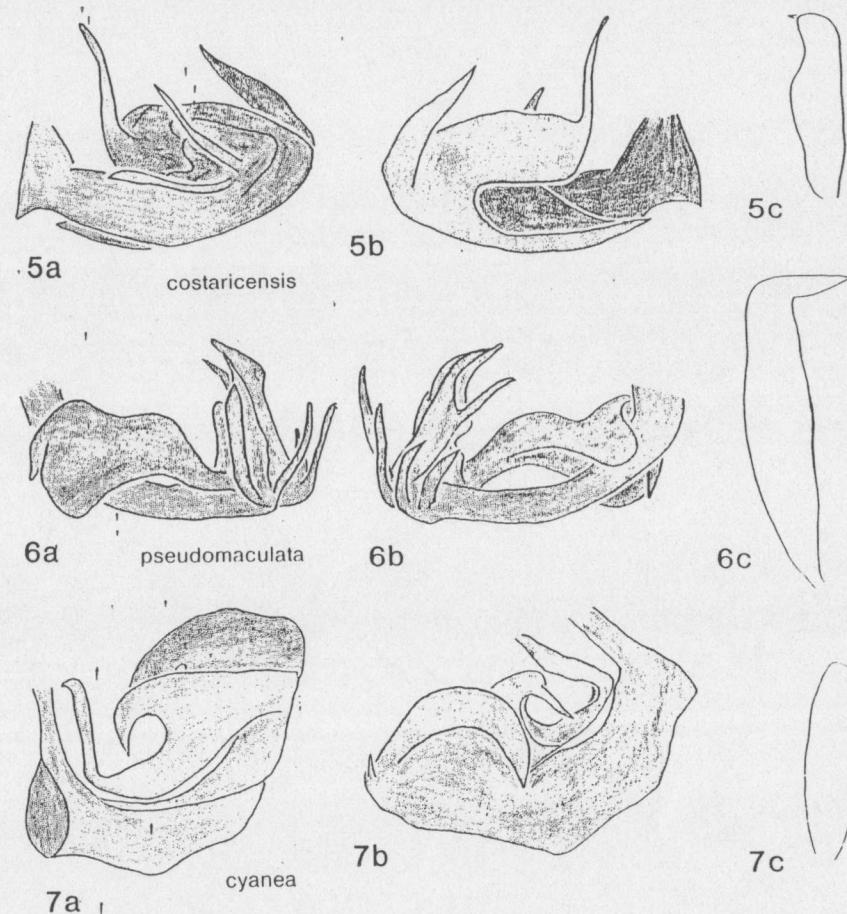
Male genitalia. Shaft of aedeagus curved. Flagellum, left side, consisting of a large dorsally directed somewhat pentagonal lobe with the dorsal apex dentate, anterior margin with a short, acute process at apical fifth, posterior margin with a longer process at about midlength and a short acute process at its base; with a short acute process at base directed dorsoposteriorly; with a slender, curved, process dorsal and anterior to preceding, bifurcate at apical third, both rami acute, directed anterodorsally; with a large lobe mesad of preceding; with a small process at dorsum of an acute curved process laterad of the first lobe described above. Flagellum, right side, with a bifid process at the posterior base, broadest in basal one-third, narrowed above, the upper ramus curved, the lower ramus, shorter, acute, less curved, the process directed nearly dorsal; with a slender, acute, decurved process at base of preceding directed anterodorsally with a long, irregular, curved process arising at its base directed anterodorsally; with a triangular process at anterior base mesad of preceding, directed dorsanteriorly; with a long, acute process, broad at base, narrowed at apical two-fifths, with a small process anteapically on left side. Parameres asymmetrical, inner ventral margin of left convex, the right shallowly concave; apical hooks very acute, small directed mesad. Pygofer with a short, truncate process at posterior margin, on each side, ventrad of anal tube, directed posteriorly.

Discussion. *Cedusa neomaculata* Caldwell was described from the male holotype and a female allotype from Rio Cajones, Oaxaca, Mexico; from a female paratype from Tolosa, Oaxaca and from a male paratype from San Pedro Yaneri, Oaxaca at approximately 1,000 meters. The holotype is illustrated. It is in the United States National Museum. No related species have been seen. An additional specimen from the Devils Millhopper, Alachua County, Florida, differs from the illustration in that the dentation of the large erect process on the left side is slightly different, and the lateral processes of the pygofer are more tapered. This species may be distinguished from all other species in the genus by the shape of the aedeagus, paramere, and pygofer.

3. *Cedusa costaricensis*, new species

(Fig. 5)

Description. Length of male 4.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina feeble; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length. Gena with genal ridge sinuate, greatly elevated between frontogenal carina



Figs. 5-7. Male genitalia. 5, *C. costaricensis*, n. sp., holotype. 6, *C. pseudomaculata* Caldwell, holotype. 7, *C. cyanea* Fennah, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin convex; length behind eyes greater than median length; disc with carinae absent. Labium with apical segment longer than wide, dark. General color a light yellowish white with small light brownish spots on the wings and legs, with two longitudinal stripes on either side of the median carina of the mesonotum, eyes reddish brown.

Male genitalia. Aedeagal shaft curved at midlength. Flagellum, left side, with two slender, acute processes at base, one horizontal, slightly expanded anteapically, the other at a forty-five degree angle to the shaft,

its apical half narrowed. Flagellum, right side, bifurcate, with an upper truncate ramus the dorsal and anterior margins of which are produced into a long, thin, slightly curved process which extends dorsally, the lower ramus a scoop-shaped structure with a stout, slightly curved, acute process at base; with a long, slender, acute process from apical third of shaft directed anteriorly (not visible in illustration). Paramere with inner ventral margin slightly convex from basal third to apical fourth; apical hook very small, acute.

Discussion. *Cedusa costaricensis* n. sp. is described from the male holotype taken from the type locality San Isidro del General, Costa Rica (D.L. Beuads?) from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

Cedusa costaricensis, n. sp. does not appear to be closely related to other species in the genus. It may be separated from its congeners by the shape of the aedeagus and paramere.

4. *Cedusa pseudomaculata* Caldwell

(Fig. 6)

Cedusa pseudomaculata Caldwell 1944b:447.

Description. Length of male 4.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina feeble; basal margin moderately concave. Frons width at base less than width at apex; widest at distance two-thirds its length from vertex; lateral margins moderately concave above and straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge greatly elevated, sinuate between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes greater than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. General color light yellowish maculate with dark yellowish brown spots.

Male genitalia. Aedeagal shaft curved. Flagellum, left side, consisting of a very large, broad, elongate, horizontal lobe from base extending anteriorly almost to apodeme, the basal portion of which is narrowed, stem-like, the margins sinuate, the apex with a short, ventrally directed, acute process at anterior margin; with a broad, acute process at base of preceding directed dorsally; with a thin, curved digitate process posterior to preceding directed dorsoposteriorly; with a large, broad, acute, semicylindrical process mesad of preceding with the apical portion bent slightly forward and with a thumb-like process at midlength of right anterior margin, the whole process directed dorsally and with a slender, acute process posterior to preceding directed dorsoposteriorly. Flagellum, right side, with three acute processes at base, the two anterior processes broad, curved, directed dorsoanteriorly, the posterior longer,

nearly straight, directed dorsally. Paramere narrow in ventral view; inner and outer ventral margins nearly subparallel; apical hook large, acute, directed mesad.

Discussion. *Cedusa pseudomaculata* Caldwell was described from the male holotype, female allotype, and two male and two female paratypes taken in Vergel (a coffee plantation), Chiapas, Mexico, and paratypes from Finca Aurora (a coffee plantation), Chiapas; 15 kilometers from Plancha Piedra, El Peten, Guatemala, near border of British Honduras; and Jesus Carranza, Veracruz, Mexico. No additional specimens have been seen.

The holotype is illustrated. It is in the United States National Museum Caldwell collection. This species appears similar to *Cedusa vanduzeei*, n. sp. on the basis of male genital features and to *Cedusa maculata* (Van Duzee) on color pattern. The shape of aedeagus, especially the shape of the long, horizontal process from the base of the flagellum that lies alongside and astride the shaft, distinguishes this species.

5. *Cedusa cyanea* Fennah

(Fig. 7)

Cedusa cyanea Fennah 1952:174.

Description. Length of male 4.0 mm. Vertex in dorsal view almost square; apical margin with carina moderately elevated, slightly depressed in middle; basal margin straight; disc depressed, basal corners depressed. Frons width at base less than width at apex; widest at distance two-thirds its length from vertex; lateral margins straight above and below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. Labium with apical segment longer than wide. General color light yellowish brown.

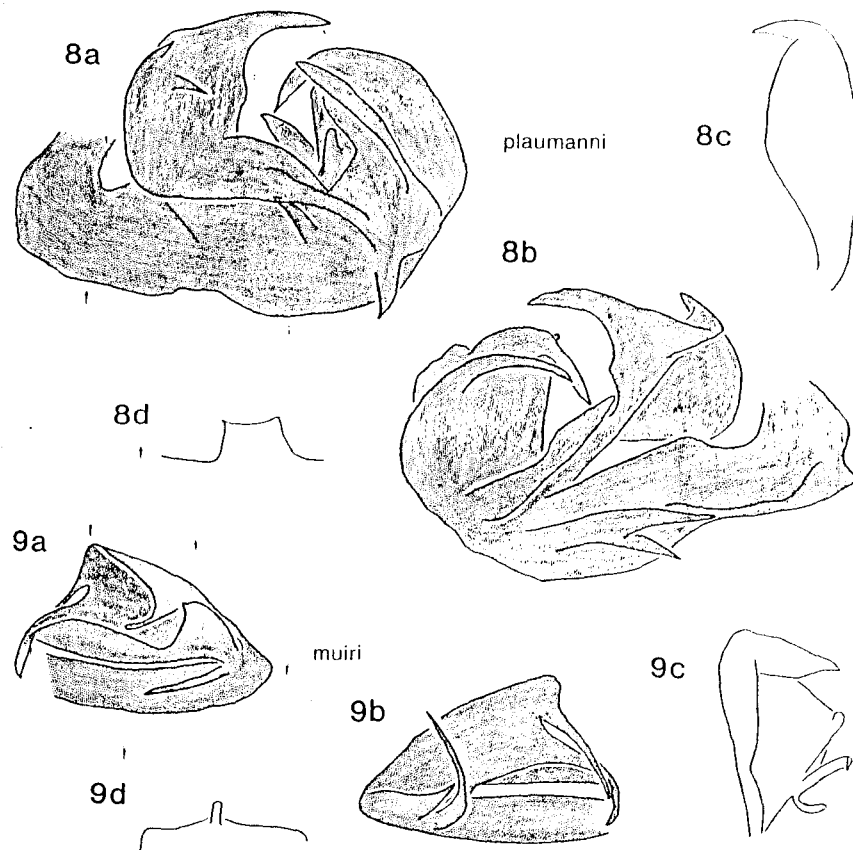
Male Genitalia. Shaft of aedeagus curved, thick. Flagellum, left side, with a forked process at base, the upper ramus broad, cultrate, the lower ramus broad at base, narrowed in apical half, longer, elbowed, its apical half vertical and curved anteriorly at tip, extending almost to apodeme. Flagellum, right side, with a thick, decurved crescentiform process from base and with a very short, small, acute process at its base. Paramere with inner and outer ventral margins subparallel; narrow in ventral view; apical hook small.

Discussion. *Cedusa cyanea* Fennah was described from a series of 15 males and 9 females taken from St. John's Valley, Trinidad, British West Indies. No additional specimens have been seen. The holotype, which is illustrated, is in the United States National Museum. No closely related species have been seen. This species may very easily be distinguished from all other species in the genus by the shape of the aedeagus.

6. *Cedusa plaumanni*, new species
(Fig. 8)

Description. Length of male 4.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin absent; basal margin slightly concave; disc slightly depressed. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex, sides concave above and straight, convergent below widest portion; disc depressed through entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes about equal to median length; disc with median carina absent, lateral carinae moderately elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median and lateral carinae slightly elevated. General color shiny blackish brown with margins, lower median area of frons, and margins of pronotum, except between lateral carinae, yellowish.

Male genitalia. Aedeagal shaft straight, apical two-thirds thicker, keeled. Shaft, left side, with a short, somewhat erect process at apical third, its apex hidden. Shaft, right side, with a horizontal, subapical, bifurcate process the upper ramus of which is longer and horizontal, the lower ramus more acute, directed anteroventrally. Flagellum, left side, with a large lobe at base the dorsal margin of which is produced into an acute, pendent process; with a long, acute process, somewhat constricted basally, at a forty-five degree angle to shaft, from the base of the lobe described above; with a short, acute process at the base of the large lobe, directed ventrally; with a large elbowed process from the anterior base of the large lobe the apex of the process produced and directed posteriorly and bearing two small acute, subapical processes, one erect and the other horizontal and directed posteriorly; with a small blunt process at anterior base of large lobe above origin of allowed structure mentioned above. Flagellum, right side, with a thin, curved, acute process from the posterior margin of the large lobe; with a long, broad process, somewhat constricted at midlength, arising from base of lobe. Paramere with inner ventral margin convex, widest at midlength; apical hook moderately long, curved mesally, acute. Pygofer produced, and its apex notched medially at posterior ventral margin.



Figs. 8-9. Male genitalia. 8, *C. plaumanni*, n. sp., holotype. 9, *C. muiri*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view; d, pygofer, posterior margin, 8, ventral, 9, dorsal view.

Discussion. *Cedusa plaumanni*, n. sp. is described from a specimen from Nova Teutonia, Santa Catarina, Brazil, September 11, 1944 (Fritz Plaumann), from the North Carolina State University collection. One additional specimen with the same date and locality (Remett, Plaumann) has the aedeagus missing, but the pygofer has the same shape and the coloration is the same. The holotype is illustrated, and it is on indefinite loan to the United States National Museum. This species can be distinguished from all other members of the genus by the shape of the aedeagus, paramere, and pygofer. It is named in honor of Mr. Fritz Plaumann, the collector.

7. *Cedusa muiri*, new species
(Fig. 9)

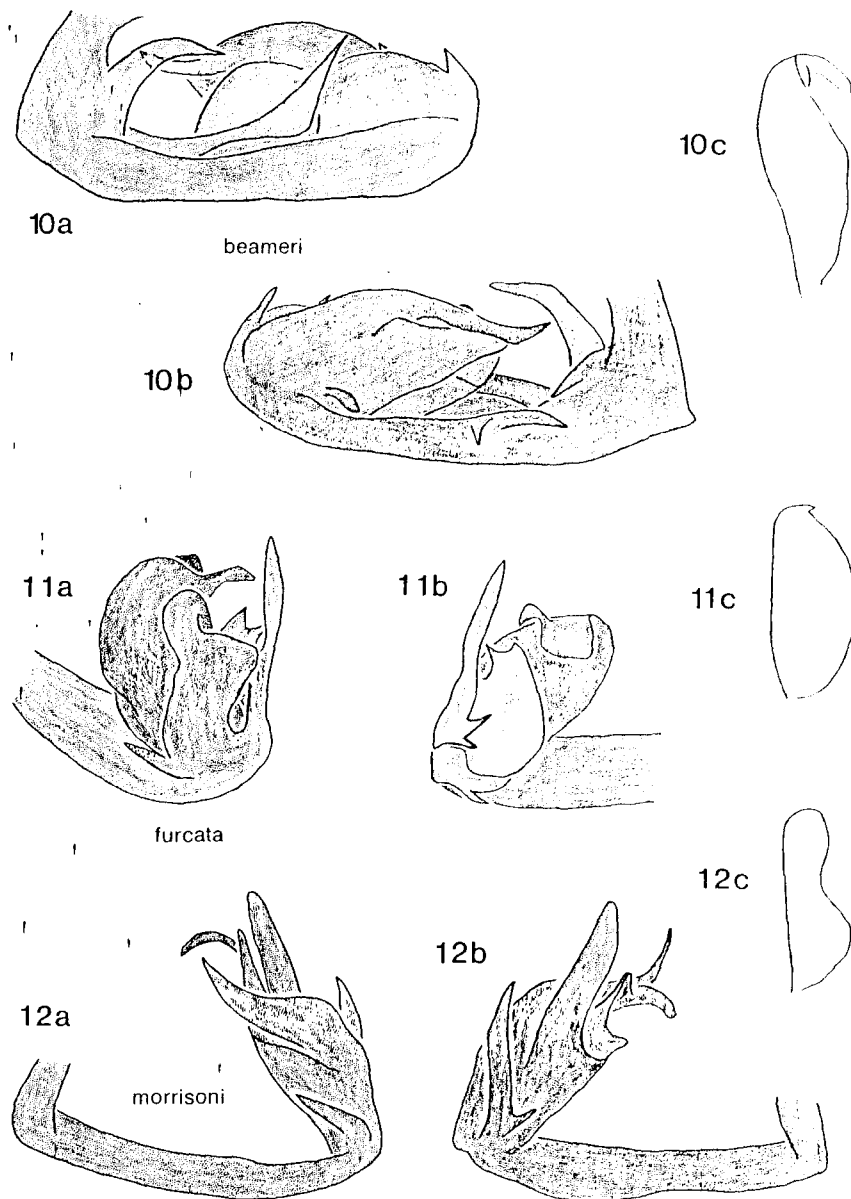
Description. Length of male 3.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly elevated, moderately convex; basal margin slightly concave; disc somewhat depressed. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; Anterior margin between eyes convex; length behind eyes equal to median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown, head and prothorax reddish brown, thorax and abdomen tinged with red.

Male genitalia. Aedeagus with shaft slightly curved. Shaft, left side, with a slender, acute subapical process directed basally. Shaft, right side, with a long, curved, semierect, subapical process and a short, broader, acute, triangular process at apex. Flagellum, semitubular, open at apex, with left dorsal margin produced into a triangular process, at base; bearing a very small projection subapically at anterior margin, produced at apex into a dependent projection; the left lateral margin produced at midlength into a short, curved, blunt process and the right anterior margin produced subapically into a long slender process, directed downward. Paramere in ventral view narrow, inner ventral margin slightly concave; apical hook large, long, acute. Pygofer with a small knob-like structure on inner ventral surface at posterior margin.

Discussion. *Cedusa muiri*, new species, is described from the male holotype from San Isidro del General, Costa Rica (D.L. Bequis?). The label is hard to read. The holotype from the collection of North Carolina State University is illustrated, and it is on indefinite loan to the United States National Museum. This species can be distinguished from all other species in the genus by the shape of the aedeagus and the pygofer. It does not appear to be closely related to any known species in the genus. It is named in honor of the Homopterist, F.A.G. Muir.

8. *Cedusa beameri*, new species
(Fig. 10)

Description. Length of male 4.5 mm. Vertex in dorsal view broadly markedly trapezoidal; apical margin with carina moderately elevated, straight, obsolete at sides, depressed in middle; basal margin straight. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median



Figs. 10-12. Male genitalia. 10, *C. beameri*, n. sp., holotype. 11, *C. furcata* Caldwell, holotype. 12, *C. morrisoni*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown.

Male genitalia. Aedeagal shaft gently curved. Shaft, left side, with a large, curved, acute process at junction of shaft and apodeme, directed dorsoposteriorly; with a long, horizontal process, elbowed at apical fourth, at base of shaft, directed posteriorly. Shaft, right side, with a bifurcate process arising at midlength from dorsum, the longer, stouter, horizontal, acute, anterior ramus directed anteriorly, the smaller, shorter, acute, posterior ramus directed ventrally. Flagellum, left side, consisting of two elongate, contiguous lobes, the sinistral rounded at apex, the dextral lobe with the anterior and dorsal margins produced into a curved, acute process; with a small, acute process between lobes at basal third. Flagellum, right side, with a blunt, sagittate, triangular process laterally from midlength of lobe directed anteriorly; with a short, blunt, digitate, club-shaped process at base of preceding. Paramere with an inner ventral margin subangularly convex; apical hook long, stout, curved, blunt, directed mesad and anteriorly.

Discussion. *Cedusa beameri*, n. sp. is described from the male holotype from Coconino County, Arizona, September 13, 1927 (R.H. Beamer), the female allotype and eight male paratypes, all topotypic and with the same date, four male paratypes from Grand Canyon, Arizona, August 14, 1927 (R.H. Beamer) (3), and (L.A. Anderson) (1); one male paratype from Grand Canyon, Arizona, August 3, 1933 (R.H. Beamer), all from the University of Kansas collection. The holotype is illustrated and in the University of Kansas collection.

No related species have been seen. *Cedusa beameri*, n. sp. may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The small dorsal process is not present in one paratype.

This species is named in honor of Dr. R.H. Beamer, taxonomist, and collector of this and several other species in this genus new to science.

9. *Cedusa furcata* Caldwell (Fig. 11)

Cedusa furcata Caldwell 1944b:450.

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly elevated, slightly convex; basal margin moderately concave; disc depressed, basal corners slightly depressed. Frons width at base slightly less than width at apex; widest at distance four-fifths its length from vertex, lateral margins concave above and straight, convergent below; widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute

angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina weak. General color dark yellowish brown.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with a large truncate lobe, bluntly produced at anterodorsal margin with a short acute process at base. Flagellum, right side, with a long, blade-like process at base with a bi- or trifurcate process at its base; with moderately large lobe mesad of preceding bearing two small angular projections on its dorsal margin; with a large lobe mesad of preceding with a narrower convex lobe produced laterally to the right at its anterodorsal margin and with a short, erect decurved process on dorsum and with a short, acute process at base directed dorsally. Paramere with inner ventral margin regularly convex; apical hook, small, acute directed mesad.

Discussion. *Cedusa furcata* Caldwell was described from the male holotype from Vergel (a coffee plantation), Chiapas, Mexico; three paratypes from Finca Aurora (a coffee plantation), Chiapas, Mexico; and a male paratype from La Forestal, Veracruz, Mexico. Additional specimens have been seen from Panama (6) in the United States National Museum collection from British Honduras (28), Guatemala (4), Mexico (1), all in the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum collection. The long process from the base of the flagellum on the right may vary from the illustration in having one or three teeth at the base and occasionally one from the ventral margin in basal third. The lobe at the apex of the main lobe of the flagellum on the right side may be large and directed anterolaterally with the process arising from it also longer, acute, and directed anterolaterally.

10. *Cedusa morrisoni*, new species (Fig. 12)

Description. Length of male 3.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; disc with median and lateral carinae absent. Labium, with apical segment longer than wide. General color dark yellowish brown, disc of frons and mesothorax with reddish tinge.

Male genitalia. Shaft of aedeagus slightly curved, relatively slender. Flagellum, left side with a long, acute, tapered process at midlength,

broadest in basal third, its dorsal margin shallowly concave, directed anterodorsally; with a short, stout, acute process at base directed anterodorsally. Flagellum, right side, with a large, moderately long, broad, blunt process at midlength directed dorsoanteriorly; main lobe with anterodorsal margin concave and with a small, blunt, medial process projecting above the rim and produced into a blunt, pendulant process on the left; with a bifid process at base with the upper ramus larger, broad, acute, directed dorsally, the lower ramus short, acute, directed anterodorsally. Paramere with inner ventral margin concave at midlength, broadest at basal third; apex rounded, apical hook absent.

Discussion. *Cedusa morrisoni*, n. sp. is described from the male holotype taken at Demerara River Bank, two miles from Georgetown, British Guiana, September 22, 1918, A603 (H. Morrison). The holotype is illustrated, and it is in the United States National Museum collection. No related species have been seen.

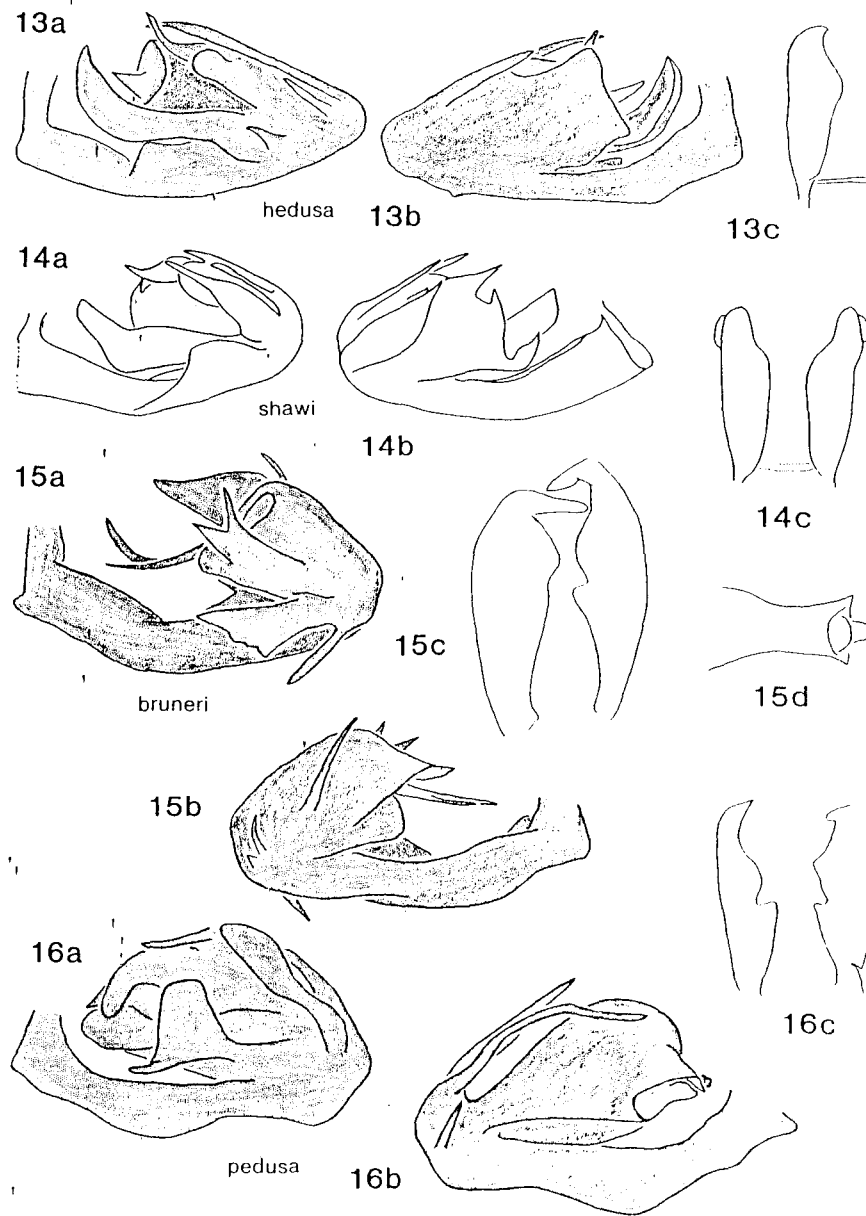
C. morrisoni, n. sp. is named in honor of the Homopterist and collector, Dr. Harold Morrison. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

11. *Cedusa hedusa* McAtee
(Fig. 13)

Cedusa hedusa McAtee 1924:184.

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina moderately elevated, straight, depressed in middle; basal margin slightly concave; disc depressed. Frons width at base less than width at apex; widest at distance five-sixths its length from vertex; lateral margins concave above and straight below widest portion; disc depressed in entire length, median carina feeble. Gena with genal ridge feeble, incomplete between fronto-genal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes greater than median length; disc with median and lateral carina feeble. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown, carinae, margins, and legs, lighter in color.

Male genitalia. Shaft of aedeagus thin, angled at basal fourth. Flagellum, left side consisting of a large elongate lobe (rectangular in outline in right view) the apex of which is produced laterally, its margin convex, and bearing on the resulting anterior surface a short, horizontal, acute process directed anteriorly; with a long, horizontal, scoop-like process arising at basal third, extending almost to apodeme; with a short, acute process arising just posterior to preceding; with a short, slender, acute process at base directed anterodorsally; with a very long, slender, acute process parallel to preceding, its tip slightly curved; dorsal margin with



Figs. 13-16. Male genitalia. 13, *C. hedusa* McAtee, holotype. 14, *C. shawi*, n. sp., holotype. 15, *C. bruneri*, n. sp., holotype. 16, *C. pedusa* McAtee, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, dorsal view.

a broad, moderately long process anterior to preceding, its apex rounded, knob-like; with a short, thin, curved, acute process from dorsum mesad of preceding directed dorsoventrally. Flagellum, right side, consisting of an elongate, truncate lobe; with a long, slender, acute process from dorsum at base, directed anterodorsally. Paramere with inner ventral margin convexly lobate at apical third; apical hook small.

Discussion. *Cedusa hedusa*, n. sp. McAtee was described from the male holotype from Beltsville, Maryland and several paratypes from Virginia. Additional specimens have been seen from Long Island, New York (1), Georgia (1), and locality unknown (2) from the North Carolina State University collection and Georgia (1), South Carolina (1) from the University of Kansas collection. The holotype is illustrated. It is in the United States National Museum.

Cedusa hedusa McAtee may be distinguished from all other species in the genus by the shape of the aedeagus, especially by the process on the left side of the apex of the main flagellar process and by the shape of the scoop-like process from the base on the left. Specimens may vary from the illustration in that the small process at the base of the scoop-like structure may be larger and its margin somewhat dentate. The apex of the large truncate lobe may be more anteriorly directed. The margin on the left side at midlength may be less convex or knob-like.

12. *Cedusa shawi*, new species
(Fig. 14)

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly concave, obsolete at sides; basal margin slightly concave. Frons width at base slightly greater than width at apex; widest at distance three-fourths its length from vertex; sides concave above and straight, converging below widest portion; disc depressed in entire length. Gena with genal ridge feeble between frontogenal carina and subantennal plate which is at a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated. General color yellowish brown.

Male genitalia. Aedeagal shaft somewhat curved. Shaft, left side, with or without a thin, curved, acute process from base directed posteriorly. Flagellum, left side, with three processes extending anterodorsally from base, the middle process shortest; and angled, blunt lobe mesad of above, the anterior margin of which is continuous with an elongate scoop-like process which is directed anteriorly above the shaft almost to the apodeme and incised at its apex to produce the effect of two rami. Flagellum, right side, with a curved, broad process arising at base, with

its apex narrowed and acute; with a scoop-like process which is bluntly incised subapically, its dorsal margin with a small acute projection just posterior to incision. Paramere with mesal margin convex in basal three-fourths, concave in apical fourth; apical hook small.

Discussion. *Cedusa shawi*, n. sp. is described from the male holotype and two paratypes taken from the type locality Glen Echo, Maryland, August 10, 1923 (J.R. Malloch). The holotype is illustrated, and it is in the United States National Museum collection. No closely related species have been seen. One paratype varied from the illustration in that the subapical process of the shaft on the left side is more angular at the junction of the anterior and dorsal margins and the ramus of the apex of the flagellum on the right side is shallowly, angularly notched.

This species is named in honor of Dr. Frank R. Shaw, entomologist, taxonomist, teacher, and friend.

13. *Cedusa bruneri*, new species
(Fig. 15)

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carinae feeble; basal margin moderately concave; disc slightly depressed, with two small pits. Frons width at base less than width at apex; widest at distance seven-eighths its length from vertex; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly rounded; length behind eyes much greater than median length; disc with median carina absent, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color piceous with legs brownish yellow.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large bifid process at base, the lower ramus slender, acute, directed ventroanteriorly, the upper ramus much broader, broadest at apex, roughly trapezoidal, the anterior margin sinuate, directed anteroventrally; main lobe subrectangular in outline with the dorsal and anterior margin produced into a long, thin, curved process bifurcate at apical third and extending almost to apodeme and with a shorter, broad process at midlength the apex of which is bifurcate with the upper ramus slender, acute, the lower ramus triangular. Flagellum, right side, with a large somewhat hood-like lobe with the apex somewhat produced, bearing a thin, tapered, slightly curved, acute process on dextral side, and two small processes at its base, the posterior process small, triangular, the anterior process longer, curved, acute, both directed dorsoposteriorly. Parameres with inner ventral margins concave at basal third, notched at midlength, the left weakly so, then convex more distally, the right paramere becoming concave in apical fifth; apical hooks large, blunt,

the left one at a right angle to the main axis of the paramere, the right one curved, directed somewhat anteriorly.

Discussion. *Cedusa bruneri* n. sp. is described from the male holotype from Jarahuca, Oriente Cuba, July 14-18, 1917 (S.C. Bruner); and from one male paratype from Palmira, Cuba, August 10, 1924 (C.H. Ballou), both from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

No species closely related to *C. bruneri*, n. sp. have been seen. This species may be distinguished from all other species by the shape of the aedeagus and paramere. The paratype varies from the illustration in that the shorter ramus on the left side is still shorter, and in that the dentate process at the base is not as broad. The process at the apex on the right side is more acute and curved, the very small process is absent and the other longer process is broader in basal third.

This species is named in honor of S.C. Bruner, the collector of this and numerous other species of Neotropical Auchenorrhyncha.

14. *Cedusa pedusa* McAtee
(Fig. 16)

Cedusa pedusa McAtee 1924:185.

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly elevated, straight; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed through entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes equal to median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown with carinae, margins, venter, legs, lighter in color.

