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**THE FULGORIDAE, OR PLANT-HOPPERS OF
MISSISSIPPI, INCLUDING THOSE OF
POSSIBLE OCCURRENCE**

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A TAXONOMIC, BIOLOGICAL, ECOLOGICAL
AND ECONOMIC STUDY

EXCHANGE
NOV 1 1928

DISSERTATION

PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY IN THE GRAD-
UATE SCHOOL OF THE OHIO STATE UNIVERSITY



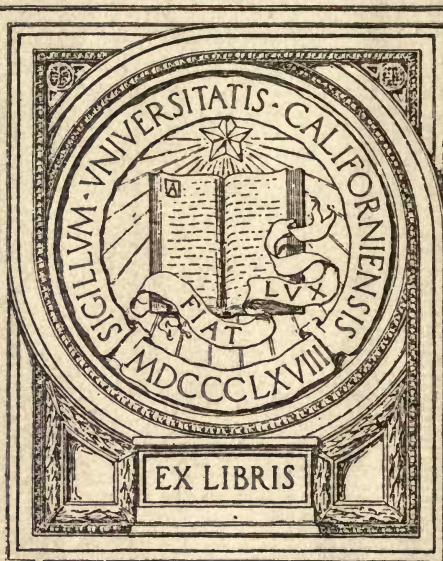
BY

HERBERT LAWRENCE DOZIER, B. S., M. S.

THE OHIO STATE UNIVERSITY

1922

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ABSTRACTS

EXCHANGE

AUTOBIOGRAPHY

I, HERBERT LAWRENCE DOZIER, was born in Wilmington, North Carolina, June 24, 1895. I received all of my secondary school education in the public and high schools of the city of Columbia, South Carolina; the first year of my undergraduate work was spent at Clemson A. & M. College of South Carolina; the remaining years at the University of South Carolina from which institution I received the Degree of Bachelor of Science in 1915. After working six months as Field Assistant with the U. S. Bureau of Entomology field station at Columbia, South Carolina, I accepted an Assistantship in Entomology at the Florida Agricultural Experiment Station. During this period half of my time was spent in Station duties and the remainder in the Graduate School of the University of Florida from which institution I received the Degree of Master of Science in June, 1917. I then worked with the U. S. Bureau of Entomology as Scientific Assistant in South Carolina and Arizona. From June, 1918, to August, 1919, was spent in service, mostly overseas, in the U. S. Army. The sessions of 1919-20 and 1921-22 were spent as a University Fellow in Entomology at the Ohio State University as a candidate for the Degree of Doctor of Philosophy. From June, 1920, to September 15, 1921, was spent as Assistant Entomologist of the State Plant Board of Mississippi.

MISSISSIPPI AGRICULTURAL EXPERIMENT STATION

Technical Bulletin No. 14

THE FULGORIDÆ or Plant-Hoppers of Mississippi, Including Those of Possible Occurrence

A Taxonomic, Biological, Ecological, and Economic Study

By Herbert L. Dozier, Ph. D.

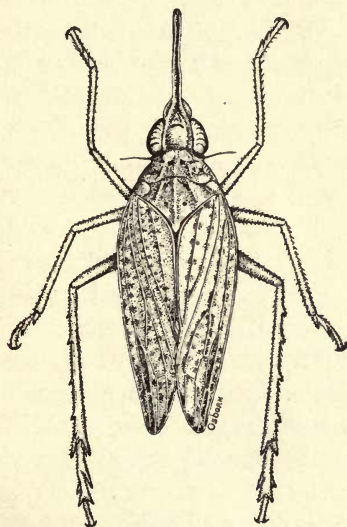


Fig. 1—Adult *Scolops perdix* Uhler

Mississippi Agricultural Experiment Station
A. & M. COLLEGE, MISSISSIPPI
J. R. RICKS, Director
December, 1926

The Fulgoridae or Plant-Hoppers of Mississippi, Including Those of Possible Occurrence; a Taxonomic, Biological, Ecological, and Economic Study*

By Herbert L. Dozier, Ph. D.

INTRODUCTION

Kirkaldy has called attention to the fact that the genus *Fulgora* was erected by Linnaeus in 1767 (Syst. Nat., Ed. 12, Tom. I, 703), and the type was fixed by Sulzer in 1776 (Algek. Gesch. Ins. 85), as *europaea* Linn. This being the earliest genus and type, the super-family and the family take their names from it. The erection of the Family Fulgoridae is credited to Latreille in 1807.

While the Membracids have the prothorax developed into many curious and odd shapes, in Fulgorids the head has undergone widely varied development. In both groups, this specialization into odd shapes and forms seems to have no definite or known purpose other than that of possible protection and mimicry.

The family is remarkable for certain exotic forms which it contains. Among these may be mentioned the great Lantern-fly of South America and the strange Candle-flies of China and the East Indies. The fact that some of the species were supposed to be phosphorescent has given the name of Lantern-flies to members of the family. However, none of our native species are phosphorescent and for them at least this name is a misnomer. A better name, as suggested by Prof. Z. P. Metcalf, would be that of Plant-hoppers.

Members of this family reach their highest development in oddness of shape and more highly colored forms in the tropics. A great many of these insects have the curious faculty of excreting large quantities of a whitish flocculent wax. We find this capacity greatly developed in the tropi-

*Contribution from the Dept. of Zoology and Entomology of the Ohio State University and the State Plant Board of Mississippi.

cal American genus *Phenax*, the members of which fly about with large masses of this waxy substance several times as long as themselves. Larvae of a maggot-like nature are frequently found hidden in the wax of the living Fulgorids of this genus.

In the form of body the various genera differ so greatly that, if only superficially examined, they appear to have very little in common. Some of them resemble very much small butterflies and moths and others might easily be mistaken for neuropterous insects. The nymphs are often totally different in appearance from the adults.

All are vegetable feeders and are found on the undersides of the leaves and along the stems of various herbaceous plants, shrubs and trees, sucking the juices, preferably from the larger veins or ribs.

The average student and even the professional entomologist knows little or practically nothing about the Fulgoridae and the relative systematic position of its members. This is due primarily to the insufficient and widely scattered literature on the subject, which is generally not readily accessible to the ordinary worker. When the latter is so fortunate as to obtain access to the original reference it is usually only to find that it is in Latin, French or German.

Early in his work upon Fulgoridae it became evident to the writer that a faunistic study of the group together with uniform keys and descriptions would be a welcome addition. A knowledge of the systematics of a group is essential before one can work out the economic status and the ecological relationships of its members. It is also necessary to know what forms occur within a State and their relative abundance.

The material used for this treatise consisted of the large private collection of Prof. Herbert Osborn, kindly placed at my disposal, and a large amount of material collected by the writer in South Carolina, Florida and Mississippi. While employed by the State Plant Board of Mississippi, from June 15, 1920, to September 15, 1921, opportunity was offered to do representative and intensive collecting and many notes were taken of food plants and ecological habitats.

The paper includes all of the species definitely known and those that are at all likely to occur within our territory. It is only a beginning, however, and without doubt many new and interesting forms are yet to be discovered and described.

To bring together in convenient form the widely scattered descriptions, I have given a rather full description of each species that occurs in this region. I have drawn freely upon the original published sources, where these have been satisfactory, and have abbreviated, amplified or otherwise modified these as the conditions required, after examining, where possible, large series of specimens many of which were types and paratypes. In a few cases actual specimens were not available and in these the description is drawn up from the original to conform with the others. The keys are intended only for the forms known to inhabit the Southern United States.

ACKNOWLEDGMENTS

The writer wishes to acknowledge here his great indebtedness to Prof. Herbert Osborn, of the Ohio State University, under whose supervision and direction this work has been done. Credit is due him for constant advice and assistance and especially for the placing of many of his records and his entire private library and collections, the latter containing many type specimens, at my disposal. To Prof. R. W. Harned, he is much indebted for arrangement of the work in such a manner as to make varied and representative collecting possible. To Dr. E. D. Ball and W. L. McAtee the writer wishes to express appreciation for the kind courtesies and help they have extended him in the examination of type and other material. Mr. George Ainslie has kindly given the writer some valuable distribution records from his Tennessee and Florida collected material. The writer also wishes to thank Dr. Raymond C. Osburn and W. L. McAtee for their kindness in carefully reading and criticizing the manuscript. L. Chester Marston, Jr., of the Delaware Agricultural Experiment Station made figures 9, 17, 18 and 20. To these and all others who in any way have assisted him in the completion of this work, the writer hereby expresses his sincere thanks.

ECONOMIC STATUS

The superfamily Fulgoroidea while of much economic importance in the warmer tropical portions of the World contains only a few really important pests in this country. The total damage caused by these insects, however, is without doubt not fully appreciated and given due consideration by most entomologists. Only those who undertake an intensive study of these small insects, some of which are very minute, realize how capable they are of inflicting serious economic losses.

Plant hoppers suck their nourishment from the leaves and stems of plants in the form of sap, often unnoticed, until the leaves begin to wither, curl and distort, then become discolored and die. The sap is pumped out by means of a long beak or sucking-tube that by means of the mandibular setae or piercing organs is capable of penetrating even very hard and tough tissues.

The Sugar Cane Leaf-hopper, *Perkinsiella saccharicida*, is a rather serious pest of sugar cane and at one time threatened the entire crop in Hawaii. This insect does not occur in North America fortunately but is widely distributed over the tropics. It is remarkable in that it has the power of stridulation, something unknown in other members of the family.

Perhaps the two species that do most damage in the United States are the Corn Delphacid, *Peregrinus maidis*, and the Cranberry Toad Bug, *Phylloscelis atra*. The latter does considerable damage to the cranberry bogs of the states of New York and New Jersey. *Peregrinus maidis* causes decided injury to young corn plants in the Southern States, especially in Florida.

The life-histories of both of these insects have been well worked up but very little is known about the life history and habits of the other members of the family.

CHARACTERIZATION

The family Fulgoridae may be briefly characterized as follows:—
Ocelli two (rarely three or entirely absent), placed below the eyes or near the eyes, very variable in form but generally reniform, usually in cavities of the cheeks. Antennae placed below the eyes, very variable in size and form, usually of two segments terminated by a very

fine hair or bristle, the second segment often with a peculiar texture of the surface, due to the presence of sensory structures; rarely with basal appendages (Otiocerus). Form of the head very diverse, the vertex and frons forming either a continuous curve, or the planes of the vertex and frons forming an acute angle, or both prolonged to form a projection that may assume monstrous proportions and varied shapes. The prothorax is normally developed and unarmed.

SYSTEMATIC POSITION AND CLASSIFICATION

The sub-order Homoptera may be somewhat loosely defined as those true bugs that have the tegmina or elytra usually of the same texture throughout and sloping, roof-like, at the sides of the body; and beak arising from the hinder part of the lower side of the head, and the head very closely joined to the thorax. They are represented by a large variety of insects many of which are of great economic importance and among our most destructive pests.

As the classification of the Homoptera into subfamilies is a matter likely to prove difficult to the student and general worker, I give here for their convenience the following key useful for plant hoppers of our region, a modification by Lutz of the one given by Brues and Melander.

1. *Active*, free-living species; beak plainly arising from the head; tarsi 3-jointed; antennae very short, with a small, terminal bristle,.....2

Females often inactive or incapable of moving; beak appearing to arise between the front legs, sometimes absent in males; tarsi, if present, 1- or 2-jointed; antennae usually well developed (sometimes absent), without conspicuous terminal bristle,.....6

2. *Our* species, usually, at least $\frac{1}{2}$ inch long; three ocelli on top of the head; antennae with short basal joint, terminated by a hair-like process which is divided into about 5 joints; front femora thickened and generally spined beneath,.....CICADIDAE.

Our species less than 5 in. long; usually not more than two ocelli, and front tibiae not enlarged,.....3

3. *Antennae* arising from below the eyes; ocelli placed beneath or near the eyes, usually in cavities of the cheeks; pronotum not unusually developed,.....FULGORIDAE.

Antennae arising from in front of and between the eyes,.....4.

4. *Pronotum* extending back over the abdomen,.....MEMBRACIDAE.

Pronotum not extending back over the base of the abdomen,.....5.

5. *Tibiae* smooth, the hind pair with one or two stout spines and with a cluster of spinules at the apex,.....CERCOPIDAE.

Hind tibiae with two rows of spines beneath; leaf-hoppers of which the Jassinae is the principal subfamily,.....CICADELLIDAE.

6. *Hind* femora much thickened; antennae long, 5 to 10-jointed, last joint with two fine apical bristles; front wings somewhat thicker than the hind ones, often rather leathery; pad between the tarsal claws prominent, bilobed,.....CHERMIDAE.

Hind femora not much larger than the others,.....7.

7. *Tarsi* 2-jointed, the basal joint sometimes reduced, the outer joint with two claws; wings, when present, four in number; mouth-parts usually well-developed in both sexes,.....8.

Tarsi, when present, 1-jointed, with a single claw; females always wingless, often without legs and usually covered with a more or less well-developed scale; males usually with a single pair of wings which lie flat, one above the other; antennae of the females absent or having up to 11 joints, of males 10- to 25-jointed,.....COCCIDAE.

8. *Wings* usually opaque, whitish, clouded or mottled with spots or bands; body more or less mealy; tarsi with two nearly equal joints; tip of tibiae with a number of short spines; a pad-shaped or spine-like process between the tarsal claws,.....ALEYRODIDAE.

Wings transparent, though sometimes colored; tarsi 2-jointed, the basal joint sometimes very much reduced; body not mealy, but rarely with waxy wool; process between the tarsal claws absent or nearly so,.....APHIDIDAE.

The sub-order Homoptera is divided into two main groups, the Auchenorrhynchi, in which the beak or rostrum plainly arises from the head, and the Sternorrhynchi, in which it arises apparently from the sternum between the anterior coxae. The first group contains six different families, one of which, the Fulgoridae, is fully treated in this bulletin.

The following classification has been adopted, the arrangement being from the more primitive to the more specialized. This represents the type of specialization in the forms today and does not necessarily indicate the points of divergence from a common stem in the matter of origin, which latter cannot be shown in serial arrangement.

ORDER HOMOPTERA LATR.

Group 1—AUCHENORHYNCHI Amyot & Serville.

Super-family 1—CICADOIDEA.

Family 1—CICADIDAE.

Family 2—CERCOPIDAE.

Sub-family 1—Cercopinae

2—Aphrophorinae

Family 3—MEMBRACIDAE

- 1—Membracinae
- 2—Hoplophorinae
- 3—Darninae
- 4—Tragopinae
- 5—Smiliinae
- 6—Centrotinae

Family 4—CICADELLIDAE.

- Sub-family
- 1—Paropinae
 - 2—Bythoscopinae
 - 3—Cicadellinae
 - 4—Gyponinae
 - 5—Jassinae

Super-Family 2—*FULGOROIDEA*.

Family 1—FULGORIDAE

- Sub-Family
- 1—Fulgorinae
 - 2—Dictyophorinae
 - 3—Achilinae
 - 4—Cixiinae
 - 5—Tropiduchinae
 - 6—Issinae
 - 7—Acanaloniinae
 - 8—Flatinae
 - 9—Derbinae

Family 2—DELPHACIDAE.

Group II—*STERNORHYNCHI* Amyot & Serville.

Family 1—CHERMIDAE.

2—APHIDIDAE.

3—ALEYRODIDAE.

4—COCCIDAE.

DISTRIBUTION

The Fulgoridae is certainly a very ancient family and one highly specialized at an early age. The early American fauna was undoubtedly connected in some way with that of Asia by means of a land bridge. During the Eocene period the entire northern hemisphere was covered by a luxuriant tropical vegetation, rich in arborescent species, and one of the most striking features was the abundance of the broad-winged, moth-like Fulgorids. Cockerell has described twenty-six fossil species from the Rocky Mountain Eocene which are of large size and bright markings that

resemble greatly the present day Indo-Malaysian fauna. For some unknown reason all representatives of this remarkable fauna have disappeared from North America. Perhaps this is due to the large insectivorous birds that came in about this time or more probably to the gradual cooling of the northern hemisphere that reached its culmination in the Glacial Period and brought about accompanying changes in the flora and fauna.

Wherever the Fulgoridae may have originated the derivation of the more recent fossil and the existing forms seems to be from the south rather than from the north. According to Webster (F. M. Webster, "The Diffusion of Insects in North America," *Psyche*, x, pp. 47-58, 1903) there are two main highways of migration from the south; first, from South America via the Antilles and Florida; and second, from Central and South America via Mexico and the Gulf Coast. The genera *Poblicia*, *Calypso*, and *Mysidia* are especially representative of Central and South America. The fact, however, that our species in these genera are distinct from those found in those regions would indicate that their presence dates from some ancient time, in our Gulf States.

As Adams has pointed out, the southeastern United States includes a large number of endemic species of plants and animals. It is therefore most likely that this region is the center of origin and distribution for many of our Fulgorids.

ECOLOGICAL CONSIDERATIONS

The native vegetation of any region will indicate to an entomologically trained ecologist the kinds of insects he may expect to find there. Every variation in the soil, rainfall, and climate is reflected in the vegetation and this in turn in the insect fauna.

Most of the Southern States fall in what Merriam has designated as the Upper and Lower Austral Region. The so-called Gulf Strip of the Lower Austral covers over half of Florida and extends around the Gulf Coast almost to Mexico. The southern extremity of Florida falls in the Tropical Region. These states have so many different soil

types and floral regions that it is, in the writer's opinion, impossible to limit any so-called life zones.

Dr. Transeau has shown that eastern North America is occupied by four great forest centers: (1) the Northeastern Conifer forest, centering in the St. Lawrence basin, (2) the Deciduous forest, centering in the lower Ohio basin and Piedmont plateau, (3) the Southeastern Conifer forest, centering in the south Atlantic and Gulf coastal plain, and (4) the Insular Tropical forest of the southern part of the Florida peninsula, centering in the West Indies.

Each of these large formations is made up of many societies or associations. Although we find insects to be to a great extent rather independent of minor differences in climate, we find a large part of them definitely linked with certain plant associations. And as the plant ecological succession progresses, we find a parallel succession taking place among the insects.

Certain of the more important associations are here taken up briefly with a discussion of the Homoptera that are more or less typical of them.

DECIDUOUS MESOPHYTIC WOODS ASSOCIATION

A large area of the Southern States is covered by mixed deciduous woods. The most abundant trees in the hills are the short-leaf pine (*Pinus echinata*) and the old field pine (*P. taeda*) and mixed with these are various species of oaks, as the black-jack (*Quercus nigra*), post oak (*Q. stellata*), Spanish Oak (*Q. falcata*) and scarlet oak (*Q. velutina*), the dogwood and hickory. Beneath the trees are many shrubs and the slopes are covered with grasses.

The various species of oaks support a very numerous insect fauna among which are such Fulgoridae as *Thionia bullata*, *Bothriocera tinealis*, *Cedusa vulgaris*, and most of the species of *Otiocerus*. *Ormenis pruinosa*, *septentrionalis* and *venusta* breed on oak, hickory, sweet gum and many shrubs and vines. The only known host plant of *Cyarda melichari* is young hickory and this is also the favorite food plant of *Cedusa obscura* and *vulgaris*. *Poblicia fuliginosa* breeds on the sumach. *Amalopata mcateeii* and *Cenchrea uhleri* have been taken by the writer on Ironwood (*Carpinus*



Fig. 2—Views in the Tishomingo Hill country of Mississippi.

caroliniana) but only in the adult stage. *Otiocerus ballii* and *Mysidia mississippiensis* were taken sweeping underbrush in Mississippi swamps and appear to be confined to such a habitat. Adults of *Otiocerus schellenbergii* have been taken on the undersides of ash leaves in Florida and Mississippi.

Feeding on the coarse grasses on the floor of typical black-jack oak woods are *Fitchiella robertsoni*, *Bruchomorpha bimaculata* and *B. jocosa*.

In the rich river bottoms there is usually a rather heavy growth of white, willow and water oaks, beech, black and sweet gum, and cypress. Redbud (*Cercis canadensis*) and alder (*Alnus serrulata*) are also abundant. Along these low river bottoms the bamboo-canes, *Arundinaria tecta* and *macrosperma*, are well distributed over most of the Southern States and form at times immense "cane-brakes." The Delphacid, *Stenocranus similis* and the Cicadellids, *Chloro-*



Fig. 3—View at edge of cane-brake in Mississippi Delta near Greenville, Miss.

tettix nacreosa, *suturalis* and *galbanata*, *Thamnotettix shermani*, *flavotinctus* and *crumbi*, and *Deltocephalus arundineus* are typical of this habitat and probably occur wherever the cane-brake occurs. *Oliarus placitus* was taken only in this habitat in Mississippi but its host plant is probably the hackberry, *Celtis mississippiensis*, that grows amid the cane-brake.

THE PINE-BARREN OR LONG-LEAF PINE ASSOCIATION

The so-called pine-barrens make up a large area in Georgia, Florida, Alabama and Mississippi. In the parts most remote from the coast the country is moderately hilly and the soil is usually a grayish sandy loam. Toward the coast the relief is very flat and poorly drained, ponds and

swamps are more frequent and as the ground water is always near the surface the soil is nearly always wet and soggy and usually very acid. In the virgin forests the conifers, mostly *Pinus palustris*, made up as high as 75% of the vegetation but a great deal of this has been cut for lumber. *Pinus elliotii*, the slash pine and *Taxodium imbricarium* are abundant in the small ponds and swamps near the coast.



Fig. 4—A typical view in the pine-barrens or long leaf pine forests of the Gulf Coast.

Living on the pine we find *Oecleus borealis* and *campestris* and *Cixius pini*. Members of the genus *Catonia* are also thought to feed on pine but there are no definite records. Beneath the bark of pine and spruce and in old stumps occur members of the genus *Epiptera* of whose habits we know nothing. On the succulent grasses of the forest floor occur in abundance the following: *Dictyophora microrrhina*, *florens* and *lingula*, *Bruchomorpha jocosus*, *bimaculatus* and *pallidipes*, *Aphelonema viridis*, *decoratus* and *obscurus*, *Scolops angustatus*, *dessicatus*, *spurcus* and *perdix*, and *Phylloscelis atra* and its variety *albovenosa*. *Cyrtoptus belfragei* and *reineckei* either feed on the foliage of the pine itself or on the coarse grasses beneath. *Acanalonia*

bivittata is also taken abundantly sweeping the grassy floor. In Florida, *Hysteropterum punctiferum* occurs very abundantly on the sparse vegetation of the pine-barrens.

THE LITTORAL OR SALT MARSH ASSOCIATION

The strip bordering the Gulf of Mexico furnishes a strand flora and fauna that is quite varied and distinct from that of the remainder of our territory. On the inner zone of the beach are found the sea-side morning glory, and *Uniola paniculata*, commonly known as sea-oats. Upon

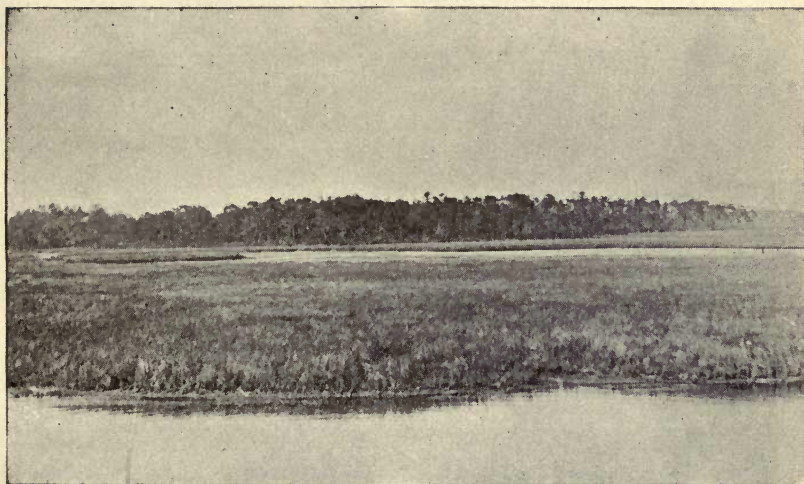


Fig. 5—A view of the bayous of South Mississippi, showing the black rush formation.

the higher sand ridges and dunes back from the beach are found *Pinus taeda* and *australis*, *Quercus geminata* and *virginiana*, *Sabal minor*, *Serenoa serrulata*, *Ilex vomitoria*, and *Myrica cerifera*.

Running back from the salt marshes are numerous bayous. The shallow, tranquil waters of these bayous, or inlets of the sea, with their floor of deep sandy mud are covered almost exclusively by the black rush (*Juncus roemerianus*). Associated with the latter are *Spartina patens*, *Fimbristylus spadicia*, *F. castanea*, *Paspalum vaginatum*, *Chaetochloa imberbis perennis*, and *Distichlis spicata*.

In the *Spartina* association are found *Aphelonema simplex*, *Myndus enotatus*, *slossoni* and *pusillus*, and *Oliarus franciscanus*. It is suspected that the nymphs of these species of *Myndus* feed on the roots of the above mentioned grasses and rushes. *Megamelanus spartini* has been beaten from the heads of *Spartina patens* and there are many other Delphacids that are found only in this kind of habitat. Among these may be mentioned *Prokelisia marginata* and *setigera*, *Megamelanus elongatus*, *dorsalis* and *lautus*, *Megamelus notulus*, *Bakerella maculata*, and *Liburnia acuministyla*. *Pentagramma vittatifrons* occurs on the spike rush (*Eleocharis*) and other sedges.

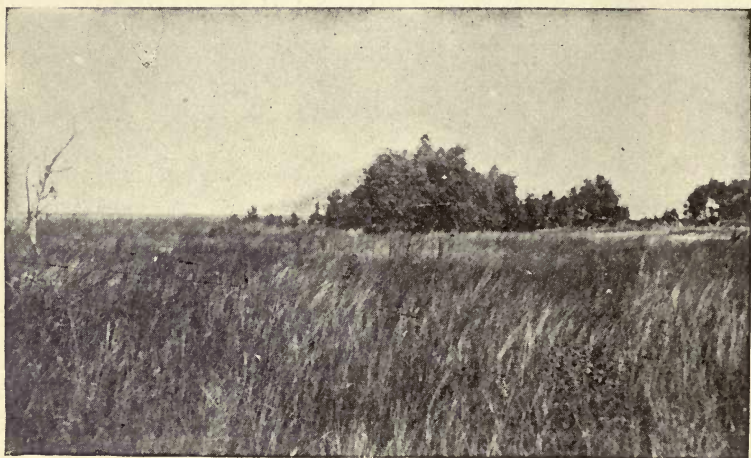


Fig. 6—View of *Spartina* association on an island in the Pascagoula River near its mouth.

EXTERNAL MORPHOLOGY OF THE FULGORIDAE

The head.—The head is composed of two main sclerites, the *epicranium* and the *clypeus*. The epicranium is usually considered to be of three so-called areas, the *vertex*, *frons*, and *genae*. These are strictly terms of convenience and are not designations of separate sclerites.

The vertex is the top of the head between the eyes, when the insect in a horizontal position is looked upon from above. In many of the Fulgorids the vertex is very short, and the vertex and frons are often confused and hard to distinguish;

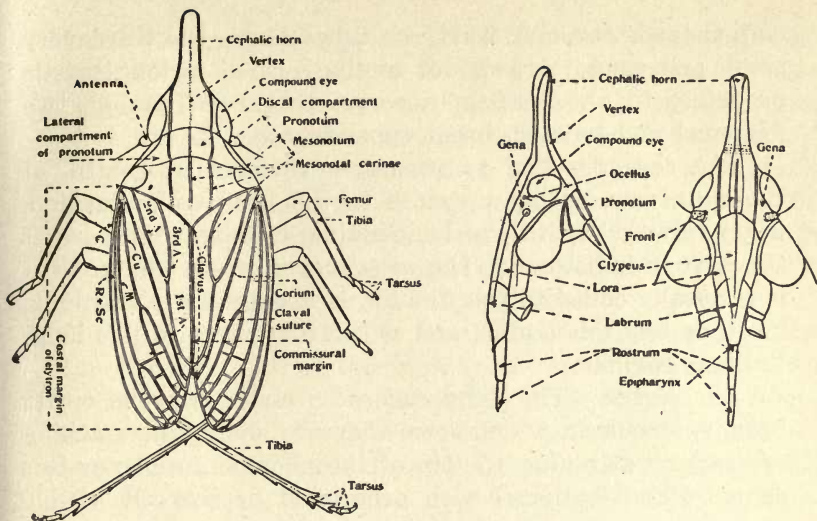


Fig. 7—Diagram of Morphology—Fulgoridae
(From "Hemiptera of Conn.," drawing by P. Garman)

in others the vertex is longer and produced snout-like before the eyes.

The frons in nearly all cases is more or less definitely carinated and in certain genera one finds numerous coarse or fine pustules on the sides. Below the frons is found the clypeus which is usually separated by a more or less definite suture but in rare cases these two parts are fused. The clypeus is composed of three segments and is generally triangular, with or without a median keel. The genae or cheeks are the lateral parts of the head. In the Fulgorids they are actually placed laterally and are hollowed.

The usual number of ocelli is two but in some (in most Cixiinae) there are three, two in the usual Fulgorid position placed close to the antennae at the more or less flat sides of the head, and one at the anterior margin of the frons, adjoining the clypeus. The function of the ocelli is little understood but if used for vision, their usefulness must be greatly limited in this family by the surrounding elevated keels or carinae.

The antennae are of varied shapes and sizes, the first segment usually cylindrical, more or less elongate or noticeably lengthened, but often very short, the second enlarged

club-shaped, at times warty or tuberculate, the third very small and round, drawn out in the form of a long bristle or seta. In the genus *Otiocerus*, there are one or two flattened and twisted, basal appendages.

The thorax.—The *pronotum* is variable in length, at times narrow, fitting up close to the head collar-fashion, nearly always with three longitudinal carinae which are at times very indistinct. The *mesonotum* or *scutellum*, as it is generally called in this family, is usually large and long, more or less triangular, and with from three to five longitudinal carinae.

The elytra.—The wing covers or elytra may be either brachypterous, in which form they are short, not reaching or scarcely attaining the tip of the abdomen, more or less rounded and leathery, with prominent or scarcely visible nervures, or else macropterous when they are longer than the abdomen, transparent or translucent, with definite, punctate or setigerous nervures. In some genera the wing covers are convexly arched.

There are two distinct regions, an inner, small and triangular *clavus* and an outer longer area known as the *corium*, the two being separated by a *claval suture*. Incompletely developed elytra often show no trace of this suture. The inner margin is known as the *commissural margin* and the outer as the costal or *external margin*. A single forked nerve occupies the clavus. The corium is traversed by a more or less large number of longitudinal and transverse nervures; there are two or three main nerves, originating at the base, and these are called *sectors*, the term embracing the main nerve and all of its branches. They are known as the first, second, and third sectors, numbering from the costal margin. The wings are transparent hyaline, and in certain genera are either vestigial or entirely lacking.

The abdomen.—The abdomen is composed of eleven segments, each formed by the union of two horny, chitinous, arched plates that fit into each other and are held together by a membrane; the dorsal plates or tergites and ventral plates or sternites are held together by the *connexivum*.

The abdomen is generally more or less conical, and narrowed behind but in many species is somewhat flat-

tened and truncate posteriorly. Often the dorsal plates are buckled up in the middle to form a longitudinal median ridge and in certain genera (*Aphelonema*) the sides may have one or more rows of minute or coarse pustules.

At the end of the abdomen we find the genital segment, frequently cut out more or less deeply about the *anal tube*, when observed from above and with the lateral margins blunt or angular, and not infrequently rounded or drawn out into a long flap or lobe-like process.

In the male the last or ninth segment is designated as the *pygofer* and in the middle of the upper rim of the same lies the anal tube; the latter is formed by the fusion of the tenth and eleventh segments, is rather elongate and broad, and of definite form. The ventral margin of the pygofer is often deeply cut out, sinuate, or with tooth-like processes. Its shape, however, is constant and quite distinctive for each species and aids in final determination. On the under side of the genital segment, in the ventral aperture of the pygofer, are the two styliform organs of varied length and shape, known as the *genital styles*, although frequently termed the *genital plates*. These are constant and definite in shape and size in the different species and in the Fulgorids, especially the Delphacids, are now considered to be the final criterion for specific determination and even to afford characters for generic classification. From the bottom of the inner chamber between the genital styles arises the *aedeagus* or penis which is rather indistinctly visible.

In the female the last abdominal segment is known as the pygofer also. The ventral portion almost completely encloses the *ovipositor* which is visible along a median slit. The ovipositor is generally a long, rather slender, heavily chitinized organ, and is hinged to the caudal end of the preceding segment. At the end of the segment is found the anal tube with its accompanying style.

The legs.—The legs are composed of the *coxa*, *trochanter*, *femur*, *tibia* and *tarsus*, the latter usually consisting of three tarsal segments and ending in a tarsal claw. The front tibiae are in some genera very much broadened or expanded leaf-like, and the hind tibiae generally have one or more large lateral spines or spurs.

The family Fulgoridae has long been divided into ten subfamilies but one of these, the Delphacinae, is now given family rank by most writers. Members of the latter group are easily differentiated by having a movable spur or calcar on the tip of the hind tibia. The fact that they are almost all sedge and grass-feeding forms occupying the same kind of an ecological habitat (low wet areas) strengthens the writer's belief that they should be treated as a separate and distinct family. Muir has more recently (Proc. Hawaiian Ent. Soc., V. pp. 205-247) divided the Fulgoroidea into fifteen families based on his extensive, careful study of tropical material. However, the following key as given by Van Duzee will suffice for those forms occurring within the United States.

The following table has been adopted from Van Duzee:

Key to the subfamilies of the Fulgoridae

- | | |
|---|---------------------------|
| Anal area of the elytra reticulated, sides of the clypeus carinate, |1. <i>Fulgorinae</i> |
| Anal area of the elytra rarely reticulated, the clypeus in this case without lateral carinae,.....1. | |
| 1. Posterior tibiae armed with a movable spur,....10. <i>Delphacinae</i> | |
| ... Posterior tibiae without a movable spur,.....2. | |
| 2. Clavus granulated; costa dilated, the costal membrane transversely venose,8. <i>Flatinae</i> | |
| ... Clavus rarely granulated; costa in this case not dilated,..3. | |
| 3. Veins of the clavus not attaining the apex, but united with the commissural margin before the apex,.....4. | |
| ... Veins of the clavus either continued to the apex or united with the claval suture before the apex,.....5. | |
| 4. Apex of the front without an ocellus; elytra reticulated toward their apex,.....2. <i>Dictyophorinae</i> | |
| ... Apex of the front usually with a third ocellus; elytra not reticulated apically,4. <i>Cixiinae</i> | |
| 5. Elytra ample, held vertical with the costal margin meeting below the abdomen, closely reticulated over the whole surface; the costal and apical margins without transverse veins; front coalescent with the vertex, no transverse carina,..... | |
|7. <i>Acanaloniinae</i> | |
| ... Elytra when broad held more horizontal not meeting below closely reticulated over the whole surface, and the front usually separated from the vertex by a transverse carina at the apex of the head,.....6. | |
| 6. Head broad, with the eyes nearly or quite as wide as the mesonotum; pronotum without carinae or with a median carina only,7. | |

- ... Head usually much narrower than the mesonotum; if as wide as the pronotum is emarginate behind and tricarinate,.....8.
7. Pronotum truncated behind or at most with a shallow rounded sinus,6. *Issinae*
8. Elytra distinctly amplified within and overlapping beyond the apex of the clavus,.....3. *Achilinae*
- ... Elytra not amplified within nor overlapping at apex,.....9.
9. Elytral membrane strongly differentiated from the corium with numerous simple longitudinal nervures,.....5. *Tropiduchinae*
Elytral venation simple, without a distinct closely veined membrane; pronotum very short, deep angularly emarginate behind,.....9. *Derbinae*.

THE SUB FAMILY FULGORINAE SPIN.

Spinola, Ann. Ent. Soc. Fr., viii, p. 202, 206, 1839 *Fulgoridea*.

This subfamily reaches its highest development in numbers and varied forms in the Tropics but we have representatives of five genera in the United States. They contain some of our largest and most curious-looking forms.

The reticulate anal area of the elytra and in most forms the obliquely truncated apex of the elytra, and the produced vertex will serve to distinguish them.

The immature stages are all unknown and practically nothing is known of their food plants and life history.

The only member of the genus *Crepusia* occurring in North America is *Crepusia glauca*, recently described by Metcalf from a male collected at Brownsville, Texas, and Arizona material.

The following is an adaptation from Metcalf:

Key to the genera

1. Head strongly produced anteriorly, the cephalic process narrowed towards apex.....*Amycle* Stål
- ... Head not strongly produced anteriorly.....2.
2. Ninth abdominal segment elongate, quinquecarinate.....*Calyptoproctus* Spin.
- ... Ninth abdominal segment not elongate, not quinquecarinate.....3.
3. Posterior border of pronotum with transverse carina.....*Crepusia* Metcalf
- ... Posterior border of pronotum without a transverse carina.....4.
4. Vertex short, with a distinct sulcus between vertex and frons,*Poblicia* Stål
- ... Vertex longer, produced anteriorly.....*Cyrpoptus* Stål

THE GENUS *AMYCLE* STÅL

This genus was erected by Stål in 1861 and is very closely allied to *Calyptoproctus*. It is easily distinguished by its very much prolonged head.

Two species have been described from the United States, *vernalis* Manee, known only from North Carolina, and *saxatilis* Van Duzee from California. *Amycle sodalis* Stål was described from Mexico.

Briefly characterized as follows: Head narrower than the thorax, strongly produced, convex below and flat above. Frons convex, rather flat at the base, carinae lacking or else almost obsolete. Pronotum and scutellum more or less feebly tricarinate. Elytra slightly widened at the apex, obliquely truncate. Anterior femora somewhat compressed; hind tibiae trispinose.

Logotype of the genus.—*Amycle amabilis* Westw.

Amycle vernalis MANEE

(1910 Ent. News, xxi, p. 117).

This species was described from five specimens taken at Southern Pines, North Carolina, in early April. The species has not been taken since and I append here the original description.



