

THE SYSTEMATICS OF THE TRIBE PLECTODERINI
IN AMERICA NORTH OF MEXICO
(Homoptera: Fulgoroidea, Achilidae)

BY
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INTRODUCTION

THIS REVISION of the tribe Plectoderini in America north of Mexico is based on an evaluation of morphological characters and host associations. These small brown plant hoppers apparently feed on the juices of trees and shrubs as adults; as nymphs they are believed to feed on fungi. The thirty-two previously known species from this area have been referred to the genus *Catonia*. Eleven of these species are found east of the 100th meridian and twenty-one are described from California and Arizona. The eastern species had been treated by Metcalf (1923) but the western species had not been studied as a group. Eight new species are described.

A comparison made with the known West Indian and Central American faunas shows that three of the United States species belong in the genera *Opsiplanon* or *Momar*. Three new genera, predominantly western, (*Juniperia*, *Synecdoche*, and *Xerbus*), are established in this paper. Eight of the eastern species plus two western ones are retained in the genus *Catonia*. Thus the forty species belong to six genera.

The tribe has its greatest representation in the tropics, although comparatively few specimens have been collected from Central and South America. Hence a precise definition of the genera and their affinities await field work and analysis of tropical American material. For the present, eight presumably definitive generic characters are compared for each United States genus, and a discussion deals with similarities between species that may be of generic or subgeneric value.

An abbreviated synonymy is used in this paper, stating only the first publication of each name. The complete synonymy of each species is cited in Metcalf's "General Catalogue of the Hemiptera, Fascicle IV, Part 10 Achilidae" (1948). Recent papers not included in Metcalf's catalogue are preceded by a dagger in the Literature Cited section of this paper.

I have included all of the host data known to me, both nymphal and adult, either citing the literature or quoting the host label on the specimens examined. Host assignments are still tentative for the tribe as a whole although enough is known in two genera to have predictive value. Detailed distribution records are included for the species occurring in the western United States and Canada, west of the 100th meridian, where differences in elevation and rainfall make such information valuable. Following the custom of many biologists, and recognizing that no new species of Achilidae have been added to the fauna of the eastern United States since Metcalf's study of the Fulgoridae [Fulgoroidea] of the eastern United States in 1923, I report geographical distribution there by state only.

The figures and discussions of species are arranged in a sequence showing my

interpretation of their morphological affinities as well as can be done in a linear series. Unfortunately, the keys usually have not followed the same sequence.

ACKNOWLEDGMENTS

I am deeply appreciative of the support of Dr. Paul D. Hurd, Jr., Department of Entomology, my major professor, in all aspects of my research, and of the helpful comments of Dr. Robert L. Usinger, Department of Entomology, and Dr. William Z. Lidicker, Department of Zoology, all of the University of California, Berkeley.

I gratefully acknowledge the support of the National Science Foundation in the form of a Cooperative Graduate Fellowship for 1964-1966.

Four Homopterists unaffiliated with the university, Kathleen C. Doering, University of Kansas, Lawrence, retired; Ronald G. Fennah, Commonwealth Institute of Entomology, London, England; James P. Kramer, United States National Museum, Washington, D.C.; and David A. Young, North Carolina State University, Raleigh, have provided stimulation, encouragement, and information for my work on Fulgoroidea. Several collectors have been outstanding in gathering specimens of Plectoderini, especially in California. Without the material collected by Raymond H. Beamer, Dorothy J. and Josef N. Knull, and Philip H. Timberlake, the variation within species could not have been assessed. Dr. Timberlake is to be thanked especially for his many reports of host associations. Dr. Norihiro Ueshima, Department of Entomology, University of California, kindly analyzed specimens collected for chromosome study.

Finally, I am indebted to a great number of individuals and museums who graciously loaned material. The institutions are listed in alphabetical order by the abbreviations used to identify repositories of particular specimens cited later in the text; these are followed by the names of the individuals responsible for the collections.

- AMNH — The American Museum of Natural History, New York; Pedro Wygodzinsky
- ASU — Arizona State University, Tempe; Mont A. Cazier
- BC — Brimley Collection, Raleigh, North Carolina; David L. Wray, Jr.
- CAS — California Academy of Sciences, San Francisco; Edward S. Ross, Paul H. Arnaud, and Hugh B. Leech
- CDA — California Department of Agriculture, Sacramento; Richard F. Wilkey
- CIS — California Insect Survey, University of California, Berkeley; Jerry A. Powell
- CM — Carnegie Museum, Pittsburgh, Pennsylvania; George E. Wallace
- CNC — Canada Department of Agriculture, Ottawa; W. R. Richards
- CU — Cornell University, Ithaca, New York; Laverne L. Pechuman
- DD — Dwight M. DeLong, Ohio State University
- FDA — Florida Department of Agriculture, Division of Plant Industry, Gainesville; Frank W. Mead and Howard V. Weems
- I — Illinois Natural History Survey, Urbana, Illinois; Herbert H. Ross

- ISU — Iowa State University, Ames; Jean L. Laffoon
 KSU — Kansas State University, Manhattan; Norman Marston
 KU — University of Kansas, Lawrence; George W. Byers
 LACM — Los Angeles County Museum, Los Angeles, California; Fred S. Truxal
 and Charles L. Hogue
 LBS — California State College, Long Beach; Elbert L. Sleeper
 MCZ — Museum of Comparative Zoology, Harvard University, Cambridge,
 Massachusetts; John F. Lawrence
 NCU — North Carolina State University, Raleigh; David A. Young
 OS — Ohio State University, Columbus; Paul H. Freytag
 OSU — Oregon State University, Corvallis; John D. Lattin
 PC — Pomona College, Claremont, California; Dwight Ryerson
 PT — Philip H. Timberlake, University of California, Riverside
 RF — Robert A. Flock, Imperial County Department of Agriculture, El
 Centro, California
 SD — San Diego Museum of Natural History, San Diego, California; Charles
 Harbison
 SJS — San Jose State College, California; J. Gordon Edwards
 UA — University of Arizona, Tucson; Floyd G. Werner
 UBC — University of British Columbia, Vancouver; Geoffrey G. E. Scudder
 UCD — University of California, Davis; Arthur T. McClay
 UCR — University of California, Riverside; Evert I. Schlinger
 UM — University of Minnesota, St. Paul; Ke Chung Kim
 USNM — United States National Museum, Washington, D.C.; Richard C.
 Froeschner and James P. Kramer
 UW — University of Wisconsin, Madison; John T. Medler

In addition:

Warren T. Atyeo, University of Nebraska, Lincoln
 Robert J. Lavigne, University of Wyoming, Laramie

The photographs used in the frontispiece were taken by my husband, and I wish to thank him.

HISTORICAL REVIEW

The genus *Catonia*, into which all Plectoderini from the United States and Canada were placed prior to this paper, was established by Uhler (1895) for a new species, *intricata*, from St. Vincent (Lesser Antilles) and two species from the United States as follows: "The generic name given above is derived from that of the great tract of land belonging to the Caton family in Maryland, where *Flata* (*Catonia*) *nava*, Say, occurs, and where another species, *Cixius* (*Catonia*) *cinctifrons*, Fitch, abounds in autumn upon the white hickory and oak trees." *Catonia* was placed in the family Achilidae Stål (1866) by Van Duzee (1907).

The first species now regarded as a *Catonia* was described as *Flata nava* by Say (1830) with two varieties. (One, var. b, was subsequently recognized as *C. impunctata*.) The species *nava* was moved from genus to genus, first to *Poeciloptera* [sic] by Schaum (1850), then to "*Phypia* (?)" by Van Duzee (1890), then to *Helicoptera* by Osborn (1892) and finally was assigned to *Catonia* by Uhler (1895).

The second and third species were described by Fitch as *Cixius impunctatus* (1851) and *Cixius cinctifrons* (1856). Van Duzee (1890), in his synonymy of the Homoptera described by Say and Fitch, placed *nava*, as mentioned, in "*Phypia* (?)," placed *impunctatus* in *Myndus*, and left *cinctifrons*, which he had not seen, in the genus *Cixius*.

Van Duzee (1910b) completed the transfer of species from other genera to *Catonia* by including seven or nine species that had been previously described from Central America. Of the species treated in the *Biologia Centrali-Americana* he stated that the following seemed to belong to *Catonia*: *Helicoptera sobrina* and *chiriquensis*; *Plectoderes basalis*, *excelsus*, *notatus*, *laticollis* [sic, *lapsus* for *lineaticollis*] and *fuscolineatus*, and possibly *montanus* and *asper*. Before the publication of the Metcalf catalogue (1948), *fuscolineata*, *rumex*, and *asper* had been transferred to other genera. Fennah (1950a) retains *chiriquensis* and *sobrina* as *Catonia*, returns *basalis* to *Plectoderes*, and erects new genera for *excelsus* (*Plectoringa*), *lineaticollis* (*Momar*), *notatus* (*Spino*), and *asper* (*Rupex*).

Since the establishment of the genus, twenty-nine new species have been described from the United States and Canada. The majority of these were described by Van Duzee (1908, 1910a, 1910b, 1912, 1914, 1915, 1916b, 1917, and 1918). Metcalf described four eastern species (1923) and Ball (1933) described five species from California and Arizona.

To the three species already mentioned from Central America and the West Indies, twenty-four have been added. Osborn described *rufula* from Cuba (1926) and *cinerea* from Puerto Rico (1935). Meanwhile Dozier had described *haitiensis* from Haiti (1931). Wolcott described *antillicola* from Puerto Rico (1936). Caldwell (Caldwell and Martorell, 1951) described *arida* and *dorsivittata* from Puerto Rico. Finally, Fennah described *pallida* and *pallidistigma* from Trinidad (1945a) and in his generic revision of the Achilidae (Fennah, 1950a) described sixteen new species (five species from Central America, two from British Guiana, and nine and a new subgenus (*Pyren*), with one species, from the Lesser Antilles).

Keys to the genera of Achilidae may be found for Panama (Metcalf, 1938), for Puerto Rico (Caldwell and Martorell, 1951), for Japan (Ishihara, 1954), for China (Fennah, 1956b), for the Pacific (Fennah, 1956a), for Africa (Synave, 1959) and for the world (Fennah, 1950a). The latter is complete except for ten genera described since, which are *Quadrana* and *Martorella* (Caldwell and Martorell, 1951); *Leptarciella* (Fennah, 1958b); *Epiusanella*, *Kawandella*, and *Nyonga* (Synave, 1959); and *Afrachilus*, *Indorupeus*, *Nephelesia*, and *Rhotaloides* (Fennah, 1965).

The only key to species of *Catonia* outside the United States is given for the four Puerto Rican species in Caldwell and Martorell (1951). Several keys have been published for species in the eastern United States. Van Duzee keys seven species (1908), twelve species (1910b), and seven species from Connecticut (1923). Metcalf's key to twelve species (1923) still includes all of the species of the United States and Canada east of the 100th meridian. Dozier keyed seven species found in Mississippi (1928) and Osborn nine species from Ohio (1938). Osborne also figured the male genitalia, laterally and ventrally, for seven species.

Essentially these keys overlap, all including *grisea*, *impunctata*, *nava*, and *picta*; all but Van Duzee (1908) including *cinctifrons* and *dimidiata*; and all but Dozier treating *pumila*.

The type-species of *Catonia* Uhler has been regarded in Van Duzee's and Metcalf's catalogues as *nava* Say, from Van Duzee's designation in his 1916a checklist. Actually, as Fennah (1950a) states, the earliest type designation was by Van Duzee in 1908 when he stated "all, including *intricata*, the type species. . ."

NOTES ON ECOLOGY, LIFE HISTORY, AND BEHAVIOR

FOOD

The adults of North American Plectoderini feed on the sap of trees and shrubs. Although the degree of host specificity is not known, at least three species (*Juni-peria producta*, *J. indella*, and *Syneccoche rubella*) appear to be able to feed on more than one species of plant as their range of distribution is broader than that of any single host on which I have found them in numbers.

The nymphs are believed to feed on fungi. Two *Syneccoche nemoralis* nymphs were reared to the adult stage in a petri dish containing three species of fungi on wood. (Dr. Isabell Tavares, University of California, identified them as *Corticium atrovirens* Fr. or *caeruleum* Fr., a basidiomycete, and an unknown.) Nymphs have been collected under rocks (*S. grisea*), on polyporid fungus under bark of dead pine (*Catonia bicinctura*), under bark of standing dead *Pinus virginiana* (*Catonia* spp., Howden and Vogt, 1952), deep in a rotten log (*S. nemoralis*), by Berlese funnel from rotten logs of *Pinus muricata* (*S. nemoralis*), in Berlese samples from redwood duff (Plectoderine species, Mill Valley, Marin County, California), and from *Arctostaphylos* spp. duff (Plectoderine species, Fresno, Lassen, and Siskiyou counties, California).

ASPECTION

The species of Plectoderini in the United States and Canada are assumed to be univoltine in the absence of evidence to the contrary. Collection records indicate that the adults are usually present after a rainy period, summer or early autumn in the east, late summer and early autumn in Arizona, spring in the coastal regions of California, summer in the Sierra and Great Basin. At least some species overwinter as nymphs, as indicated from their presence in Berlese samples from frozen *Arctostaphylos* duff. However, the stages of the life cycle of a population are not closely synchronized, and adults usually are present over a period of several months, although individual life spans are not thought to be this long. For example, a population of *Syneccoche nemoralis*, 1 mile S.E. Inverness, Marin County, California, was present as very small nymphs and adults on January 18, 1963, and adults were collected at intervals until June 15. Thus, the adult population may exist over a five-month period in one locality.

BEHAVIOR

Many species have been collected in light traps, and night may be their period of greatest flight activity; they may be swept from branches during the day. All

eight eastern species of *Catonia* have been collected at light, as have *Opsiphanon* and both species of *Momar*. *Synecdoche helenae* and *S. impunctata* are the only species of *Synecdoche* so reported; and *Xerbus* and *Juniperia* species have not been reported at light. Flight activity at dusk has been observed for one species, *S. helenae*. In the daytime, adults may be beaten, in moderate numbers, from the dead leaves of the "skirt" of fan palm, *Washingtonia filifera*, and they will fly back to the plant if so disturbed, but none are to be found on the green leaves. However, at dusk in Deep Canyon, Boyd Desert Research Center, Riverside County, California, individuals were observed flying up to the green leaves and several specimens were collected on them. As it grew darker, great numbers moved to the green leaves and when the leaves were disturbed, the insects flew out and around the tree in a swarm; earlier in the day they had not circled, but had flown directly to a substrate. This, of course, may not be an indication of nocturnal activity of the tribe, but an adaptation to living in the desert, a means of preserving moisture by resting during the heat of the day in a shaded spot protected from the wind.

Both *Momar maculifrons* and *Juniperia indella* have been found on tree trunks in numbers after sweeping the branches, although preliminary examination of the trunk revealed only one specimen, *J. indella*, partially hidden under a loose piece of bark. Whether they were returning to the trunk to hide during the day or just landing on any substrate is not known. They walk, jump, and fly readily, day or night, and one specimen of *Catonia bicinctura* has been collected 400 feet in the air in daytime (Glick, 1939).

HOST ASSOCIATION

The paucity of host records leaves the problem of host specificity unsolved. Feeding has been observed only when specimens have been collected in comparatively large numbers: *Synecdoche helenae* on green *Washingtonia filifera* leaves, *S. nemoralis* on *Pinus muricata*, *Juniperia unimaculata* on *Juniperus californica*, and *J. indella* on *Juniperus occidentalis*. While a Plectoderine species may be collected from many different plants in a heavily wooded area, nevertheless the greatest number of individuals will be taken from a single plant species. Van Duzee (1916b) noticed this with *S. nemoralis*. Similarly the widespread *S. rubella*, is most frequently associated with species of manzanita (*Arctostaphylos*) but it may be taken from other plants as well, including madrone (*Arbutus menzesii*), another red-barked plant.

On the other hand, at least in the genus *Juniperia*, it is not uncommon to find two species on the same plant. In fact, four of the five species have been collected on *Juniperus californica*, and the other species occurs in Arizona, where this juniper does not grow. In one case, *J. unimaculata* and *J. indella* were collected together on one tree along the Panoche Pass road, 17 miles east of Paicines, San Benito County, California, and both species were found again on an individual tree on the eastern side of the pass repeatedly. However, one month earlier only *J. indella* had been found in the same locality, so there may be some temporal isolation. This is not considered evidence that these species always share hosts or have evolved on the same host. *J. indella* has been collected in large numbers

on *Juniperus occidentalis* on the east side of the Sierra. This may have been its original host and *J. californica* may be an adventitious host. In the other case, *J. producta* and *J. succinea* were found on a single specimen of *Juniperus californica* along the Bartlett Springs Road above Lucerne, Lake County, California. This tree was the only juniper seen from the road in five miles. *J. producta* and *J. succinea* have also been taken together on *Libocedrus decurrens*, four miles west of Mineral, Tehama County, California. *J. majuscula* has been collected on *Juniperus deppeana*. Thus, all the species of *Juniperia* have been found on juniper, although some apparently live on other Cupressaceae as well. Other host records are listed in the discussion of the species.

Host predictions for genera other than *Juniperia* are tentative at present. However, the more frequently recorded host associations are given here. Complete records are listed, with locality, date, and collector in the species discussions.

With approximately fifty host records on specimens of the ten species of the genus *Catonia*, it is unquestionably too soon for a definitive report. Nevertheless, three species, *arbutina*, *bicinctura*, and *picta*, have host labels only citing pine. *C. arbutina* is reported from *Pinus cembroides* and has not been collected in any Arizona mountain range where this pine does not grow. The distribution maps of *bicinctura* and *picta*, however, do not coincide with that of any of the pines mapped by Critchfield and Little (1966). Two species, *cinctifrons* and *pumila*, are reported from pines, oaks, and hickory, and *lunata* from pines and oaks, but three species, *carolina*, *nava*, and *pini*, have not been reported from any of these three plants. *C. carolina* has been reported from a peach-orchard trap and beaten from a dead beech limb. *C. nava* has been reported from *Cornus*, sycamore, on trunk of a small maple and an ant nest. *C. pini* is reported from wild indigo, *Baptisia tinctoria*. No host labels accompany the specimens of *C. texana*. All of the species except *C. arbutina* and *C. texana* have been taken in light traps.

The hosts of *Opsiplanon* and *Xerbus* are unknown. *Momar* has been found abundantly on sycamore, *Platanus wrightii*, and more sparsely on oaks in Arizona, with a few specimens taken on grapes and other plants. I collected *Momar maculifrons* from both sycamore and oak, and *M. fumidus* only from sycamore.

In the genus *Syneccoche*, a number of species in two species-groups have been associated with manzanita. The *albicosta* species group of eight species, all from California, has four species, *albicosta*, *nervata*, *pseudonervata*, and *rubella*, reported from manzanita (as well as other plants). Two, *costata* and *flavicosta*, have no host records. Van Duzee (1918) reports *necopina* as probably from cypress, and *cara* has been taken from three host species, none manzanita.

A second species-group of *Syneccoche*, the *fusca* group, comprised of five species from California and Arizona, has had the host reported as manzanita in two species, *fusca* and *irrorata*. The type series of *clara* was taken on *Baccharis*, and the hosts of *bifoveata* and *tricolor* are unknown. This group is morphologically varied, however, and large series of specimens have not been taken from the reported host except of *clara* on *Baccharis*; thus, it may be too soon to generalize.

The two other species-groups of *Syneccoche*, the *grisea* and *impunctata* groups, of four species each, are not as closely united as the above groups, either morphologically, geographically, or by what is known of host preferences. Both have

representatives in the eastern and western United States. *S. constellata* and *nemoralis*, from California, have been reported on pine and douglas fir. *S. ocellata* was reported on California laurel. Of the three eastern species *S. grisea* has been reported from basswood, *S. impunctata* from oak and *Prunus* and *S. dimidiata* from pine and beech. *S. helenae* is the only member of these species groups repeatedly associated with a single host, this being the fan palm, *Washingtonia filifera*. Two specimens from native palms in Mexico have been seen.

The clear reddish brown color of *Synecdoche rubella*, which is commonly associated with red-barked plants, leads to the supposition that protective coloration is involved. A number of other species such as *S. nemoralis* and *Momar maculifrons* blend well in color with the bark of their respective hosts. *Juniperia indella* is particularly noticeable in this regard, since the eastern Sierran population is a pale yellowish brown, matching the bark of *J. occidentalis* very well while the specimens from the Coast Range are much darker, as is the bark of *J. californica*.

Ecological studies such as those of Carpenter (1937, 1939), Adams (1941), and Dowdy (1951), list species of *Catonia* present in societies and strata. Carpenter (1939) lists *Catonia pumila* as missing in a burned prairie, as one would expect with nymphs in duff or rotten wood. Hoffman et al. (1949) concluded that airplane applications of DDT probably did not reduce the population of *Synecdoche dimidiata* in an oak-maple forest in Pennsylvania.

DISTRIBUTION

The family Achilidae is represented in the United States and Canada by three of seven tribes. Two tribes, the Myconini and Elidipterini, each contain one genus in this area, respectively *Epiptera* and *Uniptera*. *Epiptera*, a Holarctic genus with fourteen species in the United States and Canada, has not been recorded south of Texas and Florida. Nymphs are commonly found in colonies under bark, presumably feeding on fungi. Adults may be taken with the nymphs or beaten from trees. *Uniptera*, with one species, is known from fourteen specimens from southern California. The Plectoderini, the third tribe, contains six genera and forty species in the United States, of which six species have been recorded from Canada and four from Mexico.

The six species known from Canada are *Catonia nava* from Ontario, *Synecdoche constellata* and *S. nemoralis* from British Columbia, *S. dimidiata* from Ontario, *S. impunctata* from Quebec, and *S. grisea* from Ontario and Quebec. The specimens examined included representatives of four of these Nearctic species from Mexico: *C. nava* labeled Frontera, Tabasco, Mexico, June 1897 (Townsend); *S. costata* and *S. helenae* from Baja California, and *Momar maculifrons* from the state of Chihuahua.

Catonia is found in Central America, the West Indies, and the eastern United States and Canada, with one species in west Texas (*texana*) and one in the mountains of Arizona (*arbutina*). The eight eastern species all overlap in the southern coastal states. *C. pini* seems to be most restricted, being found from Louisiana to North Carolina, and to the tip of Florida. *C. picta* is recorded only from coastal states, Louisiana to Connecticut, and as far south as Highlands County, Florida.

C. nava is the only species recorded from Canada (Ontario). Three species, *nava*, *carolina*, and *cinctifrons*, appear not to extend south in Florida much further than Jacksonville, and *pumila* has no records further south than mid-Mississippi, Alabama, and Georgia. All of the species except *picta* and *pini* occur in Ohio. Five eastern species, all except *picta*, *pini*, and *bicinctura*, have been collected in Kansas. Only six states are well enough represented in the material I have seen for a negative record to have any meaning. These are, alphabetically, Arizona, California, Florida, Kansas, Ohio, and North Carolina. The species of *Catonia* found in the United States are very closely related and probably have evolved here from a single introduction from Central America or the West Indies. This group has speciated in the United States with variation in the genitalia and in the color pattern of the frons, tegmina, and mesonotum.

The second Plectoderine genus in the United States, *Opsiplanon*, is known from two species in Trinidad as well. *O. luellus* is found in Florida, Georgia, Texas, and Kansas. I have seen six individuals of an undescribed species from Central America.

The largest genus in the United States, *Synecdoche*, occurs trancontinentally, although only three of the twenty-one species, *grisea*, *dimidiata*, and *impunctata*, are present in the eastern United States. In western North America the majority of the species, seventeen, are known from California. Three of these are found in other states. *S. nemoralis*, the most widely distributed western species, has been collected from British Columbia, Washington, Oregon, California, Nevada, Colorado, Utah, and northern Arizona. A closely related species, *constellata*, is found in California, Washington, and British Columbia. A third species, *rubella*, is spread throughout California into Oregon. One species, *tricolor*, has been found in southern Arizona. This genus, pending further work on Central American material, is divided into four species groups. The species exhibit marked variation in host association and morphology and may represent several introductions from Central America or the West Indies, although two species groups, *albicosta* and perhaps *fusca*, may be endemic to California, Arizona, and the adjoining portions of northern Mexico, having speciated there on members of the genus *Arctostaphylos*, one of the elements of the Madro-Tertiary geoflora.

Xerbus is known from a single species from southeastern Arizona. Its host is not known. It is quite unlike the other genera in facies and little can be stated of its probable origin at present.

Momar is known from two species from Arizona and one from Central America. It is more closely related to *Synecdoche* than it is to any of the other genera, and it may be separated from *Synecdoche* only on the basis of color pattern, male genitalia, and the shapes of the female pregenital and seventh sternites. Both Arizona species are found in the Upper Sonoran and Transition zones on sycamore.

Juniperia, with five species, is found on Cupressaceae, *Juniperus* and *Libocedrus*, in California, Nevada, and Arizona; sometimes several species are found on the same individual tree (*indella* and *unimaculata* in Panoche Pass, California; *producta* and *succinea* near Mineral, California, and at Lucerne, California. This genus has a phallobase probably modified from a *Synecdoche*-like ancestor through a reduction of the dorsal lobe and a broadening of the lateral, as has occurred in

part in *Momar*. However, it is unlike the other Plectoderine genera in the United States in having the strut to which the aedeagal appendages are attached joined to the phallobase (fig. 127) rather than the clasps (fig. 95). *Juniperia* is at present unknown outside the United States, although *Juniperus* has a holarctic distribution.

Arizona is the only state where more than three genera are found; its southeastern mountains provide a habitat for five genera, all but *Opsiplanon*.

DESCRIPTIVE METHODS

Characters used to distinguish genera are numbered 1 to 8 in sequence from the head to the abdomen. Species descriptions are divided into structure and color patterns. Genitalic descriptions for species are omitted and one is referred to figures except in the case of *Catonia*, for which a key has been written. Color patterns are described macroscopically and then in microscopic detail. Finally, comparative notes discuss characters useful in the separation of each species from its closest congeners.

Measurements were taken with an ocular grid, the part being measured being positioned in a horizontal plane. The length of the insect was taken from the apex of the vertex to the tip of the folded tegmina. The length of the frons was taken along the midline from the base to the frontoclypeal suture; in cases where the frontoclypeal suture is indistinct at the midline (*Juniperia* and the *albicosta* species group of *Synecdoche*, especially) the length was measured down the midline to a hypothetical line joining the outer ends of the frontoclypeal suture. The width was measured at the widest part. The anteclypeus and postclypeus are treated as one unit, the clypeus. In three species, *Catonia pumila*, *Opsiplanon luellus*, and *Momar maculifrons*, the variation in color pattern on the frons is shown by illustrating one side with the darkest observed pattern, the other with the lightest. The vertex was measured and drawn with the disc of the vertex, not of the mesonotum, placed in a horizontal plane. The length was taken along the midline from the frontal carina to the base; the width taken across the widest part, at the posterior angles of the sides. Since the figures of the vertex, pronotum, and mesonotum were drawn with the mesonotum rather than the vertex in a horizontal plane, the measurements of the vertex will compare poorly with the illustrations. For example, in my drawing of the vertex of *S. rubella*, it appears about half as long as broad rather than 15/17, its actual measurement.

The length of the pronotum, measured along the midline, is compared to the length of the tegulae (see fig. 52). This comparison seems more meaningful than comparison of the pronotum with the length of the vertex, for the shape of the vertex is more variable in North American Plectoderini than the size of the tegulae. No estimates of the length of the mesonotum or its convexity along the sagittal plane were made since both vary with the position of the pronotum when the insect dies.

Tegmina and wings were removed from the insect, placed on slides under cover slips, and drawn with the aid of a microprojector. Measurements were made from the drawings.

Genitalia were examined by removing the whole abdomen, treating it overnight with 10 percent potassium hydroxide, and examining it in glycerine in a depression slide. A ridge of boric acid ointment was placed, with a pin, in the depression first and covered with glycerine. A part of the genitalia not critical to the study was placed in the ointment to hold the genitalia in position. The boric acid ointment was removed with xylene before storage of the specimen in glycerine. Claspers were drawn from the dorsal or internal side after being removed from the rest of the genitalia. They were much more easily positioned comparatively in this fashion. However, for convenience in using the figures, they are drawn as from a ventral view so that they may be compared with cleared intact genitalia. The phallobase shows interrelationships between species and genera most clearly in lateral view. Often it may be examined in cleared intact genitalia by pushing the claspers away ventrally. Figures of the phallobase show only the external characters of the left side and one or both aedeagal appendages. Any attempt to include both sets of paired structures, except the aedeagal appendages when they are not symmetrical, unnecessarily complicates the figures.

Whenever possible, specimens were preserved for karyotypic examination. Specimens, intact, were preserved in a modified Carnoy fixative, 1 part glacial acetic acid to 3 parts isopropyl alcohol. Dr. Norihiro Ueshima examined and interpreted the squash preparations stained with acetocarmine.

I have seen the types of all the species except those stated and have designated lectotypes of some of Van Duzee's species. He was preparing a paper designating types for his earlier species when he died. This paper was not discovered until after some lectotypes had been published by other authors. Except in one case (see *S. rubella*), I have chosen as lectotypes those specimens which he so labeled and placed in the type collection of the California Academy of Sciences.

SYSTEMATICS

The members of the family Achilidae in the United States are dorsoventrally flattened brown or tan Homoptera with the tegmina overlapping distally in repose. The Plectoderini are the smallest, measuring from 3.0 to 7.6 mm long, while the members of the other two tribes may range from 7 to 13 mm. The tribes may be separated as follows.

KEY TO THE TRIBES OF ACHILIDAE IN AMERICA NORTH OF MEXICO

1. Costal cell broad, at its widest point at least $\frac{3}{8}$ as wide as tegmen..... Elidipterini
- Costal cell narrow, never more than $\frac{1}{4}$ as wide as tegmen..... 2
2. Head including eyes less than $\frac{3}{8}$ as wide as pronotum..... Myconini
- Head including eyes at least $\frac{3}{8}$ as wide as pronotum..... Plectoderini

TRIBE PLECTODERINI

This nearly cosmopolitan tribe consists of approximately seventy genera, of which twenty-eight occur in the New World. Of the New World genera, six, *Plectoderes*, *Phypia*, *Koloptera*, *Amblycratus*, *Opsiplanon*, and *Catonia*, and now *Momar*, *Syneccoche*, and *Juniperia*, have more than one species; the others are monotypic. *Catonia*, before this revision, contained sixty described species. Cen-

tral and South American forms of this family are virtually unknown; Fennah worked on Distant and Fowler's material in the British Museum, on material from the Naturhistoriska Riksmuseum, Stockholm, and his own material from the West Indies and South America.

Since Fulgoroidea in general are not an economically important superfamily and since so few specimens from South and Central America are known, the taxonomy of the group is still poorly investigated. Earlier authors used obvious characters such as an elongate head or carinate wing veins to define genera. Fennah, using the material at hand, usually a single specimen or two per species, proposed a generic classification of the known forms (1950a). He had more female than male specimens and used female genitalia as often as possible to set generic limits. Two genera, *Catonia* and *Plectoderes*, remained broadly delineated, and contained about three times as many species as the other twenty-three genera combined. Authors working on United States material, all before Fennah's 1950 paper, placed all species in *Catonia* although they at times compared them with forms from the *Biologia Centrali-Americana*.

I have had the opportunity of working with from three to over one hundred specimens per species, and have found more characters in male genitalia than in female. Some of my groups have been closely related morphologically with great differences between them and the others. In two cases, *Juniperia* and *Xerbus*, I have described these as new genera. The other species, once these are removed, appear to be more closely related morphologically. Here I follow Fennah in recognizing *Momar* and *Opsiplanon*. The remaining species fall into two groups, one closely related to the West Indian species of *Catonia*, which I retain as such, although it is possible that they, plus two or three West Indian species, comprise a subgenus distinct from the type of the genus and its closest congeners. The second group, more closely related to *Momar* than to *Catonia*, I place in the genus *Synecdoche*. This genus has a simple phallobase such as is found in genera throughout the world, whereas *Catonia* and *Plectoderes*, both with bifurcate medioventral lobes on the pygofer, both have a phallobase modified with spines. *Synecdoche*, as delineated here, is a very diverse group in such secondary characters as the shape of the vertex, in the occurrence of transverse incomplete veinlets in the wings, and in color pattern. I am retaining it as a single genus for the present because there is little differentiation in the phallobase and it almost certainly is related to species in Mexico and Central America that should be considered before an attempt is made to define the generic limits precisely. In short, I feel I have revised the generic concepts of the North American Plectoderini as conservatively as possible while still contributing somewhat to their understanding.

While generic problems remain in the family even in the United States, it is interesting to look forward to possible so-called "gamma" taxonomy. Variation in populations within the species occurs in *Synecdoche producta* and *S. indella* in the Sierra and the coast ranges. The morphological differences are described in the species discussions. Too few specimens are known to determine whether these differences are clinal, subspecific, or host-associated variation.

STRUCTURAL AFFINITY AND DISTINGUISHING FEATURES
OF THE GENERA IN AMERICA NORTH OF MEXICO

Although I consider characters of the male genitalia to be the most definitive, these and others will be considered in a sequence from head to abdomen.

1. The frons is $1\frac{1}{2}$ to 2 times as long as broad in *Juniperia*, raised at the base in a broad callus that unites with the lateral and median carinae to form an arch above each shallowly hollowed compartment of the disc. In the other genera the frons is $1\frac{1}{6}$ to almost $1\frac{1}{2}$ times as long as broad, and the disc varies.

2. The rostrum is long in *Catonia* and *Juniperia* and reaches the apex of the hind coxae. In *Opsiplanon*, *Momar*, and *Syneccoche* it reaches the base of the hind coxae. In *Xerbus* the rostrum is short, only as long as the clypeus.

3. The pronotum is longer medially than the tegulae in *Xerbus* and *Juniperia*. In all of the other genera it is as long as or shorter than the tegulae, except in the species *Syneccoche helenae*. Paired lateral marginal carinae running from the base of the tegulae toward the eye are present in *Catonia*, *Opsiplanon*, *Syneccoche*, and *Xerbus*. They are absent in *Juniperia* (1 is present in *producta*) and *Momar*.

4. Although in Fulgoroidea the venation often differs between the left and right tegmen or wing of a single specimen, it seems fairly conservative in the species studied. (a) In *Opsiplanon*, the Sc+R fork is near the stigma, with Cu_1 about level with the union of the claval veins; in *Catonia*, *Momar*, and *Syneccoche* it and the Cu_1 fork are about level, both slightly distad of the union of the claval veins. In *Xerbus* the Sc+R fork is basad of the Cu_1 fork, and sometimes basad of the union of the claval veins. Members of the genus *Juniperia* are quite variable in venation; in *J. producta* the Sc+R fork is near the stigma but the Cu_1 fork is at a level halfway between the union of the claval veins and the apex of the clavus; in *J. indella* the venation is similar to that of *Xerbus*; in the other species it is like that of *Syneccoche*. (b) The shape of the subcostal cell of the tegmen is diagnostic for the genus *Catonia* in the United States, although it varies in the West Indian species. It is slightly less than $\frac{1}{3}$ the length of the tegmen and wider before its apex (fig. 41). In *Opsiplanon* the subcostal cell is about $\frac{1}{6}$ the length of the tegmen and widest medially. In the other genera the cell is long and narrow (fig. 47), longer than $\frac{1}{3}$ the length of the tegmen in all except *J. producta*, *J. succinea*, and *J. majuscula*. Transverse incomplete veinlets (frontispiece, figs. c and f) occur in the wings of *Opsiplanon*, in two species-groups of *Syneccoche*, and in some individuals of *J. indella*.

5. The hind wing venation is simple with R two-branched, M two-branched, and Cu_1 three-branched in *Catonia*, *Momar*, and *Syneccoche* except *S. irrorata* (R simple, Cu_1 two-branched). It is reduced in *Opsiplanon*, with M two-branched and Cu_1 three-branched; and also reduced in *Xerbus* and *Juniperia* with M two-branched and Cu_1 two-branched. Again, because of individual variation, more than one specimen should be examined.

6. The hind tibia has a spine on its basal half in all of the genera except *Juniperia*, which lacks a spine. Some specimens of *Syneccoche fusca* have two spines, others have only one.