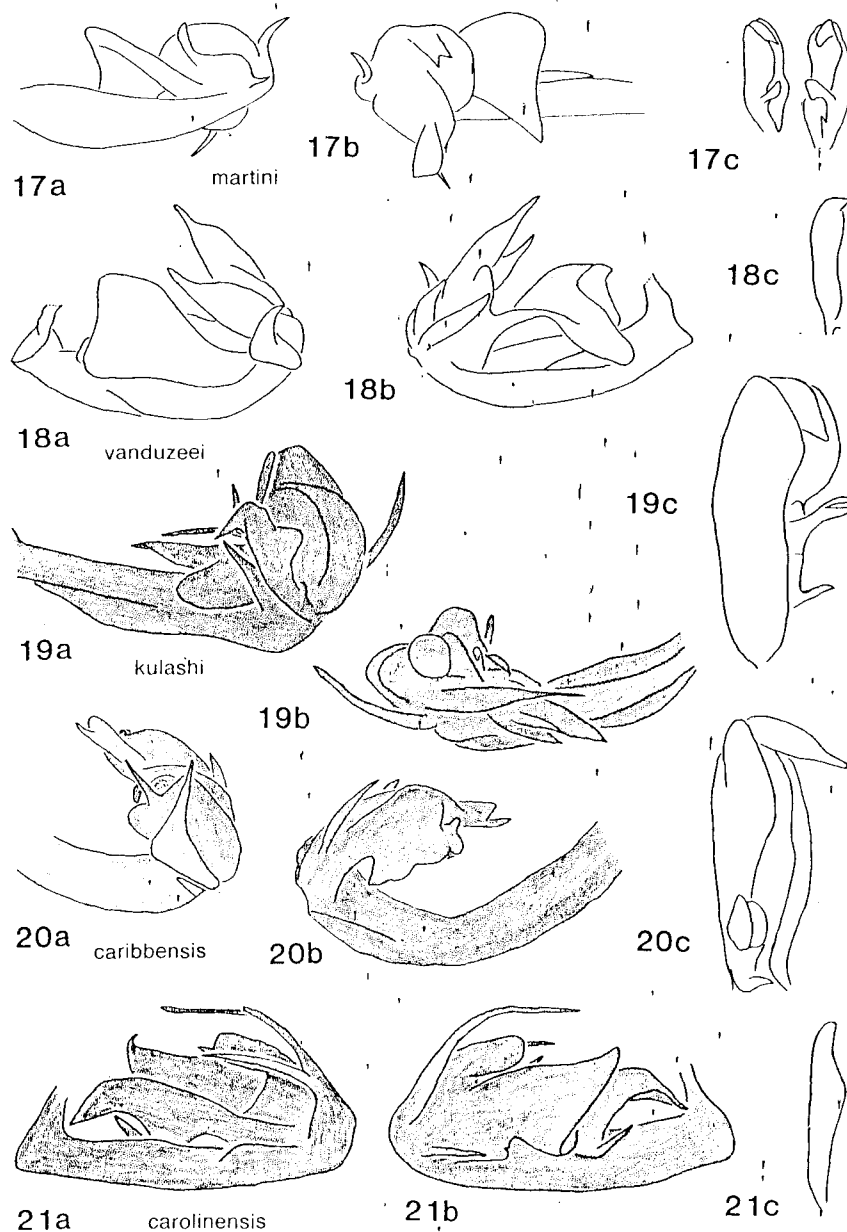
Male genitalia. Aedeagal shaft curved. Flagellum, left side, with a biundulate, flattened, paddle-like process at base; mesad of this a long, thin, irregularly curved process directed anteriorly; a cap-like, horizontal process from lateroventral portion cephalad of the two processes above; with a blunt decurved process from main lobe of flagellum visible just before the process above. Flagellum, right side, with main lobe bulbous, with a short acute process overhanging oval ventral opening at apex, with an erect, acute, tapered process at base. Parameres, asymmetrical, but similar, mesal margins of both angular at apex of basal third, the left one convex above, the right angularly produced above; apical hooks small, the left one acute, the right one blunt.

Discussion. *Cedusa pedusa* McAtee was described from the male holotype from Mexico and from paratypes, same data and from La Ceiba, Honduras. Additional specimens have been dissected from Panama (2) in the United States National Museum collection and Honduras (3), British Honduras (1), Guatemala (2), and Costa Rica (4) in the North Carolina State University collection. The holotype is illustrated, and it is in the United States National Museum collection. This species is closely related to *Cedusa irengana* Fennah, but may be distinguished from it and all other species in the genus by the shape of the aedeagus and paramere and especially by the presence of the cap-like process from the base on the left side. Some species vary from the illustration in that the crown of the cap-like structure may be higher or the visor a little longer. One specimen from Lancetilla, near Tela, Honduras has the apex of the large broad process from the base on the left more acute and broader preapically, almost triangular in dorsal view. The long process from base on the right may be more nearly horizontal.

15. *Cedusa martini*, new species
(Fig. 17)

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin moderately elevated, convex; basal margin slightly concave; disc slightly depressed. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex, lateral margins concave above and straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color very dark yellowish brown with carinae margins somewhat lighter.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, consisting of a spherical lobe at base with a short, slender, curved, acute process at posterior margin directed dorsoposteriorly and a somewhat T-shaped process at about midlength, the anterior part of the crossbar short, acute, curved, directed dorsally, the posterior part of the crossbar very short, curved, acute, directed posteriorly, the crossbar with the dorsal margin convex; with the left side of the anterior lobe triangular in outline. Flagellum, right side, anterior lobe triangular in outline with base (dorsal margin) convex, directed ventrally; the posterior lobe with a broad flat process at dorsum with its apex angularly concave, directed ventroanteriorly; with a somewhat elongate bulbous lobe at basal half directed ventrally with a smaller truncate process at its apex and with a



Figs. 17-21. Male genitalia. 17, *C. martini*, n. sp., holotype. 18, *C. vanduzeei*, n. sp., holotype. 19, *C. kulashi*, n. sp., holotype. 20, *C. caribbensis* Caldwell, holotype. 21, *C. carolinensis*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, 17, 20 dorsal, 18, 19, 21 ventral.

short acute process from its latero-apical margin. Paramere with inner ventral margin shallowly concave at midlength; apical hook stout, acute, directed mesoanteriorly.

Discussion. *Cedusa martini* n. sp. is described from the male holotype and two male paratypes taken at Hidalgo, kilometer 248, Mexico, September 22, 1945, from the United States National Museum, Caldwell collection. The holotype is illustrated.

No related species have been seen. *C. martini*, n. sp. may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. In one paratype the very slender process from the apex of the large basal lobe on the right side is longer and curved.

This species is named in honor of the late Canadian taxonomist, Dr. John C. Martin.

16. *Cedusa vanduzeei*, new species (Fig. 18)

Description. Length of male 4.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina feeble, straight, obsolete at sides, depressed in middle; basal margin slightly concave; disc slightly depressed. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown, head somewhat lighter in color.

Male genitalia. Aedeagus shaft curved. Flagellum, left side, consisting of a large long, horizontal process from base, lying alongside and on the shaft, extending almost to apodeme, the apex truncate, the basal fourth narrowed, stem-like; with three large processes from base dorsal to preceding, the sinistral process shortest, curved, acute, somewhat coiled on itself, directed dorsoposteriorly, the middle process broad in basal two-thirds, narrowed from dorsal margin, acute, the dextral process longest, narrowed abruptly at apical third, tapered to a somewhat blunt apex. Flagellum, right side, with anterior and ventral margins of large lobe discussed above produced into a large blunt process, directed ventroanteriorly; with a broad, knife-like process at base directed antero-dorsally; with a blunt lobe at midlength of right margin of long process mesad and dorsal to preceding. Paramere with inner ventral margin shallowly concave at midlength; apical hook triangular, moderately long, directed mesoposteriorly.

Discussion. *Cedusa vanduzeei*, n. sp. is described from the male holotype from Big Bend, Texas, June 24, 1947 (R.H. Beamer), in the University of Kansas collection. The holotype is illustrated.

C. vanduzeei is closely related to *Cedusa maculata* (Van Duzee) and *Cedusa pseudomaculata* Caldwell. It can be distinguished from them from all other species in the genus by the shape of the aedeagus, especially the long, horizontal process from the base of the flagellum lying alongside and astride the shaft.

This species is named in honor of E.P. Van Duzee, the describer of several other species in the genus.

17. *Cedusa kulashi*, new species
(Fig. 19)

Description. Length of male 5.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin moderately elevated; basal margin slightly concave; disc slightly depressed. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex, lateral margins concave above and straight and convergent below widest portion; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes rounded; length behind eyes slightly greater than median length; disc with median and lateral carinae absent. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal carinae absent. General color dark yellowish brown with carinae and margins, lighter in color.

Male genitalia. Shaft of aedeagus straight, keeled. Flagellum, left side, with a large bulbous lobe, its anterior margin bearing a thin, blunt process directed dorsally; with a long twisted process arising from posteriorly basal lobe at midlength and directed anterodorsally, acute apically; with slender acute process arising beneath the preceding directed anterodorsally; with a broad, flat, bluntly rounded lobe arising mesad of two preceding processes, directed anteroventrally. Flagellum, right side, with a long, thin, curved acute process at base directed posterodorsally; with long, very acute, horizontal process from base, directed basally, the apical half tapered; with a small, crook-like process on lateroanterior surface of large lobe dorsal of preceding; with two processes arising from the anterior basal portion of the main lobe, the posterior process short, acute, the anterior process, acute, with the ventral surface concave, both directed ventrodorsally. Paramere with inner ventral margin concave; apical hook large, acute, directed mesally and anteriorly.

Discussion. *Cedusa kulashi*, n. sp. is described from the male holotype taken at Hidalgo, Kilometer 248, Mexico, and one male paratype, same data from the United States National Museum Caldwell collection. The

holotype is illustrated and is in the United States National Museum collection.

No species closely related to *C. kulashi*, n. sp. have been seen. The two known specimens are similar. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

This species is named in honor of the late Dr. Walter M. Kulash, entomologist, teacher, and friend.

18. *Cedusa caribbensis* Caldwell
(Fig. 20)

Cedusa caribbensis Caldwell in Caldwell and Martorell 1950:205.

Description. Length of male 5.0 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina greatly elevated; basal margin slightly concave; not meeting lateral margins; disc depressed. Frons width at base less than width at apex; frons with sides parallel for three-fourths its length from vertex, then convex ampullar; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly rounded; length behind eyes greater than median length; disc with median carina absent, lateral carinae feeble. Labium with apical segment longer than wide, widest at apex. Mesonotum with longitudinal carina moderately elevated. General color dark yellowish brown, with margin of frons, vertex, and pronotum brownish yellow, legs and labium yellow, subantennal plate almost white apically.

Male genitalia. Shaft of aedeagus curved. Shaft, left side, with a short, acute, horizontal process at apex directed anteriorly; with an angular process at apex, dorsal to preceding, the anterior and ventral margins of which are at almost a right angle, the posterodorsal margin concave, the apex directed dorsally. Flagellum, left side, with a subrectangular, horizontal lobe at base the anterior margin of which is produced at midlength into a needle-like process; the main lobe of the flagellum, mesad of preceding, with several folds, a small, blunt, pendulant process at midlength of the left ventral margin and a moderately long, acutely tipped process from the sinistral side becoming abruptly narrowed antepically. Flagellum, right side, stalked at base, ventral margin scalloped to anterior margin which bears a small blunt process, and with a slender, acute, slightly curved process, distad and basad of the main lobe directed dorsoanteriorly. Paramere with inner ventral margin convex; apical hook large, long, narrowed antepically, acute, directed mesad and very slightly basad.

Discussion. *Cedusa caribbensis* Caldwell was described from the male holotype from Jayuya-Ponce Road, Alto de la Bandera at La Carmelita, kilometer 6, 2000 feet, Puerto Rico, and paratypes from Carite Insular Forest, Puerto Rico, at high altitudes, El Yunque Mountains, Puerto Rico, over 2,500 feet and from Mayaguez, Puerto Rico. This species has been taken from *Inga vera* Willd., *Inga laurina* Willd., and *Pennisetum purpureum* K. Schum. and Thonn. "yerba elefante" (Martorell in Caldwell and Martorell 1951:205). No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum Caldwell collection. No closely related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus, paramere, and anal tube.

19. *Cedusa carolinensis*, new species
(Fig. 21)

Description. Length of male 3.5 mm. Vertex in dorsal view broadly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin slightly concave; basal corners depressed. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes slightly convex; length behind eyes greater than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. General color light yellowish brown.

Male genitalia. Shaft straight. Flagellum, left side, with a long, thin, curved bifurcate process arising from base, directed dorsoanteriorly, bifurcate at midlength with left ramus very short, right ramus long, slender, acute; with a slender, acute, moderately long, horizontal process arising from base directed anteriorly; with a moderately long, broad, right angled process from base, base broad, narrowed and angled to midlength, apex produced into a short, acute process; with a long, horizontal bifid process from base, extending to apodeme with the upper ramus broad, acute, apex directed ventroanteriorly, the lower ramus shorter, slender, acute, elbowed, directed dorsoanteriorly. Flagellum, right side, an elongate lobe with dorsal margin sinuate, dorsal and anterior margins produced to a short somewhat coiled process, the ventral notched at midlength; with a short, slender, tapered, acute, horizontal process from base directed anteriorly. Paramere in ventral view narrow; inner ventral margin concave basad and distad of a convexity at apical third; apex rounded, apical hook absent.

Discussion. *Cedusa carolinensis*, n. sp. is described from the male holotype taken at Wilmington (probably North Carolina), July 30, ? from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum. No closely related species have been seen.

20. *Cedusa digitata* Caldwell
(Fig. 22)

Cedusa digitata Caldwell 1944b:451.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated; basal margin slightly concave; disc depressed; basal corners depressed. Frons width at base equal to width at apex; widest at distance four-fifths its length from vertex; sides slightly concave above, rectilinear and slightly convergent below widest portion; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes slightly convex; length behind eyes equal to median length; disc with median and lateral carinae absent. Labium with apical segment as long as wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carina feeble. General color very dark yellowish brown, almost black.

Male genitalia. Shaft of aedeagus curved. Shaft, left side, with a bifurcate process basad of apodeme, the upper ramus curved (tip appearing broken in holotype), lower ramus straight, acute; with a process arising from right side curved under shaft at apodeme then directed posteriorly; a moderately long, curved process at midlength, origin concealed by shaft. Flagellum, right side, with a long, broad process at base extending anteriorly to apodeme and bearing an acutely tipped process at midlength; remainder of flagellum a large, swollen lobe lying mesad of above. Parameres each with dorsal margin bearing a long digitate process, directed posteriorly, the process on the left paramere longer; apical hook short, acute.

Discussion. *Cedusa digitata* Caldwell was described from the male holotype and two paratypes taken at Payo Obispo (also known as Ciudad Chetumal), Quintana Roo, Mexico. One additional specimen from British Honduras in the North Carolina State University collection has been dissected. This species is closely related to *Cedusa panamensis*, new species, and it can readily be distinguished from them and all other species in the genus by the shape of the aedeagus, the apex of anal tube, and the paramere. The specimen from British Honduras with the digitate process on the left paramere long, slender, sinuate, and acute, on

the right paramere short, stout, and straight, its apex acute directed ventrad at a right angle to the main axis of the paramerè. The holotype is illustrated and in the United States National Museum.

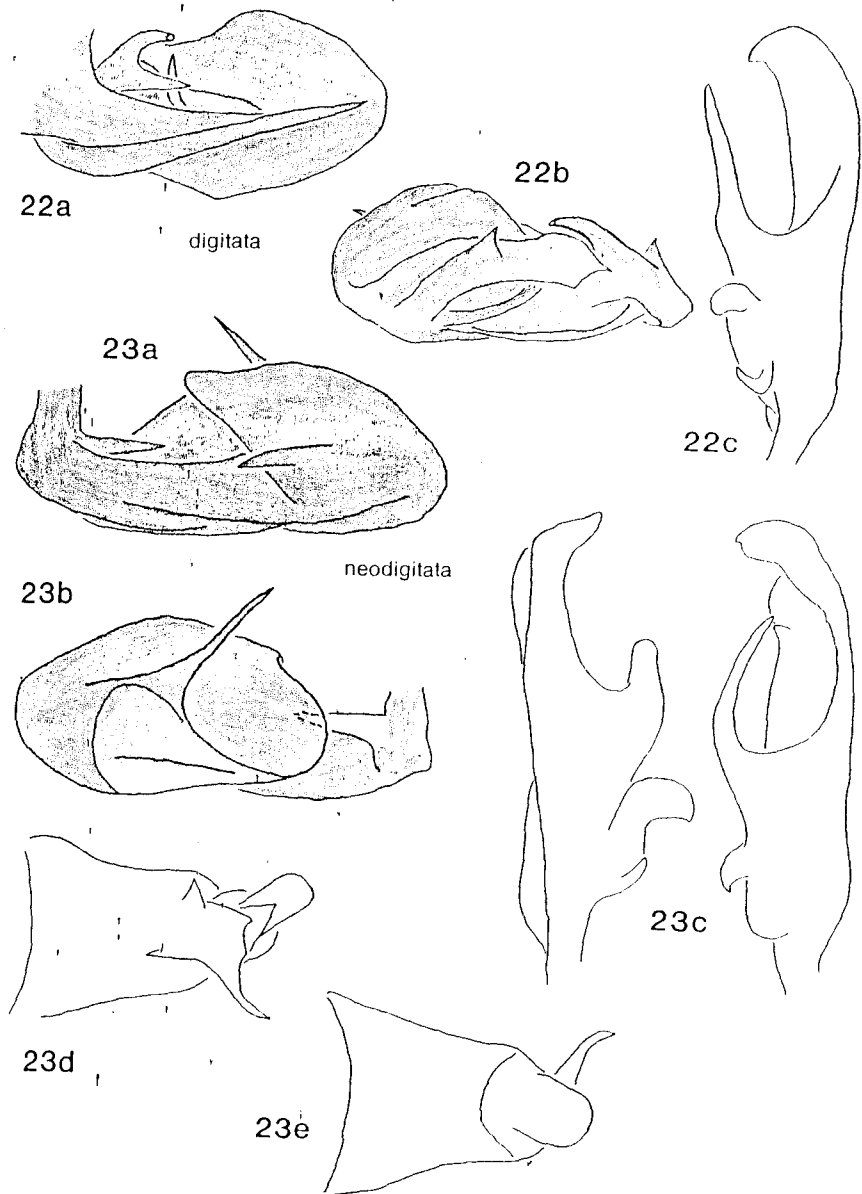
21. *Cedusa neodigitata* Caldwell
(Fig. 23)

Cedusa neodigitata Caldwell 1944a:105.

Description. Length of male 3.8 mm. Vertex in dorsal view narrowly trapezoidal; apical margin moderately elevated, obsolete at sides; basal margin slightly elevated, slightly concave. Frons width at base slightly less than width at apex; widest at distance one-sixth to one-half its length from vertex, lateral margins concave above and rectilinear, converging below widest portion; disc depressed in entire length. Gena with genal ridge absent between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length about equal to that of vertex; anterior margin between eyes slightly convex; length behind eyes slightly greater than median length; disc with median and lateral carinae absent. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown with some carinae, margins, and subantennal plate lighter in color.

Male genitalia. Shaft of aedeagus slightly curved. Shaft, left side, with a stout, acute, horizontal process arising at apodeme. Shaft, right side, without processes. Flagellum, left side, with a large lobe the dorsal margin of which is curved, the anteroventral margin oblique, the apex blunt; with a short, slender, acute, lateral, horizontal process. Flagellum, right side, with a long narrow process arising above a central membranous area. Anal tube with a complex process ventrally at apex. Parameres each with a thumb-like process on dorsal margin in addition to processes normally present on all parameres, the process on the left one moderately long, slender and acute, on the right, short, stout and blunt.

Discussion. *Cedusa neodigitata* Caldwell was described from the male holotype taken at Reventazon, Costa Rica. The holotype, which is illustrated, is in the Ohio State University Osborn collection. No additional specimens have been seen. *Cedusa neodigitata* Caldwell is closely related to *Cedusa digitata* Caldwell, from which it may be distinguished by the shape of the aedeagus, and less closely related to *Cedusa panamensis*, n. sp. from which it may be distinguished by the shape of the aedeagus. The shape of the apex of the anal tube, the digitate processes on the parameres and the shape of the aedeagus will distinguish *Cedusa neodigitata* from all other species in the genus.



Figs. 22-23. Male genitalia. 22, *C. digitata* Caldwell, holotype. 23, *C. neodigitata* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, lateral view; d, anal tube, lateral view; e, same, dorsal view.

22. *Cedusa medusa* McAtee
(Fig. 24)

Cedusa medusa McAtee 1924:184.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical carina straight, moderately elevated, obsolete at sides, basal margin moderately concave; disc with a bar-shaped depression. Frons width at base about equal to width at apex; widest at distance two-thirds its length from vertex; lateral margins concave above and convex below widest portion; disc depressed in entire length. Gena with genal ridge feeble, incomplete between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina moderately elevated, lateral carinae feeble. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina slightly elevated. General color piceous with carinae, margins, subantennal plate, legs, and subapical segments of labium light yellowish brown; abdomen with reddish tinge.

Male genitalia. Shaft of aedeagus straight, stout. Shaft, left side, with a broad, flat, triangular, subapical process, the ventral margin dentate; directed anteroventrally. Shaft, right side, with a short, acute process at midlength, directed anterodorsally. Shaft, dorsum at base, with a biramous omega-like structure directed posteriorly, the dextral ramus slightly curved and tapered, the sinistral ramus broader, elbowed subapically. Flagellum, left side, with a long process arising from dorsum at base, broad at base, constricted at basal third, apical third tapering. Flagellum, right side, an elongate, triangular, hood-like lobe with a short, acute process at midlength on ventral margin; with a long process arising from beneath the main lobe extending almost to apodeme; with a very long, acute process at base reaching almost to apodeme, apical half very slender. Parameres, markedly asymmetrical, the left with inner ventral margin concave behind and convex before, a notch at midlength, the right angularly lobed at midlength and concave behind and before; apical hooks large, curved, acute.

Discussion. *Cedusa medusa* McAtee was described from the male holotype and paratypes from La Ceiba, Honduras and from Tegucigalpa, Honduras and San Rafael, Veracruz, Mexico. Caldwell (1944b:453) lists one specimen from Tamazunchale, San Luis Potosi, Mexico. Additional specimens have been seen from Rio Temas, British Honduras from the North Carolina State University collection. No related species have been seen. In one specimen, the rami of the omegaform structure are curved mesally so that they almost touch each other. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The holotype is illustrated and is in the United States National Museum.

23. *Cedusa olseni*, new species
(Fig. 25)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight; basal margin sinuate. Frons width at base less than width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes greater than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment missing on holotype. General color dark yellowish brown with head, margins, carinae, legs, and venter lighter in color and abdomen tinged with red.

Male genitalia. Aedeagal shaft thicker from base, to midlength, tapering toward apex. Shaft, left side, with an erect, acute, curved process arising subdorsally at midlength directed somewhat anteriorly. Shaft, right side, with a large, lateral, horizontal, bifid process arising at basal fourth of shaft, the upper ramus acute, the lower ramus, larger, curved, directed ventroposteriorly. Flagellum, left side, consisting of an elongate lobe greatly produced forward over shaft; with a long, acute process at posterior margin at base directed dorsoanteriorly. Paramere with ventral surface widest between basal one-fourth and apical fourth; inner ventral margin slightly concave; apical hook small.

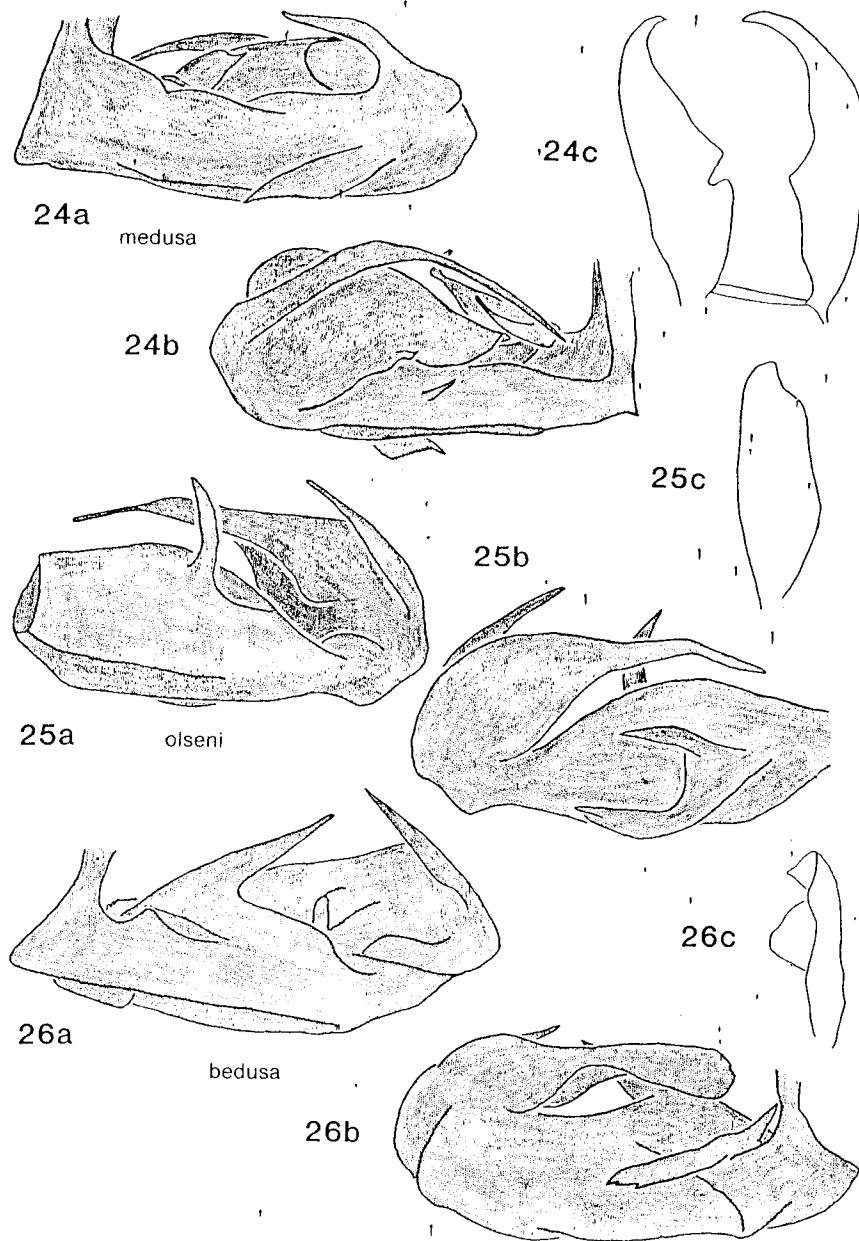
Discussion. *Cedusa olseni*, n. sp. is described from the male holotype from Bayshore, Long Island, New York, July 4-7, 1912 (Chris E. Olsen), in the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum. *Cedusa olseni* appears to be closely related to *Cedusa bedusa* McAtee, *Cedusa metcalfi*, n. sp. and *Cedusa woodsholensis* n. sp. It can easily be distinguished from them and from all other species in the genus by the shape of the aedeagus, especially by the shape of the bifid process at the basal half of the shaft on the right side.

C. olseni is named in honor of Chris E. Olsen, the collector of this and one other new species in the genus.

24. *Cedusa bedusa* McAtee
(Fig. 26)

Cedusa bedusa McAtee 1924:182.

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin moderately concave; disc depressed; basal corners depressed. Frons width at base slightly greater than width at



Figs. 24-26. Male genitalia. 24, *C. medusa* McAtee, holotype. 25, *C. olseni*, n. sp., holotype. 26, *C. bedusa* McAtee, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view.

apex; widest at distance three-fourths its length from vertex; lateral margins straight above, rectilinear, convergent below widest portion; disc depressed in entire length. Gena with genal ridge incomplete between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes slightly convex; length behind eyes slightly greater than median length; disc with median and lateral carinae absent. Labium with apical segment longer than wide, narrower than antepical segment, dark. Mesonotum with longitudinal carinae moderately elevated, longitudinal carinae absent. General color dark yellowish brown with carinae light brownish yellow.

Male genitalia. Aedeagal shaft very thick. Shaft, left side, with long, tapered, acute process arising near apodeme, broad at base, directed dorsoposteriorly. Shaft, right side, with a stalked process at base next to apodeme with an anterior short, acute ramus directed laterally to the left and anterodorsally, and a longer, stout ramus directed laterally and posteroventrally, jagged at apex. Flagellum, left side, with a moderately long, narrow process at posterior margin, constricted at base, directed anterodorsally; with a small cowl-like process at midlength directed anteroventrally. Flagellum, right side, with an elongate, horizontal, spatulate process from base at dorsum, directed anteriorly, constricted at midlength, with apex dentate. Paramere with inner ventral margin concave at midlength; apical hook triangular, from outer dorsal margin, directed mesad.

Discussion. *Cedusa bedusa* McAtee was described from the male holotype from Glencarlyn to mouth of Four-Mile Run, Virginia. Additional specimens have been dissected from North Carolina (1) in the North Carolina State University collection; Arkansas (1) in the Illinois Natural History Survey collection; California (1), locality unknown (1) in the University of Kansas collection; Florida (1) in the Florida Division of Plant Industry collection; and Louisiana (1) and Mississippi (1). The holotype is illustrated and in the United States National Museum collection. This species is related to *Cedusa metcalfi*, n. sp., *Cedusa woodsholensis*, n. sp., and *Cedusa olseni*, n. sp. It may be distinguished from the preceding and all other species in the genus by the shape of the aedeagus and paramere.

All of the seven additional specimens dissected vary from the holotype in that the short acute process at the base of the shaft on the left side is not present. The process at the base of the shaft on the left side varies in that it may be slender and acute to curved or decurved with some difference in the dentation and one specimen from Highlands Hammock State Park, Florida, has a truncate process from the lateroposterior surface near the base, the apex of which is weakly trifurcate. The lobe at midlength on the right side of the spatulate process may be more triangular than in the type. The process at the base of the shaft on the right side directed dorsoposteriorly may be more slender and the process at

the base of the flagellum from the dorsum may be broad, flat with the margins shallowly dentate or narrowed in apical half with margins entire and in one specimen the tip was upturned.

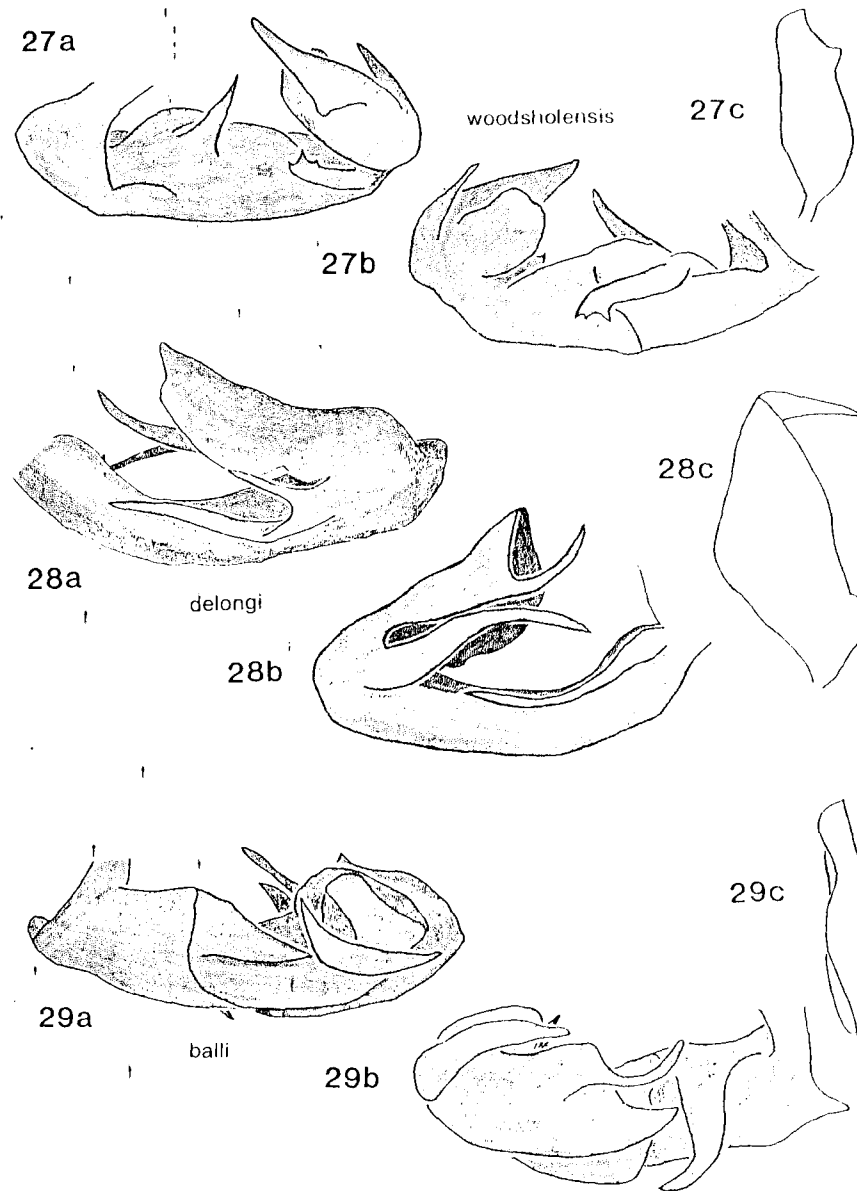
25. *Cedusa woodsholensis*, new species
(Fig. 27)

Description. Length of male (estimated) 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, straight, obsolete at sides; basal margin moderately concave; disc with Y-shaped depression; basal corners markedly depressed. Frons width at base less than width at apex; widest about three-fourths its length from vertex; disc depressed throughout length, slightly raised laterally at midlength, median carina feeble. Gena with genal ridge absent between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than median length of vertex; anterior margin between eyes broadly convex; length behind eyes greater than median length; disc with lateral carinae feeble. Mesonotum with longitudinal median carina greatly elevated, longitudinal lateral carinae represented by roughened areas. Color in general dark yellowish brown with the carinae of frons and clypeus, legs, thoracic pleura, antennae and subantennal plate yellowish brown.

Male genitalia. Aedeagal shaft thick, slightly curved. Shaft, left side, with an acute process at midlength directed dorsally and slightly posteriorly. Shaft, right side, with a broad, almost horizontal arm-like process arising near apodeme and with three small projections at apex. Flagellum, left side, with a long, triangular process to the left of a large bulbous lobe; a shorter, broad, slightly curved process with three little apical projections at base of large lobe and apex of shaft. Flagellum, right side, with the elongate, bulbous lobe bearing an acute process at posterior margin. Paramere with inner ventral margin angulate at apical third; apical hook small.

Discussion. *Cedusa woodsholensis*, n. sp., is described from the male holotype taken at Woods Hole, Massachusetts, July 15 - August 6, 1917 (Chris E. Olsen), and a male paratype from Southern Pines, North Carolina, June 1, 1909 (Z.P. Metcalf), both from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

Cedusa woodsholensis appears to be related to *Cedusa bedusa* McAtee, *Cedusa metcalfi*, n. sp., and *Cedusa olseni*, n. sp. It may be distinguished from all other species in the genus by the shape of the aedeagus, especially by the process at the base of the shaft on the right side, and by the paramere. The paratype is without the process at the base of the shaft on the right, and the process at the base of the flagellum on the left appears to have the apex broken off.