Fig. 8—*Amycle vernalis* Manee (redrawn after Metcalf)

"Head brown, prolonged to nearly twice its width at base and tapering from base to outer third where from a slight broadening it tapers to rounded point; upper side of head with carinal edges and two carinae which approach from front run parallel to first third, then separate to outward curve as if to enclose the strong carina of prothorax; under side of head with carinal edges and strong central carina; eyes large, longer than wide; legs brown, hollowed

on inside, hind tibiae with five spines; abdomen above black centered broadly with orange tipped with brown, under side brown sprinkled lighter; fore wings brown, veins prominent; hind wings clear, broadly based with pink and tipped with fuscous."

As *saxatilis* was taken by Van Duzee in California on pine we may suspect that the host of *vernalis* will prove to be similar.

THE GENUS CALYPTOPROCTUS SPINOLA

This genus was erected by Spinola in 1839, the name being derived from the Greek and signifies "hidden anus." There is only a single species known from the United States.

Briefly characterized as follows: Head very large, forming a narrow border, rounded in front and flattened on top, a little concave. Pro- and mesothorax feebly unicarinate longitudinally in the middle. Elytra more or less opaque at the base, the rest transparent, with opaque spots. Abdomen large, more or less depressed, slightly keeled in the middle; the fifth dorsal plate of the female nearly as long as the three preceding segments taken together, operculiform, large enough to cover the abdominal extremity; this plate presenting no particular development in the male.

Orthotype of the genus.—*Calyptoproctus elegans* Lep. & Serv.

Calyptoproctus marmoratus SPINOLA
(1839 Ann. Soc. Ent. Fr., viii, p. 271).

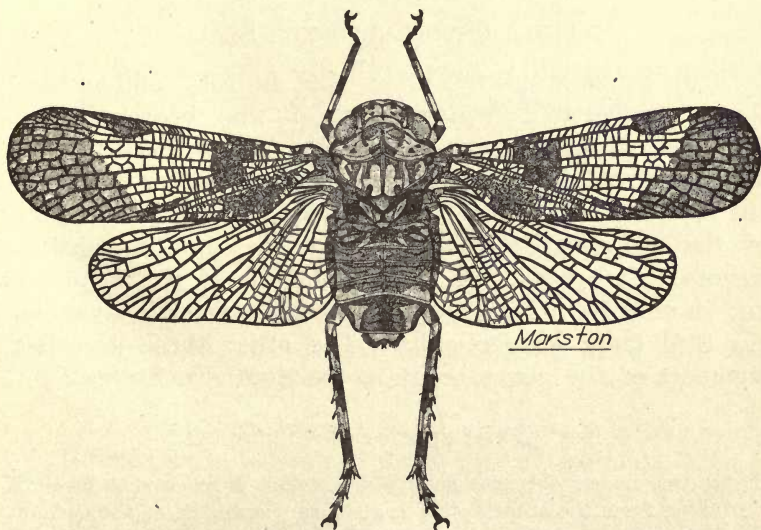


Fig. 9—Adult *Calyptoproctus marmoratus* Spinola, enlarged
(Original)

A short description of this species was published by Spinola in 1839, giving North America as its habitat. Since that time it has never been collected and the record has always been a questionable one. A single female was taken on the side of a telegraph pole at Forkville, Miss., September 2, 1921, by Miss Minnie Lee Price, that agrees exactly with the original description and confirms the original statement as to habitat.

Greenish varied with black. Vertex short, rounded and sinuated in front, the posterior margin broadly and rather deeply emarginate, distinctly foveate; greenish for the most part black with black maculations on the anterior margin and both sides. Pronotum with a single median ridge-like keel that does not reach the anterior margin, transversely wrinkled. Scutellum tricarinate. Elytra slightly opaque and greenish at their base, spotted or mottled with black, the rest transparent, with rather large square cells, more or less mottled with black, especially towards the margins and extremity. Wings hyaline, slightly greenish at their base, the venation brown. Abdomen more or less black above, the sides and margin of each segment, green or yellowish. Body beneath green or yellowish, spotted with black, the venter having a black transverse, oblong spot upon each segment on each side. Hind tibiae with four or five lateral spines; femora twice and the tibiae three times ringed with black; tarsi greenish.

Length of body 12 mm.; length to tip of elytra 18 mm.; elytral expansion 36 mm.

THE GENUS CYRPOPTUS STÅL

This genus was erected by Stål in 1862 and is most closely related to *Calyptoproctus*. It may be readily distinguished by having the vertex obtusely and roundly produced in front beyond the eyes, much flattened, and without carinae, the obliquely truncated apices of the elytra, by the bifoveolate pronotum, and the dilated anterior femora. *C. suavis* Stål, the haplotype of the genus, is known only from Mexico and Guatemala and *C. ferruginosus* Stål from Mexico only. The other three described members of the genus occur in the Southern States.

Key to the species of Cyropsus.

Costal area nearer the apex subhyaline, a dark fuscous vitta or cloud running from the outer apical angle thru the middle of the corium; a large species with the vertex short and obtuse.....*belfragei* Stål
Posterior half of elytra hyaline with its fuscous apex bisected by an oblique hyaline vitta; smaller and with the vertex slightly longer,

.....*reinecke* Van D.
Posterior half of elytra subhyaline, without any definite banding;
vertex more elongate and angular than in the others.....
.....*nubeculosus* Stål

Cyrptus belfragei STÅL

(1869 Berl. Ent. Zeit., xiii, p. 240).

Recorded from Ohio, N. C., Va., Fla., Mo. and Texas.

This is the largest of our three species and is distinguished by the shorter, more obtuse vertex, and the short longitudinal black vitta on the apical third of the elytra.

Pale olive yellow, the vertex, thorax and scutellum somewhat obscure, here and there infuscated. Vertex about equal in length to the pronotum, very bluntly rounded in front with the hind margin nearly straight across the middle, faintly sulcate along the longitudinal median line. Frons transverse, faintly longitudinally striated, sides sinuated, apex concavely arcuated, without carinae; pale dirty yellowish, very finely speckled with scarlet. Apical two-thirds of clypeus, the fore coxae and femora dark fuscous, palely speckled. Antennae very short, subglobular and tuberculate. Ocelli yellowish translucent. Pronotum truncate before, very feebly emarginate behind, the median line bluntly carinate, and either side on disc is a round dark impressed dot. Scutellum with only a faint indication of a median carina, and marked with two dark impressed dots near the margin before the apex. Elytra long, slightly narrowed and obliquely truncate at apex, the apical angles rounded; largely opaque and fuscous, tinged with ferrugineous, a large part of the basal half washed with scarlet; the costal area near the apex paler and subhyaline and another pale subhyaline area on inner margin at apex of the clavus; a short dark fuscous vitta or cloud runs from the outer apical angle through the middle of the corium; veins reddish ferrugineous. Wings vitreous, scarlet at base, infuscated at apex, the veins mostly black. Dorsum of abdomen scarlet, the venter and legs mottled with black.

Male genital styles or plates long and subrectangular, the outer angle of the apex well rounded, hirsute.

Length of body 8-9 mm.; length to tip of elytra 13-14 mm.; elytral expansion 26-28 mm.

Redescribed from several specimens taken by D. W. Grimes sweeping in tall grass near Pascagoula, Miss., Aug. 20, 1919. A male collected by J. S. Hine at Vinton, Ohio, June 5, 1900, has in addition a very small narrow oblique hyaline stripe near the outer angle of the apex but is undoubtedly this species.

Cyrptoptus reineckei VAN DUZEE
(1909 Bul. Buf. Soc. Nat. Sci., ix, p. 185).

Known heretofore only from Florida. It has the form of *C. belfragei* but is smaller and distinguished by having the posterior half of the elytra hyaline with its fuscous apex bisected by an oblique hyaline vitta.



Fig. 10—*Cyrptoptus reineckei* Van D., enlarged (from Van Duzee)

Dull testaceous brown, more or less tinged with ferrugineous, especially on the base of the elytra; the vertex, pronotum and scutellum minutely irrorate with pale. Vertex obviously longer than the pronotum, rounded or but feebly angled before, nearly straight across the middle of the basal margin; median line with a broad sulcate carina. Frons transverse, longitudinally minutely striate, sides sinuated, apex concavely arcuated; pale testaceous with a lighter indeterminate apical band which covers the lateral pleural pieces. The apical two-thirds of the clypeus, the fore and intermediate legs black irrorate with pale. Pronotum very feebly emarginate behind, truncate before, the median line carinate; disc either side with a round impressed dot. Scutellum ecarinate or nearly so, marked with two dark impressed dots near margin before the apex. Elytra long, obliquely truncated but not as strongly narrowed there as in *belfragei*, the outer apical angle rounded; the costa feebly sinuated beyond the middle; inner ulnar nervure twice forked beyond the middle, the outer ulnar forked near its base but distinctly farther than in *belfragei*, its two branches simple until lost in the confused venation of the apical portion; ferrugineous or almost coccineous on the basal half of the elytra, sometimes obscurely clouded with fuscous in places, the apical half hyaline, fusco-venose, with a large fuscous cloud at apex which is bisected by an oblique hyaline vitta from the outer angle. Wings coccineous at base, then fuscous for a space and again along the immediate apex, the intermediate surface hyaline with fus-

cous veins. Venter fuscous, irrorate with pale. Anterior femora broadly foliaceous, the intermediate narrower; hind legs pale, irrorate with fuscous.

Length of body 7-8 mm.; length to tip of elytra 10-13 mm.; elytral expansion 23-26 mm.

Van Duzee found this species numerous at various localities in Florida. The writer took several specimens on young pines along the shore at Pass Christian, Miss., Sept. 7, 1920, and others sweeping grass beneath pine trees on Cat Island, seven miles off the Mississippi coast, out in the Gulf of Mexico, Sept. 7, 1920; a female at Maxie, Aug. 19, 1920; a pair taken by sweeping coarse grass in black-jack oak association near Hattiesburg, Miss., Aug. 10, 1921; and a female at Meridian, Miss., Aug. 15, 1921. Numbers of this species were taken Aug. 6, 1921, by C. J. Drake and the writer while sweeping a pure stand of *Panicum repens* on Lowry Island, which is in the middle of Pascagoula River, at Pascagoula, Miss.

Cyrpoptus nubeculosus STÅL

(1869 Ber. Ent. Zeit., xiii, p. 240).

This species was described from Mexico but occurs also in Texas. The vertex is more elongate and angular than in the preceding two species.

Head, thorax and scutellum pale fuscous, minutely spotted with olive. Head moderately round, viewed from the side, flattened and prominent anteriorly. Vertex slightly longer than in *belfragei* and *reineckeii*, at the middle slightly longer than the pronotum, the sides much shorter. Frons, viewed from the side, transversely concave anteriorly, sinuate on sides and rounding on anterior and posterior margins; frons and clypeus pale yellowish, minutely flecked with scarlet; the apical two-thirds of the clypeus, the anterior coxae and femora black and palely speckled. Pronotum truncate in front, very slightly emarginate behind, with an almost obsolete median longitudinal ridge, rather transversely wrinkled. Scutellum without carinae, transversely wrinkled. Elytra back of the tip of clavus, gradually and gently enlarged, roundly and obliquely truncate at apex; grayish hyaline, somewhat opaque and ferrugineous and faintly varied with fuscous before the middle; more distinctly hyaline beyond the apex of clavus but without the more or less definite oblique banding of the other species. Wings vitreous, infuscated at the apex, diluted saffron towards the base, with the base itself black-fuscous, the veins black. Dorsum of the abdomen blackish, nearly yellow at the apex. Legs and venter pale olive yellow, spotted or mottled with black.

Length of body, male 7.5 mm., female 8.5 mm.; length to tip of elytra, male 11.5 mm., female 12.5 mm.; elytral expansion 23.5-24.5 mm.

Redescribed from a pair taken by Charles Dury at Brownsville, Texas, April 12.

THE GENUS *POBLICIA* STÅL

This genus was erected by Stål in 1867. It is a tropical one but is represented in the United States by three species, *P. fuliginosa*, *misella*, and *thanatophana*, the latter two occurring only in Arizona. *P. fuliginosa* is the largest of our native fulgorids and is easily recognized by its wide head, cut almost square off in front.

They live in bushy places usually near water where the soil supports a rank vegetation.

Poblicia fuliginosa OLIVER

(1791 Encyc. Meth., vi, p. 574, *Fulgora*).

Recorded from N. C., Ga., Ohio, Mo., Texas and Ariz.

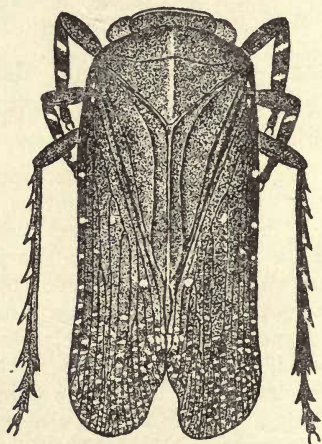


Fig. 11—Adult *Poblicia fuliginosa* Oliv., greatly enlarged. (Original)

Body coriaceous, general color piceous, the elytra minutely spotted with gray, abdomen sanguineous with black spots.

Vertex short, cut almost square off, foveate, meeting frons in a distinct suture, anterior margin marked with a greenish-gray band which extends along the upper margin of the frons. Frons somewhat rectangular, with only a faint trace of a median carina, posterior margin emarginate. Eyes large, brown. Antennae short, knob-

shaped, fuscous. Pronotum about twice as long as the vertex, both the anterior and posterior margins emarginate, a small depression each side of median carina on disc. Scutellum with a median carina, the lateral ones obsolete or with only a trace. Elytra large, long, coriaceous, obliquely truncated at apex, the outer apical angle rounded, piceous in color, the costa with grayish spots and this together with the gray cross-veins give the insect a speckled appearance; veins raised. Wings hyaline, venation fuscous, basal third clouded with fuscous, with blue basal spots. Abdomen robust, black beneath, sanguineous dorsally, base marked with black, with six round black spots on each side of median ridge arranged in two rows, and in addition a few minute black dots; anal appendage clothed with short white waxy secretion. Legs black, somewhat foliaceous, the first and second pairs banded with white, the third pair with five lateral spines on outer edge, bases marked with grayish spots.

Length of body 9-12 mm.; length to tip of elytra 13-17 mm.; humeral width 4.5-6 mm.

Redescribed from numerous specimens of both sexes taken by students from April 26—Oct. 23 at Agr. College, Miss.; Booneville, Miss., July 20, H. Parker; Verona, Miss., J. P. Gracy. The sumac is the only known host plant.

THE SUBFAMILY DICTYOPHORINAE (SPIN.)

Spinola, Ann. Soc. Ent. Fr., viii, pp. 202, 183, 1839.

This subfamily is especially well represented in the New World, seven genera being known from the United States alone. Only three of these, *Dictyophora*, *Scolops* and *Phylloscelis*, are known to occur, however, in the eastern half of the United States.

Members of these three genera at least are all grass-feeding forms and occur rather abundantly, particularly in low, damp meadows. They are among our most grotesque and bizarre insects and arouse interest whenever observed.

The anal area of the elytra is rarely reticulated and the clypeus is without lateral carinae; the veins of the clavus do not attain the apex but are united with the commissural margin before the apex; frons without an ocellus at its apex.

Key to the genera

Vertex triangularly produced; elytra greenish hyaline, the apical area more or less reticulate,.....*Dictyophora* Germ.

Vertex produced in a linear cephalic process, the lateral margins slightly dilated and flexed; elytra not transparent hyaline but usually grayish straw-colored with fuscous markings, the veins very prominent and usually spotted,.....*Scolops* Germ.
 Vertex short; front femora expanded leaf-like.....*Phylloscelis* Germ.

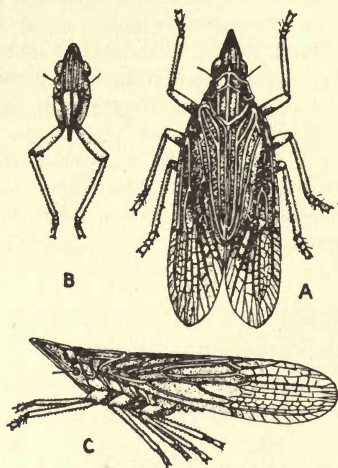


Fig. 12—Adult *Dictyophora* sp. (after Osborn)

THE GENUS *DICTYOPHORA* GERMAR

The genus *Dictyophora* was erected by Germar in 1833, based upon the species, *Fulgora europaea* of Linnaeus. It is well represented in the United States by five species, three of which are common east of the Rocky Mountains and especially so in the Southern States. Although feeders on meadow grasses their exact economic status is not known.

Briefly characterized as follows: Vertex narrow, produced in a more or less elongate, rather obtusely pointed process, with three longitudinal carinae. Frons very long and narrow, with a long median carina that is continued through the clypeus, and another on each side that runs to the apex of the frons. Eyes ovate. Antennae short. Pronotum slightly produced between the eyes, angularly cut out behind, tricarinate on disc, and on the side lobes behind the eyes are three side keels or carinae. Elytra longer than the abdomen, hyaline, usually bright grass-green and more or less reticulate; a net work of veins is formed by divisions of the sectors and by the numerous cross veins at the apex. Hind femora with a triangular pointed tooth and the hind tibiae with five or six strong spines.

Logotype of the genus: *Dictyophora europaea* Linn.

The following key is adapted from publications of Gibson and Metcalf.

Key to North American species of *Dictyophora*

1. Transverse veinlets of the elytra forming three nearly regular bands,.....*dioxys* Walk.
- ... Transverse veinlets of elytra in no regular pattern,.....2.
2. Length of vertex slightly longer than its basal width,.....4.
3. Length of vertex twice or more its basal width,.....
Head process slender, intermediate carinae of frons nearly parallel,
plates longer than the ovipositor,.....*microrhina* Walk.
- ... Head process stout, nearly parallel sided, intermediate carinae of
frons not parallel, ovipositor slightly longer than plates.....
.....*recurva* Metcalf.
4. Frontal carinae meeting in an obtuse angle and tinged with black;
female plates short, extremely broad and rounding,....*florens* Stål
- ... Frontal carinae meeting in an acute angle and not tinged with
black; female plates long and narrow,.....*lingula* Van D.

Dictyophora microrhina WALKER

(1851 List Homop. in the British Museum, i, p. 315).

This is our most common and widely distributed species and is distinguished at once by its very long head.

Recorded from N. Y., N. J., N. C., Fla., La. and Kans.

Body a bright grass-green. Head narrower than the pronotum. Vertex very long, more than twice as long as its basal width, slightly turned upwards, the elevation varying considerably within the species, a slight indication of a median carina at the base. Frons elongate and narrow, a median and two lateral carinae, all straight and parallel throughout their length and converging to a point on the subacute base. Elytra long and narrow, pale greenish hyaline with the nervures green; the apical half very finely reticulated. Tibiae rufous testaceous.

Male pygofer with ventral margin very deeply and obtusely emarginate; the genital styles or plates long, rather straight, the surface somewhat arched, the tips rounded outward. The plates of the female are ferrugineous, ligulate, and scarcely attaining the ends of the green anal tube.

Length of body 8.5-11 mm.; length to tip of elytra 11-15 mm.

Redescribed from a series of adults and nymphs taken by the writer by sweeping coarse grasses in pine lands during 1921 at the following localities in Mississippi: Pascagoula, July 5, 1920; Port Gibson, July 22; Woodville, July 26; and Laurel, August 12. He has also taken this

species while sweeping the grassy floor of high pine land at Columbia, So. Car., Aug. 18, 1919. Mr. F. M. Hull has sent the writer a series collected by himself at Kingsville, Texas, during June and July, 1921.

Dictyophora recurva METCALF

(1923 Jr. of the Elisha Mitchell Soc., Vol. 38, p. 174).

This species has been only recently described by Metcalf from a pair of specimens collected at Southern Pines, North Carolina, by A. H. Manee. The original description is here given.

"This species may be distinguished from *Dictyophora microrhina* Walker, to which it is closely related, by the more robust cephalic process which is parallel-sided and not tapering as in *D. microrhina* and the genital characters are different.

Vertex more than three times as long as broad, nearly parallel-sided and not much narrowed toward the apex; median carina extending from base to apex; genae with a median carina from the eye, almost to the apex; frons rather broad; clypeal expansion very slight; intermediate carinae more widely separated than in *D. microrhina*; fore wings very finely reticulate; female pygofers much longer and more slender than in *D. microrhina*, not so deeply curved and not as much constricted at the base; ovipositors slightly exceeding the pygofers with small teeth; subanal plate parallel-sided, reflexed border narrow; male plates rather long, blunt at the tip, slightly exceeded by the anal plate.

Color: Grass green; fore and middle tibiae and apical segment of the labium suffused with scarlet red; tip of the labium and of the tarsal claws only, black.

Length, apex of vertex to apex of abdomen, 11-12 mm.; tip of wing 14-15 mm.; wing expanse 24-25 mm."

Dictyophora florens STÅL

(1861 Bidr. Rio Jan. Hemip., ii, p. 64).

This is a neotropical species, definitely recorded in the United States only from Kansas.

Distinguished at once by its very short vertex and its wide front with the carinae meeting in an obtuse angle and being tinged with black just before and at their point of meeting.

Body a bright grass-green. Vertex a little longer than its basal width, the median carina percurrent. Frons broad, the margins strongly reflexed and a little expanded before the eyes and next the

clypeus; three prominent, longitudinal carinae, the lateral ones almost attaining the clypeal margin, diverging toward the base where they roundly converge and meet in an obtuse angle, and together with the marginal carinae are marked with black. Eyes reddish-brown. Pronotum and scutellum tricarinate, those of the latter converging and meeting before attaining the anterior margin. Elytra long and narrow, pale greenish hyaline, with the nervures green.

Sides of the male genital segment slightly oblique at the apex, the dorsal angle very obtusely rounded.

Female valve short, transverse, and oblique within; the plates oblong, rounded at apex, oblique, and not attaining the apex of the pygofer.

Length of body 8.25 mm.; length to tip of elytra 12.50 mm.

Redescribed from a series of both sexes taken by the writer by sweeping coarse grasses in low places at Fruitland Park, Aug. 17, 1920, Harvey, Aug. 20, 1920, and Greenville, Miss., Sept. 15, 1921. The writer also swept this species in great abundance from grasses on floor of high longleaf pine land at Columbia, So. Car., Aug. 17, 1917. C. J. Drake collected a number at Gainesville, Fla., July 4, 1918.

Dictyophora lingula VAN DUZEE

(1907 Proc. Acad. Nat. Sci. Phila., lix, p. 470).

Recorded from N. J., N. C. and Florida.

Very closely allied to *florens*, the vertex is of about the same length but the frontal carinae are without black markings near the base.

Body pale green. Vertex a little more produced than in *florens*, the carinae distinct. Frons somewhat broader, its sides almost rectilinear, the three discal carinae prominent, slightly diverging to a point before the anterior angle of the eyes, then deflected and running straight to the apex where they unite in an acute angle. The beak or rostrum is longer than in *florens*, distinctly surpassing the posterior trochanters. Pronotum and scutellum tricarinate, the carinae on the latter more parallel than in *florens* and almost continuous with those of the pronotum. Elytra a little narrower and more slender, with a closer venation at the apex, pale hyaline green. Legs pale green, the tibiae tinged with rufous.

Sides of the male pygofer very oblique, extended to a subacute angle dorsally; the plates long, ovate, obtuse at apex and attaining the tip of the pygofer.

Female valves longer than broad, parallel at base within; the plates long and strap-shaped, curved upwards and reaching the apex of the pygofer.

Length of body 8-8.25 mm.; length to tip of elytra 11-11.50 mm.

Taken very abundantly by the writer by sweeping coarse grasses in low flat pine land, etc., during 1920 at the following places in Mississippi: Pascagoula, July 6; Helena, July 13; Big Point, July 15; Lumberton, Aug. 26; Ship Island, Sept. 6; Cat Island, Sept. 7. Taken at Greenville, Sept. 15, by F. M. Hull. The writer has also taken this species in South Carolina and Florida.

Dictyophora dioxys WALKER

(1858 List Homop. in Br. Museum Suppl., p. 61).

This species is chiefly neotropical but is recorded from Maryland and Mississippi. It is well illustrated in the *Biologia Centrali-Americana* and may be easily distinguished by the cross-veinlets of the elytra forming three more or less regular bands. The vertex is scarcely twice as long as wide and is intermediate in length between those of *microrrhina* and *lingula*.

"Female. Green. Head testaceous; vertex not longer than broad, with the head and the slightly elevated borders green. Protuberance conical, quadrilateral, longer than the vertex, with an angular keel on each side; underside with three keels, the lateral pair continued along the front, which is long and linear; face lanceolate, with one keel. Prothorax above short, with three keels, conical in front, acutely angular on the hind border; a keel on each side. Mesothorax with three parallel keels. Wings vitreous; veins black, green towards the base. Fore wings with a green stigma, containing three veinlets; transverse veinlets forming three nearly regular bands; veins forked at the tips. Hind wings with a few veinlets. Length of body 4 lines; of the wings, 10 lines.

a. Mexico. From M. Salle's collection."

Although this species is recorded from Mississippi and the writer has collected throughout the state, he did not find it.

THE GENUS *SCOLOPS* SCHAUUM

This peculiar, distinctly North American genus was erected by Schaum in 1850. It contains eighteen species in addition to *pungens* of Germar, a species long lost and unrecognized by modern hemipterists. Five species occur in the Southern States and perhaps a sixth one, *viridis*.

These are all grass-feeding forms and are well distributed over most of the United States. In the South they

are taken abundantly by sweeping grass in the open and cut-over pine lands and where the ground is particularly damp.

Both short-winged and longed-winged forms occur in members of this genus, only adding to the difficulty in correctly placing the species.

Briefly characterized as follows: Head behind the eyes distinctly calloused; the vertex very long and narrow, much produced, the lateral margins slightly dilated and reflexed, the cephalic process arched upwards. Frons long and narrow, tricarinate; clypeus long, with a prominent median keel, and obliquely striated on the sides. Pronotum produced in front between the eyes, the hind margin emarginate, tricarinate. Scutellum distinctly tricarinate. Elytra either brachypterous or macropterous, usually grayish with coarse nervures interrupted with fuscous. In the brachypterous form the elytra are usually long oval, barely longer than the abdomen, and rounded at the tips. Posterior tibiae armed with five to eight thick spines.

Type of the genus: *Scolops sulcipes* Say.

Key to the species of *Scolops*

1. Cross-veins of the elytra numerous; frontal process slender and acute*sulcipes* Say
 Cross-veins few and near the apex.....2
2. Cephalic process long, not acute; length from eyes to tip of elytra, 4 1-2—5 mm.....*perdix* Uhl.
 Cephalic process long, less acute; 6 1-2—7 mm.....*spurcus* Uhl.
 Cephalic process short and very slender; 7-8 mm.....*angustatus* Uhl.
 Cephalic process of medium thickness, not acute; 6—6 1-2 mm.
 *dessicatus* Uhl.

Scolops sulcipes SAY

(1825 Jr. Acad. Nat. Sci. Phila., iv, p. 335; Compl. Writ., ii, p. 254, *Fulgora*).

Widely distributed throughout the United States and Canada. It may be recognized by its rather round and convex general appearance, the numerous areoles behind the middle of the corium, and the black spots along the inner margins of the veins, instead of upon them.

Body pale grayish-brown, the head yellowish-green. The cephalic process long, slender and acute, bent upwards, two rather indistinct black points between the eyes. Frons long and narrow, tricarinate, pale. Pronotum produced in front, three rather straight longitudinal carinae on disc, a small black dot on each side of the median carina; somewhat infuscated behind the eyes on the anterior margin of the sides. Scutellum tricarinate, two black dots between the carinae nearer the posterior margin and one outside of lateral carinae on each

side. Elytra with pale nervures, which are margined with black. Legs long, carinated, the anterior and intermediate tibiae with a ring, the tip and tarsi black; posterior tibiae with six or seven stout spines.

Length from eye to apex of venter 5-6 mm.; to tip of elytra 6-7 mm.; Length of cephalic process 2 1-4 mm.

There are no authentic Mississippi records.

Scolops perdix UHLER

(1900 Trans. Md. Acad. Sci., i, p. 405).

Recorded from Mass., N. Y., N. J., Md., D. C., N. C., Colo. and Ariz.

This is our smallest species of *Scolops*.

The original description is quoted here.

"Pale straw yellow, or gray above, cephalic process moderately long, slender, tapering, rounded at tip, deeply sulcated, with a very convex knob on the middle of the vertex, the front with rows of minute brownish dots. Pronotum short, the central tablet with two very deep sunken black pits, the posterior side and the margins each side deeply sinuated; the mesonotal tablet large, distinctly carinated, with a black dot on each side posteriorly. Hemelytra narrow, with very few veins, two forks of unequal length running back to the tip, veins obsoletely and very sparingly flecked with brown, the apex narrow, having four or five small apical areolets mostly caused by forking of the veins, costal border often broadly white, very moderately curved. Legs narrow, of medium length, but little marked with brown, or obsoletely clouded. Meso- and metasternum whitish, the latter deeply emarginate. Base of venter also whitish. Anterior femora flattened, posterior tibiae with five stout, piceous spines. Rostrum reaching almost to the apex of the venter, as usual black at tip.

Length from eyes to tip of abdomen 4—4 1-2 mm.; to apex of hemelytra 4 1-2—5 mm. Width of pronotum 2 1-4 mm. Length of process 1 3-4 mm."

Taken very abundantly by the writer sweeping the grassy floor of cut-over and open pine land in Mississippi during July, 1921, at Tupelo, Ellisville, Poplarville, Lyman and Biloxi.

Scolops spurcus UHLER

(1900 Trans. Md. Acad. Sci., i, p. 403).

Recorded from N. J., Md., D. C., Mo. and Kansas.

The original description is quoted here.

"Grayish straw color, marked with black, larger than either of the other species, and with coarser veins than *S. sulcipes*; tinged with greenish when fresh. Frontal process long, narrow, almost parallel-sided, truncated at tip, vertex deeply excavated, the central

knob large, highly polished, face pale, flecked with brown, space between the outer carina and the carinate margin narrower than in *S. sulcipes*, and not abruptly contracted above, sulci remotely punctate, clypeus stained with brown, gradually widening below, rostrum reaching to the posterior coxae. Pronotum short, lunate, with the lateral margins gently curved, and the latero-posterior margin widely sinuated, the callosities carrying three dark, or black, grains, central tablet longer than wide with the two central indented points black, the middle carina thick and piceous, mesonotum almost smooth, wider than long, pale orange yellow, acute at tip, sinuated each side, the femora and anterior tibiae carinated on the middle line, scabrous and pointed with brown, the anterior and middle tibiae faintly, broadly brown at base and tip, posterior tibiae pale, set with eight blackish spines on the carinate edge, and with a crown of thick spines at tip, apex of tarsi and nails piceous. Hemelytra pale gray, with a fuscous arc near tip, veins coarse, whitish, interrupted with black, long, nearly straight, without cross-veins before the apex, inner vein acutely forked at the middle, the middle vein twice forked, tip with a transverse series of six small, not uniform areoles; wings smoke blackish, with three forked and one cross vein, posterior border with one small, triangular areole. Tergum mostly smoke brown. Mesosternal plates white, or greenish, dusky on the middle, a little sinuated behind, metasternum narrow, whitish, blackish exteriorly, triangularly emarginated each side and on the middle of the posterior margin, middle line incised. Venter clouded with gray and fuscous.

Length from eye to apex of venter 5 1-2—6 mm.; to tip of hemelytra 6 1-2—7 mm. Length of cephalic process 2 mm."

The writer took a series of both macropterous and brachypterous individuals at Ocean Springs, Miss., July 24, 1920, and at Agr. College, Miss., that he identifies as this species.

Scolops dessicatus UHLER

(1900 Trans. Md. Acad. Sci., i, p. 403).

Recorded from N. J., Md., D. C., Mo. and Kansas.

The original description is quoted here.

"Dull pale smoky whitish, of nearly the same form as *S. sulcipes*, but with the cephalic process a little thicker and nearly parallel-sided, not tapering towards the tip, and the veins dotted with pale fuscous. Front minutely flecked with brown, which becomes denser and more conspicuous on the clypeus; rostrum reaching upon the posterior coxae. Pronotum wide and short, the lateral margins oblique, very gently curved, broadly whitish yellow, the posterior margin deeply sinuated, having two large impressed points on the middle of the shield, and the anterior margin of this shield bilobate; mesonotum pale orange, almost flat, a little shaded with brown, destitute of a carinate line on the middle, and with an indented point

each side of the pale apex. Hemelytra soiled with pale brown, the veins few, very prominent, pale interrupted with brown, the spots more conspicuous on the costa, exterior ulnar twice forked, the inner ulnar forked, all of these divarications bounding long, narrow areas, three rows of slender cross-veins before the apex, the apical series has four small areoles, those of the middle quadrangular. Wings a little dusky. Underside pale straw yellow, irregular spotted and marked with dull brown; metasternum deeply excavated and acutely margined each side. Legs moderate, much darkened with brownish clouds and specks.

Length to tip of hemelytra 6—6 1-2 mm, to end of abdomen 5—5 1-2 mm. Width of pronotum 2 mm. Length of cephalic process 1 3-4 mm."

There is no authentic record of this species in Mississippi.

Scolops parvulus METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 175).

This species has been recently described from a pair collected at Southern Pines, No. Car., June 14, 1918. As the writer has not seen these, the original description is given here.

"This species may be recognized by its small size and by the stout gradually tapering cephalic process.

Disk of the vertex broad, well rounded, being much broader than in any other species known to me; cephalic process broad, stout, intermediate between the process of *sulcipes* and *grossus*; general form broad and oval, wing veins sharp and distinct.

Color: General color fuscous, with the eyes, lateral areas of the pronotum, tips of the wings, the tibiae and the tarsi, blackish.

Length, eyes to tip of the abdomen 3.50 mm.; cephalic process 2.40 mm."

Scolops angustatus UHLER

(1876 Bul. U. S. Geol. & Geog. Surv., i, p. 350).

A very widely distributed species over the United States. The original description is quoted here.

"More slender than *sulcipes*, *hesperius*, and *grossus*; the hemelytra almost flat above, hardly gibbous on the sides; head more or less orange-yellow, with the face, sides of protuberance, and ridges of the front brownish; cephalic horn very short and narrow, but blunt at tip; cranium with two black, impressed dots between the eyes; rostrum reaching to the end of the fourth ventral segment, yellow, black at tip, the lobes behind the eyes with a small black dot. Pronotum with an arcuated series of indented black points, the lateral margins obliquely curved toward the head; pale, grooved, and brown behind the eyes, and with the carinate edge whitish. Mesonotum

varied with brown, and with a series of black, indented points across it, the tegular pieces a little confluent punctate; pleura washed with pale brown and flecked with dark brown; legs flecked with fuscous, the tibiae with two or more dark, band-like shades; hemelytra infuscated, moderately flat, the costal margin very feebly arcuated, a broad longitudinal vitta extending to the tip, a streak on the suture of the clavus, several coalescing spots running back from the apex interiorly, and interrupted flecks on the nervures dark brown; the costal area whitish throughout, nervures stout, the first ulnar nervure forked considerably behind the middle, and the second ulnar forked at a little distance behind the middle. Wings smoky, the nervures darkened. Disk of tergum black, with the sides orange-yellow. Venter faintly brownish, flecked with yellowish.

Length from tip of head to end of hemelytra, 7 to 8 millimeters. Width of pronotum, 2 1-4 to 2 1-2 millimeters. Length of cephalic horn, 1 1-2 millimeters."

The writer has specimens collected at Pascagoula, Miss., that he believes belong to this species.

THE GENUS PHYLLOSCELIS GERMAR

This genus consists of two species and a variety and these are among the most curious-looking members of the family. They occur in both macropterous and brachypterous forms, but the long-winged specimens are met with only occasionally. The adults, which are extremely variable in size, structure, color and habits, are characterized by having a short vertex, prominent eyes and leaf-like front femora. The hind legs can be doubled up tightly, the tibiae fitting into grooves in the distal part of the femora, and are armed with a row of four to six spines on the outer carina and a crown of eight stout spines on the tip. The legs are powerful jumping organs.

Key to the species of *Phylloscelis*

- Dark fuscous, usually black, the frons fuscous; venation not prominent, *atra* Germ.
 Grayish-yellow, thickly and finely dotted with black, venation prominent, frons thickly and finely dotted with white, the clypeus with black transverse-oblique bands, *pallescent* Germ.

Phylloscelis atra GERMAR

(1839 Zeit. fur. Ent., i, p. 192).

Recorded from N. Y., N. J., Pa., Md., D. C., Va., N. C., Ga., Fla., Miss., Ohio, Kans., Mo., Ill., Ark., Okla. and Texas.

This species is one of the few fulgorids that are of real

economic importance in temperate America. It does serious damage to the cranberry bogs on Long Island, N. Y., where the name of "Cranberry Toad-Bug" is given it. Sirrine and Fulton (N. Y. Expt. Sta. Bul. 377) give its life history and describe the five nymphal instars and the adult.

Dark fuscous or black, of elliptical form, at times with contrasting venation. Head, thorax, and legs speckled with small round dots. Vertex short and broadly rounded, the disc depressed but slightly raised in the center, the sides and the hind margins elevated; bounded in front by a pair of carinae which meet at the apex in an obtuse angle. Frons long, with distinct median carina and more or less obscure lateral ones; an oblique white band extending from base of the beak up and across the gena and lateral lobes of the pronotum; clypeus fuscous. Eyes prominent, usually brownish, revealing at times light markings. Pronotum short, black. Scutellum broadly triangular, usually lighter in color. Elytra coriaceous, black, at times with a metallic lustre; the veins run parallel and branch mostly near the base and with two or three series of cross-veins near the apex. In short-winged forms the elytra are convex, in the long-winged forms more flat. There is no constancy in the venation of either form and the veins are only slightly prominent. Hind wings thin and delicate. In the long-winged forms they reach nearly to the tip of the elytra, and in the short-winged forms they are aborted. Front femora broad and foliaceous, black with scattered white dots, in the middle of the upper and lower edges of the femora and on the tip, usually a large white fleck; hind femora grooved on the distal part to receive the tibiae; tibiae are all triangular; middle and hind legs fuscous, finely and sparsely marked with white.

Length to tip of brachypterous elytra 4—5.50 mm.; to tip of macropterous elytra 6.75 mm.; width 3 mm.

VAR. *albovenosa* MELICHAR

(1906 Abh. K. K. Zool-Bot. Ges. Wien., iii, p. 179, fig. 39)

This color variety although less common than the typical *atra* occurs along with it in similar habitats.