7. The medioventral lobe of the male pygofer is bifurcate in *Catonia*. It is thickened and convex medially with a trilobate apex in *Opsiplanon*. In *Syneccoche*, *Momar*, and *Xerbus* it is entire, rounded or triangular; and in *Juniperia* it is reduced or absent.

8. The phallobase, while showing marked modifications in these genera, seems to be modified from the following form. The phallobase is a hollow expandible cylinder made up, usually, of two dorsal lobes, two lateral lobes, and two ventral lobes. The three lobes on each side are fused together at the base; the ventral lobes are joined at the apex and appear as one, usually smoothly rounded at the apex and obscurely divided below with a slit or an inverted V; the dorsal lobes may be separate or joined to each other at the apex. The phallobase is held in place by two suspensorial arms connected to the base of the anal segment and two membranous connectives to the venter of the pygofer. The aedeagal appendages, two long rods, oval in cross section, ride in or out in a C-shaped groove (in cross section) on the inside of the lateral lobes; sometimes part of the dorsal lobe is contiguous and shaped to help guide them. The aedeagal appendages are joined at their base to a strut which attaches either to the base of the claspers or back to the phallobase. Finally, in one specimen of *S. impunctata*, a long cylindrical membranous sac (fig. 128), probably the endophallus, was found protruded from the phallobase, pushing the aedeagal appendages aside laterally. This sac, unornamented except for constrictions, stretches the phallobase into a larger circular cross section. This is possible since the dorsal and ventral lobes are expandible basally. (a) The strut of the aedeagal appendages, in all of the genera except *Juniperia*, is Y-shaped in ventral view and attached to the claspers and pygofer (fig. 95). In *Juniperia* it is curved and attached to the ventral lobe of the phallobase (fig. 127). (b) In *Syneccoche*, one finds the presumed primitive form of the Plectoderine phallobase; essentially the same form is found in many species and genera in Africa and Central America. From a lateral view the lateral lobe is most prominent, with the apex curved ventrad, the ventral lobes usually serrate, and the dorsal lobes simple, joined at the apex (figs. 103-122). *S. helenae* has the lateral lobe laterally expanded, not curving ventrad at apex, but it seems more closely allied to this genus than to the others (fig. 123).

Opsiplanon is very similar to *Syneccoche*, except the ventral lobes curve ventrad also, and the dorsal lobes are separate (fig. 102).

Catonia has the lateral lobes poorly pigmented, with the apex curving ventrad. The ventral and dorsal lobes are heavily pigmented; the ventral have three pairs of spines; the dorsal are variously serrate and joined at the apex (figs. 92-101). Since the figures are lateral views which show only the left half of the phallobase and one of each pair of spines, each pair will be referred to singly in the descriptions. The lateral and ventral lobes are bilaterally symmetrical, at times the dorsal lobes are not.

In *Momar* and *Juniperia*, the lateral lobes are expanded and the dorsal lobes are reduced or absent. *Juniperia* is very distinct, for its aedeagal appendages are attached to a curved strut which in turn is attached to the ventral edge of the phallobase. The lateral lobes of *Juniperia* are expanded dorsoventrally with a curved flange at the base, the ventral lobes are reduced to a membrane joining

the two lateral lobes at base and connecting to the anal flap, and the dorsal lobes are absent. The shape of the phallobase is so consistent in *Juniperia* that only one is figured (fig. 127).

Momar has the lateral lobes dorsoventrally expanded, with the suspensorial arm having a round end that appears to be fitted into a circular socket in the lateral lobe, rather than to be fused to it or to the ventral lobe. The ventral lobes are simple. The dorsal lobes are small and separate, each consisting of a knob with two short spines above the suspensorial arm connection and a long tail-like projection anterad along the aedeagal appendages.

Xerbus has the lateral lobes laterally expanded, with a flange along the dorsal edge, the ventral lobe simple, the dorsal lobe absent.

Eggs of *Juniperia indella*, *J. producta*, and *Synecdoche irrorata* and the United States species of *Catonia* are as described for *Catonia* by Fennah (1950a); ellipsoidal, twice as long as broad, with a peglike prominence at one end. In *Opsiplanon luellus* and *S. helenae* no such projection was seen. Other eggs were not examined.

The chromosome complement was studied in three species. The specimens of *Juniperia indella* were too old and only sperm were present. *Momar maculifrons* has 13 autosomes plus XO, with X precocious and reductional at first metaphase and equational at second. *Synecdoche helenae* has 13 bivalents. Halkka, who has done much work on chromosomes of Homoptera, has not studied Achilidae. Common numbers of other Fulgoroidea are, however, in the range of 10 to 18 bivalents, with 14 bivalents plus XO the most common. Both XO and XY mechanisms have been reported (Halkka, 1959, 1962).

Of perhaps greater interest is the observation that *Juniperia indella* has three testicular tubules; *Synecdoche helenae*, seven; *Momar maculifrons*, five; and Fennah has reported six in *Catonia* (probably *sanctae-luciae*) and *Amblycratus*. Further work is planned to determine whether these numbers hold throughout their respective genera.

KEY TO THE GENERA OF THE TRIBE PLECTODERINI
IN AMERICA NORTH OF MEXICO

1. Hind tibia with spine in basal half; medioventral lobe of male pygofer present (figs. 129-153); frons less than $1\frac{1}{2}$ times as long medially as broad (figs. 1-35).....2
Hind tibia without spine in basal half; medioventral lobe of male pygofer reduced or absent (fig. 154); frons $1\frac{1}{2}$, usually 2 times as long as broad (figs. 36-40)
Juniperia, new genus
2. Sc+R fork of tegmen near level of union of claval veins, subcostal cell about $\frac{1}{3}$ length of tegmen or longer (figs. 41, 47); medioventral lobe of male pygofer entire or bifurcate (figs. 129-153)3
Sc+R fork of tegmen near stigma, subcostal cell $\frac{1}{6}$ length of tegmen, widest medially (fig. 43); medioventral lobe of male pygofer trilobed at apex (fig. 155)..*Opsiplanon* Fennah
3. Subcostal cell of tegmen longer than $\frac{1}{3}$ length of tegmen, narrow throughout (fig. 47); medioventral lobe of male pygofer entire (figs. 130-153).....4
Subcostal cell of tegmen about $\frac{1}{3}$ length of tegmen, wider before its apex (fig. 41); medioventral lobe of male pygofer bifurcate (fig. 129).....*Catonia* Uhler
4. Rostrum longer than clypeus, reaching base of hind coxae; pronotum medially shorter than tegulae (figs. 52-82, 85-86), or if not, then mesonotum with lateral carinae straight (fig. 83)5
Rostrum as long as clypeus; pronotum medially longer than tegulae (fig. 84), and mesono-

- tum with lateral carinae bent or rounded (fig. 84).....*Xerbus*, new genus
5. Lateral lobe of phallobase broadened dorsoventrally, dorsal lobe reduced (figs. 125-126);
 frons with three pairs of dark spots, sometimes fused, on basal half (figs. 34-35);
 Arizona and California*Momar* Fennah
- Lateral lobe of phallobase not as above (figs. 103-123), dorsal lobe present; frons not so
 marked (figs. 12-32)*Synecdoche*, new genus

Catonia Uhler

(Type-species: *Catonia intricata* Uhler, 1895, by subsequent designation
 of Van Duzee, 1908)

Catonia Uhler, 1895, Proc. Zool. Soc. London, 1895:61.

1. Frons $1\frac{1}{4}$ to $1\frac{1}{2}$ times as long as broad; compartments of disc concave.
2. Rostrum long, reaching apex of hind coxae.
3. Pronotum shorter medially than tegulae. Two distinct lateral marginal carinae running from tegula to eye.
4. Tegmen with (a) Sc+R and Cu₁ fork about level, both slightly distad of union of claval veins; (b) subcostal cell about $\frac{1}{3}$ length of tegmen, ending approximately at the same level as midpoint of stigmal cell, two- or three-sided apically, broadest at level of stigmal cell base.
5. Hind wing with R two-branched, M two-branched, and Cu₁ three-branched.
6. Hind tibia with spine in basal half.
7. Male pygofer with medioventral lobe bifurcate.
8. (a) Strut of aedeagal appendages Y-shaped, attached to claspers and pygofer.
 (b) Phallobase with lateral lobes poorly pigmented and with apex curving ventrad; ventral lobes heavily pigmented, with three pairs of spines; dorsal lobes heavily pigmented, variously lobate and serrate, sometimes asymmetrical.

The United States species plus some of the central American species form a subgroup of *Catonia* differing from *C. intricata* from St. Vincent in characters 4 and 5 above. *C. intricata* has the subcostal cell of the tegmen longer, ending at the apex of the stigma, and more narrowly shaped, and Cu₁ of the hind wing is not branched. Also the vertex is 1.15 as wide as long medially and the anal segment curves ventrad rather than being straight, as in the United States species.

In addition to the above, the species of *Catonia* in America north of Mexico may be characterized as follows. Clypeus approximately $\frac{2}{3}$ length of frons, carinate laterally. Vertex with anterior margins carinate, triangular areolets are latero-apical angles of head. Vertex 1.25 to 2.0 times wider than long medially (1.25 to 1.6 in *C. arbutina*, 1.25 to 1.4 in *C. pumila*, 1.6 to 2.0 in *C. nava*); compartments concave; carinate lateral edges slightly (*C. bicinctura*), moderately (*C. picta*, *C. pini*), or subfoliately elevated above disc and median carina. Genae depressed below ocelli so that antennae are sunk in a depression. Pronotum with lateral carinae oblique, about twice length of median carina, each side with four areolets. Tegmen with stigmal cell divided in proximal third by oblique fold.

The species of *Catonia* north of Mexico show similarities in color pattern. All have a pale-colored transverse band on the frons at the level of the ocelli, with dark areas above and below, modified in *C. carolina* in which it is incomplete laterally, and in about half of the specimens of *C. pumila*, in which the frons may be entirely pale. The carinate lateral margins of the frons have round white spots

along them on both the frons and genae; these are six or seven in number on each side, with the pale band coinciding with the third from the base (as the apical pale band sometimes does with the apical spot). In *C. pumila*, the whole frons is often so pale that these spots are not visible. Finally, the fore- and mid-femora are brownish with a darker area just before the apex, and the fore- and mid-tibiae are brown with three pale spots of transverse bands. *Opsiplanon luellus* shares these color characters but has only three spots or less on the lateral carinae of the frons instead of six or seven.

Finally, *Catonia* lacks incomplete transverse veinlets on the tegmina and the veins are marked with dark spots, not concolorous. The wings are brownish with darker veins.

The color patterns of the vertex and mesonotum are rather variable. The pattern of the vertex consists of five pale areas, one apical, four along the lateral carinae, with four dark areas between. Variation occurs in the extent of the dark or pale colors, not in their location. The color pattern of the mesonotum is more variable, but still shows modifications of a pattern with three pairs of pale areas in the disc.

The ten species of *Catonia* found in the United States and Canada are so closely related morphologically that characters here used to separate them are found only in the genitalia and in variation of color and size. The slight differences in shape of vertex, frons, and tegminal venation show as much variation within as among species. Hence a morphological description of each of the ten species is omitted. However, the color pattern and genitalia of each species is discussed. The female genitalia examined differ in the shape and ornamentation of the bursa copulatrix; however, the color pattern of the frons is such a reliable guide to species that the female genitalia are not described or illustrated.

Species included in *Catonia* in America north of Mexico:

<i>arbutina</i> Ball	<i>nava</i> (Say)
<i>bicinctura</i> Van Duzee	<i>picta</i> Van Duzee
<i>carolina</i> Metcalf	<i>pini</i> Metcalf
<i>cinctifrons</i> (Fitch)	<i>pumila</i> Van Duzee
<i>lunata</i> Metcalf	<i>texana</i> , new species

KEY TO THE SPECIES OF CATONIA IN AMERICA NORTH OF MEXICO

1. Upper dark band of frons mottled, distinctly paler than lower dark band (fig. 1); large species, usually longer than 5.8 mm *nava* (Say)
- Upper dark band of frons not mottled, upper and lower bands approximately same color, or frons uniformly colored (figs. 2-10); 6.2 mm or less in length 2
2. Transverse pale band or median pale bar on frons at frontoclypeal suture in addition to one at level of ocelli (figs. 2-7) 3
- No transverse pale band or median bar on apex of frons, apex of frons distinctly darker than base of clypeus (figs. 8-10) 8
3. Pale median bar on frons at frontoclypeal suture (figs. 2-3) 4
- Pale transverse band on frons at frontoclypeal suture (figs. 4-7) or frons uniformly colored. . . 5
4. Pale transverse band on frons at level of ocelli incomplete (fig. 2) *carolina* Metcalf
- Pale transverse band on frons at level of ocelli complete (fig. 3) *lunata* Metcalf
5. Dark bands on frons almost black (figs. 5-7) 6
- Dark bands medium brown or paler, sometimes frons and clypeus without markings, concolorous (fig. 4) *pumila* Van Duzee

6. Clypeus marked with fuscous, hind femora dark, from West Texas or Arizona7
 Clypeus pale, hind femora pale, eastern species*cinctifrons* (Fitch)
7. Anterior femora dark (Texas)*texana*, n. sp.
 Anterior femora pale, upper band of frons may be paler on disc than near lateral carina,
 never mottled as in *nava* (Arizona)*arbutina* Ball
8. Frons bicolored, lower edge of dark band coinciding with frontoclypeal suture throughout
 (figs. 8-9); pale band at level of ocelli approximately width of ocellus9
 Frons tricolored, 2 paler brown triangular areas laterally (fig. 8); pale band at level of
 ocelli wider than ocellus*picta* Van Duzee
9. Tegmina with two dark narrow V-shaped bands, veins with black spots*pini* Metcalf
 Tegmina uniformly colored except for whitish costal area, veins pale with black spots
bicinctura Van Duzee

KEY TO THE SPECIES OF CATONIA IN AMERICA NORTH OF MEXICO,
 USING THE CHARACTERS OF THE MALE GENITALIA.

1. Anterior fourth of serrate area of dorsal lobe forming a free process extending dorsad
 (figs. 93-94) 2
 Anterior fourth of lateral serrate area of dorsal lobe not separated into a free process (figs.
 92, 95-101) 3
2. Second pair of spines on ventral lobe short, not more than $\frac{1}{2}$ of length of apical pair
 (fig. 93)*carolina*
 Second pair of spines longer, reaching tip of apical pair (fig. 94)*lunata*
3. Lateral serrate area of dorsal lobe crested, with angular steplike transition between two
 levels (figs. 100, 101) 9
 Lateral serrate area of dorsal lobe smoothly curved 4
4. Third pair of spines on ventral lobe projecting dorsad, toward anal segment (figs. 92, 95, 97) 5
 Third pair of spines projecting ventrad, or subparallel to axis of phallobase, not dorsad (figs.
 98, 99) 8
5. Second spine projecting distad of apical spine (fig. 92)*nava*
 Second spine projecting proximad of apical spine (figs. 95-97) 6
6. Second spine short, not more than $\frac{1}{3}$ length of apical, or if longer, very thin (fig. 96)
cinctifrons
 Second spine longer than or subequal to apical (figs. 95, 97) 7
7. Second spine longer than apical (fig. 97)*texana*
 Second spine subequal in length to apical, tips approximate (fig. 95)*pumila*
8. Tip of second spine exceeding apical (fig. 98)*arbutina*
 Tip of second spine subequal to apical (fig. 99)*bicinctura*
9. Crested area of dorsal lobe apical; tip of second spine of ventral lobe not reaching distal half
 of apical spine*pini*
 Crested area of dorsal lobe continuing past apical third of phallobase; tip of second spine
 almost reaching level of tip of apical spine (fig. 101)*picta*

Catonia nava (Say)

(Figs. 1, 52, 92)

- Flata nava* Say, 1830, J. Acad. Nat. Sci. Philadelphia, 6:238, 239.
Poeciloptera [sic] *naeva* [sic], Schaum, 1850:72.
Poeciloptera [sic] *noeva* [sic], Walker, 1851:469; Dohrn, 1859:66.
Poeciloptera [sic] *nava*, Walker, 1852:1139.
Poeciloptera [sic] *nova* [sic], Smith, 1890:438.
Phypia (♀) *nava*, Van Duzee, 1890:389.
Helicoptera nava, Osborn, 1892:127.
Catonia nava, Uhler, 1895:62; Metcalf, 1948:33; Fennah, 1950:147.
Helicoptera nova (♀) [sic], Osborn, 1900:64.
Flata noeva [sic], Melichar, 1902:230.

Length.—5.8 to 7.2 mm, with one male 4.5 mm.

Color.—Frons with transverse yellowish band at level of ocelli; darker, solid medium brown band below; paler, mottled brown band above. Lower band often paler below, along clypeal margin, or with a narrow (less than the width of an ocellus) incomplete white bar across median carina, or two such narrow bars laterally, or two dots laterally, or paler area broader at sides as in *C. picta*. (Four specimens with broad clypeal band similar to *C. cinctifrons*, *arbutina*, and *texana* from Chisos Mountains, Texas; Delaware County, Ohio; and Demarest, Georgia.) Clypeus pale brown, with two large ivory spots on each side, two along frontoclypeal suture, and one at apex; sometimes pale throughout. Lateral areolets and carinae yellowish, disc with minute dark spot. Vertex pale with four brown triangular areas, two larger laterobasal, two smaller on anterior margin, often with thin lines running posteriorly, paralleling carina.

Pronotum medium brown on ventrolateral lobes, carinae broadly pale. Mesonotum mottled yellowish with median brown area with two lateral projections on each side and an elongate, broader projection toward the posterior of the mesonotum; occasionally two brown areas posteriorly in lateral fields. Tegulae pale.

Tegmina pale triangularly at base, costal cell yellowish from Sc+R branch to stigmal cell; rest mottled pale and brown, darker basad of apex of clavus, paler distad. Legs as described for genus, except femora often pale brown throughout. Thorax pale beneath, abdominal sternites medium brown with posterior border pale; medioventral lobe of pygofer and claspers of male usually concolorous.

Phallobase.—Second spine of ventral lobe projecting distally of apical spine.

Comparative notes.—*C. nava* is distinct in *Catonia* with the basal band of the frons mottled and paler than the band along clypeus, the large size and yellowish color, and the tegmen with basal ivory area and yellowish costal area. The dark pattern on the mesonotum, shaped somewhat like the hide of a skinned mammal, is also diagnostic in every specimen I have seen. None of the specimens I have seen have the dark band on the tegmina as sharply delineated as in Metcalf's figure 14 (1923).

Type designation.—None. This species has been consistently identified so that the designation of a neotype seems unnecessary.

Type repository.—Not located.

Host records.—None previously recorded. *Cornus* (1 ♂, Williams Co., Ohio, IX-5-1931, E. P. Breakey, OSU); on trunk small maple (1 ♀, Guyasuta Run, X-3-1909, H. Kahl colln., CM); sycamore (1 ♀, Columbus, Ohio, X-4-1920, NCU); and found in aunt [sic] nest (1 ♂, Washington, D.C., VIII-18-1904, USNM).

Geographic distribution.—Originally described from Indiana, *C. nava* is now known from Jacksonville, Florida, north to Ontario, west to Texas, Kansas, and Nebraska. It has been recorded from New York, Iowa, Indiana, Ohio, Maryland, Virginia, North Carolina, Georgia, Mississippi, Louisiana, Florida, Texas, Nebraska, and Kansas. Metcalf (1948) lists it from Ontario.

Catonia carolina Metcalf

(Figs. 2, 53, 93)

Catonia carolina Metcalf, 1923, J. Elisha Mitchell Soc., 38:176, 150, 159; Metcalf, 1948:26.

Length.—3.1 to 5.8 mm.

Color.—Frons pale brown with pale transverse bar at level of ocelli and another at clypeal suture. Clypeus pale brown with two transverse pale bars at sides basally, usually with pale bar joining them medially, pale longitudinal lines at apex. Lateral areolets medium brown with pale carinae. Vertex medium brown with median carina, two lateral diagonal dashes, and apical area of lateral carinae pale.

Pronotum medium brown; median and lateral carinae narrowly pale, supernumerary carinae broadly pale. Mesonotum dark brown, disc with paired pale oval areas anteriorly and a small pair at laterobasal angles; lateral fields variously mottled. Tegulae pale.

Tegmina mottled, pale to medium brown, sometimes with faint U-shaped brown band running basad from apex of clavus. Legs as described for genus. Sternum and coxae and abdomen medium brown, sometimes posterior margins of abdominal sternites pale.

Phallobase.—Lateral serrate area of dorsal lobe produced dorsally into process with approximately anterior third free (fig. 93; also found in *C. lunata*, fig. 94); third spine of ventral lobe sharply angled dorsad, not subparallel to axis of phallobase; second spine short, less than one-fourth length apical spine.

Comparative notes.—*C. carolina* may be confused with *lunata* or with *pumila* if the frontal markings in the latter are pale. Usually it is a little darker dorsally than *lunata* and the transverse bar at the level of the ocelli does not reach the pale spots along the carinae. *C. pumila* usually has unpatterned light brown tegmina or a double V-shaped pattern rather than a U-shaped pattern, and has a straight pale band across the base of the clypeus rather than an incomplete bar. The serrate process of the dorsal lobe of the phallobase with the apical third free distally and projecting dorsally occurs only in *carolina* and *lunata*, which may be separated by the length of the second pair of ventral spines, short in *carolina*, long in *lunata*.

Type designation.—"Holotype ♀, Swannanoa, N.C., Aug. 8, 1919. H. Osborn and Z. P. Metcalf. Allotype ♂, Vienna, Va., Aug. 1918."

Type repository.—North Carolina State University, Raleigh.

Host records.—None previously recorded. Beating dead beech limb (1 ♀, 2 miles east Silver Springs, northwest Branchville, Md., VIII-18-1951, G. H. Nelson, RF); and trap peach orchard (1 ♀, Hamilton Co., Ga., VIII-28-1943, Turner, USNM).

Geographic distribution.—*C. carolina* is found from northern Florida north to Illinois and Ohio, and from the Atlantic coastal states to Kansas. I have seen specimens from Illinois, Ohio, Maryland, Virginia, North Carolina, Tennessee, Arkansas, Georgia, South Carolina, Florida, and Kansas.

Catonia lunata Metcalf

(Figs. 3, 54, 94)

Catonia lunata Metcalf, 1923, J. Elisha Mitchell Soc., 38:178, 150, 159; Metcalf, 1948:31-32.

Length.—4.0 to 5.6 mm.

Color.—Frons medium brown with transverse band at level of ocelli and transverse bar at clypeal suture. Darker areas between pale spots along lateral carinae. Clypeus medium brown with two transverse pale bars at base, median bar beneath, sometimes fusing into irregular band; pale longitudinal lines at apex. Lateral areolets medium brown with pale carinae. Vertex pale brown with four brown triangular areas, two smaller on anterior margin, two larger laterobasad, sometimes fusing, sometimes brown and pale areas equal.

Pronotum medium brown, median and lateral carinae concolorous or pale, supernumerary carinae broadly pale. Mesonotum variable, carinae pale; disc varying from dark brown with four small spots to pale with two anterior dark crescents and a five-armed area posteriorly; lateral fields mottled. Tegulae pale brown.

Tegmina mottled pale to medium brown, faint U-shaped brown band running basad from apex of clavus in some specimens, with a dark area just basad of union of claval veins; all markings often indistinct. Legs as described for genus. Thorax and abdomen pale brown ventrally, apical margins of abdominal sternites paler, medioventral lobe of pygofer and claspers paler.

Phallobase.—Lateral serrate area of dorsal lobe produced dorsally into process with approximately anterior third free (as in *carolina*); third spine of ventral lobe pointing dorsad; tip of second spine extending as far as tip of apical; second spine in lateral view strongly narrowed at base, in ventral view, dilated at base.

Comparative notes.—*C. lunata* is very variable in the color pattern of the vertex and the mesonotum, encompassing the pattern of *carolina*, so that the two may be distinguished only by the length of the ocellar band, which is abbreviated to a bar in *carolina*, and by the short second spine of the ventral lobe of the phallobase of *carolina*. The color pattern of the vertex shows either aspect of the pattern of the United States species, with either the dark color or the pale predominate. That of the mesonotum varies from four small pale dots to a pale background with a dark black area as in *nava*. *C. lunata* might also be confused with *pumila* in a specimen with the coloring of the frons indistinct, but *pumila* usually has a straight pale band across the clypeus and a double V-shaped pattern on the tegmina or an unpatterned tegmen. Usually *lunata*

has a U-shaped narrow dark band on the tegmina, for which reason it may have been so named. The flattening of the second spine of the ventral lobe of the phallobase is not unique; it occurs, but less extremely flattened, in some specimens of *arbutina*.

Type designation.—"Holotype ♀. Swannanoa, N. C., August 29, 1919. H. Osborn and Z. P. Metcalf. Allotype ♂. Paradise Keys, Florida."

Type repository.—North Carolina State University, Raleigh.

Host records.—None previously recorded. Cranberry (1 ♂, Tom's River, N.J., X-10-1924, I. D. Dobrosky, USNM); oak (1 ♂, St. Agnes, X-13 [sic], P. R. Uhler, USNM); *Pinus* (1 ♀, Hocking Co., Ohio, X-10-1931, E. P. Breakey, OSU); and white pine (1 ♂, Durham, N.H., VIII-29-1922, NCU).

Geographic distribution.—I have seen specimens from Florida, as far north as New Jersey and as far west as Texas and Kansas. Metcalf lists New York and Massachusetts as well. I have also seen specimens from Maryland, Virginia, Ohio, North and South Carolina, Georgia, Alabama, and Mississippi.

Catonia pumila Van Duzee

(Figs. 4, 41, 42, 55, 95, 129)

Catonia pumila Van Duzee, 1908, Proc. Acad. Nat. Sci. Philadelphia, 1907:483, 480, 484; Metcalf, 1948:34-35.

Length.—4.5 to 5.0 mm.

Color.—Frons and clypeus pale yellowish, unbanded, or pale yellowish brown with white band at level of ocelli and another at clypeal suture, latter on both frons and clypeus. Lateral areolets pale brown with pale carinae. Vertex pale with four medium brown elongate triangular spots, two anterior bordering pale triangularly shaped median carinal area, other two in laterobasal angles.

Pronotum pale brown on ventrolateral lobes, carinae narrowly pale. Mesonotum with disc variable, dark with two pale anterior oval areas and two posterior pale spots or pale with two irregular dark areas; lateral fields mottled, either pale or dark. Tegulae pale.

Tegmina pale, either without pattern except mottling on veins or with two dark V-shaped bands running basad from union of claval veins and from apex of clavus. Legs as described for genus. Sternum and coxae pale, abdominal sternites medium brown with pale posterior border; medio-ventral lobe of pygofer and claspers of male usually paler.

Phallobase.—Dorsal lobe serrate on two lateral elongations, apical fifth free; median lobe humped dorsally at level of ventral spines. Ventral lobe with third spine extended dorsad; apical and second spines approximately same length.

Comparative notes.—*C. pumila* is most likely to be confused with *cinclifrons*, for some specimens do not have an "immaculate" frons, but have two bands as in *cinclifrons*, but much paler. *C. cinclifrons* has a strongly marked tegmen with, macroscopically, a dark V anterior to a dark X, and its frons is banded with dark brown. *C. lunata* and *C. carolina* may also be confused with *pumila* if the frons is pale; normally they both have an incomplete pale bar on the frons along the clypeus and a single dark U-shaped band across the tegmina, while *pumila* has a band on the frons and the tegmen is unpatterned or has two V-shaped bands.

Type designation.—"Described from one pair taken by me at Milan, Ohio, September 1, 1905, and another male which I took in August, 1904, at Jamaica, Long Island." I validate by publication Van Duzee's selection of a lectotype male (No. 2222) Jamaica, Long Island, and allotype (No. 2223) Milan, Ohio.

Type repository.—California Academy of Sciences, San Francisco.

Host records.—None previously recorded. *Acer* (bark) (1 ♂, 1 ♀, Vienna, Va., VIII-30-1936, J. C. Bridwell, USNM); *Carya* (1 ♀, IX-22 [sic], 1 ♂, 2 ♀, X-13 [sic], St. Agnes, P. Uhler, USNM); *Hicoria* (1 ♀, 6 miles north Washington, D.C., IX-11-1933, P. W. Oman, USNM); *Fagus* (1 ♂, The Cliffs State Park, N.C., VIII-21-1959, F. W. Mead, NCU); pine (1 ♀, St. Agnes, X-9 [sic], P. Uhler, USNM); white pine (1 ♂, N.H., VII-29-1922, NCU); and a variety of oaks as follows: oak (1 ♂, 1 ♀, XI-1 [sic], 3 ♀, X-13 [sic], St. Agnes, P. Uhler, USNM); black oak (1 ♀, St. Agnes, IX-22 [sic], P. Uhler, USNM); *Quercus rubra* (2 ♀, 6 miles north

Washington, D.C., IX-11-1932, P. W. Oman, USNM); *Quercus alba* (1 ♂, 1 ♀, same data); collected from non-wilting *Q. ellipsoidalis* (1 ♂, 1 ♀, Wood Co., Wisc., Lake Nepco, IX-13-1951, R. D. Shenefelt, USNM).

Geographic distribution.—*C. pumila* is almost as widely distributed as *C. nava*. I have seen specimens from the northern half of Georgia, Alabama, and Louisiana north to New Hampshire and Minnesota and west to Kansas and Nebraska. States included are Iowa, Indiana, Ohio, New York, Massachusetts, Pennsylvania, New Jersey, Maryland, Virginia, Missouri, North and South Carolina and Tennessee. Metcalf reports Oklahoma as well. *C. pumila* is the only species from the eastern United States that has not been collected in Florida.

Catonia cinctifrons (Fitch)

(Figs. 5, 56, 96; frontispiece, a)

Cixius cinctifrons Fitch, 1856, Trans. New York State Agr. Soc., 16:451, 452.

Cixius [sic] *cinctifrons*, Rathvon, 1869:550.

Catonia cinctifrons, Uhler, 1895:62; Metcalf, 1948:27.

Length.—4.2 to 5.2 mm.

Color.—Frons dark brown with transverse white band at level of ocelli and another at clypeal suture. Clypeus pale, rarely with two pale brown marks on lateral carinae. Lateral areolet pale to dark brown with carinae pale. Vertex pale with four brown triangular areas, two smaller on anterior margin, two larger laterobasad, often with thin lines running from anterior triangles, paralleling carina, then diverging to basal triangles.

Pronotum medium brown, with carinae and apical half of ventrolateral lobes pale. Mesonotum with median disc dark brown with two or three paired pale spots, anterior usually largest; lateral fields variable, most often yellow with an irregular brown area posteriorly, sometimes wholly brown; carinae and margins of scutellum pale. Tegulae pale.

Tegmina clearly patterned, apparent macroscopically as a dark ∇ anterior to a dark \times . Tegmina brown with four medial transverse areas and two paired costal areas pale; pale, along mesonotum; triangularly from union of claval veins to near apex of clavus, tapering across to costal cell; between anterior and posterior cross veins; a faint cloud in three or four apical cells; two pairs of subtriangular areas on costal margin, first of these sometimes fusing with claval transverse area. Indistinct yellowish band running transversely distad to clavus. Legs as described for genus. Thorax pale beneath, abdominal sternites medium brown with anterior border pale, medioventral lobe of pygofer and claspers of male usually paler.

Phallobase.—Lateral serrate areas of dorsal lobe elongate, median serrate area double-humped. Third spines of ventral lobe extended dorsally, second short, $\frac{1}{2}$ length of first, or very thin. (One specimen shows one spine of each type.) Apparently this group, like *arbutina*, has a variable second spine.

Comparative notes.—*C. cinctifrons* is closely related to *arbutina* and *texana*, but does not extend into dry west Texas or Arizona. It might also be confused with some specimens of *pumila* which have the same pattern on the frons, but the brown frontal bands are pale rather than dark in *pumila*. In addition, *cinctifrons* has a marked pattern on its tegmina (see description) while *pumila* has either two pale ∇ -shaped bands or unpatterned tegmina.

Type designation.—"This was taken in company with the preceding, the middle of September." The preceding, *Ceresa brevicornis*, is cited as: "It was met with upon hickory bushes in New Jersey."

Type repository.—There is no specimen or label in the drawer of Fitch's types, New York State Museum, Albany, New York. It was not recorded in Felt's (1910) list of insect types in New York State Museum and was presumably destroyed by dermestids before that time. It has not been confused with any other species in the literature, so no neotype is designated.

Host records.—Fitch (1856) cites hickory in the type statement. Packard (1881, 1890) lists *cinctifrons* under "Insects injurious to hickory" and Uhler (1895) places it on white hickory and oak trees. Specimens examined were taken from oak (1 ♂, St. Agnes, X-13 [sic], P. R. Uhler, USNM); *Carya* (1 ♀, St. Agnes, IX-22 [sic], P. R. Uhler, USNM); *Pinus* (1 ♂, Adams Co.,

Ohio, IX-1-1931, and 1 ♀, Hocking Co., Ohio, E. P. Breaky, OSU); and at *Pinus clausa* (2 ♂, 5 ♀, Shalimar, Okaloosa Co., Fla., XII-5-1965, F. W. Mead, FDA).

Geographic distribution.—*C. cinctifrons* is known from northern Florida north to New Hampshire and west to Iowa, Kansas, and Texas. Specimens have been examined from the above states and from Massachusetts, New York, Connecticut, Pennsylvania, Ohio, New Jersey, Delaware, Maryland, Virginia, North and South Carolina, and Georgia. Metcalf reports Tennessee also.

Catonia texana, new species

(Figs. 6, 57, 97)

Length.—4.0 to 5.0 mm.

Color.—Frons dark brown with transverse white band at level of ocelli and another at clypeal suture. Frontoclypeal suture sometimes brown laterally. Clypeus pale above, shading to pale brown about halfway, sometimes brown only on carinae. Lateral triangular areolets dark with pale carinae. Vertex pale with four brown triangular areas, two smaller on anterior margin, two larger laterobasad, sometimes latter fusing medially.

Pronotum pale with dark spots in areolets, dark ventrolateral lobes. Mesonotum dark brown with pale transverse band across middle and pale spots at both ends of lateral carinae and at apex of scutellum, all often spreading laterally so that some specimens are markedly transversely banded. Tegulae medium or pale brown with pale posterior margins.

Tegmina dark, markedly transversely patterned, with mottled pale areas; pale in basal sixth; a pale transverse band across union of claval veins to costa; costal, subcostal, and sometimes radial cell mostly mottled yellow or white to stigmal cell; usually a pale area along commissure to end of clavus; irregularly suffused with pale color in apical third. Legs with white spots rather than bands, otherwise as in generic description. Thorax brown beneath (color matching apex of clavus), almost as dark as abdomen, abdominal sternites with pale posterior margins; female genital segments slightly paler, male concolorous.

Phallobase.—Dorsal lobe serrate laterally over two elongate areas. Ventral lobe with third pair of spines extending dorsad, second pair longer than apical, as in *arbutina*.

Comparative notes.—This is the only species of this group which occurs, as far as is known, in west Texas. It is close to, but darker than, *cinctifrons* and *arbutina*. It has transverse bands on its tegmina rather than V-shaped bands as they have.

Type designation.—Holotype male and allotype, Gillespie County, Texas, VI-5-1954 (D. J. and J. N. Knull). Fourteen paratypes from Gillespie, Jeff Davis, and Uvalde counties, all collected by D. J. and J. N. Knull and deposited at Ohio State University except the allotype and a male paratype in the J. S. Caldwell collection, USNM. Gillespie County, 1 ♂, 3 ♀, VI-5-1954, 2 ♂, 2 ♀, VI-23-1940. Davis Mts., 1 ♀, VII-2-1940, 1 ♂, VIII-22-1936 (USNM); 1 ♀, IX-2-1940, 1 ♀, IX-20-1938. Uvalde, 1 ♂, 1 ♀ (mating, ♀ with part of ♂ abdomen attached) VI-30-1936.

Type repository.—Holotype, Ohio State University, Columbus. Allotype, J. S. Caldwell collection, United States National Museum.

Host records.—None.

Geographic distribution.—Known from three counties in Texas.