Figs. 27-29. Male genitalia. 27, *C. woodsholensis*, n. sp., holotype. 28, *C. delongi* Caldwell, holotype. 29, *C. balli*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

26. *Cedusa delongi* Caldwell
(Fig. 28)

Cedusa delongi Caldwell 1944b:449.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, straight; basal margin very slightly concave; disc depressed. Frons width at base very slightly less than width at apex, widest at apex; disc depressed through entire length, median carina feeble, incomplete. Gena with genal ridge slightly elevated between frontogenal carinae and subantennal plate which is at a right angle to gena. Pronotum with median length equal to that of vertex; anterior margin between eyes slightly convex; length behind eyes greater than median length; disc with median carina feeble. Labium with apical segment as long as wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown with carinae and margins light yellowish brown.

Male genitalia. Aedeagal shaft curved. Shaft, right side, with a long process arising at apodeme, directed posteriorly. Flagellum, left side, with a bifurcate process at base, the shorter ramus acute, dorsal to the longer knife-like ramus; hood of flagellum, slightly curved, subrectangular in outline. Flagellum, right side, with the ventral and anterior margins of the hood-like process produced into a curved, acute process; a long, decurved process at base. Paramere with outer ventral margin subangular; with inner ventral margin almost straight, with a small lobe at base; broadest at midlength; apical hook long, narrow, acute, directed mesad and slightly posteriorly.

Discussion. *Cedusa delongi* Caldwell was described from specimens from Mexico, Panama, and Guatemala. The type locality is Buena Vista, Guerrero, Mexico. Additional specimens have been dissected from Panama (5) in the United States National Museum collection and British Honduras (12), Guatemala (1), Mexico (1), and from an unknown locality (1) in the North Carolina State University collection. The holotype is illustrated and in the Caldwell collection of the United States National Museum. The aedeagi of *Cedusa delongi* Caldwell and *Cedusa obscura* (Ball) appear to be almost mirror images of each other. All of the above twenty specimens are similar to the illustration. This species may be distinguished from all other species in the genus by the shape of the aedeagus.

27. *Cedusa balli*, new species
(Fig. 29)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated; basal margin slightly concave. Frons width at base less than width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire

length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; disc with median carina feeble. Labium with apical segment as long as wide, dark. General color dark yellowish brown, head and prothorax yellowish brown, carinae and margins light yellowish brown.

Male genitalia. Basal half of aedeagal shaft thickest. Shaft, right side, with a long, stout, acute process arising at dorsal margin next to apodeme, the apical third curved, directed ventroposteriorly; with a triangular lobe at apical half. Shaft, left side, somewhat twisted apically with an apical process which is crescentiform at its apex, the crescent oriented parallel to the shaft. Flagellum, right side, with a broad curved, blunt process at base near dorsum; with a large, cleaver-like process at base bearing dorsally at midlength a longer process, broader at its base, with its apical half slender, curved, and blunt, both lying alongside the shaft and directed anteriorly. Paramere in ventral view narrow with the inner ventral margin weakly lobed at apical three-fifths; apical hook small.

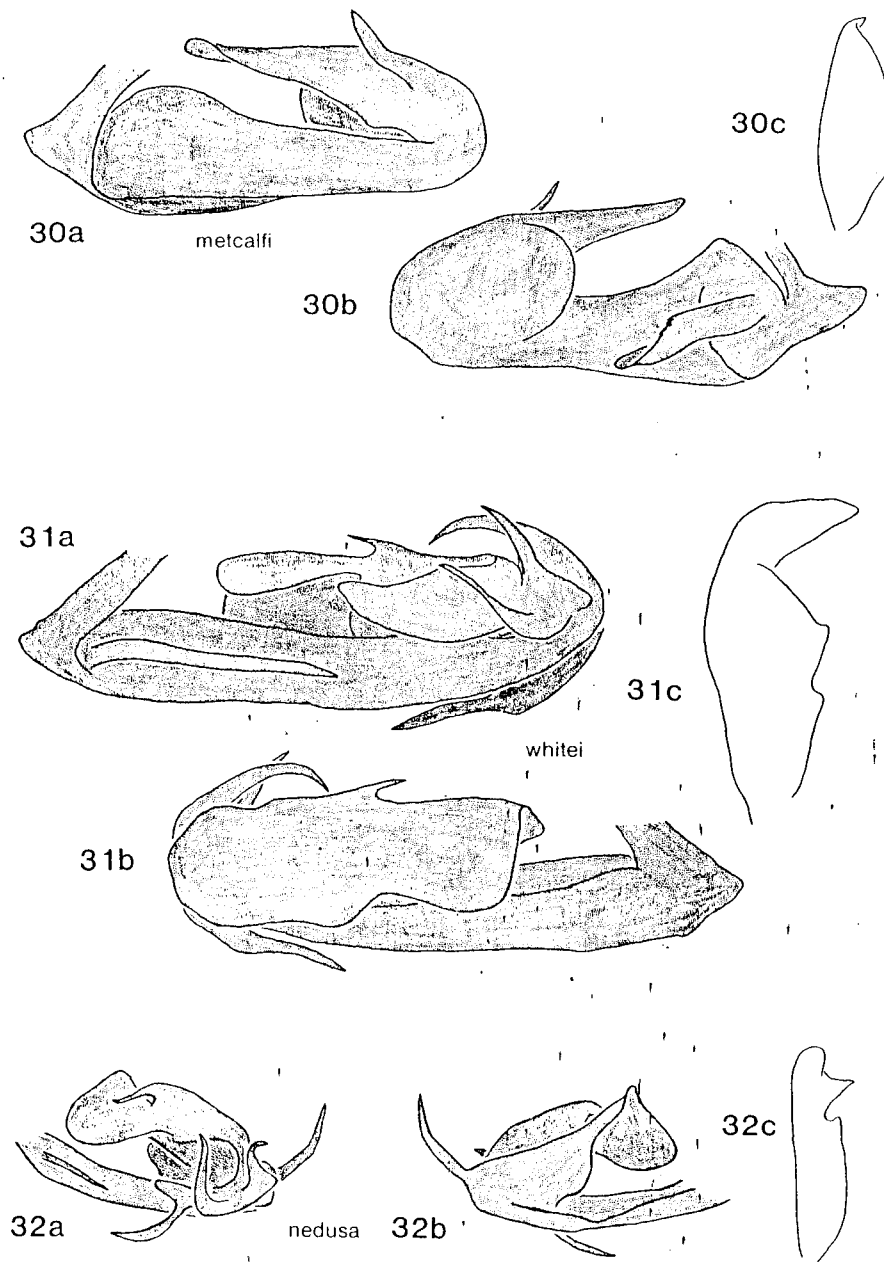
Discussion. *Cedusa balli*, n. sp., is described from the male holotype from Caddo County, Louisiana, August 19, 1928 (L.B. Beamer), from the University of Kansas collection. The holotype is illustrated and is in the University of Kansas collection. No closely related species have been seen.

Cedusa balli, n. sp., can be distinguished from all other species in the genus by the shape of the aedeagus, especially by the crescent-like process at base on the left and the stout curved process from the base of the shaft on the right.

C. balli is named in honor of E.D. Ball, the collector and describer of several species in the genus.

28. *Cedusa metcalfi*, new species
(Fig. 30)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge absent between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment as long as wide, dark. General color dark yellowish brown with carinae of head and pronotum, margins of pronotum, legs and ventral portion of the thorax light brownish yellow.



Figs. 30-32. Male genitalia. 30, *C. metcalfi*, n. sp., holotype. 31, *C. whitei*, n. sp., holotype. 32, *C. nedusa* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

Male genitalia. Aedeagal shaft straight, thick. Shaft, right side, with a scoop-like process, with outer margin serrate at apex, arising from a swelling next to the apodeme. Flagellum, with an elongate hood-like lobe bearing a large swollen lobe on its right side and a curved, slender, acute process on its left. Paramere with ventral surface widest in middle half of its length, inner ventral margin straight in its middle portion, surface trapezoidal in outline; apical hook small.

Discussion. *Cedusa metcalfi*, n. sp., is described from the male holotype taken at Southern Pines, North Carolina, May 15, 1919 (col. ?) and three male paratypes from the same locality, June 1, 1909 (Z.P. Metcalf), from the North Carolina State University collection; two male paratypes, locality unknown and two male paratypes, Wrens, Georgia, August 22, 1930 (R.H. Beamer), from the University of Kansas collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

Cedusa metcalfi is related to *Cedusa bedusa* McAtee, *Cedusa woodsholensis*, n. sp., and *Cedusa olseni*, n. sp. It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The dentation of the process at the base of the shaft on the right varies slightly.

This species is named in honor of Dr. Z.P. Metcalf, the collector and well-known Homopterist.

29. *Cedusa whitei*, new species (Fig. 31)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated; basal margin slightly concave; disc slightly depressed. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown.

Male genitalia. Aedeagal shaft slightly curved at apex, left side, with a long, narrow, somewhat curved, acute horizontal process one-half as long as shaft arising at base near apodeme. Flagellum, left side, with a somewhat triangular lobe, its ventral margin convex, the sinuate dorsal margin continuous with the dorsal margin of large hood-like lobe on right side of shaft; a two-pronged process which is broad at base at the base of the preceding lobe, the anterior ramus shorter, thin, the posterior, more dorsal, broader, both rami acute apically, slightly curved and directed anterodorsally. Flagellum, right side, with an elongate, hood-

like lobe more than half as long as shaft, with a short, very acute, dorsal process directed somewhat cephalad at midlength and ventral margin concave just beyond at midlength; with a long, curved, acute basal process arising at dorsum, directed anteriorly; with a long, acute process arising from beneath base of large hood-like lobe, its basal half broad, apical half curved anteroventrally. Paramere with inner ventral margin, produced into a small angular projection at basal third and at midlength; apical hook huge, triangular, blunt, at an obtuse angle to main axis of paramere.

Discussion. *Cedusa whitei*, n. sp., is described from the male holotype from Columbia, British Honduras, April 1922 (J.J. White), and from two male paratypes from Rio Grande, British Honduras, September, 1931 (J.J. White), and Morales, Guatemala, October, 1930 (J.J. White), all from the North Carolina State University collection. The holotype is illustrated and is on indefinite loan to the United States National Museum. This species is related to *Cedusa serrata* Caldwell and *Cedusa nedusa* Caldwell. It may be distinguished from them by the shape of the paramere and by the structures mentioned in the discussion of *Cedusa nedusa* Caldwell and from all other species in the genus by the shape of the aedeagus and paramere. The two paratypes are similar to the illustration.

This species is named in honor of J.J. White, the collector of the specimens.

30. *Cedusa nedusa* Caldwell
(Fig. 32)

Cedusa nedusa Caldwell 1944b:452.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base greater than width at apex; widest at distance three-fourths its length from vertex. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes equal to median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color very dark yellowish brown.

Male genitalia. Aedeagal shaft somewhat curved, left side with a slender horizontal process at base. Flagellum, left side, with a short, thin, recurved process behind apex on dorsum; with a U-shaped process at base, the posterior arm crooked, curved dorsally and slightly posteriorly; with a bifurcate process extending anteriorly from under the preceding process, its dorsal ramus short and blunt, ventral ramus scimitar-like and extending ventrally and anteriorly. Flagellum, right

side, hood-like in appearance with a long, thin acute, process at base curving dorsally. Paramere with inner ventral margin angularly produced mesally at apical third, apex rounded; apical hook absent.

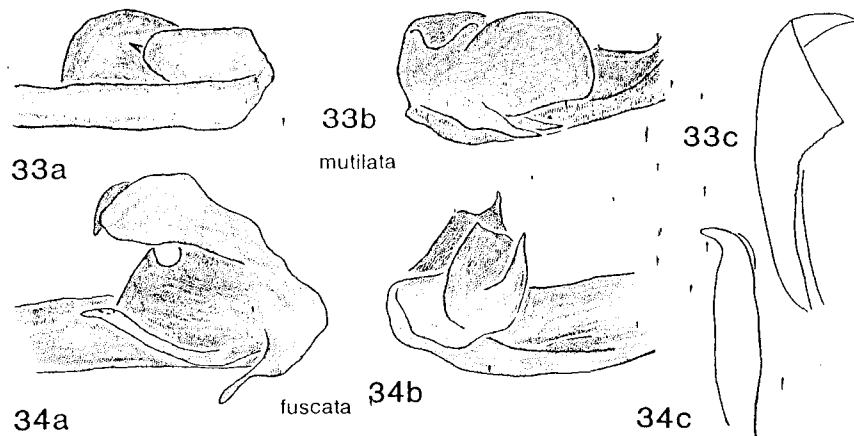
Discussion. *Cedusa nedusa* Caldwell was described from the male holotype and two paratypes from Tamazunchale, San Luis Potosi, Mexico. Additional specimens have been dissected from Tamazunchale, Mexico (1) from the Illinois Natural History Survey collection and British Honduras (1) and Honduras (1) from the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum Caldwell collection. This species is related to *Cedusa serrata* Caldwell and *Cedusa whitei*, n. sp. It may be distinguished from *Cedusa serrata*, Caldwell by the more delicate process at midlength of the dorsum of the main lobe of the flagellum, also the process at the base of the flagellum on the left side is not furcate, and the two rami of the bifid process posterior to the preceding are longer and more delicate. It may be distinguished from *Cedusa whitei*, n. sp., by the difference in the same structures and also by the much shorter process from the base of the shaft on the right side. It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The specimen not illustrated from Tamazunchale is similar to the illustration, but the other two have parameres similar to those illustrated for *Cedusa serrata* Caldwell, and the processes from the base of the flagellum on the left are broader, sinuate, dentate at apex and the ventrally directed process does not appear to arise preapically from the ventral margin of the blunt horizontal process.

31. *Cedusa mutilata* Caldwell
(Fig. 33)

Cedusa mutilata Caldwell 1944b:451.

Description. Length of male approximately 4.5 mm (Caldwell's measurement; holotype difficult to measure). Vertex in dorsal view narrowly trapezoidal; apical margin with carina greatly elevated, slightly concave, depressed in middle; basal margin slightly concave; disc moderately depressed. Frons width at base less than width at apex; widest at distance five-sixths its length from vertex; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes greater than median length; disc with median carina slightly elevated, lateral carinae slightly elevated. Labium with apical segment either concealed or missing. General color dark yellowish brown with markings and carinae generally brownish yellow.

Male genitalia. Aedeagal shaft straight, thicker apically. Flagellum, left side, with a small lobe which is rounded anteriorly and with a small acute process projecting from behind it. Flagellum, right side, consisting



Figs. 33-34. Male genitalia. 33, *C. mutilata* Caldwell, holotype. 34, *C. fuscata* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, dorsal view.

of another large bulbous lobe with two short, acute processes at midlength of ventral margin. Paramere (only one present in vial) of holotype broken, most of inner ventral surface missing, margin slightly concave distal to broken sector; outer margin convex appearing to merge with apical hook which is large, acute, triangular. Posterior margin of anal tube regularly convex (a small break on right side near base in holotype is probably not normal).

Discussion. *Cedusa mutilata* Caldwell is known only from the holotype which is illustrated and in the Caldwell collection in the United States National Museum. The type locality is Frontera, Tabasco, M.B. 259, Mexico, sea level, swept on grass along the Grijalva River. It may be closely related to *Cedusa fuscata* Caldwell from which it may be readily distinguished by the shape of the aedeagus. No additional specimens have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

32. *Cedusa fuscata* Caldwell
(Fig. 34)

Cedusa fuscata Caldwell 1944b:448.

Description. The type specimen has been lost from the point. The aedeagus is in a vial attached to the pin which bore the specimen. Caldwell's description follows: "Length 4 mm. Face and thorax light brown, elytra dusky. Face narrow, scarcely carinate. Elytra little over two times as long as broad; apical cross veins ivory. Male claspers elongate oval with very heavy, broad, apical hooks. Aedeagus one of the least ornate in this genus."

Holotype male from Tamazunchale, S.L.P., 11-15-1938 (Caldwell)."

Male genitalia. Aedeagal shaft straight. Flagellum, left side, with a large lobe the anterior and dorsal margins of which meet at an acute angle, lateroventral margin rolled with anterior margin bluntly produced; with a basal, blunt moderately long process narrowed in apical half. Flagellum, right side, consisting of a somewhat rectangular lobe at base directed dorsoanteriorly with a short, acute, curved process from base of anterior margin directed dorsoanteriorly. Paramere narrow in ventral view with outer and inner ventral margins nearly subparallel; apical hook curved, acute, moderately long, directed mesally and posteriorly.

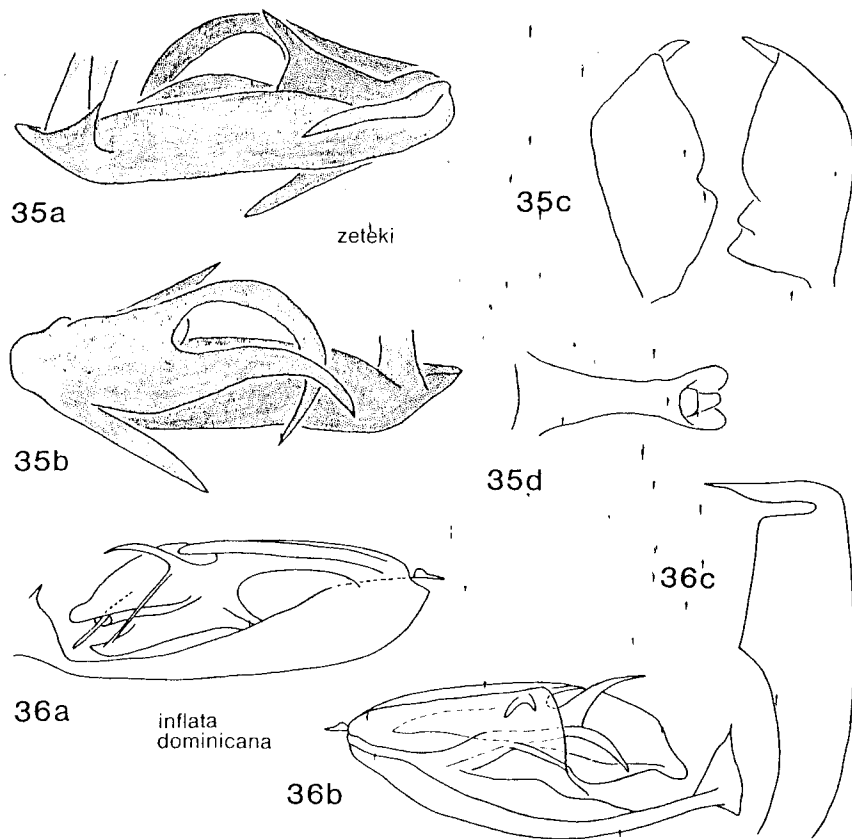
Discussion. *Cedusa fuscata* Caldwell was described from the male holotype from Tamazunchale, San Luis Potosi, Mexico. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum Caldwell collection. It is closely related to *Cedusa mutilata* Caldwell from which it may be distinguished, as well as from all other species in the genus, by the shape of the aedeagus and paramere.

33. *Cedusa zeteki*, new species
(Fig. 35)

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly convex, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed through entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; disc with median carina slightly elevated. Labium with apical segment as long as wide, dark. General color dark yellowish brown with carinae and margins brownish yellow.

Male genitalia. Aedeagus shaft straight. Flagellum, left side, with a rectangular process the anterior and dorsal margins of which are produced into a short, acute, process which is directed anterodorsally; an acute horizontal process at apex of shaft, longer than above. Flagellum, right side, with a long forked lobe extending anteriorly almost to apodeme, the upper ramus sharply curved, the lower ramus thick and more gently curved; a long tapered process directed forward and downward from base. Paramere with inner ventral margin asymmetrically notched at base; apical hook thin, very long, extending posteriorly and slightly mesally. Anal tube long with sides concave at midlength in dorsal view; apical margin notched.

Discussion. *Cedusa zeteki*, n. sp., is described from the male holotype from Los Lajos, Panama, October 16, 1952 (F.S. Blanton), and one male



Figs. 35-36. Male genitalia. 35, *C. zeteki*, n. sp., holotype. 36, *C. inflata dominicana* Fennah (redrawn from Fennah 1952:145). a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, dorsal view.

paratype with the same data from the United States National Museum collection. This species is related to *Cedusa dietzi*, n. sp., from which it can be distinguished by the longer, stouter process at the apex of the flagellum, and also to *Cedusa carranzensis* Caldwell and *Cedusa simplex*, n. sp. It may be distinguished from all other species in the genus by the shape of the aedeagus, parameres, and anal tube. The paratype does not vary from the illustration.

This species is named in honor of J. Zetek, the well-known tropical entomologist. The holotype is illustrated and in the United States National Museum.

34. *Cedusa inflata dominicana* Fennah
(Fig. 36)

Cedusa inflata dominicana Fennah 1952:145.

This subspecies has not been seen. Fennah's original description follows: "Fuscous; median disc of frons and clypeus testaceous; sides of head and coxae slightly paler; rostrum and legs stramineous to creamy white; external female genitalia dark fuscous. Tegmina uniformly fuscous; veins concolorous, with exception of transverse veins in membrane, which are hyaline. Wings infumed, veins darker, a line along anal fold hyaline. Insect in life powdered with pale wax, so as to appear smoky-blue. Male; length, 3.0 mm., tegmen, 3.8 mm. Female; length 3.1 mm.; tegmen 3.9 mm."

"Aedeagus tubular; flagellum with a minute curved spine at base directed posteriorly, arising on left side; a long sinuate spine on right arising near base, directed cephalad above aedeagus; below this a broad sclerotised plate, shallowly trough-like along middle, tapering to a point distally, left margin or submargin strongly sinuately sclerotised; below this again a stout process on left side directed cephalad, forking distally into a pair of short curved spines, at the same level expanded mesad in a broad thin plate, with a small triangular tooth near the point of origin of the two spines. Genital styles as in *C. funesta*, the longer limb of the basal process on the dorsal margin approximately mushroom-shape or clavate in side view."

"Holotype, male, B.W.I.: Dominica, Saltoun, 1000 ft. in mountain forest," 11-30. vi. 1939 (R.G. Fennah).

"Paratype, 6, same particulars as holotype. This is here recognised as a subspecies of *C. inflata* (Ball), distinguished from the Haitian type by differences in the shape of the inner (ventral) margin of the genital styles. It otherwise agrees with the published data on *inflata*, but the relationship between Haitian and Dominican material cannot be finally settled without comparison of aedeagal structures."

The illustration is redrawn from Fennah (1952:145). The holotype is in the British Museum (Natural History). This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. It is doubted that this form is a subspecies of *Cedusa inflata* (Ball), but until a specimen can be studied it is best to consider it a subspecies.

35. *Cedusa lugubrina* (Stål)

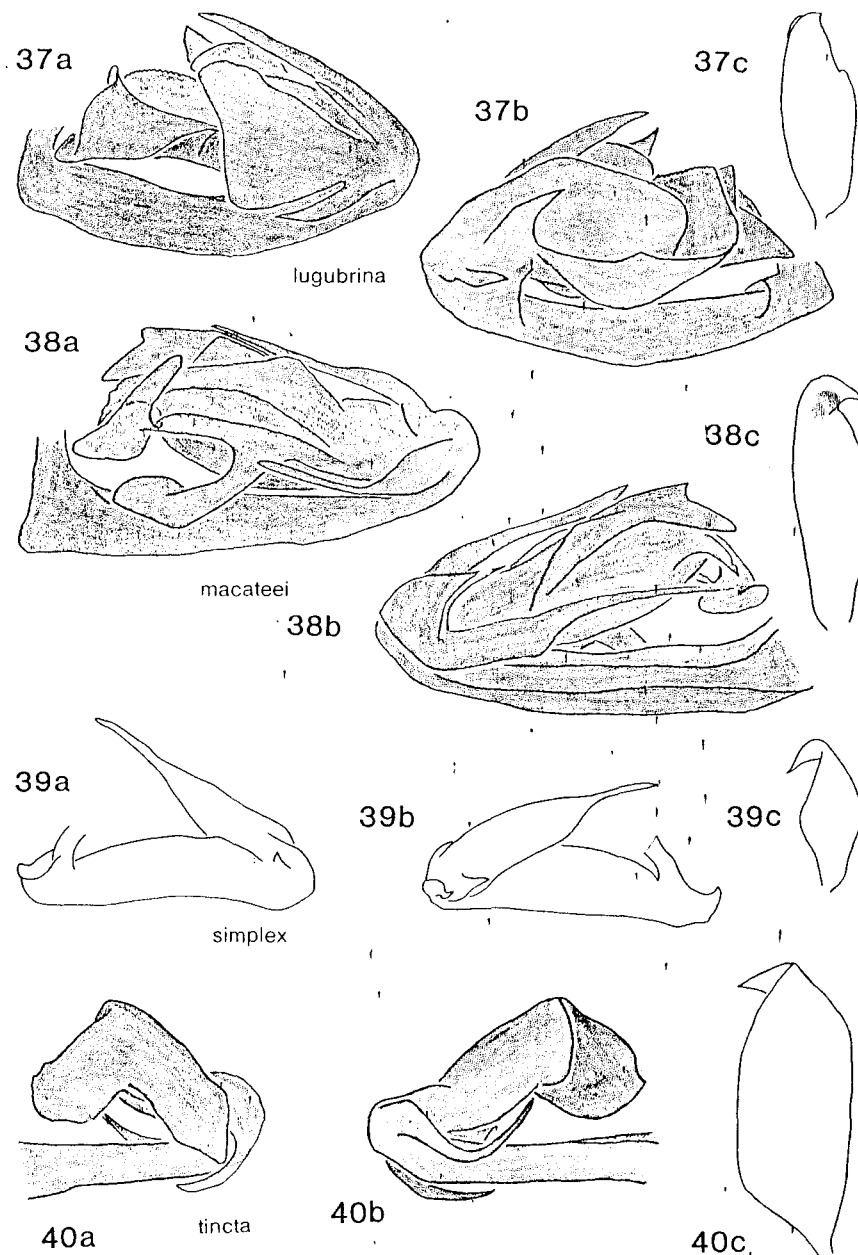
(Fig. 37)

Herpis lugubrina Stål 1862:8.

Lamenia lugubrina (Stål), Kirkaldy 1906:403.

Cedusa lugubrina (Stål), Muir 1924a:16.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obso-



Figs. 37-40. Male genitalia. 37, *C. lugubrina* (Stål), holotype. 38, *C. macateei*, n. sp., holotype. 39, *C. simplex*, n. sp., holotype. 40, *C. tincta* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

lete at sides; basal margin slightly concave; basal corners depressed; disc slightly depressed. Frons width at base equal to width at apex; widest at distance five-sixths its length from vertex; disc depressed in entire length. Gena with genal ridge sinuate, slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated. General color dark blackish brown with the carinae, margins of head and pronotum, and longitudinal median stripe of frons dark yellowish brown.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large, roughly triangular lobe arising at base directed anteriorly with a shorter, curved, acute process from the ventral margin at its base directed ventroanteriorly; with two slender, slightly curved, acute processes from posterior margin the left process one-half as long as the right process directed anterodorsally; with a wide elongate process from base mesad of triangular lobe extending to apodeme with the dorsal surface depressed, the apex wide, truncate, depressed, with an antepical triangular lobe the apex of which is directed posteriorly, antepical dorsal margin dentate. Flagellum, right side, with the elongate lobe with dextral side depressed becoming navicular with dorsal margin angular at apical third, broadest at apical third with a large membranous, somewhat rectangular lobe lying in the depression, with an acute curved process arising at base of dorsal margin directed dorsoanteriorly; with a short, knife-like, horizontal process at base ventrad of and posterior to preceding and directed anteriorly, with an elongate lobe from base medially at dorsum with the apex acutely produced laterally to the right. Paramere with inner ventral margin convex at basal two-thirds then abruptly narrowed and straight above; apical hook small, acute.

Discussion. *Cedusa lugubrina* (Stål) was described from the male holotype from Rio de Janeiro, Brazil. No additional specimens have been seen. The holotype is illustrated. It is in the Naturhistoriska Riksmuseet, Stockholm, Sweden. No closely related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

36. *Cedusa macateei*, new species
(Fig. 38)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths of its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated

between frontogenal carina and subantennal plate which is at an acute angle to the gena. Pronotum with median length less than that of vertex; anterior margin rounded between eyes; length behind eyes slightly greater than median length; disc with median carina feeble, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown, ends of subantennal plate lighter, thorax tinged with red.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with a complex elongate structure which bears an acute, serrate process at apex, a subapical hammerhead-like process, a bent club-like process from ventral margin at midlength; with a curved process which is broadest at base, slender in apical half; with a long, slender somewhat curved process from base, dorsal to preceding. Flagellum, right side, with a long, blunt process bearing a short subapical angle; with a long, anteriorly directed process which is broad in basal half, narrowing abruptly, curved and acute apically; base bearing at its base two semi-triangular processes. Paramere with inner ventral margin convex; apical hook moderately large, acute, slightly recurved, with a clear area at base near inner margin.

Discussion. The clear area on the paramere is the only such character noted to date in the genus. *Cedusa macateei*, n. sp., can be distinguished from all members of the genus by the shape of the aedeagus, especially by the hammerhead-like process and the bent club-like process on the left side, and by the paramere.

This species is described from the male holotype taken at Nova Teutonia, Brazil, 1937, 27° 11' S, 52° 23' W, (Fritz Plaumann). The holotype from the North Carolina State University collection is illustrated, and it is on indefinite loan to the United States National Museum. It does not appear to be closely related to any of the presently known species in the genus. This species is named in honor of W.L. McAtee, the describer of many other species in the genus.

37. *Cedusa simplex*, new species
(Fig. 39)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, moderately convex. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length, median carina feeble. Genal with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin rounded; disc with median carina feeble. Labium with apical segment as long as wide. General color dark yellowish brown.

Male genitalia. Aedeagal shaft somewhat arched. Flagellum, left side, elongate, tapered, narrowest at apical third, on the right side of the shaft at apex of shaft; with a very small, acute process at base. Flagellum, right side, with two small processes at base, the more anterior process broad at base, short, acute, posterior process broad at base, short, curved, acute. Paramere with inner ventral margin convex, widest at midlength; apical hook large, acute, slightly recurved at tip, at an acute angle to main axis of paramere.

Discussion. *Cedusa simplex*, n. sp., has the simplest aedeagus found in the genus to date. This species can be separated from all other species in the genus on the basis of its aedeagus and especially from the closely related species *Cedusa carranzensis* Caldwell by its less bulbous flagellum, smaller processes and the shape of the parameres, especially their inner ventral margins. This species is described from the male holotype which is illustrated and is located in the United States National Museum collection. The label data is as follows: Campinas, Sao Paulo, Brazil, 12-14, 1956 (E.J. Hambleton). It is closely related to *Cedusa dietzi*, n. sp., *Cedusa zeteki*, n. sp., and *Cedusa carranzensis* Caldwell. All three could have been derived from ancestors like *Cedusa simplex* n. sp.

38. *Cedusa tincta* Caldwell
(Fig. 40)

Cedusa tincta Caldwell 1944b:451.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length. Genal with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes slightly less than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment as long as wide, dark. General color usually dark yellowish brown with carinae, margins and venter light brownish yellow, with a tinge of red on abdomen.

Male genitalia. Aedeagal shaft straight. Flagellum, left side, consisting of a rather broad lobe in the form of an inverted V, with a curved process, broad at base, arising at base on right side and crossing behind the flagellum and directed forward on left side. Flagellum, right side, shorter in appearance only slightly exceeding angle of "V," with a curved, tapering process from base directed anterodorsally. Paramere with inner ventral margin subparallel to outer ventral margin except basally and apically, tapered in apical third; apical hook triangular.

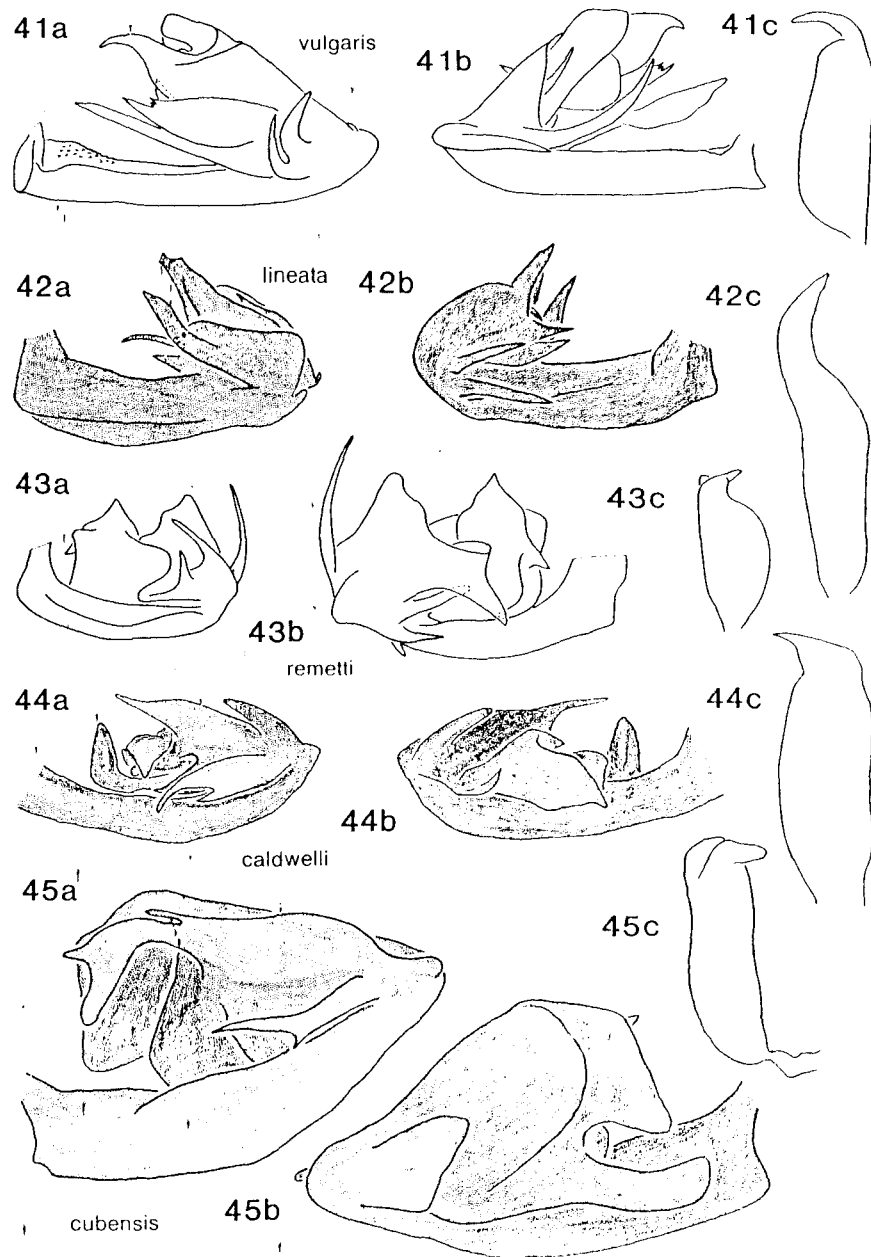
Discussion. *Cedusa tinctoria* Caldwell was described from the male holotype and female allotype from Vergel (a coffee plantation), Veracruz, Mexico. Four additional specimens have been dissected from British Honduras in the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum Caldwell collection. It appears to be related to *Cedusa nedusa* Caldwell. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. In one of the four additional specimens the main lobe of the flagellum is straighter and the right side does not appear shorter.