Body rusty-yellow; frons rusty yellowish; scutellum pale; elytra black with yellowish-white bordered veins; these areas vary much in extent and definition and are occasionally rusty-yellowish in color; beneath and legs rusty-yellow, the front femora somewhat diffused with blackish on the edges, with scattered white dots and flecks; edges of the tibiae, tarsi, and spurs of the hind legs black.

Both typical *atra* and its variety were taken abundantly by the writer by sweeping grass in low flatwoods at Pascagoula, Miss., July 12, 1920, and in high pine land at Ellisville, Miss., Aug. 24, 1920. Adults and nymphs were

abundant at Helena, July 13, 1920. Both of these have also been taken by the writer at Columbia, So. Car., Aug. 1916; and at Durant, Miss., July 14, 1921, and by Geo. G.



Fig. 13—*Phylloscelis atra* var. *albovenosa* Melichar, enlarged.
(Original)

Ainslie at Nashville, Aug. 1921, Knoxville, Sept. 14, 1916, and Union City, Tenn., Aug. 29, 1919. The writer has also taken this species and its variety in Florida and at Columbia, So. Car., Aug. 18, 1919.

Phylloscelis pallescens GERMAR
(1839 Zeit. fur. Ent., i, p. 192).

Recorded from Mass., N. Y., N. J., Pa., N. C., Fla., Ia., Ark. and Texas.

Grayish-yellow, thickly and finely dotted with black. Frons with three distinct, parallel longitudinal carinae which are thickly and finely spotted; clypeus with black transverse-oblique streaks. Eyes gray, with dark transverse bands. Elytra grayish, nearly translucent, with numerous, branched, longitudinal veins which are prominent and flecked with black and white. Wings lacking. Entire underside black finely dotted with white. Legs black, the leaf-like expanded fore femora black, dotted with white, a large white marginal area in the middle of the upper and lower edges and on the tip; front tibiae black at base, dotted with white, white in the middle, the tip black. The middle and hind legs black, dotted with white, the disc of the middle tibiae and the base of the hind tarsi whitish.

Length to tip of brachypterous elytra 4 1-2 mm.; width 2.75 mm.

A single specimen was taken by the writer while sweep-

ing underbrush at edge of a gum swamp at Fruitland Park, Miss., Aug. 17, 1920. Van Duzee states that he found this species "not uncommon among the sparse grasses and low huckleberry bushes on the pine barrens at Estero, Fla."

THE SUBFAMILY ACHILINAE STÅL

(Stål, Hemipt. Africana, iv, p. 130, 1866, *Achilida*).

The subfamily Achilinae is characterized by having the elytra, when broad, held horizontal, distinctly amplified within and overlapping beyond the apex of the clavus; the head is usually much narrower than the scutellum and, if as wide, the pronotum is emarginate behind and tricarinate.

Only two genera are represented in the United States, *Epiptera* and *Catonia*. The latter is distinguished from *Epiptera* by its narrower, more elongate form, and the much shorter pronotum which forms a rounded flap behind the eyes and not a longitudinal compartment as in *Catonia*. The species of *Catonia* are all very small and have the basal segment of the antenna almost globular, while in *Epiptera* this is much more elongated.

Nothing definite is known of the life history of *Epiptera* but Dr. C. J. Drake informs me that he has taken *slossoni* at Cranberry Lake, N. Y., in the heart of an old decayed pine stump on several occasions and that there could be no doubt that they were breeding there. Prof. H. Osborn also took this species under the bark of hemlock at the same locality. What they feed on is at present unknown.

Members of the genus *Catonia* feed on shrubs and trees but nothing is known of their life history.

THE GENUS EPIPTERA METCALF

(*Elidiptera* of authors, not *Spinola*).

The genus was first described as *Elidiptera* by Spinola but the name *Helicoptera* has long been extensively used. Metcalf has recently proposed the generic name *Epiptera* to include the North American forms. It is a cosmopolitan genus, at present represented in the United States by ten described species, four of which are found in the Southern States. In the case of *opaca* the food plant is

known to be pine and it is strongly suspected that this is the host of the other species. The species have been found only in regions where the pine occurs and usually from August to October.

Pallida and *floridæ* are very close, and without the two for direct comparison it is difficult to distinguish satisfactorily between them. The species, *septentrionalis* Prov., is proportionately broader than our other species and has a shorter vertex than *pallida* and *floridæ*.

Our species may be distinguished by the following key:

- | | |
|--|-------------------------|
| Color black, front white or banded with white..... | 1 |
| Color brown or grayish..... | 2 |
| 1. Vertex about as long as broad, front white with a black basal band, | <i>opaca</i> Say |
| 2. Vertex very short, distinctly broader than long, about the length of the eye in its superior diameter; elytra brown varied with gray patches..... | <i>variegata</i> Van D. |
| ... Vertex considerably longer than broad, much longer than in <i>opaca</i> and <i>variegata</i> ,..... | 3 |
| 3. Pale brownish-yellow; length to tip of elytra 10 mm..... | <i>pallida</i> Say |
| ... Uniform fuscous-brown, elytra proportionately narrower; length to tip of elytra 8 mm..... | <i>floridæ</i> Walk. |
| Dark brown; length to tip of elytra 6.50—7 mm..... | <i>brittoni</i> Metcalf |

Epiptera opaca SAY

(1830 Jr. Acad. Nat. Sci. Phila.; vi, p. 239; comp. Writ., ii, p. 374, *Flata*).

Recorded from Ont., N. H., N. Y., Pa., Md., N. C., Ga., Ind., and Ohio. It probably occurs in Florida, but it is scarce everywhere.



Fig. 14—*Epiptera opaca* Say, showing characteristic white banding of the frons. (Original)

Blackish, beneath with a white band, head a little produced.

Body brown black above, closely dotted with pale, a pale yellow spot on the costal border near the tip of the elytra, a small yellow

spot on tip of scutellum, a yellowish-white broad band crosses the front and extends upon the sides of the chest. Viewed from above, the head forms a blunt triangle, has the side edges turned up, and a grooved median line bounded each side by keeled edges; antennae pale fulvous; pronotum with a median carina; scutellum with three carinae, the lateral ones short and a little arcuated; venter blackish. Elytra opaque, irrorate with minute pale points; dilated towards the tip so as to lap over the opposite; a pale yellow spot beyond the middle of costa and one or two smaller ones nearer the tip. Wings smoke-brown. Legs black.

Length of body 7 mm.; length to tip of elytra 9—10.75 mm.; width across the elytra 4.25—4.75 mm.

Redescribed from three specimens, taken at Columbus, Ohio, Sept. 1919, by Ruth Veth; Jefferson, Ohio, Sept. 1908; Cleveland, Miss., June 12, 1916, by G. W. Howard; and a female collected by Geo. G. Ainslie at Knoxville, Tenn., Sept. 24, 1919.

Epiptera variegata VAN DUZEE

(1908 Proc. Acad. Nat. Sci. Phila., lix, p. 479, *Helicoptera*).

Recorded from Ont., N. H., N. J., N. C.

This has the shortest vertex of any of the species. Body grayish varied with pale fuscous brown, beneath testaceous varied with pale brown; disc of the ventral segments sometimes fuscous. Vertex very short, about the length of the eye in its greatest superior diameter, regularly rounded before, disc pale with a longitudinal furrow, edge reflexed, darker. Front narrow, contracted basally, the sides almost sinuated, distinctly tricarinate and with the clypeus pale brownish shading to darker basally and along the carinae, more or less distinctly irrorated with pale; clypeal suture strongly angulated. Pronotum short and deeply emarginate, the produced anterior margin rounded between the eyes, lateral carinae broadly rounded outwardly, median carina feeble, upper surface of the pronotum brown or ferruginous brown, closely irrorated with pale, below the carinate edge deep black, bordered with white. Scutellum brown or ferruginous, irrorated with pale, becoming darker before the pale apex and marked with a darker line without the base of the lateral; carinae close to the basal angles. These carinae feeble, especially the median which is almost obsolete. Elytra brown, varied with gray patches, most conspicuous is one along the base of the inner claval area, about four very irregular and indefinite ones along the median line of the corium and another adjoining the blackish apex of the clavus; the dark areas irrorate with pale in places and the nervures more or less irrorated, those at the apex pale; about three fuscous points in the costal area, and three others approximate in the apical field. Wings

smoky, darker toward their apex, the nervures fuscous. Legs pale brown.

Length 6 mm.; length to tip of elytra 8—10 mm.; width across the elytra about 4 mm.

There is no record of this insect in Mississippi.

Epiptera pallida SAY = (VAN DUZEE'S *septentrionalis*)

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 240; Compl. Writ., ii, p. 374, *Flata*).

Recorded from N. H., N. Y., N. J., Pa., D. C., Fla. It is very close to *septentrionalis* but has the vertex longer.

Body pale brownish-yellow above. Head, before the eyes, longer than the longitudinal diameter of the eye; eyes oval; elevated line of lower frons obsolete, excepting near the superior tip; superior half of frons yellowish, inferior half dusky; each side before the eye dusky, a yellowish band as a bounding line along the sides of the pleurae, passing under the eye; antennae pale fulvous. Vertex considerably longer than broad and is much longer than in *opaca* and *variegata*, elliptically narrowed to the rounded apex, median line grooved, scutellum with three carinae, the lateral ones short and a little arcuated. Elytra very pale brown, nearly uniform or very obsoletely variegated, dilated towards the tip so as to overlap the opposite; a few remote, small, brown spots, about two on the disk of the corium, three toward the apex, and three along the costal region. Abdomen mostly fuscous. Legs fuscous.

Length of body 7 mm.; length to tip of elytra 10 mm.; width across the elytra about 4 mm.

A single adult was taken by Dr. C. J. Drake at Agricultural College, Miss., June, 1921, under pine bark.

Epiptera floridae (WALKER)

(1851 List Homopt. in Br. Museum, ii, p. 326, *Monopsis*).

Recorded from R. I., N. J., Fla., Colo., (?) and Texas.

One of the smallest species, uniform fuscous-brown, scarcely variegated, head rather long with vertex almost acute, in these respects closely allied to *pallida*.

Head, before the eye, longer than the longitudinal diameter of the eye; vertex strongly produced, considerably longer than its basal width, in relative proportion about the same as in *pallida*, elliptically narrowed to the rounded apex, median line grooved; frons with sides strongly sinuated and the median line carinate, of a uniform dark brown, vertex and carinate edges darker; clypeus almost black; sides beneath with a broad percurrent whitish vitta beginning on the cheeks before the antennae, bordered above with blackish. Pronotum produced almost to the anterior line of the eyes,

truncate before; hind margin angularly emarginate; median carina distinctly less prominent than the lateral ones. Scutellum but feebly convex, carinae somewhat obsolete, except the median for a short space anteriorly. Elytra narrow, the costa but feebly expanded, fuscous-brown, very obscurely irrorated with pale posteriorly and with costa somewhat paler; three black points near the apex as in most of the allied species but none in the costal areole. Hind wings smoky with fuscous nervures. Legs concolorous, brown.

Length of body 6.5 mm.; length to tip of elytra 8 mm.; width across the elytra 3 mm.

Food plant unknown.

The writer has not taken this species in Mississippi.

Epiptera brittoni METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 175).

"This species may be recognized by its dark brown color, narrow produced vertex which is transversely rounded before.

Vertex elongate, narrow, the lateral margins a little arched and the anterior margin broadly transversely rounded; frons narrow, the lateral margins strongly elevated; clypeus strongly carinate; pronotum obtusely produced between the eyes; mesonotal carinae nearly obsolete.

Color: General color dark brown somewhat intermediate between the black species like *opaca* and the brown species like *variegata*; vertex, pro- and mesonotum irregularly marked with ochraceous tawny; base of frons black; apex pale ochraceous buff; clypeus black, the lighter band continued indefinitely across the genae, the narrow ventral margin of the breast plates, pro- and mesopleura; the breast plates deep dorsally; legs and abdomen dark brown, the segments of the latter narrowly bordered with paler.

Length, apex of head to apex of abdomen 6.50—7.00 mm.; tips of wings 8.00—9.00 mm."

Described by Metcalf from a male collected at Black Mountain, N. C., Sept. 12, 1912, a female from West Point, N. Y., Sept. 15, 1912 (W. T. Davis), and one male from Portland, Conn., Aug. 15, 1913, collected by B. H. Walden.

THE GENUS CATONIA UHLER

This genus was founded by Dr. Uhler in 1895 (Proc. Zool. Soc. Lond., p. c.). Nineteen species are known from the United States, eleven of which are recorded only from California and Arizona. Eight species occur in the eastern half of the United States, only five of which are known from the Southern States.

A single specimen of *C. grisea* Van D. is recorded as

being taken on basswood at Ottawa, Ont. Although described from the North, it has been collected in Maryland as I have been informed by W. L. McAtee, and a specimen was taken at a light in Mississippi. The rather large *C. nava* may possibly occur, however, and is included in the following key.

Key to the species of *Catonia**

- Front conspicuously transversely banded.....1
1. Elytra unicolorous testaceous brown, nervures impunctate, frons banded*impunctata* Fitch
 Elytra unicolorous testaceous brown, nervures impunctate, frons entirely black..... *dimidiata* Van D.
 Elytra brownish and banded, nervures dotted with black. All small species2
 2. Frons black with broad transverse median ivory white band, clypeus only slightly narrowed towards base and with an indefinite whitish band crossing the base.....*picta* Van D.
 Frons black with a similar broad band, clypeus immaculate, more decidedly narrowed towards base.....*cinctifrons* Fitch
 Frons fulvous with this band only half as wide..*bicinctura* Van D.
 3. Larger, elytral areoles with numerous incomplete transverse veinlets, apex of mesonotum with a pair of ocellated black points,*grisea* Van D.
 4. A larger species with the frons less definitely banded and the clypeus white marked with fuscous.....*nava* Say

Catonia picta VAN DUZEE

(1908 Pro. Acad. Sci. Phila., lix, p. 481).

Recorded from N. J., N. C., Ga., and Fla.

Its small size, strongly marked front, and slightly maculated elytra, showing obscure transverse banding, distinguish this species.

Testaceous-grey, frons black with a broad median white band, mesonotum a dirty rufous, elytra obscurely banded.

General color above testaceous-grey, beneath pale fulvous. Vertex short, broader than long, but feebly advanced before the eyes, obtusely angled before; margins and middle carinate. Front broad, but slightly narrowed at base, deep black with a broad median transverse band of

*Metcalf has since published descriptions of four new species and as the writer has not seen these species no attempt has been made to fit them into the above key. The original descriptions are quoted to make this publication as complete as possible.

ivory white; tricarinate, the lateral carinae marginal, strongly elevated; the marginal carinae dotted with white; clypeus short, conical, yellowish-brown, an indefinite whitish band crossing the base; tip of the rostrum black. Pronotum very short, almost linear, tricarinate. Scutellum much longer than the pronotum and vertex together, tricarinate, the lateral carinae rectilinear, very slightly diverging posteriorly; obscure dirty rufous; tip of the scutellum, a chain of points on the pronotum and a few on the vertex whitish. Elytra with a large costal spot or indistinct transverse band on the basal third obscure rufopiceous, behind this dark band is a broad indefinite whitish band; nervures mostly dotted, the dots on the costa and commissure larger; commissure with four more or less distinct black points, two on either margin of the whitish band; elytra at margin of suture adjoining the scutellum whitish. Wings smoky-hyaline. Legs testaceous, with dorsal spines black.

Length of body 2.5 mm.; length to tip of elytra 4.5—5 mm.; width across the elytra 1.5—2 mm.

Redescribed from two specimens taken by C. J. Drake at Gainesville, Fla., June 30 and July 4, 1918, and several taken by the writer by beating shrubbery in mixed pine and deciduous woods at Port Gibson, Miss., July 23, 1921, and a single specimen from Biloxi, Miss., Aug. 1, 1921. A specimen was collected by C. J. Drake while sweeping at Aberdeen, Miss., June 25, 1921.

Catonia bicinctura VAN DUZEE

(1915 Pomona Jr. Ent. Zool., vii, p. 119).

Known heretofore only from Florida. A specimen of what appears to be this species in Prof. Osborn's collection was collected by C. P. Alexander at Freyberg, Maine, Sept. 5, 1913. Most closely related to *picta* but is darker in color and has the facial bands narrower.

General color fuscous brown with the vertex, pronotum, middle of the anterior margin and apex of the scutellum paler. Head slightly longer than in our other species. Vertex distinctly longer than in *picta* and narrowed anteriorly, apical margin subangularly rounded; front a little narrower, more contracted at base with the sides a little more arcuated; the middle of the front fulvous, a shade darker than the base and clypeus, this darker band bounded by a straight clean-cut whitish band between the antennae, and a feebly curved one on the base of the clypeus; these bands about one-half the width of those seen in *picta*, the lower band is carried across the propleurae as a slender oblique white line; marginal carinae obscurely dotted. Pronotum with about four short longitudinal pale carinae behind the eyes. Scutellum immaculate except for the paler apex and anterior margin. Elytra slightly paler toward the costa, ner-

vures obscurely pale, dotted with black, the costal stout, white maculated with fuscous, apical margin with a series of oblong fuscous spots that are larger on the stigma. Abdomen sanguineous or nearly so, becoming paler at apex. Legs testaceous, lined with fuscous, the knees with a whitish point.

The male slightly smaller, darker in color and with the elytral points less conspicuous.

Length of body 3 mm.; length to tip of elytra 4.5—5mm.; width across elytra about 1.5 mm.

Redescribed from two specimens taken at Gainesville, Fla., May 5 and July 11, 1918, by C. J. Drake, and a single specimen swept by the writer from the shrub known as French Mulberry, *Callicarpa americana*, at Vicksburg, Miss., July 18, 1921. Mr. Geo. G. Ainslie has sent the writer three females collected by sweeping weeds at Knoxville, Tenn., Sept. 1916.

Catonia impunctata FITCH

(1851 Homopt. N. Y. St. Cab., p. 46, *Cixius*).

Recorded from R. I., N. Y., N. J., Pa., N. C., Ia.

There are single examples of this species in the Osborn collection from West Virginia and Morgan County, Ill.

Easily distinguished by banded frons and by the brownish-pellucid elytra with nervation impunctate and the frons banded.

Body pale with dorsum dull yellow. Vertex very short, much broader than long, barely advanced before the eyes, rounded before, pale with two black dots; front strongly tricarinate, white with two black bands, the upper one being slightly broader; these bands are broken by the median longitudinal carina and this together with the white color of the lateral carinae make it appear as if there were four large spots on the front; clypeus white, slightly creamy towards the tip. Pronotum very short, pale yellowish marked with fuscous just beneath the eyes, with two discal black dots. Scutellum tawny yellow, feebly tricarinate, the carinae of a pale color. Elytra brownish-pellucid, almost immaculate, subhyaline, nervures sometimes touched with white in places. Wings smoky hyaline, with venation slightly darker. Legs pale, without markings.

Length of body 3.5 mm.; length to tip of elytra 5.5—6 mm.; width across the elytra about 2 mm.

Fitch states that it is found on oaks.

Catonia dimidiata VAN DUZEE

(1910 Trans. Am. Ent. Soc., xxxvi, p. 85).

Recorded from R. I. and N. Y.

A single specimen in the Osborn collection is from Bedford County, Pa., Aug. 12.

Very closely allied to *impunctata*, and is Fitch's variety *a* of this species and Van Duzee's female *impunctata* of his 1907 paper. In 1910, Van Duzee recognized this as being a distinct species, having both sexes with the frons entirely black. In the writer's opinion, this is probably a color variety of *impunctata*.

Structurally identical with *impunctata* to which it is most closely allied, with the exception of the male genitalia which are slightly different. Easily distinguished by having the front entirely black, clypeus white, and the vertex and pronotum without the black discal spots. The legs are whitish with a dusky spot on the base of the hind tibiae exteriorly; in *impunctata* the legs are immaculate whitish.

Female genitalia substantially as in *impunctata*. In the male the median tooth of the basal valve is short triangular, its blunt apex attaining the middle of the plates, the margins either side of the tooth forming a moderate sinus and then retreating to the basal angles. In *impunctata* this median tooth is long and acute, attaining the apex of the plates, and the margins either side are deflected at right angles, making the basal portion of this valve of nearly equal length across its whole width.

Length same as in *impunctata* 6 mm.

Catonia grisea VAN DUZEE

(1908 Proc. Acad. Nat. Sci. Phila., lix, p. 482).

Known from Ontario and New York.

Larger than most of the eastern species. The elytra are gray varied with white, and the scutellum brown with two black ocellated points posteriorly, which differentiate it from the other species.

Vertex pale, almost square, feebly angled anteriorly, produced about half its length before the eyes, the lateral foveae marked with a dark point. Frons elongate, quite strongly narrowed basally with the sides almost straight and the carinae strong; pale yellowish, obscurely irrorated on the base of the frons and clypeus, leaving a paler intermediate band, indicated on the marginal carinae by two brownish spots. Pronotum shorter than the vertex, rather sharply angled and marked with a blackish line beneath the eye, tricarinate. Scutellum very long, tricarinate, pale quite strongly maculated with brown in the female, carinae pale, and a black spot placed in a pale round area within the lateral carinae near the apex. Elytra whitish tinged with smoky especially toward their tips; nervures white, the areoles with numerous imperfect, transverse, white veinlets; on the costa are a few larger brown spots. Beneath pale, the abdomen

fuscous with the segments edged with pale. The extent of the brown maculation on the vertex, pro- and scutellum varied.

Length of body 3.5—4 mm.; length to tip of elytra 6—7mm.; width across the elytra 2—2.25 mm.

The writer took a single specimen that agrees essentially with the description of this species at an electric porch light at Agricultural College, Miss., in 1920. There is one example in the Osborn Collection from Medina, Ohio.

Catonia cinctifrons FITCH

(1856 Trans. N. Y. St. Agr. Soc., xvi, p. 451, *Cixius*).

Recorded from N. Y., N. J., Pa., Md., N. C.

A somewhat similar appearance to *nava* but decidedly smaller. Front with a median transverse band of ivory white as in *picta* but more narrowed at the base and the clypeus immaculate ivory white. A specimen in the Osborn Collection is labeled Cold Spring Harbor, N. Y., Aug. 18, 1904.

Pale, abdomen dark, front deep black with a band of ivory white, elytra smoky-brown, banded with white.

Body pale with abdomen dark. Vertex short, broader than long, slightly advanced before the eyes, rounded before, pale with fuscous markings; margins and middle carinate; front broad, decidedly narrowed to base, deep black with a broad median transverse band of ivory white; strongly carinate, the marginal carinae dotted with white; clypeus conical and of the same color as the frontal band though slightly creamy towards tip, immaculate. Pronotum very short, whitish with obscure fuscous dots, tricarinate. Scutellum much longer than the pronotum and vertex together, rectilinearly tricarinate, the lateral carinae slightly divergent posteriorly; black, tawny yellow on each side beyond the lateral carinae; carinae and basal margins between the lateral carinae pale. Elytra smoky-brown, their basal edge, a partial oblique band crossing apical part of clavus, an area near the base of the costa, and another about the middle whitish; tips membranous, white, somewhat hyaline, with a brown band across the transverse veinlets and the hind margins fuscous interrupted by the white tips of the veins; preceding this brown band is another of white; nervures dotted with black in places. Wings black, transparent, subhyaline. Legs yellowish-white, two blackish bands on the tibiae.

Length of body 3 mm.; length to tip of elytra 4.25 mm.; width across the elytra 1.5 mm.

Oak and hickory have been recorded as food-plants.

The writer has a single female specimen collected by W. B. Cartwright at Elkmont, Tenn., Sept. 27, 1919, that seems to be this species.

Catonia nava SAY

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 238; Compl. Writ., ii, p. 373, *Flata*).

Recorded from Ont., N. Y., Md., Ohio, Ind., Ia.

A somewhat larger species than *grisea*. Its large size will distinguish it from the others. Cinereous varied with fuscous, elytra grayish, strongly variegated and nervures dotted.

Body cinereous, varied with fuscous, dorsum darker. Vertex slightly broader than long, a little advanced before the eyes, obtusely rounded before, pale with fuscous markings; margins and middle carinate; front broad, strongly narrowed to base, lateral and median carinae strongly elevated; base brown minutely irrorated with paler, followed by a white transverse median band and then a broad blackish band next the base of the clypeus; marginal carinae dotted with pale; clypeus pale with the median elevation prominent and testaceous-brown in color. Pronotum very short, whitish with discal foveae fulvous and on each side four black dots; tricarinate. Scutellum much longer than the vertex and pronotum together, feebly tricarinate; fulvous, with a large central irregular, blackish area occupying the greater portion. Elytra grayish, quite strongly variegated with fuscous and white; base of clavus and costa whitish; nervures dotted with black, particularly the costal, on which is a larger one near the tip. Wings smoky-hyaline. Legs cinereous, tibiae twice-banded with black.

Length of body 4—4.5 mm.; length to tip of elytra 5.75—7 mm.; width across the elytra 2—2.75 mm.

Redescribed from a specimen from Plummers Island, Md., Aug. 27, 1905, by H. S. Barber, and one collected at Cincinnati, Ohio, July 7, 1905, by Charles Dury.

Catonia carolina METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 176).

Described from material collected in North Carolina, Virginia and Maryland. "This species may be recognized by its rather large size, dark color with the frons unbanded but marked with two short ivory white transverse bars."

Vertex produced, obtusely angulate anteriorly; the median carina faint, the lateral margins strongly elevated; the frons narrow between

the eyes; lateral margins nearly straight to near the apex where they are slightly narrowed to the broad clypeus; pronotum short, carinae well elevated; mesonotal carinae distinct; veins of the fore wings strongly punctate.

Color: General color blackish fuscous; the carinae of the vertex, pro- and mesonotum paler; frons brownish fuscous, laterally alternate with black and white spots; a short transverse bar at the middle and another at the apex ivory white; ocellated spots on the mesonotum reduced to small pale spots; wings blackish fuscous, more or less variegated with whitish; veins in the wings irregular; longitudinal and cross veins at the apex narrowly white; venter and legs brownish fuscous; abdomen mostly blackish fuscous.

Length, apex of head to apex of abdomen 4.60 mm.; to the apex of the wings 5.90 mm."

Catonia luella METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 177).

Known only from Florida. "This species may be recognized by its small size, blackish color, veins of the wings impunctate, the cells with numerous small round pale spots.

Vertex narrow, rounded before, the carinae strongly elevated; frons broad, not distinctly narrowed between the eyes; clypeus broad, shallowly inserted in the frons; pronotum rather elongate, the carinae strongly elevated, the links of the lateral chain distinct; mesonotum tricarinate; the lateral carinae but slightly divergent; fore wings with the veins impunctate.

Color: General color blackish fuscous; frons nearly unicolorous; the lateral carinae a little paler; eyes black; mesonotum blackish fuscous, with two indistinct ocellated spots on the anterior margin, two on the posterior margin; fore wings blackish fuscous, the veins blackish, some of the cross veins at the apex narrowly pale; all of the cells with numerous pale round spots; venter and legs blackish, the latter more or less marked with pale.

Length, apex of head to apex of abdomen, 3.00 mm.; to the apex of wings 3.70 mm."

Catonia pini METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 177).

Known only from North Carolina. "This species may be recognized by its large size, uniform mesonotum, strongly variegated wings, the frons brownish with a narrow pale transverse band.

Vertex produced, obtusely rounded anteriorly; frons narrow at the base, widened apically, the lateral margins a little arcuate; median carina faint, lateral margins strongly elevated; wings strongly punctate.

Color: General color pale, more or less variegated with brownish and blackish fuscous; vertex, pro- and mesonotum uniformly ochraceous brown; frons ochraceous brown, the lateral margins alternate with black and ivory white, the narrow transverse band ivory white, basal third of the clypeus ivory white, the apex brownish; wings largely pale ochraceous yellow, irregularly variegated with brownish and blackish fuscous; venter and legs mostly ochraceous brown.

Length, apex of head to apex of abdomen, 4.70 mm.; to the tips of wings 6.20 mm."

Catonia lunata METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 178).

Described from material from Florida, North Carolina, Massachusetts, and Long Island, N. Y.

"This species may be recognized by its small size, blackish color and broad strongly produced vertex with the frons brown with a broad transverse pale band in the middle and a shorter pale bar at the apex.

Vertex strongly produced but little narrowed anteriorly; frons broad, not much narrowed at the base or at the apex; wings strongly punctate.

Color: General color blackish; vertex pale yellow, with two elongate dashes next the inner margins of the eyes and two near the median carina anteriorly; frons brown, the lateral margins alternate with black and ivory white, the transverse band broad ivory white, a small ivory white bar along the clypeal margin; clypeus mostly pale; pronotum with the carinae broadly pale, leaving small blackish spots in the compartments; mesonotum blackish, with the carinae pale and a few small tawny spots; fore wings blackish fuscous variegated with ivory white; venter largely tawny yellow, legs brownish fuscous; abdomen blackish.

Length, apex of head to apex of vertex, 4.00 mm.; to the apex of the wings 4.30 mm."

THE SUBFAMILY CIXIIDAE (SPINOLA)

Spinola, Ann. Soc. Ent. Fr., viii, pp. 202, 311, 1839
Cixioides.

This subfamily contains nine genera that are known from North America, three of which are recorded only from California.

In members of this group a third ocellus is present, placed at the apex of the frontal carina and the elytra are not reticulated apically. The female of most Cixiids bears at the apex of the abdomen a large tuft of fine snow-white

or yellowish filamentous excretions of a waxy nature. The function of this is not known but may possibly be connected with oviposition.

Very little is known of the habits and life history other than that some are tree-inhabiting and others grass-feeding forms.

Key to the genera

1. Sides of frons produced at sides and auriculate or ear-like, when viewed from above; elytra not tectiform nor adpressed to the sides.
.....*Bothriocera* Burm.
- ... Sides of frons not produced or auriculate, except very rarely, in which case the elytra are upright and adpressed to the sides.....2
2. Elytra brachypterous, frons broad oval.....*Monorachis* Uhl.
- ... Elytra macropterous, frons more elongate, elytra more or less dilated behind the claval apex; mostly obscure, more or less opaque dark species, the elytra adpressed.....*Cotyleceps* Uhl.
- ... Elytra not dilated behind the apex of clavus, not adpressed to the sides, almost always pellucid and transparent.....3
3. Vertex extremely narrow, reduced to a mere slit between the eyes; scutellum 5-carinate.....*Oecleus* Stål
- ... Vertex broader than long, or at most not much longer than broad..4
4. Scutellum 5-carinate.....*Oliarus* Stål
- ... Scutellum tricarinate; posterior tibiae armed with two or three spines*Cixius* Latr.
- ... Scutellum tricarinate; posterior tibiae without spines..*Myndus* Stål

THE GENUS BOTHRIOCERA BURMEISTER

The species belonging to this genus are all of small size with the larger and more showy species in South America.

Briefly characterized as follows: Upper portion of the frons produced at the sides into short ear-like processes, which when viewed from above, look like two small blunt horns. The frons and clypeus together form an isosceles triangle, with the vertex of the head as its base. Ocelli, especially the frontal, very distinct. Pronotum extremely short, the scutellum large with the carinae not strongly marked. Elytra much widened behind and rounded.

Haplotype of the genus: *Bothriocera tinealis* Burm.

Van Duzee in his "Catalogue of Hemiptera" gives *B. tinealis* var. *westwoodi* Stål, *B. signoreti* Stål (may not be distinct from preceding), *B. undata* Fabr., and *B. bicornis* (?) Fabr. (North American localities may refer to *undata*) as occurring in Florida. I have not been able to definitely place the *B. undata* which may not be distinct as the original description is very meagre and inadequate.

Fowler states that *B. signoreti* may be known by its having the apex of the elytra invaded with hyaline. He places *westwoodi* as a variety under *tinealis*, in which the dark and light color is more broken up behind.

In a large series of specimens collected at Gainesville, Fla., in June and July, 1918, by C. J. Drake, while sweeping ferns, there are seven specimens of a pale color with nearly all of the markings lacking. This may be designated as a new color variety of *tinealis* and be called var. *floridana*.

Bothriocera tinealis BURMEISTER

(1835 Handb. Ent., ii, p. 156).

Recorded from North Carolina and Florida.

Somewhat transparent, testaceous yellow, with the abdomen fusco-testaceous. Pronotum very short, yellowish. Scutellum large, rufo-testaceous to fuscous-testaceous. Elytra much widened behind, more or less smoky or fuscous with five or six irregular, hyaline, pellucid spots or areas, the apex hyaline. Wings smoke colored with two discolored spots. Legs yellowish.

Fowler states that "The last male abdominal segment appears to be bisinuate, more or less produced in the middle, and the styles are rather large, but the characters are more pronounced in some specimens than in others."

Length of body 3 mm.; length to tip of elytra 4.5—5 mm.; width 1 mm.

No specimens of typical *tinealis* were taken by the writer in Mississippi but the specimens collected belong to the variety *westwoodi* in which the dark and light color is more broken up behind.

Bothriocera bicornis Fabr.

(1803 Systema Rhyngotorum, p. 101, *Issus*)

Recorded from Md., N. J., Fla., No. Car. and Texas.

A distinct species with regular and constant markings. Very much like the preceding species but having the hind margin of the elytra always rather broadly black and opaque. The outline of the head, from a lateral view, is less indented than in *tinealis*.

Male pygofer small, long and slender, the ventral margin rather deeply and broadly cut out, with a small, short median tooth; genital

styles long, slender at the base, then enlarging slightly and touching each other for most of their length, the apices roundly pointed and finely hirsute.

Length of body 3 mm.; length to tip of elytra 4.5—5.00 mm.; width 1 mm.

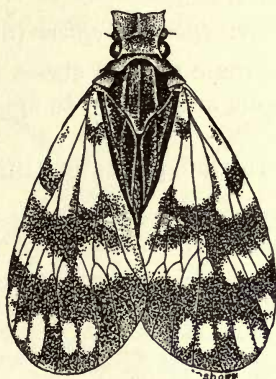


Fig. 15—*Bothriocera bicornis* Fabr., enlarged. (Original)

Adults were very abundant on young oak (*Quercus marylandica*) bushes at Longview, Miss., June 27, 1920. A number were swept by the writer in a stand of *Spartina patens* and *Juncus* sp. at Pascagoula, Miss., Aug. 6, 1921; a female at Tupelo, Miss., July 2, 1921, and another at Biloxi, Miss., July 29, 1921.

According to Uhler the species lives on alder and other bushes in wet places or near running water.

THE GENUS *OLIARUS* STÅL.

This cosmopolitan genus was erected by Stål in 1862 and contains a very large number of widely scattered species. Thirteen of them occur in the United States and of these only seven are known from the Southern States.

Very closely related to *Cixius* and *Monorachis*, especially in the head and pronotal characters.

Briefly characterized as follows: Vertex longer or shorter than the width between the eyes, usually longer, the lateral keels diverging distinctly behind, subquadrate, and angularly notched behind; near the anterior margin there is an angular broken transverse keel, forming two irregular, 4-angled compartments. Frons and clypeus together are broadest at about the middle and have a distinct median carina which is minutely forked or thickened at the vertex, forming a small triangle with the margin of the vertex as its base; a frontal

ocellus at tip of the median carina. Pronotum short, tricarinate, the lateral carinae curving out behind the eyes and reaching the lateral margin. Scutellum typically with five complete and distinct longitudinal carinae. Elytra longer than the abdomen, broadly rounded at apex, six discal and from nine to ten apical cells. Hind tibiae with three spines on basal half.

Logotype of the genus: *Oliarus walkeri* (Stål).

The shape of the male genital styles is often quite characteristic in this genus and an aid to specific identification.

Key to the species of *Oliarus*

- Elytra deep smoky brown, at least toward the apex,.....1.
- Elytra pellucid or nearly so, sometimes banded or mottled with brown,2.
- 1. Elytra deep smoky brown, the slender costa and stigma pale,*cinnamomeus* Prov.
- ... Elytra smoky at apex beyond the stigma, base usually subhyaline; size smaller,*humilis* SAY
- 2. Elytral nervures distinctly punctate,.....3.
- ... Elytra hyaline or a little dusky at apex where the nervures are then heavy and brown, nervures impunctate or nearly so,.....6.
- 3. Frons broad, brown with an ivory white area on either margin next to the base of clypeus; elytra hyaline with the stigma and nervures toward their apex brown,.....4.
- ... Frons unicolorous, the clypeus sometimes a little paler,.....5.
- 4. Ventral margin of male pygofer with a long and broad median tooth, roundedly expanded and feebly bilobate at apex; genital styles narrow and curved at base, abruptly expanded and almost square beyond the apex of the median lobe; a large species, 9 1-2—11 mm.,.....*placitus* VAN D.
- ... Ventral margin of male pygofer with a short, slender tooth; genital styles extending half their length beyond the pygofer, their inner margins narrow, nearly cylindrical at base, the apical half broad and obliquely truncate, together spear-shaped, pale yellow, 6 1-2—7 1-4 mm.,.....*aridus* BALL
- ... Male pygofer not described, a small species, 6 mm. *difficilis* VAN D.
- 5. Clypeus generally paler than the frons; elytra heavily maculated or generally transversely banded, stigma subquadrate,.....*5-lineatus* SAY
- ... Clypeus scarcely paler than the frons; elytra less maculated, the stigma distinctly longer than broad,.....*vicarius* WALK.
- 6. Length 8 mm., elytra entirely pellucid with fuscous nervures, stigma, and basal band,.....*slossoni* VAN D.
- ... Length 4-5 mm., elytra nearly hyaline or somewhat infuscated at apex, without a basal band,.....*franciscanus* STÅL.

Oliarus slossoni VAN DUZEE

(1912 Bul. Buf. Soc. Nat. Sci., x, p. 494—n.n. for *hyalinus* Van D.)

Recorded only from Florida but is probably the most abundant species of *Oliarus* in Mississippi and does some damage to alfalfa.

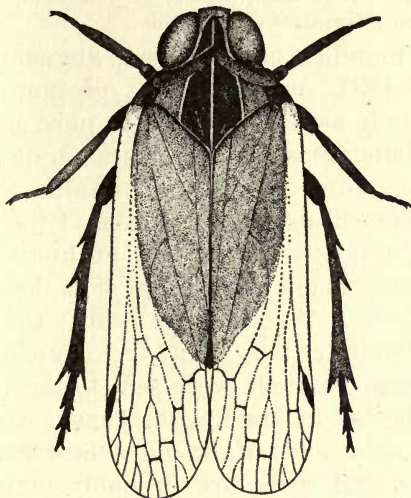


Fig. 16—Adult *Oliarus slossoni* Van D., enlarged. (Original)

The original description is quoted here.