Catonia arbutina Ball

(Figs. 7, 58, 98)

Catonia arbutina Ball, 1933, Pan-Pacific Ent., 9:135; Metcalf, 1948:26.

Length.—4.0 to 5.0 mm.

Color.—Frons dark brown, with transverse white band at level of ocelli and another at clypeal suture, latter rarely interrupted laterally. Clypeus pale, shading to brown below, with two dark brown spots on each lateral carina, these fusing on sides of clypeus. Triangular lateral areolets with dark spot, carinae pale except for a dark spot laterally. Vertex pale with brown line contiguous to median carina on each side, widening apically; dark spot in basal third, not covering lateral carinae basally, but doing so towards front of eye.

Pronotum medium brown with pale supernumerary carinae dividing it into lateral areolets. Mesonotum dark brown with three pairs of white dots which are variable in size and shape, largest anteriorly; lateral fields fading to yellow laterally; tegulae yellow.

Tegmina mottled, two pale areas in costal cell, a smaller at union of claval veins. Legs as described for genus. Thorax pale brown beneath, abdominal sternites darker, sometimes almost black, some with posterior margins pale, medioventral lobe of pygofer and claspers of male pale.

Phallobase.—Dorsal lobe with two elongate lateral serrate areas; median serrate area humped proximally; third spine of ventral lobe extended ventrally, tip subequal to tip of second spine, which is longer than apical spine. Some specimens have the second spine reduced to about $\frac{1}{3}$ the length of the apical; one specimen has one long, one reduced. Since these are from the same locality, I am assuming that this spine may be variable in this species.

Comparative notes.—*Catonia arbutina* is the only species of this genus recorded from Arizona. It is very like *bicinctura* except in genitalia and distribution.

Type designation.—"Holotype, female, allotype, male and two female paratypes, taken in the Santa Rita Mts., Sept. 29, 1929 (labeled Tucson)."

Type repository.—United States National Museum.

Host records.—*Pinus cembroides*.

Geographic distribution.—Found in five mountain ranges in four counties in southern Arizona. Critchfield and Little (1966) map *Pinus cembroides* from thirteen mountain ranges in Arizona and mountains in New Mexico, Texas, and Mexico as well.

Specimens examined.—ARIZONA. Cochise County: Chiricahua Mts., 1 ♀, VIII-23-1931 (E. D. Ball, USNM); 1 ♂, IX-20-1947 (D. J. and J. N. Knull, OSU). Huachuca Mts., 1 ♀, paratype, X-9-1932 (E. D. Ball, USNM).

Pima County: Santa Catalina Mts., mile 16 Hitchcock Highway, 4 ♂, 2 ♀, on *Pinus cembroides*, IX-16-1984 (C. W. and L. B. O'Brien).

Pinal County: Santa Catalina Mts., Pepper Sauce Canyon, 1 ♂, IX-29-1929 (E. D. Ball, USNM).

Santa Cruz County: Atascosa Mts., 2 ♂, 2 ♀, IX-29-1935, 1 ♀, X-9-1936 (E. D. Ball, USNM).

Santa Rita Mts. [not known whether Pima or Santa Cruz County]: Tucson [= Santa Rita Mts.], 2 ♀ paratypes, IX-29-1929 (E. D. Ball, USNM). Santa Rita Mts., 3 ♂, 2 ♀, IX-21-1935 (E. D. Ball, USNM); 4 ♀, IX-25-1936 (Bryant, USNM); 1 ♂, X-15-1936 (Bryant, RF); 2 ♀, X-10-1933 (Bryant, RF); 2 ♀, X-10-1933 (Bryant, CU); 1 ♂, X-22-1936 (Bryant, USNM).

Santa Cruz River [Santa Cruz or Pima County]: 1 ♂, VIII-14-1935 (E. D. Ball, USNM).

Catonia bicinctura Van Duzee

(Figs. 8, 59, 99)

Catonia bicinctura Van Duzee, 1915, J. Ent. Zool., 7:119, 120; Metcalf, 1948:26.

Length.—4.2 to 5.1 mm.

Color.—Frons medium brown, with transverse ivory band at level of ocelli, clypeal dark band usually darker than basal band, often reddish. Lateral carinae between pale spots darker than disc. Clypeus pale basally, light brown (lighter than base of frons) apically. Triangular lateral areolets yellowish brown with carinae pale or concolorous. Vertex yellowish brown with white areas, four lateral and one apical, on lateral carinae, anterior three areas extended triangularly onto disc.

Pronotum yellowish with carinae of disc concolorous, supernumerary and lateral marginal carinae pale. Mesonotum medium reddish brown, with four or six spots arranged laterally on disc and apex of scutellum pale, lateral fields sometimes irregularly mottled with pale. Tegulae pale brown with apical margins pale. Tegmina pale brown with or without an indistinct broad white transverse band from just basad of union of claval veins to apex of clavus. Legs marked as described for genus except proximal band on each tibia narrow and dark. Thorax and abdomen medium reddish brown beneath, medioventral lobe of pygofer and claspers yellowish.

Phallobase.—Lateral serrate area of dorsal lobe of phallobase strongly curved, almost crescent-

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shaped; median lobe strongly humped proximally. Tips of apical and second and third spine projecting dorsally, then curving subparallel to main axis of phall anterior to others (fig. 99).

Comparative notes.—*C. bicinctura* shares with *pini* and *picta* the single frons. It is darker than they; lacks the strongly textured claval area; and either pale brown throughout or have a faint transverse pale band, more obscure than the patterns of a pale transverse band in *picta* and dark v-shaped bands in *pini*. *C. pini* is usually larger, but the extremes overlap.

Type designation.—"Described from three examples taken in Florida by Mr. W. T. Davis; one pair at Punta Gorda, on November 12, 1911, and a female from Newberry taken on November 19, 1911." I validate by publication Van Duzee's selection of the female from Punta Gorda (No. 2378) as lectotype.

Type repository.—California Academy of Sciences.

Host records.—Dozier (1928) reported *bicinctura* from *Callicarpa americana*. Host labels on specimens include *Pinus* (4 ♂, 2 ♀, Big Pine Key, Fla., XII-15-1938, Christenson, Anderson, USNM) [probably *P. elliotii*]; *Pinus* (1 ♀, Cantwell Cliffs, Ohio, VIII-12-1934, Whittington, OSU); on polyporid fungus under bark dead pine (3 nymphs, 4 ♀, Johnsons Landing, 2½ miles below Harrisburg, Tex., X-20-1918, H. S. Barber, USNM).

Geographic distribution.—I have seen specimens from Florida, Georgia, North Carolina, Ohio, Michigan, and Texas. Metcalf reports Maine, Tennessee, Louisiana, and Mississippi also.

Catonia pini Metcalf

(Figs. 9, 60, 100)

Catonia pini Metcalf, 1923, J. Elisha Mitchell Soc., 38:177, 150, 159; Metcalf, 1948:34.

Length.—2.8 to 6.2 mm.

Color.—Frons medium brown with transverse white band at level of ocelli. Clypeus pale basally, medium or pale brown apically. Lateral areolet brown with carinae faintly pale. Vertex pale brown, sometimes with white areas, four lateral and one apical, on lateral carinae, anterior three areas sometimes extended triangularly onto disc.

Pronotum pale brown, carinae narrowly pale. Mesonotum medium or pale brown, sometimes with pair of pale ovate areas on disc and pale triangle at apex of scutellum, occasionally more pale areas basally. Tegulae medium brown.

Tegmina with surface of claval area not smooth, markedly striate. Tegmina pale except for two dark v-shaped bands (the anterior broadening laterally) crossing commissural margin just basad of union of claval veins and at apex of clavus. Legs as described for genus, but with pale areas reduced. Thorax and abdomen pale brown beneath, abdominal sternites with pale posterior margins; claspers on male slightly paler.

Phallobase.—Left lateral serrate area of dorsal lobe crested, with angular steplike transition between two levels, crest apical (fig. 100). Apical spine of ventral lobe extending anteriorly as far as tip of third spine; second spine extending less than ½ length of either.

Comparative notes.—*C. pini* shares with *bicinctura* and *picta* the single pale band on the frons. It differs from both of them in having two narrow v-shaped bands on the tegmina rather than a horizontal pale band or unpatterned pale tegmina. The claval area of *pini*, like that of *picta*, is markedly transversely striate.

Type designation.—"Holotype ♂. Southern Pines, N.C., August 10, 1917. A. H. Manee. Allotype ♀. Southern Pines, N.C., late August, 1917. A. H. Manee."

Type repository.—North Carolina State University, Raleigh.

Host records.—None previously reported. *Baptisia tinctoria* (1 ♀, Wrightsville, VI-15 [sic], NCU).

Geographic distribution.—Florida north to North Carolina and west to Louisiana, including Georgia and Mississippi. This is the most narrowly distributed species of *Catonia* in the eastern United States.

Catonia picta Van Duzee

(Figs. 10, 61, 101)

Catonia picta Van Duzee, 1908, Proc. Acad. Nat. Sci. Philadelphia, 1907:480-481; Metcalf, 1948:34.

Length.—4.4 to 5.8 mm.

Color.—Frons dark brown with transverse ivory band at level of ocelli and pale brown band at clypeal suture, widening laterally. Clypeus ivory basally, pale brown apically. Lateral areolet pale brown, sometimes with a white spot anteriorly, with pale carinae. Vertex medium brown with white areas, four lateral and one apical, on lateral carinae, anterior three areas extended triangularly onto disc.

Pronotum pale brown, paler than vertex or mesonotum; carinae narrowly pale. Mesonotum medium reddish brown, unpatterned except for triangular pale apex of scutellum. Tegulae pale brown, as pronotum.

Tegmina with surface of claval area not smooth, markedly striate. Tegmina pale brown with a broad white transverse band from just basad of union of claval veins to apex of clavus. Corium basad of this band medium reddish brown, matching mesonotum. Sometimes tip of clavus with V-shaped brownish suffusion and white suffusion before apical cells. Legs pale brown, markings so characteristic of this genus indistinct. Thorax and abdomen pale brown beneath.

Phallobase.—Left lateral serrate area of dorsal lobe crested, with angular steplike transition between two levels; crest extending past apical third of phallobase (fig. 101); tips of second and apical spines about equal.

Comparative notes.—*C. picta* may be distinguished from other species of *Catonia* by the pale brown triangular areas at the frontoclypeal suture, the broader and shorter vertex, and the shorter pronotum. For further characters that separate this species from *pini* and *picta*, the relevant comparative notes may be consulted.

Type designation.—"Described from one example taken at Lakehurst, New Jersey, August 18, and kindly sent to me for study by Prof. John B. Smith."

Type repository.—Holotype ♀, No. 2217, California Academy of Sciences.

Host records.—None previously recorded. Pine (1 ♂, 1 ♀, IX-1-1915, 2 ♀, IX-17-1916, Lakehurst, N.J., USNM); and oak-hickory (1 ♀, Duke Forest, Durham, N.C., VII-28-1943, USNM).

Geographic distribution.—*C. picta* is present in the coastal states from Louisiana to Connecticut, and from Florida as far south as Highlands County. Specimens were examined from Louisiana, Mississippi, Alabama, Georgia, Florida, North Carolina, Virginia, New Jersey, and Connecticut. Metcalf includes Long Island, New York.

Opsiplanon Fennah(Type-species: *Opsiplanon ornatifrons* Fennah, 1945a, original designation)

Opsiplanon Fennah 1945:477.

1. Frons approximately $1\frac{1}{6}$ times as long as broad; compartments of disc concave.
2. Rostrum reaching base of hind coxae.
3. Pronotum medially shorter than the tegulae. Two distinct lateral marginal carinae running from tegula to eye.
4. Tegmen with (a) Sc+R fused to a point $\frac{1}{2}$ length of stigmal cell basad of stigmal cell, Cu₁ fork at about level of union of claval veins; (b) subcostal cell about $\frac{1}{6}$ length of tegmen, widest medially.
5. Hind wing with R simple, M two-branched, Cu₁ three-branched.
6. Hind tibia with spine in basal half.

7. Male pygofer with medioventral lobe thickened and concave medially, with apex trilobate (fig. 155).

8. (a) Strut of aedeagal appendages Y-shaped and attached to claspers and pygofer. (b) Lateral and ventral lobes of phallobase with apex curved ventrad, dorsal lobes not fused at apex.

In addition to the above, the following characters are common to members of this genus: frontoclypeal suture complete, transverse, shallowly arched; clypeus carinate laterally; vertex with anterior margin carinate and triangular areolets at lateroapical angles of head; vertex as figured (fig. 62) with discs flat. Pronotum with lateral carinae of disc oblique and four distinct supernumerary areolets on each side. Tegmen with stigmal cell about as broad as long, oblique fold across proximal half; tegmina with many pale incomplete transverse veinlets.

Species included in *Opsiplanon*:

luellus Metcalf, new combination

nemorosus Fennah (Trinidad, B.W.I.)

ornatifrons Fennah (Trinidad, B.W.I.)

Opsiplanon luellus (Metcalf), new combination

(Figs. 11, 43, 44, 62, 102, 155; frontispiece, f)

Catonia luella Metcalf, 1923, J. Elisha Mitchell Soc., 38:177, 150, 159; Metcalf, 1948:31.

Length.—3.2 to 3.5 mm. Clypeus approximately $\frac{9}{10}$ as long as frons. Vertex $\frac{5}{6}$ as long as broad.

Color.—Dark or medium brown carinae very narrowly white, ocellate spot on median discs of mesonotum at base of lateral carinae, crescent-shaped pale spot at apical third, sprinkled with pale spots between, lateral discs with three pale areas. Frons and clypeus dark brown with a thin pale line along frontoclypeal suture, two pale spots at apex of clypeus, sometimes a thin pale line across frons at level of ocelli and three pairs of pale spots along lateral carinae from level of ocelli toward base. Vertex sometimes with thin dark border along pale longitudinal carinae, two dark spots on each lateral carina, lateral areolets pale. Pronotum paler medially, darker behind eyes, dark brown on ventrolateral lobe. Tegulae with border pale. Tegmina dark, costal veins with many white spots, apical and cross veins pale, edged with dark border, incomplete transverse veinlets pale. Wings dark. Venter dark brown with apical margins of abdominal sternites pale; legs dark with three light spots on outer margin of each femur and tibia; hind tibiae as seen from behind striped along each lateral edge with pale.

Comparative notes.—*Opsiplanon* can be distinguished from other genera by the venation of the tegmina and wings, by the median lobe of the pygofer, and Fennah (1945a) says by the shape of the lobes of the lateral styles of the ovipositor. This species may be separated from *O. ornatifrons* and *O. nemorosus* from Trinidad by the color pattern of the head and frons.

Type designation.—"Holotype ♂. Upper Natacumbe [sic] Key, Florida. March. In the collection of the Museum of Comparative Zoology. Allotype ♀. [actually a male] Paradise Key, Florida."

Type repository.—No. 15266, Museum of Comparative Zoology, Harvard University, Cambridge, Mass. "Allotype," North Carolina State University, Raleigh.

Host records.—None.

Geographic distribution.—*O. luellus* is found in Florida, Georgia (Bibb and Peach counties), Texas, and Kansas (Coffeyville and Douglas County), from December to May in Florida, in August in Georgia, and in August and October in Kansas.

Synecdoche, new genus(Type-species: *Catonia grisea* Van Duzee, 1908, present designation)

1. Frons 1.1 to 1.5 times as long as broad; compartments of disc variable.
2. Rostrum reaching base of hind coxae.
3. Pronotum usually medially shorter than tegulae, but about equal in *S. rubella* and longer in *S. helenae*. Two distinct lateral marginal carinae running from tegula to eye. (One species, *bifoveata*, has these two intersected by a transverse carina, producing two areolets rather than one here.)
4. Tegmen with (a) Sc+R fork about level with Cu₁, both slightly distad of union of claval veins; (b) subcostal cell about 1/3 length of tegmen, not widest just before apex.
5. Wing venation usually with R two-branched, M two-branched, and Cu₁ three-branched; except in *S. irrorata*, with R usually simple, M two-branched, and Cu₁ two-branched.
6. Hind tibia with spine in basal half.
7. Male pygofer with median lobe entire.
8. (a) Strut of aedeagal appendages Y-shaped, attached to claspers and pygofer.
(b) Phallobase with lateral lobe most prominent, apex curved ventrad (except in *S. helenae*), ventral lobe serrate, dorsal lobe simple.

This genus may be divided into a number of species groups, but the placement of several species which are intermediate among the groups is arbitrary. The greatest differences among species are usually found in the claspers and in the base of the frons, both of which show relationships among species as well. The seventh sternite in the females also shows distinct modification in the shape of the apical margin in some species. One group, the *albicosta* group, has a facies very like that of the genus *Plectoderes*, but lacks Fennah's (1950a) definitive generic character, a horseshoe-shaped sclerite at the entrance of the bursa copulatrix, at least in the species *rubella*. *Plectoderes collaris* (Coquebert), the type-species of the genus, has the medioventral lobe of the pygofer bifurcate and the phallobase quite different from the *albicosta* group. This species group may be distinguished by the frons slightly visible in dorsal view, rounding to the ventral aspect, and the tegmina usually without incomplete transverse veinlets. The claspers have two long lateral projections variously modified (figs. 130-135). Three of the six small species have been reported from manzanita, as has one of the large, *rubella*. The species involved are *albicosta*, *costata*, *necopina*, *pseudonervata*, *nervata*, and *flavicosta*. Two larger species, *rubella* and *cara*, seem to be closely allied to this group although *cara* has been reported on five other hosts, but not on manzanita.

S. constellata, *nemoralis*, *grisea*, and *ocellata* form the next group, identified by an unmarked frons and many incomplete transverse veinlets. *S. constellata* has the frons rounded at base like the *albicosta* species group; the others have the apex of the head more or less pointed, as does the *impunctata* group, but the latter have no incomplete veinlets and have the frons marked with dark. *S. grisea* and *ocellata* possess the ocellate spot on the mesonotum found in most of the *fusca* species group.

The *fusca* species group, containing *clara*, *tricolor*, *bifoveata*, *fusca*, and *irrorata*, has dark banding on the frons, interrupted medially by the pale carina, and a raised callus at the base of the frons uniting with the median and lateral carinae, somewhat like that in *Juniperia*. The tegmina have many pale incomplete transverse veinlets, sometimes transverse, sometimes merely dots. Judging from the shape of the claspers, and the female pregenital sternite, this group may not be as closely related as the species of the *albicosta* group.

The *impunctata* species group appears to be most closely allied with the *grisea* group. It differs in having a marked frons and tegmina without incomplete transverse veinlets. *S. helenae*, the most aberrant species in the genus, is placed here with *dimidiata*, *impunctata*, and *autumnalis*. *S. autumnalis* has an unmarked frons, but also tegmina without incomplete transverse veinlets, and a head which is not rounded but angulate apically.

This generic name is taken from the Greek *συνεκδοχή* and is feminine in gender.

Species included in *Synecdoche*:

<i>albicosta</i> [<i>Catonia</i>] (Van Duzee)	<i>helenae</i> [<i>Catonia</i>] (Van Duzee)
<i>autumnalis</i> , new species	<i>impunctata</i> [<i>Catonia</i>] (Fitch)
<i>bifoveata</i> , new species	<i>irrorata</i> [<i>Catonia</i>] (Van Duzee)
<i>cara</i> [<i>Catonia</i>] (Van Duzee)	<i>necopina</i> [<i>Catonia</i>] (Van Duzee)
<i>clara</i> [<i>Catonia</i>] (Van Duzee)	<i>nemorialis</i> [<i>Catonia</i>] (Van Duzee)
<i>constellata</i> [<i>Catonia</i>] (Ball)	<i>nervata</i> [<i>Catonia</i>] (Van Duzee)
<i>costata</i> [<i>Catonia</i>] (Van Duzee)	<i>ocellata</i> , new species
<i>dimidiata</i> [<i>Catonia</i>] (Van Duzee)	<i>pseudonervata</i> , new species
<i>flavicosta</i> , new species	<i>rubella</i> [<i>Catonia</i>] (Van Duzee)
<i>fusca</i> [<i>Catonia</i>] (Van Duzee)	<i>tricolor</i> , new species
<i>grisea</i> [<i>Catonia</i>] (Van Duzee)	

Two species described by Fennah (1950a) from British Guiana, *Catonia moriballi* and *C. muscosa* appear from their genitalic illustrations to belong to *Synecdoche* but Fennah (personal communication) says venation in both species resembles *Catonia* rather than *Synecdoche*. I have not seen the specimens.

KEY TO THE SPECIES OF SYNECDOCHE IN NORTH AMERICA

1. Frons pale, concolorous, at most mottled (figs. 12-23, 29) 2
Frons with large dark brown spots or bands, or all dark (figs. 24-28, 30-32) 14
2. Tegmina with many pale raised transverse incomplete cross veins (*grisea* species group) ... 11
Tegmina without, or with 7 or less, incomplete cross veins (*albicosta* species group, except *autumnalis*) 3
3. Vertex at least twice as broad as long 4
Vertex less than 1½ times as broad as long 9
4. Costal cell and sometimes cross veins white, rest of tegmina concolorous 5
Tegmina patterned, not concolorous except for costal cell 7
5. Cross veins of tegmina white, frontoclypeal suture transverse (figs. 13-14), insect usually medium to dark brown 6
Cross veins concolorous with wing, frontoclypeal suture angled upward (fig. 12), straw-colored to medium brown *albicosta* (Van Duzee)
6. Frons carinate, frons and base of clypeus pale *costata* (Van Duzee)
Frons not carinate, clypeus and apex of frons dark, paler towards base of frons
necopina (Van Duzee)
7. Tegmina with a pale transverse diamond-shaped area reaching medially from mesonotum

- to tip of clavus *cara* (Van Duzee)
 Tegmina brown with pale veins, sometimes center of cells pale 8
8. Vertex $2\frac{1}{2}$ times as wide as long, with basal and apical margins subparallel
 nervata (Van Duzee)
 Vertex twice as wide as long, apical margin produced, not subparallel to basal margin
 pseudonervata, n. sp.
9. Lateral compartments of frons concave from apex to raised area at base, lateral carinae
 above level of disc *autumnalis*, n. sp.
 Lateral compartments of frons concave only at apex, not above level of ocelli, lateral
 carinae above ocelli at same level as disc 10
10. Frontoclypeal suture incomplete, tegmina or at least veins usually reddish
 rubella (Van Duzee)
 Frontoclypeal suture complete, tegmina and veins pale yellowish brown *flavicosta*, n. sp.
11. In lateral view, apex of head smoothly rounded (as fig. 49) *constellata* (Ball)
 In lateral view, apex of head pointed, not smoothly rounded (as fig. 50) 12
12. Lateral areolets carinate anteriorly, vertex with four long dark stripes, mesonotum with
 pair of more or less distinct ocellate spots; female with apical margin of pregenital
 sternite entire 13
 Lateral areolets not carinate apically, merely raised; vertex usually concolorous, mesono-
 tum not so patterned; female with small median projection on pregenital sternite
 nemoralis (Van Duzee)
13. Eastern species (east of 100th meridian), frons sometimes mottled at base (fig. 22)
 grisea (Van Duzee)
 Western species, frons clear (fig. 23) *ocellata*, n. sp.
14. Tegmina with many pale raised transverse incomplete veinlets (*fusca* species group) 15
 Tegmina without transverse veinlets (*impunctata* species group) 19
15. Frons with dark band at clypeus, at most mottled above (fig. 24) *clara* (Van Duzee)
 Frons with two dark bands, or if only one, then specimen from Arizona (see *tricolor*)
 (figs. 25-28) 16
16. Basal area of frons without dark spots along lateral carinae (fig. 25) *tricolor*, n. sp.
 Basal area of frons with dark spots along lateral carinae (figs. 26-28) 17
17. Edge of apical dark band not coinciding with frontoclypeal suture, pale triangular area
 laterally *irrorata* (Van Duzee)
 Edge of apical dark band coinciding with frontoclypeal suture 18
18. Vertex twice as wide as long *bifoveata*, n. sp.
 Vertex 1.6 times as wide as long *fusca* (Van Duzee)
19. Frons entirely dark, contrasting sharply with clypeus *dimidiata* (Van Duzee)
 Frons pale with dark spots (figs. 31-32) 20
20. Apical dark spots on frons almost touching frontoclypeal suture (fig. 31)
 impunctata (Fitch)
 Pale area along frontoclypeal suture, dark spots basad (fig. 32) *helenae* (Van Duzee)

Synecdoche albicosta (Van Duzee), new combination

(Figs. 12, 63, 103, 130)

Catonia albicosta Van Duzee, 1917, Proc. California Acad. Sci., (4)7:306; Metcalf, 1948:25.

Catonia albocostata [sic], Van Duzee, 1918:307.

Length.—4.0 to 5.0 mm. Base of frons slightly visible from above, smoothly rounding ventrad; lateral areolets absent; frons in ventral aspect about $1\frac{1}{2}$ times as long as broad, measured along midline from base to line joining outer ends of frontoclypeal suture, median carina faint, absent where base of frons curves to vertex; lateral compartments slightly concave at apex, convex axially and transversely nearer base; frontoclypeal suture obsolete medially, oblique laterally; clypeus half as long as frons. Vertex half as long as broad, declivous, disc flat, lateral and median carinae slightly, subequally raised.

Pronotum short, lateral carinae of disc oblique; lateral areolets absent or indistinct. Stigmal cell divided in proximal third by oblique pale fold.

Clasper with two narrow lateral projections.

Color.—Golden brown; vertex, pronotum, and tegulae slightly paler; costal cell white; veins concolorous.

Comparative notes.—*S. albicosta* is most closely related to *costata*, *necopina*, *nervata*, and *flavicosta*, in that they all have long lateral spines on the claspers and a frons with its base visible from above. *S. albicosta*, *costata* and *necopina*, and sometimes *pseudonervata* all have a white costal cell. *S. albicosta* may be separated from *costata* and *necopina* by its laterally oblique frontoclypeal suture (fig. 12) and concolorous cross veins and no black border around the ocelli, as contrasting with a more transverse suture (figs. 13 and 14), white cross veins and a narrow black line edging the ocelli in *costata* and *necopina*. *S. pseudonervata* differs in the proportions of the vertex.

Type designation.—"Described from twelve examples representing both sexes, taken on manzanita at Fallen Leaf Lake by Mr. Giffard on August 21, 1916... Holotype (No. 373), male, in collection of the California Academy of Sciences. Allotype, female, in collection of Mr. Giffard."

Type repository.—California Academy of Sciences. No allotype but 1 ♂, 5 ♀, and one without an abdomen, all paratypes, at B. P. Bishop Museum, Hawaii.

Host records.—Manzanita.

Geographic distribution.—Western Sierra foothills from Tulare County north around the valley and down the coast range to near San Francisco.

Specimens examined.—CALIFORNIA. El Dorado County: Fallen Leaf Lake, 2 ♀, paratypes, VIII-21-1916, on manzanita (W. M. Giffard, CAS); 5 ♀, VII-1931 (O. H. Swezey, CAS).

Marin County: Stinson Beach, 1 ♂, 1 ♀, VIII-15-1938 (R. E. Beamer, KU).

Mariposa County: Mariposa, 1 ♂, 1 ♀, 1935 (Oman, USNM); 11 ♂, 6 ♀, VI-22-1935 (P. Oman, USNM).

Nevada County: Truckee, 1 ♂, VIII-20-1938 (R. I. Sailer, KU).

Placer County: Auburn, 4 ♂, 4 ♀, VI-9-1909 (Ball, USNM). Towie [towle, correction by L. W. Hepner], 14 ♂, 19 ♀, VIII-20-1938 (R. H. Beamer, KU).

Shasta County: Burney Falls, 2 ♂, 2 ♀, VI-29-1947 (T. O. Thatcher, CIS). Redding, 2 ♂, VI-28-1935 (R. H. Beamer, KU).

Siskiyou County: Dunsmuir, 1 ♀, VIII-13-1912 (E. D. Ball, USNM).

Tebama County: Dales, 5 ♂, 5 ♀, VI-28-1935 (R. H. Beamer, KU). 15 miles west Mineral, 4 ♂, 9 ♀, VI-25-1951 (D. J. and J. N. Knoll, OSU); 2 ♀, VI-27-1966 (L. B. and C. W. O'Brien). Paynes Creek, 1 ♂, 2 ♀, VI-27-1935 (P. Oman, USNM).

Tulare County: Three Rivers, 1 ♀, VI-9-1935 (P. Oman, USNM).

Indeterminate: Big Bar, 2 ♂, 1 ♀, VII-24-1912 (E. D. Ball, USNM).

Synecdoche costata (Van Duzee), new combination

(Figs. 13, 64, 104, 131)

Catonia costata Van Duzee, 1910, Trans. American Ent. Soc., 36:86; Metcalf, 1948:28.

Length.—3.0 to 4.1 mm. Base of frons slightly visible from above, smoothly rounding ventrad; lateral areolets absent; frons in ventral aspect about 1¾ times as long as broad; median carina present, absent at base where frons rounds to vertex, lateral compartments of disc slightly concave at apex, convex axially and transversely nearer base; frontoclypeal suture transverse, only slightly convex basad (fig. 13); clypeus half as long as frons. Vertex half as long as broad, declivous; disc flat, lateral and median carinae subequally raised.

Pronotum short, lateral carinae of disc oblique, lateral areolets indistinct or absent. Stigmal cell divided in proximal third by oblique pale fold.

Clasper with two narrow lateral projections.

Color.—Brown; base of frons, vertex, pronotum, tegulae, costal cell, and all veins behind stigmal cell pale yellowish white.

Base of frons and clypeus yellow, darkening towards apex of clypeus; well-marked speci-

mens with dark brown clypeus, legs, abdominal sternites, and wings. Many specimens paler. Posterior margin of abdominal sternites, claspers and medioventral lobe of pygofer pale.

Comparative notes.—*S. costata* is most closely related to *albicoستا* and *necopina* with which it shares a white costal cell, but *albicoستا* lacks pale cross veins. *S. costata* may be separated from *necopina* by the shape of its phallobase and claspers, the pale coloration of its frons and base of clypeus, and the more strongly carinate frons.

Type designation.—"Described from one female and five male examples taken by Mr. Fordyce Grinnell, Jr., on the San Gabriel Mountains near Pasadena, California, on June 17, 1909, at an altitude of 3000 feet." I validate by publication Van Duzee's selection of a male (No. 2382) as lectotype.

Type repository.—California Academy of Sciences.

Host records.—None.

Geographic distribution.—*S. costata* is found in the Peninsular Ranges of southern California, south into Mexico.

Specimens examined.—CALIFORNIA. Los Angeles County: 1 ♂, June (Coquillet, USNM). Camp Baldy, 1 ♂, 1 ♀, VI-14-1926 (L. J. Muchmore, LACM). Mint Canyon, 1 ♂, 2 ♀, VI-7-1935 (Oman, USNM). Pasadena, 4 ♂ paratypes, VI-17-1909 (Grinnell, CAS); 1 ♂, VI-28-1909 (Ball, USNM); 1 ♂, VII-31-1912 (E. D. Ball, USNM).

Riverside County: Anza, 1 ♂, VII-29-1938 (R. H. Beamer, KU). Cabezon, 1 ♂, 2 ♀, VI-20-1909 (Ball, USNM). San Jacinto Mts, 2 ♂, VI-30-1933 (R. H. Beamer, KU). Santa Rosa Mts., 2 ♀, V-27-1946, and Santa Rosa Mts., Pinon Flat, 1 ♀, VII-1-1941 (D. J. and J. N. Knull, OSU).

San Diego County: Boulevard, 1 ♀, VI-12-1951 (D. J. and J. N. Knull, OSU). West of Jacumba, 1 ♂, VIII-1945 (Oman, USNM). San Diego County, 2 ♂, IV-11-1914, 2 ♂, 1 ♀, IV-13-1914, 1 ♀, V-4-1913, 4 ♂, 2 ♀, V-24-1913, 1 ♀, VI-6-1914, 1 ♀, VI-7-1913, 1 ♂, VI-8-1913, 1 ♀, VI-20-1914, 1 ♀, VI-21-1914 (E. P. Van Duzee, CAS).

San Luis Obispo County: San [sic] Margareta, 1 ♀, VIII-6-1912 (Ball, USNM).

MEXICO. BAJA CALIFORNIA DEL NORTE: El Progreso, Sierra Juarez, 2 ♂, V-24-1959 (E. L. Sleeper, LBS). Tijuana, 1 ♂, VI-15-1908 (USNM).

Synecdoche necopina (Van Duzee), new combination

(Figs. 14, 65, 105, 132)

Catonia necopina Van Duzee, 1918, Proc. California Acad. Sci., (4)8:307; Metcalf, 1948:33.

Length.—3.8 to 4.2 mm. Base of frons slightly visible from above, smoothly rounding ventrad; lateral areolets absent; frons in ventral aspect about 1.3 times as long as broad, median carina indistinct, although the two compartments meet at an angle along the median line, lateral compartments slightly concave at apex, convex axially and transversely nearer base; frontoclypeal suture obsolete medially, slightly oblique laterally (fig. 14); clypeus half as long as frons. Vertex half as long as broad, declivous, disc flat; lateral and median carinae subequally raised.

Pronotum short, lateral carinae of disc oblique; lateral areolets indistinct or absent. Stigmal cell divided into proximal third by oblique pale fold.

Clasper with two narrow lateral projections.

Color.—Dark brown, mesonotum slightly paler; vertex, pronotum, and tegulae, costal cell, and cross and apical veins pale.

Base of frons sometimes pale, sometimes dark; ventral surface, including wings, dark, with posterior margins of abdominal sternites, medioventral lobe of pygofer, claspers and legs paler. Mesonotal carinae concolorous or paler.

Comparative notes.—*S. necopina* is most closely related to *costata*, from which it may be separated by the shape of its phallobase and claspers, darker color, the absence of a distinct median carina or the color pattern on its frons and clypeus.

Type designation.—"Described from one pair taken at Keen Camp, San Jacinto Mountains, June 9, 1917, on Mt. Tahquitz, at an elevation of about 7000 feet. The food plant is probably cypress. . . . Holotype (No. 442), male, and allotype (No. 443), female, in collection of the California Academy of Sciences."

Type repository.—California Academy of Sciences.

Host records.—"Probably cypress" and *Arctostaphylos pringlei drupacea*.

Geographic distribution.—*S. necopina* has been found in the Peninsular Range of mountains of Riverside and San Diego counties, California.

Specimens examined.—CALIFORNIA. Riverside County: Anza, 1 ♀, VII-12-1941 (R. H. Beamer, KU). Herkey Creek, San Jacinto Mts., 1 ♂, VI-10-1940 (CAS). Idyllwild, 1 ♂, 1 ♀, ♀ on *Arctostaphylos pringlei drupacea*, VII-29-1938, 7 ♂, 1 ♀, VIII-3-1935 (R. H. Beamer, KU). Keen Camp, 1 ♀, V-31-1941, 2 ♂, 1 ♀, VII-3-1946 (D. J. and J. N. Knull, OSU). Pinon Flat, Santa Rosa Mts., 3 ♂, 5 ♀, V-27-1941, 1 ♂, VII-1-1941 (D. J. and J. N. Knull, OSU). San Jacinto Mts., 12 ♂, 9 ♀, VII-31-1936 (R. H. Beamer, KU), 3 ♂, VII-31-1936 (P. R. Lindsay, KU). Santa Rosa Mts., 3 ♂, 6 ♀, V-27-1946, 1 ♀, VII-4-1946, 2 ♀, VI-5-1946, 2 ♀, VI-15-1946, 3 ♀, VII-1-1941, 1 ♀, VII-4-1946 (D. J. and J. N. Knull, OSU).

San Diego County: Boulevard, 6 ♂, 5 ♀, VI-12-1951, 1 ♀, VI-27-1952 (D. J. and J. N. Knull, OSU). Jacumba, 3 ♂, 13 ♀, V-18-1941, 1 ♂, 1 ♀, VI-18-1941 (D. J. and J. N. Knull, OSU). Pine Valley, 1 ♂, 1 ♀, VII-6-1931 (E. D. Ball, USNM).

Indeterminate: Newton, 1 ♂, VI-17-1954 (D. J. and J. N. Knull, OSU).

