

A REVISION OF THE MOTH
GENUS *ANACAMPTODES*
(LEPIDOPTERA, GEOMETRIDAE)

FREDERICK H. RINDGE

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INTRODUCTION

THE PRESENT PAPER is one of a continuing series of revisions on the genera of the New World Cleorini (McDunnough, 1920), or Boarmiini (Forbes, 1948). Both these names refer to a very large tribe of "inch worm" moths that are strongly represented in both the Old and New Worlds. The adults often rest on tree trunks, with their wings outspread and appressed to the bark. The wings are usually gray or brown in color, with a pattern that makes the moths almost impossible to see until they fly.

The purpose of this paper is to revise taxonomically the genus *Anacamptodes* for its entire range and to answer some of the questions pertaining to the phylogeny and distribution of its species, tasks that have been long overdue. McDunnough (1920) proposed the genus, gave a review of the North American species, and presented illustrations of the male genitalia and some adults. However, there has been no revisionary work published on this genus as a whole since then, and only one new species has been added. The Mexican, Central American, and Caribbean species have never been formally placed in the genus.

Nine species and three subspecies are described as new in this revision. In addition, two species from Central America are placed in *Anacamptodes* for the first time, and three North American taxa are transferred to other genera. Twenty-four species are placed in *Anacamptodes*; they are found from southeastern and south-central Canada to Costa Rica, with one species being known from the island of Hispaniola. Another species has recently been introduced into the Hawaiian Islands, where it has become an economic pest.

The genus is divided into three groups primarily on the basis of the genitalia and the secondary sexual characters of the males. The more primitive species, placed in group I, are characterized by the lack of both the ventral row of bristles on the third abdominal segment and the hair pencil on the hind tibia of the male. These two characters are apparently inherited together, and presumably are sex-linked. The members of the other two

groups have both of the above characters in the males. The taxa that are placed in group II have a short uncus in the male genitalia and a small sterigma in the female genitalia, whereas group III is characterized by a very long uncus and a large, heavily sclerotized, elongate sterigma.

There is a difference in the distributional pattern of the species of these groups. The species of the more primitive group I are found primarily in the western United States, with one being restricted to the cypress swamps of the southeastern part of that country. The taxa of group II are found primarily in eastern North America and Mexico, with one species each in Costa Rica and Hispaniola; one species occurs on the west coast of North America and has been introduced into the Hawaiian Islands. The species of the more highly evolved group III are to be found from the southeastern United States to Costa Rica, with one taxon being endemic to southern Baja California.

This type of distributional pattern indicates that the genus developed from some neotropical taxon, and probably diverged from it in the more temperate regions of North America. At a later date some of the species reinvaded Central America. When related genera are studied, *Anacamptodes* is found to be very closely allied to the large neotropical genus *Iridopsis* Warren. Many taxa of the latter occur in South and Central America, and two closely allied species, presumably of relatively recent origin, extend northward into temperate North America.

More than 3600 specimens have been studied during the preparation of this paper. It is interesting to note that 2634 of them were males, while only 983 were females, a sex ratio of roughly three males to one female. These figures undoubtedly result from a differential response between the two sexes to the collector's lights, as there is no reason to doubt that the two sexes occur in approximately equal numbers. If the several species that are known from only a few examples are disregarded, the females of only one species (*pergracilis*) outnumber the males, and by a 2/1 ratio. Three species (*jacumbaria*, *dataria*, and

sancta) had approximately the same number of both sexes. Six species (*obliquaria*, *providentia*, *pseudoherse*, *fragilaria*, *cerasta*, and *lurida*) had two males to every female studied; in six (*cypressaria*, *clivinaria impia*, *perfectaria*, *vellivolata*, *humaria*, and *defectaria*) the ratio was 3/1; one species (*ephyraria*) had four males to every female; two (*c. clivinaria* and *c. profanata*) had a 5/1 ratio; one (*g. gemella*) was 6/1; the extreme sex ratio was 10 males to every female (*sanctissima*). Improved or modified collecting techniques are called for to find the females of some of these species.

MATERIALS AND METHODS

This revision is based on a study of the collections of the American Museum of Natural History, the Canadian National Collection, the Los Angeles County Museum, and the United States National Museum of the Smithsonian Institution. Material from the private collections of several individuals has also been examined; these are referred to specifically in the section on Acknowledgments. All the type specimens in this country have been studied by the author during the preparation of this revision.