“Elytra hyaline, with fuscous nervures, stigma, basal band and commissural nervure.

Vertex long and narrow, about as in *franciscanus*; blackish fuscous with fulvous carinae and a whitish line either side next the inner margin of the eye. Frons strongly widened below; dark castaneous with pale carinae and a pale area on either side next the clypeal margin. Clypeus blackish fuscous with pale carinae. Pronotum very short, linear, acutely emarginate behind almost to the anterior margin; soiled yellowish clouded with fuscous at the sides and under the eyes. Tegulae pale clouded on their discs. Scutellum dark castaneous; intermediate carinae obsolete or very feebly indicated anteriorly. Elytra long and narrow, clear hyaline with the nervures brown, under a lens very obscurely and minutely punctate; marginal and transverse nervures heavier; stigma long and narrow, fuscous, darker inwardly and bounded by a whitish nervure anteriorly; base marked by a transverse fuscous band across the apex of the scutellum which scarcely attains the costal margin; claval suture pale; commissural nervure fuscous, heavier for a space on the middle, then whitish to the apex of the clavus. Beneath blackish fuscous, paler

on the meso- and metapleura and edges of the abdominal segments. Legs brownish-testaceous, darker on the femora.

Ventral sinus of the male genital segment deep, with a short median tooth; its sides obliquely rounded; plates long, but little separated at base; expanded apical plate as long as the slender base, roundedly triangular, inner edges approximate, grooved, pygofers just as long as the plates and concentric with them at their rounded apex."

Length of body, male 5 mm.; female 6—7.50 mm.; length to tip of elytra, male 7 mm.; female 8—9.50 mm.

The writer found this species very abundant at Muldon, Miss., June 1, 1921, on the trunks of plum trees in an orchard and also in sweepings made in pure stands of alfalfa; also very abundant at Prairie, Miss., June 11, 1921, and at Gibson, Miss., June 27, 1921, on alfalfa. Six specimens were taken at Agricultural College, Miss., Sept 7, 1909, three on pecan and the others at light, by an unknown collector, and five more were taken on pecan at same locality Aug. 30, 1915, by C. C. Greer. At the latter locality the writer found this species abundant at trap lights from June to September.

Two females and a male were sent to the writer by Mr. F. M. Hull, collected at Harlingen, Texas, Aug. 4, 1921.

The pecan, plum and alfalfa must be recorded as definite host plants and there are probably many others yet to be noted.

Oliarus humilis SAY

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 241; Compl. Writ., ii, p. 376, *Flata*).

Recorded from Ont., N. Y., N. J., Pa. and Ohio.

Varies considerably in size and depth of coloring but is easily distinguished by having the apical portion of the elytra enfumed.

Vertex longer than broad, blackish with a whitish spot on each side next the inner margin of the eye. Frons strongly widened below; dark castaneous with pale carinae. Pronotum very short, acutely and deeply emarginate behind, lateral carinae curving out and reaching the lateral margins; dark fuscous with the carinae and margins paler. Tegulae pale. Scutellum brownish-piceous; the intermediate carinae nearly obsolete. Elytra long and narrow, more or less transparent, with the nervures pale brown, obscurely and minutely punctate, becoming dark fuscous apically; beginning with the stigma the apical portion is enfumed. Beneath dark fuscous, paler on margins of the abdominal segments. Legs brownish-testaceous, darker on the femora.

Ventral margin of the male pygofer with a short median tooth; genital styles deflexed downwards at apex, and curved backwards somewhat hook-shaped.

Length of body 3.50 mm.; length to tip of elytra 4.50—5.75 mm.

Redescribed from three females taken by the writer at Okolona, Miss., June 28, 1921, and Tupelo, Miss., July 1, 1921, and several specimens in Prof. Herbert Osborn's collection from Iowa and New York.

Oliarus franciscanus STÅL

(1859 Freg. Eugen. Resa., Ins., p. 273, *Cixius*).

Widely distributed over most of the entire United States and is also known from the West Indies.

Form and general appearance of *aridus*, but much smaller. Smaller and narrower than *humilis* and without the infuscated apical portion of the elytra. The small size and unmarked nervures readily distinguish this species.

Vertex very long and narrow comparatively, definitely produced in front of the eyes and angulate with the frons, nearly a half longer than broad; black with the carinae pale. Frons enlarged to apex, brown with the lateral edges and median carina pale. Pronotum short, fuscous with the lateral carinae and margins paler. Scutellum 5-carinate, dark fuscous, paler on the disc. Elytra long and narrow, subhyaline, the nervures yellow and only very obscurely and minutely marked with black dots before the stigma; in apical portion these nervures are more or less smoky and punctured with black. Beneath testaceous to fulvous-brown. Legs testaceous-brown.

Redescribed from two females and a male taken by the writer by sweeping *Juncus* and sedges at edge of a bayou at Ocean Springs, Miss., June 26, 1921, and numerous females in the Osborn collection from N. J., D. C., N. H., and Ohio.

Oliarus quinquelineatus SAY

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 241; Compl. Writ., ii, p. 375, *Flata*).

This is our most abundant and widely distributed North American species of the genus. Recorded from Quebec, Ont., N. Y., N. J., Ohio, N. C., Fla. and Colorado.

Closely related to *vicarius* but proportionately broader and shorter, with heavier elytral maculations, a blacker and nearly quadrate stigma and a distinctly broader frons.

Vertex rather broad, fuscous with a white spot on each side next to the eye. Frons greatly broadened to apex, with a prominent

median keel, fulvous. Pronotum short, fuscous, the lateral carinae distinctly paler and attaining the lateral margins. Scutellum 5-carinate, sordid yellowish on the disc and dark fuscous outside of the lateral carinae. Elytra long and rather broad, hyaline, clouded with fuscous at base and slightly so towards the tip, a more or less obscure or interrupted transverse band before the middle and the stigma fuscous; nervures minutely punctated with black. Abdomen dark. Legs pale testaceous, the femora darker and the tibiae twice banded with brown.

Length of body 5.50—6 mm.; length to tip of elytra 7—8 mm.

Redescribed from two females taken by Charles Dury at Cincinnati, Ohio, June 27, 1900, a female from Marion County, Arkansas, taken by F. M. MacElfresh, and another taken by the writer at Gainesville, Fla., in 1917.

Say states that the species occurred in New Jersey early in August on *Pinus rigida*.

Oliarus vicarius WALKER

(1851 List Homop., ii, p. 343, *Cixius*).

Recorded from Md. (?), Ga., Fla., Texas (?), and Colo. (?).

Very close to *5-lineatus*, but is slightly larger, the elytra are less strongly maculated, the stigma is longer and narrower, and the wings are pellucid.

General color pale fulvous-brown or ferruginous. Vertex longer than wide, fulvous-brown with a whitish area on each side. Frons enlarged to apex, with a median carina, brown. Pronotum short, the lateral carinae curved out behind the eyes and attaining the lateral margins. Scutellum long, fulvous-brown, paler on the disc, with five carinae, the intermediate ones become evanescent or join the median carinae some distance from the hind margin of the pronotum. Elytra transparent hyaline, the stigma and apical cross-veins pale fuscous; nervures pale yellow with dark setigerous dots. Wings pellucid, veins brown. Pale tawny brown beneath. Legs pale brown.

Male pygofer long and slender, the ventral margin deeply cut out, with a median tooth; the genital styles rather long, hirsute, flexed outwards and downwards, the apical portion much enlarged; each style resembling very much a tobacco pipe in general shape.

Length of body 5.25 mm.; length to tip of elytra 7.75 mm.

Redescribed from a male taken by C. J. Drake at Gainesville, Fla., June 30, 1918.

Oliarus placitus VAN DUZEE

(1912 Bul. Buf. Soc. Nat. Sci., x, p. 493)

Allied to *vicarius* and *5-lineatus*. A large elongated

species; the females generally marked with a longitudinal fuscous vitta on the elytra.

The original description is quoted here.

"Female: Vertex as broad as in *5-lineatus* and as long as in *vicarius*. Front and clypeus together proportionately longer than in *5-lineatus* and less angled at the sides; distinctly broader than in *vicarius*; base of the clypeus distinctly broader and less deeply inserted in the front than in either of the allied species. Pronotal carinae straighter and more parallel than in *vicarius*. Elytra long and parallel sided; radial and ulnar nervures forked on the same line but farther from the base than the point of union of the claval nervures. In *vicarius* the point of union of the claval nervures is beyond the others while in *5-lineatus* the three are about on a line; stigma still longer than in *vicarius*. Elytral setae less conspicuous than in the allied species. Hind femora with three equidistant teeth, the basal very minute and placed close to the base.

Color ferruginous-brown or almost castaneous; the sides of the mesonotum darker; meso- and meta-pleurae and legs paler, the femora darker; anterior and intermediate tibiae twice banded with brown. Abdomen fuscous, the segments edged with white. Carinae of the vertex with a median pale spot; those of the face paler, the marginal forming a pale hook either side of the base of the clypeus. Elytra whitish-hyaline, the nervures pale dotted with black; stigma and a longitudinal discal vitta which begins at the base of the anteapical areoles, fuscous; the transverse, and the tips of all the apical nervures blackish and bordered with fuscous. Commissure usually with a fuscous vitta to near the apex of the clavus. Generally there are two fuscous marks on the costa near the middle, a mark on the inner branch of the radial vein next the fork, another on the fork, and a round spot on the fork of the claval vein. The fuscous vitta on the apex and that on the commissure may be reduced or wanting but the spots on the nervures seem to be constant.

The male is smaller and wants most of the elytral markings but has the four dots on the nervures; and the stigma, the transverse veins, and the tips of the apical are fuscous. The male genital characters in this species are very distinct. The median tooth of this segment is long and broad, roundedly expanded and feebly bilobate at apex where its slender margin is reflexed. Side pieces of the genital segment obtusely triangular, but little surpassing the median tooth. Plates narrow and curved at base, abruptly expanded and almost square beyond the apex of the median lobe, their inner margins contiguous and their outer angles produced. Pygofers forming a hood over the apex of the plates, armed with a slender tooth dorsally."

Length of body, male 5 mm., female 5.50 mm.; length to tip of elytra, male 7.50—9.50 mm.; female 9—11 mm.

The writer and C. J. Drake took a number of this species

while sweeping in typical cane-brake near Tupelo, Miss., July 1, 1921; one of these was taken on hackberry, *Celtis occidentalis*, overhanging the brake. In Prof. Osborn's collection there is a pair taken by C. J. Drake at Gainesville, Fla., July 21, 1918, and a male from Lawrence, Kansas, taken in June by E. S. Tucker.

Oliarus difficilis VAN DUZEE

(1912 Bul. Buf. Soc. Nat. Sci., x, p. 494)

Known only from Florida.

The original description is quoted here.

"Smaller than *slossoni* with the vertex broader, the clypeus proportionately shorter, the mesonotum paler between the lateral carinae and the elytral nervures distinctly punctate. Length 6 mm.

Vertex much narrower than in *slossoni* but still at least one-half times longer than broad. Front broad, but proportionately longer with a narrower base than in either *slossoni* or *aridus*, the median carina distinctly but narrowly forked at base while in both of the allied species this fork is as broad as long and is obscure in *aridus* and almost obsolete in *slossoni*. Clypeus scarcely longer than the front, about twice as long in both the allied species; very minutely transversely striate, and viewed from the side or below exhibiting heavy oblique striae. Pronotum very short. Mesonotum tricarinate. Elytra proportionately a little broader than in *slossoni*, the nervures heavy, evidently but not strongly punctate, the anastomoses heavily infuscated; stigma large as in *aridus*.

Color piceous brown, almost black in places; carinae of the head and pronotum, margins of the abdominal segments, tegulae and apex of the mesonotum testaceous; disk of the mesonotum pale castaneous between the lateral carinae; apex of the front with an indefinite paler spot on either side of the base of the clypeus; clypeus almost fulvous in one example. Mesosternum and pleura whitish as in the allied species. Legs brown, becoming paler toward their apex, the incisions pallid. Elytra obviously whitish-hyaline, nervures pale, fusco-punctate, infuscated only on the forks, transverse veins and at apex; commissural nervure twice alternated with white. Nervures of the wings slender, fuscous. In one example the base of the elytra bears a fuscous cloud as in *slossoni* and *humeralis*.

Described from two females taken at Belleair, Fla., by Mrs. Annie Trumbull Slosson."

Oliarus montanus METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 179)

Described from Virginia and North Carolina material;

can be recognized by its broad vertex, finely punctate wing veins and distinct male genitalia.

The original description is quoted here.

"Vertex broad, narrowed anteriorly, deeply notched posteriorly; frons longer than broad; the clypeus shorter than the frons, much more deeply inserted. Pronotum rather long, the posterior margin triangularly emarginate, the sides nearly straight. Mesonotum with five carinae distinct, the intermediate carinae broadly arched. Male pygofer short, broad, the ventral sinus broad, median tooth broadly expanded apically, the apical border but little reflexed, genital styles slender, broadly curved, the apical portion but little widened; the inner margins short, not contiguous, the outer angles but little produced; the anal segment hood-like, rounded on the apex, which is strongly deflexed, almost touching the apex of the median tooth.

Color: General color blackish fuscous, the wings strongly infuscated, veins darker, finely punctate; frons blackish fuscous, the carinae but little paler; clypeus rufo-fuscous; carinae distinctly paler; venter and femora fuscous, with tibiae testaceous brown, with fuscous rings; abdomen black, the segments narrowly bordered with pale yellow, male genital pieces brown.

Length, apex of head to apex of abdomen 5.00 mm.; to the tip of the wings 7.20 mm."

Oliarus vitreus METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 180)

Known only from Southern Pines, No. Carolina. May be recognized by its large size, glossy blackish color and distinct male genitalia.

The original description is quoted here.

"Vertex narrow, triangularly narrowed anteriorly; frons narrow between the eyes, broader below; pronotum deeply notched posteriorly; mesonotum with five distinct carinae; forewings uniformly punctate; male pygofer with a long median tooth, genital styles slender with a distinct elevated ridge, their apices much reflexed appearing coiled.

Color: General color dark, glossy; head, thorax and abdomen black, clypeus not distinctly paler than the frons; legs uniform dark tawny; fore wings glossy, much infuscated and marked with blackish, there is usually a broad distinct transverse band from the middle of the costal margin diagonally across the wings to near the apex of the clavus, this band nearly paralleling the lateral borders of the mesonotum.

Length, male, apex of head to apex of abdomen 6.00 mm.; tips of wings 8.00 mm.; female, apex of head to apex of abdomen, 7.00 mm.; tips of wings 9.00 mm."

THE GENUS *MONORACHIS* UHLER

This genus was erected by Uhler in 1901 for a single brachypterous female from Florida.

Briefly characterized as follows: Form of a long *Issus*. Vertex short, transverse, lunately emarginate behind, the apex slightly angularly produced. Frons oblique, just in front of junction with vertex, decidedly and angularly projected backwards, making the base of the frons plainly visible from a dorsal view of the insect, the sides gradually enlarging to near the apex, an ocellus placed at apex of the median carina. Clypeus triangular, convexly elevated longitudinally. Pronotum very narrow, entering deeply into the notch of the head, the lateral carinae curved out behind the eye and reaching the lateral margins. Scutellum long, tricarinate. Brachypterous elytra scarcely longer than the abdomen, bluntly rounded at tip, the veins coarse, granulate, the medial areoles few, long, narrow, the apical series composed of rather short areoles which widen apically, the clavus large, long, and acutely triangular. Legs short, stout, the anterior femora grooved and carinate beneath, tibiae flattened on the outer surface and margined with carinate lines.

Haplotype of the genus: *Monorachis sordulentus* Uhl.

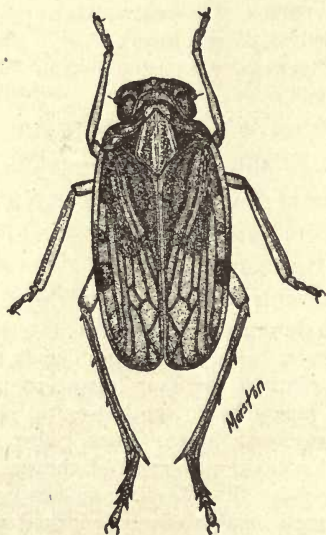


Fig. 17—*Monorachis sordulentus* Uhler, brachypterous male, greatly enlarged. (Original).

Monorachis sordulentus UHLER

(1901 Proc. Ent. Soc. Wash., iv, No. 4, pp. 509-510)

General color dark brown, somewhat clouded with obscure fulvous. Vertex short, transverse, rather lunately emarginate behind, apex slightly angularly produced, testaceous-yellow. Frons soiled yellowish-brown, the sides gradually enlarging to near the apex, oblique. Pronotum and scutellum pale fulvous on disc, piceous on sides outside

of lateral carinae. Elytra in brachypterous form scarcely longer than the abdomen, flexed downwards, bluntly rounded at apex, the veins coarse and granulate; dull fulvous in color, crossed by irregular bands of brown ragged spots, the coarse vein of inner margin and veins between the spots, pale fulvous or testaceous. Wings hyaline, the veins fuscous. Legs pale testaceous, the femora slightly embrowned.

Male pygofer very narrow and elongate, the ventral margin deeply cut out, with a median strap-shaped tooth; genital styles slender at base, curved inward semicircularly and then enlarged, continued straight for a short distance and then flexed outward and downwards, very much enlarged and especially hairy on the apical half, the tip blunt; anal tube with ventral margin bluntly produced on each side.

Length to tip of brachypterous elytra 3.25 mm.

Redescribed from a single brachypterous male taken sweeping in low shady spot or edge of deciduous woods, Prairie, Miss., June 11, 1921.

THE GENUS COTYLECEPS UHLER

The genus was erected in 1895 and therefore takes precedence over Fowler's *Metabrixia*.

Briefly characterized as follows: Form of *Bothriocerus* excepting in the shape of head. Vertex shorter than the eye, but projecting nearly the full length in front of them, with the surface deeply sunken and the sides correspondingly and acutely elevated, having the line of contact with the front indented; the front long, deeply scooped out, with the sides foliaceous, expanded and then tapering to the tip of clypeus, and carina of the middle much lower than the sides, point of juncture between the front and clypeus indented and occupied by an ocellus, clypeus with a low, thick carina; cheeks broad, somewhat foliaceous, excavated above the eyes. Pronotum very short, saddle-shaped, deep-seated, and upturned in the middle, regularly wide on the sides extending downwards. Mesonotum with the dorsal shield long and narrow, carinate in the middle, with the lateral carinate margins spreading apart posteriorly, with the scutellum large, triangular, depressed in the middle. Elytra gradually and almost symmetrically widening towards the tip, the tip almost bluntly rounded, with the inner arc a little narrower than the outer one; veins of the middle apex straight, bounding long and narrow areoles, one on either side of the four middle ones forked, those of the upper extremity curved outwards; middle longitudinal nerve with two curved forks near its tip. Elytra held nearly vertical. Abdomen somewhat prismatic, with the central ridge prominent; venter moderately wide and not quite flat.

Haplotype of the genus: *Cotyleceps decorata* Uhl.

Cotyleceps delicata Fowler

(1905 Biologia Centrali-Americana, Rhyncota, vol. I, p. 86,
Metabrixia)

Color a blackish-fuscous, paler beneath; frons clouded with brown, the carinae paler. Dorsal surface black with a broad pale fulvous vitta covering the entire vertex and the pro- and mesonotum on the disc between the lateral carinae, and this vitta is continued along the elytral commissure where it is paler in color, gradually narrowing and becoming obscured. Elytra, macropterous, smoky with the veins fuscous. Legs testaceous.

Length to tip of elytra 6. mm.

A series of six females and four males were taken by the writer during 1921 at the following localities in Mississippi: Ocean Springs, July 24, 1920, and Aug. 3, 1921; Pascagoula, Aug. 7, 1921; and Columbus, June 23, 1921. Three specimens collected by F. M. Hull at Harlingen, Texas, July 12, 1921, and a small series taken by the writer in low woods near New Orleans, La., July 23, 1922, are at hand. A pair in Prof. Osborn's collection taken by Wm. Palmer at N. Alexandria, Va., July, 1907, and a female from Orangeburg, So. Car., Aug. 18, 1914, F. H. Lathrop, have also been studied.

Van Duzee redescribed this species under the name of *Cixius dorsivittatus* from a single female example from Florida and Metcalf figures this same species (Fulgoridae of Eastern No. Amer., Plate 44, fig. 77) and erected the new genus *Ciocixius* to contain it.

The Arrow Head, *Sagitaria latifolia*, is a definite food plant of this species. This plant grows in low, moist places in deep deciduous woods, and the writer took most of his specimens sweeping pure stands of this plant at various localities. Several specimens were also taken at bright light traps.

Cotyleceps aspersa Fowler

(1905 Biologia Centrali-Americana, p. 87, *Metabrixia*)

This species is very close to the preceding one but is distinguished by its slightly larger size, more mottled elytra, and in having the commissural vitta decidedly less distinct. Legs testaceous but somewhat variegated. Its length varies from 6.5 to 7 mm.

The writer collected two females at Meridian, Aug. 14, 1921, a male at Aberdeen, June 26, 1921, and a male at Hattiesburg, Aug. 10, 1921. This species occurs also in low deciduous woods but is far less common in Mississippi than *Cotyleceps delicata*.

THE GENUS CIXIUS LATREILLE

This genus was erected in 1804 by Latreille (Hist. Nat. Crust. Ins., xii, p. 310) and is well represented in Europe and the New World. Seven species have been recorded from North America but the record of *albicinctus* is probably based on an erroneous determination. Three species are known to occur in the Southern States.

What little is known of these plant hoppers indicates that they are tree and shrub inhabiting. Some show a decided preference for conifers, such as the spruce and pine. One species, *stigmatus* SAY, seems to feed on grasses and sedges in low wet places.

The genus is very closely related to *Monorachis* and *Oliarus* and may be briefly characterized as follows: Vertex short, four angled, together with the large but inconspicuous eyes, narrower than the pronotum, separated in front from the frons by a transverse ridge; four compartments are formed by the median longitudinal carina and an anterior transverse one, the two hind compartments larger than the front ones. Frons with a median longitudinal carina, at the apex of which is placed an ocellus. Pronotum very short, angularly emarginate behind, the lateral carinae curved out behind the eyes and attaining the lateral margins. Scutellum large and tricarinate. Elytra longer than the abdomen, broadly rounded at apex; nervures punctated with more or less distinct black dots, from which areas arise fine fuscous hairs; stigma distinct. Wings present. Hind tibiae with two or three spines, nearly always three. Logotype of the genus: *Cixius nervosus* Linn.

The following key has been adapted from Van Duzee.

Key to the species of Cixius.

- Elytra hyaline or slightly suffused, frequently more or less banded or maculated with fuscous; nervures with brown punctures,.....1.
1. Vertex distinctly transverse, at most obtusely angled before; elytra proportionately broader; outer sector of the corium forked as near to or nearer the base than is the inner; maculation transverse,2.
- .. Vertex a little longer than broad, triangular, its apex subacute; elytra proportionately narrower; outer sector of the corium forked

- farther from the base than is the inner; maculation longitudinal,
.....*cultus* BALL
- Vertex broad triangular, obtuse or subacute before, its apex very nearly attaining the base of the frons and almost bisecting the transverse compartment at the apex of the head; frons black with the carinae pale; plates and styles of the male about equalling the pygofer.....*misellus* VAN D.
- .. Vertex short, transverse, rounded before; transverse compartment at the apex of the head much less narrowed, divided by a median carina.....3.
3. Larger, 6-7 mm.; clypeus paler than the frons; plates and styles of the male distinctly shorter than the pygofer.....4.
- ... Smaller, 5 mm.; face entirely black with pale carinae; plates and styles of the male as long as the pygofer.....*coloepeum* FITCH
4. Length 7 mm.; clypeus abruptly paler, at base strongly angled; plates of the male less than half the length of the pygofer; elytra generally quite strongly maculated, their base more or less distinctly fuscous.....*basalis* VAN D.
- ... Length 6 mm.; clypeus less strongly differentiated; plates more than half the length of the pygofer; elytra almost immaculate or with some small broken spots beyond the middle, base not darker,*pini* FITCH

Cixius pini FITCH

(1851 Homop. N. Y. St. Cab., p. 45)

Recorded from Quebec, Ont., Mass., N. Y., Pa. and N. C.

A small species with elytra almost immaculate or with some small broken brownish spots beyond the middle.

Vertex very short, transverse, distinctly carinated, fuscous with pale area next the eyes. Frons and clypeus fuscous, the edges and median carina fulvous. Pronotum very short, lateral carinae curved out behind the eyes and reaching the hind margin. Scutellum long, distinctly tricarinate, dark fuscous, slightly fulvous on the disc. Elytra hyaline, almost immaculate but in some specimens with some small broken brownish spots beyond the middle; stigma pale brown; nervures minutely dotted with black, the dots on the costal nervure slightly heavier. Abdomen black. Legs testaceous.

Male pygofer dark fuscous, the ventral margin deeply cut out and with a very short median tooth, the sides much more oblique than in *basalis*; genital styles pale, slender at the base, much enlarged, rounded and compressed at the apices; anal tube produced slightly each side ventrad.

Length of body 3.5—4.5 mm.; length to tip of elytra 5.25—6.25 mm.

Redescribed from a large series of both sexes taken by Prof. H. Osborn at Orono, Me., during August, 1913; several taken by C. J. Drake at Cranberry Lake, N. Y.; several

pairs from New Hampshire, collected by W. F. Fisk; and a series from Sault St. Marie, Can., all in the private collection of Prof. Osborn.

Pine, fir, and spruce are known definitely to be host plants of this species.

Cixius basalis VAN DUZEE

(1908 Proc. Acad. Nat. Sci. Phila., lix, p. 489)

Recorded from Quebec, Ont., N. H., Mass., R. I., N. Y., Ga., Colo., Texas, Calif. and Br. Columbia.

Of about the same size and general aspect of *Oliarus 5-lineatus*, but readily distinguished from that species by three mesonotal carinae. It varies greatly in the extent of the elytral maculation.

The original description is quoted here.

"Vertex short, transverse, arcuated, its anterior and posterior margins about parallel, its outer angles rounded, median carina not pronounced; transverse compartment at the apex of the head but slightly narrowed at center. Front proportionately longer than in *pini*, but shorter than in *stigmatus*; black with the strong carinae fulvous; clypeus abruptly fulvous, its apex and the tylus blackish, basal margin strongly angled. Pronotum linear and deeply angled as in the allied species; soiled fulvous-yellow as are the carinae of the vertex and the tegulae; mesonotum deep black with a pale point at the posterior end of each carina. Elytra abruptly widened near the base, then almost parallel to the stigma; whitish hyaline, nervures white conspicuously dotted with black, costal stronger with about 16 larger dots before the stigma, a few of which are grouped where the transverse band touched the margin; the radial forked nearer the base than is the second ulnar. In fully marked specimens the base of the elytra are deep fuscous or black to behind the tip of the scutellum; a broken linear transverse band crosses about halfway to the stigma and another at the stigma; sometimes there is a costal spot between these bands, and the transverse nervures at the base of the apical areoles are heavily brown. Frequently the base is but slightly obscured and the anterior band and costal spots or all the markings are wanting or feebly indicated. Beneath black varied with soiled yellow; legs pale with the femora more or less fuscous. Abdomen black with the narrow edges of the segments and base of the genital pieces of the female pale; in the male the plates, inferior surface of the pygofer at base and a dot at each incisure on the edge of the abdomen is pale. Plates of the male short, slender at base, abruptly expanded above in a transverse oblique plate lying against the slightly oblique apical margin of the genital segment;

pygofer extending for more than half their length beyond the plates, estimating from the ventral notch of the genital segments. Length 7 mm."

The writer has for study a pair from Westfield, N. J., July 16, 1904, a female from Wooster, Ohio, July 5, 1920, a female from Forest Park, N. Y., June 14, 1902, and a female from Fairfax, Iowa, June 24, 1899, H. Osborn; all in the private collection of Prof. Herbert Osborn.

Cixius stigmatus SAY

(1825 Jr. Acad. Nat. Sci. Phila., iv, p. 336; Compl. Writ., ii, p. 255, *Flata*)

Recorded from Mo., Kans., and Colo.

Body black. Vertex short, broad, triangular, subacute before, median carina abbreviated. Frons black with the carinae pale. Pronotum short, dark fuscous, the margins and carinae slightly paler, deeply emarginate behind. Scutellum large, distinctly tricarinate, black. Elytra white, a common black band near the base, becoming brown towards the suture, and a black stigma, which is margined with white before; nervures white, regularly dotted with black, setigerous. Tibiae fuscous.

Male pygofer with the ventral margin deeply and broadly notched out, with a short blunt median tooth; the sides are short and rounded, and not oblique; genital styles slender at base, enlarged about the middle and flexed outwards, the two styles converging and touching along the middle.

Length of body 4 mm.; length to tip of elytra 6.25 mm.

Redescribed from two females taken by A. E. Miller at Columbus, Ohio, Oct. 20, 1921, while sweeping in a low meadow, a female from Ames, Ia., and another from San Antonio, Texas, March 1, 1910, the latter swept by Prof. Osborn from oats in an irrigated field, and a male taken by the writer at Bay Pt., near Sandusky, Ohio, Oct. 6, 1921, by sweeping grass and sedges in a low spot along the shore.

Cixius misellus VAN DUZEE

(1906 Check List Hemip., p. 79, n.n. for *stigmatus* VAN D. 1906)

Widely distributed over Canada and the United States. This species was for many years misidentified as *stigmatus* of Say but these two are distinct according to Van Duzee.

Vertex triangular and acutely produced anteriorly, its apex very nearly attaining the base of the frons, and almost bisecting the

transverse compartment on the apex of the head. Frons, clypeus and scutellum black with the frontal carinae pale. Elytra of the female transparent, with a conspicuous blackish vitta before the middle, a fuscous spot on the stigmata and the nervures are conspicuously dotted with black; the male elytra show but faint traces of the transverse vitta.

Male genital styles broad, about equalling the pygoferes.

Length of body 4 mm.; length to tip of elytra 6.25 mm.

There is no authentic Mississippi record for this species.

THE GENUS *OECLEUS* STÅL

The genus was erected by Stål in 1862; *seminiger* Stål as the logotype. It is easily recognized by the very narrow vertex, which is reduced to a mere slit between the eyes and the 5-carinate scutellum.

There are at present thirteen described species from North America and only two of these, *borealis* and *campes- tris*, are known from the eastern half of the United States. Nothing is known of their life history but they are probably either feeders on pine or else grasses in pine woods.

Oecleus borealis VAN DUZEE

(1912 Bul. Buf. Soc. Nat. Sci., x, p. 495)

Recorded from N. Y., N. J., D. C. and Florida.

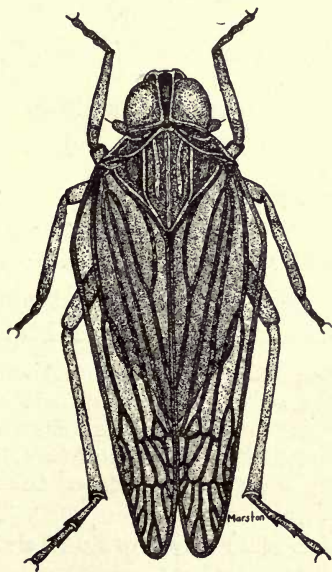


Fig. 18—*Oecleus borealis* Van Duzee, greatly enlarged. (Original).

This is the most common of the eastern species and is closely allied to *obtusus* Ball.

General color black, with all the carinae, the narrow margins of the pronotum, scutellum and pleural pieces, fulvotestaceous; usually there is a broad fulvous vitta near the lateral angles of the scutellum. Head broader than in some of our species, almost semicircular in outline. Vertex rather wide at apex, narrowed to a point at base; viewed from above, produced hardly one-half its width before the eyes. Frons strongly narrowed at base where the median carina is nearly obsolete. Antennae black on a narrow pale base. Pronotum deeply sub-angularly emarginate behind. Scutellum 5-carinate. Elytra nearly hyaline, becoming distinctly smoky at apex; nervures strong, the punctures distinct at base and as far as the apical areoles; stigma unusually short and broad, sometimes more elongated. In dark examples the apical nervures are more or less clouded with fuscous and the pale commissure is twice interrupted with fuscous. Metapleura and base of the abdomen covered by a testaceous band; the base of the genital segments of the same color in the female. Legs pale, lineate or clouded with fuscous.

Length of body 3-3.50 mm.; length to tip of elytra 4.25-6 mm.

The writer has taken both sexes by sweeping grasses in pine woods during 1921 at the following localities in Mississippi: Columbus, June 23-25; Okolona, June 28; Tupelo, July 2; Port Gibson, July 22; Poplarville, July 28; Lucedale, Aug. 8; and Hattiesburg, Aug. 10. The writer also has on hand a male collected by himself at Columbia, S. C., Aug. 7, 1917 and a series from Chester, Ga., June 14, 1904.

Oecleus decens STÅL

(1862 Ber. Ent. Zeit., vi, p. 307)

This is chiefly a western species. It was described from Mexico and is known from New Mexico and California.

I have on hand three females taken by Prof. J. S. Hine at Cameron, La., Aug. 14, 1903, that agree for the most part with the meager description of Stål.

Very close to *borealis* but distinguished at once by the vertex which is of about the same proportionate width as in *borealis* but distinctly more produced before the eyes. Elytra are entirely transparent hyaline, without the smoky apex of *borealis*, and the nervures are pale but distinctly and darkly punctate. Otherwise as in *borealis* but larger.

Length of body 4.25 mm.; length to tip of elytra 5.50 mm.

Oecleus campestris BALL

Very closely allied to *borealis* but the vertex is slightly wider and the nervures over the entire elytra are much more distinctly and darkly punctate.

General color dark fuscous, with all the carinae, the narrow margins of the scutellum, the pleural pieces, and a cloud or vitta near the lateral angles of the scutellum, fulvo-testaceous.

Head distinctly broader than long, somewhat semicircular in outline. Vertex distinctly wider than in *borealis*, slightly produced beyond the eyes, rather wide at the apex. Frons strongly narrowed at base where the median carina is nearly obsolete. Pronotum short, deeply and angularly emarginate behind, lateral carinae, on the disc, and the margins, pale. Scutellum 5-carinate. Elytra nearly transparent, without the smoky apex of *borealis*; the nervures pale but distinctly and darkly punctate. Legs pale, lineate or clouded with fuscous.

Length of body 3.25 mm.; length to tip of elytra 5 mm.

A single female of this western species beaten by the writer from a pine tree at Columbus, Miss., June 25, 1921, and carefully compared with the type series in the Ball collection.

THE GENUS MYNDUS STÅL

This genus was erected by Stål in 1862 and is almost entirely limited to North America. Thirteen species have been described from the United States, one of which is known only from the Pacific Coast. A single species, *musivus*, occurs in Europe and differs from its American congeners in having a black frons and clypeus.

Closely related to *Oecleus*.

Briefly characterized as follows: Vertex long and subrectangular, about three times as long as the pronotum, median carina indefinite or obsolete, produced to a slightly rounded, obtuse apex. Frons narrowed above, broadest at clypeus, a median carina with an ocellus placed at its apical end. Eyes large, kidney-shaped, emarginate below. Antennae very short, the second segment subglobose. Pronotum short, tricarinate, the lateral carinae placed very close to the median one on the disc. Scutellum rather long, tricarinate. Elytra longer than the abdomen, broad, dilated towards the apex, broadly rounded off behind. Female with white flocculent secretion at tip of abdomen. Hind tibiae without spines.

Logotype of the genus: *Myndus musivus* Germ.

Prof. Herbert Osborn found nymphs of *Myndus radialis* occurring upon the roots of *Impatiens*, nettles and some

grasses, in a river bed near Columbus, Ohio, in May and worked out a partial life history. This is the only hint we have of the habits and early life history of the species of *Myndus*.

Key to the species of *Myndus*

1. Frons distinctly twice-banded.....2.
 Frons not banded.....4.
2. Frons yellowish-white
 Elytra with a fuscous apical vitta along the commissure.....
 *pictifrons* Stål
 Elytra sordid, without a vitta, the veins fuscous.....
 *sordidipennis* Stål
 Elytra without a vitta, veins pale; smaller and paler than
 sordidipennis 5 mm.,.....*delicatus* Van D.
3. Frons greenish-white, a basal and apical fuscous vitta, the latter
 outlined above by a fuscous lunate vitta; elytra varied with
 fuscous; the lunate vitta lacking in the male.....*lunatus* Van D
4. Frons uniform fulvous-brown; elytra black, a slight orange-
 yellow "Saddle" occupying most of the clavus.....*slossoni* Ball
 Frons pale brown; elytra soiled yellowish-testaceous.....
 *enotatus* Van D.
 Frons testaceous, usually with a horse-shoe shaped light
 mark.....*impiger* Ball
 Frons pale with a black spot on each side of median carina
 at base.....*radicis* Osb.
 Frons fulvous, immaculate; elytra hyaline, veins distinctly
 brown*occidentalis* Van D.
 Frons fulvous, immaculate; elytra hyaline, veins very pale,
 4 mm.....*fulvus* Osb.
 Frons dull fulvous, immaculate, with carinae pale; elytra
 whitish-hyaline, veins pale but distinctly granulated; the
 smallest known species, 3½ - 4 mm.,.....*pusillus* Van D.
 Frons pale green, immaculate.....*viridis* Ball

Myndus slossoni BALL

(1902 Can. Ent., xxxiv, p. 154)

The head is proportionately larger (broader) in this form than in any other of our species. There is considerable variation in the extent of the pale saddle on the dorsal line of the elytra. This pretty species is readily distinguished by this light yellow or orange saddle.

Short and stout, black with the margins of the elytra and a median "saddle", light yellow.

Vertex, frons, legs and pronotum leather-brown, lighter beneath. Vertex very broad, but slightly carinate, scarcely angled with the

frons. Frons broad, uniform brown, median carina distinct throughout the clypeus. Eyes large, black, together with the vertex nearly as broad as the pronotum. Pronotum very short, angulate behind. Scutellum piceous, strongly tricarinate. Elytra short and rather broad, black, a light yellow, illy-defined "saddle" occupying nearly all of the claval area back of the tip of the scutellum; the costal margins with narrow white stripes extending back beyond apex of the clavus.