39. *Cedusa vulgaris* (Fitch)
(Fig. 41)

Poeciloptera vulgaris Fitch 1851:47.
Flata vulgaris (Fitch), Glover 1878:1.
Lamenia vulgaris (Fitch), Uhler 1884:233.
Lamenia fitchi Kirkaldy 1906:403.
Herpis vulgaris (Fitch), Muir 1913a:112.
Cedusa vulgaris (Fitch), Muir 1913b:35.
Cedusa tedusa McAtee 1924:185.

Discussion. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carinae moderately elevated, moderately convex; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length shorter than that of vertex; anterior margin between eyes convex; length behind eyes less than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown with margins, carinae, legs, light brownish yellow. (Holotype faded to a more or less uniform light yellow.)

Male genitalia. Shaft of aedeagus straight, dorsal surface somewhat depressed with many microspines in basal portion. Flagellum, left side, with a large, elongate, semitubular lobe, open dorsally and anteriorly, directed dorsoanteriorly, with the left anterior and dorsal margins produced into a curved, hook-like process directed anteroventrally and the right margin inrolled; with a bifid process arising at base, the larger, broader, acute, curved, posterior ramus directed dorsoposteriorly, the smaller, thinner acute, anterior ramus directed dorsally; with an elongate, horizontal, elliptic process arising, dorsad of preceding, the ventral portion of its dentate apex produced anteriorly; with a very long, slender process arising from base, mesad of bifid process, broadest in apical third. Flagellum, right side, main lobe rectangular in outline with thin, tapered, curved, acute process arising at midlength from the anteroventral



Figs. 41-45. Male genitalia. 41, *C. vulgaris* (Fitch), lectotype. 42, *C. lineata* Caldwell, holotype. 43, *C. remetti*, n. sp., holotype. 44, *C. caldwelli*, n. sp., holotype. 45, *C. cubensis*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

tal margin of a fold, which begins preapically on left side, directed dorsoanteriorly; with a long, curved, acute process from anterior base directed dorsoanteriorly; with a stout, sharply curved, horizontal process arising at posterior base, directed anteriorly. Paramere with inner ventral margin shallowly concave at midlength; slightly broader at base; apical hook large, long, curved.

Discussion. *Cedusa vulgaris* (Fitch) was described from a male and a female (no locality information with specimens or in original paper). Fitch (1851:47) gives the male as No. 639 and the female as No. 640. These numbers are reversed. The male specimen labeled No. 640 is here designated lectotype and it is so labeled. The lectotype is illustrated. It is in the New York State Museum, Albany. Additional specimens have been dissected from North Carolina (7) and Virginia (1) from the North Carolina State University collection; Illinois (21), unknown locality (22) (most from the Hart collection) from the Illinois Natural History Survey collection; and California (3), Oklahoma (1), Kansas (2), Georgia (1), Michigan (1), and Connecticut (2) from the University of Kansas collection. This species is probably related to *Cedusa arizonensis*, n. sp. It can be distinguished from it and all other species in the genus by the shape of the aedeagus, especially by the shape of the main lobe of the flagellum.

Cedusa vulgaris (Fitch) was the most variable species studied. Forty-three specimens were studied and displayed eight different variations. Nine of these were similar to the illustration although most have more microspines on the dorsum of the shaft. These were from Grafton, Oakwood (2), Hardin (3), Jeff, and Paris Illinois; Cheboygan County, Michigan; La Jolla, California; Storrs, Connecticut (2); Cherrivale, Kansas (2); Swannanoa, Raleigh and Wake County, North Carolina. Four more specimens differ only in that the apex of the long anteriorly directed process from beneath flagellum is concavely emarginate. These were from Oakwood, Illinois; San Diego, California, and unknown locality (2). A third type differs in that the large lobe at the base of the flagellum on the left side was produced anteriorly into a moderately long, horizontal, acute process directed anteriorly and the bifid process is replaced by one large, moderately long, horizontal, acute process directed dorsally. The main lobe of the flagellum is similar. Microspines on the dorsum of the shaft are absent. On the right side the process from the posterior margin at the base of the main lobe of the flagellum is much longer and acute; the process from beneath the main lobe of the flagellum extending to the apodeme is broad in basal half and slender and acute in apical half. These were from Havana, Illinois (3); Siskiyou National Forest, California; Wrens, Georgia; Stockton, Noble County and Swannanoa (2), North Carolina. One specimen from Tushahoma, Oklahoma had an additional small, slender, curved process dorsad to the base of the single process on the left at base. Six specimens differ in that the lobe at the base of the flagellum on the left is singly produced, as in the preceding

two varieties, the bifid process is present as illustrated and the process from beneath the main lobe of the flagellum extending to the apodeme is slender and acute and there are only a few microspines on the dorsum of the shaft at base. These were from Starved Rock, Watson, Homer Park, Charleston and Equality, Illinois. Three specimens differ in that the lobe at the base of the flagellum on the left is very dentate in its anterodorsal margin and the process at the base is long, acute, curved, directed anteriorly with a shorter, acute process at its base directed anterodorsally (this replaces the bifid process illustrated) and the long process from beneath the main lobe of the flagellum extending to the apodeme is much broadened apically and also that a portion of it is directed dorsally. This resembles the type of *Cedusa tedusa* McAtee. These were from Apple River Canyon State Park and Galena (2), Illinois. Two specimens differ in that the lobe at the base of the flagellum on the left is long and narrow, almost rectangular, with the anterior margin coarsely dentate; with the process at the base bifurcate with the lower ramus stout, acute, curved, directed anteriorly and the upper ramus, nearly as long, stout, acute, directed dorsoanteriorly; with the process at the posterior margin at the base of the flagellum on the right side very short, stout in basal half, slender, curved, acute in apical half, and the process from the fold on the right side of the main lobe is also very short. These were from Homer Park, Illinois. One specimen differs in that the bifid process on the left at the base of the flagellum was relatively huge, the lobe at the base on the left was very long, narrow and acute, and the apical hooks of the parameres were curved anteriorly. This specimen was from Raleigh, North Carolina.

40. *Cedusa lineata* Caldwell
(Fig. 42)

Cedusa lineata Caldwell 1944b:448.

Description. Length of male 6.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance one-half its length from vertex; lateral margins concave above and slightly convex below widest portion; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes greater than median length; disc with median carina slightly elevated, lateral carinae absent. Labium with apical segment longer than wide, distinctly narrower than subapical segment. General color light yellowish brown.

Male genitalia. Shaft of aedeagus slightly curved, moderately thick. Shaft, right side, with a moderately long, acute, subapical process

directed anteroventrally. Flagellum, left side, bifid process arising at base, broad at base, the lower, thicker, blunter ramus curved dorsoanteriorly, the upper, thinner, more acute ramus mesad of its complement and directed anteriorly; with a broad-elongate lobe, extending dorsoanteriorly, narrowed and produced in apical third, the apex of which appears less acute from the left; with a small acute process between two folds of the preceding at midlength. Flagellum, right side, with two short processes from anterior ventral margin, the upper, acute, the lower, longer and broader both directed anteriorly; with a moderately long, narrow process from base of flagellum directed anterodorsally and with the ventral and anterior margins of the large lobe produced into a short, very acute process, directed anteriorly. Paramere with inner and outer ventral margins subparallel in basal two-thirds, inner ventral margin slightly concave at basal third; apical hook large, curved, acute, directed mesally and posteriorly.

Discussion. *Cedusa lineata* Caldwell was described from the male holotype taken at Taxco, Guerrero, Mexico. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum collection. No related species have been seen.

This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

41. *Cedusa remetti*, new species
(Fig. 43)

Description. Length of male 4.8 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides; basal margin slightly concave; disc with one longitudinal median depression and four lateral pits, basal corners depressed. Frons width at base equal to width at apex; lateral margins subparallel; disc depressed in entire length. Gena with genal ridge feeble to slightly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly less than median length; disc with median and lateral carinae slightly elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median and lateral carinae feeble. General color dark yellowish brown, metathorax with reddish tinge.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, consisting of a large lobe from base with basal third very narrow, horizontal, the apical two-thirds very broad, extending dorsally, with the posterior margin convex basally merging with the triangular apex preapically, with the anterior margin shallowly concave, merging with apex at same level as preceding; the apex acute, anterior preapical margin shallowly concave, posterior preapical margin slightly convex; with a bifid pro-

cess at base, the anterior ramus nearly straight, acute, directed dorsally, the posterior ramus curved, slender, acute, directed anterodorsally. Flagellum, right side, with the anterior margin of large lobe on right side bearing a long, stout, curved acute process from midlength directed ventrally, thence posteriorly with a small triangular process at the base of preceding directed anteriorly; with a large roughly pentagonal lobe from base, the apex blunt, the anterodorsal margin slightly convex preapically, then directed forward, then turning laterally and thence posteriorly; the ventral and anterior margin ventral to the preceding stoutly, acutely produced, and directed anteroventrally; with a moderately long, acute process from base directed anterodorsally its apex hidden by the preceding; with a horizontal, curved acute process at base of preceding directed anteriorly; with a short, acute process arising mesad of preceding directed ventroanteriorly; with a very long, slender, curved, acute process from base at posterior margin directed nearly dorsally. Paramere with inner ventral margin convex at midlength; apical hook short, blunt, directed posteromesally.

Discussion. *Cedusa remetti*, n. sp., is described from the male holotype from Nova Teutonia, Santa Catarina, Brazil, October 3, 1952 (F. Plaumann), and three male paratypes, same locality, October 2, 1952, October 3, 1952, September 27, 1952 (F. Plaumann), all from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

C. remetti, n. sp., is related to *Cedusa stali*, n. sp., *Cedusa ecuadorensis*, n. sp., *Cedusa braziliensis*, n. sp., and *Cedusa sanctaecatharinae*. It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. Specimens may vary from the illustration in that the dorsal anterior margin of the large process from base on the right may be more convex and the recurved part not visible. In a right lateral view, the ventral process at the recurved part not visible. In a right lateral view, the ventral process at the anterior margin of the large lobe may be thinner, straighter, or decurved anteapically and the small horizontal process at base of preceding may be more acute and pendent.

This species is named in honor of Remett, the co-collector of several of the species new to science.

42. *Cedusa caldwelli*, NEW NAME
(Fig. 44)

Cedusa brunnea Caldwell 1944b:448, preoccupied by *C. brunnea* (Muir) 1914:43.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave, depressed in middle; basal margin straight; disc not depressed. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex, lateral margins slightly concave above and rectilinear and convergent below widest portion; disc depressed in

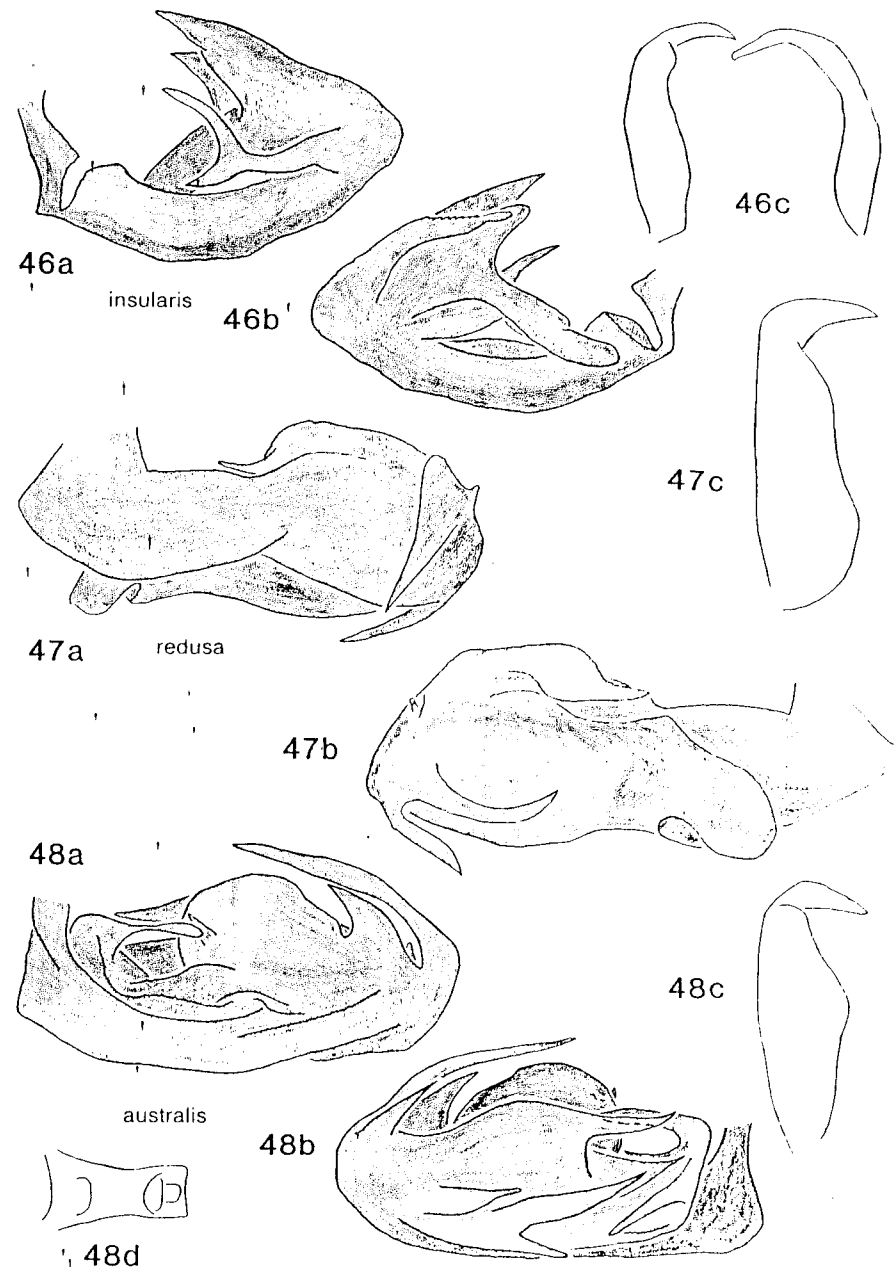
entire length. Gena with genal ridge greatly elevated between fronto-genal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly rounded; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina moderately elevated. General color dark yellowish brown, carinae light yellowish brown, forewings with veins lighter in color.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, consisting of a large, somewhat elongate lobe from base with an acute process on its dorsum at midlength, the process broad at base, tapered in apical third, directed anterodorsally; with a small cowl-like structure at anterior dorsal margin anterior to the preceding; with a broad, acute process ventrally at basal half, directed anteroventrally and partly hidden by a broad, somewhat horizontal, bifid process from base, the upper ramus longer, slender, acute, curved downward, the lower ramus acute, the entire process directed anteroventrally; with scoop-like process from base extending almost to apodeme, the basal half horizontal, the apical half at a right angle to basal half, directed dorsally. Flagellum, right side, consisting of an elongate, horizontal process roughly triangular in outline bearing cowl-like process laterally on right at dorsal apex, directed anteriorly; with a small, acute, curved process from ventral margin at base directed anterodorsally; with stout, curved, blunt (the apex appears broken off in the holotype) process near dorsum at base, directed anterodorsally. Paramere with inner ventral margin convex; apical hook, broad at base, narrowed anteapically, acute, directed mesad.

Discussion. *Cedusa caldwelli*, new name, was described from the male holotype and female allotype taken at the type locality Acapulco, Guerrero, Mexico (Caldwell). The holotype is illustrated. It is in the United States National Museum collection. Muir described *Herpis brunnea* from Formosa in 1914, Metcalf moved it to *Cedusa* in 1945 (Metcalf 1945:128). *Cedusa brunnea* Caldwell is, therefore, a secondary homonym and has to be renamed. No additional specimens have been seen. This species may be related to *Cedusa hedusa* McAtee. It may be distinguished from all other species in the genus by the shape of the aedeagus.

43. *Cedusa cubensis*, new species
(Fig. 45)

Description. Length of male 4.2 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina absent; basal margin slightly concave; disc with a pair of depressions. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex, lateral margins slightly concave above and straight, convergent below widest portion; disc broadly depressed in entire length. Gena with genal



Figs. 46-48. Male genitalia. 46, *C. insularis*, n. sp., holotype. 47, *C. redusa* McAtee, holotype. 48, *C. australis* (Metcalf). a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, dorsal view.

ridge moderately elevated between frontogenal carina and subantennal plate which is at almost right angle to gena. Pronotum with median length equal to that of vertex; anterior margin between eyes broadly rounded; length behind eyes equal to median length; disc with median carina absent, lateral carinae feeble. Labium with apical segment as long as wide. Mesonotum with longitudinal median carina slightly elevated; longitudinal lateral carinae feeble. General color testaceous with carinae and subantennal plate lighter (specimen faded, but with a few blotches indicating that possibly in a fresh specimen color would range from brownish black to black).

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, with a large, broad, roughly triangular lobe with an unequally branched arched process from the left side, the smaller branch short and blunt, the dextral lobe larger, bluntly rounded subapically; with a horizontal, asymmetrically branched process at base, the upper ramus longer, acute, directed dorsoanteriorly, the lower ramus very short, acute, directed anteroventrally. Flagellum, right side, with a large lobe bearing on its anterior margin a large, broad notch above a long broad ventral projection which extends almost to the apodeme and bearing a convex lobe proximal to the notch; with a broad, truncate process at base. Paramere with inner ventral margin slightly concave at midlength; apical hook blunt, short; connective between the two parameres heavily sclerotized and V-shaped.

Discussion. *Cedusa cubensis* n. sp., is described from the male holotype from Loma del Gato, Sierra del Cobre, Cuba, September 24-30, 1935, 2,600-3,325 feet (J. Acura, S.C. Bruner, L.C. Scaramuzza) and a male paratype labeled Naugua, presumably from Oriente, Cuba, both in the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

C. cubensis, n. sp., is closely related to *Cedusa balloui*, n. sp. It can be distinguished from it and all other species in the genus by the shape of the aedeagus, especially the shape of the bifid process at base on the left and the bifid process dorsad of it. The paratype varies from the illustration in that the bifid process from base on left side is longer with the upper ramus decurved preapically and the more dorsal "bifid" process is longer, blunt and without the smaller branch. The triangular process on the right side at base has the dorsal and anterior margins produced into a long, moderately broad process directed dorsoanteriorly in the paratype.

44. *Cedusa insularis*, new species
(Fig. 46)

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina absent; basal margin moderately concave; disc with two shallow lateral depressions and a feeble

median carina. Frons width at base less than width at apex, widest about three-fourths its length from vertex, lateral margins slightly concave above and straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length equal to that of vertex; anterior margin between eyes broadly convex; length behind eyes slightly greater than median length; disc with median carina feeble. Labium with apical segment slightly longer than wide. Mesonotum with longitudinal median carina feeble. General color light yellowish brown, mesonotum, cells of wings and apical segment of labium yellowish brown.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a long, bifid process arising at base, the upper ramus longer, curved, more acute than the lower ramus; with a large, broad at base, triangular process arising at base, somewhat constricted antepically, directed anterodorsally. Flagellum, right side, with a large lobe, its apex blunt directed dorsoanteriorly and its anterior margin produced at midlength into a long, blunt process, somewhat twisted antepically, extending almost to apodeme, directed anteroventrally and with a long, curved process arising at its base, constricted antepically, and with the dorsal margin subapically dentate. Parameres asymmetrical, with the left paramere broader; inner ventral margins convex; apical hooks large, curved, the left one more acute.

Discussion. *Cedusa insularis*, n. sp., is described from the male holotype from C. Baragua, Cuba, July 26-27, 1927 (C.F. Stahl, L.C. Scaramuzza, S.C. Bruner) from the North Carolina State University collection. The holotype, which is illustrated, is on indefinite loan to the United States National Museum.

C. insularis, new species is related to *Cedusa inflata* (Ball). It may be separated from *Cedusa inflata* (Ball) by the difference in shape of the bifid process at base on the left and from all other species in the genus by the shape of the aedeagus, especially by the process just mentioned and by the blunt process on the right side.

45. *Cedusa redusa* McAtee
(Fig. 47)

Cedusa redusa McAtee 1924:185.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly convex, obsolete at sides; basal margin sinuate. Frons width at base equal to width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge feeble, incomplete between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that

of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment as long as wide, dark. General color yellowish brown.

Male genitalia. Shaft of aedeagus more or less straight, thick, constricted and somewhat twisted on the left side. Flagellum, left side, with an elongate triangular process arising at base, directed ventrally, its basidorsal margin concave and with a small process (illustrated as broken in the holotype) at base of preceding, directed dorsally. Flagellum, right side, with a large, horizontal, portion arising from base, directed forward along the left side of shaft its apex a rounded lobe extending anteroventrally; with a moderately long, moderately thick process at dorsum constricted at its base and narrowed antepically, directed anteriorly; with a two-pronged process arising at ventral portion of base, the upper ramus thin, arcuate, curved, horizontal, the lower ramus straight, knife-like, directed anteroventrally. Paramere narrowing from base to apical hook with inner ventral margin slightly concave; apical hook large, curved, acute, directed mesally.

Discussion. *Cedusa redusa* McAtee was described from the male holotype and two females from Glen Echo, Maryland, also paratypes from Dunn-Loring, Virginia. Additional specimens have been seen from North Carolina (9) in the North Carolina State University collection; Kentucky (1) and Georgia (1) in the Illinois Natural History Survey collection. The holotype is illustrated. It is in the United States National Museum collection. No closely related species have been seen. In some specimens the small process at the posterior dorsum, which is illustrated as broken, is present as a short acute process. The ventrally directed process on the left side, basad of the preceding, may be longer and more slender. This species may be distinguished from all other species in the genus by the shape of the aedeagus.

46. *Cedusa australis* (Metcalf)
(Fig. 48)

Herpis australis Metcalf 1923:196.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, convex, obsolete at sides; basal margin moderately elevated, convex, obsolete at sides; basal margin moderately concave; disc with one longitudinal depression. Frons width at base less than width at apex; widest at distance six-sevenths its length from vertex; sides slightly concave above, straight, convergent below widest portion. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae

feeble. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated. General color dark yellowish brown with carinae, thorax, legs, and labium lighter in color.

Male genitalia. Aedeagal shaft curved. Flagellum, occurring on right side of shaft. Flagellum, left side, with a large bulbous lobe at midlength bearing on anterior sinistral surface a short process directed forward and upward; with a recurved process arising apicoventrally, constricted subapically; with two basal processes, the shorter broadest at base and directed anteroventrally and with a small acute process at its base posteriorly, the longer thinner, basally directed anteriorly over the bulbous lobe and the preceding. Flagellum, right side, with a process at apex directed posteroventrally; with a ventral bifurcate process at midlength directed anteriorly with both rami tapering and acute, the upper ramus longer; with an acute horizontal process basad of the preceding, broad at base, abruptly tapered preapically; with an acute, tapered process at base at dorsum directed anterodorsally; with a moderately long, acute horizontal process from midlength, base large, tip upturned, acute; with a short, slender, acute process at dorsal margin directed forward. Paramere with inner ventral margin with a convexity at midlength; apical hook large, acute, broad at midlength, directed mesally. Anal tube truncate in dorsal view, posterior margin slightly concave.

Discussion. *Cedusa australis* was described by Metcalf from four specimens: holotype, allotype, and paratypes from Brownsville, Texas. The paratype of *Cedusa incisa* (Metcalf) also from Brownsville is *Cedusa australis* (Metcalf). McAtee (1924:181) wrongly considered this species conspecific with *Cedusa praecox* (Van Duzee). Additional male specimens have been dissected from Michigan (6), Mississippi (1), Texas (8) in the University of Kansas collection; Illinois (9), Texas (1) in the North Carolina State University collection. The holotype is in the Illinois Laboratory of Natural History collection. The present identification is based on a drawing of the holotype by Caldwell. The specimen illustrated is from the North Carolina State University type collection and labeled paratype of *Herpis incisa* Metcalf. *Cedusa dubiata* Caldwell appears to be related to this species. *C. australis* may be distinguished from all other species by the shape of the aedeagus, paramere, and anal tube. Specimens were taken from *Nymphaea* and *Potomageton* at Oakwood, Illinois. In one specimen from Prairie, Mississippi, the process at the apex on the right side that is directed ventroposteriorly was bifurcate about one-third to one-half its length with the posterior ramus broader.

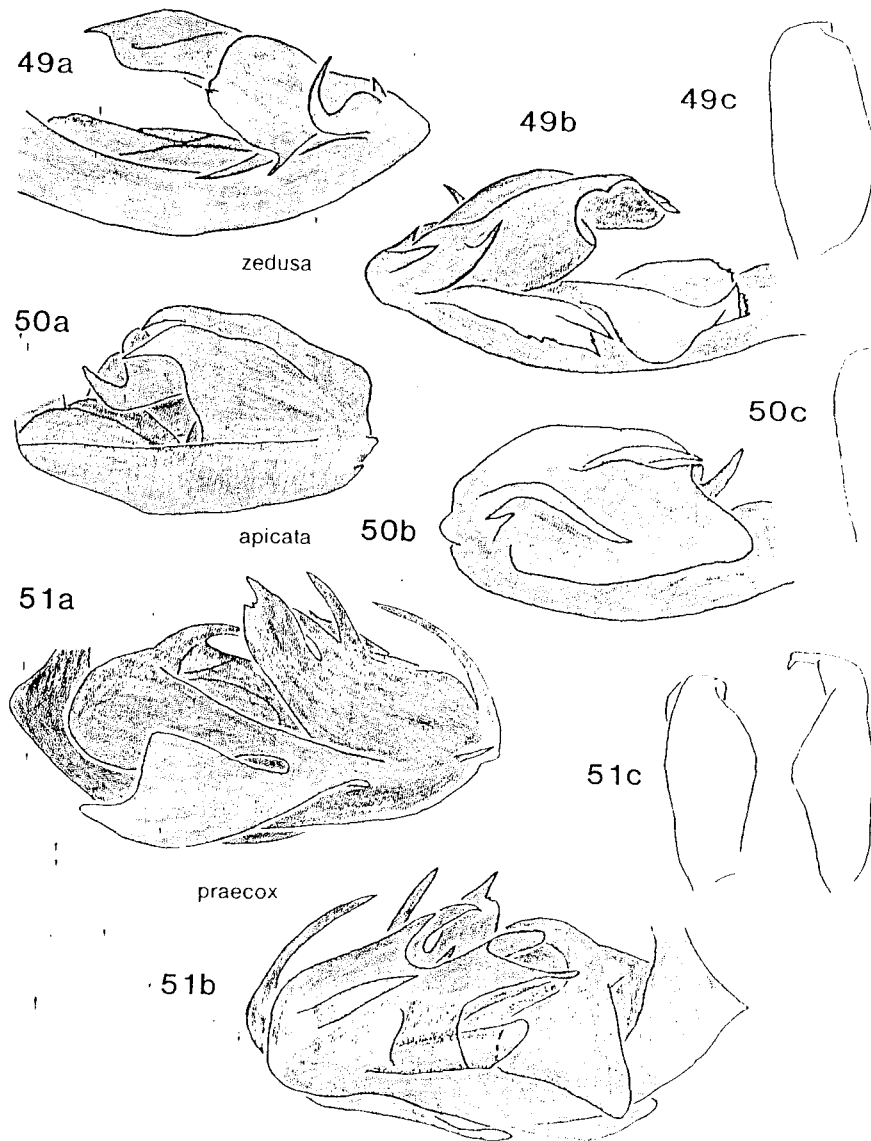
47. *Cedusa zedusa* Caldwell
(Fig. 49)

Cedusa zedusa Caldwell 1944b:450.

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, middle section straight, ends bent apically, obsolete at sides; basal margin slightly concave; disc with one median depression. Frons width at base equal to width at apex; widest at distance four-fifths its length from vertex; sides moderately concave above, straight, converging below widest portion; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes slightly greater than median length; disc with median and lateral carinae feeble. Labium with apical segment as long as wide. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown, head and pronotum lighter in color, covered in part with a bluish white powder.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large roughly quadrilateral lobe arising at base with a short process at junction of anterior and posterior ventral margins; a moderately long, knife-like process extending anteroventrally beneath the above; with a shorter process broad at base, elbowed and tapered, acute and extending dorsally in apical half; another shorter triangular process near base of preceding; left side of elongated tubular hood-like lobe with right anterior margin scalloped and inrolled, produced anteriorly; at base of preceding a short, knife-like process and a short broadly based, acute process narrowed subapically; from beneath latter a jagged bifurcate process extending basally; a longer scoop-shaped process with dentate anterior margin overlain by the hood-like process. Paramere in ventral view with inner and outer ventral margins subparallel, basal third of inner ventral margin convex; apical hook small.

Discussion. *Cedusa zedusa* Caldwell was described from the male holotype, female allotype, and one paratype from Santa Isabel (a coffee plantation), Chiapas, Mexico, and a paratype from Vergel (a coffee plantation), Chiapas. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum Caldwell collection. It appears to be related to *Cedusa costaricensis*, n. sp., and *Cedusa isthmusehsis* n. sp. It may be distinguished from them and all other species in the genus by the shape of the aedeagus and paramere.



Figs. 49-51. Male genitalia. 49, *C. zedusa* Caldwell, holotype. 50, *C. apicata* Caldwell, holotype. 51, *C. praecox* (Van Duzee), cotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view.

48. *Cedusa apicata* Caldwell
(Fig. 50)

Cedusa apicata Caldwell 1944b:448.

Description. Length of male 4.0 mm (head of holotype on point separately, therefore, it is difficult to measure length). Vertex in dorsal view narrowly trapezoidal; apical margin carina feeble, slightly concave, obsolete at sides, depressed in middle; basal margin slightly concave at middle; disc with a slight longitudinal depression. Frons width at base greater than width at apex; widest at distance two-thirds its length from vertex, sides slightly concave above, straight below widest portion, slightly constricted before joining clypeus, disc depressed in entire length. Gena with genal ridge feeble between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes slightly greater than median length; disc with median carina feeble, lateral carinae slightly elevated. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina slightly elevated. General color brownish yellow.

Male genitalia. Aedeagal shaft exceptionally thick, lacking processes. Flagellum, left side, with ventral and anterior margins produced into a short, acute process which is curved upward; with a large bird-shaped process arising at base directed forward. Flagellum, right side, broad and obliquely truncate with a bifid process at base, the upper ramus moderately long, decurved, directed forward, the lower ramus short, acute. Flagellum, dorsally, at base with a long tapering broadly-based acute process curved forward. Paramere narrow with inner and outer ventral margins subparallel; apical hook absent.

Discussion. *Cedusa apicata* Caldwell was described from the male holotype from Finca Aurora (a coffee plantation), Chiapas, Mexico, and female allotype from Chiltepec, Oaxaca, Mexico, both taken at lights. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum, Caldwell collection. The species does not appear to be closely related to any other known species in the genus. It can easily be distinguished from all other species of the genus by the large hood-like shape of the aedeagus.

49. *Cedusa praecox* (Van Duzee)
(Fig. 51)

Lamenia praecox Van Duzee 1912:502.

Cedusa praecox (Van Duzee), McAtee 1924:181.

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin slightly concave. Frons width at base equal to width at apex; widest at distance three-fourths its length from vertex;

disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes less than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. Tegmina dark yellowish brown, mesonotum yellowish brown, head, pronotum, carinae and margins brownish yellow.

Male genitalia. Aedeagal shaft curved. Flagellum, left side, consisting of a long process from base extending to apodeme, basal two-thirds slender, more or less straight, at a slight angle to shaft, tapered anteriorly from basal third, abruptly broadened at apical third into subrectangular lobe, the dorsal and posterior margins of which are produced into a long, slender, curved process, directed dorsoposteriorly, also produced laterally into a large flap, this combination lying astride the shaft, and from its basal third a cleaver-like process laterad of and parallel to preceding extending almost to apodeme with dorsal margin straight, anterior margin straight in dorsal two-thirds, ventral one-third with convex ventral margin produced into a short acute process; with a long, slender, curved, acute process from base with many microsetae, directed anterodorsally over remainder of flagellum; with a trifurcate process from base, the sinistral ramus broad with apex dentate and anterior and dorsal margins angularly produced, the middle ramus stout, acute, shorter than preceding, the dextral, short, acute, all three rami directed anterodorsally; with or without a small, slender, acute process at base directed posterodorsally. Flagellum, right side, consisting of a broad, acute process from base directed anteriorly; with an acute process dorsomesad of preceding directed dorsoanteriorly; with a semi-tubular process from base anterior and ventral to preceding with the inner ventral margin and anterior margin produced into an acute process and the outer ventral margin and anterior margin produced into a similar process, the outer anterior margin with the ventral margin produced and rolled mesad into a blunt scoop-like process; with a very small, slender, acute process just visible mesad at midlength of posterior margin of preceding; with a long, slender, process ventrally from base, dentate preapically and slightly constricted and twisted anteapically, directed anteriorly. Parameres each with inner ventral margin convex; apical hook of the right long, acute, directed mesad; the apical hook of the left very short, scarcely produced.

Discussion. *Cedusa praecox* (Van Duzee) was described from two males and two females from Huachuca Mountains, Arizona. Four additional specimens have been dissected from Arizona from the Illinois Natural History Survey collection. The cotype is illustrated. It is in the United States National Museum collection. The lighter color of the head and pronotum may lead to confusion with *Cedusa californica* (Van Duzee). No closely related species have been seen.