Synecdoche pseudonervata, new species

(Figs. 15, 66, 106, 133)

Length.—3.8 to 4.1 mm. Base of frons visible from above, smoothly rounding ventrad; lateral areolets absent; frons in ventral aspect $1\frac{1}{2}$ as long as broad, median carina present apically, absent in basal fifth, lateral compartments slightly concave at apex, convex axially and transversely nearer base; frontoclypeal suture incomplete medially, slightly oblique laterally (fig. 15); clypeus $\frac{3}{5}$ as long as frons. Vertex $\frac{3}{5}$ as long as broad, declivous; disc flat, lateral and median carinae subequally raised.

Pronotum short, lateral carinae of disc oblique; lateral areolets present. Stigmal cell divided in proximal third by oblique pale fold; first radial and sometimes first medial cell with raised incomplete transverse veinlets.

Clasper with two narrow lateral projections.

Color.—Dark brown, with frons, clypeus, vertex, carinae, areas on thorax and veins of tegmina pale. Legs also paler than body. Basal $\frac{3}{5}$ of mesonotum with pale rectangle between carinae, or dark with ocellate spot at base of carinae. Tegmina with cells brown or with irregular medial areas clear, bordered with brown; stigmal cell distad of oblique fold darkest area of tegmen. Wings brown with brown veins. Abdominal sternites at posterior margin, medioventral lobe of pygofer, and claspers, pale.

Comparative notes.—*S. pseudonervata* could be most easily confused with *nervata*, with a similar tegminal color pattern, but for the unmistakable differences in the shape of the vertex. Morphologically it is more closely related to *albicosta*, *costata*, and *necopina*, in which the vertex is longer. The presence of transverse veinlets in the radial cell separates it from the other members of this species-group. Five aberrant females and one male from Ontario and Pasadena, California, have the costal cell white, the veins pale, the cells with fewer irregular clear areas, the pronotum without lateral areolets, and the mesonotum with the disc pale. They are assigned to *pseudonervata* provisionally, as the structure of the male genitalia suggests that they should be placed here.

Type designation.—This species is described from nine specimens from southern California. Holotype male, allotype, and one male and three female paratypes from Topango [sic] Canyon, Los Angeles County, August 5, 1938, R. H. Beamer, holotype labeled *Arctostaphylos glandulosa*. One female paratype, same locality and date, L. W. Hepner, one male paratype, Santa Ynez Mountains, Santa Barbara County, June 24, 1959, R. W. Spore (UCD), and one female paratype 3 miles north Refugio Beach, June 18, 1965, M. R. Gardner (UCD).

Type repository.—University of Kansas, Lawrence.

Host records.—*Arctostaphylos glandulosa*.

Geographic distribution.—In the transverse range of Southern California and its adjacent valleys, elevation unknown. Six slightly differently patterned individuals were taken as follows:

Los Angeles County: Mint Canyon, 1 ♂, VI-7-1935 (Oman, USNM); Pasadena, 1 ♀, VI-21-1909 (Ball, USNM).

San Bernardino County: Ontario, 4 ♀, IV-21-1908 (USNM).

Synecdoche nervata (Van Duzee), new combination

(Figs. 16, 67, 107, 134)

Catonia nervata Van Duzee, 1910, Canadian Ent., 42:265, 262, 263; Metcalf, 1948:33.

Length.—5.0 to 6.0 mm. Base of frons visible from above, smoothly rounding ventrad; lateral areolet absent; frons in ventral aspect 1.1 times as long as broad, median carina absent at base where frons rounds to vertex, this area convex axially and transversely, lateral compartments slightly concave at apex; frontoclypeal suture incomplete medially, slightly oblique laterally; clypeus about $\frac{3}{4}$ as long as frons. Vertex $\frac{3}{5}$ as long as wide, median and lateral lengths subequal; compartments of disc slightly concave, lateral and median carinae subequally raised.

Pronotum short, lateral carinae of disc oblique, lateral areolet absent or indistinct. Stigmal cell divided in proximal third by oblique pale fold.

Clasper with single lateral lobe, showing, however, the two projections which are not fused in *costata*, *necopina*, or *albicosta*.

Color.—Brown, with carinae on pronotum and mesonotum and veins pale, each vein of tegmina bordered with brown, disc of cell usually pale. Female darker than male. Frons, vertex, and legs yellowish brown. Clypeus dark, sometimes with pale area at base or apex, pronotum and mesonotum brown, carinae and margins of lateroventral pronotal lobes pale. Mesonotum sometimes with a pair of ocellate spots on median disc adjoining lateral carinae basally; sometimes pale areas present laterally. Tegmina as described, with dark borders of veins occasionally spreading into dark spots about the size of the tegulae; stigmal cell with medial area transparent. Abdominal sternites dark brown, with pale posterior margins, medioventral lobe of pygofer and claspers usually pale.

Comparative notes.—This species may be separated from the others in the *albicosta* group by its short vertex, $\frac{2}{3}$ as long as wide, subequally long throughout its width.

Type designation.—"Described from one male taken on Mt. Wilson, near Pasadena, California, on August 10th, 1909, by Mr. Fordyce Grinnell, jr."

Type repository.—Holotype 2380, California Academy of Sciences.

Host records.—*Arctostaphylos glauca*, *Cercocarpus ledifolius*, *Alnus rhombifolia*, *Pinus lambertiana*, and mint.

Geographic distribution.—The transverse ranges of California and the coast ranges as far north as Santa Cruz County.

Specimens examined.—CALIFORNIA. Los Angeles County: Mt. San Antonio, about 6000 feet, 1 ♂, 2 ♀, VIII-22-1946, manzanita (Timberlake, PT). San Antonio Canyons, 100 ♂, 14 ♀, VIII-4-1938, *Arctostaphylos glauca* (R. H. Beamer, KU), 1 ♀ (L. W. Hepner, KU). San Gabriel Canyon, Falling Spring, 1 ♀, VI-24-1948, mint (R. A. Flock, UCR). Tanbark Flat, 1 ♂, VI-19-1956 (L. A. Stange, LACM).

San Bernardino County: Big Bear Lake, 1 ♂, VII-26-1932 (R. H. Beamer, KU). Mill Creek, San Bernardino Mts., 6000 feet, 2 ♂, VII-2-1952, *Cercocarpus ledifolius*, 4 ♂, VII-27-1957, *Cercocarpus ledifolius*, 1 ♂, VII-26-1947, *Alnus rhombifolia*, 1 ♂, VIII-19-1945, *Pinus lambertiana* (Timberlake, PT).

Santa Clara or Santa Cruz County: Santa Cruz Mountains, 15 ♂, 2 ♀, VIII-13-1938, *Arctostaphylos glauca* (R. H. Beamer, KU).

Synecdoche flavicosta, new species

(Figs. 17, 49, 68, 108, 135)

Length.—4.0 to 5.0 mm. Base of frons slightly visible from above, smoothly rounding ventrad; lateral areolet absent; frons in ventral aspect about $1\frac{1}{2}$ times as long as broad, median carina absent at base where frons curves to vertex, lateral compartments slightly concave at apex, convex axially and transversely near base; frontoclypeal suture incomplete medially, oblique laterally; clypeus about half as long as frons. Vertex half as long as broad, declivous; discs concave, lateral and median carinae slightly subequally raised.

Pronotum short medially, almost as long as tegulae; lateral carinae of disc oblique; lateral areolet absent or indistinct. Stigmal cell divided in proximal half by oblique pale fold.

Claspers similar to *albicosta* series, but lateral lobes shorter.

Color.—Pale yellowish brown throughout, sometimes cross veins paler; abdominal sternites brown in male, pygofer and claspers pale yellowish brown.

Comparative notes.—This species is very close to *S. albicosta*, but differs in the concolorous costal cell and in the shorter lateral lobes of the claspers.

Type designation.—Described from 18 specimens from the coast range of California south of San Francisco Bay. Holotype male, allotype, five male and two female paratypes from S. Margarita [sic], June 25, 1909, collected by E. D. Ball. Six male and one female paratypes, San Luis Obispo, June 14, 1934, E. D. Ball. Two males and one female paratypes, Salinas, June 26, 1909, E. D. Ball, and one male paratype, 3000 feet up Cone Mountain, Monterey County, August 10, 1962, E. I. Schlinger, R. v.d. Bosch (UCR).

Type repository.—United States National Museum; University of California, Riverside.

Host records.—None.

Geographic distribution.—Coast ranges of Monterey and San Luis Obispo counties, California.

Synecdoche rubella (Van Duzee), new combination

(Figs. 18, 47, 48, 69, 109, 136)

Catonia rubella Van Duzee, 1910, Canadian Ent., 42:264, 262, 263, 265; Metcalf, 1948:35.

Length.—4.2 to 5.5 mm. Lateral base of frons visible from above, smoothly rounding ventrad; lateral areolet absent; frontoclypeal suture indistinct medially, oblique laterally; frons in ventral aspect about $1\frac{3}{4}$ times as long as broad, median carina distinct apically, absent where base of frons rounds to vertex; lateral compartments of disc convex medially near apex, concave near margins, convex axially and transversely near base; clypeus almost $\frac{3}{4}$ as long as frons. Vertex almost as long as broad ($1\frac{5}{7}$), declivous, produced before the eye about half its length, disc flat, lateral and median carinae slightly and subequally raised.

Midline of pronotum as long as tegulae; lateral carinae of disc oblique, lateral areolet usually absent. Stigmal cell divided in proximal third by oblique fold.

Clasper with proximal lobe broad, distal lobe folding back over clasper (fig. 136).

Color.—Reddish brown, head and pronotum paler brown, veins more or less distinctly reddish. Tegmen with reddish opaque stippling, especially heavy in costal, subcostal, and stigmal cell, less dense across tegmen from apex of clavus to stigmal cell, apical area clear. Vertex, frons, and dorsal area of pronotum paler than rest of body.

Comparative notes.—*S. rubella* shares with the *S. albicosta* group a frons that is exposed dorsally, and rounds broadly ventrad. Of these species, *rubella* is distinct in having a pronotum that is medially as long as a tegula and in being larger. In well-marked specimens the red color alone sets it apart from the 39 other species in the tribe in the United States.

Type designation.—"Described from two male and two female examples from the Cornell University Collection, taken at Felton, California, about May 22nd, 1907, by Mr. J. C. Bradley." I designate as lectotype the female specimen belonging to Cornell, labeled "type," and as allotype the male labeled "co-type," not Van Duzee's unpublished lectotype at the California Academy of Sciences.

Type repository.—Cornell University, Ithaca, New York, C. U. No. 4012.

Host records.—*Arbutus menziesii*, manzanita, *Arctostaphylos glauca*, *Arctostaphylos tomentosa*, *Arctostaphylos canescens* var. *candidissima*, *Arctostaphylos montana*, *Pasania*, oak, *Ceanothus cyneatus*.

Geographic distribution.—The western side of the Sierra, the transverse and coast ranges, and the Cascades north into Oregon. Apparently so widespread because it can live on many species of *Arctostaphylos* (manzanita). It matches the bark color of this plant and madrone (*Arbutus*) very closely.

Specimens examined.—CALIFORNIA. Alameda County: Canyon Station, 1 ♂, VI-12-1926 (H. H. Keifer, CAS).

Butte County: Chico, 1 ♂, 1 ♀, VIII-11-1912 (E. D. Ball, USNM). Oroville, 1 ♀, V-1-1928, *Ceanothus cyneatus* (H. H. Keifer, CAS). 1 mile north Oroville, 1 ♀, VI-1-1961, ex oak (G. M. Buxton, CDA). Richardson Springs, 1000 feet, 1 ♀, V-10-1955 (Bryant, CAS).

- Calaveras County: Angels Camp, 1 ♀, V-22-1930 (E. P. Van Duzee, CAS).
- Contra Costa County: 2 miles southwest Moraga, 5 ♂, 9 ♀, VII-24-1965, 1 ♂, V-21-1966, *Arbutus menziesii* (C. W. and L. B. O'Brien).
- Del Norte County: Gasquet, 1 ♀, VI-8-1960 (T. R. Haig, CDA). Siskiyou National Forest, 2 ♀, VII-14-1935 (R. H. Beamer, KU).
- El Dorado County: 2 miles east Camino, 1 ♀, VII-12-1962, manzanita (J. T. Doyen, O'B). Fallen Leaf Lake, VIII-8-1932, *Arctostaphylos* (H. H. Keifer, CDA). Placerville, V-27-1935 (H. H. Keifer, CDA). Pollock Pines, 1 ♂, VI-16-1952 (E. I. Schlinger, UCD).
- Fresno County: Fresno, 2 ♂, 1 ♀, VI-20-1926 (C. J. Drake, USNM).
- Humboldt County: Eureka, 2 ♀, VI-22-1934 (E. D. Ball, USNM). Weott, 1 ♂, VII-15-1924 (E. C. Van Dyke, CAS).
- Lake County: Boggs Lake, 8 miles northwest Cobb, Bottle Rock Road, 2 ♂, 2 ♀, VII-2-1963, *Arctostaphylos canescens* var. *candidissima* (determined by Peter Rubtzoff) (L. B. O'Brien). Near Hobergs, 3 ♂, VIII-2-1916 (E. P. Van Duzee, CAS).
- Lassen County: Susanville, 1 ♂, 1 ♀, VI-17-1959 (Kelton and Madge, CNC).
- Los Angeles County: Camp Baldy, 3 ♂, 3 ♀, VI-14-1926 (L. J. Muchmore, LACM). Glendora, Angeles National Forest, 1 ♀, VII-14-1944, mixed chaparral (USNM). Pasadena, 2 ♂, 2 ♀ (1 pair in copulo), VI-21-1909 (E. D. Ball, USNM). Tanbark Flat, 2 ♀, VI-25-1952 (E. M. Evans, UCD); 1 ♀, VI-25-1956 (A. Menke, Jr., LACM).
- Marin County: 1 mile southeast Inverness, 1 ♂, VI-15-1963 (L. B. O'Brien). Lagunitas, 1 ♂, VIII-7-1921 (E. P. Van Duzee, CAS). Mill Valley, 1 ♀, V-11-1959, 1 ♂, VI-10-1959 (H. B. Leech, CAS); 1 ♀, VI-7-1915 (E. P. Van Duzee, CAS). Mount Tamalpais, 1 ♀, V-20-1904 (E. P. Van Duzee, CAS).
- Mariposa County: Coffee Creek Ranger Station, 2 ♂, 1 ♀ VII-14-1955 (J. W. MacSwain, CIS). Mariposa, 10 ♂, 2 ♀, VI-22-1935 (Oman, USNM). Miami Ranger Station, 5000 feet, 1 ♀, VII-27-1946 (H. P. Chandler No. 3, RF). 4 miles south Miami Ranger Station, 1 ♀, VII-19-1941 (RF).
- Mendocino County: Twin Rocks, 1 ♂, VII-10-1929 (E. C. Van Dyke, CAS). Ukiah Grade, 1 ♂, V-10-1926 (E. P. Van Duzee, CAS).
- Monterey County: Jamesburg, 1 ♀, VIII-11-1938 (R. H. Beamer, KU).
- Napa County: Mount St. Helena, 3 ♀, VI-9-1918 (E. P. Van Duzee, CAS); 2 ♀, VI-19-1941 (D. J. and J. N. Knull, OSU, USNM); Napa, 1 ♂, VI-26-1935 (Oman, USNM).
- Nevada County: Rush Creek, 2 ♂, VII-5-1956, on madrone (R. F. Wilkey, CDA).
- Placer County: Colfax, 1 ♂, VI-8-1909 (E. D. Ball, USNM). Towie [Towle], 1 ♂, 1 ♀, VIII-20-1938 (R. H. Beamer, KU); 1 ♀, VIII-20-1938 (R. I. Sailer, KU).
- Plumas County: Keddie, 1 ♀, VI-16-1941 (Fred H. Rindge, CIS). Quiney, 1 ♂, VI-25-1948 (D. J. and J. N. Knull, OSU); 3 ♂, 3 ♀, VII-23-1912 (E. D. Ball, USNM).
- Riverside County: Beaumont, 1 ♀, VI-12-1931 (E. D. Ball, USNM). Keen Camp, 2 ♂, 2 ♀, VII-3-1946 (D. J. and J. N. Knull, OSU).
- San Bernardino County: Mountain Home Canyon, San Bernardino Mountains, 3 ♀, VIII-7-1949, 2 on *Arctostaphylos glauca*, 1 on *Arctostaphylos tomentosa* (Timberlake, PHT).
- San Diego County: Del Mar, 2 ♀, VI-12-1935 (Oman, USNM). Pine Hills, 1 ♀, VI-22-1950, *Arctostaphylos canescens* (Timberlake, PT). San Diego, 2 ♀, V-17-1913, 2 ♂, 1 ♀, V-24-1913 (W. S. Wright, CAS). San Diego County, 3 ♂, 4 ♀, V-10-1913, 1 ♂, VI-6-1914, 1 ♂, 1 ♀, VI-8-1913 (E. P. Van Duzee, CAS). Kings Mountain, VII-3-1931, *Pasania* (H. H. Keifer, CDA).
- Santa Barbara County: Lompoc, 1 ♀, VIII-6-1938, *Arctostaphylos montana*, 1 ♀, VIII-9-1938 (R. H. Beamer, KU).
- Santa Cruz County: Boulder Creek, 3 ♂, 6 ♀, VII-18-1933 (R. H. Beamer, KU). 5 miles east Boulder Creek, 2 ♂, VII-15-1961 (J. T. Doyen, O'B). Felton, 300-500 feet, 1 ♀ paratype, V-20-22-1907 (Bradley, CAS). Santa Cruz, 2 ♂, 1 ♀, VI-2-1914 (E. P. Van Duzee, CAS). Santa Cruz Mountains, 1 ♀, VIII-13-1938 (R. H. Beamer, KU); 1 ♀, VIII-13-1938 (R. I. Sailer, KU); 4 ♀, no date (H. Osborn collection, OSU, USNM). Watsonville, 1 ♀, VI-15-1934 (E. D. Ball, USNM).
- Shasta County: Burney Falls, 3 ♂, 4 ♀, VI-24-1947 (T. O. Thatcher, UCD). Cayton, 3 ♂, 5 ♀, VII-9-1913, 2 ♂, VII-10-1913, 5 ♂, 1 ♀, VII-12-1918, 1 ♂, VII-13-1918, 1 ♀, VII-14-1918, 1 ♂,

2 ♀, VII-15-1918, 1 ♂, VII-21-1918 (E. P. Van Duzee, CAS). Delta, 2 ♀, VI-28-1935 (Oman, USNM). Hat Creek Post Office, 1 (abdomen missing), VII-15-1935 (W. H. Lange, UCD). Shasta County, 1 ♀, VI-20-1921, 1 (abdomen missing), 2 ♂, 2 ♀, VI-26-1921, 2 ♂, 1 ♀, VII-13-1921 (J. A. Kusche, CAS).

Siskiyou County: Dunsmuir, 1 ♂, 3 ♀, VI-28-1935 (Oman, USNM); 1 ♂, 1 ♀, VI-29-1935 (R. H. Beamer, KU); 1 ♂, VIII-13-1912 (E. D. Ball, USNM). Fowler's Camp, 4 miles east McCloud, 7 ♂, 3 ♀, VII-2-1963 (V. B. Whitehead, O'B). Mt. Shasta City, 1 ♀, VI-26-1958 (J. Powell, CIS). North of Weed, 1 ♂, 1 ♀, VI-29-1935 (Oman, USNM).

Sonoma County: Bennett Mountain Lake, 3 miles west Kenwood, 4 ♂, 6 ♀, VI-22-1963, *Arctostaphylos* (C. W. and L. B. O'Brien).

Tehama County: 9 miles west Mineral, 1 ♂, VI-27-1966, 1 ♂, VI-28-1966 (C. W. O'Brien). 13 miles west Mineral, 1 ♂, 3 ♀, VII-9-1954, 2 ♂, 5 ♀, VII-12-1954 (D. J. and J. N. Knull, OSU). 15 miles west Mineral, 1 ♀, VI-16-1966, 1 ♂, VI-25-1959, 4 ♂, 2 ♀, VII-3-1951, 1 ♂, 1 ♀, VII-20-1956 (D. J. and J. N. Knull, OSU, USNM). Paynes Creek, 1 ♀, VI-27-1935 (Oman, USNM).

Trinity County: Weaverville, 2 ♂, 2 ♀, VI-16-1941 (D. J. and J. N. Knull, OSU, USNM).

Tulare County: Potwisha, Sequoia National Park, 2000-5000 feet, 1 ♀, V-29-1929 (E. P. Van Dyke, CAS).

Tuolumne County: Bear River, 1 ♂, V-17-1930 (E. P. Van Duzee, CAS). Sonora, 1 ♀, VI-23-1930 (E. P. Van Duzee, CAS). Strawberry, 1 ♀, VIII-6-1960 (D. Q. Cavagnaro, UCD). Twain Harte, 4800 feet, 1 ♀, VII-1937 (F. E. Blaisdell, CAS).

Indeterminate: Big Bar, Calif., 1 ♂, 3 ♀, VII-24-1912 (E. D. Ball, USNM). San Dimas Experimental Forest #2, 1 ♀, VI-13-1959 (M. Knox, E. Sleeper, LBS).

OREGON. Jackson County: Ashland, 1 ♂, 1 ♀, VII-13-1951 (D. J. and J. N. Knull, OSU); 1 ♂, 1 ♀, VIII-13-1912 (E. D. Ball, USNM). Medford, 1 ♂, 1 ♀, VI-26-1934, 1 ♀, VII-1-1909 (E. D. Ball, USNM).

Josephine County: Grants Pass, 1 ♂, 1 ♀, VII-12-1935 (R. H. Beamer, KU).

Synecdoche cara (Van Duzee), new combination

(Figs. 19, 70, 110, 137)

Catonia cara Van Duzee, 1910, Trans. American Ent. Soc., 36:86; Metcalf, 1948:26.

Length.—5.8 to 6.1 mm. Lateral base of frons visible from above, smoothly rounding ventrad; lateral areolet absent; frontoclypeal suture indistinct at midline, oblique laterally; frons in ventral aspect $1\frac{1}{4}$ times as long as broad, median carina distinct apically, absent where base of frons rounds to vertex; lateral discs concave for length of median carina, convex axially and transversely at base; clypeus half as long as frons. Vertex as long as broad, declivous, disc flat, lateral and median carinae slightly, subequally raised.

Pronotum shorter than tegula, lateral carinae of disc oblique; lateral areolet absent or indistinct. Stigmal cell divided in proximal third by oblique pale fold; proximal third subrectangular because of curve in subcosta.

Clasper with lateral lobe broad. Phallobase as figured.

Color.—*S. cara* is unique in having a pale yellowish somewhat diamond-shaped band across the tegmina at rest, reaching from the scutellum to the apex of the clavus. Diamond-shaped area pale yellow, truncate on costal margins, bordered with a dark band distally about $\frac{1}{3}$ its width; dark border fading distad to pale brown; mesonotum and tegmen basad of diamond dark brown; vertex, pronotum and tegulae as pale as apex of tegmina. Tegminal veins colorous but cross veins white.

Comparative notes.—*S. cara* may most easily be identified by its tegminal color pattern. Once identified as one of the *albicosta* group, it may be separated from all but *rubella* by its large size, and from *rubella* by the latter's longer pronotum.

Type designation.—"Described from one pair taken in copulation on Mt. Wilson, California, September 14, 1908, by J. C. Bradley." I validate by publication Van Duzee's selection of the male as lectotype (No. 2214) and the female as allotype (No. 2215).

Type repository.—California Academy of Sciences.

Host records.—Sycamore, *Libocedrus decurrens*, *Alnus rhombifolia*, *Chrysopsis villosa*.

Geographic distribution.—Transverse and peninsular ranges and west side of the Sierra as far north as Tuolumne County.

Specimens examined.—CALIFORNIA. Los Angeles County: Mt. Baldy, 1 ♀, VIII-10-1947 (R. A. Flock, RF). San Antonio Canyons, 1 ♂, VIII-4-1938 (R. H. Beamer, KU).

Riverside County: Palm Springs, 1 ♂, V-19-1917, sycamore (E. P. Van Duzee, CAS).

San Bernardino County: Mill Creek Canyon, 1 ♂, 1 ♀, VII-24-1923, 1 ♂, 1 ♀, VII-24-1923, on *Libocedrus decurrens* (E. P. Van Duzee, CAS, USNM). Mill Creek Canyon, 6000 feet, 1 ♀, VII-26-1947, *Chrysopsis villosa*, 1 ♂, VIII-2-1951, 2 ♂, VIII-4-1951, 1 ♂, VIII-5-1951, all 4 on *Alnus rhombifolia* (Timberlake, PT). Mountain Home, 1 ♀, IX-12-1953 (J. C. Hall, UCD).

San Diego County: Descanso, 1 ♂, VIII-1914 (W. S. Wright, CAS).

San Luis Obispo County: San Luis Obispo, 2 ♂, 1 ♀, VI-22-1931 (E. D. Ball, USNM).

Tuolumne County: near Groveland, 2 ♂, 2 ♀, VIII-18-1954 (R. H. Goodwin, CIS).

Synecdoche constellata (Ball), new combination

(Figs. 20, 71, 111, 138)

Catonia constellata Ball, 1933, Pan-Pacific Ent., 9:137; Metcalf, 1948:28.

Length.—4.8 to 5.0 mm. Frontoclypeal suture almost transverse. Frons approximately as long as wide, convex axially and transversely at base, each compartment concave toward apex, rounding from sides of vertex to ventral aspect; median carina faint, lateral margins slightly elevated above disc. Lateral areolets indistinct or absent, sometimes shallow impressions present on each side. Clypeus approximately as long as frons. Vertex half as long as broad, discs flat, median carina scarcely elevated, lateral carinae slightly so.

Pronotum shorter than tegulae; lateral carinae of disc oblique, three lateral areolets more or less distinct. Stigmal cell with oblique fold in proximal third indistinct; tegmina with incomplete transverse veinlets.

Claspers with proximal lobe serrate. Posterior margin of seventh sternite of female slightly concave on each side, a small triangular lobe produced caudad medially.

Color.—Brown, unpatterned except for white cross veins and incomplete transverse veinlets of tegmina; head and pronotum usually paler, wings and mesonotum rarely suffused with white. Abdominal sternites usually dark with pale posterior margins, external male genitalia dark or pale.

Comparative notes.—The pregenital sternite of the female and the male claspers of *S. constellata* and *S. nemoralis* are very close, but the species differ in the apex of the head of *constellata* being rounded, with the lateral areolets indistinct, while that of *nemoralis* is angulate; and in the lateral margins of the vertex in *constellata* being as short as the length of the pronotum behind the eye whereas in *nemoralis* they are longer; moreover, *nemoralis* is usually larger and often has a third shade, dark brown, on its dorsal surface.

Type designation.—"Holotype, female, allotype, male, and one female paratype taken by the writer at Colfax, Calif., June 8, 1909."

Type repository.—United States National Museum.

Host records.—*Pinus sabiniana*, *Cercocarpus betuloides*, and *Pseudotsuga taxifolia* [now *menziesii*].

Geographic distribution.—Central and north coast ranges and western Sierra foothills north to British Columbia.

Specimens examined.—CALIFORNIA. Butte County: Pentz, 1 ♂, IV-5-1928 (H. H. Keifer, CAS). Richardson Springs, 1000 feet, 1 ♀, V-10-1955 (Bryant, CAS).

Colusa County: Wilbur Springs, 1 ♂, 1 ♀, IV-19-1964 (R. D. Sage, O'B).

Lake County: 12 miles north Upper Lake, 2800 feet, 1 ♂, III-18-1965 (J. Powell, CIS).

Mendocino County: 4 miles west Willits, 1 ♂, II-30-1963, *Pseudotsuga taxifolia* [now *menziesii*] (C. W. O'Brien).

Napa County: Soda Creek, V-3-1932, *Cercocarpus betuloides* (Keifer, CDA).

Nevada County: 6 miles south Grass Valley, 2 ♂, V-16-1930 (E. P. Van Duzee, CAS). Sagehen near Hobart Mills, 1 ♂, VIII-3-1962 (C. A. Toschi, CIS).

Placer County: Colfax, 1 ♀, VI-8-1909 (Ball, USNM). Dutch Flat, 2 ♂, 1 ♀, V-2-1957 (W. H. Lange, UCD).

San Benito County: Vicinity Pinnacles Monument, 1 ♀, VI-13-1964 (D. C. and K. A. Rentz, O'B).

Sonoma County: Pine Flat Road, 34 ♂, 27 ♀, V-2-1964, *Pinus sabiniana* (D. C. and K. A. Rentz, O'B). Trinity, 1 ♀, II-25-1938, 1 ♂, IV-15-1938 (N. W. Frazier, CIS).

Trinity County: Weaverville, 1 ♂, 4 ♀, VI-16-1941 (D. J. and J. N. Knull, OSU).

WASHINGTON. Kittitas County: Easton (through C. V. Riley, USNM).

CANADA. BRITISH COLUMBIA: Seton Lake, Lillooet, 2 ♀, VI-3-1926 (J. McDunnough, CNC).

Synecdoche nemoralis (Van Duzee), new combination

(Figs. 21, 72, 112, 139)

Catonia nemoralis Van Duzee, 1916, Univ. California Publ. Ent., Tech. Bull., 1:246; Metcalf, 1948:33.

Catonia memorialis [sic], Van Duzee, 1917:306.

Length.—4.6 to 6.2 mm. Frontoclypeal suture almost transverse, absent or indistinct medially. Frons approximately $1\frac{1}{4}$ times as long as wide, disc flat, median carina and lateral margins slightly elevated. Lateral areolets distinct, containing two impressions each. Clypeus approximately $\frac{4}{6}$ as long as frons. Vertex half as long as broad, compartments usually concave, median carina scarcely elevated, lateral carinae usually strongly elevated, occasionally disc flat, carinae slightly elevated.

Pronotum shorter than tegulae; lateral carinae of disc oblique; three lateral areolets more or less distinct. Stigmal cell with oblique fold indistinct or absent; tegmina with many incomplete transverse veinlets.

Claspers with serrate proximal lobe as figured. Seventh sternite of female slightly concave on each side, produced caudad medially in a small triangular lobe.

Color.—Brown, with carinae and veins paler, incomplete transverse veinlets white. Members of this species are very variable in color, having tegmina mottled or banded with white or mottled in brown, or even without mottling. Some have thin dark borders along the carinae of the vertex; some have an indication of two spots adjoining the base of the mesonotal carinae; in some the frons is yellow and immaculate, in others it is heavily speckled with brown. Lower surface of body usually dark, posterior margin of abdominal sternites sometimes pale; male claspers, and sometimes medioventral lobe, pale.

Comparative notes.—*S. nemoralis* may be distinguished from *S. constellata* (q.v.) by the apex of its head in profile being angulate (as in fig. 50) rather than rounded (as in fig. 49) and the lateral carinae of the vertex longer than, not as short as, the pronotum behind the eyes. Usually the vertex is concave and the lateral margins markedly elevated as contrasted with a flat vertex with margins slightly elevated in *constellata*.

Type designation.—"Described from numerous examples taken June 20 to the last of July from the level of Lake Tahoe up to 8000 feet. This species seems to live entirely on the lodgepole pine, although it was occasionally captured on other trees whence it had evidently flown from the pines." I validate by publication Van Duzee's selection of lectotype male, No. 3103, allotype No. 3104, Glen Alpine Creek, Tahoe, California.

Type repository.—California Academy of Sciences.

Host records.—Lodgepole pine (type designation), douglas fir (Downes, 1927), Bishop pine, Monterey pine, *Pinus sabiniana*, hemlock, and Cupressaceae.

Geographic distribution.—California north to British Columbia, and northern Arizona and Utah.

Specimens examined.—ARIZONA. Coconino County: Flagstaff, 1 ♀, VI-23-1937 (D. J. and J. N. Knull, OSU); 1 ♀, VII-8-1941 (R. H. Beamer, KU). Oak Creek Canyon, 1 ♂, (E. L. Todd, KU). Williams, 1 ♂, V-1928, 1 ♂, V-1930 (Barber-Schwarz, USNM).

Coconino or Yavapai County: Kaibab National Forest, 6 ♂, 7 ♀, VI-26-1937 (D. J. and J. N. Knull, OSU).

Apache or Navajo County: Carrizo, 2 ♂, 3 ♀, V-28-1948 (D. J. and J. N. Knull, OSU).

CALIFORNIA. Alameda County: Berkeley, 1 ♀, X-1914 (E. P. Van Duzee, CAS). Cedar Ridge, 1 ♂, XI-22-1931 (E. C. Van Dyke, USNM).

Butte County: Butte Creek near Chico, 1 ♀, X-25-1922 (E. P. Van Duzee, CAS). Chico, 2 ♂, VII-28-1908 (E. D. Ball, USNM). Oroville, 6 ♂, 5 ♀, III-16-1928, on *Pinus sabiniana* (H. H. Keifer, CAS, KU); 1 ♀, VII-23-1927 (R. Anderson, CIS).

Calaveras County: Angels Camp, 1 ♂, 3 ♀, V-22-1930 (E. P. Van Duzee, CAS). Calaveras Grove, 1 ♀, IV-17-1934 (E. P. Van Duzee, CAS). Murphys, 2500 feet, 2 ♀, V-7-1937 (F. E. Blaisdell, CAS).

Contra Costa County: Moraga 1 ♂, IV-30 (E. S. Ross, CAS). Mount Diablo, 1 ♀, V-29-1936 (M. A. Embury, CIS); 1 ♀, VI-21-1935 (Oman, USNM).

El Dorado County: Angora Lake Tahoe, 1 ♂, 1 ♀, VI-22-1915 (E. P. Van Duzee, CAS). Angora Lake, 7000 feet, 2 ♀, VII-25-1935 (F. E. Blaisdell, CAS). Cascade Lake, Tahoe, 1 ♀, VI-22-1930 (A. T. McClay, UCD). Clarksville, 1 ♂, IV-1-1951, *Pinus* sp. (Keifer, CDA). Echo Lake, 1 ♀, VII-16-1933 (E. C. Zimmerman, USNM). Fallen Leaf Lake, 1 ♂, 1 ♀, VII-1931 (O. H. Swezey, CAS). Glen Alpine, 1 ♂, 3 ♀, VI-29-1929 (E. P. Van Duzee, CAS). Glen Alpine Creek, 2 ♂ paratypes, VI-21-1915, 1 ♂, 1 ♀, VI-21-1915, 1 ♂, 1 ♀, VI-25-1915, 2 ♂, 2 ♀, VI-29-1915, 1 ♀, VII-12-1915, 2 ♂, VII-19-1915, 1 ♂ paratype, VII-19-1915, 2 ♂ paratypes, VII-21-1915, 1 ♂, VII-22-1915 (E. P. Van Duzee, paratypes, CAS, others CIS). Pilot Hill, 1 ♂, 1 ♀, (in copulo) V-4-1937 (A. T. McClay, UCD). Pollack Pines, 1 ♀, V-3-1952 (E. I. Schlinger, UCD). Snowline Camp, 1 ♀, VII-14-1948 (J. W. MacSwain, CIS). Tallac Lake Tahoe, 1 ♂, 1 ♀, VI-24-1915 (E. P. Van Duzee, CIS).

Fresno County: Dalton Ranger Station, 1 ♂, V-6-1920 (Henry Dietrich, USNM). Huntington Lake, 8000 feet. 1 ♂, VII-10-1919 (E. P. Van Duzee, CAS).

Humboldt County: Bair's Ranch, Redwood Creek, 2 ♀, VI-9-1903, 1 ♂, VI-13-1903, 1 ♂, VI-19-1903 (H. S. Barber, USNM). Eureka, 1 ♂, V-24, 3 ♀, VI-4 (H. S. Barber, USNM). Fieldbrook, 1 ♀, V-27-1903 (H. S. Barber, USNM). Fort Seward, 1 ♂, 1 ♀, V-17-1935 (P. Schulthess, CIS). Garberville, 1 ♀, VI-19-1935, E. P. Van Duzee, CAS). Humboldt County, 1 ♂, V-6-1911, 1 ♂, 6 ♀, V-11-1911, 1 ♂, V-14-1911, 1 ♂, V-15-1911 (F. W. Nunenmacher, NCU). Mad River Mountains, 1 ♀, VII-20-1929 (E. C. Van Dyke, CAS). Trinidad, 1 ♀, VI-11-1902 (J. O. Martin, CAS). Weott, 1 ♀, VII-13-1929 (E. C. Van Dyke, CAS).