Male pygofers with a semicircular excavation bearing a minute knobbed median process; genital styles long, touching in the middle, then obliquely divergent; anal tube with an acute median ventral process.

Length to tip of elytra 4 mm.; width 1.25 mm.



Fig. 19—*Myndus slossoni* Ball, enlarged. (Original).

Described by Ball from a single pair from Biscayne Bay, Fla. Van Duzee found this species in great abundance on the prairies at Haw Creek near Crescent City, and more rarely at other localities in Florida.

The writer took it abundantly while sweeping marsh reed (*Juncus sp.*) on an island at Pascagoula, Miss., July 5, 1920, on Ship Island, Sept. 6, 1920, and on Cat Island, Sept. 7, 1920. A number were taken by sweeping coarse grasses in low pine flatwoods at Baxterville, Miss., July 27, 1921, and also in sweeping coarse grass on floor of typical black-jack oak woods near Hattiesburg, Miss., Aug. 10, 1921. The last two localities are inland many miles from the coast.

Myndus enotatus VAN DUZEE

(1909 Bul. Buf. Soc. Nat. Sci., ix, p. 188)

Recorded from Md., N. C., Ga. and Fla.

A species that is very close to *slossoni* but lacking the "saddle" and darker color of the latter. The frons is narrower basally, the expanded divergent apices of the

plates in the male genitalia are smaller and narrower, and are distinctly whitish, and the styles are longer.

Soiled yellowish-testaceous in color, almost uniform above or a little darker toward the costal base of the elytra and on the sides of the scutellum. Abdomen and beneath quite strongly tinged with fulvous or at times almost rufous; the tergum more or less blackish at the base. Eyes ovate. Hind margins of the meso- and meta-pleura at times black. Costa narrowly whitish.

Length to tip of elytra 4 mm.; width 1.25 mm.

This species was described by Van Duzee from numerous specimens swept from grass on the prairies at Haw Creek, Fla., in untold thousands. Metcalf and Osborn give an interesting account of finding this species on a rather coarse grass in a tidal flat at Southport, N. C., and state that "the species has certainly been able to accommodate itself to the tide flat habitat and there is little doubt that it is able to undergo periods of submergence lasting a number of hours."

The writer has swept this species together with *slossoni* in large numbers from the marsh reed (*Juncus sp.*) on an island in the Pascagoula River at Pascagoula, Miss., July 5, 1920 and on Cat Island, seven miles off the Mississippi coast, Sept. 7, 1920, and also at Ocean Springs, Miss., Aug. 3, 1921. Prof. J. S. Hine took a large series at Bay Ridge, Md., July 1, 1899. All of these records would indicate a maritime distribution.

Myndus pusillus VAN DUZEE

(1909 Bul. Buf. Soc. Nat. Sci., ix, p. 190)

Recorded only from Florida.

Allied to *radicis* Osborn but much smaller with a narrower and immaculate frons. The smallest and most delicate North American Cixiid.

The original description is quoted here.

"Female: Vertex rather wider than in the allied species, its carinate sides almost parallel. Front moderately broad, distinctly convex in both diameters, strongly carinate. Eyes fuscous. Pronotum very short, the broadly and deeply emarginate hind edge attaining the base of the vertex. Vertex and pronotum pale greenish, the latter with a black mark on either side beneath the eye. Face dull fulvous with whitish carinae. Scutellum fulvous. Tergum more or less embrowned.

Beneath pale, tinted with fulvous on the pectoral pieces. Elytra hyaline, immaculate, the nervures obsoletely punctate.

Male smaller than the female and without the blackish marks behind the eyes, front greenish white like the vertex. Length $3\frac{1}{2}$ to 4 mm."

Described from one female taken at Crescent City and two males from Sevenoaks, Fla. It is closely related to *viridis* Ball but is much smaller; the vertex is broader, and shorter, scarcely surpassing the eyes; the front is wider at base and fuller and more convex in both diameters; the elytral nervures are more strongly punctate and are obviously infuscated toward the apex; the pygofer of the male genital segment are more produced dorsally so the apical margin is strongly oblique, and the tergum is distinctly marked with blackish."

The writer took a single male while sweeping *Juncus* and sedges on Cat Island, seven miles off the Mississippi coast from Gulfport, Miss., Sept. 7, 1920; two females from Biloxi, Miss., Aug. 1, 1921; a female from Poplarville, Miss., July 28, 1921, by sweeping grass in cut over pine lands; a female from Enterprise, Miss., Aug. 13, 1921; and another by sweeping coarse grasses in woods near Hattiesburg, Miss., Aug. 10, 1921,

Myndus pictifrons STÅL

(1862 Berl. Ent. Zeit., vi, p. 307)

Recorded from N. Y., N. J., D. C., N. C., and Ohio.

Most readily distinguished from its closest allied species, *sordidipennis*, by the brown vitta at the inner angle of the elytra. Frons banded.

General color yellowish-white. Head, including the eyes, narrower than the pronotum; vertex sordid, broad, the lateral margins carinate and usually fuscous, slightly produced before the eyes, and scarcely angled with the frons. Frons very broad below the eyes, the median carina distinct and continuing through the clypeus; whitish with a broad basal band and a smaller apical one, black. Eyes large, dark brown. Antennae very short, pale. Pronotum and scutellum more or less infuscated. Elytra transparent, the veins, and the small stig-matal spots of costa black-fuscous; a fuscous apical vitta that curves along the commissure and inwards just below the apex of the clavus. Legs testaceous.

Male pygofer with a semicircular excavation bearing a minute

knobbed median process; genital styles long, touching in the middle, enlarging slightly and then obliquely diverged downwards, very hirsute.

Length of body 4 mm.; length to tip of elytra 5.50 mm.

A number were taken by C. J. Drake and the writer while sweeping in low deciduous woods near river bank at Columbus, Miss., June 23, 1921. I suspect that the Arrowhead, *Sagittaria latifolia*, is one of its food plants. Several were also taken by sweeping the grassy floor of a stretch of open high pine land near Columbus, Miss., June 25, 1921.

Myndus sordidipennis STÅL

(1862 Ber. Ent. Zeit., vi, p. 307)

Recorded from Ont., N. Y., N. J., Pa., Fla., and Colo.

Distinguished from its nearest ally, *pictifrons*, by its sordid elytra which lack any definite banding.

Yellowish-testaceous, beneath and the legs paler. Vertex broad, the margins feebly carinate. Frons with median carina distinct throughout its length, pale whitish, with a broad basal and an apical band, blackish. Eyes large, dark brown. Elytra sordid testaceous, the veins more or less fuscous and granulated.

Length of body 3.5 mm.; length to tip of elytra 5 mm.

Redescribed from a pair from Westfield, N. J., July 16, 1904, and single females from Philadelphia, Pa., June 10, 1897; Pt. Pleasant, N. J., July 27, 1905; Washington, D. C., June 25, 1905, E. P. Van Duzee; and Ironton, Ohio, May 26; all in the private collection of Prof. H. Osborn.

Myndus delicatus VAN DUZEE

(1908 Proc. Acad. Nat. Sci. Phila., lix, p. 492)

Known only from North Carolina.

The original description is quoted here.

"Closely allied to *sordidipennis*, but a little smaller and paler. Vertex a little narrower anteriorly, the sides almost parallel before the middle; in *sordidipennis* these sides converge nearly to their apex; black with a broad longitudinal line toward the apex pale fulvous. Eyes black with their inner edges slenderly pale. Front rounded ovate; yellowish white with a black band across the base and apex; these bands a little narrower than in the allied species; carinae on the apex of the head pale, lower down on the front the lateral carinae become blackish within. Clypeus soiled white. Pronotum about as wide as in the same sex of *sordidipennis*; the

hind edge more angularly emarginate and the humeral angles more rounded; superior disc black with the slender hind edge and median carina pale; sides pale slightly stained, the deflected portion black more or less broadly bordered with pale; in *sordidipennis* entirely pale in the specimens before me. Patagia black, fuscous in its ally. Mesonotum black with its side compartments invaded with ferruginous before, the small scutellum pale. Elytra almost hyaline, slightly smoky at tip; nervures white dotted with concolorous bristle-bearing pits; stigma whitish. Beneath whitish, a little suffused with flavous on the venter. Apex of the genital segment oblique, armed with a minute triangular ventral tooth; in *sordidipennis* this ventral tooth is larger with the adjoining margin quite deeply excavated; styles undulated at base as in *sordidipennis* but distally approximated to their rounded apex. In *sordidipennis* most of the lower surface and genital pieces are black. Length 5 mm.

Described from two male examples taken at Hot Springs, North Carolina, by Mrs. Annie Trumbull Slosson."

Myndus lunatus VAN DUZEE

(1909 Bul. Buf. Soc. Nat. Sci., ix, p. 189)

Known only from Florida.

The original description is quoted here.

"Female: Pale straw-yellow or testaceous-yellow varied with white and fuscous. Head rather longer than in most of our species. Vertex long, whitish, and its margin strongly carinate, fulvous, slenderly lined with fuscous. Front unusually broad, rapidly widening almost to the straight deeply impressed clypeal suture, its thin expanded sides broadly reflexed and rounded to the base of the clypeus; greenish-white in color and marked with a narrow transverse fulvous band at base and a broader one at apex, the latter outlined above by a fuscous or black lunate vitta which may be much extended over the fulvous area; clypeus pale green marked with fuscous or black on either side at base. Pronotum narrow, subangularly emarginate behind, marked with an angular black spot behind either eye and a similar spot below the lateral margin. Eyes black superiorly. Ocelli rufous. Scutellum varied with fuscous on either side, the disc pale between the prominent straight carinae. Elytra varied with fuscous, the most conspicuous marks being a large basal area containing a whitish cloud, a vague vitta beyond the middle, and the apex; the claval suture and one or two of the principal longitudinal nervures lined with fuscous. In fully colored examples there is a fuscous or black spot on the middle of the clavus at the junction of the nervures, another on the costa opposite this, one on the base of the stigma, a larger one behind a white mark on the tip of the clavus, a spot on the transverse veinlet at base of the second apical areole, and a point anterior to this. Nervures obsoletely punctate but not dotted. Body

beneath whitish varied with fuscous on the sides of the venter; oviduct fuscous or black. Legs pale, the femora fuscous exteriorly. Length nearly 4 mm.

Male: A little smaller than the female. Pale straw becoming fulvous on the sides of the scutellum and abdomen. Vertex and face greenish white, the front showing two transverse fulvous vittae but wanting the fuscous markings found in the female. Elytra without the fuscous markings but showing a white subapical cloud and the black points as described in the female, those on the clavus and costa much reduced or obsolete.

Described from numerous specimens swept from low huckleberry bushes and accompanying weeds and grasses on the dry pine barrens at Sanford, Sevenoaks, Ft. Myers and Estero. This is a very pretty little species distinguished by the greenish front banded with fulvous and marked with a fuscous lunule in the female. In one female the fuscous markings of the elytra form a large blackish cloud on the base of the clavus and an elongated mark on the disk of the corium posteriorly against the claval suture."

THE SUBFAMILY TROPIDUCHINAE STÅL

(Stål, Hemip. Afr. iv, pp. 130, 186, 1866, *Tropiduchida*)

Members of this subfamily occur in all parts of the world, most of the genera, however, being found in the indomalaysian and neotropical regions. The elytral membrane is strongly differentiated from the corium with numerous simple longitudinal nervures and there is no ampliation or overlapping of the elytra at the apex. There are three American species, representing as many genera, two of which are known only from Florida.

Key to the genera

- Frons not keeled in the middle; line of cross-veins obliquely placed.....*Pelitropis* Van D
Frons with swollen median keel,.....*Monopsis* Spin.
Frons with median keel; keel of vertex simple, the middle sector forked on the middle of the corium, the inner forked vein branching again, the inner sector forked before the middle; line of cross-veins transversely placed, no subapical line,*Neurotemeta* Guer.

THE GENUS PELITROPIS VAN DUZEE

The genus was erected by Van Duzee in 1908 and contains a single species, *rotulata*, that is known only from Florida and Mississippi and is a rather rare insect.

Original generic characterization is quoted here.

Briefly characterized as follows: "Closely allied to *Tambinia* and differing principally in its wider head, non-carinate frons and different elytral venation. Head with the eyes as wide as the pronotum or nearly so, laminately flattened. Vertex produced, flat, base angularly emarginate, sides parallel, the margins and middle

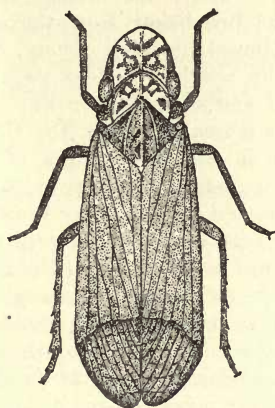


Fig. 20—*Pelitropis rotulata* Van D., enlarged. (Original).

line carinate. Frons almost horizontal, broad, sides parallel, base angularly rounded, disk a little depressed. Pronotum roundedly produced before, deeply and angularly emarginate behind, tricarinate, the lateral carinae curved and almost reaching the posterior angles. Mesonotum tricarinate. Elytra long and narrow, parallel, hyaline, with a very slender costal membrane; radial nervures simple, first ulnar forked behind the middle, second at the middle; claval nervures united before the middle of the commissural margin, the resulting nervure attaining the apex of the clavus; apex of elytra subangularly rounded, inner edge of the membrane almost rectilinear, outer curved; base of the membrane separated from corium by a subangulated line of transverse nervures, behind which eight longitudinal nervures run straight and almost parallel to the apex; these are crossed about halfway to the apex by a second series of transverse veinlets; a few supernumerary veinlets may occur on the disk either side of this second line, and two short longitudinal nervures are interpolated near the inner angle; apical margin with a very narrow areolate or punctate appendix. Posterior tibiae with three spines."

Haplotype of the genus: *Pelitropis rotulata* Van D.

Pelitropis rotulata VAN DUZEE
(1908 Pro. Acad. Sci. Phila., lix, p. 474)

The original description is quoted here.

"Pale green obscurely varied with brown. Vertex as long as broad, anterior margin obtusely angled, almost parallel with the posterior; edge carinate all around, median carina distinct, surface depressed with a few lineations, most conspicuous of which are two on the middle and two on either side anteriorly, placed at right angles to and touching the margin. Cheeks before the eyes narrow, pointed, together with the pleurae and sides of the pronotum deeper green, marked with black above under the lateral carinae of the vertex and with a short parallel line below from the anterior angle of the eye. Front almost horizontal, its disk oblong, depressed; its length one-third greater than its width; its sides parallel and its base obtusely angled, the apical angles cut off in line with the sides of the clypeus. Clypeus an equilateral triangle, the three sides rectilinear. Ocelli minute, placed next the lower angle of the eye. Antennae placed against the inferior edge of the eye; base green, cylindrical, next joint brown, surmounted by a slender brown seta. Pronotum of about equal length across its whole width, deeply acutely emarginate behind; carinae distinct, the lateral meeting the median before, curved, at first concentric with the anterior edge, almost attaining the prominent posterior angles; sides tricarinate behind the eyes, the inferior carina bounded above by a black line, and there are a few obscure marks along the disk anteriorly. Tegulae small with a black disk. Scutellum with some obscure marks on the disk. Elytra pale greenish pellucid, sparsely dotted with black along the nervures of the clavus and corium; those along the costa drawn out in oblique false veinlets; tip of the membrane a little smoky with some of the transverse veins brownish. Beneath deeper green, the legs paler with the tips of the tarsal and tibial spines and a mark on the apex of the femora exteriorly blackish. Length 7 mm."

A specimen was taken by the writer on a pecan seedling in a nursery at Long Beach, Miss., July, 1920, and several were swept from French Mulberry, *Callicarpa americana*, and other shrubs at Biloxi, July 23, Gulfport, Miss., July 30, and at Port Gibson, July 23, 1921.

THE GENUS *MONOPSIS* SPINOLA

Briefly characterized as follows: Vertex longer than wide, broadly produced beyond the eyes, anterior margin rounded, lateral margins and in the middle strongly carinated, posterior margin angularly emarginate. Frons horizontal, longer than wide, lateral edges and middle thickly carinated. Clypeus short, with a median carina. Ocelli present. Pronotum very narrow, produced in front lobe-shaped,

posterior margin obtuse-angularly emarginate, tricarinate. Scutellum broad, with three longitudinal carinae. Elytra long, with very small costal membrane, transparent; the largest part of the basal portion formed of long cells; a small transverse line before the apex, followed by a large number of small cells formed by the numerous cross-veins. Abdomen somewhat flat and oblong. Hind tibiae with three spines.

Haplotype of the genus: *Monopsis tabida* Spinola

Monopsis tabida SPIN.

(1839 Ann. Soc. Ent. Fr., viii, p. 34, 1 fig.)

Somewhat resembling *Pelitropis rotulata* but with a much shorter and more quadrangular head. This pale green species has not been taken since it was described from Cuban material.

THE GENUS NEUROTMETA GUERIN. (Tangia Stål.)

Briefly characterized as follows: Vertex produced more or less before the eyes, carinated on the sides and in the middle. Frons tricarinate, the median one forked behind; clypeus triangularly elongate, indistinctly keeled in the middle. Ocelli present. Pronotum produced lobe-shaped between the eyes, hind margin obtuse-angularly emarginate, tricarinate, the lateral carinae curved outward, divergent behind; in addition the lateral margins are keeled. Scutellum three to four times as long as the pronotum, tricarinate. Elytra reaching beyond the abdomen, on the apical third a transverse line of cross-veins; costal membrane narrow, without cross-veins; cross-veins numerous and irregularly branched. Hind tibiae with three spines.

Haplotype of the genus: *Neurotmeta sponsa* Guer.

Neurotmeta sponsa GUERIN

(1856 in La Sagra, Hist. de Cuba, Ins., p. 180, *Pseudophana*)

A pale green insect with milky, transparent elytra.

Vertex broad, produced in front parabolic-shaped, flat, broader between the eyes than in the median length, angularly cut out behind; a small flat depression on each side in the posterior corner. Frons twice as long as broad, strongly carinated in the middle and on sides. Pronotum half as long as the vertex, produced lobe-shaped in front; obtusely emarginate behind. Elytra hyaline, the veins rusty or pale yellow.

The insect when fresh and early in the season is bright green with the eyes sometimes reddish, later becoming paler and even bleached yellow.

Length to tip of elytra 11-12 mm.

Uhler states that it inhabits Cuba, San Domingo, and Southern Florida, and that it lives upon reedy plants near the water.

THE SUBFAMILY ISSINAE (SPINOLA)

(Spinola, Ann. Soc. Ent. Fr., viii, p. 204, 1839, *Issites*)

This subfamily is world wide in distribution and contains a very large number of genera, eighteen of which are recorded from North America. The numerous and varied shapes of the different genera makes it extremely difficult to characterize the subfamily in a few words. In general the Issids have more or less uneven parchment-like elytra, which cover the abdomen, but at times these are narrowly lanceolate or cut off behind, leaving the abdomen free and uncovered. In certain genera both a short-winged and a long-winged form occurs. In the macropterous form the elytra are in some cases translucent or transparent and extend beyond the tip of the abdomen. The vertex is either short, transversely quadrate or produced into a conical or cylindrical process that in some genera greatly resembles a snout. Ocelli and wings may be present or lacking. The pronotum is produced forwards lobe-like or obtusely angled between the eyes, smooth or at times with numerous small pustules on the sides. The legs are always armed with spines.

A superficial key is here given to the genera known to occur within our territory.

Key to the genera

1. Head produced snout-like, enlarged knob-like at the end,.....*Fitchiella* Fitch
- ... Head more or less produced snout-like downwards, triangular, the apex more or less acute and not knob-like,.....2.
- ... Head short and not produced snout-like,.....3.
2. Clypeal suture indistinct; frons placed at an angle of about 45 degrees,.....*Bruchomorpho* Newm.
- ... Clypeal suture very distinct; frons placed nearly vertical,.....*Aphelonema* Uhl.
3. Body compactly built, the elytra more or less strongly arched, covering the abdomen entirely; head with the eyes nearly as wide as the thorax; frons subquadrate, generally flat, tricarinate, the outer carinae curved somewhat bow-shaped,.....4.

4. Body short; elytra short, parchment-like; wings lacking,.....
*Hysteropterum* Am. & Serv.
 ... Body more elongate; elytra longer, narrowed behind and rounded
 off at the apex; wings present,.....*Thionia* Stål

THE GENUS FITCHIELLA FITCH

The genus *Naso* was erected by Fitch in 1857 but as this name was preoccupied it was changed by Van Duzee to *Fitchiella*. Members of this genus are readily distinguished from those of the next genus, *Bruchomorpha*, by means of the snout-like produced and bent head process which is knob-like enlarged at the end.

There are three species, one of which, *robertsoni*, occurs in the South. *Fitchi* Melich. is known from Kansas and Colorado, and is distinguished by its decidedly larger and more robust form (length 5 mm.) and its peach or dark brown body color. *Melichari* Ball is known only from Arizona and closely resembles *robertsoni* in size and form. It is smaller, with the cephalic process less inflated at the apex, and is of a pitchy black color without markings (length 3.75 mm.)

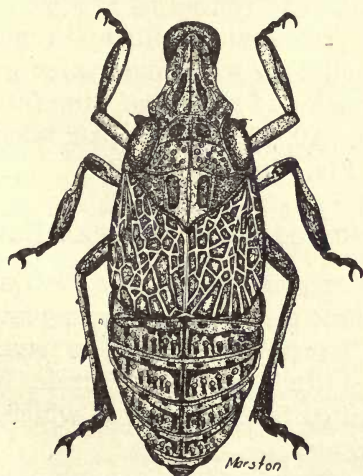


Fig. 21—*Fitchiella robertsoni* Fitch, greatly enlarged. (Original).

Fitchiella robertsoni FITCH

(1856 Trans. N. Y. St. Agr. Soc., xvi, p. 396, *Naso*)

Recorded from N. Y., Md., Fla., Ind., Kans., Ark., Okla., and Texas. (Central America).

Brownish-yellow in color, marked with black. Head produced into a short, slightly downwards bent process of a snout-like appearance; this process is enlarged at the tip into a smooth, polished knob; the upper surface of the process with three longitudinal carinae, the middle one of which becomes obliterated before the tip, the lateral carinae curve outwards and are furnished at the outside towards the base of the process with two longitudinal rows of dark pustules; in the space between the eyes are found two somewhat oval black spots and on the front, somewhat in the middle, are two black longitudinal flecks; the upper surface of the process is of a pale yellow color. Pronotum semicircular, with a median carina and numerous dark pustules. Scutellum with three parallel longitudinal carinae, between which are two dark longitudinal streaks, and furnished with dark pustules on the sides of the lateral carinae. Elytra short, reticulated, the cells filled with fuscous-brown, so that the yellowish network appears distinct. Abdomen somewhat widened in the middle, gradually narrowed to the tip; there is a fine black median longitudinal line whose sides are furnished with impressed longitudinal points, which take in almost the entire length of each segment, so that the same appears as being longitudinally streaked; these streaks reach nearly to the median line; the underside of the abdomen is yellowish. Legs brownish-yellow, tibiae fuscous-brown, slightly widened towards the tip, the basal furrow of the tibiae is very indistinct.

Length to apex of abdomen, male 2.50 mm.; of female, 4 mm.

Redescribed from eight adults and a number of nymphs taken by the writer by sweeping coarse grass on the floor of a black-jack oak and short-leaf pine forest near Hattiesburg, Miss., Aug. 10, 1921, and a pair taken by C. J. Drake at Gainesville, Fla., July 28, 1918.

THE GENUS BRUCHOMORPHO NEWMAN

The genus was established by Newman in 1838 and strictly speaking is a North American genus although Melichar describes the species, *globosa*, as having been collected in Mt. Coffee, Liberia by R. P. Currie. Thirteen species occur in the United States, seven of which are known from the Southern States.

Briefly characterized as follows: Head broad, triangular, and produced downwards. Vertex extremely narrow, set off from the frons by means of a fine bow-shaped transverse border. Frons is sharply bent forwards at an angle of about 45 degrees, so that because of the triangular form the frontal surface, when viewed from above, resembles a snout; with three longitudinal carinae the outer ones being curved outwards and converging at the apex of frons; a median carina extends ridge-like on the upper surface of the head process.

Clypeus small, compact, with a median keel, and is indistinctly separated from the frons. Eyes long and oval. Pronotum semicircular, with a median carina and numerous pustules. Scutellum is broad, triangular, with three parallel longitudinal carinae, the sides pustulated to the lateral carinae. Elytra short, not covering the abdomen, parallel at the sides, cut off straight behind with the terminal corners rounded, parchment-like, thickly reticulate-veined, claval suture absent, both a macropterous and brachypterous form exists but the long-winged form is known of only a few of the species; in the macropterous form, the elytra are long, membranous, transparent, traversed by three longitudinal and five apical veins; the clavus, which contains a forked vein, is separated from the corium by a distinct suture. Wings are present and are large although shorter than the elytra, vitreous. Abdomen arched and narrowed behind into a blunt tip. Legs short, the hind tibiae with a spine in the middle.

Haplotype of the genus: *Bruchomorpha oculata* NEWM.

These insects are found on thin, fine grasses, usually in damp or moist pastures and meadows. They are very difficult to take, being very timid and quick in action, leaping with surprising agility, often throwing themselves as far as eighteen inches at a single bound. The brachypterous forms are the ones most frequently collected as they are the most abundant in addition to having only rudimentary wings.

Key to the species of *Bruchomorpha*

1. Body black with a brassy luster,.....2.
 Body and legs rusty yellow, with a black spot on the underside of the frons close to the apex; length 3 mm.,.....*jocosa* Stål
 Body and legs testaceous yellow to pale fulvous-yellow; the male with a broad piceous longitudinal tho somewhat oblique band on the outer margin of each elytra; length 2-2.75 mm.,
*bimaculata* Dozier
 Body and legs dull yellow, a broad blackish stripe on each side of body from apex of nasal process to apex of abdomen in both sexes.....*bicolor* Metcalf
2. Legs bright or reddish yellow, rarely rusty-brown,.....3.
 Legs black; body robust and broad, the vertex moderately produced; length 3.50,.....*tristis* Stål
 Legs black, the posterior tarsi a little rusty, vertex narrow; length 1.90 mm.,.....*minima* Metcalf
3. With a broad bright yellow longitudinal stripe on the middle of the body,.....4.
 The longitudinal stripe lacking, at most only the central carina rusty yellow or rusty brown in color.....5.
4. The longitudinal stripe reaching from the apex of head to the tip of the abdomen; length 3 mm.,.....*dorsata* Fitch

- This stripe reaching only onto the base of the abdomen; length 2.50 mm.,.....*suturalis* Melich.
5. Vertex acutely angled and strongly produced,.....6.
Vertex bluntly angled and weakly produced,.....7.
6. Head process (snout) somewhat narrowed at the middle; femora blackish on the basal half; length 2.50-4 mm.,.....*oculata* Newm.
Head process not narrowed at the middle; legs bright yellowish; length 3 mm.,.....*nasuta* Stål
7. Body not strongly arched, black with a yellowish longitudinal stripe along the middle of the back from the front to the tip; carinae of the frons distinct; legs bright yellow; length 3mm.,.....*pallidipes* Stål
- Body not strongly arched, black and concolorous except the coxae and femora which are partly at least suffused with blackish; length 3 mm.,.....*mormo* Kirk.

Bruchomorpho oculata NEWMAN
(1838 Ent. Mag., v, p. 399)

Widely distributed over most of Canada and the United States and is our most common species.

Head produced in a somewhat compressed process, which when viewed from above, appears acutely angled; the median keel is continuous and is raised up edge-like; the under surface of the process is strongly and concavely grooved in profile, which enhances the snout-like appearance; the lateral carinae fine and distinct; several pustules at the base of the head in the neighborhood of the inner margins of the eyes. Pronotum furnished with small pustules outside of the lateral carinae. Elytra short, wrinkled like leather. Abdomen short and arched.

The entire body is black, shining with a metallic luster, a more or less distinct, narrow, rusty-yellow median line reaching from the tip of the process to the tip of the scutellum, frequently distinct only on the frons. Clypeus and legs rusty-yellow or brown, the femora on the outside a shining metallic black.

The macropterous form is like the brachypterous except that the hind margin of the pronotum is distinctly and angularly notched in the middle; the elytra reaching beyond the abdomen are vitreous, with peach-brown nervures. The wings somewhat shorter, transparent, the venation brown.

Length of body 2.50-4 mm.

Redescribed from a large series in Prof. Osborn's collection from Ohio and Iowa and a series taken by the writer by sweeping grass in pine lands during 1921 at the following localities in Mississippi: Port Gibson, July 22; Baxterville, July 27; Biloxi, July 29; Ellisville, Aug. 11; and Meridian, Aug. 21.

Bruchomorpha nasuta STÅL
(1862 Berl. Ent. Zeit., vi, p. 310)

Very similar to the preceding species in the form of the frontal process, although in *oculata* this process appears narrowed in the middle, as well in profile as from above, while in *nasuta* the sides of the head process are weakly curved outwards. Distinguished especially by the acutely-angled produced frons, the median keel or carina beneath strongly pectinate-raised and deeply bent out, by means of which the process is made more snout-like. The entire body is black, shining with a metallic luster, except the median carina of the frons which is rusty-brown. Legs bright yellowish, with indistinct dark longitudinal streaks. Otherwise as in *dorsata* Fitch.

Length of body 3 mm.; width 1.50 mm.

This species is known only from Pennsylvania and Wisconsin.

Bruchomorpha dorsata FITCH
(1856 Trans. N. Y. St. Agr. Soc., xvi, p. 396)

Recorded from N. Y., N. J., N. C., Ohio, Wisc., Ia., Kans., Mo., Ark., Okla., Colo., and Texas. (Mexico).

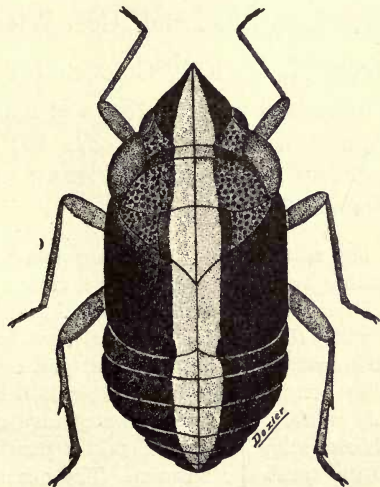


Fig. 22—Adult brachypterous *Bruchomorpha dorsata* Fitch, greatly enlarged. (Original).

Brachypterous: Frons triangular, moderately but not snout-like produced. The pustulation on the pronotum not reaching as far as the median line. The entire body black, shining with a brassy luster, a broad bright yellow longitudinal stripe running from the apex of

the vertex to the tip of abdomen; this stripe is narrow at the apex of the frons, gradually broadening behind to apex of the scutellum and continuing almost evenly in width, slightly narrowing to the tip of the abdomen. Elytra are wrinkled and leathery, venation not visible. Legs, including coxae, bright yellow, the femora and tibiae with dark longitudinal streaks, the tarsi dark.

Macropterous: Elytra reaching beyond the abdomen, membranous, transparent, faintly clouded with brown, especially on the base, the venation brown; claval suture present, a forked vein on the same. Wings shorter than the elytra, vitreous, with straight little-branched longitudinal veins. Structure otherwise as in the brachypterous form.

Length of body 3 mm.; width 1.50 mm.

Two males, a female, and several last instar nymphs were taken by the writer while sweeping coarse grass in an open low spot in the midst of a black-jack oak woods at Okolona, Miss., June 28, 1921. The snout seems to be much more produced and sharper in the male and the longitudinal stripe is shorter also.

Bruchomorpha suturalis MELICHAR

(1906 Abh. k. k. Zool. Bot. Ges. Wiener, p. 24)

Recorded from N. C., Fla., Colo. and Texas.

In Prof. Osborn's collection there is a pair, collected by Severin at Capa, So. Dak., Aug. 27, 1919. As Melichar states in describing the species it may only prove to be a variety of *dorsata*.

Like *dorsata* but smaller and is distinguished in that the yellow median stripe reaches from the apex of the vertex only onto the base of the abdomen; the abdomen is shining black, and at the most there are two small bright yellowish longitudinal streaks upon the anterior part of the elytra, not covering the hind segments as a continuation of the median stripe. The pectinate-raised carina beneath the vertex is outwards weakly put down, almost straight. The femora in the male are reddish-yellow, in the female a peach-brown; the tibiae at their tips and the tarsi, dark brown. The other characters are as in *dorsata*.

Length of male 2.50 mm., of female 3 mm.; width, male 1.30 mm., of female 3.50 mm.

A single female of this species was taken while sweeping grass at the edge of a gum swamp at Fruitland Park, Miss., Aug. 17, 1920.

Bruchomorpha jocosa STÅL
(1862 Berl. Ent. Zeit., vi, p. 310)

Recorded from S. C., Fla., Kans. and Texas.

Form and structure like *dorsata* Fitch. The entire body and the legs rusty-yellow, on the underside of the frons darker, a more or less large black fleck at the apex.

Length of body 3 mm.; width 1.50 mm.

Taken by the writer rather abundantly while sweeping coarse grasses in open pine woods during 1921 at the following localities in Mississippi: Golden, June 5; Kosciusko, July 14; Lyman, July 28; Pascagoula, Aug. 5; Merrill, Aug. 9; and Meridian, Aug. 15.

Bruchomorpha pallidipes STÅL
(1862 Berl. Ent. Zeit., vi, p. 309)

Recorded from Va., S. C., Fla., Kans. and Colo.

Form and structure like *dorsata* Fitch. Frons bluntly-triangular, not snout-like produced, more vertically placed, but still obliquely declined, rounded at apex, the carinae distinct. The body is black, shining, a yellowish longitudinal vitta reaching from the apex of the vertex to the tip of the elytra. At times the whole pronotum, the scutellum, and the terminal margin of the elytra rusty-yellow or rusty-brown. Legs rusty-yellow, without markings, the tarsi also rusty-yellow. Otherwise like *dorsata*.

Length of body 3 mm., width 1.50 mm.

A series of six males and two females were taken by the writer while sweeping grass in pine woods during 1921 at the following localities in Mississippi: Belmont, June 7; Okolona, June 26; Weir, July 14; Pickens, July 16; Baxterville, July 27; Biloxi, July 30; Gulfport, Aug. 1; Hattiesburg, Aug. 10; Laurel, Aug. 12. Two macropterous females were taken at Biloxi, Miss., July 30 and Gulfport, Miss., Aug. 1, 1921.

Bruchomorpha tristis STÅL
(1862 Berl. Ent. Zeit., vi, p. 309)

Recorded from Ont., N. Y., N. J., D. C., N. C., Fla., Wisc., Texas and Calif. (Central America).

Distinguished from all other species by its broad robust body. The sides of the frons are rounded outwards, the surface transversely wrinkled, the median carina below the frontal apex is strongly edge-

like raised, weakly notched in the middle. Elytra with distinct longitudinal veins, which are united with each other by means of irregularly branched veins. The entire body and legs black, shining with a brassy luster.

Length of body (female) 3.50 mm., width 2 mm.

Bruchomorpha bimaculata, new species

The female is very closely allied to *B. jocosa* and resembles *Aphelonema obscura* somewhat in general appearance. The male is testaceous-yellow with a conspicuous black longitudinal although somewhat oblique band on each elytron. Resembles most closely *B. bicolor* Metcalf.

Vertex very short, only about a fourth as long as the pronotum at its median length, hexagonal. Frons longer than broad, somewhat hexagonal, with three carinae, the outer ones bent semicircularly, the space between these nearly twice as long as its middle width; two rows of pustules outside of the lateral carinae; the clypeus rounding back under the head, at its base black, very prominently and strongly keeled in the middle. Antennae rather short, basal segment extremely so. Front margin of the pronotum rounded in the form of a semicircle, the hind margin slightly emarginate, with a strong median carina, and most of the surface coarsely pustulated. Scutellum less than twice the length of the pronotum, tricarinate, the lateral carinae curved inwards towards the apex; outside of these covered with coarse pustules. Elytra short, truncate, somewhat coriaceous and rather shiny, the nervures distinct. Abdominal segments on dorsum with a single row of small obscure pustules on each side of each segment and with no definite dorsal median keel.

Color of the male is a testaceous-yellow, the base of the clypeus and a broad longitudinal band on outer margin of each elytron, piceous; the eyes and tarsal claws, fuscous. The female has the frons projected slightly more in front than in the male and the color ranges from testaceous-yellow to fulvous-brown, without markings.

Length of male, 2-2.50 mm.; of female, 2.50-2.75 mm.

Described from a large series of thirteen brachypterous males taken by the writer while sweeping coarse grasses in cut-over and open pine land and on the floor of typical black-jack oak woods during 1921 at the following localities in Mississippi: Baxterville, July 27; Poplarville, July 28; Biloxi, July 29; Gulfport, Aug. 1; Hattiesburg, Aug. 10; Ellisville, Aug. 11; Meridian, Aug. 15; and Crawford, Aug. 17. A series of twelve females was taken in association with the males at most of the above localities. Holotype male from Ellisville, Miss., Aug. 11, 1921, and allotype fe-

male from same locality are deposited in the U. S. National Museum.

The male on account of its distinctive difference in coloration might easily be mistaken for another and distinct species but the writer believes that he has the two sexes correctly associated.

Bruchomorpha minima METCALF

(1923 Jr. of the Elisha Mitchell Soc., p. 187)

Apparently the smallest known species of the genus and only taken so far in North Carolina. Metcalf states that it is very close to *tristis* Stål but seems to be distinct.

The original description is quoted here.

"This species may be recognized by the uniform black color, small size and narrow frons.

Vertex narrow, the anterior border broadly sinuate, median carina of the frons strongly elevated, the intermediate carina strongly arched basally, gradually converging anteriorly; nasal process not produced, broadly rounded anteriorly; anterior border of the pronotum broadly rounded, the posterior border narrowly and shallowly sinuate. Mesonotum but little longer than pronotum, none of the carinae strongly elevated; wings coarsely rugose.

Color: General color almost uniform shining black; the posterior tarsi a little rusty.

Length, apex of head to apex of abdomen 1.90 mm."