Specimens may vary from the illustrations in that the sinistral process of the trifurcate process from the base on the left side of the flagellum may be nearly truncate at apex with the dorsal and anterior margins somewhat angularly produced as in two specimens from Oak Creek Canyon, Arizona, or with the apex convex and with a small, slender, acute process at midlength as in two specimens from the Chiricahua Mountains of Arizona. The preapical lobe on the right of the process that lies alongside and on the shaft has the anterior margin concave in an example from Oak Creek Canyon; and in a specimen from the Chiricahua Mountains, the lobe was wider at base with the apex convex. One specimen from Oak Creek Canyon has many small spines at the apical half of the long process from the dorsal margin.

50. *Cedusa elongata* Caldwell
(Fig. 52)

Cedusa elongata Caldwell 1944b:450.

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin slightly concave; disc depressed; basal corners depressed. Frons width at base equal to width at apex; widest at distance four-fifths its length from vertex; lateral margins slightly concave above and straight below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes about equal to median length; disc with median carina feeble. Labium with apical segment longer than wide, widest at apex. Mesonotum with longitudinal median carina slightly elevated. General color dark yellowish brown, carinae and margins dark brownish yellow.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with an elongate lobe, concave ventrally and anteapically; the apex broadly truncate; with a trifid process at base with a slender curved ramus at posterior margin directed dorsoanteriorly, a slender, acute, horizontal ramus basad and anterior to the preceding directed anteriorly, and a long, tapered, acute ramus at anterior margin directed anterodorsally; with a long thin, curved acute process at base posterior to preceding directed anterodorsally; with a bifurcate process mesad of three-pronged process, the anterior, acute ramus directed dorsally and the posterior acute ramus directed dorsoposteriorly; a very thin acute process from a tubular lobe at dorsum anteapically. Flagellum, right side, with an acute, curved process at base directed anteroventrally; with a convex lobe from ventral margin of main lobe at apical third directed dorsally; with a long, slender, curved, acute process from posterior dorsum directed anteriorly. Paramere with inner ventral margin convex; apical hook small, acute, directed mesoposteriorly.

Discussion. *Cedusa elongata* Caldwell was described from the male holotype from Coatepec, Veracruz, Mexico. The holotype is illustrated. It is in the United States National Museum Caldwell collection. A specimen labeled *Cedusa elongata*, paratype, is in the Ohio State University collection (F.W. Mead, personal communication). No additional specimens have been seen. No related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

51. *Cedusa californica* (Van Duzee)
(Fig. 53)

Lamenia californica Van Duzee 1891:169.

Cedusa californica (Van Duzee), McAtee 1924:181.

Description. Length of male 4.0 to 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin slightly concave; disc slightly depressed. Frons width at base equal to width at apex; widest at distance two-thirds its length from vertex, lateral margins concave above and rectilinear and convergent below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly rounded; length behind eyes greater than median length; disc with median and lateral carinae absent. Mesonotum with longitudinal median carina moderately elevated. Labium with apical segment longer than wide, dark. General color dark yellowish brown with head and pronotum light brownish yellow to yellow, legs brownish yellow, darker at apex.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large oval to rectangular lobe at base the dorsal margin of which bears an acute, curved process directed anterodorsally; with a short, acute, horizontal process at base directed posteriorly; often a very short acute process at posterior margin; main lobe of flagellum elongate with apex greatly produced extending to apodeme and bifurcate anteapically, the left ramus often blunt and curved downward, the right ramus acute, very membranous, directed anteriorly to laterally and ventrally; a long process from base with five processes variable in shape (see illustration); with a scoop-shaped process between the two preceding, very membranous. Flagellum, right side, with a large structure at base bearing four acute processes, three large, and one small arising from beneath the large ventral process, the dorsal process directed dorsoanteriorly, the middle process directed anterodorsally, the ventral process directed anteriorly, the small process directed ventroanteriorly. Paramere with inner ventral margin concave at midlength; apical hook large, curved, acute, directed mesally.

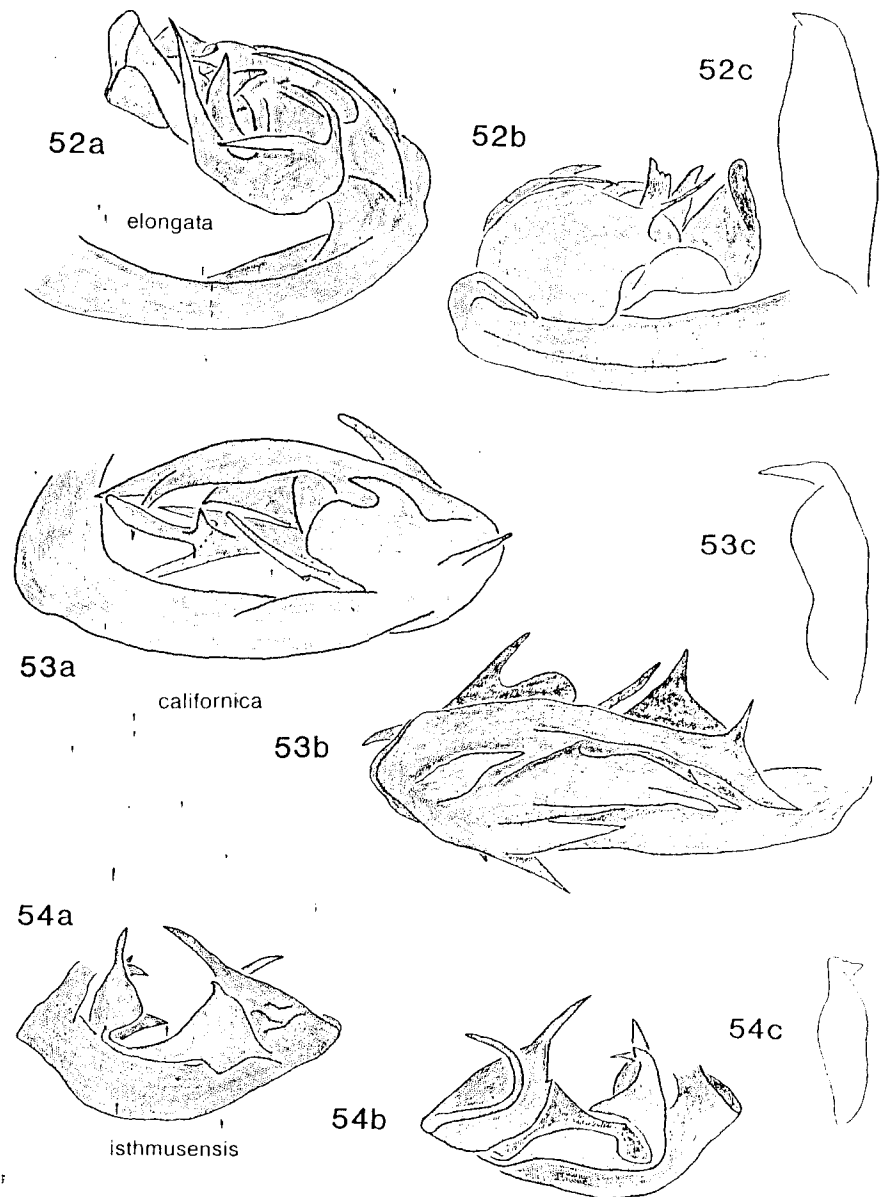
Discussion. *Cedusa californica* (Van Duzee) was described from a series of six males from Los Angeles, California. Additional specimens have been seen from Colorado (1), California (12), Arizona (1) from the North Carolina State University collection; Arizona (46), Utah (1), Idaho (5), Michigan (7) from the California Insect Survey collection. A specimen labeled cotype is illustrated, and it is in the California Academy of Science collection. No closely related species have been seen. *C. californica* (Van Duzee) may be distinguished from all other species in the genus by the shape of the aedeagus, especially by the rectangular process arising at base of flagellum on the left and bearing a stout, curved acute process on its dorsum.

Of the 86 specimens dissected most agree reasonably well with the illustration. In some, the apex of the process with five projections from beneath the main lobe of the flagellum extending almost to the apodeme may have the middle projection bent to the right. The second projection or the middle projection on the left side is absent in specimens from Zion National Park (1), Bliss, Idaho (5), Norman, Oklahoma (2 of 5), and reduced in one more, also a small projection occurs between the middle process (number three) and the middle projection on the right (number four) in two specimens from Norman, Oklahoma. The process at the base of the flagellum on the right side has three large rami and may or may not have a fourth from the ventrobasal margin of the large ventral ramus. This fourth ramus may be so small that it is difficult to see or it may be almost as long as the projection above but it is always very narrow. The apex of the main lobe is often angularly lobed on the right side and very transparent and difficult to see. The angle and orientation of the acute process at the dorsum of the large lobe from the base of the flagellum on the left may vary slightly and shape of the lobe may be more elongate, but both are always present and very distinctive.

52. *Cedusa isthmusensis*, new species
(Fig. 54)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes rounded; length behind eyes equal to median length; disc with median carina slightly elevated. Labium with apical segment longer than wide, dark. General color dark yellowish brown, head and prothorax brownish yellow, eyes, red.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, consisting of an elongate, elbowed, scoop-like process from base lying alongside and on top of the shaft extending almost to apodeme, the ventral margin



Figs. 52-54. Male genitalia. 52, *C. elongata* Caldwell, holotype. 53, *C. californica* (Van Duzee), cotype. 54, *C. isthmusensis*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

angulate at base, the apex with three short processes, one erect, and two directed posteriorly, with a triangular process at its base, the apex of which is somewhat produced into a short, acute, bent process; with a long, acute, process, its basal half broad, its apical half slender, with a small anterior process directed dorsoanteriorly at a forty-five degree angle to shaft. Flagellum, right side, with the right side of the apex of the scoop-like structure with the posterior margin acutely produced horizontally posteriorly at midlength of erect portion; with the dorsal margin of the horizontal portion of the preceding truncately incised at elbow and concavely narrowed at base; with a very long slender, sickle-shaped process arising from base, directed posteriorly. Paramere with outer ventral margin convex in basal two-thirds; inner ventral margin shallowly concave at midlength; apical hook triangular, acute, posterior margin sinuate, directed mesad.

Discussion. *Cedusa isthmusensis*, n. sp., is described from the male holotype from Arraijan, Panama, October 7, 1952 (F.S. Blanton), from the United States National Museum collection. This species appears to be related to *Cedusa costaricensis*, n. sp., and *Cedusa zedusa* Caldwell. It may be separated from all other species in the genus by the shape of the aedeagus.

53. *Cedusa stali*, new species
(Fig. 55)

Description. Length of male 5.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina feeble, straight, obsolete at sides; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc without carinae. Labium with apical segment longer than wide, dark. General color dark blackish brown, tegmina with a short, light yellowish streak at base of radial vein; tegulae dark with margins light yellowish brown; margins of frons and clypeus light yellowish to white; frons with a yellowish brown longitudinal median stripe; median carina of clypeus light yellowish brown; pronotum with margin, except for area behind eyes, and the oblique transverse lateral carinae, light yellowish brown; sides of thorax spotted; legs dark yellowish brown.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, with a somewhat oval lobe from base; with a short, acute, curved process at base directed posteroventrally; with a long, slender, acute, curved process from dorsum at basal third directed anteriorly; with a stout, acute process from dorsum at midlength mesad of preceding; with a long

process from base lying alongside and on the shaft and extending to apodeme, broadest at midlength with the apex T-shaped on the right side, at an acute angle to the shaft. Flagellum, right side, with four processes from base the most dorsal process broad at base, tapered from midlength, acute, and most ventral, broad, acute, slightly decurved, between the two preceding a broader, longer, acute process with the tip upturned, and mesad of the three preceding a very broad process with the acute tip upturned and the anteroventral margin slightly concave. Paramere with inner ventral margin convex; apical hook acute, directed mesally.

Discussion. *Cedusa stali*, n. sp., is described from the male holotype from Nova Teutonia, Santa Caterina, Brazil, December 22, 1952 (F. Plaumann), from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

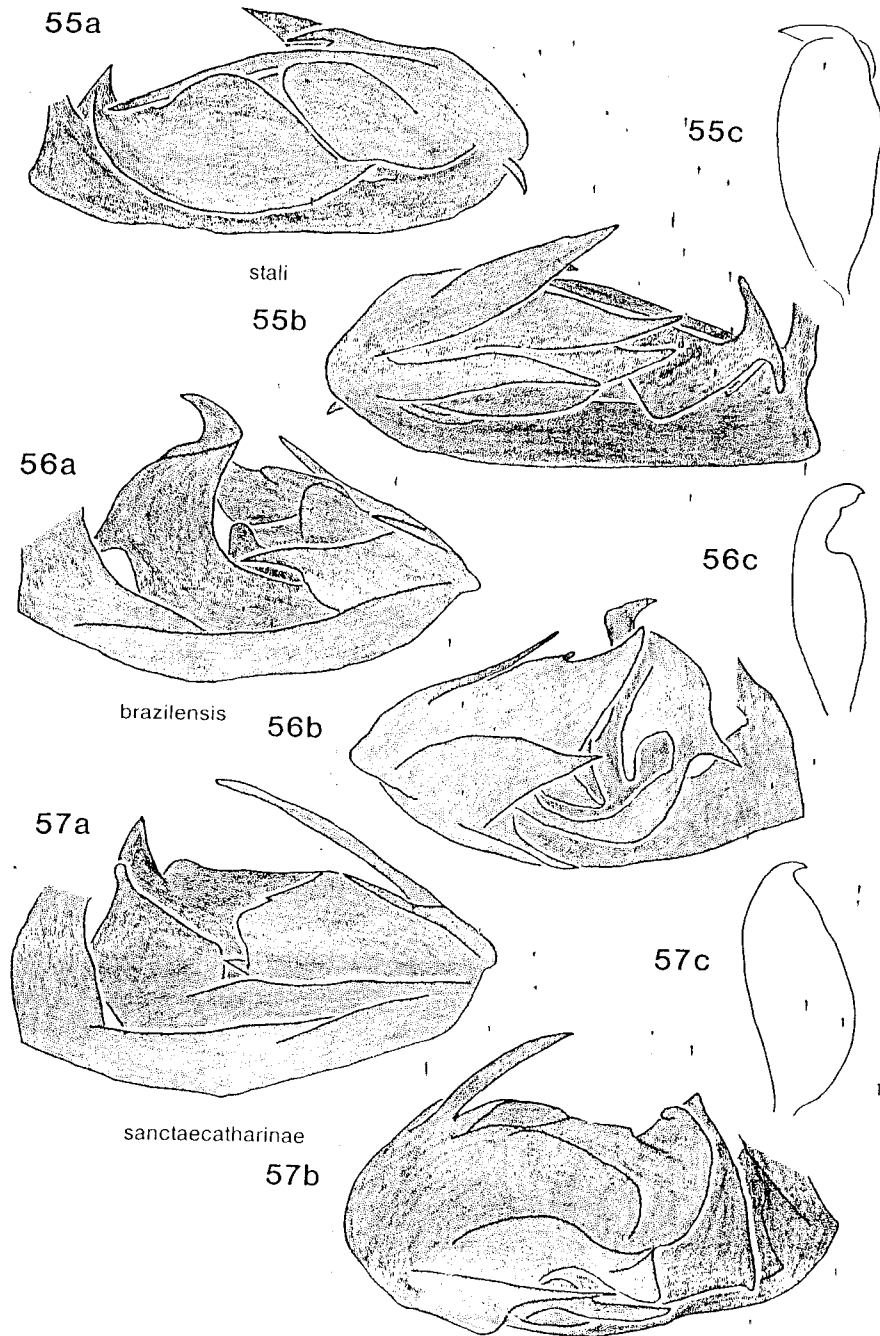
C. stali, n. sp., is closely related to *Cedusa sanctaecatharinae*, n. sp., and *Cedusa ecuadorensis*, n. sp. It can be distinguished from them and all other species in the genus by the shape of the aedeagus, especially by the shape of the apex of the horizontal process from beneath the main lobe of the flagellum.

This species is named in honor of C. Stål, an excellent early worker in the Homoptera and the describer of one of the species in the genus.

54. *Cedusa brazilensis*, new species
(Fig. 56)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin straight. Frons width at base and at apex equal; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown with carinae, margins, legs a lighter yellowish brown.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, consisting of an elongate, curved lobe from base extending almost to apodeme with the apex somewhat twisted preapically, acute, directed anterodorsally and the anterior margin produced into a short, acute projection at level of shaft; with an elongate lobe from base mesad of the preceding, the apex produced acutely (with few features visible from left side); with a broad, elongate, horizontal lobe at base with the anterior and dorsal margins produced into an acute process and with anterior margin dentate below, directed anteriorly and bearing a short, slender, anterodor-



sally directed acute process at dorsoposterior margin. Flagellum, right side, with the ventral margin of sinistral lobe produced laterally and dorsally, appearing navicular and at apical third produced into a stout, curved, sagittate portion directed dorsoposteriorly; the "mesad lobe" (see above) with the ventral and anterior margin scoop-like and anterior and dorsal margin acutely angled, with a slender, curved, acute process on dorsum directed anterodorsally; with a somewhat triangular process at base, the dorsal margin of which is convex, directed anterodorsally; with an acute process from anterior portion of base, ventral of preceding, directed ventroanteriorly. Paramere with inner ventral margin convex in basal three-fourths, angularly concave apical fourth; apical hook triangular, acute, directed mesoposteriorly.

Discussion. *Cedusa brazilensis*, n. sp., is described from the male holotype from Nova Teutonia, Santa Catarina, Brazil, January 21, 1950 (Remett, Plaumann), and male paratypes, same locality, September 9, 1952 (F. Plaumann), May 8, 1950 (Plaumann), January 21, 1950 (Remett, Plaumann), January 29, 1950 (Remett, Plaumann), September 22, 1952 (F. Plaumann), all from the North Carolina State University collection and two paratypes from Parana, Sao Paulo, Brazil, Maringa, May 13, 1961 (N. Marston), from the Kansas State University collection. The holotype is illustrated, and it is on indefinite loan to the United States National Museum.

C. brazilensis, n. sp., is closely related to *Cedusa stali*, n. sp., *Cedusa ecuadorensis* n. sp., *Cedusa sanctaecatharinae*, n. sp., and *Cedusa remetti*, n. sp. It may be distinguished from them and all other species in the genus by the shape of the aedeagus, especially by the shape of the apex of the long process from the base of the flagellum and by the sagittate structure at the apex of same on the right. Specimens may vary from the illustration in that the elongate process at base on the left side may have a roundly convex dorsal margin and may have a somewhat convex lobe basally and the apex may be decurved. The apex of the large elongate curved lobe may be produced laterally to the right and horizontally. The sagittate structure may be more horizontal and a little broader.

55. *Cedusa sanctaecatharinae*, new species
(Fig. 57)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; depressed in middle; basal margin very slightly concave; disc depressed with one longitudinal median depression and two lateral pits; basal corners depressed. Frons width at base greater than width at

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 Figs. 55-57. Male genitalia. 55, *C. stali*, n. sp., holotype. 56, *C. brazilensis*, n. sp., holotype. 57, *C. sanctaecatharinae*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

apex; widest at distance two-thirds its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes slightly convex; length behind eyes greater than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide. General color dark brownish black.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left sides, consisting of a lobe arising from base which is directed anteriorly and long, horizontal, narrow in basal two-thirds, very broad, pentagonal in apical third, its dorsal angle narrowed preapically, apex blunt; with a large, elongate, horizontal lobe from base, the anterior margin convex with a small process at apical third and larger, acute, horizontal process at base; with bifid process from dorsum at base directed anterodorsally, the sinistral ramus short, acute, the dextral ramus long, slender, and acute. Flagellum, right side, of an elongate lobe from base with the dorsal and anterior margins angularly produced into a blunt apex and with a small process twisted at very apex, the anterior margin convex, the anterior and ventral margins bluntly produced at junction, the ventral margin rolled outward and upward somewhat and dorsal margin convex; with the anterior margin of large lobe on left side convex and at the junction with the ventral margin slightly lobate; with a broad, blunt, horizontal process from base directed anteriorly; with an acute, horizontal process from base, posterior to preceding, basal half broad, apical half tapered, directed anteriorly. Paramere with inner ventral margin convex; apical hook small, curved, acute, directed mesad.

Discussion. *Cedusa sanctaecatharinae*, n. sp., is described from the male holotype from Nova Teutonia, Santa Catarina, Brazil, October 3, 1952 (Remett, F. Plaumann), and five male paratypes, same locality, September 26, 1952 (F. Plaumann), October 2, 1952 (2) (F. Plaumann), September 11, 1959 (Plaumann), and September 9, 1950 (Plaumann), all from the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

C. sanctaecatharinae, n. sp., is related to *Cedusa stali*, n. sp., *Cedusa ecuadorensis*, n. sp., *Cedusa remetti*, n. sp., and *Cedusa brazilensis*, n. sp. It may be distinguished from all other species in the genus by the shape of the aedeagus. Specimens may vary in the amount of dentation on the large lobe at base on the right and in one specimen the apex of the other lobe from the base was curled over the apex of the large lobe on the right.

56. *Cedusa flavida* (Van Duzee)
(Fig. 58)

Lamenia flavida Van Duzee 1907:36.
Cedusa flavida (Van Duzee), McAtee 1924:181.

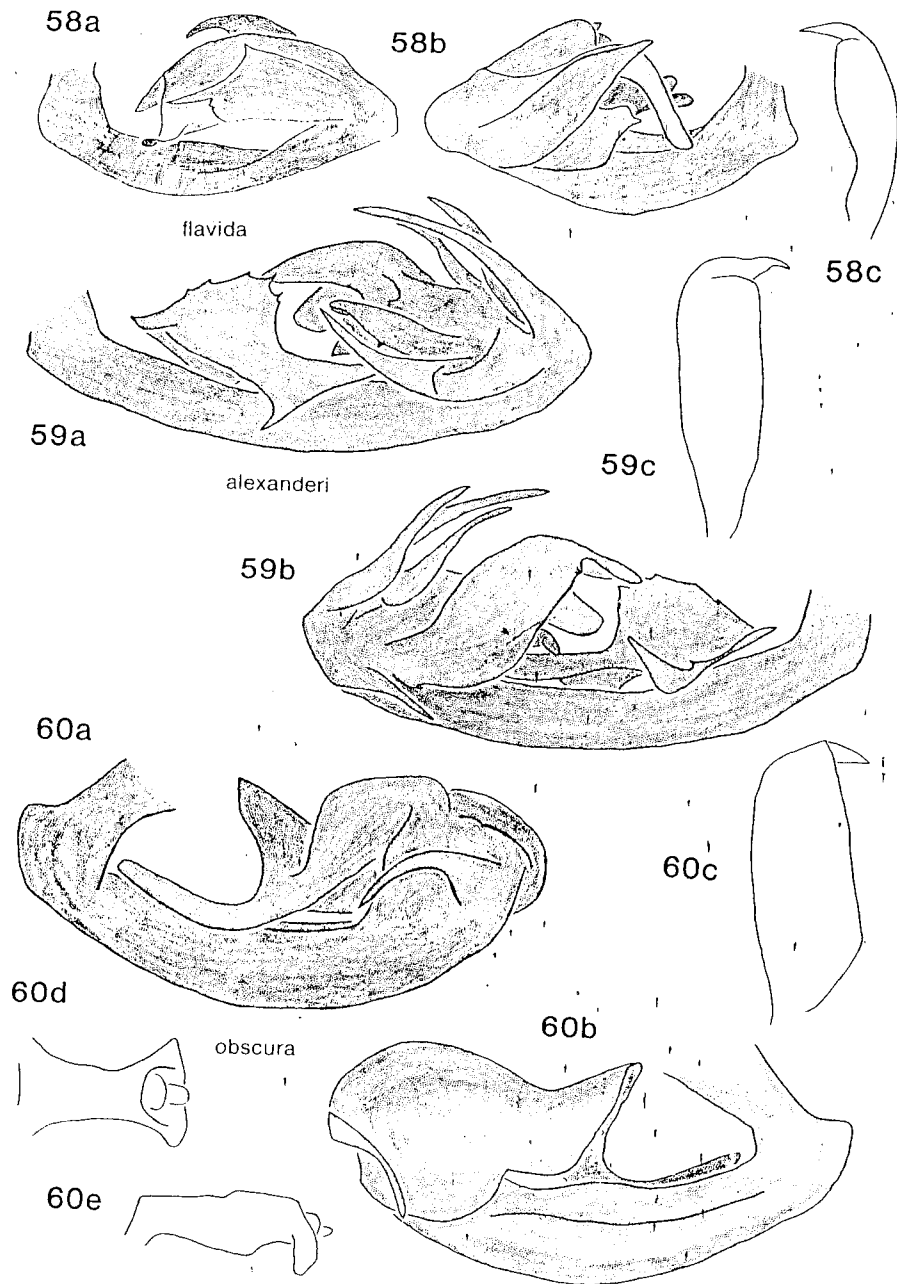
Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated; basal margin moderately concave; disc depressed. Frons width at base less than width at apex; widest about two-thirds its length from vertex, sides concave above, straight convergent below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length about equal to that of vertex; anterior margin between eyes broadly convex; length behind eyes slightly greater than median length; disc with lateral carinae feeble. Labium as long as wide. Mesonotum with longitudinal median slightly elevated, longitudinal lateral carinae feeble. General color faded yellow, mesonotum light yellowish brown.

Male genitalia. Aedeagal shaft curved and without processes. Flagellum, left side, with flat lobe arising near base, a small angular projection on at midlength of its dorsal margin, anterior margin slightly and acutely produced; main lobe of flagellum hood-like, anterior margin concave, flap-like at its junction with left ventral margin. Flagellum, right side, with a broad process acute at apex; with a very broad process, somewhat bird-like in outline mesad of and below the preceding; anterior and right ventral margins of main lobe produced into a long, slender, decurved, blunt projection. Paramere with inner ventral margin concave at basal third; apical hook moderately long, acute.

Discussion. *Cedusa flavida* (Van Duzee) was described from four specimens from Mandeville, Jamaica, British West Indies. The holotype is illustrated. It is in the United States National Museum. No additional specimens have been seen. It does not appear that there are any known closely related species in the genus. *C. flavida* may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

57. *Cedusa alexanderi*, new species
(Fig. 59)

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina feeble; basal margin slightly concave; disc with one median longitudinal and two lateral depressions; basal corners depressed. Frons width at base slightly less than width at apex; widest at distance three-fourths its length from vertex; lateral margins concave above and convex below widest portion; disc depressed in entire length, shallowest at eye level. Gena with genal ridge moder-



Figs. 58-60. Male genitalia. 58, *C. flavida* (Van Duzee), holotype. 59, *C. alexanderi*, n. sp., holotype. 60, *C. obscura* (Ball), cotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view; d, anal tube, dorsal view; e, same, left lateral view.

ately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length equal to that of vertex; anterior margin between eyes broadly rounded; length behind eyes greater than median length; disc with median carina slightly elevated. Labium with apical segment longer than wide. Mesonotum with longitudinal carina slightly elevated, longitudinal lateral carinae feeble. General color brownish black to black with carinae and margins light yellowish brown; metathoracic pleura with reddish tinge; with bluish pulverulence on body and wings.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with three acute processes from dorsoposterior margin directed dorsoanteriorly, the sinistral the longest, curved, the middle somewhat broad at base, decurved, the dextral similar in shape to preceding; with an acute, tapered, curved process from base directed anterodorsally; with a broad, blunt, somewhat decurved process from base mesad of preceding directed nearly anteriorly; main lobe elongate with ventral margin concave, apex bluntly produced; with a long, horizontal process from base lying along shaft, extending almost to apodeme, with apex enlarged, acute; anterior, dorsal and ventral margins dentate, ventral margin with an acute projection at midlength. Flagellum, right side, main lobe with ventral margin deeply scalloped antepically, basal third convex; with long process arising from beneath preceding with ventral margin flared antepically, dentate and acutely produced at apical third directed laterodorsoposteriorly; with a curved, tapered, acute process from base directed anteroventrally. Paramere with inner ventral margin almost straight, ventral surface narrowed basal fourth; apical hook very acute, slightly curved antepically directed mesad.

Discussion. *Cedusa alexanderi*, n. sp., is described from the male holotype from Nova Teutonia, Santa Caterina, Brazil, January 20, 1950 (Remett, Plaumann), and a male paratype, same locality, September 9, 1952 (F. Plaumann), both from the North Carolina State University collection. The holotype is illustrated, and it is on indefinite loan to the United States National Museum.

C. alexanderi, n. sp., appears to be related to *Cedusa plaumanni*, n. sp. Two small spines are located subdorsally on the left side of the large lobe at about midlength in the paratype. This species may be distinguished from all other species in the genus by the cockcomb-like apex of the long process from beneath the main lobe of the flagellum.

This species is named in honor of the late Dr. Charles P. Alexander, renowned dipterist and teacher.

58. *Cedusa obscura* (Ball)
(Fig. 60)

Lamenia obscura Ball 1902:262.

Herpis obscura (Ball), Muir 1918:415.

Cedusa fedusa McAtee 1924:183.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave; basal margin slightly concave. Frons width at base less than width at apex; widest at distance six-sevenths its length from vertex. Gena with genal ridge moderately elevated between frontogenal ridge and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes less than median length; disc with median and lateral carinae feeble. Labium with apical segment as long as wide, dark. General color shiny black with carinae and margins often yellowish brown.

Male genitalia. Aedeagal shaft curved. Shaft, left side, apex with a curved process broad at base directed forward and downward. Flagellum, a saddle-like hood reflexed at apex of shaft, left side, with anteroventral margin produced into a slender curved process reaching almost to apodeme. Flagellum, right side, with a curved process arising at base directed downward and forward. Paramere with inner and outer ventral margins subparallel; apical hook triangular. Anal tube with apex in dorsal view flared, in lateral view often pendulant.

Discussion. *Cedusa obscura* (Ball) was described from twenty-two specimens taken from Greeley, Colorado, the type locality, and two from Haw Creek and Lake Worth, Florida. Additional specimens have been dissected from Georgia (10), Cuba (3), North Carolina (13), Florida (56) in the North Carolina State University collection; Illinois (10), locality unknown (2), in the Illinois Natural History Survey collection; Georgia (2), Kansas (2), Florida (10), Michigan (14), Wisconsin (3), Virginia (1), Maine (1), Connecticut (1), California (1), in the University of Kansas collection. This is probably one of the widest ranging species in the genus. The lectotype is illustrated, and it is in the United States National Museum collection. The aedeagus is almost a mirror image of the aedeagus of *Cedusa delongi* Caldwell. This species may be distinguished from all other species in the genus by the shape of the aedeagus, paramere, and anal tube.

Forty-two specimens were dissected which are similar to the illustration. These were from Illinois, Florida, North Carolina, Maine, Mississippi, Wisconsin, Michigan, Kansas, Georgia, and Connecticut. Thirty-three specimens dissected from Florida, North Carolina, Michigan, Georgia, Louisiana, Virginia, and California in which the apical fourth of the flagellum is produced dorsally into a somewhat crown-like structure, the long thin process from the anterior and ventral margins is more

curved, directed at a right angle to the shaft and the entire flagellum is canted to the right so that the curved process is practically horizontal and directed laterally, and the crown-shaped structure is lateral. Three specimens from Cuba, two from Mississippi, and one from North Carolina have the right side of the flagellum extending almost to the apodeme. The apex of the anal tube may or may not be pendulant and it may be concavely emarginate producing the effect of two processes which may be blunt or acute.

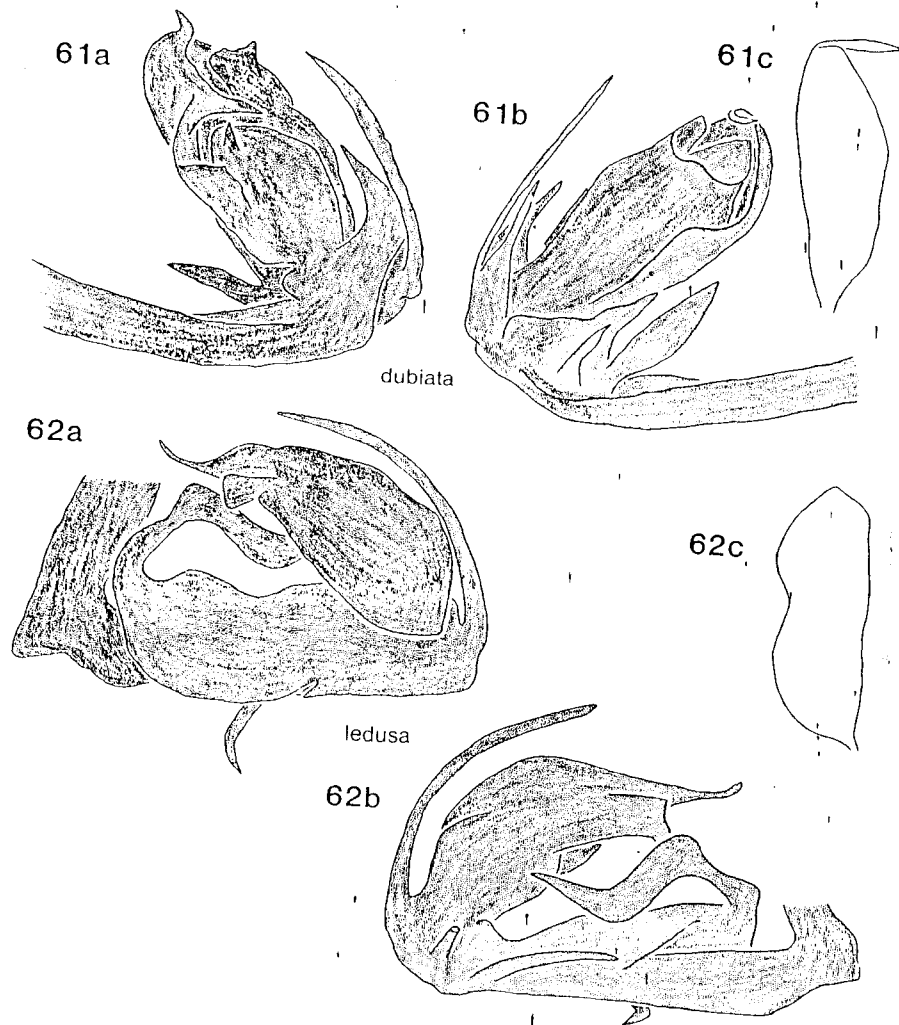
Ball (1928:200) placed *Cedusa tedusa* McAtee in synonymy under *C. obscura* Ball, an erroneous disposition (see *C. vulgaris* (Fitch) above).