Inyo County: Lone Pine, 1 ♂, VI-12-1937 (N. W. Frazier, CIS). Panamint Mts., 1 ♀, V-3-1937, 2 ♀, V-29-1937 (N. W. Frazier, CIS). Mt. W. [sic], 1 ♂, VI-10-1937 (L. R. Gillogly, CIS).

Lake County: Hopland Grade, 1 ♀, VI-16-1959 (S. M. Fidel, UCD). Whispering Pines, 3 ♂ IV-14-1964, Douglas fir (C. W. O'Brien).

Lassen County: Facht, 1 ♂, VI-20-1922 (J. O. Martin, CAS).

Marin County: 1-2 miles east of Highway 1 at Bolinas Junction, 1 ♀, IV-26-1964 (L. B. O'Brien). Cypress Ridge, 1 ♂, IV-11-1920, 1 ♀, IV-27-1920, 1 ♀, IV-30-1922, 1 ♀, V-29-1920 (E. C. Van Dyke, CAS). Fairfax, 1 ♀, V-7-1911, 1 ♀, VI-4-1911 (E. C. Van Dyke, CAS); 5 ♂, 8 ♀, V-11-1919 (E. P. Van Duzee, CAS). Inverness, 1 ♀, II-23-1964, 1 ♀, II-27-1965 (CIS); 1 ♀, IV-9-1955, 1 ♀, IV-20-1955 (D. J. Burdick, CIS); 1 ♀, V-14-1961 (C. A. Toschi, CIS). 1 mile southeast Inverness, 2 ♂, I-18-1963, 1 ♂, II-23-1964, 1 ♂, II-27-1965, 1 ♂, III-4-1962, 11 ♂, 3 ♀, III-7-1964, Bishop pine, 13 ♂, 4 ♀, IV-15-1964, Bishop pine, 1 ♂, 1 ♀, V-20-1963, 1 ♂, 2 ♀, V-30-1961, 7 ♂, 4 ♀, VI-8-1963, 14 ♂, 12 ♀, VI-15-1963 (L. B. and/or C. W. O'Brien). Lagunitas, 3 ♂, 3 ♀, II-21-1925, on *Pinus sabiniana* (H. H. Kiefer, CAS); 3 ♀, III-29-1908, 2 ♀, IV-23-24-1916 (E. C. Van Dyke, CAS). Lake Lagunitas, 1 ♂, 1 ♀, II-30-1961 (D. Q. Cavagnaro, UCD). Marin County, 1 ♂, (E. C. Van Dyke, OSU); 2 ♀, (AMNH). Mill Valley, 1 ♀, II-21-1920, 1 ♂, II-16-1919, 1 ♀, III-18-1919, 1 ♀, IV-1-1926, 3 ♀, IV-16-1927 (E. P. Van Duzee, CAS); 1 ♀, IV-1947 (E. S. Ross, CAS); 1 ♀, IV-28-1959 (C. W. O'Brien, CIS). Mt. Tamalpais, 13 ♂, III-15-1964, *Pseudotsuga menziesii* (C. W. O'Brien); 2 ♂, 1 ♀, IV-26-1965 (L. B. O'Brien); 1 ♀, V-21-1954 (J. Powell, CIS); 1 ♀, V-23-1909 (E. C. Van Dyke, CAS). Ross, 1 ♀, IV-28-1918 (E. P. Van Duzee, CAS).

Mariposa County: Illiloutte Falls, Yosemite National Park, 1 ♂, VII-29-1946 (R. L. Usinger, O'B). Miami Ranger Station, 5 ♂, 6 ♀, V-17-1942 (C. Kennett, CIS).

Mendocino County: Fort Bragg, 2 ♂, 3 ♀, V-30-1937 (R. L. Usinger, CAS). Laytonville, 1 ♀,

V-8-1930 (A. T. McClay, UCD). 2 miles north Piercy, 1 ♂, II-23-1963 (C. W. O'Brien). Pigmy Forest near Mendocino City, 1 ♂, 1 ♀, (in copulo) V-7-1936 (E. C. Van Dyke, CAS). Ryan Lake, 1 ♂, IV-17-1938 (N. F. Hardman, CIS). Willits, 1 ♂, 3 ♀, V-9-1946 (T. O. Thatcher, CIS); 1 ♀, VI-9-1932 (UCD). Yorkville, 1 ♀, IV-24-1928, 1 ♂, 5 ♀, IV-30-1924, 1 ♂, 2 ♀, V-1-1924 (E. P. Van Duzee, CAS).

Mono County: Tioga Pass, 1 ♂, VII-31-1940 (L. C. Kuitert, KU).

Monterey County: Bryson, 1 ♂, 1 ♀, IV-24-1917, pine (E. P. Van Duzee, CAS). Carmel, 3 ♂, 2 ♀, III-24-1919, pine (E. P. Van Duzee, CAS). Monterey, 1 ♂, 2 ♀, VIII-10-1938 (L. W. Hepner, KU). Monterey County, 1 ♂, V-5-1904, on foliage *Pinus radiata* (Coleman, USNM).

Napa County: Angwin, 1 ♂, IV-19-1964 (CAS). 1 mile north Angwin, 2 ♀, VI-9-1965 (D. C. Rentz, O'B). Calistoga, 1 ♀, III-8-1934 (E. O. Essig, CIS); 1 ♀, V-15-1964 (R. P. Allen, CDA). Pope Valley, 1 ♂, V-12-1966 (J. Cope, O'B).

Nevada County: Boca, 1 ♂, VI-17-1964 (D. F. Viers, O'B). Sagehen near Hobart Mills, 1 ♂, VII-21-1964 (R. H. Goodwin, CIS); 2 ♂, VIII-3-1962 (K. A. Toschi, CIS). Truckee, 2 ♂, VI-17-1927, 1 ♂, VI-19-1927, 2 ♂, 1 ♀, VII-5-1927, 1 ♂, VII-6-1927 (E. P. Van Duzee, CAS, KU).

Placer County: Carnelian Bay, Lake Tahoe, 3 ♂, 1 ♀, VI-17-1964, 1 ♂, VII-1-1964 (D. F. Viers, O'B); 2 ♂, 2 ♀, VI-17-1964 (F. D. Parker, UCD). Dutch Flat, 1 ♀, V-29-1954 (E. I. Schlinger, UCD). Loomis, 1 ♂, IV-10-1950 (E. I. Schlinger, UCD). Placer County, 1 ♂, VI (Osborn Collection, OSU).

Plumas County: Chester, 1 ♂, VI-7-1960, 1 ♀, VI-12-1951, 2 ♂, 1 ♀, VI-23-1948, 2 ♂, 1 ♀, VI-25-1951, 5 ♀, VI-30-1948 (D. J. and J. N. Knull, OSU, USNM); 2 ♂, 10 ♀, VI-18-1919, Lodgepole pine (Kelton and Madge, CNC). Quincy, 1 ♂, VII-23-1916 (E. D. Ball, USNM). 4 miles west Quincy, 1 ♂, VI-20-1949 (C. I. Smith, CIS); 1 ♀, VII-20-1949 (E. I. Schlinger, UCD).

Riverside County: Keen Camp, 3 ♀, V-24-1946 (D. J. and J. N. Knull, OSU); 5 ♂, VI-6-12-1917 (E. P. Van Duzee, CAS). Pine Cove, San Jacinto Mts., 1 ♀, V-23-1939 (E. S. Ross, CIS). Tahquitz Valley, San Jacinto Mts., 2 ♀, VI-16-1939 (J. G. Shanafelt, LACM).

San Benito County: Clear Creek, 4000 feet, 3 airline miles southwest New Idria, 1 ♂, IV-24-1964 (W. Turner, CIS).

San Bernardo County: Lake Arrowhead, 1 ♀, VI-14-1958 (P. Paige, UCD). Mill Creek Canyon, 1 ♀, IX-24-1928 (E. P. Van Duzee, CAS).

San Diego County: Cuyamaca Rancho State Park, 2 ♂, V-19-1941 (D. J. and J. N. Knull, OSU, USNM). Mt. Laguna, 1 ♀, VI-21-1963 (P. D. Hurd, CIS).

San Francisco County: near Fleishhacker Zoo, 1 ♀, IV-28-1962 (G. I. Stage, O'B).

San Mateo County: 1 ♀ (AMNH); 1 ♀, VI-6-1932 (E. S. Ross, CIS).

Santa Clara County: Alma College, 1 ♀, V-10-1951 (H. B. Leech, CAS). Mt. Hamilton, 1 ♂, V-6-1957, 1 ♀, V-26-1957 (D. Burdick, CIS); 1 ♂, VI-3-1934 (L. S. Slevin, CAS); 1 ♂, 1 ♀, VI-20-1952 (CIS). 1 mile east Mt. Hamilton, 2 ♀, IV-25-1959 (D. Burdick, CIS). Mt. Umunhum, 2 ♂, 2 ♀, IV-18-1959 (J. W. Tilden, SJS). Santa Clara County, 1 ♀ (Baker, PC).

Santa Cruz County: Ben Lomond, 1 ♀, V-10-1930 (E. P. Van Duzee, CAS). Mt. Hermon, 1 ♂, 2 ♀, III-11-1943 (K. Frick, CIS). Santa Cruz, 2 ♀, VI-2-1919 (E. P. Van Duzee, CAS); 1 ♀, VI-6-1922 (E. O. Essig, CIS). Santa Cruz County, 1 ♀, III-4-1958 (F. J. Santana, UA).

Shasta County: Cayton, 1 ♀, VII-12-1918, 1 ♂, VII-14-1918, 1 ♂, VII-15-1918 (E. P. Van Duzee, CAS). Hat Creek, 1 ♀, V-26-1965, *Pinus ponderosa* (R. R. Pinger, CDA), 1 ♀, VII-1946 (A. S. Perry, CIS). Hat Creek Post Office, 1 ♂, VI-23-1955 (W. W. Middlekauff, CIS). 4 miles north Hat Creek, 1 ♂, 2 ♀, VI-1-1941 (P. D. Hurd, CIS). Miller Canyon, 1 ♂, VII-7-1947 (D. W. Adams, CIS). Shasta County, 1 ♀, VI-13-1921 (J. A. Kusche, CAS).

Siskiyou County: Fowlers Camp, 4 miles E. McCloud, 1 ♀, VII-2-1963 (V. B. Whitehead, O'B). Siskiyou County, 2 ♂, 2 ♀, V-28-1911 (F. W. Nunenmacher, USNM, NCU).

Sonoma County: Cazadero, 2 ♂, 2 ♀, IV-13-1918, Douglas fir (E. P. Van Duzee, CAS). Mt. St. Helena, 1 ♀, VI-19-1941 (OSU). Mark West Springs, 1 ♀ (V-10-1930, E. P. Van Duzee, CAS). 1 mile northeast Occidental, 1 ♂, V-17-1964 (C. W. O'Brien). Pine Flat Road, 3 ♂, V-2-1964, *Pinus sabiniana* (D. C. and K. A. Rentz, O'B). Sebastopol, 1 ♀, V-20-1923 (B. C. Cain, NCU). Sonoma County, 1 ♂, III-24-1957 (F. Santana, SJS). Trinita, 2 ♂, III-27-1938, 1 ♂, IV-15-1938, 2 ♂, 3 ♀ (one pair in copulo), V-15-1938 (N. W. Frazier, CIS).

Tehama County: Childs Meadows, 2 ♀, VI-16-1959 (Kelton and Madge, CNC). 5 miles east Mineral, 2 ♂, 3 ♀, VI-23-1960 (D. J. and J. N. Knull, OSU). 15 miles west Mineral, 1 ♂, VI-16-1941 (D. J. and J. N. Knull, OSU).

Trinity County: Carrville, 1 ♂, V-25-1934, 2 ♀, VI-23-1913 (E. C. Van Dyke, CAS). Eagle Creek, 1 ♀, V-28-1949 (A. T. McClay, UCD). Scott Mt. Summit, 1 ♀, VII-5-1963 (V. B. Whitehead, O'B). Trinity County, 5500 feet, 1 ♀, V-25-1934 (R. M. and G. E. Bohart, CIS). Weaver-ville, 1 ♀, VI-16-1941 (D. J. and J. N. Knull, OSU).

Tulare County: Ash Mountain Road, Sequoia National Park, 1 ♂, 2 ♀, V-1-1955 (H. R. Moffitt, UCD). Potwisha, Sequoia National Park, 1 ♂, 2 ♀, V-19-1929 (E. C. Van Dyke, CAS).

Tuolumne County: Long Barn, 3 ♂, 4 ♀, V-24-1930 (E. P. Van Duzee, CAS). Sonora, 1 ♀, VI-17-1924 (E. P. Van Duzee, CAS). South fork Stanislaus River, 4 airline miles northeast Columbia, 1 ♂, III-25-1965 (R. L. Langston, CIS).

Indeterminate California localities: Lake Tahoe, 12 ♂, 6 ♀, VI-19-1948 (D. J. and J. N. Knull, OSU). Siskiyou Mountains, 1 ♀, VI-24-1939 (E. D. Ball, USNM). Santa Cruz Mts., 1 ♂ (Osborn Collection, USNM); 3 ♀ (USNM). Yosemite, 3880-4000 feet, 1 ♀, VI-17-1938 (E. O. Essig, CIS); 1 ♀, V-31-1938, 1 ♀, VI-25-1938 (N. F. Hardman, UCD).

COLORADO. Colorado, 1 ♂ (H. Osborn, OSU).

NEVADA. Dixie National Forest, 1 ♀, VII-1-1937 (D. J. and J. N. Knull, OSU).

OREGON. Benton County: Corvallis, 1 ♂, IV-30-1931 (USNM); 1 ♂, 1 ♀, VI-12-1925 (E. P. Van Duzee, CAS); 1 ♂, 1 ♀, VI-26-1920 (C. J. Drake, USNM). Marys Peak, 1 ♂, 1 ♀, VI-6-1953 (V. Roth, OSU). Marys Peak, 4000 feet, 1 ♀, V-23-1954 (F. F. Hasbrouck, OSU).

Clatsop County: Cannon Beach, 1 ♂, VI-12-1927, 1 ♂, VI-14-1927, 1 ♀, VI-17-1927 (E. C. Van Dyke, CAS).

Columbia County: Goble, 1 ♀, IV-28-1938 (K. Gray, S. Schuh, USNM).

Coos County: Bandon, 1 ♀, V-19-1915, cranberry SBT (Joe Capizzi, USNM). Charleston, 1 ♂, 1 ♀, V-27-1952 (V. Roth, OS); 2 ♀, VII-10-1950 (Borys Malkin, OSU).

Curry County: 8 miles east Gold Beach, 5 ♀, IV-29-1951 (V. Roth, OS).

Douglas County: 6 miles south Yoncalla, 1 ♂, IV-28-1951 (V. Roth, OS).

Hood River County: Homestead Inn, Mt. Hood, 1 ♂, 1 ♀, VII-3-1927 (E. C. Van Dyke, CAS).

Jackson County: Dead Indian Soda Springs, 1 ♂, V-18-1962 (OS).

Lane County: 7 miles southwest Cottage Grove, 1 ♀, VI-29-1953 (V. Roth, OS).

Lincoln County: Boyer, 1 ♀, V-27-1934, hemlock tree top, P.M. (JHK, CAS). Newport, 2 ♂, 1 ♀, VI-8-1928, 3 ♂, 5 ♀, VI-9-1925 (E. C. Van Dyke, CAS). Saddleback Mt., 2 ♀, VI-24-1961, 3 ♂, 2 ♀, VI-9-1960, 1 ♀, VII-23-1960, 1 ♂, IX-17-1960 (J. C. Dirks, Edmunds, UBC). Waldport, 1 ♀, VI-13-1936 (E. C. Van Dyke, CAS).

Linn County: Cascadia, 1 ♀, VI-25-1954 (E. I. Schlinger, UCD).

Marion County: Breitenbush Spring, 1 ♂, IV-27-1941 (Schuh and Gray, USNM).

Multnomah County: Multnomah Falls, 1 ♀, VI-10-1962 (C. W. O'Brien).

Washington County: Portland, 1 ♀, V-28-1933 (USNM).

UTAH. Piute County: Marysvale, 1 ♀, VI-25-1906 (USNM).

Utah County: Timpanagos Canyon National Monument, 1 ♂, VI-23-1963 (C. A. Toschi, CIS).

Indeterminate: Pine Valley, 1 ♂, VI-28-1937 (D. J. and J. N. Knull, OSU).

WASHINGTON. Columbia County: 1 ♀, VIII-7-1920 (A. A. Nichols, UM).

Cowlitz County: Kalama, 1 ♂, VII-4-1934 (Oman, USNM).

Friday County: 1 ♀, VI-1927 (Mozenette, CAS).

Grays Harbor County: Quinault, 1 ♂, 5 ♀, VII-14-1960 (D. J. and J. N. Knull, OSU).

Kittitas County: Easton, 1 ♂ (USNM).

Lewis County: Longmire Springs, Mt. Rainier, 2500 feet, 1 ♀, VII-17-1919 (C. L. Fox, CAS).

Pacific County: Ocean Park, 1 ♂, V-6-1954 (UBC).

Pierce County: Fort Lewis, 1 ♀, VI-19-1944 (P. H. Arnaud, UCD). Mt. Rainier National Park, White River Camp, 4300-5000 feet, 1 ♀, VII-23-1954 (B. Malkin, CAS).

Thurston County: Olympia, 1 ♀ (T. Kincaid, CU). Tenino, 1 ♂ (USNM).

Indeterminate: Nahatts, 1 ♂, V-20-1953 (UBC). Olympic National Forest, 1 ♀, VII-19-1958 (D. J. and J. N. Knull, OSU).

CANADA. BRITISH COLUMBIA. Alta Lake, Mons, 1 ♂, 1 ♀, VI-11-1926 (J. McDunnough, CNC).

Bowser, 1 ♀, V-27-1955, 1 ♂, VI-1-1955 (W. J. Brown, CNC). Cowichan Lake, 1 ♂, 1 ♀, IV-25-1941 (M. L. Pribble, CNC). Cultus Lake, 1 ♂, V-9-1959 (G. G. E. Scudder, UBC); 1 ♀, V-31-1959 (N. J. Filmer, UBC). Goldstream, 6 ♂, 5 ♀ (1 pair in copulo), VI-12-19-1923 (W. Downes, UBC); 1 ♂, 1 ♀, VI-17-1923, 1 ♀, VIII-26-1925 (K. F. Auden, UBC). Hope Mts., 1 ♀, IX-13-1934 (W. Downes, UBC). Kaslo, 2 ♂, VIII-5-1903 (R. P. Currie, USNM). Kaslo, Powder Creek, 2 ♂, 1 ♀ (1 pair in copulo), VI-26 (R. P. Currie, USNM). Ladysmith, 1 ♂, 1 ♀, VII-12-1959 (L. A. Kelton, CNC). Lillooet, 1 ♀, V-29-1926, 1 ♀, V-30-1926 (J. McDunnough, CNC). Lillooet, Texas Creek, 1 ♂, VI-15-1926, *Chrysothamnus* (J. McDunnough, CNC). Malahot, 1 ♂, 1 ♀, VII-18-1927 (W. Downes, UBC). Midday Valley, Merritt, 1 ♂, VI-1924 (K. F. Auden, UBC). Nanaimo Biological Station, 2 ♂, 4 ♀, VI-24-1920, 1 ♂, VI-25-1920, 2 ♀, VI-26-1920 (E. P. Van Duzee, CAS). Quesnel, 2 ♂, 1 ♀, VI-16-1944 (G. J. Spencer, UBC). Saanich Dist., 2 ♂, 1 ♀, VI-11-1922 (W. Downes, CNC, UBC). Salmon Arm, 1 ♀, VII-11-1961 (G. G. E. Scudder, UBC). Seton Lake, Lillooet, 1 ♂, V-27-1926, 1 ♂, 1 ♀, VI-3-1926, 1 ♀, VI-6-1926 (J. McDunnough, CNC). Shawnigan, 1 ♀, V-26-1923, 1 ♂, VI-22-1919, 1 ♀, VII-20-1919, 1 ♀, VIII-2-1919 (W. Downes, USNM). Sproat Lake, 1 ♀, VI-22-1955 (R. Coyles, CNC). Trinity Valley, 2 ♂, V-21-1959 (L. A. Kelton, CNC). Victoria, 1 ♀, V-27-1923, 1 ♀, VI-9-1923, 3 ♂, 5 ♀, VI-22-23-1920 (K. F. Auden, CNC). Yale, 1 ♂, V-17-1919 (W. B. Anderson, CAS).

Synechdoche grisea (Van Duzee), new combination

(Figs. 22, 73, 113, 140; frontispiece, c)

Catonia grisea Van Duzee, 1908, Proc. Acad. Nat. Sci. Philadelphia, 1907: 482, 480, 481, 483; Metcalf, 1948:29.

Length.—5.5 to 6.5 mm. Frons approximately $1\frac{1}{4}$ times as long as broad; median carina and lateral margins strongly, equally elevated above concave lateral compartments of disc. Lateral areolets small, distinct. Clypeus approximately $\frac{2}{3}$ as long as frons. Vertex half as long as broad; compartments concave, median carina very slightly elevated, lateral margins strongly elevated, foliate.

Pronotum shorter than tegulae; lateral carinae of disc oblique; three distinct lateral areolets. Stigmal cell divided in proximal half by oblique fold; tegmina with many incomplete transverse veinlets.

Claspers with two lateral lobes (fig. 140).

Color.—Pale brown, tegmina mottled with translucent, with light veins and incomplete transverse veinlets, vertex with four longitudinal stripes; mesonotum with two ocellate spots and other markings. Frons pale yellow, feebly maculate with brown at base for about the length of the eyes and again in a narrow band along frontoclypeal suture, sometimes sprinkled throughout with minute brown spots. Clypeus brown apically. Genae dark brown along frons except for three pale arcuate areas along the frontal carina (from frontoclypeal suture to ocellus, from ocellus to top of head above eye, and from there to occipital margin behind eye), pale circle around base of antenna. Vertex pale with dark stripes bordering median carina completely and lateral carinae for length of dark area on gena. Pronotum brown on disc, carinae broadly pale, ventrolateral lobe dark brown. Mesonotum yellowish brown with pale carinae; posterior $\frac{2}{3}$ of median disc brown with ocellate spot at end of each lateral carinae; many small yellow spots sprinkled throughout; lateral fields with yellow triangle behind tegulae; tegulae pale, with paler margin. Legs pale, wings darker brown than tegmen, abdominal sternites brown with pale posterior margins; external male genitalia brown. Stigmal cell translucent proximally, brown distally.

Comparative notes.—*S. grisea* may usually be distinguished from the other species of the tribe by the presence of a mottled brown area on the base of the frons and a pale area below. It is intermediate between *S. nemoralis* and the *fusca* group, having incomplete veinlets as *nemoralis* and the tendency toward ocellate spots as the *fusca* group, but it lacks the brown banding and the raised base of the frons of the latter. It is most closely associated with *S. ocellata*, from which it may be separated by color pattern, geographic distribution, and the shape of the lateral lobes of the claspers.

Type designation.—"Described from a series of both sexes taken at Niagara Falls, Hamburg

and Gowanda, New York, and one female taken on basswood at Ottawa, Ont., by Mr. W. Metcalfe." I validate by publication Van Duzee's selection of male lectotype (No. 2220) and allotype (No. 2221) both from Niagara Falls,

Type repository.—California Academy of Sciences.

Host records.—Basswood (see type designation) and under stones (opposite Plummers Island, Maryland, 4 nymphs, 1 ♂, 1 ♀, VII-2-1932, under stones, H. S. Barber, USNM).

Geographic distribution.—*S. grisea* occurs from North Carolina west to Iowa, north to Ontario and Quebec. Dozier (1928) recorded one specimen from northern Mississippi. The states represented are North Carolina, Maryland, Kentucky, Virginia, Pennsylvania, Ohio, Iowa, Michigan, New York, and Connecticut.

Synecdoche ocellata, new species

(Figs. 23, 74, 114, 141)

Length.—5.5 to 6.1 mm. Frons approximately $1\frac{3}{4}$ as long as broad; median carina and lateral margins equally elevated above concave compartments of disc. Lateral areolets small, distinct. Clypeus approximately $\frac{7}{10}$ as long as frons. Vertex half as long as broad; compartments of discs concave, median carina very slightly elevated, lateral margins strongly elevated, foliate.

Pronotum shorter than tegulae; lateral carinae of disc oblique, 3 or 4 lateral areolets marked with color, their carinae indistinct. Stigmal cell divided in proximal third by oblique fold; tegmina with many incomplete transverse veinlets.

Color.—Brown with white veins and incomplete transverse veinlets on tegmina, carinae pale, longitudinal stripes on vertex, mesonotum with two ocellate spots on disc, near posterior end of lateral carina, two crescent-shaped spots at anterior third, and area between speckled with pale yellow. Frons pale yellow with seven or eight small brown spots along each lateral margin; clypeus pale with brown v-shaped mark at apex; genae brown but border along frontal carina and vertex pale, interrupted by a narrow brown band above ocellus and a broader one above eye; a pale transverse band just below genae. Vertex brown, with median carina, a round spot in each anterolateral angle, and lateral margins behind eyes, yellow. Pronotum brown, carinae and border of ventrolateral lobe pale. Mesonotum as described above, sometimes each anterior crescent lined with dark brown, preceded by a paler brown ovate area. Lateral fields with two triangular-shaped paler areas. Tegulae bordered with pale. Venter brown, abdominal sternites with pale posterior margins, external genitalia brown. Legs brown with femora and tibiae pale at base and apex, in posterior view tibiae with lateral margins pale.

Comparative notes.—*S. ocellata* may be separated from the other members of its species group except *grisea* by the presence of black spots along the lateral carinae of the frons and the bold color pattern of the vertex and thorax. From *grisea* it may be separated by the shape of the claspers and by geographical distribution.

Type designation.—Described from eleven specimens taken in California. Holotype male, allotype, and one paratype of each sex from 15 miles west of Mineral, Tehama County, June 25, 1951; two paratypes (1 ♂, 1 ♀) May 16, 1941, same locality; two male paratypes, 12 miles west of Mineral, May 6, 1960, all taken by D. J. and J. N. Knull. Two additional paratypes (1 ♂, 1 ♀), Mount San Antonio, 5000 feet, August 22, 1920, on *Umbellularia californica*, P. H. Timberlake (PT); one paratype female, Fresno, June 20, 1926, C. J. Drake.

Type repository.—Holotype and paratypes, Ohio State University, Columbus. Allotype, J. S. Caldwell Collection, United States National Museum.

Host records.—*Umbellularia californica*.

Geographic distribution.—California.

Synecdoche clara (Van Duzee), new combination

(Figs. 24, 75, 115, 142)

Catonia clara Van Duzee, 1917, Proc. California Acad. Sci., (4)7:306; Metcalf, 1948:28.

Length.—4.0 to 4.8 mm. Frons approximately $1\frac{1}{4}$ times as long as broad; base of frons raised in a broad callus to level of median carina and lateral margins above concave compartments of disc. Anterior carinae of lateral areolets indistinct. Clypeus $\frac{3}{4}$ as long as frons. Vertex half

as long as broad; disc concave, lateral carinae in four of five specimens examined more elevated than median; in paratype they are subequal, and the disc is flat.

Pronotum about as long as tegulae; lateral carinae of disc oblique; three lateral areolets distinct. Stigmal cell divided in proximal third by oblique fold. Tegmina with white incomplete transverse veinlets.

Male pygofer with medioventral lobe entire, narrow. Phallobase and claspers as figured.

Color.—Tegmina pale brown with pale veins and white veinlets and cross veins, head and thorax patterned. Frons and clypeus pale yellowish with dark brown band above frontoclypeal suture, band only slightly interrupted by pale carina; five or six small round dark spots along each lateral carina, and a further spot in lateral areolets. Base of frons flecked with brown. Vertex yellowish, with brown lines bordering median carina, lateral carinae with variable brown border. Pronotum with border along median carina, spots in areolets, and ventrolateral lobes dark brown, latter with pale margins. Tegulae pale brown. Tegmina light brown with darker veins. Abdominal sternites pale or dark brown with pale posterior margins; medioventral lobe of pygofer and claspers pale.

Comparative notes.—*S. clara* may be separated from the other members of the *fusca* group by the presence of only a single dark transverse band on the frons in combination with small dark spots along the lateral carinae. Sometimes *S. tricolor* has only a single dark band, but lacks the lateral spots.

Type designation.—"Described from twenty examples taken by Mr. Giffard on *Baccharis* at Los Altos, Santa Clara Co., July 26, 1916. Holotype (No. 372), male, in collection of the California Academy of Sciences. Allotype, female, in collection of Mr. Giffard."

Type repository.—California Academy of Sciences; seven male and five female paratypes but no allotype in the B. P. Bishop Museum, Hawaii.

Host records.—*Baccharis* (see type designation).

Geographic distribution.—*S. clara* is known from three counties in the San Francisco Bay area of California, and from one specimen labeled Jacksonville, Florida. The Florida record requires confirmation.

Specimens examined.—CALIFORNIA. Alameda County: Moraga Valley, 1♀, VII-7-1928 (E. P. Van Duzee, CAS).

Contra Costa County: Mt. Diablo, 1♀, VI-25-1932, 1♂, VII-14-1916 (E. P. Van Duzee, CAS).

Santa Clara County: Los Altos, 1♀ paratype, VII-1916 (W. M. Giffard, CAS). Santa Clara County, 1♀, May (H. Osborn, OSU).

FLORIDA. Duval County: Jacksonville, 1♀, IX-15 (R. L. Blicke, OSU).

Synecdoche tricolor, new species

(Figs. 25, 76, 116, 143)

Length.—5.2 to 5.8 mm. Frons approximately $1\frac{1}{4}$ times as long as broad, base of frons raised in a broad callus to level of median and lateral carinae above concave lateral compartments. Clypeus about $\frac{2}{3}$ as long as frons. Vertex $\frac{1}{3}$ as long as broad; disc flat, lateral and median carinae subequally raised.

Pronotum medially shorter than tegulae, lateral carinae of disc oblique, lateral areolets more or less distinct. Stigmal cell divided in proximal half by oblique fold; tegmina with many incomplete transverse veinlets.

Color.—Pale brown, carinae yellowish, usually bordered with brown, tegmina clear, veins and transverse incomplete veinlets white, bordered with pale brown, apex brownish. Frons pale with two pairs of dark arch-shaped areas, light brown at base; color pattern of frons extending to genae; clypeus pale, apically brown. Vertex pale brown medially, with carinae pale, bordered with brown. Mesonotum with carinae similarly bordered, sometimes an ocellate spot near posterior ends of each lateral carina, pale spot in anterior third bordered with brown; lateral fields with three pale areas bordered with brown. Male abdomen dark with genitalia pale; female abdominal sternites dark medially, pale laterally and apically. Apical segment of rostrum dark. Four female specimens lack the basal dark spots on the frons, and one female from the Huachuca Mountains has a fainter basal band. The vertex is longer; in other characters they seem to agree.

Comparative notes.—*S. tricolor* may be separated from the other species of this group by the claspers, the lack of small dark spots along the lateral carinae of the frons, even in the lateral areolet area, and by its distribution.

Type designation.—Holotype male, allotype, and 4 ♀ paratypes taken October 7, 1931, in the Santa Rita Mountains by E. D. Ball. Six other paratypes as follows: 3 ♂, Santa Rita Mts., IX-10-1933, Bryant (2 RF); Tucson [possibly Santa Rita Mts., see type designation of *X. brunellus*], 2 ♂, 1 ♀, IX-29-1929, E. D. Ball.

Type repository.—United States National Museum.

Host records.—None.

Geographic distribution.—The Huachuca and Santa Rita Mountains of southeastern Arizona, and possibly Tucson. The five specimens with the second band on the frons absent or pale were collected as follows: Tucson, 3 ♀, X-20-1929 (E. D. Ball, USNM); Huachuca Mountains, 1 ♀, X-30-1937 (E. D. Ball, USNM). Santa Rita Mountains, 1 ♀, XI-2-1935 (Bryant, RF).

***Synecdoche bifoveata*, new species**

(Figs. 26, 50, 77, 117, 144)

Length.—4.2 to 5.2 mm. Frons approximately $1\frac{1}{4}$ times as long as broad; base of frons raised in a broad callus to level of median and lateral carinae above concave lateral compartments. Anterior carinae of lateral areolets indistinct, two impressions in each areolet. Clypeus $\frac{3}{4}$ as long as frons. Vertex $\frac{5}{11}$ as long as broad, compartments of disc concave, lateral carinae strongly raised, foliate.

Pronotum medially shorter than tegulae; lateral carinae of disc oblique; three distinct lateral areolets on each side. Stigmal cell divided in proximal half by oblique fold; tegmina with many raised incomplete transverse veinlets.

Color.—Light brown with pale carinae, veins, and incomplete transverse veinlets. Frons with dark band at apex and near base, interrupted narrowly by pale median carina; intervening area pale; a light brown band at base; six or seven pairs of dark spots along lateral carinae; genae dark, pattern not corresponding with that of frons; clypeus pale but apical third brownish. Vertex with dark bands bordering median carina, two spots on lateral carinae dark. Pronotum dark with carinae light, ventrolateral lobes with pale margins. Mesonotum brown, carinae narrowly pale, bordered with dark, two ocellate spots near posterior ends of lateral carinae. Tegulae concolorous with tegmina.

Comparative notes.—*S. bifoveata* may be separated from *tricolor* by the presence of small dark spots along the lateral carinae of the former, from *fusca* by the vertex of *fusca* being less than twice as broad as long, and from *irrorata* by the latter's apical band which is not contiguous with the frontoclypeal suture. It is unique in having the pronotal marginal carinae intersected by a transverse carina, making this area bifoveate.

Type designation.—Described from seven specimens, the holotype, male, collected September 2, 1918, at Cazadero, Sonoma County, California, by E. P. Van Duzee, and the allotype and three female and one male paratypes collected July 17, 1935, at Lucerne, Lake County, California, by R. H. Beamer, and one female paratype at Clear Lake, June 18, 1941, by D. J. and J. N. Knull (USNM).

Type repository.—California Academy of Sciences. Allotype and paratypes at University of Kansas, Lawrence, and the United States National Museum.

Host records.—None.

Geographic distribution.—Sonoma and Lake counties, California.

***Synecdoche fusca* (Van Duzee), new combination**

(Figs. 27, 78, 118, 145)

Catonia fusca Van Duzee, 1908, Proc. Acad. Sci. Philadelphia, 1907:481, 480; Metcalf, 1948:29.

Length.—5.3 to 6.2 mm. Frons approximately $1\frac{1}{5}$ as long as broad; base of frons raised in a broad callus to level of median and lateral carinae above concave lateral compartments. Anterior carinae of lateral areolets indistinct, three impressions in each areolet. Clypeus $\frac{4}{5}$ as long as frons. Vertex $\frac{7}{11}$ times as long as broad; compartments concave, lateral and median carinae subequally elevated.

Pronotum at midline shorter than tegulae; lateral carinae of disc oblique; three distinct lateral areolets behind each eye. Stigmal cell divided in proximal third by oblique fold; tegmina with many incomplete transverse veinlets. Posttibiae in some specimens laterally bispinose rather than unispinose.

Phallobase and claspers as figured. Posterior margin of female seventh sternite excavated medially in a semicircle about width of antenna.

Color.—Brown, with white incomplete transverse veinlets on tegmina; dorsal carinae edged with darker brown. Frons with dark band at apex and near base interrupted narrowly by pale median carina, pale intervening area sometimes arched, just below level of ocelli, this pale area with a small black spot at each lateral carina. Base of frons and lateral areolets light brown, with three small black spots near each lateral carina. Apical third of clypeus pale brown. Carinae of vertex pale, bordered with brown, more narrowly so laterally.

Pronotum dark brown with carinae pale; mesonotum and tegulae brown with middle third of disc mottled, a pair of small pale areas anteriorly and a pair of more or less ocellate spots posteriorly adjoining carinae. Wings brown with darker veins; abdomen brown with posterior margins, legs, and sternum pale brown. One specimen (Arroyo Seco) with base of frons completely dark brown.