Bruchomorpha bicolor METCALF

(1923 Jr. Elisha Mitchell Soc., p. 186)

Known only from Texas. The original description is quoted here. "This species may be recognized by its shortly produced nasal process, elongate frons, general pale yellow color with two broad black stripes extending from the apex of the nasal process across the eyes to the apex of the abdomen.

Vertex short, the anterior margin broad, nearly straight; frons elongate, the intermediate carina broadly arched basally then converging straight to the apex of the frons; nasal process elongate, bluntly triangular, the ventral margin not sinuate. Pronotum broadly rounding anteriorly, broadly sinuate posteriorly, about half as long as the mesonotum; disk of the mesonotum broad, the lateral carinae evident, the intermediate carina faint; male genital styles broad at the base, gradually narrowed apically, the apex produced, short triangular teeth directed anteriorly.

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

Length of male, 2 mm.; of the female 3 mm."

Bruchomorpha mormo KIRKALDY

(1907 Bul. Haw. S. P. A. Expt. Station, iv, p. 64)

Described by Kirkaldy from specimens collected by Koebele at Nogales, Arizona.

The original description is quoted here.

"Black, partly with a brassy gleam. Legs yellowish, coxae and femora partly at least suffused with blackish. Vertex sublinear. Frons not very long, not extending outwards farther than the abdomen, in profile. Head nearly one-half higher than its width at the base between the eyes; sublateral keels of frons enclosing an oval, curved but not sinuate laterally. Puncturation much as in *B. oculata* Newm. (probably generic). Tegmina formed much as in the latter species, or a trifle shorter, truncate apically, venation almost obsolete.

Length (female) 3 mm.

The coloring agrees with the laconic description of *B. nasuta* STÅL but the frons is apparently much shorter".

THE GENUS APHELONEMA UHLER

There are at present six members of the genus known from North America, three of these definitely from the Southern States. *A. histrionica*, *rugosa* and *bivittata* are northern and western in distribution and probably do not occur within our territory. Dr. E. D. Ball has recently placed *obscura* Van Duzee, *decorata* Van Duzee and *dorsata* Ball as varieties under *simplex* of Uhler and notes that they all occur in damp, grassy meadows or along the edges of swamps.

Briefly characterized as follows: Resembling the preceding genus but lacking the snout-like frontal process, the frons is nearly vertical and there is a distinct clypeal suture. Vertex trapezoidal. Frons broad, nearly hexagonal, the corners rounded, longer than median width, weakly arched in the middle, a median carina and two semi-circularly bent lateral carinae; sides of the frons rounded, bowed to the narrow clypeus. Clypeus short, with a distinct median keel. Antennae short. Pronotum short, broader than long, anterior margin

arched, with a median carina, pustulated on sides. Scutellum large, tricarinate, pustulated outside of the outer carinae. Elytra usually half as long as the abdomen, leathery, truncate behind with the corners rounded; clavus merging with the corium, the nervures indistinct, the outer sector forked. Wings lacking. Abdomen broad, dorsum with one or two rows of more or less distinct pustules on sides of each segment. Hind femora with two small spines.

Haplotype of the genus: *Aphelonema simplex* Uhl.

The following key is taken from Ball.

Key to the North American species of *Aphelonema*

- I. Vertex short transverse, parallel margined. Front almost round, slightly inflated and inclined so as to be slightly visible from above1. *simplex* Uhl.
- II. Vertex almost as long as the pronotum. Front oval or elongate, vertical or retreating slightly.
 - A. Front oval flat, median carina strong.
 - B. Brachypterous elytra with few simple veins.....2. *histrionica* Stål.
 - BB. Brachypterous elytra with a closely anastomosing net work of veins. Angle of clypeus with a slight acute protuberance.3. *rugosa* Ball
 - AA. Front elongate, lateral carinae only slightly curved, median carina fading out above.....4. *bivittata* Ball
- III. Vertex long, five angular. Front inflated, retreating, broader than long, the pustular area much enlarged above.
 - C. Vertex longer than the pronotum, definitely angular. Front strongly retreating5. *nigriviridia* Ball
 - CC. Vertex about equalling the pronotum, weakly angled. Front convex above, retreating below.....6. *viridis* Dozier

Aphelonema simplex var. *simplex* UHLER

(1875 Bul. U. S. Geol. & Geog. Surv., i, p. 356)

A widely distributed species, recorded from N. J., Conn., Va., Md., Ia., S. Dak. and Kansas.

It is easily distinguished by its short and rather quadrate body.

Vertex very short, four to five times as wide as long, trapezoidal, with the front corners rounded. Frons as wide as long, hexagonal, tricarinate, the lateral carinae weakly bent and reaching to the tip of the median carina; outside of the lateral carinae there is a row of pustules which are very small and indistinct in the male but very large and deep in the female; near the inner margin of the eye is another but much shorter row of pustules. Clypeus weakly keeled in the middle. Antennae short, brownish. Pronotum about twice as long as the vertex,

with median carina, each side pustulated. Scutellum tricarinate, with numerous pustules outside of the lateral carinae. Elytra short, truncate behind, the outer corners well-rounded, nervures slightly raised but on account of their pale color rather indistinct. Dorsum of abdomen with a median ridge, a partially double row of pustules on sides of each segment, which are weaker in the male.

In the female the elytra and entire body is a dull sordid testaceous, in the male a rosy or orange-yellow color. Legs pale testaceous. The single macropterous female on hand is marked with fuscous in places and the elytra are long, pale translucent, the nervures pale but distinct.

The male plates or genital styles are rather long and thick, and are narrowed to an incurved pointed apex.

Length of male, 2.50 mm., of female 3.50-4 mm.

Redescribed from a brachypterous series of two males from Cat Island, seven miles off the Mississippi coast, Sept. 7, 1920, and six females and five males from Pascagoula, Miss., Aug. 6, 1921, all taken by the writer sweeping marsh grass, *Spartina patens*. At the latter place a number of last instar nymphs were taken. The writer has also examined Prof. Osborn's series of ten brachypterous females and three males also, and a macropterous female, collected at Ames, Ia., and a female taken by H. S. Severin at Capa, So. Dak., Aug. 27, 1919.

Metcalf has evidently redescribed the male of this species under the name of *Aphelonema rosa* Metcalf, being misled by the remarkable difference in coloration between the sexes in this species. His name *rosa* must therefore fall as a synonym of *simplex* UHLER as pointed out by Dr. Ball.

Aphelonema simplex var. *obscura* Van Duzee

(1912 Bul. Buf. Soc. Nat. Sci., x, p. 499)

Recorded from Ga., Fla., Kans. and Iowa.

Originally described from Georgia material as a distinct species but recently Ball has placed it as only a variety of *simplex*.

"Allied to *simplex* but smaller and darker in color. Vertex transverse very short, but little broader than the bounding carinae. Frons ovate oblong, distinctly narrower than in *simplex*; median carinae feeble; clypeus but moderately incurved, feebly carinate. Pronotum regularly rounded before without the slight angle observable in *simplex*, evenly but obscurely pustulate, median carina obtuse; hind margin but feebly arcuated; mesonotum with the smooth median area

narrower than in the allied species, the three carinae distinct but not sharp. Elytra in the brachypterous form truncated, reaching to about the middle of the tergum, the nervures reticulated but not conspicuous. Length $2\frac{1}{2}$ mm.

Color luteous brown becoming darker fuscous-brown beneath and on the pustulated portion of the face, pro- and mesonotum, and black on the clypeus, sides of the face and venter; elytra, middle compartment of the mesonotum and front distinctly paler, with a dusky cloud on either side of the latter; apical one-half of the last ventral segment and slender margins of the basal segments paler. Tergum with a double row of incomplete blackish ocellated marks on either side. Legs pale, the femora obscurely lineated with fuscous, the tarsal claws black.

Described from two female examples at Tifton, Ga., Sept. 8, 1910, by Mr. J. C. Bradley. The macropterous form and male are unknown to me. This inconspicuous little species might be considered as a small dark variety of *simplex* were it not for the narrower and distinctly oval front."

Aphelonema simplex var. *dorsata* Ball
(1926 Canadian Entomologist, lviii, p. 242)

In this variety the straw-color of the head and pronotum is continued as a broad dorsal stripe to the apex of the abdomen, this stripe often being mottled with milky white. From the eye back to the apex of the abdomen on either side runs a shining black stripe. Legs and below pale reddish, the vertex often dark.

Described by Dr. Ball from three females taken at Sanford, Fla., from Feb. 17 to June 4, 1926, with the statement that "this variety is intermediate in character between *simplex* and *dorsata* and was taken with examples of the latter".

Aphelonema simplex var. *decorata* Van Duzee
(1908 Proc. Acad. Nat. Sci. Phila., lix, p. 492, *Peltonotellus*)

Recorded only from Florida.

Resembling *simplex* but with the elytra and abdomen mostly piceous black.

"Characters of the front, vertex, pro- and mesonotum almost exactly as in *simplex*; the anterior edge of the pronotum is, however, more regularly rounded instead of forming an indistinct angle at the inner corner of the eyes; the mesonotum is shorter with its lateral posterior margins much less oblique and the pectoral flap of the pro-

notum is narrower and more transverse. Immediately below this flap projects the inferior end of one of the pleural pieces; in *decoratus* its sides are almost at right angles with the emarginated apex which fits around the base of the intermediate coxae; in *simplex* the hind edge of this piece is oblique and the apex is scarcely sinuated; the next adjoining piece is almost square in this new species but sub-triangular in *simplex*.

Color fuscous deepened almost to ferruginous in the male in which sex the elytra and abdomen are deep piceous black, almost blue-black on the elytra, with the base of the abdomen and the apex of the genital segments touched with fulvous. Legs fulvous with the tarsal claws and the line of fine bristles on the edges of the tibiae blackish; the pustulate border of the front is slightly infuscated. In the female the general color is more flavous and this pale color is much more extended over the abdomen and inner field of the elytra.

In the characters of the male genitalia this species is quite distinct. The ventral aspect of the genital segment is much shorter with the valve small and triangular, not short and transverse as in *simplex*; the plates (stiles of some authors) are much shorter and more rounded and do not nearly attain the anal tube. In *simplex* the plates are longer and thicker, are narrowed to an incurved pointed apex like the strong stout claws of some birds, and in my specimens project almost at right angles to the apex of the segment, and would about reach the anal tube if depressed. Length 3 mm.

Described from one male and three female examples taken at Charlotte Harbor, Fla., by Mrs. Slossom. At first sight this looks like a mere color variety of *simplex*, but the different form of the pro- and mesonotum, pleural pieces and male genitalia as well as its very distinct coloring will readily separate it. This species and *simplex* differ from our three other known species, *histrionicus* STÅL, *rugosa* BALL, and *bivittatus* BALL, in having a pale clypeus."

The writer has a pair of this species collected by George G. Ainslie sweeping along the lake shore at Lakeland, Florida, Feb. 13, 1918.

Dr. Ball has found this to be the most common form in Florida with gradations in color varying from the *dorsata* stripe to the dull color of *obscura* and straw and orange of *simplex*.

Aphelonema nigriviridia BALL

(1926 Canadian Entomologist, lviii, p. 244)

The original description is here quoted.

"A small elongate greenish or straw colored species with black

stripes somewhat resembling *bivittata* but with a much longer vertex and broader face. Length, female 2.5 mm.; male 2 mm.

Vertex definitely longer than pronotum, obtusely angulate at apex and again before the eyes, where it is narrower than the margin of the face. Face extending out to the line of the eyes giving the appearance of a parallel margined vertex but really exposing a triangular pustulate compartment. Face sloping at an angle of nearly 45 degrees, broader than long, conically inflated with a sharp median carina and wing-like lateral ones. Clypeus broad, tumid, but little more retreating than the face. Brachypterous elytra short, with but few simple veins. Color: female white, fading to straw, with a slightly iridescent greenish cast. A narrow median black line from the base of the vertex to an expanded spot on the apex of abdomen. Eyes dark, a narrow black line running back parallel with a similar line on the costa. Circular carinae on each segment of abdomen narrowly black from the margin to a pair of irregular stripes arising just inside the lines on the elytra. Below greenish; a smoky arc slightly below the vertex margin.

Male: like the female except that there is a broad shining black band extending from the upper part of front across the eyes and including the outer third of the elytra and abdomen. Clypeus and legs except the joints dark. Sometimes there are traces of a pair of converging stripes arising on the lateral carinae of the scutellum and following the inner fork of the claval nervures.

Holotype female, allotype male and four pairs of paratypes collected by the writer at Sanford, Fla. This is a strikingly distinct little species which has been found only on the wetter portions of the "flat woods" and along the margins of swamps." Dr. Ball has presented the writer with a pair of this distinct species.

Apelonema viridis, new species

Resembling most closely *nigriviridia* Ball but slightly smaller with a shorter vertex, and more rounding frons. The pale green color of the female and rosy orange abdomen of the male will easily distinguish it.

Vertex about three times as wide as its median length, somewhat hexagonal, the front corners slightly rounded. Frons rather short, sides rounded, with three carinae, the outer bent almost in the form of a semicircle; outside of these there are two rows of pustules. Antennae very short, the seta also short. Pronotum slightly shorter than the vertex, with a median carina, and coarsely pustulated on the sides. Scutellum tricarinate, with coarse pustules outside of the lateral carinae. Elytra short, truncate, the nervures rather indistinct. Abdomen with median keel on dorsum, a single row of pustules on sides of each segment.

Female very pale green in color, except the dark green eyes and two small black spots on the last two abdominal segments along the

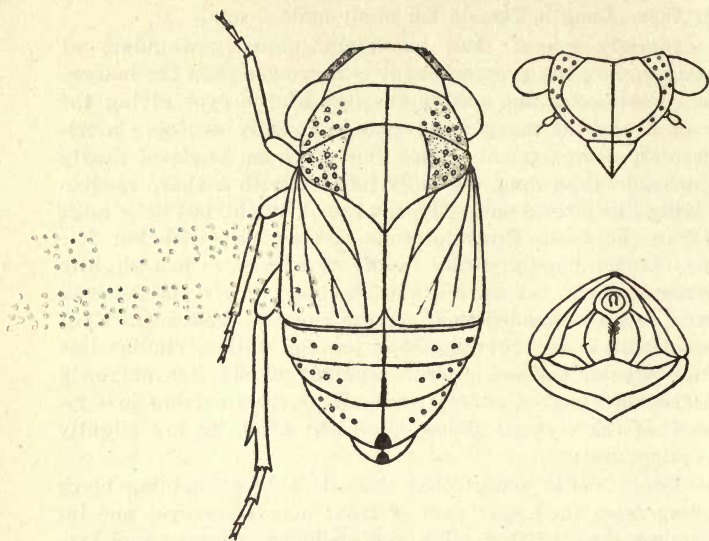


Fig. 23—Adult female *Aphelonema viridis*, new species, face and female genital segment (original).

median keel; the two preceding segments have the median keel partially black; the elytra and frons are paler in places and the legs are pale testaceous. The male differs in having the abdomen a distinctive rosy-orange color.

Male genital plates or styles short and narrow, somewhat triangular, stout at the base and the acuminate tip slightly incurved, and not quite reaching the anal tube.

Length of body, female 2.25-2.50 mm.; of the male 1.80 mm.

Described from a female taken by the writer sweeping grass on floor of pine woods at Hattiesburg, Miss., Aug. 10, 1921, and a series of two females from Ocean Springs, Miss., Feb. 22, six females and five males from Hurley, Miss., Feb. 24, and a pair from Wade, Miss., Feb. 24, 1922, all brachypterous and taken by Prof. Herbert Osborn sweeping grass in low pine land.

THE GENUS HYSTEROPTERUM AMYOT & SERVILE

Members of this genus are of world-wide distribution, occurring in Europe, Africa, Indo-Malaysia and America. Four species are known from the United States, only one of which is recorded from our territory; another, *H. auroreum* is known only from Texas.

Briefly characterized as follows: Head with the eyes as wide as the thorax. Vertex subquadrate, straight in front or very bluntly curved, at times with shallow depressions. Frons vertically placed, nearly quadrate, longer than broad or as wide as long, tricarinate, the lateral carinae at times very indistinct, curved. Pronotum with a median carina and two impressed spots, furnished with more or less distinct granules. Scutellum tricarinate. Elytra more or less strongly arched, parchment-like, uneven on account of the more or less thickly branched veins; the inner ulnar vein simple. Wings lacking. Hind tibiae with two spines.

Logotype of the genus: *Hysteropterum immaculatum* (H. S.)

Hysteropterum punctiferum WALKER
(1851 List Homop., ii, p. 376)

Recorded from Fla., Colo. and Texas.

Body short, broad, tawny or yellowish-brown spotted with brown. Vertex more than twice as wide as long, depressed on the disc, anterior and posterior margins nearly straight, subquadrate, two small black flecks at the center of the anterior margin and two semicircular flecks posteriorly. Frons large, vertical, as long as wide, somewhat quadrate and almost flat, tricarinate, the median carina more prominent than the lateral ones which are rounded inwards to clypeus; the genae separated from the central disc by two curved ridges; the clypeus carinated in the middle, always transversely marked with brown. Antennae black. Pronotum about as long as the vertex, slightly impressed on the disc and furnished with flat fuscous granules. Scutellum with a median groove, to each side of this is a dark spot. Elytra broad, convex above, a little longer than broad; venation distinct, narrowly bordered with fuscous, the veins united with each other by a number of cross-veins, forming large subquadrate cells which are thickly filled with small brown dots; usually adorned near the base with fuscous areas, although these may be almost entirely lacking. Wings lacking. Abdomen brownish-yellow, with blackish areas on the disc and small black dots on the sides. Legs brown, marked with fuscous, especially the femora, with broad black rings before the tip, slightly grooved; the hind tibiae with two spines.

Length to tip of elytra 4-5.50 mm.; width 2.50-3 mm.

Van Duzee writes of the species the following, "Swept from the sparse vegetation of the interminable pine barrens everywhere I collected in Florida. At Crescent City they were rare and here and at Sanford where they occurred in numbers they were mostly of the unicolorous form described both by Walker and Uhler. Farther south they became abundant and were marked with brown and fuscous. In fully colored examples from Estero these markings remind one much of those seen in the genus *Gelastocoris*."

THE GENUS THIONIA STÅL

This genus is especially well represented in Central and South America. Of the seven species occurring in the United States, only four, *bullata*, *simplex*, *elliptica*, and *quinquata* are known from the Southern States.

Briefly characterized as follows: Body usually long, at times short, strongly built. Head with the eyes as wide as the thorax. Vertex not produced beyond the eyes, the lateral edges not sharp, the anterior margin nearly straight. Frons vertical, as wide as long or longer than broad, somewhat narrowed between the eyes, tricarinate, the lateral carinae curved, united above with the median carina; clypeus convex. Antennae short. Ocelli present. Elytra long or short, extended reaching beyond the apex of abdomen, narrowed and rounded behind; the longitudinal veins run rather straight, curved more or less strongly in the apical region with the convexity inwards; the radial nerve consists of two long simple veins; the inner ulnar always simple, the outer is forked before the middle; cross-veins are not numerous, mostly simple and very little branched; a forked vein in the clavus. Wings present. Hind tibiae with two spines.

Logotype of the genus: *Thionia longipennis* (Spin.)

Key to the species of Thionia

1. General color pale green; frons with a single median keel,
..... *simplex* Germ.
- ... General color dark brown, spotted,.....2.
2. Frons about a third longer than wide, with a single median keel,
7.50 mm.....*elliptica* Germ.
- ... Frons quadrate, tricarinate, the outer carinae curved somewhat
bow-shaped, 6.50-7 mm.,.....*bullata* Say
- ... Frons tricarinate, narrow, the lateral margins a little arched,
.....*quinquata* Metcalf

Thionia bullata SAY

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 240; Compl. ii, p. 375,
Flata)

Recorded from Ont., N. Y., N. J., Pa., D. C., Ga., Fla.
and Ohio.

Somewhat elongate oval, yellowish-brown, spotted with pitch brown. Vertex as long as wide, nearly straight in front, flat, with two shallow depressions posteriorly; a median groove-like depression. Frons longer than broad, widened below, being distinctly broader towards the apex than between the eyes; the anterior margin fuscous. Frontal surface weakly curved, the distinct median and lateral carinae of which extend onto the long, triangular clypeus; the lateral carinae somewhat curved inwards towards the apex; the genae separated from the

central disc by distinct curved carinae which unite at the vertex. The frons, genae, antennae, and clypeus yellowish-brown without markings. Pronotum about as long as the vertex, obtusely-angled in front, with two impressed spots on the disc. Scutellum as long as the pronotum, indistinctly carinate, with two dark spots between the carinae. Elytra twice as long as broad, rounded behind, the longitudinal veins distinct, curved outwards posteriorly, with the outer ulnar vein forked near its base, the numerous cross-veins mostly simple; the surface of the elytra is spotted with pitch brown to black making the veins that are light-colored stand out more prominent. Wings smoky brown. Beneath brownish-yellow, at times greenish, abdominal segments marked with fuscous on the disc and small black dots on the sides, the apex fuscous. Legs very thickly and finely dotted, with a small black point on the tip of the femora; the ridges of the tibiae, the tips of the spines, and the claws, dark fuscous.

Length to tip of elytra 6.50-7 mm.; width 3-3.25 mm.



Fig. 24—Adult *Thionia bullata* (Say), enlarged (original).

Redescribed from a series of both sexes taken by the writer in Mississippi at Longview, June 27, 1920, Port Gibson, July 22, 1921, and Tupelo, July 1, 1921; a female taken by sweeping grass and low shrubbery in pine flatwoods at Pascagoula, Miss., July 6, 1920.

Oak is without question the principal host as adults and nymphs of all stages were abundant on this tree in many localities. Hickory is a possible host as the writer took a specimen on this tree at Columbia, South Carolina, Aug. 11, 1917.

Thionia simplex GERMAR

(1830 Thon's Ent. Arch., ii, p. 51, *Issus*)

Recorded from N. J., Md., D. C., N. C., Fla., Ohio, Ky., Mo. and Texas.

Pale brownish-yellow without markings. In fresh specimens decidedly greenish. Vertex wider than long, square, with two slight depressions posteriorly, the anterior margin very bluntly rounded, nearly straight, marginal carina fuscous. Frons slightly longer than wide, barely narrowed between the eyes, weakly curved and supplied with a weak median carina which runs through the entire frontal surface, otherwise smooth; the lateral carinae very indistinct with the outer edges narrowed towards the apex of the frons. Pronotum produced lobe-like in front, almost straight behind, with two slight depressions on the disc. Scutellum only slightly longer than the pronotum. Elytra more than twice as long as broad, scarcely narrowed posteriorly, translucent, with brown longitudinal veins, which are united with each other by scarcely visible cross-veins; the longitudinal veins run parallel to each other, the outer ulnar vein is forked near its base with its outer branch divided at the tip although in occasional specimens this is not divided; the basal forked shaft of the claval vein is extremely short. Wings are vitreous, with venation brownish. Beneath and the legs pale greenish-yellow, with tips of the spines, the claws and the tip of the clypeus, brown; the ridges of the tibiae at times brownish.

Length to tip of elytra 6-6.50 mm.; width 2.50-3 mm.

Redescribed from a series of both sexes from Gainesville, Fla., collected by C. J. Drake in May and July, 1918, a single specimen taken while sweeping in low deciduous woods near Belmont, Miss., June 7, 1921, and two specimens taken by Geo. G. Ainslie at Knoxville, Tenn., Sept. 1916, one at night Aug. 7, 1916.

Thionia elliptica GERMAR

(1830 Thons. Ent. Arch., ii, p. 51, *Issus*)

Recorded from N. J., D. C., N. C., Ga., Ky. and Mo.

Vertex twice as wide as long, the lateral edges sharp and raised, with a black spot. Frons about a third longer than wide, flat, the edges somewhat sharpened, with a median carina that runs through the entire frontal surface and continues onto the clypeus; the upper margin of the frons curved, numerous black dots on the sides. Genae with a black transverse streak in front of the antennal grooves and a quadrate spot below this. Pronotum longer than the vertex, produced forwards lobe-like, furnished with black dots and two small depressions on the disc. Scutellum with three distinct longitudinal carinae and two small depressions between these. Elytra longer than broad, rounded behind, spotted with black or with numerous small dark spots in the cells. Beneath brownish-yellow, on the sides of the abdominal segments are small groups of black dots. Legs speckled with brown, the femora with a black cross band before the tip; the tips of the spines and the claws dark.

Length to tip of elytra 7.50 mm.; width 4.50 mm.

Apparently this is a rare species, never collected anywhere in numbers.

Thionia quinquata METCALF

(1923 Jr. Elisha Mitchell Soc., vol. 38, p. 190)

Described from a single female taken at Raleigh, No. Car., in early September by C. S. Brimley.

The original description is quoted here.

"This species may be recognized by its narrow five angled vertex and nearly uniform brown color which is almost uniformly covered with small dark points.

Vertex narrow, a little longer than broad, the lateral margins diverging, the anterior margins strongly produced; frons narrow tricarinate, the lateral margins a little arched; pronotum strongly produced between the eyes; mesonotum long with an evident transverse carina; fore wings with the longitudinal and transverse veins evident.

General color ochraceous brown with the whole surface of the body including the wings and legs uniformly sprinkled with small black points, veins of the wings and claws black.

Length to tips of the wings 8.00 mm."

THE SUBFAMILY ACANALONIINAE (A. & S.)

(Amyot & Serville, Hemipt., pp. lviii, 520, 1843 *Acanonides*.)

This subfamily is represented in North America by the single genus *Acanalonia*.

The members have often been confused with those of the Flatinae which they resemble upon superficial examination. They may be differentiated however, by having the elytra without cross-veins on the costal margin, by not being granulated on the clavus, and by the spineless hind legs. On the contrary the Flatinae have the elytra with cross-veins in the distinctly bordered costal membrane, the clavus is always tubercular, and there are from one to three spines on the hind legs.

THE GENUS ACANALONIA SPINOLA

This genus is confined to the new world and is represented in the United States by nine species, five of which are known from the Southern States.

The genus may be distinguished by its having the vertex straight or somewhat angularly produced anteriorly, the

frons flat, generally keeled, the antennae short, ocelli small, the pronotum frequently carinate in the middle, with two small impressed cavities, the scutellum tricarinate, and the elytra reticulated with net-work of veins, the longitudinal ones more prominent. The members of the genus are generally green in color, with the apical margins of the elytra furnished with brown dots or markings.

Key to Southern species of *Acanalonia*

1. Elytra almost semicircular in outline.
 Very small species, elytra almost unicolorous 4 mm.....*pumila* V. D.
 Larger species, bivittate, 7 mm.....*bivittatus* Say
2. Elytra more quadrate
 Vertex broader than long, 10-13 mm.....*latifrons* Walk.
 Vertex as long as broad, conically produced, 9-12 mm.....
*conica* Say
 Extremely large species, 14-15 mm.....*servillei* Spin.

Acanalonia latifrons WALKER

(1851 List Homop. in Br. Museum, ii, p. 457, *Poeciloptera*)

Recorded from N. C., Ga., Fla. and La.

A species that is not particularly abundant, and one easily distinguished by its wide frons.

Body and elytra pale green in color. Front broader than long, faintly speckled with yellowish-white, a sharp yellow median carina which is continued on the vertex, pronotum and scutellum where it is likewise of a yellow color. Two small impressions on the pronotum. Lateral carinae of scutellum faint. Elytra long-oval, the costal margin arched, the apical margin weakly convex, with rounded corners; sutural margins yellow; veins forming a delicate net work, inner vein of the outer ulnar vein simple; apical margin with small rusty-brown points. Wings milk-white. Hind legs pale green, the femora and tarsi of the first and second pairs rusty-brown.

Length of body 6-8 mm.; length to tip of elytra 10-13 mm.

The writer took numbers of these insects while sweeping roadside vegetation at Pascagoula, Miss., July 10, 1920. A number were taken on young pecan nursery stock at Ocean Springs and Biloxi, Miss., July 20-Aug. 2, 1920, and this is probably a true host plant. A specimen was taken at Clara, Miss., July 1, 1916, by F. B. Pittman, and another at Gulfport, June 27, 1921, by F. H. Benjamin.

The native host plant is not known, but probably will prove to be a hickory.

Acanalonia bivittata SAY

(1830 Jr. Acad. Phila. vi. p. 235; Compl. writings 11, p. 255)

Although this is one of the most widely distributed North American Fulgorids it does not seem to be an overly abundant species in the State.

Recorded from Ont., N. Y., N. J., Pa., D. C., Va., N. C., Ga., Fla., Ohio, Wisc., Minn., Ia., Kans., Mo., Ark., Texas, Ariz. (Mexico).

Body green. Front nearly twice as broad as long, not carinated, lateral-edges not sharp and rounded to the clypeus. Front and clypeus rusty-brown in color. Head with the eyes as wide as the pronotum, the vertex very broad and rounded to the front; vertex with two lateral rusty-brown stripes that join the front anteriorly, pass posteriorly over the thorax and are continued along the entire length of the elytral suture. Elytra green, short, nearly semi-circular in shape, rounded off at the sutural corner. Wings milk-white. Beneath and legs brownish-yellow.

Length to tip of elytra $7-7\frac{1}{2}$ mm.; width 2 mm.

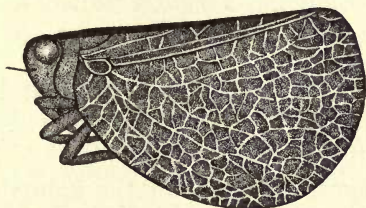


Fig. 25—Adult *Acanalonia bivittata* Say, enlarged (original).

Swept from grass in flatwoods at Helena, Miss., July 13, 1920, by the writer. Also taken abundantly sweeping the floor of high pine land at Ellisville, Miss., Aug. 24, 1920, Agr. College, Miss., Oct. 1, 1920, and Bradley, Miss., July 14, 1921. Taken sweeping grass at Salem, Va., in 1925 by C. R. Willey.

Melichar distinguishes a variety of this species from Georgia, giving it the varietal name *rubescens*, in which the entire body and elytra are reddish-brown, venation bright, and the dark lateral longitudinal stripes are missing.

Acanalonia pumila VAN DUZEE

(1909 Proc. Acad. Nat. Sci. Phila., lix, p. 495, *Amphiscepa*)

Known only from No. Car. and Fla. It is our smallest member of this genus.

Form nearly of *Hysteropterum*. Normally pea green, but many specimens are of dull straw color.

Vertex very short, rounded almost from the base to the front with no transverse carina between the two; anterior and posterior margins nearly parallel. Front almost quadrate, the lower angles cut off in line with the sides of the clypeus, the sides below a little expanded and reflexed; base of clypeus strongly and acutely angled, reaching almost to the line of the antennae. Eyes reddish. Pronotum short, broadly rounded before, almost straight behind. Elytra almost circular in outline, but little longer than broad, somewhat swollen towards the base, costa semicircularly rounded, entire surface closely but not prominently reticulated.

Length of body 3 mm., length to tip of elytra $3\frac{1}{2}$ - $4\frac{1}{2}$ mm.

Van Duzee records sweeping a good series of this pretty species from a peculiar succulent plant growing along the shore near the line of high tides on Estero Island in Florida. Metcalf and Osborn took this species from beach grass at about the level of high tide at Wrightsville Beach, No. Car. This species seems to be limited in distribution to the sea-shore.

Acanalonia servillei SPINOLA

(1839 Ann. Soc. Ent. Fr., viii, p. 448, pl. 16, fig. 2)

Recorded from South America, Cuba and Jamaica, and reported from Florida by Uhler and from Pennsylvania by Amyot and Serville.

One of the largest members of the genus and extremely rare. The following description translated from Melichar.

Body and elytra bright green, the latter with delicate brown cross streaks between the apical veins on apical margin. Vertex as long as pronotum, rounded to frons, obtusely-angled in front, a strong median carina, which continues on the frons. The frons is broader than long, the sides nearly parallel, widened outwards in a blunt angle before the clypeus. Pronotum broadly rounded in front, straight behind, with a strong median carina and two small depressions. Scutellum oval, strongly arched, with a prominent median carina and weak lateral ones, which are slightly bent inwards. Elytra one and a half times as long as broad, the costal margin rounded, the apical margin rounded off proportionately. The n. ulnaris ext. is thrice forked, the veins running parallel with the n. ulnaris int. Elytra with entire surface delicately reticulated with network of veins, the somewhat more prominent longitudinal nerves yellowish green. The costal margin frequently more brightly colored. Wings milk-white. Abdomen and hind legs pale green; the tips of the spines black; the first two pairs of legs frequently lightly colored brownish-yellow.

Length to tip of elytra 14-15 mm.

Acanalonia conica SAY

(1830 Jr. Acad. Phila., vi, p. 238, *Amphiscepa*)

Recorded from Va., N. C., Miss., La., Ohio, Ky., Ind., Ill., Mo., Ark. and Texas.

Fairly common in Mississippi, and distinguished at once by its conical vertex.

Body and elytra pale green in color. Vertex somewhat longer than the pronotum, angularly produced, anterior margin separated from the frons by a sharp edge; surface of the vertex flat, lightly granulated and faintly carinated in the middle. Frons broader than long, smooth, a short faint median carina at the tip, lateral margins parallel, forming outwards an obtusely-angled corner. Antennae yellow, pronotum with margin slightly emarginate, the surface faintly granulated or wrinkled, two small impressions on disc. Scutellum faintly tricarinate, the median carina very obscure, two dark round spots posteriorly placed. Elytra long-oval, one and a third times as long as broad, rounded behind, apical margin with rusty-brown points; costal margin strongly curved, the inner vein of the outer ulnar vein forked; veins stand out forming a delicate net work. Wings milk-white. Legs pale green with the tips of the femoral spines black.

Length of body 6-8 mm.; length to tip of elytra 9-12 mm.

Redescribed from numerous specimens taken at Agr. College, Miss., Oct. 1, 1915, by E. H. Dickey, on cowpeas; Brookhaven, Miss., Sept. 1913, K. W. Holloway; Goodman, Miss., 1915, G. D. Cowsert; and Agr. College, Miss., June 21, 1920, on grapes, H. L. Dozier. Several were collected by the writer at New Orleans, La., July 23, 1922. Three specimens, collected by George G. Ainslie at Knoxville, Tenn., July 8, 1919, also have been available for study.

Host plants—Grape, cowpeas, and cotton. Swezy records also the osage orange, lilac, corn, ragweed, catnip, milkweed and sugar beet as food plants. Murtfeldt gives notes on life-history in U. S. Dept. of Agr. Ent. bulletin XIII, page 61, 1887.

SUBFAMILY FLATINAE (SPIN.)

(Spinola, Ann. Soc., Ent. Fr., viii, pp. 204, 387, 1839, *Flatoides*)

Represented in North America by six genera, three of which, however, are known only from California and Arizona and in all probability do not occur in our territory.

Very little is known of the life history of members of this subfamily, but they are all vine, shrub and tree-loving forms and occur usually in thick deciduous woods.

Key to Southern genera.

- Head not strongly produced in front; frons as broad as long or longer, *Ormenis* Stål
 Head more or less strongly produced in front; elytra broad, held nearly horizontal, *Flatoides* Guer.
 Elytra narrow, three or four times as long as broad, strongly narrowed to subacute apex, the axillary protuberance or hump prominent, *Cyarda* Stål

THE GENUS ORMENIS STÅL

There are five members of this genus that have been recorded from the Southern States. Of these *O. proxima* and *rufifascia* are known only from Florida. Van Duzee states that he found *rufifascia* not uncommon at Ft. Myers and Estero, Fla., but *proxima* has not been taken since it was described.

Briefly characterized as follows: Head together with the eyes not as wide as the prothorax. Vertex straight in front, narrow, partly covered by the pronotum. Front as long as wide or longer, generally with a median carina. Antennae very short. Ocelli distinct. Elytra narrow, widened towards tip. In the apical region of the elytra are one or two subapical cross-veins which unite with the costal vein.

Logotype of the genus: *Ormenis rufo-terminata* Stål.

The course of the subapical veins is very characteristic with many species and enable us to separate forms that in other respects are very much alike.

Key to species of Ormenis.

1. Elytra pruinose *pruinosa* Say
 ... Elytra pale green, commissural margin luteous, thorax pale red with three green stripes, *rufifascia* Walk.
 ... Elytra pale green, thorax unicolorous, 2.
 2. Elytra cut off squarely at tip, *septentrionalis* Spin.
 ... Elytra rounded at tip *venusta* Melich.

Ormenis pruinosa SAY

(1830 Jr. Acad. Nat. Sci. Phila., vi, p. 237; Compl. Writ., ii, p. 373, *Flata*)

A very abundant species throughout the entire United States.