59. *Cedusa dubiata* Caldwell
(Fig. 61)

Cedusa dubiata Caldwell 1944b:450.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, straight, obsolete at sides; basal margin straight; disc depressed. Frons width at base less than width at apex; lateral margins slightly concave above and straight, slightly convergent below widest portion; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina moderately elevated. Labium with apical segment longer than wide. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown with carinae and margins brownish yellow.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large complex, elongate lobe the apex of which gives rise to a Y-shaped process which extends basad with the arms acute, the sinistral ramus directed posteriorly, the dextral ramus curved and directed anteriorly; with a subrectangular lobe at midlength, bearing a short acute process directed anterodorsally; with two basal processes, one broad at base, the other very long, slender process posterior to preceding, both directed anterodorsally and acute apically. Flagellum, right side, with an elongate tubular structure, open at apex lying partly within a longer somewhat boat-like structure, both directed anterodorsally; with three acute processes at anterior portion of base directed anterodorsally, the anterior process broad, knife-like, a shorter process, constricted at basal third and anteapically posterior to preceding and a large somewhat triangular process mesad of the last; with moderately long, acute process at posterior portion of base, broad at base, narrowed at midlength, directed dorsoanteriorly. Paramere with inner ventral margin convex; broadest at midlength; apical hook long, narrow, acute, at a right angle to the main axis of the paramere.



Figs. 61-62. Male genitalia. 61, *C. dubiata* Caldwell, holotype. 62, *C. ledusa* McAtee, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

Discussion. *Cedusa dubiata* Caldwell was described from the male holotype from Tamazunchale, San Luis Potosi, Mexico, and a female allotype and male and female paratypes, same data, a male topotypic paratype, a male paratype from Finca Aurora (a coffee plantation), Chiapas, Mexico, and one from Chetla, Puebla, Mexico, SE from Matamoros Izucar, altitude approximately 1,300 m swept from *Taxodium* sp., and shrubs along the Nexapa River. No additional specimens have been

seen. The holotype is illustrated. It is in the United States National Museum Caldwell collection. This species may be related to *Cedusa australis* (Metcalf). It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

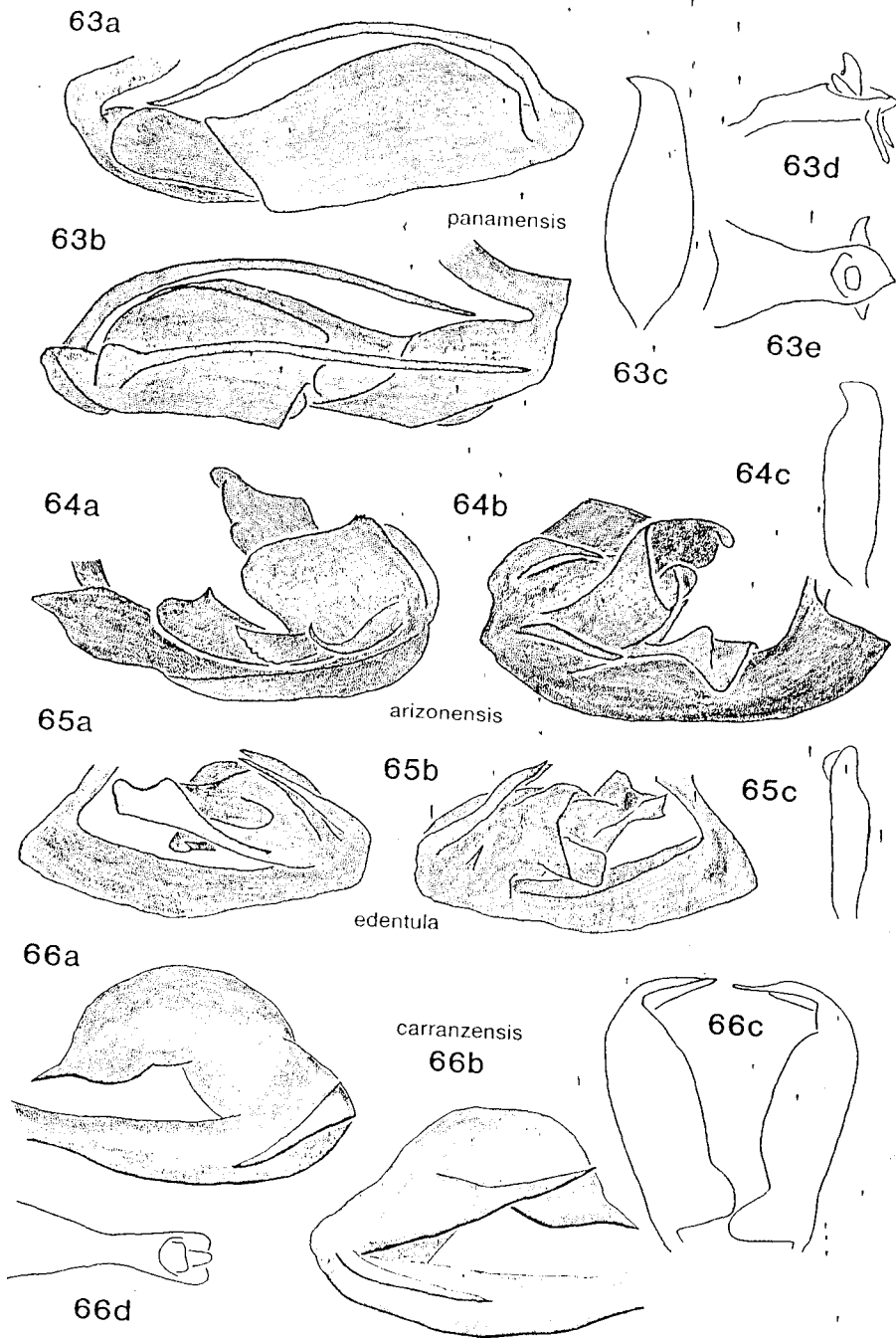
60. *Cedusa ledusa* McAtee
(Fig. 62)

Cedusa ledusa McAtee 1924:184.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, straight; basal margin slightly concave. Frons width at base less than width at apex widest at distance five-sixths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes less than median length; disc with carinae absent. Labium with apical segment longer than wide, dark. General color dark yellowish brown, veins of tegmina darker.

Male genitalia. Aedeagal shaft straight. Flagellum, left side, consisting of a large, elongate, somewhat triangular lobe, produced apically into a slender, upturned process and bearing at apical fourth a short, broad, subtruncate ventrolateral process which is directed anterodorsally with a very long, slender, acute process from apex of shaft directed dorsoanteriorly over the remainder of flagellum with a long, horizontal process from apical third of shaft, broad at basal half, directed anteriorly over basal half of shaft, extending to apodeme, becoming narrowed, curving dorsally, laterally and then posteriorly becoming broader, sinuate, tapered preapically, apex acute with a slender, acute process arising at apex of shaft, horizontal in basal portion then curving ventrally at midlength of shaft and its apex preapically curved and directed ventroposteriorly. Flagellum, right side, with a short, blunt process (probably broken in holotype) at base directed dorsoanteriorly; with a moderately long, curved acute process at base, anterior to preceding, directed anteriorly. Paramere with inner ventral margin concave at midlength; apex obtusely angular; apical hook absent.

Discussion. *Cedusa ledusa* McAtee was described from the male holotype and female allotype taken in Manos, Brazil. One additional specimen has been dissected, also from Brazil, from the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum collection. No related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The one additional specimen does not vary from the illustration.



61. *Cedusa panamensis*, new species
(Fig. 63)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides; basal margin slightly concave. Frons width at base greater than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carinae and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina feeble, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color very dark pitch black.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, with a large, elongate, hood-like lobe lying along shaft and with a very long, slender, acute, curved process at base directed forward over lobe. Flagellum, right side, with a very long, thin, acute, horizontal process lying alongside hooded lobe and shaft, extending to base of latter. Paramere with inner ventral margin convex in basal two-thirds; apical hook small, acute; anal tube acutely tipped with two subapical processes from ventral surface.

Discussion. *Cedusa panamensis*, n. sp., is described from the male holotype form Portrerillos, Panama, April 25, 1935. The holotype is illustrated and from the North Carolina State University collection. It is on indefinite loan to the United States National Museum. This species can be distinguished from all other members of the genus by the shape of the aedeagus, especially by the two long, slender processes and the shape of the apex of the anal tube. On the basis of the presence of processes at the apex of the anal tube, this species appears to be related to *Cedusa neodigitata* Caldwell and *Cedusa digitata* Caldwell, but differs from them in that it lacks the finger-like process on the paramere.

62. *Cedusa arizonensis*, new species
(Fig. 64)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base greater than width at apex; widest at distance one-half its length from vertex; lateral margins concave above and straight below

Figs. 63-66. Male genitalia. 63, *C. panamensis*, n. sp., holotype. 64, *C. arizonensis*, n. sp., holotype. 65, *C. edentula* (Van Duzee), holotype. 66, *C. carranzensis* Caldwell, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, left lateral view; e, same, dorsal view.

widest portion; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc without carinae. Labium with apical segment longer than wide, dark. General color dark yellowish brown with carinae and margins yellowish brown.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a large basal rectangular lobe the posterior dorsal margin of which is dentate; with a tapering, curved, acute process at base directed anteriorly; with a broad, curved process, anterior to the preceding, the anterior margin of which is dentate; with a long, blunt, process from beneath large lobe lying alongside and on top of the shaft extending almost to apodeme and with a lateral, antepical ridge; a large, somewhat triangular process above dorsal margin of large lobe the features of which are more easily seen from the right side. Flagellum, right side, with a long, broad, curved, tubular process from the anterior portion of the base with the left dorsal and anterior margins produced into a very short, blunt, pedulant projection, the ventral surface and ventral anterior margin concave; with a curved, acute process arising from posterior margin at midlength, directed anteriorly; with an acute, horizontal process at base directed anteriorly. Paramere with inner ventral margin convex; apical hook moderate in size, moderately acute.

Discussion. *Cedusa arizonensis*, n. sp., is described from the male holotype from Santa Rita Mountains, Arizona, August 18, 1935 (R.H. Beamer). The holotype, which is illustrated, is in the University of Kansas collection.

C. arizonensis, n. sp., displays several similarities to *Cedusa vulgaris* (Fitch). It can readily be distinguished from it and from all other species in the genus by the shape of the aedeagus, especially by the shape of the main lobe. The paratype differs from the illustration in that the posterior process at the base of the flagellum on the left side is longer, less curved, more tapered, in that the process anterior to the preceding is with dorsal margin more convex preapically and more dentate and in that the process from the posterior margin at midlength on the right side is not present.

63. *Cedusa edentula* (Van Duzee)
(Fig. 65)

Lamenia edentula Van Duzee 1912:503.

Herpis edentula (Van Duzee), Metcalf 1923:165.

Cedusa edentula (Van Duzee), McAtee 1924:181.

Description. Length of male 3.2 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides; basal margin almost straight; disc depressed.

Frons width at base greater than width at apex; widest at distance two-thirds its length from vertex; sides concave above, straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes slightly greater than median length; disc with carinae absent. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color light yellowish brown.

Male genitalia. Aedeagal shaft somewhat curved, basal half thicker. Flagellum, left side, with a moderately long, needle-like process at base; apex of flagellum reaching almost to apodeme, scoop-shaped with left side higher than right, dorsal margin shallowly concave subapically. Flagellum, dorsum, at base a median needle-like process equal in length to those on each side. Flagellum, right side, with scoop-like structure reaching almost to apodeme, its right side lower than left; with a large somewhat rectangular lobe from base with its anterior and ventral margins produced into an inrolled rectangular process which is directed anteroventrally; with a moderately long, sinuate, acute process at base and a short, spine-like, basal process on lower right portion. Paramere with inner ventral margin concave subapically; inner and outer ventral margins subparallel; apical hook absent.

Discussion. *Cedusa edentula* (Van Duzee) was described from a series of seven specimens of both sexes from Austell, Georgia, and one female from Riverton, New Jersey. Additional specimens have been seen from North Carolina (5) in the North Carolina State University collection; Virginia (1) in the Illinois Natural History Survey collection and North Carolina (3) in the Florida Division of Plant Industry collection. The holotype is illustrated. It is in the United States National Museum collection. No closely related species have been seen.

The illustration of the type is unusual in that generally the right side of the rather dentate process from the base on the left is not turned up, but is in one plane, with the ventral margin regularly concave in apical half and often astride the shaft. The dentations of the preceding process also vary and may in some specimens be almost absent. This same structure in a specimen from Memphis, Tennessee, was angularly lobed on the right side, the lobe folded upward and its apex was deeply, narrowly incised. One specimen from five miles west of Selma, Tennessee, had the ventral margin of this same structure acutely emarginate preapically.

64. *Cedusa carranzensis* Caldwell
(Fig. 66)

Cedusa carranzensis Caldwell 1944b:449.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave medially; basal margin slightly concave; disc depressed laterally. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; lateral margins concave above and straight, subparallel below widest portion; disc depressed through entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length equal to or slightly greater than that of vertex; anterior margin between the eyes straight; length behind eyes equal to median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment as long as wide, narrower than anteapical segment, dark. Mesonotum with longitudinal median carina slightly elevated, lateral carinae feeble. Labium with apical segment as long as wide, narrower than anteapical segment, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown with antennae, subantennal plate, legs, margins of pronotum, frons, and vertex whitish yellow.

Male genitalia. Aedeagal shaft slightly curved. Shaft, left side, without processes. Shaft, right side, with a moderately long, aciculate process at apex directed anteriorly. Flagellum simple, bulbous, apex produced to a point. Flagellum, right side, with a long, broad-based, narrowly triangular process at base directed anterodorsally. Paramere with inner ventral margin asymmetrically lobed at base, convex at midlength; apical hook large, curved mesad, narrow, acute. Anal tube with posterior margin concave.

Discussion. Caldwell described *Cedusa carranzensis* from the male holotype and paratypes from Mexico, the type locality being Jesus Carranza, Veracruz. Other localities were Schilipa, Oaxaca and La Forestal, Veracruz. Additional specimens have been dissected from British Honduras (27) and Guatemala (1) in the North Carolina State University collection. The holotype is illustrated and in the Caldwell collection in the United States National Museum. *Cedusa carranzensis* may be distinguished from all other species in the genus by the shape of the aedeagus, parameres, and anal tube. It is related to *Cedusa simplex*, n. sp., *Cedusa zeteki*, n. sp., and *Cedusa dietzi*, n. sp. Individual specimens vary from the illustration in that the flagellum may be more or less produced and more erect; the process on the right side of the flagellum may be more erect; the process on the left may be more slender.

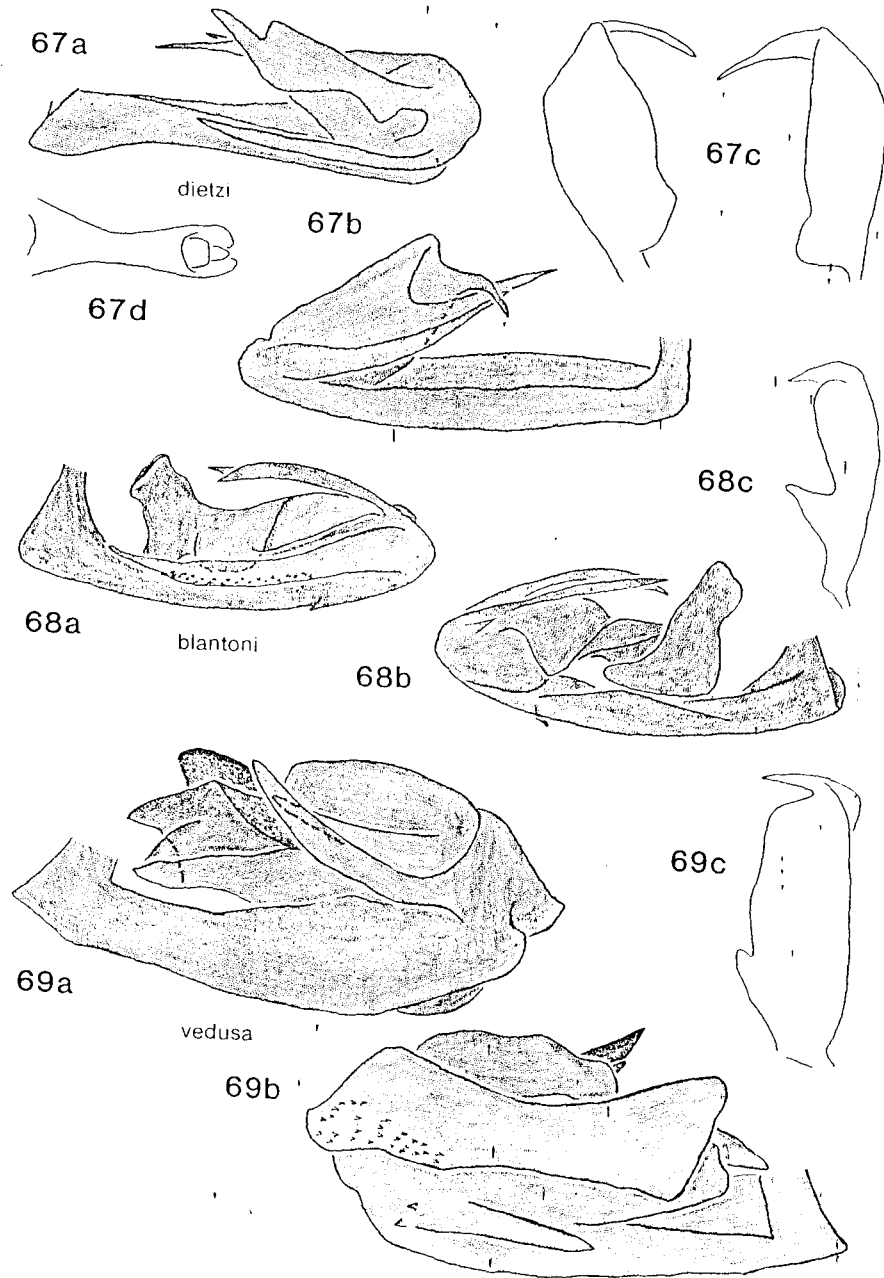
(Fig. 67)

Description. Length of male 3.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, moderately convex; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal ridge and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes less than median length; disc with median carina feeble. Labium with apical segment wider than long, dark. General color dark yellowish brown, thorax with tinge of red.

Male genitalia. Aedeagal shaft straight. Flagellum, left side, with an elongate hood-like lobe, the left ventral and anterior margins of which are produced into a curved process which is abruptly narrowed anteapically; with a very long, slender, horizontal, acute process arising at base. Flagellum, right side, with the right ventral and anterior margins of the hood-like lobe produced into a long, slender, acute process; with a long, slender, tapering, acute process at base directed anterodorsally. Paramere with inner ventral margin asymmetrically lobate at base, slightly concave in basal half, convex in apical half; apical hook long, slender, acute, extending mesad and slightly anteriorly. Anal tube longer than in most other species, constricted at midlength in dorsal view, posterior margin notched.

Discussion. *Cedusa dietzi*, n. sp., is described from the male holotype from Frijoles, Panama Canal Zone, Panama, October 23, 1916, G 291, (Dietz and Zetek); four male paratypes from Plantation Barracho, Panama Canal Zone, July 10, 1918 (H.F. Dietz and J. Zetek), swept from grass under papaya trees; one male paratype from Flat Rock, 1 mile above Juan Mina, Chilibre River, Republic of Panama, A 586, August 24, 1918 (H. Morrison); one male paratype, Ancon Hospital Grounds, Ancon, Panama Canal Zone, July 22, 1916 (H.F. Dietz); and one male paratype, Juan Mina Citrus plantation, b 200, August 24, 1919 (H.F. Dietz, J. Zetek), all from the United States National Museum collection. In two of the four specimens from Borracho, there is a suggestion of a very small dorsal, median projection at the apex of the flagellum. This species appears to be related to *Cedusa zeteki*, n. sp., *Cedusa simplex*, n. sp., and *Cedusa carranzensis* Caldwell. It may be distinguished from them and all other species in the genus by the shape of the aedeagus, parameres and anal tube. The holotype is illustrated and in the United States National Museum.

This species is named in honor of H.F. Dietz, the collector of this and several other new species.



Figs. 67-69. Male genitalia. 67, *C. dietzi*, n. sp., holotype. 68, *C. blantoni*, n. sp., holotype. 69, *C. vedusa* McAtee, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; d, anal tube, dorsal view.

66. *Cedusa blantoni*, new species
(Fig. 68)

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at side, basal margin slightly concave; disc slightly depressed. Frons width at base greater than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown with margins and carinae whitish yellow.

Male genitalia. Aedeagal shaft slightly curved. Shaft, left side, with a small acute process at apical third of ventral margin. Flagellum, left side, with an elongate, twisted, process, the apex irregularly T-shaped with crosspiece truncate on left side, produced posteriorly on right side; with two long, thin tapered processes, shorter than the above, extending anteriorly from the base, the sinistral process slightly curved, the dextral straight; with a very long, horizontal, acute process arising from the base and with microsetae on lateroventral surface. Flagellum, right side, with a small, triangular process at base beneath origin of the two long, slender processes described above. Paramere with inner ventral margin produced into a thumb-like process at basal third; apical hook large, acute, triangular, directed mesally.

Discussion. *Cedusa blantoni*, n. sp., is described from the male holotype and one male paratype, both from Arraijan, Panama, October 7, 1952 (F.S. Blanton) in the United States National Museum collection. The holotype is illustrated. No closely related species have been seen.

The small process at base on the right side is a little wider in the paratype. The paratype does not differ otherwise from the illustration. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

This species is named in honor of Dr. F.S. Blanton, the collector of this and several other species new to science.

67. *Cedusa vedusa* McAtee
(Fig. 69)

Cedusa vedusa McAtee 1924:185.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin straight; disc depressed; basal corners depressed. Frons width at base less than width at apex; widest at distance one-half its length from vertex; disc depressed in

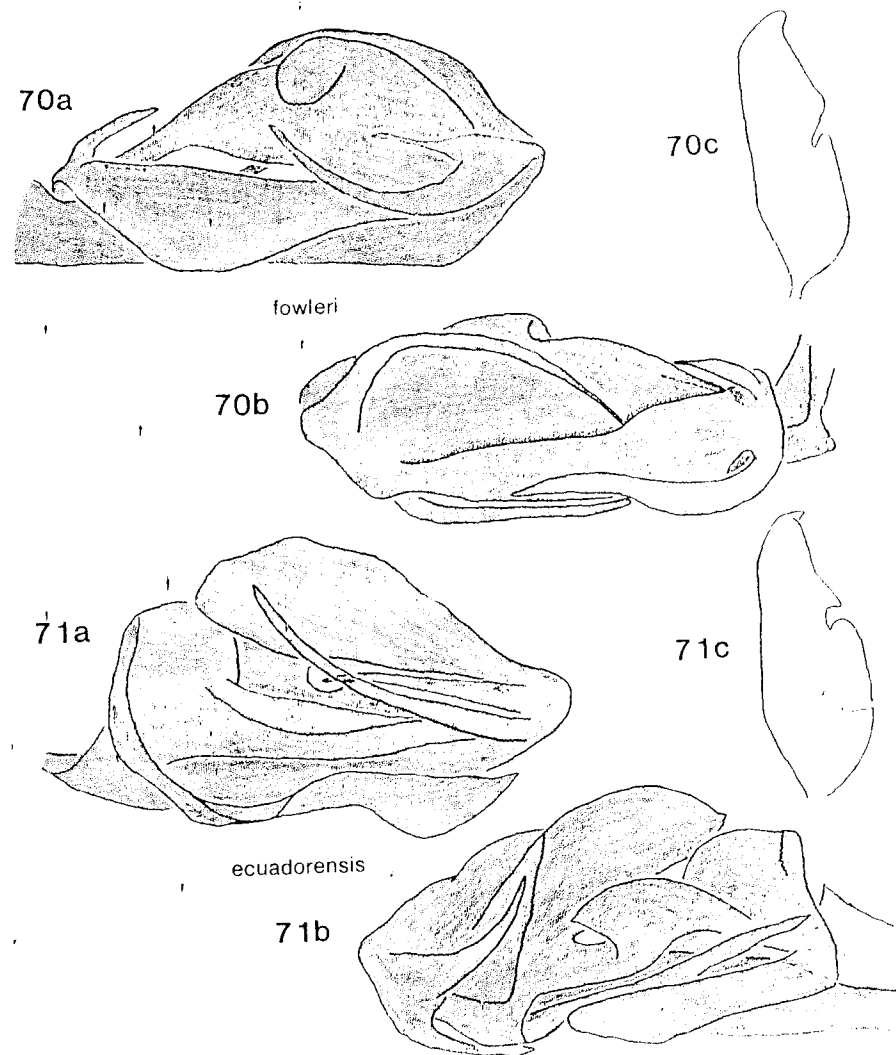
entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length; disc with median carina slightly elevated, lateral carina feeble. Labium with apical segment longer than wide. General color dark yellowish brown with carinae, margins, venter, and legs light brownish yellow.

Male genitalia. Aedeagal shaft slightly curved, thicker apically. Flagellum, left side, with a large elongate lobe the apex of which is shallowly forked, reaching almost to apodeme, right ramus short, thick, the left ramus depressed dorsally, with a long, moderately thick, arising at base, process curved anteriorly and dorsally; with a shorter process mesad of preceding. Flagellum, right side, with a large quadrilateral process originating from base with microsetae on basiventral surface, slightly constricted at midlength; with a thick, acute, horizontal process with two very small denticles at its base ventral to large process described above. Paramere with a small lobe at basal third of inner ventral margin, somewhat concave more distally; apical hook large, thin, acute, directed mesally.

Discussion. *Cedusa vedusa* McAtee was described from the male holotype thought to have been from Mexico. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum collection. Caldwell (1944b:445), in his paper on *Cedusa* in Mexico and Central America, is not clear as to whether he considered *Cedusa vedusa* McAtee a doubtful species in the genus or whether he doubted it came from Mexico. He includes it in his paper and states that it runs to *Cedusa mexicana* Caldwell in the key. No related species have been seen. This species may be separated from all other species in the genus by the shape of the aedeagus and paramere.

68. *Cedusa fowleri*, new species
(Fig. 70)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length; median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown.



Figs. 70-71. Male genitalia. 70, *C. fowleri*, n. sp., holotype. 71, *C. ecuadorensis*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with an elongate lobe acutely produced at apex and with an oval structure dorsally at midlength; with a bifurcate process at base, the upper ramus thin, horizontal, abruptly narrowed at basal fourth, directed anteriorly, the lower ramus crescentiform, longer, acute, directed dorsoanteriorly in its apical half; with a long horizontal process from base extending to

apodeme lying alongside and on the shaft, the left side broadest at midlength, the apex produced into an acute, curved process directed dextrally and dorsoposteriorly. Flagellum, right side, with the long horizontal process produced laterally at apex into a long, slender, process, directed posteriorly; with a long, thin, curved, acute process from the base, directed ventroanteriorly. Paramere with inner ventral margin obliquely incised at midlength; apical hook small, blunt, directed mesally and posteriorly.

Discussion. *Cedusa fowleri*, n. sp., is described from the male holotype from Los Amates, Guatemala, October 1930 (Kellerman), and a male paratype from Morales, Guatemala, October 1930 (J.J. White), from the North Carolina State University collection; a male paratype from El Zapote, Chiapas, Mexico, November 13, 1930 (M.F. 1835); a male paratype from Teapa, Tabasco, Mexico (H.H.S.); also with labels Biol C-A and *Cedusa funesta* F.W.; the female allotype is on the same point, from the United States National Museum collection. The holotype is on indefinite loan to the United States National Museum. The specimen from Teapa is illustrated.

C. fowleri, n. sp., was illustrated as *Cedusa funesta* Fowler by Caldwell (1944b: Pls. VIII, X). No related species have been seen. In two paratypes the long, thin, curved, acute process from the base of the flagellum on the right side was directed forward on the left side of the flagellum. In one, the upper ramus of the bifid process on the left at base was thinner and the lower ramus longer. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

This species is named in honor of Canon W.W. Fowler, the describer of the genus.

69. *Cedusa ecuadorensis*, new species
(Fig. 71)

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides; basal margin sinuate. Frons width at base greater than width at apex; widest at distance two-thirds its length from vertex, lateral margins concave above and straight, convergent below widest portion, slightly constricted at frontoclypeal suture; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes straight; length behind eyes greater than median length; disc with median carina slightly elevated. Labium with apical segment longer than wide, dark. General color very dark yellowish brown to almost black.

Male genitalia. Aedeagal shaft straight. Flagellum, left side, consisting of an elongate, triangular lobe from base, dorsally, its apex somewhat blunt and its dorsal margin convex with small undulation; with a very long, slender, curved, acute process from base; with a shorter, acute, tapered process from base dorsad and mesad of preceding; with a long, large process from anterior base directed anteriorly, extending almost to apodeme, astride the shaft, its basal two-thirds narrow, stalk-like, its apex bulbous and with a long acute process from the lateroanterior margin directed ventrodorsally in basal third, then turning posterior alongside and parallel to shaft, its margins sinuate, enlarged antepically. Flagellum, right side, with the ventroanterior portion of the apex of the structure lying astride the shaft produced into a broad, blunt, near horizontal process directed posterior alongside the shaft, and with a large acute process at midlength directed posteriorly, its dorsal margin convex, its posterior margin concave; with a bifid process at base, the upper ramus broad at base, tapered, curved, acute, directed dorsoanteriorly, the lower ramus, shorter, slender, acute, directed anteriorly; with a very long, slender, acute, bisinuate process from base, anterior to preceding, directed anterodorsally between the two processes on the structure astride shaft (illustrated aedeagus damaged during dissection).

Paramere with inner ventral margin truncately incised at apical third, apical hook small, acute, directed mesad (illustrated paramere damaged during dissection).

Discussion. *Cedusa ecuadorensis*, n. sp., is described from the male holotype from Balzapamba, Ecuador, 700 m, May 27, 1938 (Wm. Clarke-Macintyre) from the North Carolina State University collection. The holotype is illustrated and is on indefinite loan to the United States National Museum. This species is apparently related to *Cedusa stali*, n. sp., *Cedusa braziliensis*, n. sp., *Cedusa sanctaecatharinae*, n. sp., and *Cedusa remetti*, n. sp. It can readily be distinguished from them and from all other species in the genus by the shape of the aedeagus, especially by the long, broad, blunt process from the right apex of the horizontal process from the base of the flagellum.

70. *Cedusa cedusa* McAtee
(Fig. 72)

Cedusa cedusa McAtee 1924:182.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, convex; basal margin slightly concave; disc depressed. Frons width at base equal to width at apex; widest at distance three-fourths its length from vertex, sides concave above and straight, subparallel below widest portion; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median

length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes less than median length; disc with lateral carinae feeble. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina moderately elevated, longitudinal lateral carinae feeble. Tegmina with cross veins weaker than usual in genus. General color dark yellowish brown with carinae, subantennal plate, and thorax light yellowish brown.

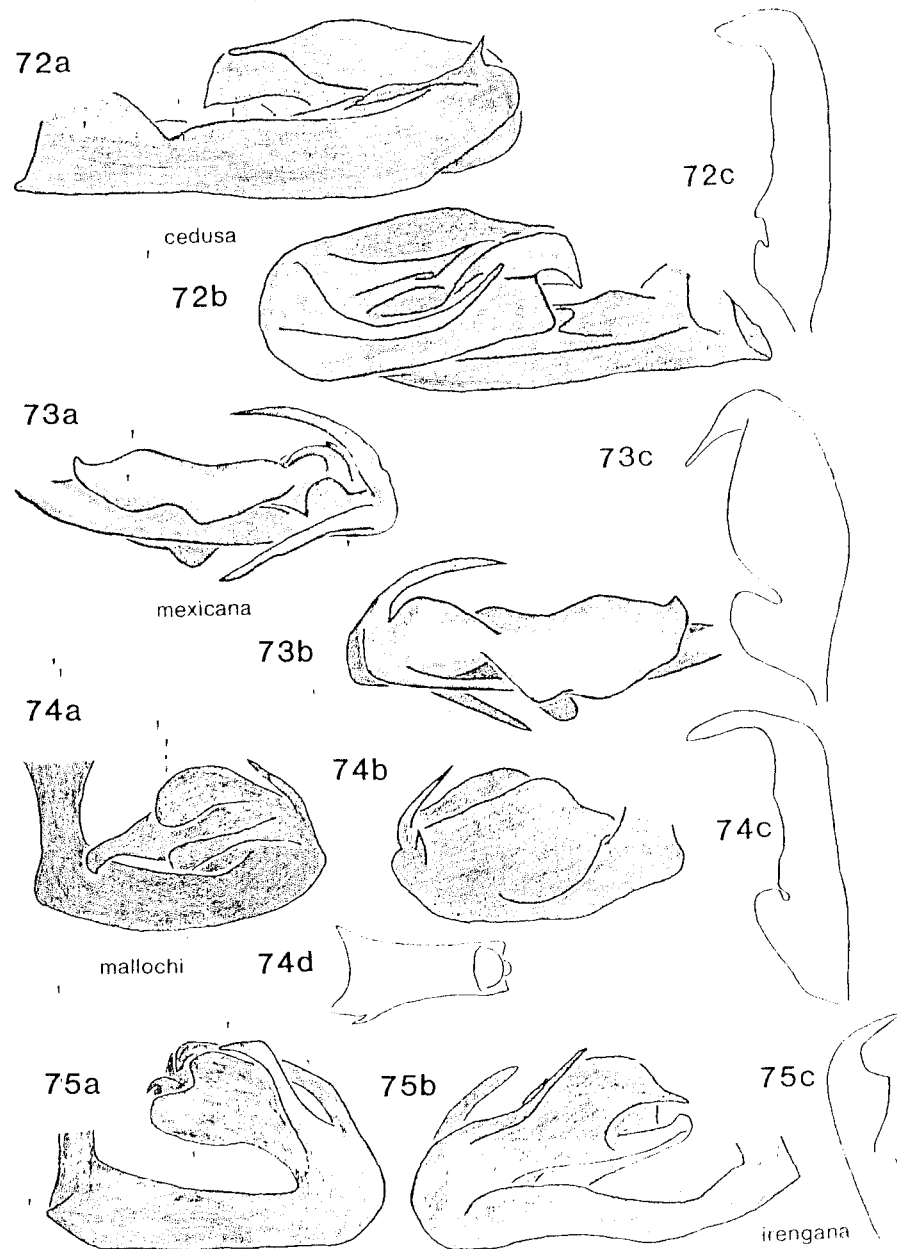
Male genitalia. Aedeagal shaft curved. Shaft, left side, bent upward at apical fourth, a short acute process on apical dorsal margin directed dorsally and somewhat posteriorly. Flagellum, left side, with a long broad process abruptly tapered to a point at apical third. Flagellum, right side, with a hood-like lobe of which the right anterior margin is regularly concave and with a ridge running posteriorly from midlength of concavity; with a long, slender, curved process at base directed anterodorsally. Paramere with inner ventral margin convex in basal third and bearing a truncate emargination, subparallel to outer margin in more distal portion; apical hook large, thick, at right angle to main axis of paramere.