Comparative notes.—*S. fusca* may be separated from the other members of its group except *clara* by the vertex being less than twice as broad as long. It is larger than *clara*, has two dark bands on the frons, and the female seventh sternite is emarginate medially, a character found in no other species.

Type designation.—"Described from one female specimen collected in San Mateo County, California, by a Mr. Coleman."

Type repository.—Holotype, No. 2379, California Academy of Sciences.

Host records.—"Not uncommon on manzanita (*Arctostaphylos bicolor*) in the canyons east of San Diego and at Alpine, May and June" (Van Duzee, 1914:36). Also from oak and *Arbutus menziesii*.

Geographic distribution.—The coast range from San Diego to the San Francisco Bay area.

Specimens examined.—CALIFORNIA. Alameda County: Niles Canyon, 1 ♂, VII-15-1916 (E. P. Van Duzee, CAS).

Contra Costa County: 2 miles southwest Moraga, 2 ♂, VII-24-1965, 2 ♂, 1 ♀, V-21-1966, *Arbutus menziesii* (C. W. O'Brien). Mount Diablo, 1 ♀, VI-21-1935 (Oman, USNM).

Los Angeles County: Camp Baldy, 1 ♀, VI-25-1950 (W. C. Bentinek, CIS). Claremont, 1 ♀ (CIS). Mountains near Claremont, 3 ♂ (Baker, PC). Tanbark Flat, 1 ♀, VI-17-1956 (A. Menke, Jr., LACM); 1 ♂, VI-17-1956 (H. W. Michalk, UCD); 1 ♂, VI-18-1956 (C. L. Wiley, CIS); 1 ♀, VI-25-1952 (A. T. McClay, UCD); 1 ♂, VII-15-1956 (R. C. Bechtel, UCD); 1 ♂, VII-21-1952 (A. T. McClay, UCD). Topanga Canyon, 1 ♂, VIII-5-1938 (R. Sailer, KU).

Monterey County: Arroyo Seco, 1 ♂, V-6-1961 (L. B. O'Brien). Bryson, 1 ♀, V-18-1920 (E. P. Van Duzee, CAS). Jamesburg, 1 ♂, VIII-11-1938 (R. H. Beamer, KU).

San Diego County: San Diego County, 4 ♂, V-10-1913, 1 ♂, VI-4-1913, 1 ♀, VI-8-1913 (E. P. Van Duzee, CAS).

San Mateo County: Palo Alto, 1 ♀, V-31-1922 (F. H. Wymore, CAS).

Santa Barbara County: Figueroa Public Camp, Los Padres National Forest, 1 ♀, V-20-1961 (J. K. Drew, O'B). Mission Canyon, 1 ♀, VI-2-1915, from oak, 1 ♀, VI-3-1915 (H. Morrison, USNM). San Marcos Pass, Santa Inez Mts., 2 ♂, 1 ♀, VII-14-1965 (C. A. Toschi, M. J. Tauber, CIS).

Santa Clara County: Stevens Creek, 1 ♀, VI-37 (E. S. Beal, CAS).

Santa Cruz County: Santa Cruz Mountains, 1 ♂, 1 ♀ (H. Osborn, OSU).

Synecdoche irrorata (Van Duzee), new combination

(Figs. 28, 79, 119, 146)

Catonia irrorata Van Duzee, 1914, Trans. San Diego Soc. Nat. Hist., 2:35; Metcalf, 1948:31.

Length.—4.6 to 5.3 mm. Frons approximately $1\frac{1}{8}$ times as long as broad; sides subparallel, not widest just before frontoclypeal suture; base of frons raised in a broad callus to level of median and lateral carinae above concave lateral compartments of disc. Anterior carinae of lateral

areolets indistinct, three dark impressions in each areolet. Clypeus $\frac{5}{11}$ as long as frons. Vertex half as long as broad; disc flat, lateral and median carinae only slightly elevated.

Pronotum shorter than tegulae; lateral carinae of disc oblique; three distinct lateral areolets. Tegmina with incomplete transverse veinlets throughout, those outside clavus usually pustuliform, not touching veins, in stigmal cell obscuring area of oblique fold so that its presence cannot be determined. Wing venation reduced from usual generic pattern with R simple, M two-branched, and Cu_1 two-branched.

Phallobase and claspers as figured. Female seventh sternite with hind margin straight.

Color.—Dark brown, with light carinae, veins, incomplete transverse veinlets, and a few pale spots. Frons with dark bands at apex and near base, intervening area below level of ocelli and two areas laterally just above frontoclypeal suture pale. Base of frons and lateral areolets light brown, with three small black spots in impressions. Approximately apical third of clypeus pale brown. Vertex, pronotum, and mesonotum dark brown with pale carinae, a pale area on disc of vertex; two pale areas anteriorly and one posteriorly in each compartment of disc of mesonotum, two fainter in each lateral field. Tegulae dark brown with pale margins. Tegmina with faintly darker bands distad of union of claval veins and at apex of clavus; stigmal cell dark distally, pale proximally. Wings and abdominal sternites dark brown (latter with pale margins), legs and thorax brown.

Comparative notes.—*S. irrorata* may be separated from the other members of the *fusca* species group by the lower dark band of the frons not being contiguous with the frontoclypeal suture. The dorsal color pattern is very close to that of *fusca*, but the shape of the vertex will serve to separate the two species.

Type designation.—"Described from two examples; a male taken May 6th at Brooklyn Heights in San Diego and a female taken March 11th at Alpine; both from manzanita bushes." Despite Van Duzee's statement, both of his original specimens are female. I validate by publication his selection of the specimen from Alpine (No. 2225) as lectotype, and consider No. 2226 a paratype.

Type repository.—California Academy of Sciences.

Host records.—Manzanita bushes (see type designation).

Geographic distribution.—This species is known from nine specimens, taken in San Diego County, the transverse range, and the Coast Range, north into Monterey County, California.

Specimens examined.—CALIFORNIA. Los Angeles County: Mint Canyon, 1 ♂, V-16-1937 (E. P. Van Duzee, CAS).

Monterey County: Bryson, 1 ♀, V-18-1920 (E. P. Van Duzee, CAS). 7 miles northeast King City, 1 ♂, IV-17-1966 (L. B. O'Brien).

Riverside County: Snow Creek, 1500 feet, White Water, 1 ♂, IV-29-1955 (W. R. M. Mason, CNC).

San Bernardino County: San Bernardino Mts., 2000 feet, 1 ♂, 1 ♀, V-5-1952 (O. Bryant, RF).

San Luis Obispo County: La Panza Camp, 12 miles northeast Pozo, 1 ♀, V-2-1962 (J. K. Drew, CIS).

Synechdoche autumnalis, new species

(Figs. 29, 80, 120, 147)

Length.—4.5 to 5.2 mm. Frons approximately $1\frac{1}{3}$ times as long as broad, base of frons raised in a broad callus to level of median and lateral carinae above concave compartments of disc. Clypeus $\frac{3}{4}$ as long as frons. Vertex half as long as broad; disc concave, lateral carinae raised above median carina.

Pronotum medially shorter than tegulae, lateral carinae of disc oblique; lateral areolets indistinct. Stigmal cell divided in proximal third by oblique fold.

Color.—Yellowish brown throughout, except abdominal sternites in one male brown.

Comparative notes.—This is the only species of *Synechdoche* with a pale frons and without incomplete transverse veinlets that does not have the frons convex at base. It does not fit well into any species group, but is placed tentatively with the *impunctata* group.

Type designation.—Described from five specimens taken in the mountains in Los Angeles and San Bernardino counties, California. Holotype, male, Mt. Wilson, Oct. 18, 1917, E. P. Van Duzee, collector. Four paratypes, as follows: one with abdomen missing, same data as holotype; 1 ♂,

Mt. San Antonio, 5700 feet, VIII-22-1920, on *Quercus chrysolepis*, P. H. Timberlake (PT); 1 ♂, San Antonio Canyons, VIII-4-1938, L. W. Hepner (KU); 1 with abdomen missing, Mill Creek, San Bernardino Mountains, 6000 feet, VIII-27-1945, on *Pinus lambertiana*, P. H. Timberlake (PT).

Type repository.—California Academy of Sciences.

Host records.—*Quercus chrysolepis* and *Pinus lambertiana*.

Geographic distribution.—The transverse range in Los Angeles and San Bernardino counties, California.

Synecloche dimidiata (Van Duzee), new combination

(Figs. 30, 81, 122, 148)

Cixius impunctatus var. a Fitch, 1851:46.

Catonia dimidiata Van Duzee, 1910, Trans. American Ent. Soc., 36:85; Metcalf, 1948:28.

Catonia dimidata [sic], Van Duzee, 1917:729.

Length.—5.8 to 6.0 mm. Frons approximately $1\frac{1}{2}$ times as long as broad; frontoclypeal suture transverse; median and lateral carinae strongly, equally elevated above concave lateral compartments of disc. Anterior carinae of lateral areolets indistinct. Clypeus $\frac{3}{4}$ as long as frons. Vertex three times as broad as long; compartments of disc concave, median and lateral carinae subequally elevated.

Pronotum medially shorter than tegulae, lateral carinae of disc oblique, lateral areolets indistinct. Stigmal cell divided in proximal third by oblique fold.

Pygofer abruptly narrower than preceding segments, less compressed dorsoventrally. Phallobase and claspers as figured.

Color.—Usually medium brown, some specimens dark or pale brown, with entire frons almost black, abdominal sternites almost as dark. Clypeus, carinae of head and pronotum and sometimes areas around anterior cross veins pale. All transverse veins, including anal vein along mesonotum, PCu at union with A, apex of clavus, and cross veins white; other veins concolorous. Wings brown, slightly darker than tegmina.

Comparative notes.—Among eastern species of Plectoderini, only two, *S. dimidiata* and *S. impunctata*, have unpatterned tegmina, not marked with dark spots along veins or with pale incomplete veinlets. *S. dimidiata* may be separated from *impunctata* by its entirely dark frons.

Type designation.—"Described from one female taken by me at Phoenicia, N. Y., in August, 1904, and one male and two females taken by Prof. John Barlow at Kingston, R. I." I validate by publication Van Duzee's selection of lectotype, female (No. 2218) from Phoenicia, and allotype (No. 2219) from Kingston.

Type repository.—California Academy of Sciences.

Host records.—In pine (1 ♀, Patton, Pa., IX-24-1902, USNM); beating beech (1 ♂, 2 miles east Silver Spring, Northwest Branch, Md., VII-20-1951, G. H. Nelson, RF); swept from beech (1 ♀, Merivale, Ont., VIII-22-1932, L. Milne, CNC).

Geographic distribution.—Known from Florida to Ontario, west to Ohio. States represented include Maine, New Hampshire, New York, Connecticut, Rhode Island, New Jersey, Pennsylvania, Ohio, Maryland, Virginia, West Virginia, North Carolina, Georgia, and Florida.

Synecloche impunctata (Fitch), new combination

(Figs. 31, 82, 121, 128, 149)

Flata nava var. b. Say, 1830:239.

Cixius impunctatus Fitch, 1851, Ann. Rept. State Cab. Nat. Hist., 4:46.

Myndus impunctatus, Van Duzee, 1890:390.

Catonia impunctata, Van Duzee, 1908:480; Metcalf, 1948:30.

Length.—5.0 to 5.8 mm. Frons approximately $1\frac{1}{2}$ times as long as broad; median carina and lateral margins strongly, equally elevated above concave lateral compartments of disc. Anterior carinae of lateral areolets indistinct. Clypeus $\frac{4}{7}$ as long as frons. Vertex about half as long as broad; disc flat, median and lateral carinae slightly, subequally elevated.

Pronotum about as long as tegulae; lateral carinae of disc oblique; lateral areolets indistinct. Stigmal cell divided in proximal third by oblique fold.

Pygofer abruptly narrower than preceding segments, less compressed dorsoventrally. Phallobase and claspers as figured.

Color.—Tegmina brown, mesonotum paler with pale carinae; head and pronotum pale with dark brown spots. Frons with dark band at apex, divided by pale carina, two arch-shaped spots towards base; discs of vertex and pronotum and ventrolateral flap of pronotum, and tegulae dark brown with carinae and margins of tegulae pale. Legs pale, abdomen dark. Wings darker than tegmina. Tegmina with small white spot at apex of clavus and costal margin of stigmal cell.

Comparative notes.—Only two eastern species of Plectoderini, *S. impunctata* and *S. dimidiata*, have tegmina without dark spots on the veins or pale incomplete veinlets. *S. impunctata* may be separated from *dimidiata* by its pale frons, vertex, and pronotum with, respectively, four, two, and two dark areas on them while *dimidiata* has the frons completely dark and the vertex and pronotum unmarked.

Type designation.—"Found on oaks. No. 618, male." Title of the paper is "Catalogue of the known Homoptera of the State of New York in 1851." One tegmen and one wing, both faded, remain in the Fitch collection. Fortunately, no confusion exists as to the identity of the species.

Type repository.—New York State Museum, Albany, New York.

Host records.—On oak (see type designation). White oak (1 ♂, Lee, N.H., VIII-7-1930, OSU). *Prunus* (1 ♀, Franklin County, Ohio, VIII-16-1931, E. P. Breakey).

Geographic distribution.—Specimens have been recorded from Georgia to Quebec, west to Iowa and Oklahoma. I have seen representatives from Maine, New Hampshire, Massachusetts, Connecticut, New York, Michigan, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Iowa, West Virginia, Virginia, North Carolina, Tennessee, Oklahoma, and Georgia. Metcalf's catalogue adds Rhode Island and Quebec.

Synecdoche helenae (Van Duzee), new combination

(Figs. 32, 83, 123, 150, 157)

Catonia helenae Van Duzee, 1918, Proc. California Acad. Sci., (4)8:306; Metcalf, 1948:29.

Length.—5.1 to 7.6 mm. Frons approximately $1\frac{2}{3}$ times as long as broad; median carina and lateral margins subequally elevated above concave compartments of disc. Lateral areolets distinct. Clypeus as long as frons, its sides visible in frontal view. Vertex $\frac{2}{3}$ as long as broad; disc concave, lateral carinae raised above median carina.

Pronotum longer than tegulae; lateral carinae of disc oblique, curving mesad posteriorly; four distinct lateral areolets on each side. Stigmal cell divided in proximal third by oblique fold.

Claspers held apart, revealing phallobase in ventral view. Phallobase and claspers as figured.

Color.—Pale brown with darker markings on head and thorax, tegmina pale brown with brown mottling, veins yellow, apical area clear. Frons yellowish with four longitudinal dark spots, two at base, two smaller at apex. Clypeus yellowish, sides brown; disc of vertex and lateral areolets brown; dorsum of pronotum dark or pale brown, ventrolateral lobes brown, edged with pale. Tegulae with dark area ventrally. Mesonotum either dark brown with orange carinae or orange with three brown triangular spots in each compartment of disc, lateral fields brown or orange or mottled. Wings clear with brown veins. Abdominal sternites dark brown with paler margins; claspers pale with dark edges; phallobase medium brown.

Comparative notes.—*S. helenae* may be separated from all other species of *Synecdoche* by its long pronotum. Two characters, the lateral lobe of the phallobase being expanded laterally and the sides of the clypeus being visible in frontal view show similarities to *Xerbus brunellus*. This is the only species in which the claspers are consistently separated medially, revealing the phallobase.

Type designation.—"Described from 35 specimens, representing both sexes, taken on the dead reflexed leaves of the California fan palm, *Washingtonia filifera*, in Andreas' Canyon at Palm Springs, Calif., May 9, 1917.... It seems to be confined to this palm and to find its sustenance among the dead foliage only, as I was unable to obtain any from the living leaves.

"Holotype (No. 440), male, allotype (No. 441), female, and paratypes in collection of the California Academy of Sciences."

Type repository.—California Academy of Sciences.

Host records.—*Washingtonia filifera*. *S. helenae* probably feeds on the green leaves during the night. See the behavior section for further information.

Geographic distribution.—Found in localities where the fan palm is native in San Diego and Riverside counties in California and in one locality in Baja California. Attempts to collect examples of this species at Twentynine Palms, Joshua Tree National Monument, in a higher, colder desert, were fruitless. I had no opportunity to check the single native stand of fan palm in Arizona.

Specimens examined.—CALIFORNIA. Riverside County: Boyd Desert Research Center, 4 miles south Palm Desert, 1 ♀, IV-6-1963 (R. L. Langston, CIS). Deep Canyon, 2 ♂, III-6-1963, in association with dead palm fronds, 2 ♂, 1 ♀, IV-28-1965, 61 ♂, 21 ♀, V-3-1963, 1 ♀, V-16-1963, at light (all E. I. Schlinger, UCR). Deep Canyon, 6 miles south Palm Desert, 82 ♂, 41 ♀, IV-14-1965, ex skirt *Washingtonia filifera* in daytime, 1 ♂, 2 ♀, ex green leaves *Washingtonia filifera* at dusk (C. W. and L. B. O'Brien). Lost Palms Canyon, Joshua Tree National Monument, 1 ♀, VI-26-1963, blacklight (E. L. Sleeper, LBS). Palm Springs, 5 ♂, 2 ♀, 9 ♂ paratypes, 10 ♀ paratypes (E. P. Van Duzee, CAS, USNM).

San Diego County: Mortrero Palms, Anza-Borrego State Park, 34 ♂, 22 ♀, IV-12-1965, ex skirt *Washingtonia filifera* (L. B. and C. W. O'Brien). Mountain Palm Springs, Anza-Borrego State Park, 3 ♂, 2 ♀, IV-11-1965, ex skirt *Washingtonia filifera* (L. B. and C. W. O'Brien).

Xerbus, new genus

(Type-species: *Catonia brunella* Ball, 1933, present designation)

1. Frons as long as wide, measured along midline from base to level of outer ends of frontoclypeal suture, convex throughout axially and transversely; median carinae indistinct.

2. Rostrum short, only as long as clypeus.

3. Pronotum medially longer than tegulae, with two distinct lateral marginal carinae running from tegula towards eye.

4. Tegmen with (a) Sc+R fork basad of Cu₁ fork, sometimes basad of level of union of claval veins; (b) subcostal cell longer than 1/3 length of tegmen, equally wide throughout.

5. Hind wing with R₁ two-branched, M two-branched, and Cu₁ two-branched.

6. Hind tibia with spine in basal half.

7. Male pygofer with median lobe entire.

8. (a) Strut of aedeagal appendages Y-shaped, attached to claspers and pygofer; (b) phallobase with lateral lobes laterally expanded, with a flange along the dorsal edge, the ventral lobe simple, the dorsal lobe absent.

This generic name is an arbitrary combination of letters and is masculine in gender.

Comparative notes.—This genus is very distinct with the postclypeus lacking lateral carinae distally, the pronotum long, and the phallobase expanded laterally. *S. helenae* resembles it in a lesser degree in these three points. However, *Xerbus* differs from *Synecdoche* in the lateral view of the head (figs. 49–51), in the curve of the lateral mesonotal carinae, and in the large areolets of the lateroapical angle of the head which are not declivous and not carinate anterad. The postclypeus with incomplete lateral carinae is similar to that found in the Myconini.

Species included in *Xerbus*: *brunellus* [*Catonia*] (Ball).

Xerbus brunellus (Ball), new combination(Figs. 33, 51, 84, 124, 151; frontispiece, *g*, holotype)*Catonia brunella* Ball, 1933, Pan-Pacific Ent., 9:137; Metcalf, 1948:26.

Length.—5.0 mm. (Ball gives 5 to 6 mm.) Frontoclypeal suture obsolete medially, oblique laterally. Areolet at lateroapical angles of head large, not declivous, with anterior carinae indistinct. Clypeus approximately as long as frons, without lateral carinae except near base, rounding smoothly to sides. Vertex almost triangular, about $\frac{2}{3}$ as long as broad, posterior margin shallowly arcuate, sides short, rounding into apical margin; disc flat, median and lateral carinae slightly, subequally elevated.

Pronotum with lateral carinae of disc oblique, curved, not reaching hind margin; lateral areolet absent. Mesonotum with lateral carinae rounded or subangulately bent mesad. Tegmina with r-m and m-cu cross veins distad of level of base of stigmal cell; stigmal cell without oblique fold.

Color.—Pale brown, with abdomen, longitudinal veins, and apical margin of tegmina a little darker. Abdominal sternites with pale posterior border.

Type designation.—"Holotype, female, Huachuca Mts. Oct. 9, 1932, allotype, male, and paratype male taken in the Santa Rita Mts. (labeled Tucson) Sept. 29, 1929; all taken in Arizona by the writer."

Type repository.—United States National Museum. The allotype and paratype males were mounted on the same point. I chose the specimen with the genitalia dissected as the lectoallotype and remounted and relabeled the other specimen as the paratype.

Host records.—None.

Geographic distribution.—Two other specimens, also from Arizona, have been taken. Neither can be sexed because the tip of the abdomen is missing. They are: Atascosa Mt., Ar., X-8-1936 (E. D. Ball, USNM). Sta. Rita Mts., Ariz., X-5-1936 (Bryant, Lot 51, RF).

Momar Fennah(Type-species: *Momar lineatocollis* (Fowler), 1904, original designation)*Momar Fennah*, 1950, Bull. British Mus. (N. H.) Ent., 1(1):58.

1. Frons $1\frac{1}{5}$ to $1\frac{1}{3}$ times as long as broad; compartments of disc concave.
2. Rostrum reaching base of hind coxae.
3. Pronotum medially shorter than the tegulae with no (or indistinct) lateral carina running from tegula to eye.
4. Tegmen with (a) Sc+R and Cu₁ fork about level, both slightly distad of union of claval veins; (b) subcostal cell longer than $\frac{1}{3}$ length of tegmen, subequally wide throughout, ending near apex of stigmal cell.
5. Hind wing with R two-branched, M two-branched, and Cu₁ three-branched.
6. Hind tibia with spine in basal half.
7. Male pygofer with median lobe rounded, entire.
8. (a) Strut of aedeagal appendages Y-shaped, attached to claspers and pygofer. (b) Phallobase with lateral lobes dorsoventrally expanded, suspensorial arm to anal segment having round end that appears to be fitted into circular socket on lateral lobe; ventral lobe simple; dorsal lobes small, each consisting of a knob with two spines distad of suspensorial arm, and a tail-like projection paralleling aedeagal appendages.

The species of *Momar*, in addition to the above, have the following characters in common. Areolet at lateroapical angles of head not carinate anteriorly. Vertex with disc concave, median carina slightly elevated, lateral carinae strongly

elevated. Pronotum short, lateral carinae of disc divergent, more than twice as long as median carina; lateral areolets indistinct or absent. Tegmina with stigmal cell divided in proximal third by oblique pale fold. Male pygofer almost square rather than oval in cross section, with medioventral lobe inclined dorsad. Claspers with a single truncate lateral lobe. Seventh sternite of female triangularly depressed medially, tumid laterally, with apical margin strongly emarginate, V-shaped.

Frons pale, marked with three pairs of dark spots basally, sometimes fused; dark band at frontoclypeal suture.

Comparative notes—*Momar* can be separated from other genera by the form of the male phallobase, the square cross section of the male pygofer, and the V-shaped posterior margin of the female sixth sternite. The species in the United States have three pairs of dark spots basally on the frons and a dark band at the frontoclypeal suture. They are closely related to *Synechdoche*, sharing most other characters with some of its members.

Species included in *Momar*:

fumidus (Ball), new combination
lineatocollis (Fowler) (Panama)
maculifrons (Van Duzee), new combination)

KEY TO THE SPECIES OF MOMAR OF AMERICA NORTH OF MEXICO

1. Hind wings white with dark veins; medioventral lobe of male pygofer about 3 times as broad as long *maculifrons* (Van Duzee)
- Hind wings brown with brown veins; medioventral lobe of male pygofer about $1\frac{1}{2}$ times as broad as long *fumidus* (Ball)

Momar maculifrons (Van Duzee), new combination

(Figs. 35, 86, 126, 153, 156; frontispiece, b)

Catonia maculifrons Van Duzee, 1912, Bull. Buffalo Soc. Nat. Sci., 10:491; Metcalf 1948:32.

Length.—4.0 to 5.0 mm. Frons about half as wide at base as at maximum width; clypeus about half as long as frons. Vertex appearing roughly triangular, $\frac{3}{4}$ as long as broad. Medioventral lobe of pygofer about three times as broad as long.

Color.—Pale brown mottled with pale and darker brown throughout; carinae pale, often bordered with brown, tegmina mostly clear but with brown blotches especially around costal and apical margin. Frons pale, with dark band, medially emarginate above, across apex and three pairs of dark spots at base; spots variable in size, usually partially fused, sometimes spreading and fusing to cover entire base. Vertex with brown border along lateral carinae spreading mesad in anterior half, a pale spot on each compartment posteriorly. Pronotum pale with areolets and spot on ventrolateral lobe brown. Carinae of mesonotum bordered with dark areas of variable width, lateral fields mottled with brown. Hind wings white with dark veins. Sternum and legs pale, abdominal sternites dark brown, their posterior margins and median lobe of pygofer and claspers pale.

Comparative notes.—*M. maculifrons* may be distinguished from *M. fumidus* by its wings being pale rather than dark; by the median lobe of the pygofer being broader than long instead of about as broad as long; by the heavy dark mottling of the lateral areolets and frons as opposed to the usually smaller, unfused spots of *fumidus*; by the tegmina being proportionally broader when at rest, and by the vertex being $\frac{3}{4}$ rather than $\frac{3}{5}$ as long as broad.

Type designation.—"Described from one male taken in the Huachuca Mts., Arizona, on July 23rd, by Mr. H. G. Barber...."

Type repository.—Holotype, male, No. 2224, California Academy of Sciences.

Karyotype.—13 autosomes + XO. Five testicular tubules.

Host records.—None previously reported. I have taken specimens on *Platanus wrightii*, oak, and grape, and at light.

Geographic distribution.—Found from west Texas to Arizona and Chihuahua, Mexico.

Specimens examined.—ARIZONA. Cochise County: Douglas, 1 ♀, VIII-16-1936 (W. W. Jones, CIS). Wilcox, 1 ♂, X-15-1939 (E. D. Ball, USNM).

Chiricahua Mountains: Chiricahua Mts., 1 ♂, VII-12-1953, 1 ♀, VII-16-1954, 1 ♀, VII-25-1961, 2 ♂, VII-26-1937, 24 ♂, VII-29-1961, 1 ♀, VIII-2-1952, 24 ♂, 13 ♀, VIII-28-1940, 2 ♂, VIII-28-1962, 1 ♂, IX-4-1962, 2 ♂, 3 ♀, IX-5-1947, 1 ♂, 11 ♀, IX-12-1947, 16 ♂, 19 ♀, IX-14-1938, 3 ♂, 11 ♀, IX-19-1947 (D. J. and/or J. N. Knull, OSU); 1 ♀, VIII-7-1941 (R. H. Beamer, KU); 1 ♂, VIII-23-1931 (E. D. Ball, USNM); 1 ♂, VIII-27-1936 (R. A. Flock, RF); 1 ♀, IX-15-1935 (F. H. Parker, RF). Cave Creek, 1 ♀, VII-23-27-1962, at light (H. V. Weems, Jr., FDA); 5-6000 feet, 1 ♂, VIII-25-1927, 1 ♂, VIII-26-1927 (J. A. Kusche, CAS). Near entrance Chiricahua National Monument, 1 ♂, 1 ♀, VIII-17-1952 (H. B. Leech, J. W. Green, CAS). Southwest Research Station, 5-6000 feet, 1 ♂, VIII-27-1958, *Heterotheca subaxillaris*, 1 ♂, VIII-27-1958, *Melilotus alba* (H. V. Weems, FDA). Paradise, 5-6000 feet, 1 ♂, VIII-27-1927 (J. A. Kusche, KU). Pinery Canyon, 6400 feet, 1 ♀, IX-6-1965 (C. W. O'Brien). One mile south Portal, 4800 feet, 1 ♂, VI-30-1965, 2 ♂, VII-7-1965, 7 ♂, 1 ♀, VII-12-1965, 6 ♂, VII-23-1965, 4 ♂, 3 ♀, VIII-1-1965, 2 ♂, 1 ♀, VIII-2-1965 (J. M. and J. H. Davidson, M. A. Cazier, ASU).

Dragoon Mountains: Cochise Stronghold, 26 ♂, 23 ♀, IX-12-1964, 1 ♂ on *Vitis*, 2 ♂ on *Platanus wrightii* (L. B. and C. W. O'Brien).

Huachuca Mountains: Huachuca Mts., 1 ♂, 3 ♀, VII-20-1936, 2 ♂, 4 ♀, VII-20-1937, 3 ♂, 1 ♀, VII-10-1953, 2 ♀, VII-12-1953, 3 ♂, VIII-18-1936, 5 ♂, VIII-19-1950, 7 ♂, 5 ♀, IX-9-1938 (D. J. and/or J. N. Knull, OSU); 1 ♀, VII-28-1907, 1 ♂, VIII-2-1931 (E. D. Ball, USNM); 1 ♂, VII-18-1938 (D. W. Craik, KU). Carr Canyon, 1 ♂, VIII-5-1924, 1 ♀, VIII-6-1924 (E. P. Van Duzee, CAS); 1 ♀, VIII-7-1924 (J. O. Martin, CAS); 5400 feet, 1 ♂, 2 ♀, IX-7-1965 on *Quercus*, 2 ♂, 3 ♀, IX-7-1965, blacklight (C. W. O'Brien). Copper Canyon, 2 miles west Montezuma Pass, 2 ♂, 2 ♀, IX-9-1965, *Platanus wrightii*, 1 ♂, 5 ♀, IX-9-1965, *Quercus* (L. B. and C. W. O'Brien).

Coconino County: Oak Creek Canyon, 2 ♀, VIII-1-1938, 4 ♂, 6 ♀, VIII-15-1938 (D. J. and J. N. Knull, OSU); 1 ♀, VIII-8-1933 (E. D. Ball, USNM); 1 ♂, VIII-14-1927 (P. A. Readio, KU); Williams, 1 ♀, VIII-9-1923 (D. J. and J. N. Knull, OSU).

Gila County: Gila County, 2 ♂, 3 ♀, VIII-5-1927, 2 ♂, 1 ♀, VIII-6-1927 (R. H. Beamer, KU).

Graham County: Arivaipa [sic], 1 ♀, VIII-25-1933 (Bryant, USNM). 13 miles east Bonita, 4 ♂, 2 ♀, IX-5-1965, *Platanus wrightii* (C. W. and L. B. O'Brien). Mt. Graham, 1 ♀, VIII-27-1937 (E. D. Ball, USNM).

Pima County: Tucson, 1 ♂, VII-12-1937, 1 ♂, 1 ♀, VIII-13-1935, 2 ♀, VIII-16-1940, 4 ♂, 2 ♀, VIII-27-1938 (D. J. and J. N. Knull, OSU); 14 ♂, 7 ♀, IX-22-1929, 1 ♂, X-20-1929 (E. D. Ball, USNM). 16 miles south Tucson, 1 ♀, VIII-11-1924 (E. P. Van Duzee, CAS).

Baboquivari Mountains: Baboquivari Mts., 4 ♂, 2 ♀, VII-26-1933 (E. D. Ball, USNM); 5 ♂, 2 ♀, IX-1938 (D. J. and J. N. Knull, OSU); 15 ♂, 5 ♀, X-16-1937 (Oman, USNM). Brown's Canyon, 1 ♂, VII-1937 (Floyd Andre, USNM).

Rincon Mountains: 9 ♂, 4 ♀, IX-15-1937 (R. Flock, RF).

Santa Catalina Mountains: 1 ♀, VIII-15-1931, 1 ♂, X-10-1931, 1 ♂, X-20-1929 (E. D. Ball, USNM); 2-3000 feet, 1 ♀, VII-15-1924 (A. A. Nichol, USNM). Bear Canyon, 1 ♂, 1 ♀, IX-16-1964, *Platanus wrightii* (L. B. and C. W. O'Brien). Hitchcock Highway, mile 4, 4 ♀, VIII-26-1958 (M. S. Adachi, UA). Hitchcock Highway, mile 5, 4200 feet, 1 ♂, VIII-9-1961, UV, 1 ♂, 2 ♀, VIII-11-1961 (Werner, Nutting, UA). Molino Basin, 4600 feet, 1 ♂, IX-3-1965, *Quercus*, 1 ♂, 3 ♀, IX-3-1965, *Platanus wrightii*, 6 ♀, IX-3-1965, blacklight trap, 49 ♂, 28 ♀, IX-16-1964, *Platanus wrightii* (C. W. and L. B. O'Brien). Pepper Sauce Canyon, 1 ♂, VIII-15-1924 (E. P. Van Duzee, CAS). Sabino Canyon, 1 ♂, VII-14-1932 (E. D. Ball, USNM); 1 ♂, VII-14-1932 (R. H. Beamer, KU); 1 ♂, VIII-13-1924 (E. P. Van Duzee, CAS); 7 ♂, 2 ♀, IX-4-1965 (L. B. and C. W. O'Brien); 1 ♂, 2 ♀, X-27-1937 (Oman, USNM).

Santa Rita Mountains: Florida Canyon, 3 ♂, 4 ♀, VII-10-1924 (J. O. Martin, CAS); 2 ♂, 3 ♀, VII-10-1924 (E. P. Van Duzee, CAS); 1 ♂, IX-12-1965, 1 ♂, 4 ♀, IX-14-1964, 3 ♂, 2 ♀, IX-14-1964, *Platanus wrightii* (L. B. and C. W. O'Brien).

Pinal County: 14 miles east Oracle, 1 ♀, VII-27-1924 (E. P. Van Duzee, CAS). Superior, 1 ♂, VIII-1-1929 (E. D. Ball, USNM).

Santa Cruz County: Atascosa Mt. 1 ♂, VIII-7-1937, 1 ♀, VIII-15-1935 (E. D. Ball, USNM). Badger, 1 ♀, VIII-31-1924 (J. O. Martin, CAS). Madera Canyon, Bog Springs Camp, Sta. Rita Mts., 1 ♂, 2 ♀, IX-13-1964 (L. B. and C. W. O'Brien). Nogales, 1 ♂, IX-6-1906 (F. W. Nunenmacher, USNM); 7 ♂, 1 ♀, IX-19-1931, 2 ♂, 1 ♀, X-19-1931 (E. D. Ball, USNM). Patagonia, 1 ♂, VIII-8-1940 (Timberlake, PT); 8 ♂, 4 ♀, IX-7-1929 (E. D. Ball, USNM); on Sonoita Creek, 4 ♂, X-14-1927 (J. A. Kusche, CAS). 2 miles southwest Patagonia, 1 ♂, IX-10-1965 (L. B. and C. W. O'Brien). Pena Blanca Lake, White Rock Camp, 11 ♂, 29 ♀, IX-14-1964, at blacklight (C. W. O'Brien). Santa Cruz River near Tubac, 2 ♂, X-23-1937 (Oman, USNM).

Yavapai County: Ashfork, 1 ♀, VIII-8-1932 (R. H. Beamer, KU). Granite Dells, 1 ♂, VIII-14-1929 (R. H. Beamer, KU); 2 ♂, 3 ♀, VIII-17-1929, 1 ♂, 1 ♀, IX-10-1932, 1 ♀, X-6-1929 (E. D. Ball, USNM).

Pima or Santa Cruz County: Sta. Cruz River, 2 ♂, VIII-15-1937, 3 ♂, 5 ♀, IX-6-1937 (E. D. Ball, USNM, RF). Sta. Rita Mts., 1 ♂, VIII-18-1935 (R. H. Beamer, KU); 1 ♂, VIII-18-1935, 1 ♂, 1 ♀, IX-13-1931 (E. D. Ball, USNM); 1 ♂, VIII-30-1938 (D. J. and J. N. Knull, OSU); 1 ♂, 3 ♀, IX-10-1933 (Bryant, RF). Madera Canyon, circa 4000 feet, 1 ♀, IX-12-1965 (L. B. and C. W. O'Brien).

Indeterminate: Glenn Oaks, 1 ♂, 2 ♀ (1 pair in copulo), VIII-19-1924 (E. D. Ball, USNM).