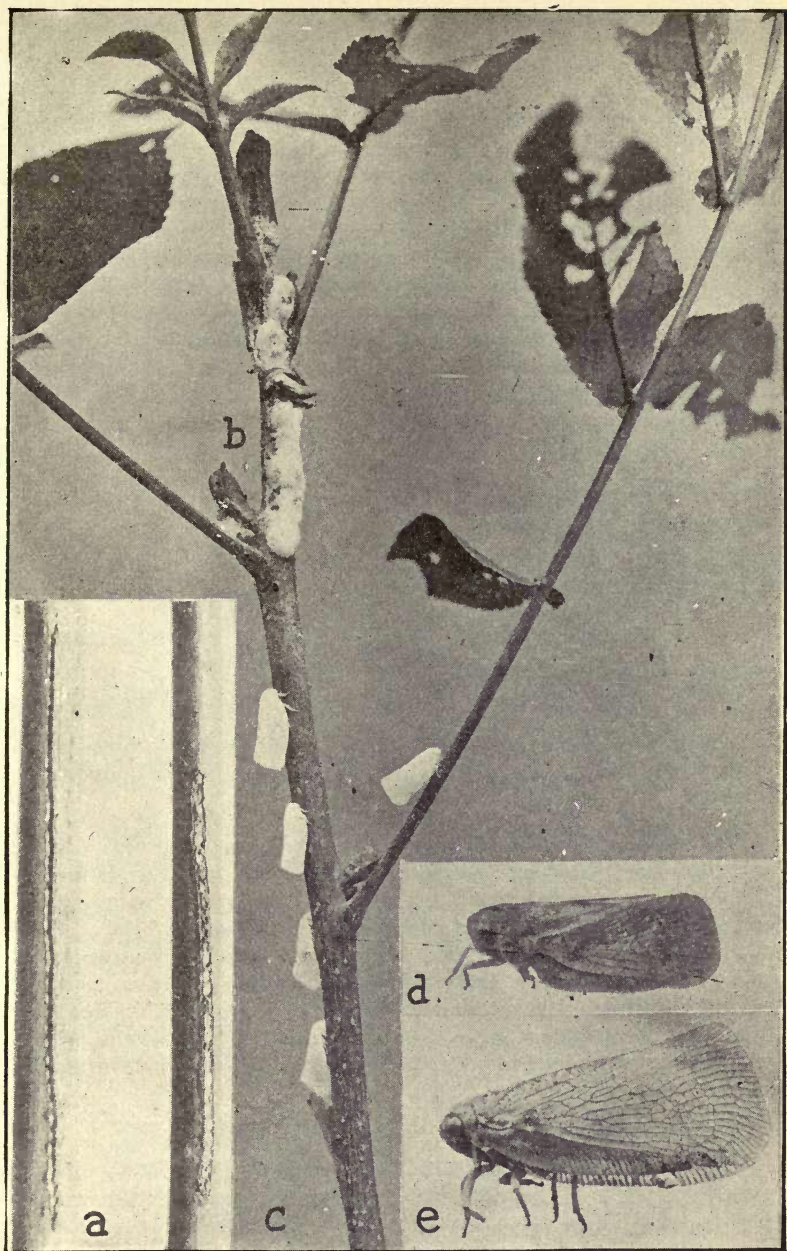


Fig. 26—a. Egg-punctures of *Ormenis pruinosus*, twice enlarged; b. Froth masses of *Ormenis septentrionalis*, natural size; c. Adults of *O. septentrionalis*, natural size; d. Adult of *O. pruinosus*, four times enlarged; e. Adult of *O. septentrionalis*, four times enlarged. (After Walden, Conn. Bul. 234).

Slate, dark grey, or blackish color, which is made to appear bluish by the pruinose powder that covers most of the surface in fresh specimens.

Head, front, and underside of the body yellowish. Front a little longer than wide, with a faint median carina extending the entire length of the frons. Clypeus with transverse brownish markings. Scutellum arched, without definite carinae. Elytra are wedge-shaped, covered with pruinose powder; when this powder is rubbed off the elytra appear to be blackish, becoming somewhat translucent towards the tips; costal margin and claval suture whitish; corium marked with three or four more or less round, black spots. Wings smoky with venation brown. Legs pale yellow.

Length of body 5 mm.; length to tip of elytra 7.5 - 8.5 mm.

This species lives upon a variety of small trees and bushes, especially young hickory. Food plants: oak, elm, white birch, basswood, ash, paw-paw, privet, sassafras, black alder, hazel, prickly ash. orchard trees, grape, gooseberry, sugar-beet, rhubarb, sweet gum, and the pecan.

Ormenis septentrionalis SPINOLA

(1839 Ann. Soc. Ent. Fr., viii, p. 436, *Poeciloptera*)

N. Y., N. J., Pa., Va., Md., D. C., Tenn., N. C., Ga., Ohio, Miss., Kansas, S. C., and Fla. Very abundant all over the South.

Pale green, powdered with white; eyes pale brown. Front as wide as long, almost broader, the sides rounded to the clypeus, a median carina. Pronotum and scutellum without carinae. Elytra are green or pale green, often with the costal margin yellowish-white, widened at the tip, cut off square with the corners rounded, two subapical veins which are distant from each other as the posterior subapical vein is from the apical margin; the posterior one almost straight, the preceding one undulating, both uniting with the costal vein. Wings milk-white with venation whitish. Abdomen and legs pale greenish-yellow.

Length of body 6 mm.; length to tip of elytra 9-10 mm.

Food plants: Climbing bittersweet, dogwood, plum, grape, prickly ash, red oak, hawthorne, black alder, cross-vine, sweet gum, and pecan.

Ormenis rufifascia WALKER

(1851, List of Homoptera, 11, p. 458, *Poeciloptera*)

Body grass-green, thorax pale red with three prominent longitudinal green stripes.

Vertex very short, shorter at the middle than on each side, pale red, green at median line. Frons about as wide as long, rather flat, with the median carina prominent on disc and the lateral margins slightly elevated; anterior margin almost straight, posterior one rather deeply and angularly emarginate; pale red with three green stripes which are united at both ends, spread out particularly at the apex. Clypeus short, pale. Antennae rather short, reddish. Pronotum pale red adorned with a green median stripe and on each side with a green band along the fore-border, almost truncate-conical in front and very deeply emarginate behind. Scutellum very long, somewhat convex, pale red, with three longitudinal green stripes, the median one slightly elevated. Elytra very pale green with a luteous tinge along the commissural margin and apex, hind borders almost truncate at apex, the clavus strongly granulate; longitudinal veins very numerous, green. Legs pale yellowish-green.

Length of body 7 mm.; length to tip of elytra 11 mm.

Redescribed from a single specimen from Gulfport, Fla., and a specimen collected by George G. Ainslie at Orlando, Florida. There are a number of specimens in the U. S. National Museum collection taken at several localities in Florida, and in south Georgia on the saw palmetto, *Serrenoa serrulata*, as follows: Marlow, Ga., July 11, 1917, W. D. Pierce; Jekyll Island, Ga., June 22, 1923, W. L. McAtee.

Ormenis venusta MELICHAR

(1902 Ann. K. K. Natl. Hofms. Wien xvii, p. 84)

Recorded from No. Car., Ga., and Texas. The writer has taken it in So. Car., Florida and Mississippi. It is much less abundant than either *O. pruinosa* or *septrionialis*.

Pale green, more or less covered with a whitish powder in fresh specimens. Front longer than wide, distinctly narrowed at the clypeus, lateral margins sharp; a distinct median carina extending downward nearly to the clypeus. Antennae orange-yellow, bristle black. Eyes dark brown. Pronotum very narrow with a faint lighter colored median carina. Scutellum arched, with three faint longitudinal carinae. Elytra about twice as long as wide, broadened behind, symmetrically rounded off at tip; a subapical cross-vein, running parallel with the apical margin, runs into the costal vein. Elytra are pale green in color, the costal margin brighter, nearly white, the apical and sutural margins slightly colored with yellow. Wings milk-white. Legs greenish-yellow, the tarsi orange-yellow, tips of the femoral spines dark.

Length of body 6 mm.; length to tip of elytra 6-9 mm.

Taken breeding on pecan, sweetgum, and oak. Several

specimens taken on pecan at Ruth, Miss., Aug. 11, 1915, by C. C. Greer. Numerous specimens in U. S. National Museum collection as follows: Peruque, Mo., on grape, July 21, 1919, W. L. McAtee; Victoria, Texas, on pecan, J. D. Mitchell; Clarksville, Tenn., Aug. 10, 1917, W. D. Pierce; Falls Church, Va.

THE GENUS FLATOIDES GUERIN

This genus includes some remarkable insects and is found in South America, Mexico, the Antilles, and in Florida and Arizona.

The three eastern species, *punctatus*, *maculosus*, and *concisus* have been taken only in Florida. An undescribed species was taken at Gainesville, Fla., by Prof. J. R. Watson that is even larger and with a wider wing spread than *punctatus*. Description of two species, and the following key are quoted from Metcalf.

Key to Flatoides

1. Hind tibiae with three spines before the apex; fore wings light buff, heavily spotted with large black spots.....*maculosus* Metcalf
2. Hind tibiae with two spines before the apex; the vertex twice as broad as its median length.....3
3. Color ochraceous buff with a broad transverse fuscous band at the base and at apex of clavus.....*concisus* Metcalf
Color greenish without evident transverse bands..*punctatus* Walker

Flatoides punctatus WALKER

(1851 List Hemipt. in Br. Museum, ii, p. 332, *Elidiptera*)

A large and very striking species that is covered with a white powder that renders the insects inconspicuous on the whitish trunks of certain trees on which they most frequently rest.

Large, greenish-gray in color. Body yellowish-gray, strongly tinged with pale green, rather broad, covered with a powdery coating in fresh specimens. Head very broad, slightly marked with brown, forming an obtuse angle on each side in front of the eyes. Frons quadrate and flat. Antennae with the second joint about twice the length of the first, yellowish towards the base. Eyes prominent, greenish-brown. Elytra broad, pale dull green, powdered with white, with dark brown dots which are mostly along the border; a series of dark, minute points along mostly the apical edge; costal border very convex and much dilated near the base, furnished with very numerous

branch veins that are mostly parallel; the veins pale green, some of them fuscous. Wings whitish, tinged with pale brown towards the tips and along the hind border; veins stramineous or straw-colored. Legs pale yellowish-green.

Length of body 7.25 mm.; length to tip of elytra 11 mm.

Recorded localities all in Florida: "Taken occasionally at all places where I collected in Fla." (Van Duzee); Biscayne Bay, Jacksonville, (Mrs. Slosson); Marco, Ft. Myers, Clearwater, Lakeland, and Punta Gorda (Am. Mus. Nat. Hist.); Gainesville, April 9, 1918, by the writer while beating trees and bushes. A specimen was taken by Geo. G. Ainslie at Lakeland, Fla., April 12, 1918.



Fig. 27—Adult *Flatoides punctatus* Walker (original).

Flatoides maculosus METCALF

(1923, Jr. of Elisha Mitchell Soc., 38, p. 191)

"This species may be recognized by its short, broad vertex, pale ochraceous buff or olive ochraceous buff color, heavily spotted with fuscous and by the very distinct genitalia.

Head broad; vertex nearly twice broader than long angularly produced anteriorly; frons somewhat elongate, conically produced basally; clypeus about one and one-half times as long as broad;

clypeal grooves evident; antennae with second segment about one and one-half times as long as first segment, both segments somewhat flattened. Pronotum broad, short, nearly four times as broad as long. Mesonotum strongly produced anteriorly; costal margins of the wing faintly crenulate; costal membrane about twice as broad as the costal cell; the transverse veins slightly reticulate; humeral angles not much produced; hind tibia with three spines; the basilar one small; female genitalia with last and penultimate segments deeply almost squarely excavated; pygofer large, broadly curved on the inner margins; marginal teeth very fine and numerous; anal segment broad, triangular, barely exceeding the pygofer; last ventral segment of the male broader than long, roundly excavated apically; pygofer narrow, about two and one-half times as long as broad, longer than the last ventral segment, broadly separated at the base, approximate subapically, their apices bluntly rounded.

Color: General color in the female pale ochraceous buff, heavily flecked with blackish fuscous; in the male the general color is more olive; head unmarked except for two blackish dashes in front of the eyes and three black spots on the second joint of the antennae. Pronotum with two impressed points near the anterior border and a blackish cloud behind the eye. Mesonotum with three blackish spots along each posterior border, the central one very large and a pair of spots medianly near the anterior border; wings heavily marked with irregular blackish fuscous spots. There is usually a row of very irregular spots along the costal border which become small triangular spots around the apical margin. The corium is marked with numerous large and small spots and the last subapical line is irregularly bordered with fuscous externally; the clavus has a large spot near the base and a row of short dashes along the sutural margin.

Length, female, apex of head to apex of abdomen 7.50 mm.; to apex of wing 10.40 mm.; male, apex of head to apex of abdomen 6.30 mm.; to apex of wing 9.20 mm.

This species might be confused with pale specimen of *Flatoides punctatus* Walker but they are much more heavily spotted and their genitalia are entirely different.

Holotype female. Paradise Key, Florida. In the collection of the U. S. National Museum.

Allotype male. Marco, Florida."

Flatoides concisus METCALF

(1923, Jr. of Elisha Mitchell Soc. 38, p. 192)

The original description is here quoted.

This species may be recognized by its small size, pale color and short transverse vertex.

Head broad, nearly as broad as the disk of the pronotum; vertex short, about one and one-half times as broad as long; anterior margin

nearly right angled; frons longer than broad, bluntly produced basally; clypeus broad, flat, clypeal grooves indistinct, antennae with second joint nearly three times as long as first, truncate apically. Pronotum short, produced anteriorly to the anterior margins of the eyes, triangularly notched posteriorly. Mesonotum small, flat, wings elongate narrow, costal membrane about twice as wide as the costal cell, costal margin straight; two subapical lines rather irregular; hind tibia with two spines on the apical third; last ventral segment of the female triangularly notched; penultimate deeply notched with the side margins converging slightly; pygofer short, broader than long, the apical margins broadly rounded with heavy teeth; anal segment short, transverse, exceeded by the pygofer.

Color: General color pale ochraceous buff, heavily sprinkled with a whitish powder, a few blackish fuscous markings; vertex fuscous with the median lines and lateral margins paler; frons and clypeus ochraceous buff; pronotum with two impressed points and a blackish cloud behind the eyes. Mesonotum brownish fuscous clouded with blackish anteriorly; fore wings ochraceous buff, veins nearly concolorous. There is a broad irregular blackish fuscous band from the costal margin across the humeri to the middle of the clavus, another diagonal band at the apex of the costal membrane and a few irregular fuscous clouds in the cells of the membrane, apical spots very faint; venter and legs ochraceous buff, excepting the mesopleura, genital pieces, spines and claws of the legs which are marked with fuscous.

Length, apex of head to apex of abdomen, 6.60 mm.; to tip of wing 9.10 mm. Holotype female from Florida.

This is a very small pale species which is closely related to *Flatoides acutus* Uhler. The genitalia seem to be sufficiently distinct and the color is entirely distinct."

THE GENUS CYARDA WALKER

This genus was established by Walker in 1858 and contains only a single species known to the United States.

Briefly characterized as follows: Elytra are very long, much widened at the base, then strongly narrowed behind, the axillary protuberance or hump prominent. Vertex is a little produced and rounded. Front nearly elliptical, without carinae. Scutellum flattened on the disc. Ocelli distinct. Antennae short. Femora with two spines.

Haplotype of the genus—*Cyarda difformis* WALK.

The elytra strongly narrowed behind and the prominent axillary protuberance especially distinguishes this genus.

This species has heretofore been recorded only from No. Car. and Florida. It was swept in abundance from marsh grass (*Juncus*) and underbrush on Cat Island, seven miles off the Mississippi Coast, by the writer Sept. 7, 1920. At Gainesville, Florida, it was found by him breeding on the stems of young hickory shrubs.

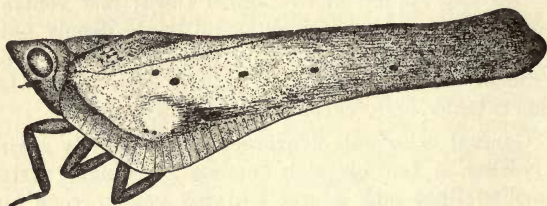


Fig. 28—*Cyarda melichari* Van Duzee (original).

Cyarda melichari VAN DUZEE

(1907 Buf. Soc. Nat. Sci., viii, No. 5, p. 40, n. n. for *punctata* Melichar)

Elytra strongly narrowed, yellowish-brown with black spots.

Elytra and entire body yellowish-brown. Vertex between the eyes twice as wide as long in the middle, rounded in front, the somewhat darker colored anterior margin slightly raised, with two deep parallel, longitudinal furrows. Front about as long as its width at the middle, narrower at the clypeus than the above margin, the sides weakly bent and carinated. Pronotum as long as vertex, with two small pit-like grooves, very faintly tricarinate. Scutellum strongly flattened, the flattened disc being defined by two parallel lateral carinae. Elytra three times as long as wide at the broadest point, behind the base strongly bent outwards and then sharply narrowed to the sub-acute tip, yellowish-brown with black spots that are nearly equidistant from each other; axillary protuberance or hump (viewed from above) prominent; small tubercles at the base of the clavus, near the axillary hump, and at the base of the costal membrane; costal membrane a little wider than the costal cells and supplied with numerous simple cross-veins; longitudinal veins not black. Wings smoky-brown.

Length of body 5 mm.; length to tip of elytra 7-8 mm.

THE SUBFAMILY DERBINAЕ SPINOLA

(Spinola, Ann. Ent. Soc. Fr., viii, pp. 205, 377, *Derboides*.)

This subfamily contains the most delicate and remarkable forms among the fulgoridae. It is well represented in the United States by seven genera, numbering thirty-two species at present. From Muir's study of the "Derbidae of

the Philippine Islands" it seems that the Philippine Archipelago bids fair to be the richest representation in the world of these extremely delicate insects. He lists 98 species as occurring there.

But little is known of the life history except that the adults nearly all feed on the foliage of trees and tall shrubs. The few exotic nymphs that have been described all live in rotten wood or under old bark, but the eggs have never been described.

Key to the genera

1. Head broad, if viewed from above; small, short, compact species, the antennae short and inconspicuous, subovate or subpyriform, the auriculate process or antennal trough an appendage of the head *Cedusa* Fowler
- ... Head about as broad as in the above but with elytra distinctly longer, the antennal trough an appendage of the pronotum.....
..... *Cenchrea* Westw.
2. Head thin, if viewed from above, the elytra long and narrow, enlarging and dilating towards the apex.....3.
3. Antennae with one or more basal appendages; the head long, thin and rostrate..... *Otiocerus* Kirby
- ... Antennae without basal appendages, long, flattened in some species and subcylindrical in others, extending to or beyond the tip of the head.....4.
4. Three of four discoidal cells between the postcostal and median veins; head slightly produced beyond the eyes; carinae of head feeble, expanded very thin, vertex little depressed,..... *Patara* Ball
- ... A large number of apical cells which are long and narrow, preceded by cross-veins arranged in a nearly transverse regular band; head more produced beyond the eyes; carinae much elevated at the sides, leaving a deep impression,..... *Amalopota* Van. D.
- ... These apical cells much shorter, more irregular, and usually fewer in number than in preceding genus; head produced beyond the eyes; carinae of head elevated at sides, leaving a deep depression; ocelli lacking, *Anotia* Kirby
5. Moth-like, wing expansion 17 mm.,..... *Mysidia* Westw.

THE GENUS PATARA BALL

In profile, members of this genus, have the vertex and face forming a continuous curve; the antennae are small, cylindrical or long, broad and flattened in our species, and without appendages; and the elytra are long and apically pointed with distinctive shape and neurulation.

Patara vanduzei BALL
(102 Can. Ent., xxxiv, p. 260)

This, the only North American species, has been recorded only from New York, Pennsylvania and Ohio.

General color brownish-purple, a light stripe on the vertex and pronotum, and a light area around the apex of the elytra. In profile, the vertex and frons forming a continuous semicircular curve, about equally margining the eye all around; vertex extremely thin at apex, expanded posteriorly, white. Frons and antennae brownish testaceous, the latter long, broad, and flattened. Pronotum slightly carinate, broad and nearly parallel margined, brownish fuscous, with a broad, median light stripe. Scutellum light testaceous, with a pale stripe. Elytra long, apically pointed, although roundedly so, brownish with the venation red, giving the insect a brownish-purple appearance; the three cross-veins before the apical cells fuscous; a light spot on the apex of each apical vein and a larger one on the inner reflected one; the claval nervure tuberculate, white. Wings slightly smoky hyaline, the venation reddish. Legs pale.

Length of body 2 mm.; length to tip of elytra 4.75 mm.; elytra expansion 8.5 mm.

The food plant is not definitely known but is probably a species of oak.

THE GENUS *CEDUSA* FOWLER

This is considered to be our most primitive form of the Derbinae as the frons is relatively broad, the elytral venation simple, and the antennae are but slightly enlarged or flattened. All are small, short, compact species and range in color from fumose to black, more or less covered with bluish-gray pruinosity. In *Cedusa* the lower margin of the pronotum is without up-curved lamina, the lower part of the antennal trough being formed by a more or less scoop-shaped process of the genal ridge. The only reliable characters for separation of certain of the species are the male genitalia.

The following key has been partially adapted from McAtee*.

Key to some of the species of *Cedusa*.

- Elytra fuscous or black.....1.
- Elytra white, clouded with fuscous in the areoles..*maculata* Van D.
- 1. Mesonotum and parts anterior chiefly fulvous, the elytra more or less dusky apically, fulvous towards base.....*edentula* Van D.

... Mesonotum (in mature specimens) always and parts anteriorly usually, dusky to black; elytra dusky.....refer to accompanying Fig. 29 of male genitalia for specific determination.

Cedusa vulgaris FITCH

(1851 Cat. Ins. N. Y. St. Cab., p. 47, *Poecelopectera*)

This is a common northern species that has been recorded with a range from Quebec, Ontario, Kansas, Texas, and Georgia as its extremes.

Blackish-pruinose, having a powdered, somewhat grayish appearance.

Body blackish-pruinose, abdominal segments sometimes touched with orange. Head black, carinated portions paler; the frontal carinae

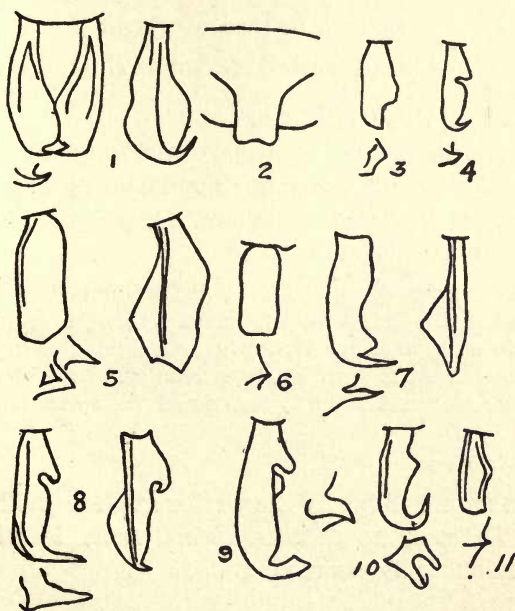


Fig. 29—Male claspers of Southern species of *Cedusa* (Adapted from McAtee). 1. *Cedusa maculata*; 2. *maculata*, apical sternite of female; 3. *edentula*; 4. *gedusa*; 5. *obscura*, two shapes of apical hook shown, and at right a lateral view of clasper; 6. *bedusa*; 7. *vulgaris*, lateral view at right; 8. *mallochii*, lateral view at right; 9. *cedusa*; 10. *kedusa*; 11. *hedusa*.

*For a complete treatise of this genus, see "Notes on *Cenchrea* Westwood and *Cedusa* Fowler" by W. L. McAtee, *Annals Ent. Soc. Amer.*, vol. 17, June, 1924, pp. 179-185, Pl. 21.

prominent. Eyes brown. Elytra blackish-pruinose, lighter and more smoky towards the apex. Wings light smoky in color. Legs pale.

Last ventral segment of the female triangular, with its margins almost rectilinear.

Male plates have their inner margins divergent on their immediate base, then somewhat sinuated to their apex which has an unusually large pale tooth.

Length of body 3 mm.; length to tip of elytra 4-5 mm.; elytral expansion 9 mm.

A male swept from weeds at Knoxville, Tenn., Aug. 29, 1919, by W. B. Cartwright has been examined.

Known food plants: Willow, thorn, beech, oak, hickory, grape, alder, wild cherry, and skunk cabbage.

Cedusa bedusa MCATEE

(1924, Ann. Ent. Soc. Am., 17, p. 182)

Recorded from Virginia.

This species is one of the forms long confused with *C. obscura* by various workers. The latter species, as shown by McAtee, is a western species, at present known only definitely from Colorado.

Dusky in general color, the head and pronotum distinctly paler. Frons widest at a point about two-thirds its length from vertex, the sides a little concave above that point, straight and gradually convergent below. Ventral view of outer male clasper shows the lateral lobe not quite so broad as in *C. incisa* and the apical hook is nearly obsolete.

Length 4.75 mm.

Beaten from foliage by the writer at Gainesville, Florida, in 1917. There is no definite record from Mississippi, although undoubtedly occurring.

Cedusa edentula VAN DUZEE

(1902 Bul. Buf. Soc. Nat. Sci., x, p. 503, *Lamenia*)

Recorded from N. J., D. C., and N. Carolina.

Distinctly fulvous in color and easily distinguished from the others. Frons gradually widened almost to the apex.

Length 3.75 - 4.5 mm.

A male was taken by the writer while beating in low deciduous woods at Longview, Mississippi, June 27, 1920.

Cedusa incisa METCALF

(1923 Jr. Elisha Mitchell Soc., 38, p. 195, *Herpis*)

Recorded from Conn., N. Y., Mich., N. J., and Iowa.

Frons broadest about two-thirds its length from vertex, the sides above that point a little incurved, below it is more strongly out-curved. The apical hook of the male clasper upcurved and prominent.

Length 3.75-4.5 mm.

A male was taken by C. J. Drake at Tupelo, Miss., July 1, 1921.

Cedusa mallochii MCATEE

(1924 Ann. Ent. Soc. Am., 17, p. 184)

McAtee in his brief description records this species from Maryland and Louisiana and it undoubtedly occurs in Mississippi.

The frons is of nearly uniform width, slightly widening from vertex to a point three-fourths its length below, then slightly constricted before joining the clypeus. The apical hook of male clasper long, and directed nearly straight inwardly but slightly curved anteriorly.

Length 4.-5.5 mm.



Fig. 30—Lateral view of *Cedusa maculata* Van D.
(Drawing by Osborn)

Cedusa maculata VAN DUZEE

(1902 Bul. Buf. Soc. Nat. Sci., x, p. 503, *Lamenia*)

Distinguished at once by its color from all the other species.

Recorded from Ont., N. Y., D. C. and N. Car.

General color grayish-white, the frons with a fuscous median vitta which extends over the clypeus and is expanded about an oval white spot on the apex of the frons; dorsally this fuscous vitta extends across the pronotum and scutellum; the cheeks are infuscated and

marked with a triangular black spot at their lower angle. Antennae testaceous, infuscated below. Vertex apparently wanting, the base of the frons rounding over to the hind margin of the head, viewed from above not surpassing the eyes; the frons slightly expanded at the apex. Pronotum short, deeply but roundly emarginate behind; marked with a black patch behind the eyes. Lateral angles of the scutellum infuscated. Abdomen blackish, edged with white, the pleural pieces with a fuscous spot superiorly. Elytra infuscated in each of the areoles, the nervures strong, white at base, infuscated at apex. Wings white, with slender, fuscous nervures. Legs white, the femora slightly infuscated; tibiae banded with fuscous at base and apex; tarsi brown, the posterior ones mostly white.

Inner margin of the male plates with a linear excavation almost to their apex, leaving only a blunt tooth before the oblique apical margin; the upper angle of this apical margin produced in a short triangular tooth in place of the long spur-like process in most of the species of *Cedusa*.

Length to tip of elytra 5 mm.

Taken by Prof. Herbert Osborn along the coast of North Carolina in hardwood forests on a species of small bush, possibly a huckleberry. The writer collected specimens during 1921 at the following localities in Mississippi, always by sweeping and beating in low deciduous woods: Columbus, June 23, Dozier and Drake; Tupelo, July 2; and Fulton, July 4. A specimen was collected at Knoxville, Tenn., in 1919 by Geo. G. Ainslie.

THE GENUS *CENCHREA* WESTWOOD

Members of this genus have the head very small, the second antennal segment short, tuberculate with a seta, and the elytra are broad at the middle, and narrowed behind the middle. The reflector-like structure, called the antennal trough by McAtee, that forms a guard for the highly sensorial antennae, is an appendage of the pronotum in *Cenchrea* and of the head in *Cedusa* as pointed out by McAtee. (Ann. Ent. Soc. Am., vol. 17, June, 1924). There are four species of *Cenchrea* that occur in the United States, one of which, *fulva*, is known only from Florida. Ball's species, *heidemanni*, has recently had the new genus *Neocenchrea* erected to contain it by Metcalf but it now seems advisable to retain all under *Cenchrea* (see McAtee). So far *heidemanni* has never been recorded from the Southern States.

McAtee has briefly characterized the genus as follows:

Lower margin of pronotum with an upcurved lamina forming lower border of antennal trough, genal ridge prominent but not produced; margin of vertex and frons elevated and granulate; face distinctly inwardly angulate at junction of frons and clypeus; pronotum angulate-emarginate posteriorly; veins of tegmen tending to be granulate, veins always distinctly so; claval veins uniting at or beyond middle of commissure; margin of tegmen serrulate apically. All species with carinae of head more or less fuscous-edged.

Cenchrea fulva VAN DUZEE

(1909 Bul. Buf. Soc. Nat. Sci., ix, p. 195)

This large species recorded only from Florida may be readily distinguished by its pinkish color. It differs from *heidemanni* Ball by its narrow and deeply sunken vertex and frons and the fulvo-testaceous elytra, which in *heidemanni* are milky-white; from *uhleri* at once by the small size of the latter and creamy elytra, margined with fuscous.

The original description is here quoted.

"Very closely allied to *Heidemanni* Ball but with a narrower and more deeply channeled front. Elevated margins of the vertex as high as the width of its carinate base. Front distinguished from the vertex by a slight angle but the dividing line not at all carinate; narrow, but little broader at apex; the edges greatly elevated; middle line feebly carinate. Eyes vertical, sinuated behind and strongly narrowed below. Second joint of the antennae large, ovate, but not nearly attaining the margin of the post-ocular cavity in which it stands; setae short, black. Pronotum shorter than the dorsal aspect of the vertex, angularly emarginate behind; on either side produced in a semicircular auriculate cavity for the reception of the antennae; the elevation of the posterior wall of this cavity is about equal to the length of the pronotum. Mesonotum transverse, convex, polished and very obscurely tricarinate on the disk; the obtuse triangular apex depressed. Elytra long and narrow; the outer claval nervure distinctly granulate. Genital plates of the male with their inner margins strongly toothed at the middle leaving a rounded opening at base and an oblong one apically. Length to tip of the abdomen $3\frac{1}{2}$ mm.; to apex of the closed elytra $6\frac{1}{2}$ mm.

Color obscure rufo-fulvous, deeper on the abdomen and paler or subtestaceous on the elytra; eyes, slender edge of the facial carinae and stiles of the male black. Wings and plates of the male whitish. the nervures of the former brownish; apical margin of the elytra slightly enfumed and very minutely serrate.

Described from one male taken at Estero. This large species may readily be distinguished by its pinkish color. It differs from the closely related *Heidemanni* Ball by its narrow and deeply sunken vertex and front and the fulvo-testaceous elytra. It has a much more produced vertex than *Uhleri*."

Cenchrea mcateeii, new species

This species has long been confused with the description of *Cenchrea fulva* Van Duzee and this is what Metcalf placed as that species and called *Phasiocephalus fulvus*. As Van Duzee compared his *fulva* with *heidemanni* and gave its length as 6.5 mm. this small species cannot be *fulva* and must be described as new.

Easily distinguished from *C. fulva* by its much smaller size and less pinkish color. General color tawny fulvous.

Vertex and frons narrow and deeply sunken, the frons distinguished from the vertex by only a slight angle the dividing line of which is not at all carinate. Frons narrow, only slightly broader at apex, the edges greatly elevated, the median carina very faint. The lateral carinae of the vertex distinctly elevated. Antennae with the second joint large and ovate, the seta short and dark colored. Pronotum distinctly shorter than the vertex, angularly emarginate posteriorly. Mesonotum transverse, convex, slightly polished and distinctly tricarinate on the disk. Elytra varying from testaceous tawny to darker color, sometimes enfumed, long and narrow, the outer claval vein distinctly granulate. The venation in light colored specimens almost concolorous with the elytra, in darker specimens the venation is more fuscous.

Male genitalia with the claspers testaceous, their inner margins towards base with strong spur-like tooth.

Length of body 2 mm.; length to tip of elytra 3.5-4 mm.

Described from a mutilated female from Ellisville, Miss., August 11, 1921, and four males collected at the following localities in Mississippi: Vicksburg, July 14, 1921; Okolona, June 28, 1921; Woodville, July 25, 1921; and Ocean Springs, August 3, 1921. All specimens taken by the writer by beating and sweeping in deciduous woods.

The writer takes pleasure in dedicating the above species to Mr. W. L. McAtee of the U. S. Biological Survey who has contributed valuable work on this group and who pointed out to the writer the fact that this species was not *fulva* and must be considered as new.

Cenchrea uhleri BALL

(1902 Canadian Entomologist., xxxiv, p. 261)

Recorded from N. Y., N. J., Md., D. C. and Kansas.

Resembling somewhat a *Cedusa* in appearance and in the way the elytra are held when at rest, but slightly longer and narrower. Much smaller than *heidemanni*.

Pale creamy or slightly testaceous-yellow, washed with tawny, the abdominal segments above and below blackish, with pale margins. Vertex broader at base than at the anterior margin which is straight, sunken on the disk, and definitely angled with the frons. Frons widening slightly below to the clypeus. Antennae short, globular, the fuscous seta short. Elytra long, strictly parallel-margined, creamy in color; a round fuscous spot just before the apex of the costa and usually a brownish or fuscous submarginal stripe along the costa, and a brownish line along the sutural margin; the apical margin usually reddish. Wings pale hyaline, the nervures slightly darker.

Male genital plates or claspers long, strap-like, slightly widening towards the apex.

Length of body 2-3 mm.; length to tip of elytra 4-5 mm.

The writer took specimens while sweeping in deciduous woods during 1921 at the following localities in Mississippi: a male on underside of ironwood leaf (*Carpinus caroliniana*) at Yokena, July 20; a female at Port Gibson, July 21; and a female at Woodville, July 25. Dr. C. J. Drake also took a specimen at Vicksburg, Miss., July 19, 1921. A pair was collected in woods at Nashville, Tenn., Sept. 3, 1915, by Mr. Geo. G. Ainslie and loaned for study. The writer's material has been carefully compared with the Ball type.

THE GENUS OTIOCERUS KIRBY

This genus is peculiar to the New World. It was erected by Kirby in 1819 and eight species from North American material were then described. Since Kirby's time all of these species have again been collected and recognized with the exception of *reamurii* which was described from Georgia. Later, Fitch and others have added to the genus. Kirby's descriptions were all made in Latin and are rather meager.

Briefly characterized as follows: Head long, thin and rostrate. Antennae, lying upon and rigidly appressed to the cheeks, sometimes passing over the eyes with basal appendages that are extremely deli-

cate and easily broken off; they resemble slender tapering worms irregularly curled. Ocelli lacking. Elytra subhyaline, long and delicate.

Logotype of the genus: *Otiocerus stollii* Kby.

All the members of the genus are comparatively scarce in numbers and practically nothing is known of their life history, except that the known food plants are all deciduous trees. The shape and lateral outline of the rostrum of each species seems to be very distinctive and will prove of value in making identifications.

It is rather difficult to arrange a key for members of this genus but the following artificial one will aid in their proper identification.

Key to the species of *Otiocerus*

1. General color pale red to dark red.....2
- ... General color whitish or a pale yellow.....3
2. Elytra with an oval spot on apical margin in addition to the commissural line, 7 mm.....*stollii* Kirby
- ... Elytra with only a short pale line beyond tip of clavus; large species, 11 mm.....*degeeri* Kirby
3. Elytra hyaline without markings, the veins red, 7.2 mm.
.....*schellenbergi* Kirby
- ... Elytra with red markings only, in the form of a red vitta along claval suture, forking at end of clavus, 8.75 mm., *coquebertii* Kirby
4. Elytra with dark markings, chiefly in form of spots.....5
- ... Elytra with dark markings in form of vittae or bands.....8
5. Spots arranged over the entire elytron.....6.
- ... Base of corium without spots.....7
6. Spots forming series in the cells, abdomen without black spots, body red.....*degeeri* Kirby
- ... Spots not in series in the cells, some of them grouped in an oblique vitta, body pale, the abdomen spotted, 7.5 mm.....*francilloni* Kirby
7. Spots irregular in shape, aggregated, covering most of elytron except the clavus, 6 mm.....*ballii* McAtee
- ... Spots chiefly round, widely spaced, one in clavus, 9.5 mm.,
.....*abbottii* Kirby
8. Elytra whitish, with faint dark somewhat broken vitta from apex of clavus obliquely across to costal margin, faintly clouded at inner apical angle, 8 mm.....*kirbyi* Fitch
- ... Elytra pale yellow with broad dusky vitta from base to middle of the inner margin, extending thence obliquely across to outer margin at its tip and sending a very broad branch to tip of inner margin, 9 mm.....*signoretii* Fitch
- ... Elytra pale with reddish veins, a broad subarcuate vitta, broadened at apex with five black dots on tip and three on the vitta itself, body pale tinged with red, 7 mm.....*reaumurii* Kirby

Elytra pale sulphur yellow with brown vitta from base to middle of inner margin, thence to the outer tip, veins concolorous with the ground color, an orange-red stripe on each side of eye to the forward edge below the apex, 10 mm.....*amyotii* Fitch
 Elytra yellowish with brown vitta, very much, as in *amyotii*, the orange-red stripe on each side runs from the eye obliquely upwards to apex of rostrum where it ends in a fine black streak, 10.25 mm.....*wolfii* Kirby

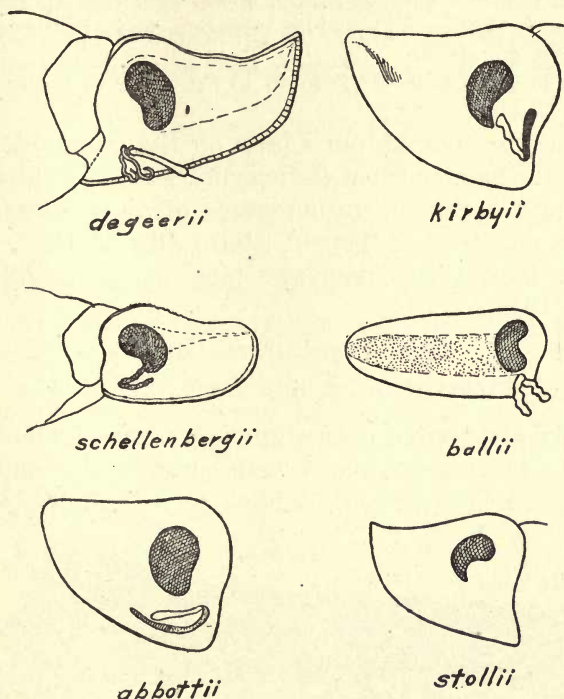


Fig. 31—Lateral outlines of heads of species of *Otiocerus*, drawn to same scale (original).

Otiocerus schellenbergii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 18)

Recorded from N. Y. and Georgia.

Resembles *degeerii* most closely but distinguished at once by its smaller size, the absence of green spots on the elytr., and by the shape of the well-rounded rostrum which in *degeerii* is acutely produced upwards.