The specimens studied by the author at the American Museum of Natural History during the preparation of this paper have had identification or type labels affixed. Too often such labeling has not been done in the past, so that there is always the question of whether or not certain specimens were examined by a reviser.

The specimens photographed for this revision bear a typewritten "photo" label. In general, the adults and genitalia that are figured have been taken from the collection of the American Museum of Natural History. When such a procedure was not practical, the fact is specifically noted. The following abbreviations have been used:

A.M.N.H., the American Museum of Natural History
L.A.M., Los Angeles County Museum, Los Angeles, California
U.S.N.M., United States National Museum, Smithsonian Institution, Washington, D. C.

A large number of genitalic preparations were made by the author, who also had at his

disposal the slides made by J. H. Sperry at the American Museum of Natural History, by J. H. McDunnough at both the Canadian National Collection and the United States National Museum, by H. W. Capps and E. L. Todd of the United States National Museum, and by C. W. Kirkwood. In all, 356 genitalic slides were examined.

All the male genitalia were drawn to the same scale and have received a uniform reduction. The same is true of the female genitalia, although the amount of reduction is different between the two sexes.

Some precaution must be taken in the use of these figures, as the appearance of certain parts may vary depending upon the degree to which the preparations were flattened or the angle at which they were drawn. The author attempted to overcome such discrepancies by making several dissections to obtain comparable mounts, but this was sometimes impossible because of the difficulty in working with these structures.

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SYSTEMATIC DESCRIPTIONS

GENUS *ANACAMPTODES* McDUNNOUGH

Anacamptodes McDUNNOUGH, 1920, p. 28; 1938, p. 164. FORBES, 1948, p. 55.

Head with front flat, smooth-scaled; eyes large, wider than front; antennae of male bipectinate, with pectinations arising from apex of segments and extending from about three-fourths to seven-eighths of length of antenna, each pectination with numerous setae; antennae of female simple, scaled, with terminal setae on each segment; tongue present; labial palpi variable in size, ranging from small to large, not extending beyond middle of eye. Thorax with small posterior tufts; fore tibia of male with moderate process, one-half to two-thirds of length of tibia, in female somewhat shorter; hind tibia with two pairs of spines, swollen and with large groove in male, with or without hair pencil. Abdomen without tufts; male with third segment with or without medioventral row of bristles, remainder of abdomen without additional modifications.

Forewings broad, with 11 veins, and with or without elongate areole; R_{1+2} anastomosed, R_5 arising basal to R_{3+4} ; M_1 from upper angle, M_2 from near middle of dc, M_3 from lower angle; Cu_1 from just before lower angle, Cu_2 from beyond middle of cell; without fovea at base of wing. Hind wings broad, rounded or produced at apex, and with outer margin either smooth or weakly concave between veins; frenulum strong in both sexes; with seven veins; Sc with slightly swollen base, paralleling cell for one-half of length; R_1 separating from M_1 before upper angle, M_3 from lower angle; Cu_1 from near angle, Cu_2 from between one-half to two-thirds of length of cell; $m+ldc$ slightly curved or angulate.

MALE GENITALIA: Uncus with broad base, bifurcate apically, either short and squat, with broadly separated apices, or elongate and tapering, both apical projections having one or more small, dorsal projections near distal end; socius and gnathos absent; valves large, bifurcate, symmetrical; costa and valvula combined to form posterior portion of valve, extending posterior to uncus, varying in outline from a simple, lightly sclerotized

lobe, covered with uniformly slender setae, to having sclerotized basal portion and more or less enlarged distal section, covered with both setae and spines; sacculus projecting either as more or less heavily sclerotized finger or as curved, hooklike process; transstilla weakly indicated; cristae either absent or small and inconspicuous; furca absent; anellus with juxta in form of weakly sclerotized, elongate, slender process; tegumen broad and thick dorsoventrally; saccus with sides slender, tapering to anterior point; aedeagus slender, elongate, in length greater than combined lengths of uncus, tegumen, and saccus; vesica variable, ranging from being unarmed to having spiculate area, group of small spines, or large spine.

FEMALE GENITALIA: Papillae anales simple, membranous, scarcely distinguishable from adjacent membranous area, lengthily exsertile, with apophyses posteriores two or three times longer than apophyses anteriores, from 1.3 to 3.5 mm. in length; sterigma well sclerotized, a more or less flat, rectangular or elliptical plate with posterior median indentation, and having anterior membranous projection; ductus bursae sclerotized, tapering, with longitudinal striations, smoothly sclerotized near sterigma; ductus seminalis arising ventrally from anterior portion of striate sclerotized area; corpus bursae globular, membranous; signum prominent, round or elliptical, with stellate margins in most species.