NEW MEXICO. Eddy County: Artesia, 1 ♂, VII-29-1937 (D. J. and J. N. Knull, OSU).

Grant County: Cherry Creek Picnic Grounds, 6 miles north Pinos Altos, 1 ♂, VIII-21-22-1952 (H. B. Leech, J. W. Green, CAS).

TEXAS. Brewster County: Big Bend National Park, vicinity Oak Springs, 1 ♂, VII-16-1963 (A. B. Gurney, USNM).

Jeff Davis County: Davis Mts., 1 ♀, VII-4-1952, 1 ♀, VII-6-1936, 3 ♂, 2 ♀, VII-2-1937, 10 ♂, 10 ♀, VIII-22-1936, 1 ♀, IX-20-1938 (D. J. and/or J. N. Knull, OSU).

UTAH. Zion National Park, 1 ♂, VIII-13-1939 (R. H. Beamer, KU).

MEXICO. CHIHUAHUA. Santa Clara Canyon, 5 miles west Parrita, 1 ♂, 2 ♀, IX-5-1956, *Salix* sp. (J. W. MacSwain, CIS).

Momar fumidus (Ball), new combination

(Figs. 34, 85, 125, 152)

Catonia fumida Ball, 1933, Pan-Pacific Entomologist, 9:135; Metcalf, 1948:29.

Length.—3.8 to 5.3 mm. Frons not quite half as wide at base as at maximum width; clypeus about $\frac{2}{3}$ as long as frons. Vertex appearing roughly triangular, $\frac{3}{5}$ as long as broad. Medioventral lobe of pygofer about $1\frac{1}{3}$ times as broad as long.

Color.—Dark brown with carinae and veins of tegmina pale. Frons pale with dark band across apex, median carina pale; three pairs of spots at base, usually distinct. Apex of clypeus with dark spots. Pronotum dark except for light carinae and pale spot on ventrolateral lobe. Mesonotum pale with dark borders along carinae, three dark spots on each lateral field. Tegmina with veins white, less mottled with brown than in *maculifrons*; hind wings and their veins dark brown. Thorax pale ventrally, sometimes with darker cloud; abdominal sternites dark, their posterior margins, and median lobe of pygofer and claspers pale.

Comparative notes.—See those given under *maculifrons*.

Type designation.—"Holotype, female, allotype, male, and two pairs of paratypes. Huachuca Mts., Aug. 2, 1931, a female Sabino Canyon, July 14, 1932, and a male (labeled) Tucson, Sept. 1, 1929. All taken in the mountains of southern Arizona by the author."

Unfortunately, on the pin labeled "holotype" was a point with two females and one male, and the pin labeled "allotype" had two males and one female. A lectotype and allotype were remounted and labeled with the original labels and the paratypes were relabeled.

Type repository.—United States National Museum.

Host records.—None reported. I have taken specimens on *Platanus wrightii*.

Geographic distribution.—The lower elevations of the mountains of southern Arizona and California.

Specimens examined.—ARIZONA. Cochise County: Chiricahua Mountains: Chiricahua Mts., 1 ♂, VII-14-1936, 1 ♂, VII-18-1961, 2 ♂, 2 ♀, VII-25-1961, 2 ♂, 1 ♀, VII-26-1952, 7 ♂, 15 ♀, VII-29-1961, 3 ♀, VIII-6-1961, 1 ♂, 1 ♀, VIII-12-1952, 1 ♀, VIII-19-1961, 7 ♂, 5 ♀, VIII-28-1940, 1 ♀, IX-4-1962, 2 ♂, 2 ♀, IX-5-1947, 1 ♂, 1 ♀, IX-14-1938, 2 ♀, IX-19-1947 (D. J. and J. N. Knull, OSU). Chiricahua National Monument, 1 ♂, 1 ♀, VIII-24-1935 (Jean Russell, KU). Cave Creek, 1 ♂, 2 ♀, VIII-27-1939, 1 ♂, VIII-27-1954 (R. A. Flock, RF). Cave Creek, 5–6000 feet, 1 ♂, VIII-16-1927, 1 ♂, 3 ♀, VIII-25-1927, 1 ♂, VIII-26-1927 (J. A. Kusche, CAS). Douglas, 1 without abdomen, VIII-21-1933, 1 ♀, VIII-30-1933 (W. W. Jones, CIS). Paradise, 5–6000 feet, 1 ♀, VIII-22-1927 (J. A. Kusche, CAS). Pinery Canyon, 6000 feet, 1 ♂, 1 ♀, IX-6-1965, *Platanus wrightii* (C. W. O'Brien). Pinery Canyon, 7200 feet, 1 ♂, 2 ♀, IX-6-1965 (C. W. O'Brien). 5 miles west Portal, 1 ♀, VIII-7-1958 (P. Opler, CIS); 3 ♂, 2 ♀, VIII-17-1958 (J. M. Marston, UCD). Southwest Research Station, 5 miles northwest Portal, 2 ♀, VIII-25-1960 (P. H. Arnaud, D. C. Rentz, CAS). 1 mile south Portal, 4800 feet, 2 ♂, 7 ♀, VII-12-1965, at light (J. H. and J. M. Davidson, M. A. Cazier, ASU).

Dragoon Mountains: Cochise Stronghold, 4600 feet, 1 ♀, IX-12-1964, 7 ♀, IX-6-1965, blacklight trap (C. W. and L. B. O'Brien).

Huachuca Mountains: Huachuca Mts., 1 ♀, VII-18-1938, 2 ♀, VIII-1-1927, 1 ♀, VIII-22-1935 (R. H. Beamer, KU); 1 ♂, 1 ♀, VII-20-1936, 3 ♂, 1 ♀, VII-20-1937, 3 ♂, 1 ♀, VIII-10-1953, 3 ♂, 1 ♀, VIII-18-1936, 1 ♂, 2 ♀, IX-9-1938 (D. J. and J. N. Knull, OSU); 1 ♂, X-12-1951 (E. L. Kessel, CAS). Carr Canyon, 5400 feet, 1 ♀, VIII-8-9-1952 (H. B. Leech, J. W. Green, CAS); 1 ♂, 5 ♀, IX-7-1965, blacklight trap (L. B. and C. W. O'Brien). Carr Canyon, 1 ♀, VIII-7-1924 (J. O. Martin, CAS); 3 ♀, VIII-9-1940, at light (Timberlake, PT). Ramsey Canyon, 1 ♀, XII-28-1961, UV Trap (Werner, Nutting, UA).

Graham County: Mt. Graham, 1 ♀, VIII-27-1937 (E. D. Ball, USNM).

Pima County: Kitt Peak, Baboquivari Mts., 4050 feet, 1 ♂, VIII-1/4-1916. Tucson, 1 ♂, IX-1-1929 (E. D. Ball, USNM), 1 ♂, VIII-27-1938 (D. J. and J. N. Knull, OSU). Santa Catalina Mountains: Bear Canyon, 5800 feet, 1 ♂, IX-16-1964, *Platanus wrightii* (L. B. O'Brien). Mile 5 Hitchcock Highway, 4200 feet, 2 ♀, VIII-11-1961 (Nutting, Werner, UA). Mile 17 Hitchcock Highway, 1 ♀, IX-16-1964 (C. W. O'Brien). Molino Basin, 5 ♂, 26 ♀, IX-16-1964, 1 ♂, IX-3-1965, 1 ♀, IX-4-1965, all blacklight trap (L. B. and C. W. O'Brien). Sabino Canyon, 1 ♂, VII-29-1937 (E. D. Ball, USNM); 1 ♀, IX-15-1964 (L. B. O'Brien). Tucson, 1 ♂, 9-1-1929 (E. D. Ball, USNM). Pima County, 1 ♂, VII-27-1927 (P. A. Readio, KU).

Santa Cruz County: Madera Canyon, Bog Springs Camp, 3 ♂, 2 ♀, IX-13-1964, blacklight (C. W. and L. B. O'Brien). Patagonia, 1 ♂, VII-1936 (E. S. Ross, CAS). 2 miles south Patagonia, 1 ♂, IX-10-1965 (L. B. and C. W. O'Brien). Sycamore Canyon near Ruby, 4 ♀, VIII-16-1961, UV trap (F. Werner, UA). Tumacacori Mts., 1 ♀, VIII-1-1962 (D. J. and J. N. Knull, OSU). White Rock Camp, Pena Blanca Lake, 3 ♂, 2 ♀, IX-14-1964, blacklight (C. W. and L. B. O'Brien).

Pima or Santa Cruz counties: Santa Cruz River, 1 ♀, VIII-15-1937 (E. D. Ball, USNM). Santa Rita Mountains: Madera Canyon, 1 ♂, VII-11-1959, blacklight trap (Radford, Werner, Patterson, Samuelson, UA); 4880 feet, 1 ♀, VIII-28-1963, 1 ♀, IX-25-1963 (V. L. Vesterby, UCD). Santa Rita Mts., 2 ♂, VII-24-1929 (R. H. Beamer, KU); 2 ♂, 1 ♀, VIII-11-1936, 3 ♀, VIII-30-1938 (D. J. and J. N. Knull, OSU).

CALIFORNIA. San Diego County: Escondido, 1 ♀, VII-15-1941 (E. L. Todd, KU). Guatay, 1 ♂, VII-21-1941 (E. L. Todd, KU).

Juniperia, new genus

(Type-species: *Catonia succinea* Van Duzee, present designation)

1. Frons $1\frac{1}{2}$ to 2 times as long as broad, raised at base in a broad callus that unites with lateral and median carinae to form an arch above each shallowly hollowed half of disc. Broad area at base usually at least twice width of lateral ocellus.

2. Rostrum long, reaching apex of hind coxae.
3. Pronotum medially longer than tegulae, with one lateral marginal carina between tegula and eye in *J. producta*, carina indistinct or absent in other species.
4. Tegmen with (a) Sc+R fork variable, between level of union of claval veins and stigmal cell, Cu₁ fork between level of union of claval veins and apex of clavus. (b) Subcostal cell longer than $\frac{1}{3}$ length of tegmen in *J. indella* and *J. unimaculata*, shorter in *J. producta*, *J. succinea*, and *J. majuscula*; not widest apically.
5. Hind wing usually with R single, M two-branched, and Cu₁ two-branched.
6. Hind tibia without spine in basal half.
7. Male pygofer with medioventral lobe absent or vestigial.
8. (a) Strut of aedeagal appendage not Y-shaped but sinuate, attached to venter of phallobase. (b) Phallobase with lateral lobes dorsoventrally expanded with curved flange at base; ventral lobes reduced to membrane joining lateral lobes; dorsal lobes absent.

In *Juniperia* the shape of the vertex, often considered a generic character, is quite variable. The areolets of the lateroapical angle of the head are present only as depressions adjoining parts of the anterior margin and are completely absent in *J. producta*. The tegmina are transparent and often have a spurious cross vein between the postcubitus and the claval suture. The wings are clear, tinged with brown in *majuscula*, with brown veins. The shape of the phallobase has remained nearly constant during speciation and differs only in nuances of curvature. Only one species is figured (fig. 127). Variation also occurs in the pronotal carinae, tegminal venation, and color pattern. *J. succinea* and *producta* have the Sc+R fork distad of the Cu₁ fork; *indella* and *unimaculata* have them about equal, distad of the claval union, and specimens of *majuscula* have the Sc+R fork just distad of the Cu₁ fork, near the union of the claval veins. Two species, *producta* and *indella*, show differences in coastal and Sierran populations.

This generic name is modified from the Latin adjective *junipereus*, meaning pertaining to juniper, and is feminine in gender.

Species included in *Juniperia*:

- indella* (Ball), new combination
- majuscula* (Van Duzee), new combination
- producta* (Van Duzee), new combination
- succinea* (Van Duzee), new combination
- unimaculata*, new species

KEY TO THE SPECIES OF JUNIPERIA

1. Vertex longer than broad *producta* (Van Duzee)
Vertex broader than long 2
2. Vertex as long as pronotum at midline, Arizona *majuscula* (Van Duzee)
Vertex longer than pronotum at midline, California and Nevada 3
3. Tegmina with Sc+R forking distad of level of Cu₁ fork, near level of apex of clavus
succinea (Van Duzee)
- Tegmina with Sc+R and Cu₁ forking near same level, near union of claval veins 4
4. Tegmina with a single white area at union of claval veins, otherwise pale yellowish brown;
small species, 3.8 to 4.8 mm *unimaculata*, n. sp.
Tegmina patterned, not as above; larger species, 4.6 to 6.7 mm *indella* (Ball)

Juniperia producta (Van Duzee), new combination

(Figs. 36, 45, 46, 87)

Catonia producta Van Duzee, 1915, J. Ent. Zool., 7:120; Metcalf, 1948:34.

Length.—5.0 to 6.5 mm. Frons approximately twice as long as broad, measured along midline to line joining outer ends of frontoclypeal suture; $\frac{1}{2}$ as wide as base as at apex; lateral compartments V-shaped in cross section; frontoclypeal suture obscure medially, strongly oblique laterally. Lateral areolets of head absent (see populational differences). Clypeus half as long as frons. Vertex subtriangular, emarginate at base, lateral margins convex; $1\frac{1}{4}$ times as long as broad, extending before eyes for less than half its length; median carina present in basal $\frac{2}{3}$ to $\frac{3}{4}$; lateral margins foliate.

Pronotum with lateral carinae of disc slightly divergent; maximum separation less than width of vertex; lateral areolets indistinct. Subcostal cell $\frac{1}{4}$ length of tegmina, constricted medially as Sc and R almost touch at widest point of stigmal cell; usually one spurious cross vein (0 to 3) between postcubitus and claval suture (not usually three, as stated by Ball); stigmal cell broad, less than $2\frac{1}{2}$ times as long as broad.

Color.—Frons and clypeus pale yellow; vertex medium brown; genae pale yellow, sides of head above eyes medium brown. Disc of pronotum medium brown, lateral fields yellowish. Mesonotum reddish brown; tegulae yellowish. In well-marked specimens, tegmina pale brown with medium brown saddle between postcubital veins; stigmal cell yellowish, its veins white, with a pale triangle from it to apex of clavus and another pale triangle basally on costal margin; postcubital vein and an adjoining lateral band on clavus pale. Veins of tegmina not mottled, concolorous, but postcubitus and cross veins white.

Legs and sternum medium brown, but coxae, trochanters and femora dark brown; abdomen dark, medium, or pale brown, pygofer often slightly darker. Populational differences: The population of *producta* found in southern California and the Sierra Nevada is longer (5.3 to 7.5 mm), paler and has lateral areolets with more elevated margins; the stigmal cell sometimes narrower and hence the subcostal cell not so narrowed, Sc and R are not nearly touching, the area between the postcubitus and the claval suture is white and the distal $\frac{3}{4}$ of the stigmal cell brown; the pale area before the stigmal cell is longer and less triangular, and does not reach the costal cell. Two specimens from four miles west of Mineral share characters of both populations. With so few specimens, with host plant and climatic differences, and with no other such population differences known in the tribe except a paler color and a narrower stigmal cell in *J. indella* (q.v.), I shall not attempt here to evaluate the taxonomic significance of such differences.

Comparative notes.—This species may be separated from all others in the United States by its long vertex (at least as long as wide) with foliate lateral margins, long frons, twice as long as wide, and long pronotum. With its reddish brown mesonotum and the pale and dark browns of the tegmina, it appears patterned in three shades of brown.

Type designation.—"Described from two female examples taken about the base of redwood trees in Muir Woods, Marin County, Calif., September 5, 1914." I validate by publication Van Duzee's selection of No. 2213 as lectotype.

Type repository.—California Academy of Sciences.

Host records.—About the base of redwood trees, from *Juniperus*, *Juniperus californica*, *Libocedrus decurrens*, cedar, in cheesecloth trap, and ex Frick trap in cherry.

Geographic distribution.—Coast range of California, southern mountains, and the Sierra.

Specimens examined.—CALIFORNIA. Alameda County: Strawberry Canyon, 1 ♂, VII-2-1962 (L. B. O'Brien).

Contra Costa County: Mt. Diablo, 1 ♂, V-29-1936 (A. R. Mead, SJS); 1 ♂, V-29-1930 (M. A. Embury, CIS); 1 ♀, VII-21-1935 (R. H. Beamer, KU); 3 ♂, 1 ♀, VII-14-1966 (E. P. Van Duzee, CAS); 2000 feet, 1 ♀, VI-19-1952, ex *Juniperus* (F. X. Williams, CAS). 2 miles south-west Moraga, 1 ♂, VII-24-1965 (L. B. and C. W. O'Brien).

Del Norte County: Siskiyou N. F., 3 ♂, 1 ♀, VII-14-1935 (R. H. Beamer, KU).

Humboldt County: Bair's Ranch, 1 ♂, VI-12 [sic] (H. S. Barber, USNM).

Lake County: Lucerne, 1800 feet, 1 with abdomen missing, 9 ♂, 6 ♀ VI-28-1966, *Juniperus californica* (L. and C. W. O'Brien).

Marin County: 1-2 miles east highway at Bolinas Junction, 1 ♀, VIII-30-1965 (L. B. O'Brien). Cypress Ridge, 1 with abdomen missing, IX-21-1930 (E. P. Van Duzee, CAS). Mill Valley, 1 ♀, VII-11-1950, caught in cheesecloth trap (H. B. Leech, CAS). Mt. Tamalpais, 1 ♂, VI-23-1918 (E. P. Van Duzee, CAS). Taylorville, 1 ♀, VIII-11-1937 (H. G. Barber, USNM).

Napa County: Mt. St. Helena, 2 ♂, 4 ♀, VI-19-1941 (D. J. and J. N. Knull, OSU).

San Joaquin County: Tracy, 1 ♂, VII-1937 (E. S. Ross, CAS).

Siskiyou County: Dunsmuir, 1 ♂, VIII-13-1912 (E. D. Ball, USNM); 2 ♀, summer, 1963, ex Frick trap in cherry (CDA).

Sierra and Southern population. Fresno County: South Fork Kings River, 1 ♂, VII-8-1910 (E. C. Van Dyke, CAS).

Los Angeles County: Glendora, 1 ♀, VII-2-1950 (A. T. McClay, UCD). Mt. San Antonio, 5000 feet, 1 ♂, 1 ♀, VIII-22-1920, *Libocedrus decurrens* (Timberlake, PT).

Mariposa County: Nevada Falls, Yosemite National Park, 1 ♂, VII-29-1946 (R. L. Usinger).

Riverside County: Keen Camp, 1 ♂, VI-6-12-1917, cedar (E. P. Van Duzee, CAS).

San Bernardino County: San Bernardino Mountains, 1 ♀, VII-14-1948 (R. A. Flock, RF). Mill Creek Canyon, 6500 feet, 1 ♀, VII-24-1966, *Libocedrus decurrens* (Timberlake, PT). Mill Creek Canyon, San Bernardino Mts., 1 ♂, IX-24-1923, 1 ♀, IX-25-1923 (E. P. Van Duzee, CAS).

Tehama County: 4 miles west Mineral, 1 ♂, 1 ♀, VI-27-1966, *Libocedrus decurrens* (L. B. and C. W. O'Brien).

Juniperia succinea (Van Duzee), new combination

(Figs. 37, 88; frontispiece, h)

Catonia succinea Van Duzee, 1916, Univ. California Publ. Ent. Tech. Bull., 1:247; Metcalf, 1948:35.

Length.—4.8 to 6.2 mm. Frons approximately $1\frac{2}{3}$ times as long as broad, measured along midline to hypothetical line joining outer ends of frontoclypeal suture; frontoclypeal suture obscure medially, laterally oblique. Lateral areolets more or less indistinct. Clypeus about $\frac{2}{3}$ as long as frons. Vertex chevron-shaped, $\frac{4}{5}$ as long as wide, extending before eyes about $\frac{1}{4}$ its length; disc slightly concave.

Pronotum with lateral carinae of disc slightly divergent, maximum separation slightly wider than vertex. Lateral areolets sometimes indistinct.

Tegmina with Sc+R forking distad of Cu₁ fork, about level with apex of clavus; stigmal cell oval, almost three times as long as broad.

Color.—Amber, mesonotum slightly darker, lower surface of body usually paler. Tegmina occasionally with cross veins white.

Comparative notes.—*J. succinea* may be separated from the other species by its tegmina with Sc+R forking distad of the Cu₁ fork, a little before the level of the apex of the clavus, and by the shape of the vertex (fig. 88). Some specimens of *J. indella* are as uniformly colored as *J. succinea*, but they differ in the position of Sc+R fork, in the shape of the vertex, which is more rounded and more deeply concave, in the shape of the frons, which is broader, and in the color of the lower surface of the body, which is usually darker than the clypeus, whereas in *J. succinea* it is usually paler.

Type designation.—"Described from 12 examples, representing both sexes, taken about the upper end of Fallen Leaf Lake and along Glen Alpine Creek during July. Most of these I beat from cypress bushes [sic, either *Juniperus* or *Libocedrus*] and that probably is the native food-plant of the species." I validate by publication Van Duzee's selection of lectotype, male (No. 3358) and allotype (No. 3359) both from Glen Alpine Creek.

Type repository.—California Academy of Sciences.

Host records.—*Libocedrus decurrens*, *Juniperus* sp., Sargent's cypress, *Juniperus californica*.

Geographic distribution.—Northern coast range, southern Cascades and Sierra. One specimen labeled Valley, Nebraska, VII-17-1941 (D. J. and J. N. Knull, OSU) extends the range out of California.

Specimens examined.—CALIFORNIA. Del Norte County: Siskiyou National Forest, 2 with abdomen missing, 7 ♂, 13 ♀, VII-14-1935 (R. H. Beamer, KU).

El Dorado County: Angora Peak, Tahoe, "cotype," 1 ♂, VII-18-1916 (E. C. Van Dyke, CIS). Chile Bar, 2 ♂, 2 ♀, VII-5-1948 (R. C. Bynum, CIS); 1 ♂ (K. W. Tucker, CIS). Fallen Leaf Lake, 2 ♂, VII-1931 (O. H. Swezey, CAS). Glen Alpine Creek, Tahoe, 3 ♂, 3 ♀, "cotypes" [paratypes], VII-22-1917 (E. P. Van Duzee, CAS).

Napa County: Mount St. Helena, 8 ♂, 2 ♀, VI-19-1941 (D. J. and J. N. Knull, OSU, USNM). Pope Valley, 1 ♂, V-12-1966, on Sargent's cypress (Jim Cope, O'B).

Plumas County: Quincy, 1 ♂, 1 ♀, VI-25-1948 (D. J. and J. N. Knull, OSU).

Shasta County: Brown Butte, 1 ♀, VII-7-1947, *Juniperus* sp. (R. L. Usinger, CIS).

Tehama County: 4 miles west Mineral, 17 ♂, 4 ♀, VI-27-1966, *Libocedrus decurrens* (L. and C. W. O'Brien).

Tulare County: 9 miles south Fairview, 1 ♂, IV-30-1964 (P. Rude, CIS).

Tuolumne County: Oakland Recreation Camp, 1 ♀, VII-20-1928 (CIS).

Juniperia majuscula (Van Duzee), new combination

(Figs. 38, 89)

Catonia majusculus [sic] Van Duzee, 1912, Bull. Buffalo Soc. Nat. Sci., 10:492.

Catonia majuscula, Van Duzee, 1916:79; Metcalf, 1948:32.

Length.—5.8 to 7.0 mm. Frons approximately $1\frac{1}{2}$ times as long as broad, measured from basal carina medially to line joining outer ends of frontoclypeal suture. Frontoclypeal suture obsolete medially, laterally oblique. Clypeus about $\frac{2}{3}$ as long as frons. Vertex chevron-shaped, $\frac{3}{5}$ as long medially as wide, scarcely extending before eyes; disc slightly concave; median and lateral carinae scarcely elevated.

Pronotum with median carina present, lateral carinae obscure or absent. Tegmina with Sc+R forking just distad of Cu, fork, near union of claval veins, subcostal cell about $\frac{2}{3}$ length of wing; usually one spurious cross vein between postcubitus and claval suture in basal third of clavus; stigmal cell oval, about $2\frac{1}{2}$ times as long as broad.

Color.—Pale yellowish brown; mesonotum (except apical margin), markings on wings, and sometimes spots on tegulae darker. Tegulae pale throughout or brown with basal and lateral margins pale. Veins of tegmina usually dark, with cross veins white, and a series of pale veins followed by dark longitudinal areas along mesonotum, at union of claval veins, basad of apex of clavus, basad and distad of Cu fork, and on M at corresponding level. Proximal half of stigma pale, distal half dark; a dark cloud at apex of each apical cell. Lower surface of body pale brown but sternal portions of metapleuron and metasternum dark brown; base of coxae and fore- and mid-tarsi, pygofer, and claspers sometimes brownish.

Comparative notes.—*J. majuscula* may be separated from other species by the pronotum and vertex being equal in median length. It is the largest *Juniperia* and is the only species of the genus from Arizona.

Type designation.—"Described from one male and two female examples taken in the Huachuca Mts., Arizona, on July 28th and 29th, by Mr. H. G. Barber." I designate as lectotype the specimen labeled by Van Duzee "Holotype majuscula," No. 2216.

Type repository.—California Academy of Sciences.

Host records.—Juniper, *Juniperus deppeana*.

Geographic distribution.—At present known from three mountain ranges in southeastern Arizona and a single female labeled Palomar, San Diego Co., California, VIII-5-1928, Brake, C. C. Searle (SD).

Specimens examined.—ARIZONA. Cochise County: Chiricahua Mountains, 1 ♀, VII-8-1932 (R. H. Beamer, KU); 1 ♀, VII-8-1961, 1 ♂, VII-20-1955, 1 ♂, 2 ♀, VIII-28-1940, 1 ♂, IX-4-1962, 2 ♂, IX-14-1938 (all D. J. and J. N. Knull, OSU); 1 ♂, VII-26-1935 (E. D. Ball, USNM). Chiricahua Mountains, 5-6000 feet, Paradise, 1 ♂, VIII-22-1927 (J. A. Kusche, CAS). Huachuca Mountains, 1 ♂, 1 ♀, paratypes (one labeled cotype, the other, type), VII-29-1905 (USNM); 1 ♀, VII-20-1933, 2 ♂, *Juniper*, 2 ♂, 2 ♀, VIII-2-1931 (E. D. Ball, USNM); 1 ♂, 1 ♀, VII-20-1936, 1 ♂, VIII-7-1953, 1 ♀, VIII-10-1953, 1 ♀, VIII-18-1936 (D. J. and J. N.

Knull, OSU); 1 ♀, VIII-22-1935 (R. H. Beamer, KU). Carr Canyon, Huachuca Mountains, 7200 feet, 5 ♂, 7 ♀, on three trees of *Juniperus deppeana* (C. W. O'Brien). Mirador, Huachuca Mountains, 1 ♀, X-30-1937 (Oman, USNM).

Pima County: Tucson, 2 ♂, IX-29-1929 (E. D. Ball, USNM) [probably Santa Rita Mountains, for Ball (1933) collected *C. arbutina* and *X. brunellus* there Sept. 29, 1929, and labeled them Tucson].

Santa Cruz County: Santa Rita Mountains, 2 ♂, VII-13-1930, 1 ♀, IX-5-1933, 1 ♀, IX-9-1931, 2 ♂, 2 ♀, Juniper, IX-13-1931 (E. D. Ball, USNM); 1 ♂, VII-1-1936 (R. A. Flock, RF); 1 ♀, VII-11-1949 (D. J. and J. N. Knull, OSU); 1 ♀, VII-17-1932, 2 ♀, VIII-18-1935 (R. H. Beamer, KU). Madera Canyon, 5500 feet, 1 ♀, IX-3-1964 (C. D. Johnson, O'B). I place these in Santa Cruz County, for the higher mountains are there, although the approach and lower mountains are in Pima County.

Indeterminate: Yarnell Heights, 1 ♂, 1 ♀, VIII-10-1929, 1 ♂, 1 ♀, VIII-20-1929, 1 ♀ VIII-27-1935.

Juniperia indella (Ball), new combination

(Figs. 39, 90, 154)

Catonia indella Ball, 1933, Pan-Pacific Ent., 9:136-7; Metcalf, 1948:31.

Length.—4.6 to 6 mm. Frons approximately $1\frac{1}{2}$ times as long medially as broad, measured to line joining outer ends of frontoclypeal suture. Frontoclypeal suture obscure medially, oblique laterally. Clypeus about $\frac{2}{3}$ as long as frons along median line. Vertex $\frac{4}{5}$ as long as broad, extending before eyes either less than $\frac{1}{4}$ its length or not at all, compartments of disc concave, lateral carinae slightly foliate, raised above height of median carina.

Pronotum with lateral carinae of disc subparallel, maximum separation less than width of vertex. Lateral areolets distinct or obscure.

Tegmina with Sc+R forking at level of Cu_1 fork, near union of claval veins; usually two spurious cross veins between postcubitus and claval suture; stigmal cell 3 times as long as broad.

Color.—Extremely variable, from unpatterned amber like *succinea* through paler versions of pattern to be described to aberrant pattern described in discussion. Frons milky or yellowish, sometimes with pale brown starting at antennal level and deepening on clypeus, clypeus brown only at apex, dark on sides; vertex and thorax dark with carinae, tegulae, sides of pronotum above tegulae, and apex of vertex pale, except for a dark round spot in each lateral areolet of head and another at middle of each lateral carina of vertex. Tegmina transparent, with basal margin, commissure, and two irregular bands directed obliquely toward costa, dark, with milky spots along midline at base, at union of claval veins, and at claval apex; cross veins white; tips of apical cells with dark half moons; proximal third of stigmal cell pale, distal two-thirds dark; tegmina distad of stigmal cell suffused with brown.

Lower surface of body dark; legs near joints and tarsal segments apically pale. Female genitalia and sometimes abdominal sternites in lateral thirds and at posterior margins, pale.

Geographic variation.—Specimens from San Benito and Mariposa counties, two of the most northern counties of its range, are more darkly pigmented than most of the other specimens. Those from Mono County on the east side of the Sierra are pale brown, matching the color of the *Juniperus occidentalis* bark very well. The specimens from the south and from the east side of the Sierra also have longer narrower stigmal cells and were slightly longer. Six specimens collected in Mono County in 1966 and 23 from earlier years (all marked with an asterisk in the specimens examined section) have many transverse incomplete cross veins rather than just a few and pale tegmina with dark banding along the mesonotum and commissure to the claval apex, with two dark irregular diagonal bands directed distad from the union of the claval veins and the claval apex, and the apical area of the tegmina mottled with dark. These specimens are very distinct in color pattern, but I discovered no structural characters to lead me to believe them specifically distinct.

Comparative notes.—*J. indella* shows very broad variation in color pattern from concolorous amber to darkly marked specimens. It may be separated most easily from *J. succinea* by the position of the fork of Sc+R which is near the level of the claval apex in *succinea* but nearer to the union of the claval veins in *indella*. In *succinea* the vertex is angulate anterolaterally,

whereas in *indella* it is rounded; moreover in *succinea* the frons is $1\frac{1}{2}$ as long as broad, as compared with $1\frac{1}{2}$. *J. indella* may be separated from *unimaculata* by color pattern and size.

Type designation.—"Holotype, female, taken in mountains above San Louis [sic] Obispo, Calif., June 22, 1931, by the writer."

Type repository.—United States National Museum.

Host records.—*Salix* sp., *Juniperus californica*, *Baccharis* sp., *Libocedrus decurrens*, *Arctostaphylos tomentosa*, and *Juniperus occidentalis*. In Panoche Pass, where *J. indella* was found on *Juniperus californica*, I checked *Salix* as well. No specimens of *indella* were found on *Salix*, but there were many ants, and they may discourage *Juniperia*. In May, both *J. indella* and *J. unimaculata* were found on the same trees in the Pass area. Two trees of *Juniperus occidentalis*, one forty feet tall, one about six, were found along the old Sherwin Grade, Mono County, California. More than 100 specimens were taken in a few moments on the larger tree on July 7 and more than 45 on the next day; 6 specimens were taken from the smaller tree, some two miles away. No other Cupressaceae were seen from the road. The large population leads me to believe *Juniperus occidentalis* is indeed the host in this area, and probably *J. californica* is host in the Coast Range. Numerous trees of *Juniperus osteosperma* were swept in the White Mountains, about 20 miles away, but no specimens were collected. Despite Van Duzee's label reading Bishop, Inyo County, Sherwin Grade, I believe that we were collecting in the same locality, as the county line is just a short distance away.

Karyotype.—Only sperm were present in males collected IV-16-1966 at Panoche Pass. Each testis contains three testicular tubules.

Geographic distribution.—*J. indella* has been found in California and Nevada in the foothills, eastern and western, of the Sierra, the transverse range, and the Coast Range as far north as Santa Cruz County.

Specimens examined.—CALIFORNIA. Fresno County: Huntington Lake, 8000 feet, 8 ♂, 10 ♀, VII-11-1919 (E. P. Van Duzee, CAS).

Inyo County: Bishop, 8 ♂*, 4 ♀*, 6 ♂, VI-22-1929; Bishop, Sherwin Grade, 5 ♂*, 4 ♀*, 6 ♂, VI-22-1929 (E. P. Van Duzee, CAS) [possibly Mono County, see comment in host records]. Panamint City, Panamint Mountains, 1 ♀, IV-24-1951 (G. I. Stage, CIS).

Los Angeles County: Camp Baldy, 3 ♂, VI-26-1950 (W. C. Bentinck, CIS). Los Angeles County, 1 ♀, June (Coquillett, USNM). Mint Canyon, 1 ♀, VI-7-1935 (Oman, USNM). San Gabriel Cañon, 1 ♀, VII-15-1947 (R. A. Flock, RF).

Mariposa County: 7 miles east Briceburg, 1 ♂, 2 ♀, IV-31-1963, on *Salix* sp. (R. P. Allen, CDA).

Mono County: 3 miles north Bridgeport, 1 ♂, VII-9-1934 (E. P. Van Duzee, CAS). 5.7 miles southwest Tom's Place, 6400 feet, Old Sherwin Grade, 2 ♂*, 1 ♀*, 75 ♂, 28 ♀, VII-7-1966, 2 ♂*, 37 ♂, 8 ♀, VII-8-1966, *Juniperus occidentalis* (L. B. and C. W. O'Brien). 3 miles south Tom's Place, Highway 395, 1 ♂*, 4 ♂, 1 ♀, *Juniperus occidentalis* (C. W. and L. B. O'Brien).

Monterey County: Redwood Gulch near Salmon Creek, 2 ♂, VIII-7-1962 (E. I. Schlinger, R. v. d. Bosch, UCR).

San Benito County: 17 miles east Paicines, 1750 feet, 2 ♂, IV-16-1966, *Juniperus californica* (C. W. and L. B. O'Brien). Panoche Pass, 1900 feet, 5 ♂, 2 ♀, III-18-1966, *Juniperus californica* (C. W. and L. B. O'Brien); 1850 feet, 4 ♂, 12 ♀, IV-16-1966, *Juniperus californica* (L. B. O'Brien). Pinnacles National Monument, 1 ♀, IV-17-1964, (D. C. and K. A. Rentz, O'B); 1 ♀, V-6-1963 (R. L. Langston, CIS).

San Bernardino County: Baldwin Lake, 1 ♂, VI-5-1948, 1 ♂, VI-27-1941 (D. J. and J. N. Knull, OSU). Mill Creek, 6000 feet, 1 ♀, VII-28-1960, *Libocedrus decurrens* (Timberlake, PT).

Santa Cruz County: Davenport, 1 ♀, VIII-13-1938, *Arctostaphylos tomentosa* Pur. (R. H. Beamer, KU).

Stanislaus County: Adobe Creek, west Stanislaus County, 1 ♂, V-6-1948, *Baccharis* sp. (Ray F. Smith and J. W. MacSwain, CIS).

Tulare County: Sequoia National Park, Ash Mt. Road, 1 ♀, V-1-1955 (H. R. Moffitt, UCD).

Indeterminate: Yosemite Creek Ranger Station, 1 ♀, VII-21-1946 (R. L. Usinger, CIS).

NEVADA. Clear Creek Grade, Tahoe, 1 ♂, VI-27-1929 (E. P. Van Duzee, CAS). Dixie National Forest, 1 ♀, VII-1-1937 (D. J. and J. N. Knull, OSU). Esmeralda County: 1 ♀*, VI-23-1907 (F. W. Nunenmacher, NCU).