Discussion. *Cedusa cedusa* McAtee was described from the male holotype and male paratype from Plummers Island, Maryland, with additional male paratypes from Glen Echo, Maryland and Dunn Loring, Virginia. Additional specimens have been dissected from New York (1) from the New York State Museum collection; Michigan (1) from the University of Kansas collection; and Washington County, Minnesota (1) in the United States National Museum collection. The holotype is in the United States National Museum. A specimen from Karner (near Albany), New York, is illustrated; and it is in the New York State Museum collection. McAtee's illustration does not show the notch on the inner ventral margin of the paramere clearly enough and the shape of the apical hook could be misleading. No related species have been seen. All specimens seen are similar to the illustration.

71. *Cedusa mexicana* Caldwell
(Fig. 73)

Cedusa mexicana Caldwell 1944b:449.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly convex, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge slightly elevated between fronto-genal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium



Figs. 72-75. Male genitalia. 72, *C. cedusa* McAtee, holotype. 73, *C. mexicana* Caldwell, holotype. 74, *C. mallochi* McAtee, holotype. 75, *C. irengana* Fennah, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view; d, anal tube, dorsal view.

with apical segment as long as wide, dark. "General color black covered with blue pruinosity; lateral carinae and stripe down center of face brown" Caldwell (1944b:449).

Male genitalia. Aedeagal shaft straight. Flagellum, left side, with an elongate hood-like lobe with a crescentiform process at base directed forward over lobe; with a long, narrow process at base, ventral to preceding, directed anteroventrally. Paramere with inner ventral margin acutely incised at basal third; apical hook large, apical half narrowed, directed mesad and anteriorly.

Discussion. *Cedusa mexicana* Caldwell was described from the male holotype and one paratype from Finca Aurora (a coffee plantation), Chiapas, Mexico, and one paratype from Huixtla, Chiapas. No additional specimens have been dissected. The holotype is illustrated. It is in the United States National Museum collection. It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. No related species have been seen.

72. *Cedusa mallochi* McAtee
(Fig. 74)

Cedusa mallochi McAtee 1924:184.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated; straight; basal margin slightly concave. Frons width at base less than width at apex; widest at distance five-sixths its length from vertex; disc depressed in entire length, median carina slightly elevated. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae slightly elevated. Labium with apical segment as long as wide, dark. General color dark yellowish brown.

Male genitalia. Aedeagal shaft somewhat curved. Flagellum, left side, produced anteriorly to apodeme, apex narrowed subapically, hook-like; with a long, slender, rectangular process arising at base, its ventral margin concave; with a long, thin, curved process from base directed anterodorsally over large lobe with a small spine subapically on the left side; with a large median, rounded, lobate process. Flagellum, right side, with a short, acute process at base. Paramere with inner ventral margin lobate in basal third, incised then sinuate and narrower more distally in ventral view; apical hook large, curved, mesally.

Discussion. *Cedusa mallochi* McAtee was described from the male holotype from the type locality Glen Echo, Maryland and from paratypes, same locality, and Loui (Louisiana?). Additional specimens have been dissected from Virginia (1), Honduras (1), locality unknown (1) in

the University of Kansas collection; North Carolina (31), Illinois (1) in the North Carolina State University collection. This species has been taken from black jack oak, *Quercus marilandica* Meench, from pecan leaves, and *Prunus angustifolia* Marsh in North Carolina; and it appears to be related to *Cedusa incisa* (Metcalf), *Cedusa kedusa* McAtee and *Cedusa gedusa* McAtee. *Cedusa mallochi* may be distinguished from the above and from all other species in the genus by the shape of the aedeagus and paramere. Specimens may vary from the illustration in that the apex of the flagellum may be upturned and the long, thin, curved process at the base of and curved forward over the remainder of the flagellum may lack the small spine, or may have two spines which may be also very small. One specimen from Gainesville, Florida has three weak spines; in one specimen from Southern Pines, North Carolina, the spine occurs at the tip so that the process appears to be bifid at the apex.

73. *Cedusa irengana* Fennah
(Fig. 75)

Cedusa irengana Fennah 1944:9

Cedusa rubriventris Fennah 1945:446. NEW SYNONYMY

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, depressed in middle, obsolete at sides; basal margin straight; disc depressed. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; sides slightly concave above and straight, converging below widest portion; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontocarina and subantennal plate which is at a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina feeble, lateral carinae slightly elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown.

Male genitalia. Aedeagal shaft slightly arched. Flagellum, left side, consisting of an elongate, bulbous lobe, the basal fifth stem-like with a lateral, elongate, groove extending from midlength to apex and with the dorsal and lateroanterior margins produced into a blunt, pendant process; with a long, acute, process from base stout in basal half directed dorsoanteriorly, then bending and lying within the groove, sinuate in apical portion; with a broad, flat subtruncate process from base at posterior margin, broad in basal portion, curved beyond, broadened preapically. Flagellum, right side, the elongate bulbous lobe with an elongate oval opening at anteroventral portion and the anterior margin with a concavity immediately above the preceding and in which the

apex of the process lying in the groove on the other side is visible; with a long, slender, acute, sinuate process at basoposterior margin directed dorsoanteriorly; with a very short acute process anterior and basad of the preceding directed dorsally. Paramere in ventral view with inner and outer ventral margins convergent basally, mesal margin angularly notched at basal third; apical hook large, at an obtuse angle to the main axis of paramere.

Discussion. *Cedusa irengana* Fennah was described from the male holotype from Ireng R. to Roraima, Brazil. The aedeagus of the type is embedded and it could not be removed to be studied as carefully as desired, but we believe that it is conspecific with *Cedusa rubriventris* Fennah. The holotype of the former nominal species is in the American Museum of Natural History collection and that of the latter in the United States National Museum collection. The illustration is from a specimen from Panama. This species is closely related to *Cedusa pedusa* McAtee and can be distinguished from it by its lack of a visored cap-like structure at base on the left of the aedeagal flagellum. The type locality of *Cedusa rubriventris* Fennah is St. John's Valley, Trinidad. The one additional specimen seen did not vary from the illustration.

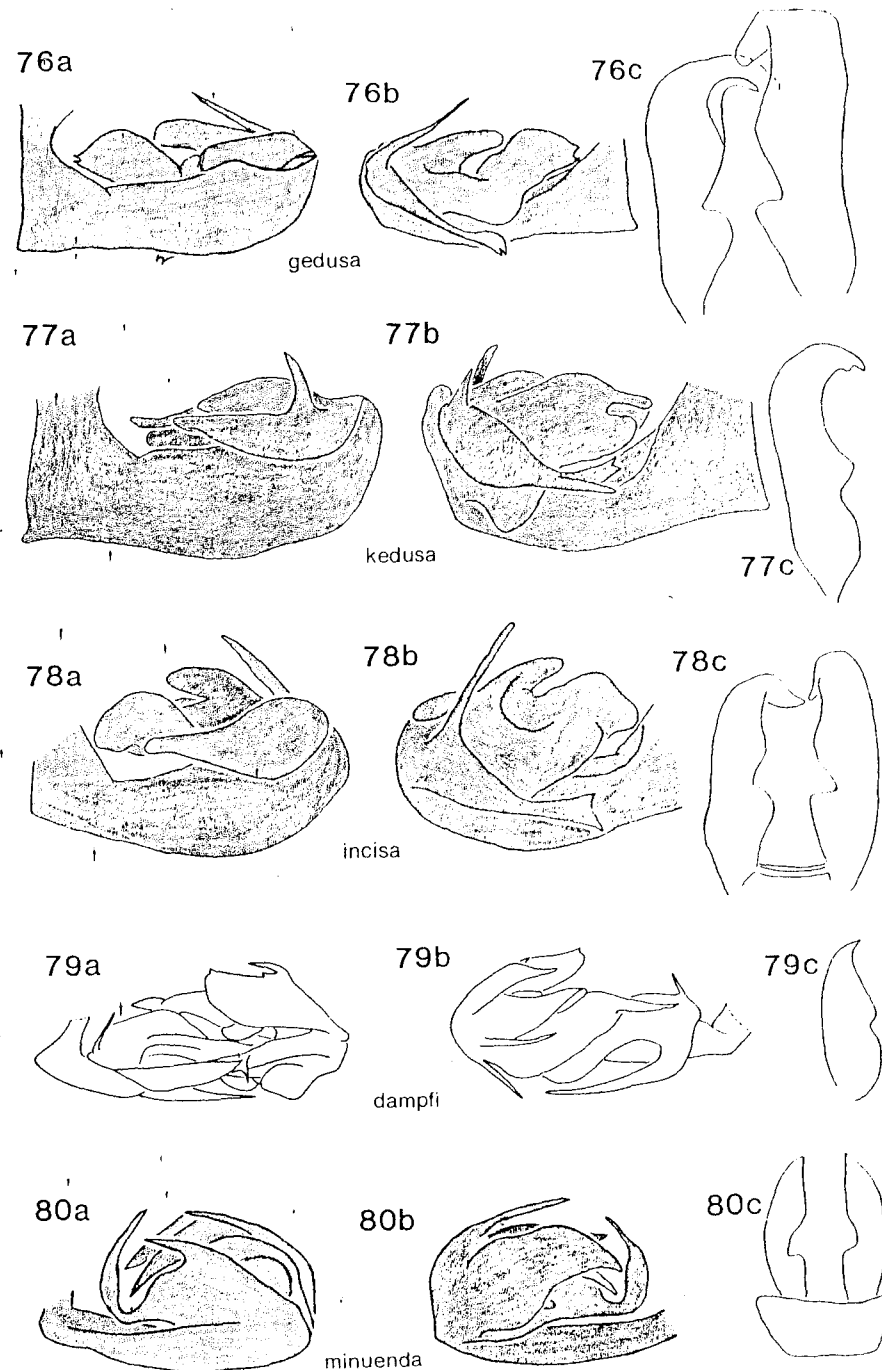
74. *Cedusa gedusa* McAtee
(Fig. 76)

Cedusa gedusa McAtee 1924:183.

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina greatly elevated, concave; basal margin concave; disc depressed. Frons width at base less than width at apex; widest at distance two-fifths its length from vertex; sides moderately concave above, straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge absent between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length; disc with median carina absent, lateral carinae slightly elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina moderately elevated, longitudinal lateral carinae slightly elevated. General color very dark yellowish brown, carinae, margins of head and pronotum, legs, dark brownish yellow.

Male genitalia. Aedeagal shaft slightly curved, thick, broader at apex. Flagellum, left side with a narrow elongate lobe with a small, acute process from the posteroventral margin directed posteriorly. Flagellum, right side, consisting of a bilobed structure, the basal portion horizontal

Figs. 76-80. Male genitalia. 76, *C. gedusa* McAtee, holotype. 77, *C. kedusa* McAtee, holotype. 78, *C. incisa* (Metcalf), holotype. 79, *C. dampfi* Caldwell, holotype. 80, *C. minuenda* Ball, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view; 80c, includes tip of pygofer.



and with a large, stout, curved, blunt process from dorsum directed dorsoanteriorly, the apical portion directed anterodorsally with its apical portion bulbous, compressed and with two small anterior processes separated by a concavity; with a large bifid process at base, the posterior ramus long, slender, acute at the dorsum, directed dorsoanteriorly, and the anterior ramus swollen preapically with its apex dentate, directed ventroanteriorly; swollen between bases of rami. Paramere with inner ventral margin angularly emarginate at basal third; apical hook large, blunt, curved, directed mesoanteriorly.

Discussion. *Cedusa gedusa* McAtee was described from the male holotype from Beltsville, Maryland, and four topotypic females. Three additional specimens have been dissected from Tennessee (1) and Mississippi (2). This species is closely related to *Cedusa incisa* (Metcalf), but it can be distinguished from the latter by its expanded apex of the horizontal ramus of the bifid process at the base on the right and by the shape of the apex of its main lobe and also by the fact that it is more heavily pigmented, being a light yellowish brown, whereas *Cedusa incisa* (Metcalf) is practically colorless. The same structures will serve to distinguish *Cedusa gedusa* from the closely related *Cedusa kedusa* McAtee and *Cedusa mallochi* McAtee and from all other species in the genus. The holotype is illustrated. It is in the United States National Museum. Specimens vary from the illustration in that there may be a small ventral preapical process on the horizontal ramus of the bifid process at base on the right, and also the apex of the type specimen is unusual in that the two small processes are not apparent and one specimen has a very small process between the two.

75. *Cedusa kedusa* McAtee
(Fig. 77)

Cedusa kedusa McAtee 1924:184.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated; basal margin almost straight. Frons width at base equal to width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length equal to that of vertex; anterior margin between eyes almost straight; length behind eyes slightly greater than median length; disc with median carina slightly elevated, lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown.

Male genitalia. Aedeagal shaft curved, thick. Flagellum, left side, consisting of a blunt, horizontal, basidorsal process with its dorsal margin straight and bearing a short, slender, slightly curved, erect,

acute projection basally and with its ventral margin convex. Flagellum, right side, consisting of a large bilobed structure, the basal portion with a large, curved, blunt process from dorsum; apical portion turning to the left extending to apodeme its ventral margin strongly convex near base, concave at midlength, narrowly and deeply incised at apex with the more dorsal of the resulting apical lobes more slender and extending farther cephalad bluntly rounded at apex; with a large bifid process at base the posterior ramus short, acute, erect from posterodorsum directed dorsally, the anterior ramus near horizontal, slightly curved, with a ventral preapical acute process and with its apex acutely emarginate, process swollen between rami. Paramere with inner ventral margin slightly convex in basal third, angularly lobed at midlength, concave in apical half; outer margin rounded at apex; apical hook large, curved, with inner margin slightly scalloped anteapically.

Discussion. *Cedusa kedusa* McAtee was described from the male holotype from Forest Glen, Maryland, taken on *Morus rubra* L. and from paratypes from the same locality; Odenton, Maryland; near Chevy Chase Lake, Maryland; Plummers Island, Maryland; Glen Echo, Maryland; Vietch to Torrison, Virginia; Virginia near Plummers Island; near Dead Run Swamp, Virginia; Mount Vernon, Virginia on *Salix babylonica* L.; Southern Illinois; Lakehurst, New Jersey; Ames, Iowa; and Saint Croix Falls, Wisconsin. Additional specimens have been dissected from Ohio (1), North Carolina (1), from the North Carolina State University collection; Virginia (1), Kansas (3), British Columbia (1), Michigan (1), Arizona (1), California (1), and Connecticut (1) in the University of Kansas collection; Illinois (11) and unknown locality (14) in the Illinois Natural History Survey collection. The holotype is illustrated. It is in the United States National Museum collection. This species appears to be related to *Cedusa mallochi* McAtee, *Cedusa gedusa* McAtee, and *Cedusa incisa* (Metcalf). It may be distinguished from the above and from all other species in the genus by the shape of the aedeagus and paramere.

Specimens may vary from the illustration in that the erect process at dorsum of the elongate, horizontal lobe at base on the left side may be longer, more slender and curved; the horizontal ramus of the bifid process at base on the right with a ventral preapical process that may be single or bifurcate, the apex most often bifurcate, but occasionally trifurcate and dentate anteapically with the number of teeth varying from none to four, and several of these may themselves be slightly bifurcate.

76. *Cedusa incisa* (Metcalf)
(Fig. 78)

Herpis incisa Metcalf 1923:195.

Cedusa incisa (Metcalf), McAtee 1924:182.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, obsolete at

sides; basal margin straight; disc depressed. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; sides moderately concave above, straight, converging below widest portion; disc depressed in entire length, median carina slightly elevated. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length about equal to that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length; disc with median carina moderately elevated, lateral carinae more elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color dark yellowish brown to almost piceous, carinae, margins, legs, venter of thorax lighter in color.

Male genitalia. Aedeagal shaft thick. Flagellum, left side, with a large, roughly triangular lobe with dorsal margin concave, junction of dorsal and anteroventral margins rounded, swollen. Flagellum, right side, with a large two-pronged process arising at base, the upper ramus long, slender, and erect, the lower ramus broad, somewhat constricted at midlength, apex concavely truncate, horizontal; major lobe of flagellum with a large, truncate portion and a blunt, curved portion at midlength on dorsum. Paramere with inner ventral margin bluntly notched at basal third, convex more distally; apical hook broad, moderately long, tip upturned, at an acute angle to the main axis of the paramere.

Discussion. *Cedusa incisa* (Metcalf) was described from the male holotype from New Haven, Connecticut, and a female allotype from North Bradford, Connecticut from *Salix*. Additional specimens have been dissected from Ohio (1), North Carolina (2), New Hampshire (1), New York (1) from the North Carolina State University collection; locality unknown (4), Illinois (14), Connecticut (1) from the Illinois Natural History Survey collection; Michigan (12) from the University of Kansas collection; New York (2) from the New York State Museum collection and Nebraska (2). The holotype is illustrated. It is in the North Carolina State University collection. This species is closely related to *Cedusa gedusa* McAtee, *Cedusa mallochii* McAtee, and *Cedusa kedusa* McAtee, but can be distinguished from them and all other species in the genus by the shape of the aedeagus, especially by the generally concavely truncate apex of the horizontal ramus of the bifid process from base on the right and by the lack of pigmentation in the apical portion of the main lobe of the flagellum. One specimen from Illinois was taken on white pine (*Pinus strobus* L.), several were taken on *Rhus glabra* L. at Durham, North Carolina. Specimens may vary from the illustration in that the apex of the horizontal ramus of the bifid process at base on the right

may be trifurcate (Cheboygan, Michigan), or weakly trifurcate with the middle projection shorter (Durham, North Carolina), or acutely concave (Cheboygan, Michigan).

77. *Cedusa dampfi* Caldwell
(Fig. 79)

Cedusa dampfi Caldwell 1944b:453.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave, depressed in middle; basal margin slightly concave, disc depressed, basal corners depressed. Frons width at base greater than width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire length. Gena with genal ridge feeble, incomplete between frontogenal carina and subantennal plate. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length; disc with median carina slightly elevated, lateral carinae feeble (labium missing on holotype). Mesonotum with longitudinal median carina moderately elevated, longitudinal lateral carinae feeble. General color dark yellowish brown, carinae and margins dark brownish yellow.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with a large process from base, its ventroanterior margin convex, its anterior margin scalloped just before dorsal margin, dorsal and posterior margins produced into an acute process directed anterodorsally, with a small dorsal acute process just anterior to preceding; with a long, broad, irregular process from base lying alongside and on the shaft, recurved, its apical portion produced into a long knife-like horizontal process directed posteriorly and medially into a slender, acute process directed dorsoposteriorly; with a short, acute process at midlength, just posterior to knife-like process, directed ventrally. Flagellum, right side, with a long, horizontal process from base produced laterally at apex into a long, slender, recurved, tapered process which is directed posteroventrally; with a long process at midlength, the basal two-thirds rectangular and directed dorsoanteriorly, then becoming narrow, horizontal, blunt, flattened at apex, directed anteriorly; with a long, acute, horizontal process at base directed anteriorly; with an acute process shorter than preceding, directed ventroanteriorly. Paramere with inner ventral margin convex in outline with a concave notch at midlength; apical hook acute, small, directed mesally and posteriorly.

Discussion. *Cedusa dampfi* Caldwell was described from the male holotype from Tiena Planca, Veracruz, Mexico station of the Isthmian railway. No additional specimens have been seen. The holotype is illustrated. It is in the United States National Museum Caldwell collection. No closely related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus.

78. *Cedusa minuenda* Ball
(Fig. 80)

Cedusa minuenda Ball 1928:200.

Description. Length of male 3.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave, depressed in middle; basal margin slightly concave. Frons width at base less than width at apex, widest at apex, lateral margins slightly concave; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with lateral carinae feeble. Labium with apical segment as long as wide, dark. General color dark yellowish brown to brownish yellow (markings on mesothorax similar to those illustrated for *Cedusa venosa* Fowler (Fowler 1904:112).)

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, consisting of a large lobe from base, the dorsoanterior margin of which is produced into an acute process directed anterodorsally, and the anterior and ventral margin produced into a long, acute, slender, elbowed process, broadest just distal to elbow, directed dorsally; with a smaller, regular lobe from base partly hiding a long, thin, curved process arising at base, mesad to preceding, directed anterodorsally; with a longer, curved, acute process from base, mesad of preceding, directed ventroanteriorly, extending almost to elbowed process. Flagellum, right side, consisting of an elongate, bulbous lobe, the apex of which is acutely produced and directed ventroanteriorly, extending almost to the elbowed process; with a very small, rounded lobe arising from beneath the preceding at midlength. Paramere with inner ventral margin notched at about midlength with base of notch at a right angle to main axis of paramere; apical hook weak.

Discussion. *Cedusa minuenda* Ball was described from the male holotype, female allotype, three male and three female paratypes taken at Sanford, Florida. Additional specimens have been seen from North Carolina (7), locality unknown (1) from the North Carolina State University collection. The holotype is illustrated. It is in the United States National Museum collection. The genitalia of this species are the smallest seen in the genus. No related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. Specimens may vary from the illustration in that the inner ventral margin of the parameres may be somewhat convexly lobed in the apical fourth. The apex of the elbowed process on the left may be narrowed in its apical half and the apex of the elongate somewhat acute lobe from the base on the right may be bent to the left.

79. *Cedusa funesta* Fowler
(Fig. 81)

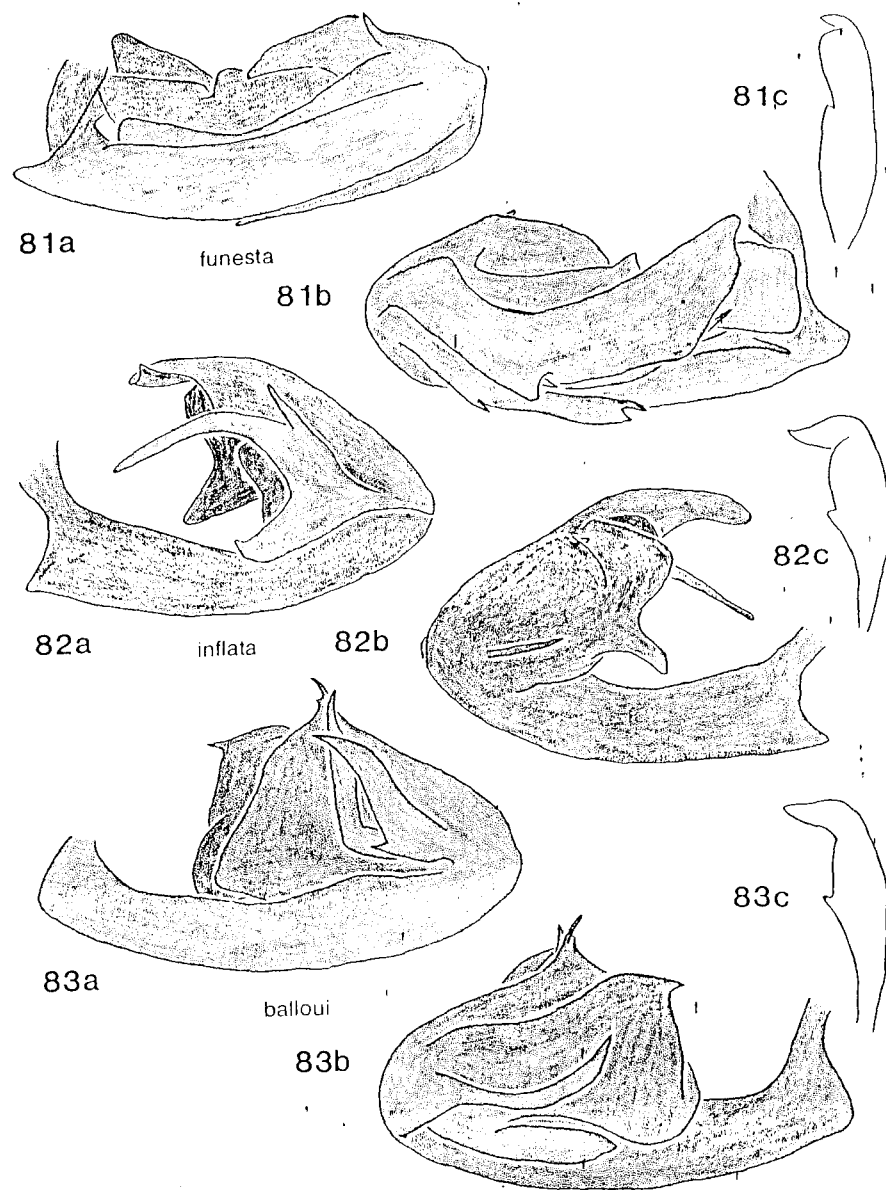
Cedusa funesta Fowler 1904:112.

Cedusa tropicalis Caldwell 1944b:452. NEW SYNONYMY

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly concave, obsolete at sides; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide. General color light yellow-brown, carinae, margins, and legs brownish yellow.

Male genitalia. Shaft of aedeagus somewhat curved. Flagellum, left side, with an elongate, curved rectangular process from the base with the anterior margin scalloped just ventral to the junction of the anterior and dorsal margins, broadest at basal third, then abruptly narrowed, with the short anterior margin dentate, and with a small acute process arising from beneath; with an elongate lobe from base, with apex truncate, dorsal margin dentate antepically, mesad of preceding; with a long, curved, acute process (probably from base) lying between two preceding processes; with a long, broad, curved process ventrally from base, the apex of which is concave, emarginate with a small process at midlength on ventral margin; all processes mentioned directed, in general, anteriorly. Flagellum, right side, with the right ventral surface of the long process, mentioned second above, depressed; with a moderately long, tapered process, broad at base, arising from dorsum at base directed anteriorly; with a short, curved, acute process from dorsum at base, directed dorsally. Paramere in ventral view broadest in basal three-fifths, inner ventral margin convex; apical hooks short, not very acute, directed mesoposteriorly.

Discussion. *Cedusa funesta* Fowler, the type-species, was described from a series of five specimens from Atoyac, Veracruz; Teapa, Tabasco; Xucumanatlan and Chilpancingo, Guerrero, all from Mexico, and San Geronimo, Guatemala. Additional specimens have been seen from Arri-jan (1) and Patino (1), Panama from the United States National Museum collection. The figure is from a specimen from Panama. The type specimen of *Cedusa tropicalis* Caldwell, type locality, San Jose, Lake Peten, El Peten, Guatemala, which has been examined, is conspecific with *Cedusa funesta* Fowler. The Caldwell type is in the United States National Museum Caldwell collection. The identification and synonym is based on China's drawing of the "type" in Fennah 1952:144. The Fowler "type" is in the British Museum (Natural History). *Cedusa*



Figs. 81-83. Male genitalia. 81, *C. funesta* Fowler. 82, *C. inflata* (Ball), holotype. 83, *C. balloui*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

vedusa McAtee appears to be distantly related to this species. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. The two specimens agree with China's illustration very well.

80. *Cedusa inflata* (Ball)
(Fig. 82)

Lamenia inflata Ball 1902:262.

Cedusa inflata (Ball), McAtee 1924:183.

Cedusa santaclara Myers 1928:13. NEW SYNONYMY

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina feeble, moderately convex, obsolete at sides; basal margin slightly concave; disc depressed slightly. Frons width at base less than width at apex; widest at distance four-fifths its length from vertex; lateral margins slightly concave above and straight and convergent below widest portion; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly rounded; length behind eyes less than median length; disc with longitudinal carina obsolete; longitudinal lateral carinae feeble. Labium with apical segment longer than wide, lighter in color. Mesonotum with longitudinal carina slightly elevated, longitudinal lateral carinae feeble. General color light yellowish brown.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a prominent bifid structure at base, the upper ramus of which is long, slender, curved, extending almost to apodeme with a short, thin, acute process on dorsoposterior margin, the lower ramus shorter, broad, the apex somewhat upturned or hook-like; with the main lobe elongate, somewhat hood-like, anterior margin concave, angularly produced laterally before apex. Flagellum, right side, with the main lobe appearing bluntly produced at apex; with the ventroanterior margin produced at midlength into a stout, acute process directed ventroanteriorly; with a sinuate process arising internally from base, its apex just visible from a cleft on the laterodorsal surface of the main lobe; the margin dorsal to the preceding dentate; with a short, thin, almost horizontal process at base directed anteriorly. Paramere with inner ventral margin concave in basal half, angularly lobed near midlength, convex distally; apical hook broad, long, acute, slightly upturned at apex.

Discussion. *Cedusa inflata* (Ball) was described from a series of eight specimens from Haiti. Fourteen additional specimens have been seen from Cuba in the North Carolina State University collection, and thirty from the Dominican Republic and six from Florida in the collection of the United States National Museum. The holotype is illustrated. It is in the United States National Museum. The holotype of *Cedusa santaclara*

Myers in the Museum of Comparative Zoology, Harvard University, has been examined and it is conspecific with *Cedusa inflata* (Ball). Caldwell (1951:203) records it from Mayaguez and Anasco, Puerto Rico. The specimens from Florida (Miami and Ft. Lauderdale) were taken on coconut palm, *Cocos nucifera* L.; and those from the Dominican Republic on coconut palm, *Cocos nucifera* L.; Manila palm, *Veitchia merrillii* (Becc.) H.E. Moore; and *Roystonea hispaniola* L.H. Bailey. This species appears to be related to *Cedusa insularis*, n. sp. It can be distinguished from the preceding by the shape of the bifid process at base on the left. This process is lacking in *Cedusa inflata dominicana* Fennah. *C. inflata* (Ball) may be distinguished from all other species in the genus by the shape of the aedeagus, especially by the bifid process.

Specimens may vary from the illustration in that the process on the dorsum of the upper ramus of the bifid process from the base of the flagellum on the left may be absent; in others the upper ramus may be bifurcate at apex. The apex of the main lobe is usually angularly produced preapically on the right side.

81. *Cedusa balloui*, new species
(Fig. 83)

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina absent; basal margin slightly concave. Frons width at base less than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge greatly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes rounded; length behind eyes less than median length; disc with median carina absent, lateral carinae feeble. Labium with apical segment longer than wide, lighter in color. Mesonotum with longitudinal median carina feeble, longitudinal lateral carinae absent. General color yellowish brown with the head and pronotum light yellowish brown, mesonotum dark yellowish brown and the tegmina very light yellowish brown, almost white.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, with a large, roughly triangular lobe the dorsal apex of which is produced into a small, curved, weakly bifid process; with an elbowed process at base, extending dorsally, the apex acute and slightly curved; with a process at base arising posterolateral to preceding, large, broad, slightly curved and directed anterodorsally, with a small, acutangular horizontal projection near its base, directed forward. Flagellum, right side, with a large, elongate triangular lobe, the dorsal and anterior margins produced into a very small, acute process; with a broad, knife-like, horizontal process at base of preceding, directed anteriorly; with a long, falciform process from base directed anterodorsally. Paramere with inner ventral margin concave in basal half, with a small angular

projection at midlength, slightly convex in apical half; apical hook large, acute, at a right angle to main axis of paramere with tip slightly upturned.

Discussion. *Cedusa balloui*, n. sp., is described from the male holotype from Pico Turquino, Cuba, 3750 feet, June 10-29, 1936 (J. Acufia), and from four male paratypes; one, same locality, July 20, 1922, 6,000-6,500 feet (C.H. Ballou, S.C. Bruner); one, Sierra Maestra, Cuba, July 10-20, 1922, 3,000-4,000 feet (C.H. Ballou, S.C. Bruner, P. Motha); one, Palmar Macha, Sierra Maestra, July 10-20, 1922, 1070-1350 meters (C.H. Ballou, S.C. Bruner); and one, Sierra Maestra, all from the North Carolina State University collection. The holotype is illustrated. It is on loan to the United States National Museum.

C. balloui, n. sp., is closely related to *Cedusa cubensis*, n. sp. It may be distinguished from it and all other species in the genus by the shape of the aedeagus, especially by the shape of the bifurcate process at the base on the left and the two major lobes of the flagellum. Some specimens vary from the illustration in that the elbowed process at base on left side may be more gently curved, the process at the apex of the large lobe may be unbranched and slightly larger or smaller. The curved process on the right side may be more slender, the blunt process from the base may be more slender and acute and the small process at anterior margin of large lobe may be nearer midlength.

This species is named in honor of C.H. Ballou, one of the collectors.

82. *Cedusa serrata* Caldwell
(Fig. 84)

Cedusa serrata Caldwell 1944b:451.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin slightly concave. Frons width at base greater than width at apex; widest at distance one-half its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge slightly elevated, incomplete between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes broadly convex; length behind eyes slightly greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide. General color shiny black with carinae and margins light brownish yellow to whitish yellow.

Male genitalia. Aedeagal shaft straight. Shaft, left side, with a short, acute, horizontal process at base near apodeme and a larger, bifurcate, subapical process arising beneath flagellum extending basally, the upper ramus longer than lower. Flagellum, left side, consisting of a large, twisted, elongate, hood-like lobe with a short, stout, acute process on dorsum near base; with another erect, short, acute, bent process

extending dorsally at base and a short, tapered, acute, horizontal process at base extending anteriorly. Flagellum, right side, with right side of main lobe shorter than left side, only slightly exceeding midlength; with a long, thin, straight, acute process at posterior margin at base, directed dorsally. Parameres slightly asymmetrical, both with acute mesal projections at one-third length from apex and concavely emarginate below projections and narrowed beyond projections; apical hooks large.