The upper surface of the wings of the species of *Anacamptodes* is either gray or brownish gray. The maculation consists of black t. a. and t. p. lines on the forewings, varying in intensity and, in their course, from straight to sinuate. The secondaries are concolorous with the forewings, and they have the same type of maculation as is found on the primaries. The under surface of the wings is usually unicolorous gray, without maculation, although the cross lines of the upper surface may be weakly indicated, and a subterminal band may be present in some species, tending to be more strongly represented in the females than in the males.

EARLY STAGES: At least eight species have been reared, but not all of their early stages

have been described. The larvae seem to be rather general feeders on herbaceous plants and deciduous and coniferous trees.

TYPE SPECIES: *Boarmia humaria* Guenée, by original designation.

RANGE: Most of the species of the genus *Anacamptodes* are found from southern Canada to Costa Rica; one is found in Hispaniola; and another has been recently introduced into the Hawaiian Islands.

In North America *Anacamptodes* forms a distinct group within the Cleorini (McDunnough, 1920) of the subfamily Ennominae. It is closely allied to *Glena* McDunnough (Rindge, 1965), *Stenoporpia* McDunnough, and *Anavitrinella* McDunnough. It can be separated from these genera by the lack of the fovea at the base of the forewing, by the presence in the male of the swollen hind tibia with its very large groove (and hair pencil in many species), and by the genitalia. The last is probably the best and safest means for identification, as these structures of both sexes offer excellent characters for the recognition of the genus. The male genitalia have a bifurcate uncus with one or more small dorsal projectons from the distal end of each lobe, lack the gnathos, and have a large costa and a sclerotized and elongate, often hooklike, sacculus. The female genitalia can be recognized by the exceedingly long apophyses posteriores.

The problem of identifying the members of this genus from the Caribbean area and from Mexico and Central America is more difficult. The genitalia must serve as the primary means of recognition, as the other characters, mentioned above, may be shared with other genera. The large neotropical genus *Iridopsis* Warren is very closely related to *Anacamptodes*, as are one or two Antillean groups. The genitalic characters, given in the preceding paragraph, will serve to delimit the present genus. It might be advisable to place *Anacamptodes* as a subgenus or group of *Iridopsis*, as the two taxa are so closely allied. However, such action is not taken, because a preliminary study of the latter genus indicates that the two are distinct.

The results of this revisionary study show that three species that have heretofore been placed in *Anacamptodes* (McDunnough, 1938, p. 164) should be moved to other

genera. The species *pulmonaria* Grote is transferred to *Stenoporpia*, while both the closely related *larvaria* Guenée and *emasculata* Dyar go into *Iridopsis*. McDunnough (1920) noted that the uncus of the last two species did not agree with that of the other species of *Anacamptodes*. Similarly, the female genitalia of these two species do not have the very long and characteristic apophyses posteriores typical of the present genus. The genitalia of both sexes of *larvaria* and *emasculata* indicate clearly that these two species are closely related to a large group of *Iridopsis* that have a long, undivided uncus and a two-piece valve.

The male genitalia of most of the species of *Anacamptodes* are not easy to work with. The valves tend to be heavily sclerotized, and they do not readily open to provide the ventral view from which these organs are usually studied. Consequently some difficulties will be encountered when one is working with these structures. It is often advisable to make several mounts of each species, whenever possible, in order to get at least one good dissection. Without the latter, difficulties may be encountered in any attempt to use the following genitalic key or the drawings in this paper.

The very long apophyses posteriores are an interesting modification of the female structures. This has presumably resulted from some characteristic egg-laying habit in the ancestral type of the genus, such as the depositing of the eggs in cracks and crevasses in the bark of the host. The caterpillars of a number of the species today feed on the leaves of different kinds of trees, whereas others have modified their habits to eat annual plants. This remarkable elongation of the apophyses posteriores apparently has arisen independently several times in the Cleorini, as it is present in *Pseudoboarmia* McDunnough and *Hesperumia* Packard in North America, and in *Scotorythra* Butler in the Hawaiian Islands, for example. A similar modification is also present in at least one species of the Crambinae (Pyralidae) (Klots, personal communication).

Whereas some of the species of *Anacamptodes* are easy to recognize by maculation, color, and size, several taxa resemble one another, confusingly, in appearance. The only certain way to distinguish the latter is by an

examination of the genitalia. It is for this reason that no key is given to the adults based on maculation.