Junipera unimaculata, new species

(Figs. 40, 91, 127)

Length.—3.8 to 4.8 mm. Frons approximately $1\frac{1}{2}$ times as long as broad, measured medially from base to line joining outer ends of frontoclypeal suture; clypeal suture obscure medially, oblique laterally. Lateral areolets of head indistinct. Clypeus about $\frac{2}{3}$ as long as frons. Vertex $\frac{5}{8}$ as long medially as wide, extending before eyes about $\frac{1}{5}$ of its length, compartments of disc concave, lateral and median carinae subequally raised.

Pronotum with lateral carinae of disc straight, subparallel; maximum separation less than width of vertex; four or five lateral areolets on each side, sometimes obscure. Tegmina with Sc+R fork near level of union of claval veins; sometimes one spurious cross vein between postcubitus and claval suture in basal half of clavus; stigmal cell twice as long as broad.

Color.—Pale yellowish brown; vertex, pronotum, and mesonotum reddish brown; abdominal sternites brown; cross veins and an area at union of claval veins white. Pronotal carinae broadly pale; proximal third of stigmal cell, posterior margins of abdominal sternites and claspers, pale.

Comparative notes.—*Junipera unimaculata* may be separated from other species of *Junipera* by its small size, and the presence of a single white area across the commissure at the union of the claval veins. The lateral carinae of the vertex are less foliate than in *J. indella*, with which it shares the pattern of wing venation. The stigmal cell is only twice as long as broad, whereas it is at least $2\frac{1}{2}$ times as long as broad in the other species.

Type designation.—Holotype ♂, allotype, and 39 paratypes (19 ♂, 20 ♀) from *Juniperus californica*, 8 miles southwest Coalinga, Fresno County, California. Eleven other paratypes, 7 ♂, 4 ♀, same locality, IV-9-1966, and five (2 ♂, 3 ♀) from 12 miles southwest Coalinga, IV-16-1966, on *J. californica*.

Type repository.—California Academy of Sciences. Paratypes have been sent to the five museums in the United States that have large collections of Fulgoroidea and that loaned over 600 specimens each for study, namely, in alphabetical order, California Academy of Sciences, North Carolina State University at Raleigh, Ohio State University, University of Kansas, and the United States National Museum.

Host records.—*Juniperus californica*.

Geographic distribution.—Inner coast range in Fresno County, California. Other specimens examined include: Coalinga, Jacalitos Canyon, 1 ♂, III-18-1921 (E. P. Van Duzee, CIS). 17 miles east Paicines, 1750 feet, 1 ♂, IV-16-1966, *Juniperus californica* (L. B. O'Brien). Panoche Pass, 1850 feet, 17 ♂, IV-16-1966, *Juniperus californica* (C. W. and L. B. O'Brien).

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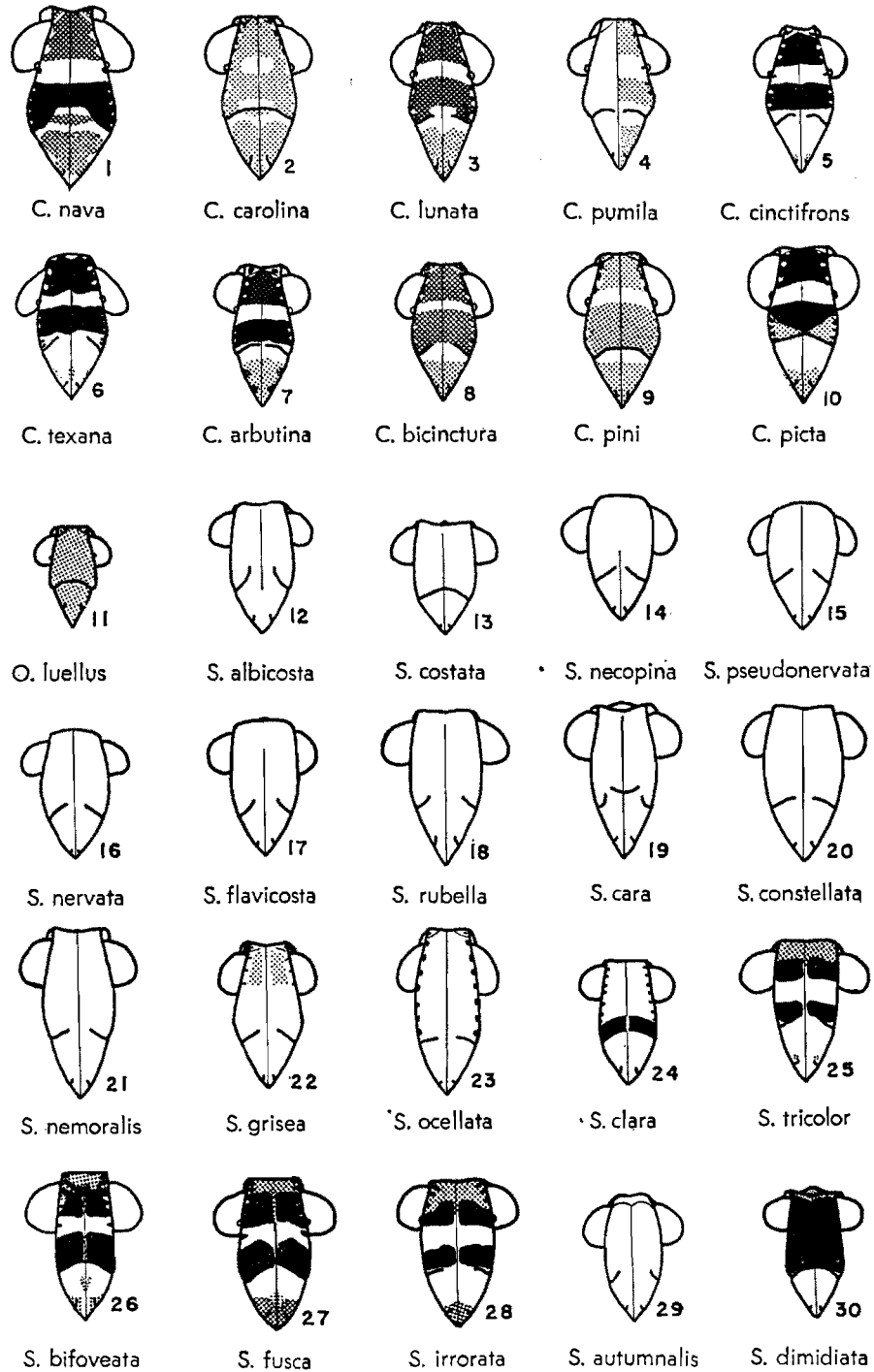
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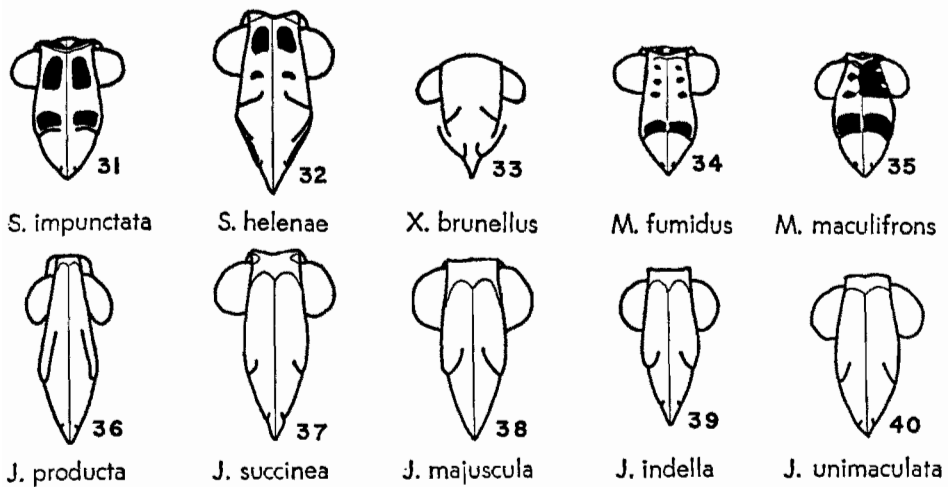
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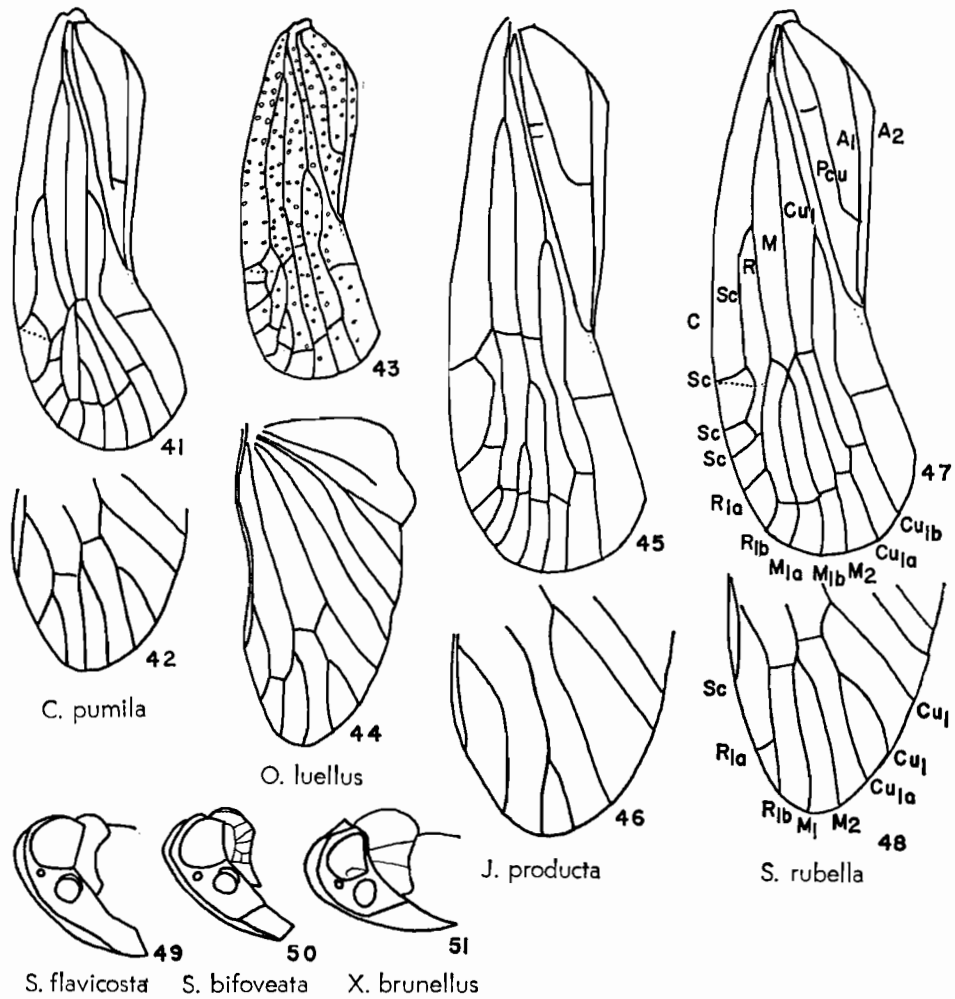
FIGURES



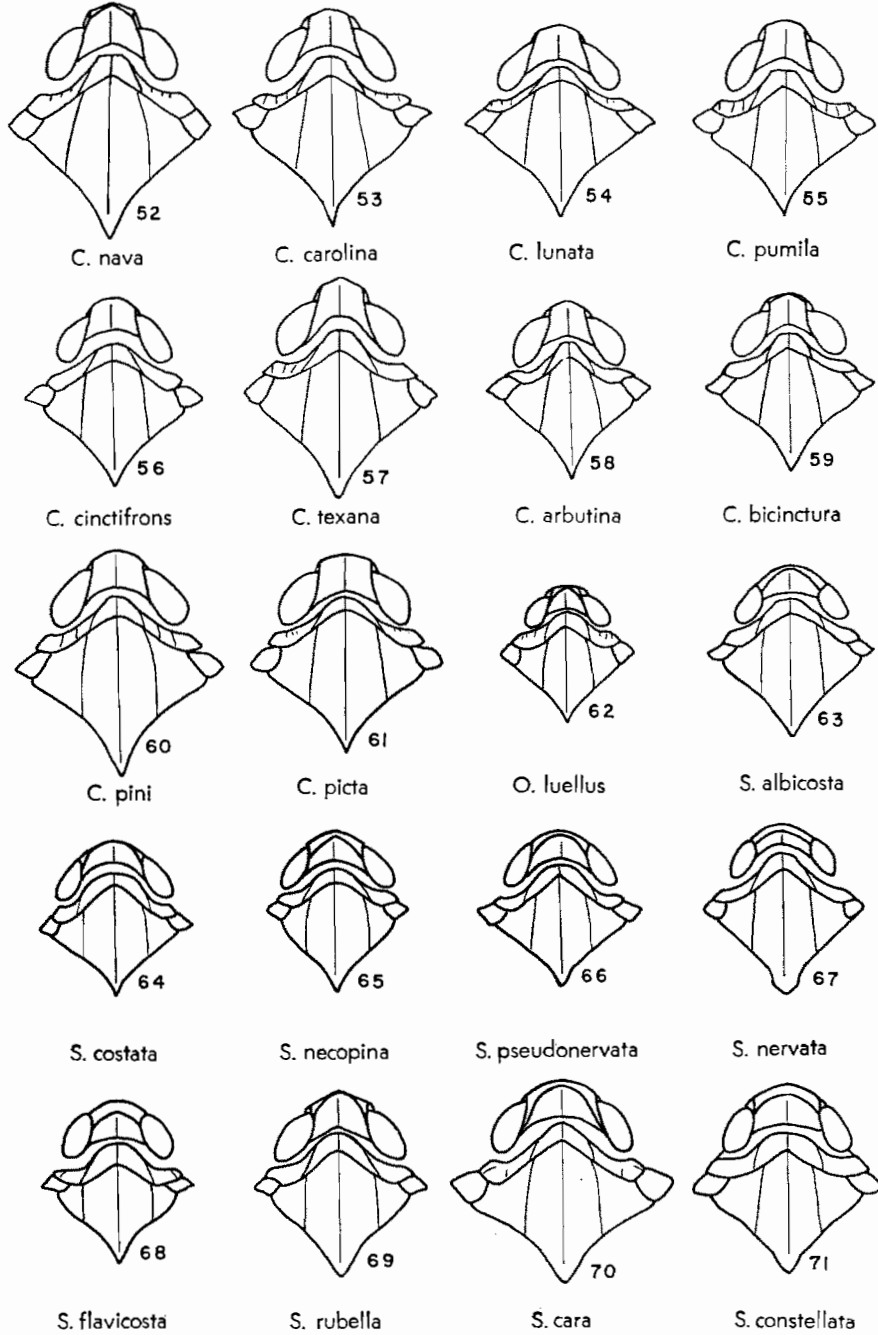
Figs. 1-30. Frontal aspect of head of species of *Catonia*, *Opsiphanon*, and *Synecdoche*, with figures 4 and 11 showing on right and left sides maximum and minimum color pattern.



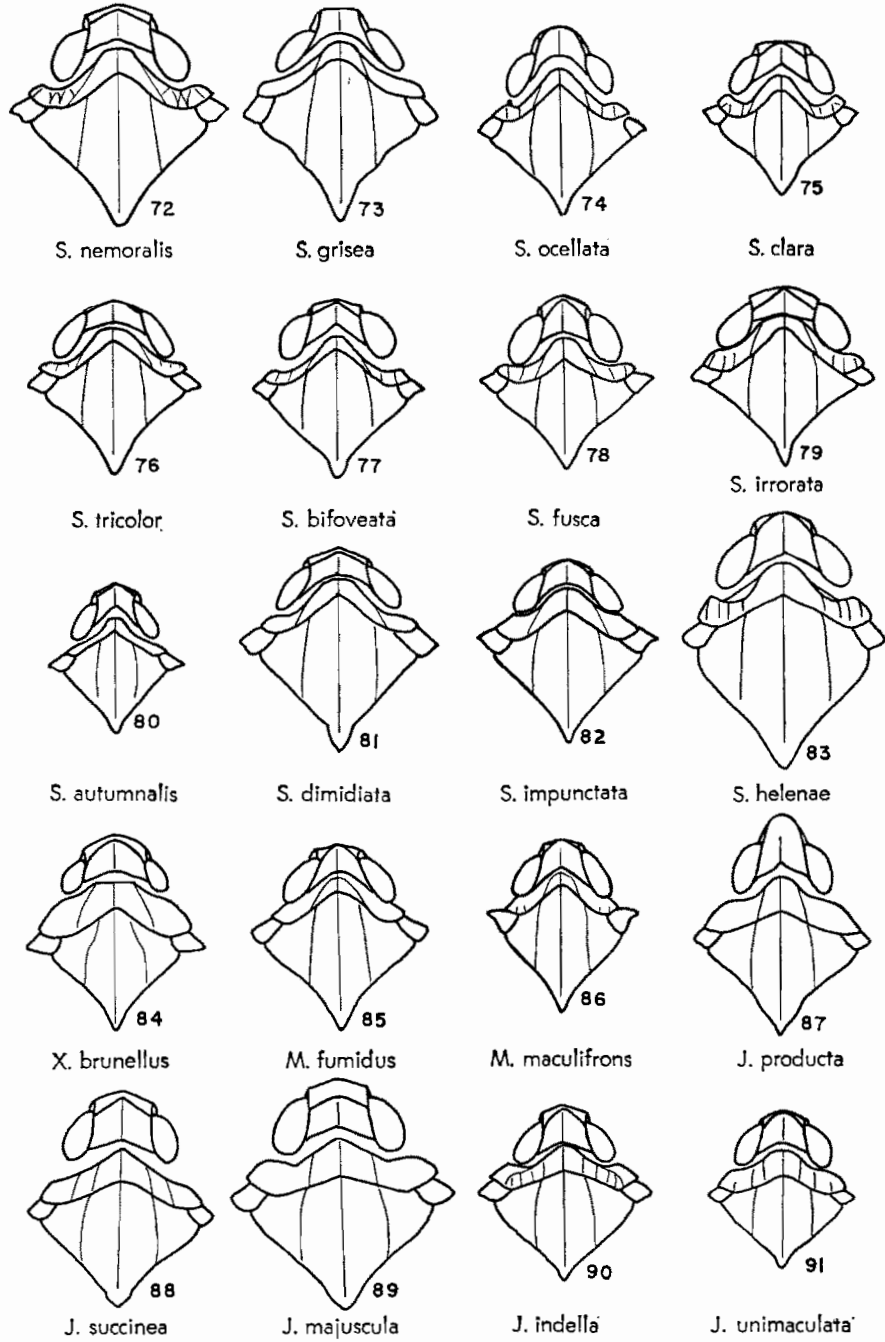
Figs. 31-40. Frontal aspect of head of species of *Synecdoche*, *Xerbus*, *Momar*, and *Juniperia*, with figure 35 showing on right and left side maximum and minimum color patterns.



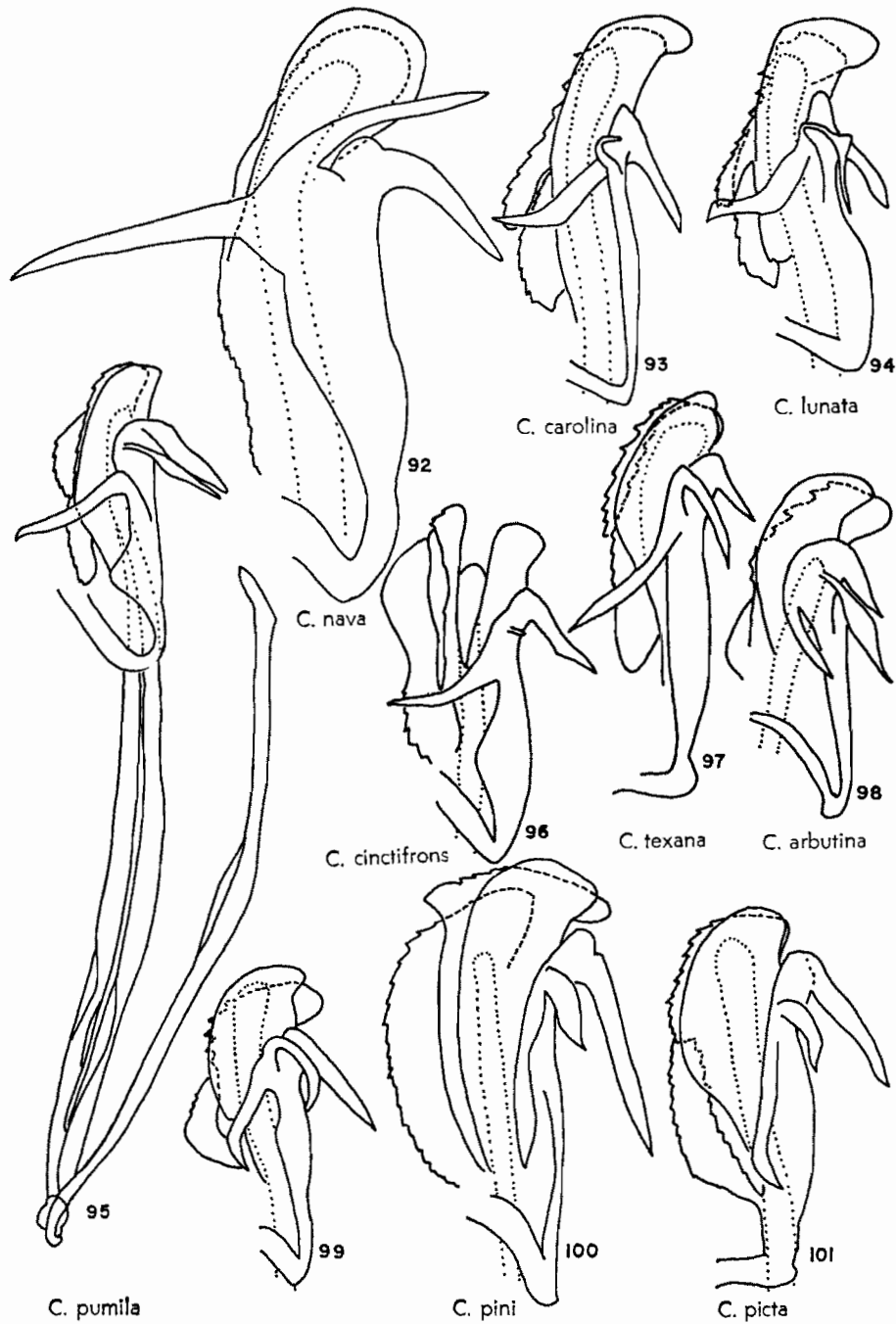
Figs. 41-51. Figs. 41, 43, 45, and 47: Tegmina of *Catonia pumila*, *Opsiphanon luellus*, *Juniperia producta*, and *Synecdoche rubella*. Figs. 42, 44, 46, and 48: Hind wings, or apex of hind wings of same species. Figs. 49, 50, and 51: Lateral aspect of head of *Synecdoche flavicosta*, *S. bifoveata*, and *Xerbus brunellus*.



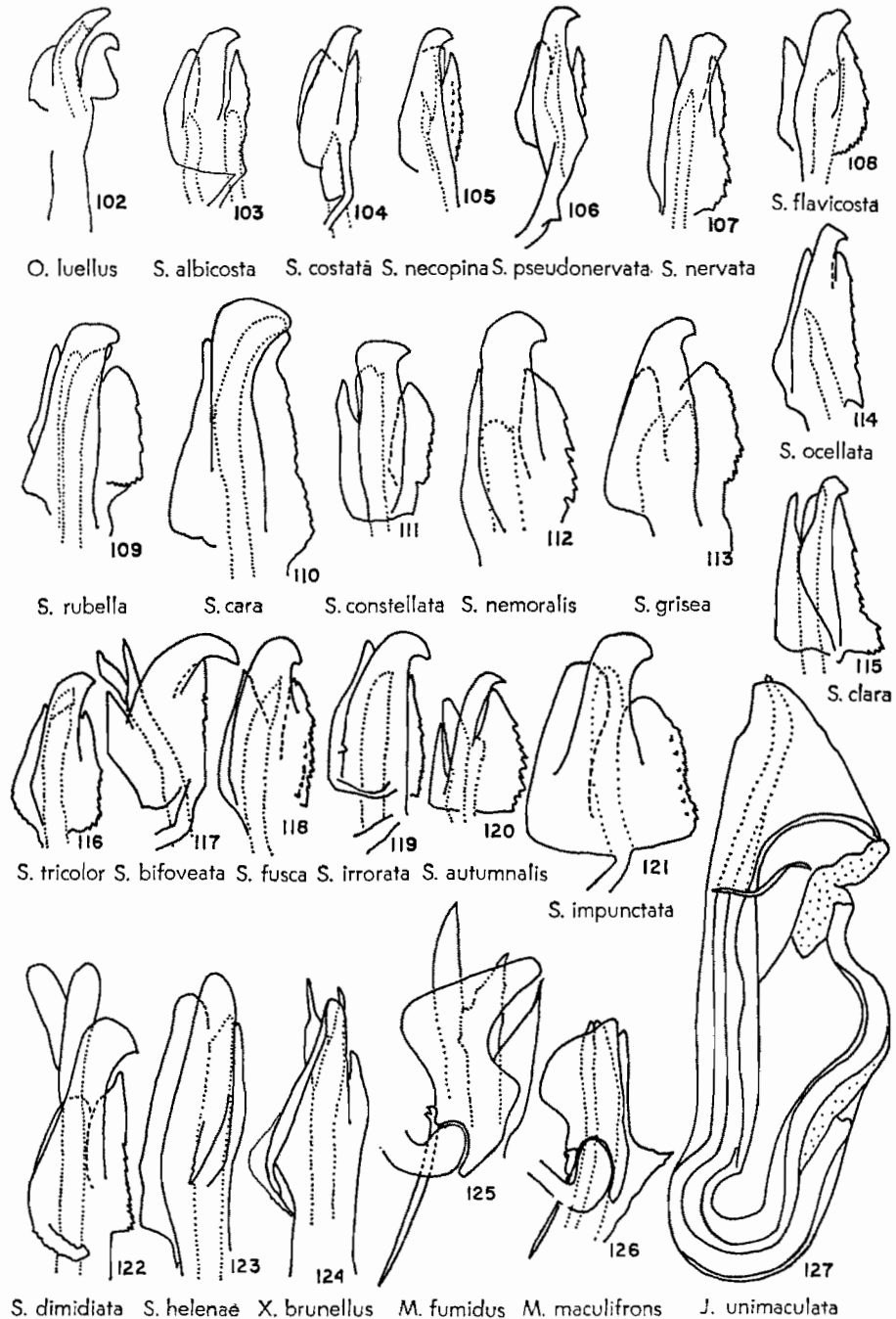
Figs. 52-71. Dorsal aspect of head and thorax of species of *Catonia*, *Opsiplanon*, and *Synecdoche*.



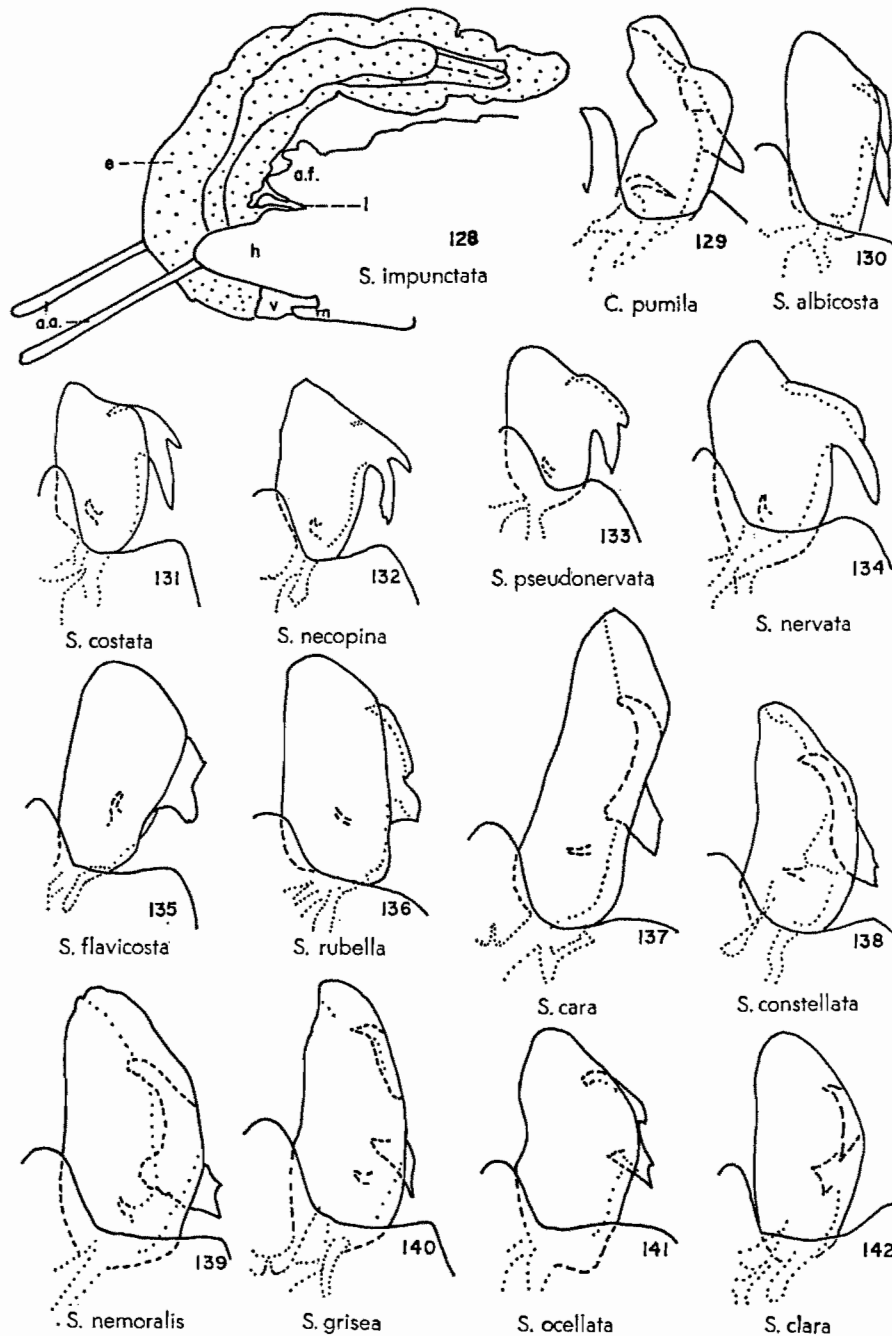
Figs. 72-91. Dorsal aspect of head and thorax of species of *Synecdoche*, *Xerbus*, *Momar*, and *Juniperia*.



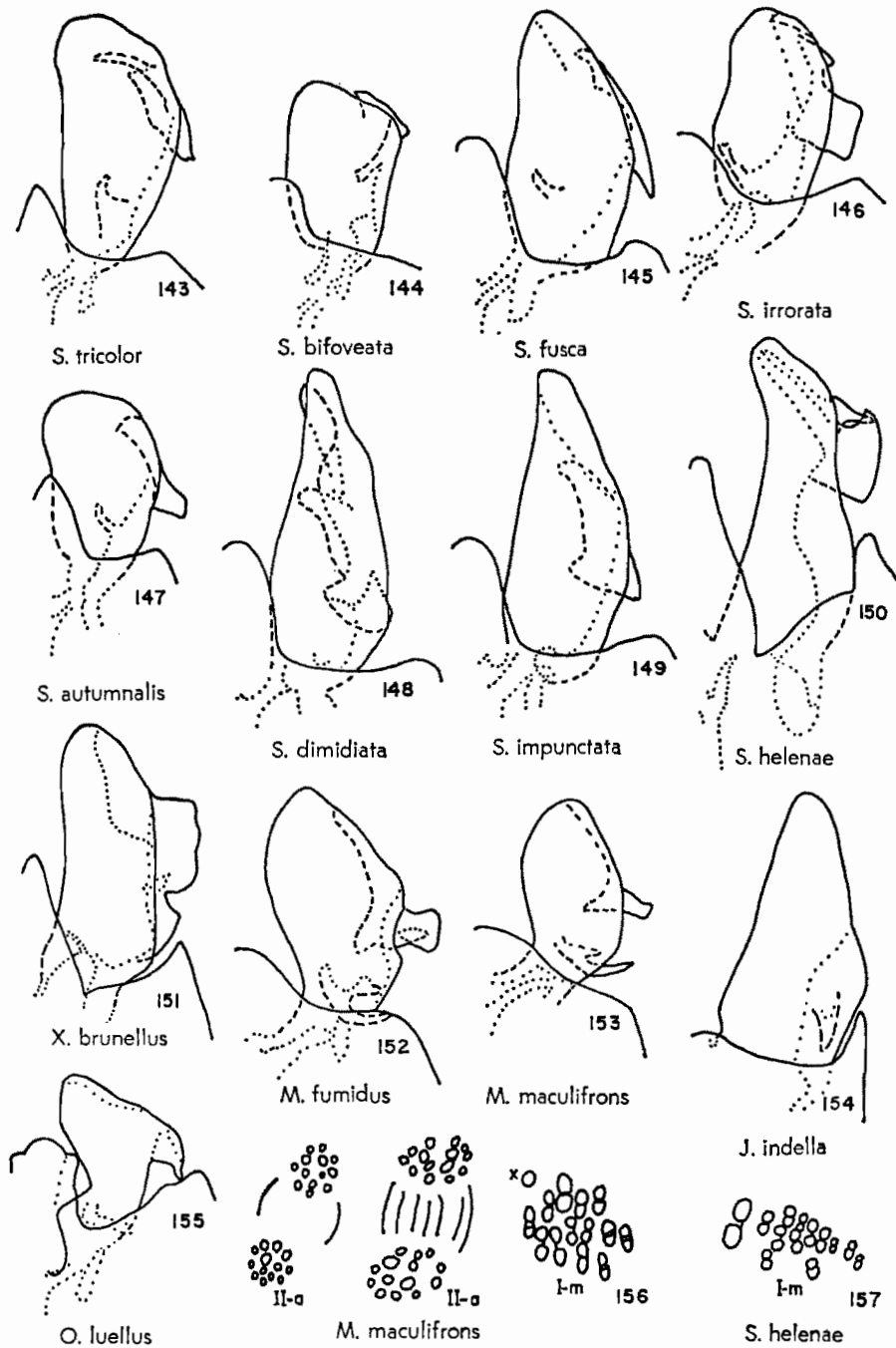
Figs. 92-101. Lateral aspect of left side of phallobase of species of *Catonia*. Figure 95 shows connection of aedeagal appendages and their strut. Aedeagal appendages are shown in dotted lines where they are inside phallobase, dorsal (left) and ventral lobe (right) shown by dashed lines when they are behind lateral lobe.



Figs. 102-127. Lateral aspect of left side of phallobase of species of *Opsiplanon*, *Synecdoche*, *Xerbus*, *Momar*, and *Juniperia*. Figure 127 shows connection of aedeagal appendages and their strut. Aedeagal appendages are shown in dotted lines where they are inside phallobase, dorsal (left) and ventral lobe (right) shown by dashed lines when they are behind lateral lobe.



Figs. 128-142. Fig. 128: Membranous endophallus of *S. impunctata* exerted; a.a. = aedeagal appendages; a.f. = anal flap; e = endophallus; h = clasper; l = lateral lobe of phallobase; m = medioventral lobe of pygofer; v = ventral lobe of phallobase. Figs. 129-142: Ventral aspect of right clasper and right half of apical portion of male pygofer of species of *Catonia* and *Synechdoche*.



Figs. 143-157. Figs. 143-155: Ventral aspect of right clasper and right half of apical portion of male pygofer of species of *Synechdoche*, *Xerbus*, *Momar*, *Juniperia*, and *Opsiplanon*. Figs. 156 and 157: Chromosomes, 10×45 magnification, of *Momar maculifrons* and *Synechdoche helenae*. II-a: second anaphase, first group without X, second group with X. I-m: first metaphase.

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