Discussion. *Cedusa serrata* Caldwell was described from the male holotype, female allotype, and paratypes from Fortin, Veracruz, Mexico; male and female paratypes from Orizaba, Veracruz; male paratype from Jesus Carranza, Veracruz; a male paratype from Manzanillo, Veracruz near the Potrero railway station. Three additional male specimens have been dissected from one mile east of Cordoba (1) and Fortin de las Flores (3), all Veracruz, Mexico. The holotype is illustrated. It is in the United States National Museum Caldwell collection. This species is related to *Cedusa whitei*, n. sp., and *Cedusa mexicana* Caldwell. It may be distinguished from *Cedusa whitei*, n. sp., by the shape of the paramere and from *Cedusa nedusa* Caldwell by the structures discussed under *Cedusa nedusa* Caldwell. It may be distinguished from all other species in the genus by the shape of the aedeagus and paramere. Some specimens examined varied from the illustration in that the process from the base of the flagellum on the left side was longer and the apex of one was weakly trifurcate with a very small median process, one other was dentate with two small teeth on the ventral margin of the dorsal ramus and in the other two, the rami were longer and more widely separated.

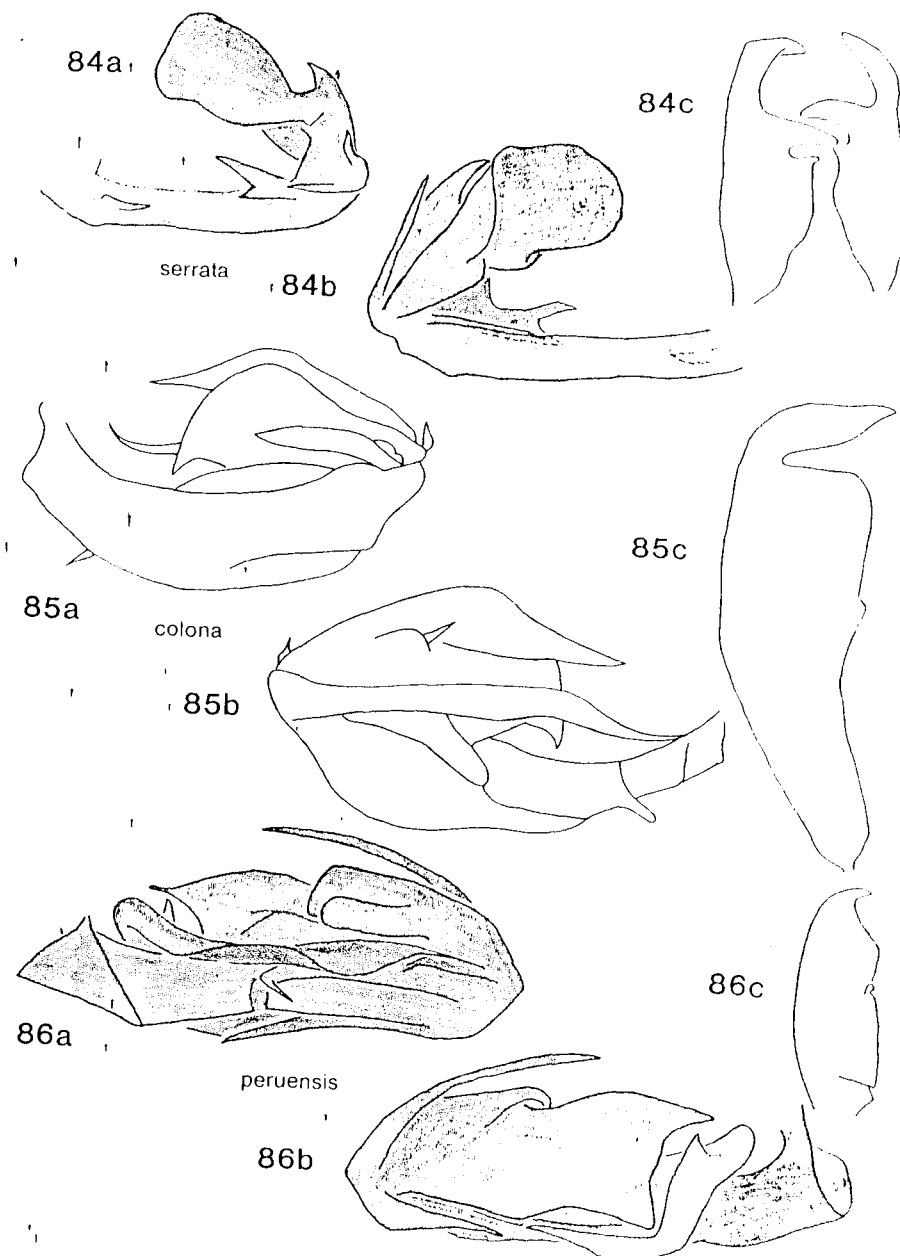
83. *Cedusa colona* Caldwell
(Fig. 85)

Cedusa colona Caldwell in Caldwell and Martorell 1950:205.

This species has not been seen. Caldwell (1951:205) described it as follows: "Length of male 3.5 mm. General color black. Frons without median carina."

"Male style similar to *inflata* Ball; apical hook much stouter and projected more posteriorly. Aedeagus with one short process on the left and a very long slender process on the right, also various median processes present as illustrated."

Cedusa colona Caldwell was described from the male holotype taken on grass at the type locality Mayaguez, Puerto Rico, December 12, 1947 (Caldwell and Martorell). No additional specimens have been seen. The holotype is apparently lost. The illustration is redrawn from the original paper. No closely related species have been seen. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.



Figs. 84-86. Male genitalia. 84, *C. serrata* Caldwell, holotype. 85, *C. colona* Caldwell (redrawn from Caldwell in Caldwell and Martorell 1950:205). 86, *C. peruensis*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere or parameres, ventral view.

84. *Cedusa peruensis*, new species
(Fig. 86)

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, slightly concave, obsolete at sides; basal margin slightly concave. Frons width at base slightly more than width at apex; widest at distance one-half its length from vertex, lateral margins subparallel above and below widest portion; disc depressed in entire length. Gena with genal ridge feeble between frontogenal ridge and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes rounded; length behind eyes greater than median length. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina moderately elevated, longitudinal lateral carinae, feeble. General color dark yellowish brown with margins, carinae, subantennal plate, venter, legs, dark yellowish brown.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with a long, wide process from base lying alongside and on shaft (the right side broader) extending anteriorly almost to apodeme, then turning and extending posteriorly, apex acute, tapered antepically, with a small process at posterior margin at first bend; with a shorter, curved, acute, horizontal process from base parallel to and lying beneath the preceding, about half as long, sharply curved antepically; main lobe elongate, with dorsal and anterior margins acutely produced with a blunt, horizontal, somewhat bifurcate process from base at dorsum. Flagellum, right side, with ventral and anterior margin somewhat produced and the anterior margin sinuately concave, ventral margin slightly convex in apical half; with a long, tapered, acute, horizontal process from base directed anteriorly; with a very long, slender, curved, acute process at posterior margin directed dorsoventrally. Paramere with inner ventral margin slightly convex beyond and below a small knob-like lobe which is parallel to the main axis, at apical third; apical hook short, acute, directed mesoposteriorly.

Discussion. *Cedusa peruensis*, n. sp., is described from the male holotype from Tingo Maria, Peru, September 15, 1944 (E.J. Hambleton) from beans. The holotype is illustrated (broken during dissection). It is in the United States National Museum collection.

C. peruensis, n. sp., is closely related to *Cedusa albolineata* Fennah and *Cedusa plummeri* Caldwell. It may be distinguished from all other species in the genus by the shape of the aedeagus, especially by the shape of the aedeagal flagellum and the long process from beneath the main lobe on the left.

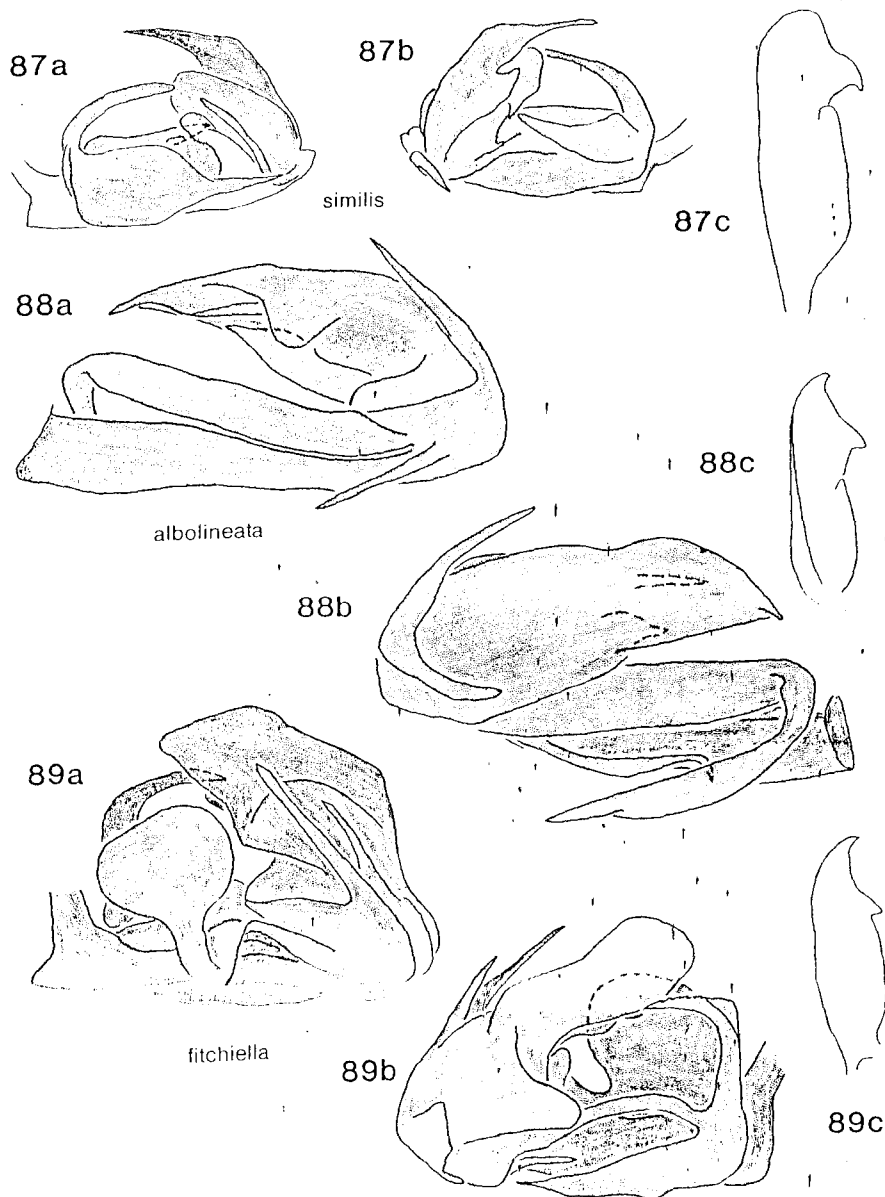
85. *Cedusa similis* Caldwell
(Fig. 87)

Cedusa similis Caldwell 1944b:452.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, straight, obsolete at sides, depressed in middle; basal margin straight. Frons width at base equal to width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin straight between eyes; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, apical half dark. General color dark yellowish brown, carinae and margins brownish yellow.

Male genitalia. Shaft of aedeagus curved. Flagellum, left side, with a long, large process from the anterior base of the main lobe of the flagellum directed anteriorly astride the shaft, its apex with three large projections, the sinistral projection horizontal, pentagonal, broad in basal two-thirds, then abruptly tapered to an acute tip, directed posteriorly, the middle projection thin, curved, directed posteriorly, the dextral projection curved, broadest in basal sixth, acute, horizontal, directed posteriorly; with two processes at base, one broad, blunt, somewhat twisted antepically, directed dorsoanteriorly, the other posterior to preceding slender, acute, sharply curved at basal sixth, then slightly curved in the opposite direction above, directed dorsoanteriorly; with a large elongate oval lobe at base mesad of preceding directed anterodorsally. Flagellum, right side, with a large elongate lobe the apex of which is produced into a thin, acute process directed anteriorly and with its lateroanterior margin obliquely incised at apical third; with a short, acute process at base directed ventroanteriorly. Paramere with inner ventral margin straight in basal two-thirds, with a small blunt lobe below the large hood-like structure in the apical third; apex rounded; apical hook absent.

Discussion. *Cedusa similis* Caldwell was described from the male holotype from Toluca, Oaxaca, Mexico. The holotype, which is illustrated, is in the United States National Museum Caldwell collection. No additional specimens have been seen. This species is probably related to *Cedusa fitchiella*, n. sp. It may be distinguished from it and all other species in the genus by the shape of the processes at the apex of the long, horizontal process from the base of the flagellum.



Figs. 87-89. Male genitalia. 87, *C. similis* Caldwell, holotype. 88, *C. albolineata* Fennah. 89, *C. fitchiella*, n. sp., holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view. Note: In Fig. 88a, the apparently hidden horizontal acute process at the apical third of the main lobe of the flagellum is only a keel-like fold of tissue and not a process.

86. *Cedusa albolineata* Fennah
(Fig. 88)

Cedusa albolineata Fennah 1952:144.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina greatly elevated, straight; basal margin slightly concave; disc depressed. Frons width at base slightly less than width at apex; widest at distance two-thirds its length from vertex, lateral margins concave above and straight, convergent below widest portion. Gena with genal ridge incomplete between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina feeble, lateral carinae slightly elevated. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated. General color dark brownish black, carinae light yellowish brown, apical half of subantennal plate nearly white.

Male genitalia. Shaft of aedeagus nearly straight. Flagellum, left side, with an elongate, triangular, hood-like lobe from base, its apex acute; with a broad process from base extending to apodeme, then becoming narrowed and directed posteroventrally with its apex narrowed antepically, apex acute, broadest in midlength of apical half; with a slender, tapered, acute process from base posterior to preceding, directed anteroventrally; with a broad, acute process from base ventral to the main lobe broadest antepically in form of head and neck of a bird; with a long, slender, acute process from posterior margin directed anterodorsally. Flagellum, right side, with a long, slender, horizontal, acute process from base with its apex sharply curved ventrally, directed anteriorly; with a large bifid process at posterior margin at base with the upper ramus curved, broad at basal half, acute, directed dorsoanteriorly, the lower ramus shorter, less acute, curved, directed anteroventrally. Paramere with inner ventral margin convex basad of and concave beyond and angular lobe at apical third; apical hook small, blunt, directed mesally and posteriorly.

Discussion. *Cedusa albolineata* Fennah was described from the male holotype from sugar cane at Chivacoa, Venezuela. Additional specimens have been seen from Panama (5) from grass and cowpeas, and Venezuela (1) from cotton from the United States National Museum collection. The holotype is in the British Museum (Natural History); a specimen from Tocumen, Panama, is illustrated. *Cedusa albolineata* is closely related to *Cedusa peruensis*, n. sp., and *Cedusa plummeri* Caldwell. It may be distinguished from these and all other species in the genus by the shape of the aedeagus, especially by the main lobe of the flagellum. One specimen from Panama has an additional large process from the posterodorsal margin, with a small projection on its right margin at the basal third, directed anterodorsally.

87. *Cedusa fitchiella*, new species

(Fig. 89)

Description. Length of male 3.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated; basal margin slightly concave. Frons width at base less than width at apex; widest at distance two-thirds its length from vertex; disc depressed in entire length, median carina feeble. Gena with genal ridge moderately elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length shorter than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color dark yellowish brown with carinae and margins only slightly lighter.

Male genitalia. Shaft of aedeagus slightly arched. Flagellum, left side, with a large, semierect, irregularly pentagonal lobe with two long, slender, acute processes arising at base and extending anterodorsally; with a huge, complex process arising from the base extending almost to apodeme lying alongside and on the shaft, its apex produced into an erect, acute process bent dorsally antepically and with the dorsal margin dentate. Flagellum, right side, with a large irregularly tapered, acute process from the apex of preceding structure directed posteriorly alongside the shaft; with a somewhat triangular lobe from base directed forward with apex rounded; with a small trapezium-like lobe at base with ventral and anterior margins produced into a short, acute process directed ventroanteriorly; with a slender, acute, slightly curved, nearly horizontal process arising from beneath the base of flagellum. Paramere with inner ventral margin convex below, concave beyond a small angular lobe at apical third; apical hook small, curved, directed mesally and posteriorly.

Discussion. *Cedusa fitchiella* n. sp., is described from the male holotype from Rio Branco, Brazil, July 1933 (L.C. Scaramuzza) from the North Carolina State University collection. The holotype, which is illustrated, is on indefinite loan to the United States National Museum.

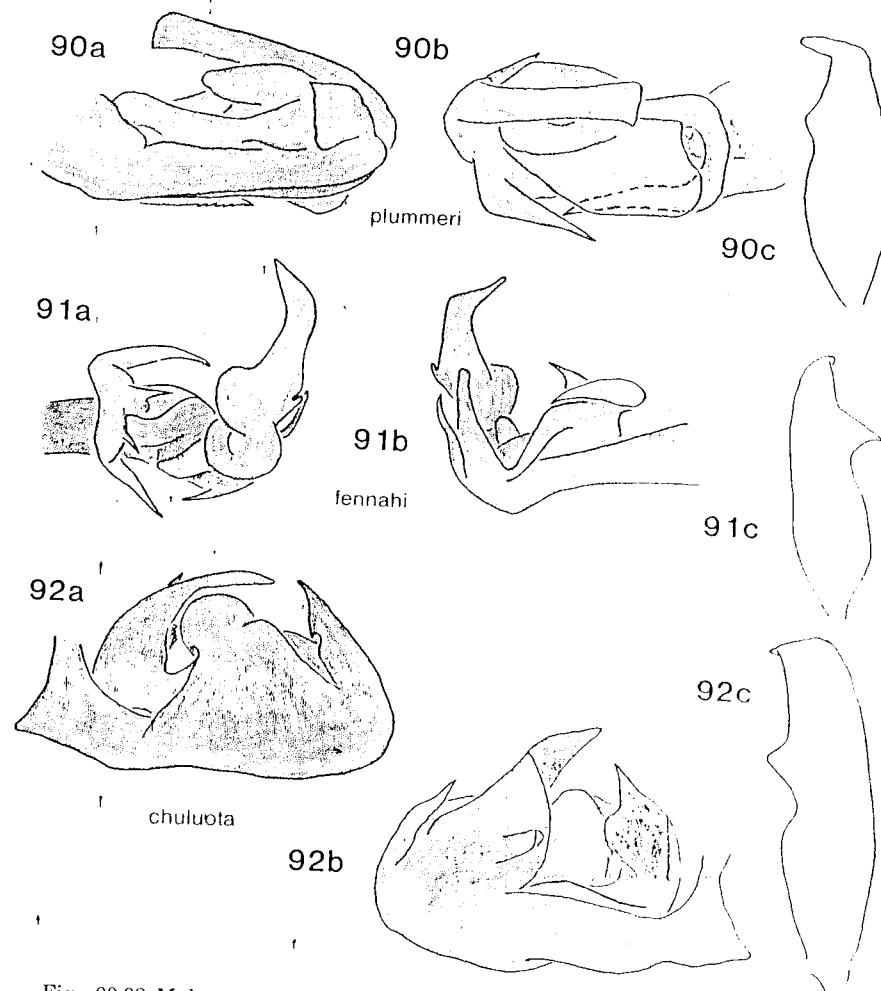
C. fitchiella n. sp., is probably related to *Cedusa similis* Caldwell. It may be distinguished from it and all other species in the genus by the large ovate lobe on the long, horizontal process from the base of the flagellum. This species is named in honor of Asa Fitch.

88. *Cedusa plummeri* Caldwell

(Fig. 90)

Cedusa plummeri Caldwell 1944b:452.

Description. Length of male 4.5 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina slightly elevated, slightly emarginate medially; basal margin slightly concave. Frons width at base less



Figs. 90-92. Male genitalia. 90, *C. plummeri* Caldwell, holotype. 91, *C. fennahi*, n. sp., holotype. 92, *C. chuluota* Ball, holotype. a, aedeagus, left lateral view; b, same, right lateral view; c, paramere, ventral view.

than width at apex; widest at distance three-fourths its length from vertex; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at an acute angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes slightly convex; length behind eyes less than median length; disc with median and lateral carinae feeble. Labium with apical segment longer than wide, dark. General color very dark yellowish brown, almost black, margins, carinae, and legs brownish yellow.

Male genitalia. Shaft of aedeagus slightly curved. Flagellum, left side, consisting of an elongate, rugose process from base at dorsum directed anteriorly; with a broad process at base lateral and posterior to preceding directed dorsally with its anterior margin straight, the posteodorsal margin convex and shallowly dentate dorsally; with an elongate, narrow process from base mesad and anterior to preceding extending to the apodeme on right side of shaft, thence turning ventrally to the level of the ventral margin of the shaft, then turning posteriorly and parallel to shaft, the apex acute, with many preapical microspines. Flagellum, right side, consisting of a long, broad horizontal process from base directed anteriorly, the anterior and ventral margins slightly produced, the base with several microsetae; with a very broad, elongate process from base, mesad of preceding, the apex bluntly rounded, broader and longer than preceding, with a small lobe at basal third of ventral margin; with a very acute process from base directed anteroventrally. Paramere with inner ventral margin convex in basal half, then shallowly concave through about one-eighth its length, then angularly and weakly lobed in apical fourth; apical hook stout, blunt, moderately long, directed mesoposteriorly.

Discussion. *Cedusa plummeri* Caldwell was described from the male holotype and three paratypes from 18 km west of Mexico, D.F. One additional specimen has been seen from Costa Rica, from the North Carolina State University collection, and three from Arizona in the United States National Museum. The holotype is illustrated. It is in the United States National Museum Caldwell collection. This species appears to be related to *Cedusa albolineata* Fennah and *Cedusa peruensis*, n. sp. It may be distinguished from all species in the genus by the shape of the aedeagus, especially by the shape of the long, horizontal, acute process from base that extends forward almost to apodeme, then turns right across the shaft, then posteriorly, with preapical spines. There are several small spines at the base of the long broad somewhat truncate process from the base on the right side that are not illustrated.

89. *Cedusa fennahi*, new species
(Fig. 91)

Description. Length of male 5.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina moderately elevated, straight, obsolete at sides, basal margin slightly concave; basal corners depressed. Frons width at base slightly greater than width at apex; widest at distance one-fourth to three-fourths its length from vertex, lateral margins subparallel above and below widest portion; disc depressed in entire length, median carina feeble. Gena with genal ridge feeble between frontogenal carina and subantennal plate which is at almost a right angle to gena. Pronotum with median length less than that of vertex; anterior margin between eyes convex; length behind eyes greater than median length; disc with median carina slightly elevated, lateral

carinae feeble. Labium with apical segment longer than wide, dark. (Holotype with mesonotum damaged by a pin.) General color dark yellowish brown with margins, carinae, subantennal plate, and legs dark brownish yellow.

Male genitalia. Shaft of aedeagus straight. Flagellum, left side, with a large process at base with two basal swellings then produced acutely and narrowly into an erect process the apex of which is curved anteriorly antepically; with a very small process at midlength of posterior margin of preceding directed dorsally; with a short, acute process ventrally at base directed anteroventrally; with a complex, horizontal process arising from anterior basal margin of main lobe, lying alongside and on the shaft with four acute processes of various lengths, all directed posteriorly, the two middle processes shorter. Flagellum, right side, with two processes at base, one thin, bisinuate, the other, more anterior, thicker, longer, blunt, both directed dorsally. Paramere with inner ventral margin convex before, straight beyond; a triangular lobe at apical third, apical hook small.

Discussion. *Cedusa fennahi*, n. sp., is described from the male holotype from the Maroni River Valley, French Guiana, in the North Carolina State University collection. The holotype is illustrated. It is on indefinite loan to the United States National Museum.

No related species have been seen. *C. fennahi*, n. sp., is named in honor of Dr. R.G. Fennah, the describer of several species in the genus.

90. *Cedusa chuluota* Ball
(Fig. 92)

Cedusa chuluota Ball 1928:200.

Description. Length of male 4.0 mm. Vertex in dorsal view narrowly trapezoidal; apical margin with carina greatly elevated, straight; basal margin slightly concave; disc depressed. Frons width at base equal to width at apex; widest at distance three-fourths its length from vertex; sides concave above, straight, convergent below widest portion; disc depressed in entire length. Gena with genal ridge slightly elevated between frontogenal carina and subantennal plate which is at a right angle to gena. Pronotum with median length about equal to that of vertex; anterior margin between eyes convex; length behind eyes slightly greater than median length. Labium with apical segment longer than wide, dark. Mesonotum with longitudinal median carina slightly elevated, longitudinal lateral carinae feeble. General color, lighter than usual in the genus, head, legs, pronotum, and thoracic pleura brownish yellow with carinae and margins lighter brownish yellow.

Male genitalia. Aedeagal shaft straight. Shaft, left side, with a large roughly triangular lobe at midlength, and a moderately long tapering process arising at base, extending dorsally and posteriorly. Flagellum,

left side, with a long curved process directed posteriorly. Flagellum, right side, with a short tapered process at base extending dorsally; with a large hood-like lobe with its dorsal and left anterior margins produced to a broad pointed process and bearing on the right side a short process that appears broken in the holotype; and a scoop-like process arising ventrally directed dorsally with the apex pointed and the sides serrate. Paramere narrow, with inner ventral margin subangulately convex at midlength.

Discussion. *Cedusa chuluota* Ball was described from the male holotype, female allotype, and four paratypes from Sanford, Florida, from the ditch fern (*Woodwardia*). Additional specimens have been dissected from Florida (1), North Carolina (1), Georgia (1) from the North Carolina State University collection, and one locality unknown from the Florida Division of Plant Industry collection. The holotype is illustrated and it is in the United States National Museum collection. No closely related species have been seen. All specimens examined were similar to the illustration. This species may be distinguished from all other species in the genus by the shape of the aedeagus and paramere.

Cedusa venosa Fowler

Cedusa venosa Fowler 1904:112.

This species is known only from the female holotype deposited in the British Museum (Nat. Hist.). We have been unable to positively associate this female with any of the males described in this study.

CHECKLIST OF THE NEW WORLD SPECIES OF *CEDUSA* WITH COUNTRY RECORDS AND STATE RECORDS FOR THE UNITED STATES¹

1. *alexanderi*, n. sp. Brazil.
2. *albolineata* Fennah 1952:144. Panama; Venezuela.
3. *apicata* Caldwell 1944b:448. Mexico.
4. *arizonensis*, n. sp. USA: Ariz.; Mexico.
5. *australis* (Metcalf) 1923:196. USA: Ill., La., Mich., Miss., Mo., Texas; El Salvador; Honduras; Panama.
6. *balli*, n. sp. USA: La.
7. *balloui*, n. sp. Cuba.
8. *beameri*, n. sp. USA: Ariz., N.M., Utah.
9. *bedusa* McAtee 1924:182. USA: Ark., Cal., Fla., La., Miss. (N.C.), Va.
10. *blantoni*, n. sp. Panama.
11. *brazilensis*, n. sp. Argentina; Brazil.
12. *bruneri*, n. sp. Cuba.
13. *caldwelli*, n. n. Mexico.
14. *californica* (Van Duzee) 1891:169. USA: Ariz., Cal., Colo., Ida., Okla., Oreg., Tex., Utah.
15. *caribbensis* Caldwell 1950:205. Puerto Rico.
16. *carolinensis*, n. sp. USA: Fla., Ga., Md., (N.C.) S.C.
17. *carranzensis* Caldwell 1944b:449. British Honduras; Guatemala; Mexico.
18. *cedusa* McAtee 1924:182. USA: Fla., Md., Mich., Minn., N.Y., Va.
19. *chuluota* Ball 1928:200. USA: Fla., Ga., (N.C.) N.J.
20. *colona* Caldwell 1950:205. Dominican Republic; Puerto Rico.
21. *costaricensis*, n. sp. Costa Rica.
22. *cubensis*, n. sp. Cuba.
23. *cyanea* Fennah 1952:147. Trinidad.
24. *dampfi* Caldwell 1944b:453. Mexico; Panama.
25. *delongi* Caldwell 1944b:449. El Salvador; Guatemala; Mexico; Nicaragua; Panama.
26. *dietzi*, n. sp. Panama.
27. *digitata* Caldwell 1944b:451. British Honduras; Mexico.
28. *dubiata* Caldwell 1944b:450. Mexico.
29. *ecuadorensis*, n. sp. Ecuador.
30. *edentula* (Van Duzee) 1912:503. USA: Ga., Miss., (N.C.) N.J., (Tenn.) Va.
31. *elongata* Caldwell 1944b:450. Mexico.
32. *fennahi*, n. sp. French Guiana.
33. *fitchiella*, n. sp. Brazil.
34. *flavida* (Van Duzee) 1907:36. Jamaica.
35. *fowleri*, n. sp. Costa Rica; El Salvador; Guatemala; Mexico; Nicaragua; Panama.
36. *funesta* Fowler 1904:112. Costa Rica; Guatemala; Mexico; Panama.
= *tropicalis* Caldwell 1944b:452. N. syn.
37. *furcata* Caldwell 1944b:450. British Honduras; Guatemala; Mexico; Panama.
38. *fuscata* Caldwell 1944b:448. Mexico.
39. *gedusa* McAtee 1924:183. USA: Fla., Ga., Md., Miss., N.J., N.Y., Pa., (Tenn.)
40. *hedusa* McAtee 1924:184. USA: Fla., Ga., Md., N.Y., Ohio, S.C., Va.; Canada.
41. *incisa* (Metcalf) 1923:195. USA: Conn., Ill., Iowa, Ind., Me., Mass., Mich., Minn., Neb., N.H., N.Y., (N.C.) Ohio, Pa., Wis.; Canada.

¹Many of these records were added after the completion of the earlier portions of this study.

42. *inflata* (Ball) 1902:262. USA: Fla.; Cuba; Dominican Republic; Haiti; Puerto Rico.
= *santaclara* Myers 1928:13. N. syn.
43. *inflata dominicana* Fennah 1952:145. Dominica.
44. *insularis*, n. sp. Cuba.
45. *irengana* Fennah 1944:9. Brazil; Panama; Trinidad.
rubriventris Fennah 1945:446. N. syn.
46. *isthmusensis*, n. sp. Panama.
47. *kedusa* McAtee 1924:184. USA: Ariz., Cal., Conn., Fla., Ga., Ill., Ind., Iowa, Kans., Md., Mich., N.J. (N.C.), Ohio, Va., Wis.
48. *kulashi*, n. sp. Mexico.
49. *ledusa* McAtee 1924:184. Brazil.
50. *lineata* Caldwell 1944b:448. Mexico.
51. *lugubrina* (Stål) 1862:8. Brazil.
52. *macateei*, n. sp. Brazil.
53. *maculata* (Van Duzee) 1912:503. USA: Fla., Ga., Ind., Md., Minn., Miss. (N.C.), Okla., Pa., Tex.; Canada; Costa Rica; Honduras.
54. *mallochi* McAtee 1924:184. USA: Fla., Ga., Ill., La., Md., Miss. (N.C.), Ohio, S.C., Tenn. Va; Honduras.
55. *martini*, n. sp. Mexico.
56. *medusa* McAtee 1924:184. British Honduras; Honduras; Mexico.
57. *metcalfi*, n. sp. USA: Ga. (N.C.)
58. *mexicana* Caldwell 1944b:449. El Salvador; Honduras; Mexico.
59. *minuenda* Ball 1928:200. USA: Fla., Ga.
60. *morrisoni*, n. sp. British Guiana.
61. *mui*, n. sp. Costa Rica.
62. *mutilata* Caldwell 1944b:451. Mexico.
63. *nedusa* Caldwell 1944b:452. British Honduras; Honduras; Mexico.
64. *neodigitata* Caldwell 1944a:105. Costa Rica; Nicaragua.
65. *neomaculata* Caldwell 1944b:447. USA: Fla.; Mexico.
66. *obscura* (Ball) 1902:262. USA: Cal., Colo., Conn., Fla., Ga., Ill., Kans., La., Md., Me., Mich., Miss., N.J. (N.C.), Tex., Va., Vt., Wis.; Canada; Cuba.
= *fedusa* McAtee 1924:183.
67. *olseni*, n. sp. USA: N.Y. (N.C.) W. Va.
68. *panamensis*, n. sp. Panama.
69. *pedusa* McAtee 1924:185. British Honduras; Costa Rica; Guatemala; Honduras; Panama.
70. *peruensis*, n. sp. Peru.
71. *plaumanni*, n. sp. Brazil.
72. *plummeri* Caldwell 1944b:452. USA: Ariz.; Costa Rica; Mexico.
73. *praecox* (Van Duzee) 1912:502. USA: Ariz.
74. *pseudomaculata* Caldwell 1944b:447. Guatemala; Mexico
75. *redusa* McAtee 1924:185. USA: Fla., Ga., Kent., Md. (N.C.)
76. *remetti*, n. sp. Brazil.
77. *sanctaecatharinae*, n. sp. Brazil.
78. *serrata* Caldwell 1944b:451. Mexico.
79. *shawi*, n. sp. USA: Md.
80. *similis* Caldwell 1944b:452. Mexico.
81. *simplex*, n. sp. Brazil.
82. *stali*, n. sp. Argentina; Brazil.
83. *tincta* Caldwell 1944b:451. British Honduras; Mexico.
84. *vanduzeei*, n. sp. USA: Texas.
85. *vedusa* McAtee 1924:185. Mexico.
86. *venosa* Fowler 1904:112. Mexico.

87. *vulgaris* (Fitch) 1851:47. USA: Ark., Cal., Conn., Ga., Ill., Kans., Me., Md., Mich., N.Y. (N.C.), Ohio, Okla., Va.; Canada.
= *fitchi* Kirkaldy 1906:403.
= *tedusa* McAtee 1924:185.
88. *whitei*, n. sp. British Honduras; Guatemala.
89. *woodsholensis*, n. sp. USA: Miss. (N.C.)
90. *zedusa* Caldwell 1944b:450. Mexico.
91. *zeteki*, n. sp. Panama.

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