Elytra milky white, clouded, somewhat hyaline, snowy along the median suture; tip of apex polinose-snowy. Body yellowish-orange,

venter with a more reddish tinge, a median polinose-snowy line on the dorsal surface of the thorax. Head long and rostrated, the tip well-rounded, upper carinae straight, snowy, lower ones very close together and fuscous, the rostrum with exception of the carinae reddish-orange. Eyes black. Antennae short, reddish, at the base a single reddish appendage longer than the antenna, much twisted. Elytra dilated at tip, milky, somewhat hyaline, venation rosy gradually fading out towards the base which is immaculate, interstices clouded, tip of apex in center polinose-snowy, upper margin along the median suture snowy. Wings milky-white, venation rosy, iridescent. Legs pale without markings.

Length of body 4:30 mm.; length to tip of elytra 9 mm.; elytral expansion 15 mm.

The writer took eleven adults on the underside of ash leaves in the hammocks at Gainesville, Fla., March 30, 1918, and a single specimen on underside of an ash leaf in low deciduous woods near Tupelo, Miss., July 2, 1921. Dr. C. J. Drake took a specimen sweeping at Gainesville, Fla., July 21, 1918.

Otiocerus degeerii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii. p. 16)

Widely distributed over Ontario and the United States and is the largest and most common species of the genus. Its color varies from pale reddish to brownish purple.

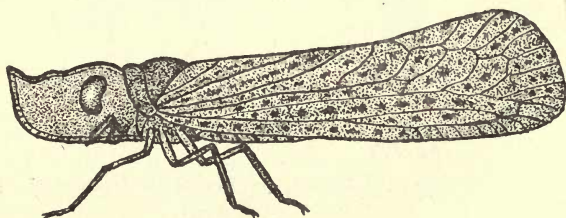


Fig. 32—Adult *Otiocerus degeeri* Kirby (original).

Body red, paler on the upper part. Head long, rostrum acutely produced upwards and red in color; carinae snowy, the upper ones undulate and immaculate, the lower ones transversely striated with black. Antennae reddish, more or less cylindrical, extending to the lower margin of face, with two appendages at the base in both sexes, not quite as large and long as the antennae. Eyes brown. Elytra smoky-hyaline, dilated at apex; venation crimson, the interstices irrorate with round dark green spots; the tip of apex polinose-snowy. Wings milky-white, the veins rosy. Legs pale, without markings.

Males are slightly smaller than the females.

Length of body 5.50 mm.; length to tip of elytra 11 mm.; elytral expansion 19 mm.

The writer took a specimen on willow at Marianna, Fla., and at the following localities in Mississippi: Tupelo, July 1, 1921; Jonestown, Sept., 1915, J. L. E. Lauderdale. A specimen was taken by W. B. Cartwright at Knoxville, Tenn., Sept. 29, 1919.

Swezey (1904 Prel. Cat. of Fulgoridae) lists oak, beech, maple and hickory as food plants.

Otiocerus stollii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 16)

Recorded from N. Y., Pa., Ga., Ohio, La., and is also found in Brazil.

Of the same dark color as in *degeerii*.

Reddish, elytra of about the same color of *degeerii* with large white area on apex.

Body pale red. Head large and pale; upper carinae straight, polinose-snowy, lower carinae very close together; antennae reddish, shorter than head, gradually becoming a little thicker, the base with two reddish appendages shorter than the antennae; eyes brown. Elytra smoky-hyaline with a more or less carmine tinge; a pale rosaceous vitta occupies the vertex, the middle of the thorax, and the elytral suture, as far as the tip of the clavus, beyond which is a pale line that extends to where the dilation of the elytra begins; a large white area at apex; venation reddish. Wings smoky-hyaline, veins reddish, legs pale, without markings.

Length of body 5 mm.; length to tip of elytra 7 mm.; elytral expansion 12 mm.

A specimen beaten from oak near Buffalo, N. Y., by E. P. Van Duzee gives us a clue as to one of its food-plants. Specimens were taken on pecan at Agricultural College, Miss., Aug. 17, 1915, by C. C. Greer; on same host at Hamburg, Miss., Aug. 22, 1911, by W. E. Dove; and beaten from shrubbery at Trimcane, Miss., April 19, 1921, by the writer. Prof. Herbert Osborn collected a single specimen while beating a coniferous tree, probably *Juniperus virginianus*, at Biloxi, Jan. 14, 1922.

Otiocerus coquerbertii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 18)

Recorded from Ont., N. H., N. Y., Pa., N. C., Ga., Ill., Minn., Texas.

A very strikingly colored species, approaching *degeerii* in size, easily distinguished from the other species.

Ground color pale, relieved by a broad band of red.

Body pale. Head large, rostrate, a broad red band on each side; upper carinae pale, sinuous, lower ones pale; antennae reddish, short, clavate, at the base two reddish appendages larger than the antennae; eyes greenish. Elytra of a pale yellowish-white ground color, relieved by a broad band of red, extending from the tip of the head across the eye and thorax, and along near the elytral suture to the tip of the clavus, where it forks, one branch bordering the inner apical margin, the other deflected to the apex of the costa, a dash of red lying just beneath this band as it runs along near the suture. Wings clear hyaline, immaculate. Legs pale, without markings.

Length of body 6 mm.; length to tip of elytra 8.75 mm.; elytral expansion 18.5 mm.

Hickory, grape, oak, beech and maple are given by Swezey as food-plants.

Otiocerus francilloni KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 17)

Recorded from N. J. and Georgia.

Very like *stollii* but larger. Body pale, in no degree red. Head darkly clouded, the lower carinae darkly spotted. Antennae blackish, the basal appendages white. The entire elytra darkly spotted and not immaculate at the base; an indistinct, broken, oblique band above, composed of black dots and spots, and also with three blackish spots on the posterior margin. Wings marked on the inside near the base with blackish. Abdomen with a black dot on each side of ventral segments.

Otiocerus amyotii FITCH

(1856 Trans. N. Y. St. Agr. Soc., xvi, p. 394)

Recorded from N. Y., Pa., Ga., Ohio, Iowa.

A very strikingly colored species and easily distinguished.

Light yellow, elytra pale sulphur yellow, with a brown band or stripe. Body light yellow. Head large, rostrate, an orange-red stripe on each side from the eye to the forward edge below the apex; upper

carinae slightly sinuous and polinose-snowy, lower ones faintly fuscous; three brown stripes on the thorax; antennae in the females with two long appendages; eyes brown. Elytra pale sulphur yellow, with a brown stripe from the base to the middle of the inner margin and thence to the outer tip; a row of blackish dots on the hind edge alternating with the ends of the apical veins, and about six dots forward of the innermost of these, placed on the tips of the subapical and on the bases of the apical veins; venation almost concolorous with the ground color, slightly darker. Wings white, with iridescent reflections. Legs pale, tarsi slightly fuscous.

Length of body 4.7 mm.; length to tip of elytra 10 mm.; elytral expansion 17 mm.

Occurs on hickory and other forest trees.

Otiocerus wolfii KIRBY

(1819 Trans. Linn. Soc. Lond., xii, p. 15)

Recorded from N. Y., Pa., Ga., Ohio and Iowa.

Resembling *amyotii* very much but having the orange-red stripe on side of the head from the eyes obliquely upwards to apex where it ends in a black streak, and the elytra with three faint blackish dots placed outside of the brown band.

Body pale yellow, mesothorax slightly darker along median line. Head large, rostrate, apex pointed, an orange-red stripe on each side from the eye obliquely upwards to the apex of rostrum where it ends in a fine black streak; upper carinae sinuous and polinose-snowy, the lower ones faintly fuscous. Eyes brown. Antennae clavate, reddish; the female with a single pale yellowish basal appendage, longer than the antennae. Elytra yellowish, a faint brownish stripe extending from the base to the middle of the inner margin and thence obliquely to the lower tip; a row of blackish dots on the hind edge, alternating with the ends of the apical veins and about six dots forward of the innermost of these, placed on the tips of the subapical and on the bases of the apical veins; in addition, the elytra have three faint blackish dots in a row, outside of the brown stripe, one of these dots being placed near the base of each of the discoidal cells. Wings milky. Legs pale.

Length of body 5 mm.; length to tip of elytra 10.25 mm.; elytral expansion 17 mm.

Redescribed from a female taken by the writer on sycamore at Pickens, Miss., July 16, 1921, and a female in the Osborn collection taken by W. S. Blatchley in Florida. Fitch records this species as occurring on walnut bushes.

Otiocerus ballii MCATEE

(1923 Proc. Biol. Soc. Wash., vol. 36, pp. 45-46)

This species, carried by the writer in manuscript for many years, has recently been described by McAtee from material collected at Glen Echo, Md. Through the courtesy of Mr. McAtee the writer has been able to study paratype specimens of this species in the U. S. National Museum.

The species is easily distinguished by its elongate bluntly rostrate head with a broad orange-red stripe on the sides of the same.

Body pale yellowish-white, the dorsum of the abdomen partially orange-red. Head very elongate, rostrate, with the tip rounded; upper carinae scarcely sinuated, polinose-snowy; on each side a broad orange-red band from the eye to the apex, covering the lower two-thirds of the side; this band runs along the sides of the thorax and is continued onto the base of the elytra by the longitudinal nerves which are orange on their basal third. Antennae very long, slender and enlarged lightly at tip; very difficult to distinguish from the single, worm-like, much twisted, basal appendage which is shorter than the antennae in this species; both antenna and appendage are reddish. Eyes dark brown. Elytra subhyaline, the clavus transparent and clear, the veins prominently pinkish with the cells irregularly clouded with gray. Wings iridescent hyaline, the veins rosy. Legs pale.

Length of body 3.5 mm.; length to tip of elytra 6 mm.; elytral expansion 13 mm.

The above description was made from a male taken by the writer while sweeping undergrowth in Okatibbee swamp near Meridian, Miss., Aug. 14, 1921, and a female taken by C. J. Drake in a swamp near Leland, Miss., Sept. 15, 1921.

McAtee adequately describes the genitalia as follows: "Male genital segment with a median triangular process rounded apically, claspers widely separated at base, the general trend of their inner margins toward each other, overlapping at apices which are pointed and recurved, each clasper bearing on inner margin at about a third of its length from base a short, broad process, the posterior angle of which is produced as an upwardly and anteriorly curved hook; aedeagus narrowed opposite these processes, its apex with two anteriorly directed tapering, curved and acutely pointed processes. Female genital segment broadly triangularly produced."

Otiocerus abbotii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 17)

Recorded from N. Y., Ga. and Florida.

Body very pale reddish. Head with the upper carinae rather straight and snowy-polinose; lower margin of rostrum, viewed from the side, rounding to rather angular apex. Antennae short, subclavate, reddish, a single, very much twisted, basal appendage, longer than the antenna. Elytra milky-white, sparsely dotted with black, the base immaculate however. Wings milky, iridescent. Legs pale testaceous.

Length of body 4.50 mm.; length to tip of elytra 9.5 mm.; elytral expansion 16.5 mm.

The writer has for study a single female taken by Wm. T. Davis at Clayton, Ga., June, 1909. Fitch records taking a pair on oak in New York.

Otiocerus kirbyii FITCH

(1851 Homop. N. Y. St. Cab., p. 46)

Recorded only from the state of New York.

Body pale whitish. Elytra whitish with a faint somewhat broken band extending from the base to the middle of the inner margin and then obliquely to outer margin of apex, and with numerous sparsely scattered faint brownish dots. Wings milky. Legs pale.

Length of body 4 mm.; length to tip of elytra 8 mm.; elytral expansion 13 mm.

There is a female specimen in the U. S. National Museum taken at Selma, Ala., Oct. 20, by W. H. Gates and a male taken by the writer beating a Japanese walnut tree at Lexington, Miss., July 16, 1921, that appears to be this species. The short description by Fitch is inadequate to make absolutely sure of the identity of these southern specimens.

The following descriptive notes made from these specimens may aid in more definitely placing this species.

Nearest to *abbotii* in lateral outline of rostrum, coloration and wing maculation although in this species some of the elytral spots form an interrupted vitta. If its color were yellowish instead of distinct white it would resemble very closely *wolfii*. Rostrum from lateral view distinctly angulate as in Fig. 31. Antennae rope-like, very dark brown, with one basal appendage which is lighter in color and is as long as the antenna itself. Both antenna and appendage is much stouter and shorter than those of *abbotii* which are long. General color white, irregular brown spots in cells and also forming a faint more or less interrupted vitta. Elytra and body white, the abdomen unspotted. Length to tip of elytra 8 mm.

Otiocerus signoretii FITCH

(1856 Trans. N. Y. St. Agr. Soc., xvi, p. 394)

Recorded from N. Y., Ia., Mo., Ark., and Texas.

Quite similar to *reaumurii*, but with the dots on the elytra differently placed.

Body pale yellow. Carinae of upper side of the head minutely toothed, those of the lower side edged by a slender coal black line. Antennae short, scarcely reaching to the eye, but with one basal appendage of about the same length. Eyes dark brown. Elytra very pale hyaline yellow, with a broad dusky cloud-like stripe from the base to the middle of the inner margin, and extending thence obliquely across to the outer margin at its tip, and sending a very broad cloudy branch to the tip of the inner margin; a large blackish dot anteriorly, on the inner side of the dusky stripe, situated in the middle of the subaxillary cell, and four dots on the outer side of the stripe, placed at the angles of an imaginary square, the outermost one of these dots being in the middle of the outer or costal cell; veins yellow, posteriorly red. Wings whitish hyaline, the veins rosy. Legs pale.

Length of body 5 mm.; length to tip of elytra 9 mm.; elytral expansion 16 mm.

The writer has on hand for study a series of five females taken at Ames, Ia., by Prof. H. Osborn.

Otiocerus reaumurii KIRBY

(1819 Trans. Linn. Soc. Lond., xiii, p. 18)

This species has not been retaken since the original description, and is known only from Georgia.

Body pale, rather faintly tinged with red. Head with the upper carinae straight and snowy-pollinose. Eyes golden. Antennae lacking in the type specimen. Elytra with a broad, subarcuate band, widening at apex, and with five blackish dots on top, three on the vitta itself; veins reddish. Wings rather milkish and iridescent.

THE GENUS *AMALOPOTA* VAN DUZEE

This genus is very near *Anotia* and forms a connecting link between it and *Otiocerus*. It is difficult to distinguish from *Anotia* in a key but is more definitely marked in coloration than the latter, and has a somewhat broader costa and the apical cells are a little longer and more regular.

There have been only two species described in the genus,

both of which have been taken by the writer in Mississippi. A third species is here described for the first time.

Members of this genus hold their wings in a characteristic horizontal position backwards. So far as is known they are all bush and tree-loving forms with a number of different hosts.

Key to the species.

- Color pale sanguineous, elytra transparent milky-white, dusky at base.....*mcateeii* Dozier
Color pale sanguineous, elytra transparent with basal third and a broad band before the apex, fuscous.....*uhleri* Van D.
Color pale yellowish-white, elytra smoky, twice banded with white, hyaline areas reflecting iridescence.....*fitchii* Van D.

Amalopota uhleri VAN DUZEE

(1889 Can. Ent., xxi, p. 178)

Recorded from Ont., N. Y. and Ill.

Beautifully marked species. Pale sanguineous, elytra transparent with the basal third and a broad band before the apex fuscous, the latter marked with sanguineous towards the costa. The whole insect, when fresh, covered with a white bloom, most conspicuous on the face and abdomen.

Body color sanguineous, the head, thorax and antennae fulvous, the abdomen deep sanguineous. Head, viewed from the side, with carinae and vertex gradually rounded; vertex very narrow, the carinae crested with white, rostrum pale. Eyes greenish-brown. Ocelli pale. Antennae of the female pale reddish-brown, cylindrical, reaching to the tip of the head; the second segment somewhat compressed, a little widened at the apex, which is obliquely and concavely truncated for the reception of the seta or bristle; in the male this second segment is a little longer and wider than in the female, and is more compressed, with the margins thickened and the surface more distinctly papillated; a minute notch, almost at the end, bears a bristle which is a little longer than the width of the segment. Pronotum widened to an almost quadrangular scale behind the eye; the central carina of the scutellum inconspicuous, the lateral carinae almost obsolete. Elytra, when closed, extending about two-thirds of their length beyond the abdomen, transparent, the basal third smoky-brown excepting the humerus and costal region; a broad brown band occupies the apical third of the costa, and narrows to about one-half of this width at the internal apical angle, omits six of the apical areoles; the veins are sanguineous within the limits of the brown, apical band, and in the stigmal region are broadly bordered with the same color; there are veins of this color also in the basal brown

patch, elsewhere they are concolorous with the transparent elytra. Wings clear, with fuscous tip and area at base smoky, slightly diffused. Legs clear whitish, the posterior femora more or less invaded with sanguineous.

Length of body 3 mm.; length to tip of elytra 8 mm.; elytral expansion 15 mm.

Beaten by Van Duzee from maple in the state of New York. Two specimens were taken by C. J. Drake at Gainesville, Fla., May 4, 1918. The writer took several specimens in deep deciduous woods, one of these on the underside of a wild cherry leaf at Port Gibson, Miss., July 21, 1921, and a specimen was taken by C. J. Drake at Natchez, Miss., July 23, 1921. Mr. Geo. G. Ainslie collected a specimen sweeping in woods at Nashville, Tenn., Sept. 13, 1915.

Amalopota fitchi VAN DUZEE
(1893 Can. Ent., xxv, p. 280)

Recorded from N. Y., Pa., N. C., and Kansas.

Slightly smaller than the preceding and differently marked in coloration. Pale yellowish-white, the elytra smoky, twice banded with white, iridescent reflecting.

Body color pale yellowish-white, the sides of the face with a faint transverse carmine band between the base of the antennae and the eye which is extended along the sides of the thorax where it becomes darker. Vertex slightly shorter and broader posteriorly than in *uhleri*, hind margin very feebly emarginate, apex of the pronotum not advanced beyond the base of the lateral carinae; the vertex, if viewed from the side, is more angularly and slightly farther produced than in *uhleri*, and with a more conspicuous notch at the base of the clypeus. Antennae distinctly reddish in color, long, flattened, slightly narrowed at base, obliquely cut off at tip, with the setigerous notch deeper than in *uhleri*. Eyes black. Ocelli apparently lacking. Beak attaining the apex of the hind coxae, the tip black. Elytra, when closed, extending about two-thirds of their length beyond the abdomen, fuscous; a basal yellowish spot on the costa including the rounded elytral appendage; beyond this are two rounded spots, a broad transverse median band not touching the costa, and a large angular spot on the third and fourth subapical areoles sending a branch to the apex of the costa and another to the middle of the apical margin, whitish-hyaline; the narrow costal area white with four brown spots, the stigmatal deeper and crossed at apex by a heavy carmine veinlet; the venation nearly the same as in *uhleri* but with fewer apical areoles, these being ten in number from the tip of the clavus to the apex of the subcostal nervure; subapical areoles six, of which the first (outer) is large and oblong, the second small and triangular,

and the third the longest; venation white except carmine red in the stigmatal region. Legs pale yellowish-white.

Length of body 2.5 mm.; length to tip of elytra 6 mm.; elytral expansion 11 mm.

A specimen was taken by the writer while beating at Weir, Miss., July 14, 1921. Mr. George G. Ainslie collected this species by beating at Hurricane Mills, Tenn. The wild cherry and hickory have been recorded as host plants.

Amalopota mcateei, new species

Resembling *A. uhleri* very closely but lacking the red bands on the elytra.

Body pale sanguineous, the abdomen distinctly red, the vertex and thorax pale testaceous. Antennae pale, usually tinged with reddish, the second segment long and flattened. Head, viewed from the side, with vertex and carinae gradually rounded. Eyes dark brown to black. Ocelli lacking. Elytra, when closed, extending about two-thirds of their length beyond the abdomen, translucent, subhyaline, pale milky-white in color, faintly dusky at base; the veins pale, becoming sanguineous at the base of the elytra; the inner margin at apex sometimes with faint traces of sanguineous. Wings transparent, the veins pale, faintly sanguineous at their base. Legs yellowish. The hind femora more or less invaded with sanguineous.

Length of body 2.50-2.75 mm.; length to tip of elytra 5.75-6 mm.; elytral expansion 11 mm.

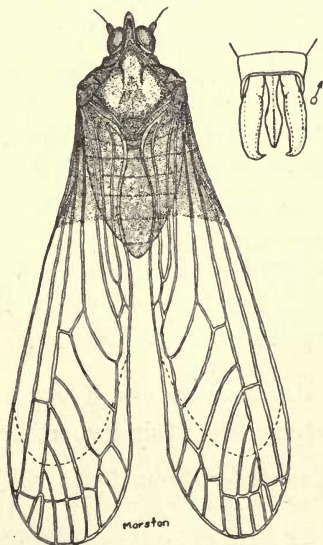


Fig. 33—Adult *Amalopota mcateei* Dozier, greatly enlarged (original).

Described from a series of three males and a female taken by the writer on the underside of leaves of ironwood, *Carpinus caroliniana*, at Yokena, Miss., July 20, 1921, and a female taken on the underside of a leaf of the French mulberry, *Callicarpa americana*, at Vicksburg, Miss., July 18, 1921.

Following the time-honored custom of dedicating species in the Derbinae to prominent hemipterists I take pleasure in naming this interesting species after W. L. McAtee who has contributed much to our knowledge of the group.

THE GENUS ANOTIA KIRBY

This genus was erected in 1819 by Kirby with *Anotia bonnetii* as the type. It is characterized chiefly by the great length of the antennae, which are long and more or less cylindrical in some species and in others flat on both sides and notched at the tip to receive the seta, and all are destitute of basal appendages. In all of the North American species known there are a number of oblique sanguineous veinlets along the costal margins of the elytra towards the apex. *Anotia* species are very gauzy-winged and are extremely delicate.

Members of the genus are rare, usually being collected one or two specimens at a time at long intervals; hence the writer does not have material adequate for preparation of a key and uniform descriptions. Seven species were described in the "Biologia Centrali-Americana" and there have been six described from the United States.

Most of these, so far as known, are bush and tree-inhabiting forms and are found in low humid deciduous woods. Fitch states that his *westwoodi* is met with frequently upon grasses and on willows in lowland meadows in New York from August until the end of the season.

Anotia bonnetii KIRBY

(1819 Trans. Linn. Soc. London, xiii, p. 21, fig. 1)

This species is recorded from Ont., N. Y., Ga. and Kansas.

Body pale. Head triangular, with a golden line leading from the eyes to apex of the rostrum. Eyes pale. Antennae longer than the

head. Elytra pale clear yellowish, spotted hyaline; an oblique nerve behind the middle black, costa towards the apex with fine transverse, sanguineous veins; on the apex itself are four blackish dots. Wings subhyaline.

Elytral expansion about 11 mm.

Nothing is known of its food plants or life history.

Anotia westwoodi FITCH

(1856 Trans. N. Y. State Agr. Soc., xvi, p. 394)

Recorded from New York, Ohio, and Kansas.

This species was for a long time confused with *bonnetii* but the elytra have no tint of yellow and none of their veinlets are black.

The original description is here quoted.

"Differs from *Bonnetii*, in that the wing covers have no tint of yellow, and none of their veinlets are black. The veins and veinlets are pallid, and for the most part are broadly margined with pale brown, which color also forms an irregular band before and another behind the middle, leaving large whitish hyaline spots in the intervals. The rib vein commonly shows three or four blackish alternations forward of its middle, and there is also a short black streak upon the middle of the inner margin. The wings are whitish hyaline with a blue iridescence, and their veins are slender and whitish with the veinlet at the apex of the outer discoidal cell robust, black, and slightly margined with brown. The thorax is pale yellow, smooth and shining, with three elevated white longitudinal lines.

Length 0.15; to tip of the wings 0.25; width 0.45."

Anotia burnetii FITCH

(1856 Trans. N. Y. State Agr. Soc., xvi, p. 395)

Recorded from New York, No. Car. and Illinois.

Very closely related to *bonnetii* but readily distinguished from *westwoodi*, *bonnetii*, and *robertsonii* by having a black strip above along the middle of the three first segments of its abdomen. Body white. Elytra milky-white, subhyaline, with faint clouds of a more dusky tinge forming about three imperfect bands; the three veinlets on the disk blackish. Same size as *bonnetii*.

Fitch states that a single specimen was taken by Albert G. Burnet, upon ash bushes beside the Henderson river in Illinois. The writer took a female on a French mulberry (*Callicarpa americana*) on a hillside near Vicksburg, Miss., July 18, 1921, and several on the underside of leaves of

ironwood, *Carpinus caroliniana*, at Yokena, Miss., July 20, 1921. These specimens were compared with material in the Ball collection determined as this species.

Anotia robertsonii FITCH

(1856 Trans. N. Y. State Agr. Soc., xvi, p. 395)

Fitch states "Very similar to the *Burnetii*, appearing to differ only in having the tips of the antennae and its feet blackish or dusky and the back of the abdomen white without any blackish discoloration. Two specimens sent me from west of Arkansas, by W. S. Robertson."

The species has never been re-taken since the original collection.

Anotia Kirkaldyi BALL

(1902 Can. Ent., 34, p. 259)

The original description is here quoted.

"Form and general appearance of *Amalopota fitchi*, but broader and less definitely marked. Form of *A. Burnetii*, but with a sharp head and blunter elytra. Length, including elytra, 6.5 mm.

Vertex slightly broader than in *Burnetii*, inclined upward, nearly flat, not rounding over at apex as in that species; elytra broader towards apices than in *Burnetii*; venation very similar, but with the median nervure not forked beyond the cross-vein, and the first branch of the post-costal nervure coming off close to the cross-vein and at nearly right angles to the nervure. Costal appendix larger than in *Burnetii*, obliquely truncate posteriorly.

Color: pale creamy, slightly tinged with testaceous, a pale testaceous stripe runs from the eye forward to the apex of vertex, and another from below the eye downward to the front; elytra milky subhyaline, a faint smoky or testaceous spot near base, a smoky transverse band half way to apex of clypeus, another partial band extending to the sutural margin, down the median to the cross nervure, and then out that to the post-costal; beyond this nearly all the nervures are broadly smoky margined, leaving a light patch in each anteapical cell and a light spot on apex of each apical nervure; the costal margin beyond the middle, the costal nervures, the apical margin, the apical nervures, except their apices and a section of the postcostal beyond the cross nervure, testaceous.

Described from a single specimen collected by the author, at Ames, Iowa."

A specimen collected by the writer at Lucedale, Miss., Sept. 11, 1920, was compared with the type in the Ball collection and although slightly lighter in markings, probably is this species.

Anotia Sayi BALL

(1902 Can. Ent., 34, p. 259)

The original description is here quoted.

"Resembling *Burnetii* in form, but much larger, as large as *Otiocerus*. Costal appendage very long; color yellowish; elytra white, with a transverse fuscous band before the middle. Length, 11 mm. to the tip of elytra.

Vertex but little rounded above, the apex slightly rounder than in *Kirkaldyi*. Second joint of antennae very large, consisting of a long, flat plate thickest on the margins and studded with fine knobs; elytra very large, venation as in *Burnetii* nearly, the outer branch of the median nervure straight, the cross nervures at the apices of the elytra in a straight line; costal appendage as long as the second joint of antennae, strap-shaped towards apex, the posterior margin nearly straight, anterior margin sloping off to the base of the costa; the whole appendix curved back across the corium, with the apex on the claval suture.

Color: pale straw; eyes black; elytra milky at base, a fuscous band at one-third the distance from base, beyond this subhyaline, with the nervures faintly brown as far as the apical nervures. Posterior margin of appendage, and sometimes a spot near the outer corner of scutellum, fuscous.

Described from two females collected at Albion, N. Y., by E. P. Van Duzee."

THE GENUS *MYSIDIA* WESTWOOD

Many of the members of this genus closely resemble certain whitish geometrid moths. They run very swiftly on the upper surface of leaves or when caught in a net, with their wings partially raised. The genus is a tropical one, at least nine species occurring in Central America.

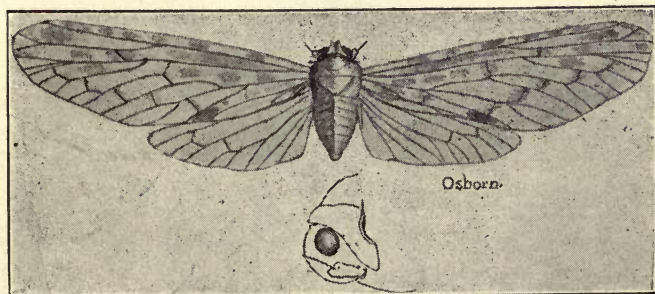


Fig. 34—Adult *Mysidia mississippiensis* Dozier, enlarged (original).

Heretofore no species has been reported from North America.

For the most part members of this genus are white and more or less opaque; the head is narrow and compressed; the antennae have the first joint short, the second large and swollen, more or less pointed or truncate, the third consisting of a fine seta; the elytra are very long and rather narrow, much larger than the wings, both vitreous, with the veins very light in color with occasional more or less obscure markings. One of the best characteristics is the large number of long, narrow, and very regular apical areas.

Mysidia mississippiensis DOZIER
(1922 Ohio Jr. of Sci., xxii, p. 82)

Head, antennae, pronotum and scutellum yellowish, covered more or less with whitish powder, the abdomen with greenish tinge. Head very narrow, compressed, distinctly produced before the eyes and plainly longer than the pronotum. Eyes dark brown. Pronotum narrow with the sides flaring-like. Elytra and wings translucent, of a milky-white color, venation distinctly but not strongly marked; the elytra long and rather narrow, with very light fuscous areas especially along the transverse veins and a distinct fuscous patch near the middle of posterior margin. Abdominal plates meet in a median ridge. Legs very slender, testaceous.

Length of body, male 2.50, female 3 mm.; elytral expansion, male 15, female 17 mm.

Described from a female taken by the writer while sweeping *Arundinaria tecta* and grass in Okatibbee Swamp near Meridian, Miss., Aug. 14, 1921, and a series of two females and a male taken by C. J. Drake in a swamp near Leland, Miss., Sept. 15, 1921. Four adults were taken by W. G. Bradley and T. H. Jones at Magnolia, La., June 11, 1923.



Fig. 35—Adult Delphacid, *Kelisia axialis* Van Duzee, greatly enlarged (original).

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GLOSSARY OF TERMS USED

- Anterior:** In front of; before.
- Apex:** That point furtherest removed from the base.
- Apical:** At, near, or pertaining to the apex; usually of the wing.
- Areole:** The cells of the tegmina or elytra and underwings.
- Arcuate:** Bow-shaped; curved like a bow=arquate.
- Callosities:** Thick swollen lumps, harder than its surroundings; also a rather flattened elevation not necessarily harder than the surrounding tissue=callous; usually occurring on the metopidium in the Membracidae.
- Carinae:** An elevated ridge or keel, not necessarily high or acute.
- Carinate:** Having carinae; keeled.
- Castaneous:** Chestnut brown; bright red-brown.
- Cell:** Any space between or bounded by veins.
- Clavate:** Club-shaped, thickened at tip.
- Clypeus:** That portion of the head before or below the front, to which the labrum is attached anteriorly. Morphologically, the labrum.
- Coriaceous:** Thick, tough, leather-like.
- Commissural:** Connecting.
- Convergent:** Approaching or drawing together.
- Convex:** Opposed to concave; the outer curved surface of the prothorax.
- Costa:** The thickened anterior margin of any wing, but usually the elytra or primaries.
- Costal Area:** The area behind the costal vein.
- Costal Vein:** Vein running close to and parallel with the costal or outer margin, extending from base to the margin before the apex.
- Deflected:** Abruptly bent downwards.
- Dilated:** Expanded, widened, or enlarged.
- Disk: (disc)** The central upper surface of any part; the central area.
- Discal Area:** Relating to the disc of any surface or structure, meaning the more central portion.
- Dorsal:** Of or belonging to the upper surface.
- Dorsum:** The upper surface.
- Ecology:** The science of the interrelation of organisms to each other and to their surroundings.
- Elytron:** Singular of elytra; wing covers.
- Exterior:** The outside.
- Ferruginous:** Rusty red-brown.
- Flavous:** Yellow, approaching sulphur.

Glossary of Terms Used—Continued

- Foliate:** Leaf-like or resembling a leaf.
- Foliaceous:** Leaf-like or resembling a leaf.
- Front—(Frons):** The anterior portion of the head between base of antennae and below the ocelli; in systematic papers and morphologically considered the clypeus the vertical median area of the face.
- Fuscous:** Dark brown, running into black.
- Gena-ae:** The cheeks; includes that portion of the head on each side below the eyes, and extends to the gular suture.
- Genital Styles:** The paired claspers within the aperture of the pygofer and are variable in shape.
- Haplotype:** A type by single reference.
- Hinge:** Point of articulation of the elytral base with the thorax.
- Hirsute:** Hairy; clothed with long, strong hair.
- Humerus:** The shoulder.
- Hyaline:** Transparent or partially so, usually iridescent.
- Impunctate:** Without impressed points or punctures.
- Inermis:** Unarmed; without spines or spurs.
- Inferior:** Beneath, below or behind; a term of position.
- Infumed:** Clouded.
- Instar:** The period or stage between molts of the nymph or larva, numbered to designate the various stages.
- Inter:** Between, among.
- Intra:** Within.
- Interstice:** Space between two veins.
- Iridescent:** Reflecting the prismatic hues.
- Irrorate:** Marked with minute points; freckled.
- Logotype:** A type by subsequent designation.
- Lora-ae:** Those veins nearest the clavus are known as ulnar veins; those nearest the costa as radial.
- Median:** Referring to the middle.
- Metopidium:** The anterior declivous surface of prothorax in the Membracidae.
- Nervation:** Venation.
- Nervures:** Veins.
- Neuration:** Venation or nervation.
- Notched:** Indented, cut or nicked.
- Nymph:** The young or larval stage.
- Oblique:** Any direction between perpendicular and horizontal.
- Ocelli:** Simple eyes.
- Orthotype:** A type by original designation.

Glossary of Terms Used—Continued

- Ovipositor:** Female organ for egg deposition—in simplest form consists of two ventral valves, which on being spread apart, expose the two inner valves.
- Paratype:** Is every specimen of the series from which the type was selected.
- Pellucid:** Colorless or colored, but transparent.
- Penis:** Male genital organ, when visible projects ventral from below the lower margin of the anal tube.
- Penultimate:** Next to or preceding the last.
- Percurrent:** Running thru the entire length.
- Periphery:** The circumference or outer margin; the outline, or contour.
- Plates (Genital Plates):** Two long, somewhat rectangular pieces, which cover the penis and penis guides; vary considerably in size and shape.
- Pleura-ae:** The lateral sclerites between the dorsal and sternal portion of thorax; in general, the sides of the body between the dorsum and sternum.
- Posterior:** Behind, hindmost, coming after.
- Posterior Process:** The long drawn-out point or tip of the prothorax, a term much employed in the Membracidae.
- Pronotum:** The upper or dorsal part of the prothorax.
- Prothorax:** The first thoracic ring or segment, which bears the anterior pair of legs, but no wings.
- Pruinose:** As if covered with a fine dust or frost; powdery; hoary.
- Pseudotype:** An erroneous type designation.
- Pubescent:** Downy; clothed with soft, short, fine, closely set hair.
- Punctate:** With impressed points or punctures.
- Pygofer:** The last dorsal segment of abdomen, especially the lateral margins which appear in a ventral view.
- Scutellum:** The third dorsal sclerite of the meso—and meta—thorax; the triangular piece between the elytra at their base.
- Sectors:** The main longitudinal veins, usually running thru to the apex or apical margin, two or three in number and known as the 1st, 2nd and 3rd sectors, the 1st being the vein nearest the costa.
- Seta-ae:** A long stiff bristle or hair.
- Setose-ous:** Bristly or set with bristles.
- Sinuuous:** Wavy; curved in and out; undulating.
- Species:** An aggregation of individuals alike in appearance and structure, which mate with each other and reproduce themselves successfully in continued generations.
- Sternum:** The breast; the middle portion of the under surface of thorax between the coxal cavities.

Glossary of Terms Used—Continued

- Stigmatal Area:** Portion of the costal margin of a wing, usually at the end of the radius and marked by opacity, thickening or extra veined, frequently called the nodal veins.
- Stria-ae:** Longitudinal or transverse depressed line or furrow.
- Striate:** Marked with parallel, fine, impressed lines.
- Style:** Process at end of abdomen.
- Sub:** Nearly or in a slight degree; under or beneath.
- Subcostal:** Beneath or below the costa.
- Sulcus:** A furrow or groove.
- Supra:** Over; above.
- Supra-humeral:** Over or above the shoulders.
- Superior:** Above, upper, or in front of; a term of position.
- Suture:** A seam or impressed line.
- Symbiosis:** Used where two kinds of animals or plants live together, true symbiosis being where both parties to the relation benefit.
- Tarsus-i:** The foot.
- Tawny:** A brownish yellow, like the color of a tanned hide; may approach reddish-brown, tho paler.
- Tectiform:** Concealed; covered.
- Tegmina:** The wing covers, attached to the mesothorax.
- Testaceous:** Dull yellowish brown.
- Tortuose:** Snake-like; irregularly curved and bent.
- Truncate:** Cut off squarely at tip.
- Tuberculate:** With tubercles, pimples or chitinous buttons.
- Type:** A unique or single specimen selected from a series and labeled by the describer to represent his name and description; where both male and female are described, the first specimen described is designated as the holotype and the opposite sex as the allotype, the remainder of the series as paratypes.
- Ultimate:** Last or final.
- Undulate:** Wavy; curved in and out; sinuous.
- Valve:** A small transverse or generally triangular piece behind the last full ventral segment, at base of plates in male Homoptera.
- Variety:** Any departure from the normal type of a species which, while retaining the specific characters, is yet recognizably different because of climatic, seasonal, and other influences; may occur with the type form or as a geographical race; based principally on differences in coloration more than in structural ones.
- Venation:** The system of chitinous frame-work supporting the wings and covers; system of veins; nervation.
- Ventral:** Of or belonging to the lower or under surface.
- Vitreous:** Glassy, transparent.
- Vitta:** A stripe or band.
- Vittate:** Striped or banded.
- Wings:** The underwings or secondaries.
- Wing Covers:** The elytra or tegmina.

Dozier, H. L.

The Fulgoridae or
plant-hoppers of
Mississippi.

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