KEY TO SPECIES

BASED ON MALE GENITALIA AND SECONDARY SEXUAL CHARACTERS

1. Abdomen without row of bristles on ventral surface of third segment, or with row rudimentary and inconspicuous 2
 Abdomen with prominent row of bristles on ventral surface of third segment 8
- 2(1). Sacculus very short, with apex bluntly pointed, not extending beyond middle of costa *cypressaria*
 Sacculus elongate, with sclerotized shoulder or basal tooth, with apical portion needle-like, curved, and extending beyond middle of costa 3
- 3(2). Vesica unarmed; sacculus sharply curved, with tip pointing at middle of costa *dataria*
 Vesica with one or more spines, usually arranged in row or group; sacculus gently curved, with tip extending to near apex of costa 4
- 4(3). Vesica with very few spines or with small group or row of inconspicuous spines *clivinaria*
 Vesica with prominent row or group of spines 5
- 5(4). Vesica with single, large spine extending from one-third to one-fourth of length of aedeagus 6
 Vesica with smaller spine or group of spines, usually not exceeding one-sixth of length of aedeagus 7
- 6(5). Length of sacculus, from apex to base of valve at mid line, measured in a straight line, 1.8 to 1.9 mm. *obliquaria*
 Length of sacculus, 1.5 to 1.6 mm. *providentia*
- 7(5). Vesica with single spine *sanctissima*
 Vesica with group of spines in form of inverted V *clivinaria*
- 8(1). Vesica unarmed 9
 Vesica armed with row or group of spines 16
- 9(8). Uncus elongate, with from two to four prominent spines posteriorly on each lobe *cerasta*
 Uncus short, without prominent posterior spines 10
- 10(9). Sacculus flat, anterior margin distally bent at right angle, with tip of arm widely separated from costa *angulata*
- Sacculus not as above 11
- 11(10). Sacculus arm long and slender, directed posteriorly. 12
 Sacculus arm short, sharply curved, with tip of arm pointed at outer margin of costa 14
- 12(11). Sacculus arm extending from two-thirds to three-fourths of length of costa . 13
 Sacculus arm extending to end of costa *vellivolata*
- 13(12). Costa with posterior three-fourths curved, and with sides parallel *jacumbaria*
 Costa more or less straight, with prominent basal swelling on inner margin, and with anterior one-half of outer margin strongly concave *monticola*
- 14(11). Sacculus arm needle-like, pointed at outer margin of costa posterior of prominent swelling thereon *pergracilis*
 Sacculus arm flattened, pointed at small spinose swelling on outer margin of costa 15
- 15(14). Tip of sacculus arm evenly tapered; outer margin of costa straight or gently concave *perfectaria*
 Tip of sacculus arm bluntly pointed; outer margin of costa strongly concave *encarsia*
- 16(8). Uncus short and squat, with terminal lobes short 17
 Uncus very long, about twice as long as wide, and with terminal lobes much longer than wide 24
- 17(16). Sacculus arm short and without shoulder 18
 Sacculus arm elongate, tapered to sharp point 19
- 18(17). Length of spines in vesica shorter than width of aedeagus *ephyraria*
 Length of spines in aedeagus about three times as long as width of aedeagus *herse*
- 19(17). Sacculus arm very long and slender, needle-like 20
 Sacculus arm shorter and broad, tapered to apex 21
- 20(19). Sacculus arm very long, extending to end of costa *vellivolata*
 Sacculus arm shorter, not extending beyond three-fourths of length of costa 22
- 21(19). Inner face of valve with ridge extending from protuberance toward base, separating sclerotized basal portion from more membranous outer portion; aedeagus 0.9 mm. in length *fragilaria*
 Inner face of valve without ridge; aedeagus

- gus 1.0 to 1.1 mm. in length
 *pseudoherse*
 22(20). Costa simple, without swelling on outer
 margin; sacculus arm evenly and gently
 curved *providentia*
 Costa with swelling on outer margin;
 sacculus arm sharply curved and with
 tip recurved 23
 23(22). Sacculus with sharply raised shoulder at
 base; vesica with row of about 10 well-
 defined spines *humaria*
 Sacculus with moderate shoulder at base;
 vesica with group of about six weakly
 defined spines *sancta*
 24(16). Costa of even width; aedeagus without
 subterminal spinose area *defectaria*
 Costa with terminal portion swollen;
 aedeagus with spinose subterminal area
 25
 25(24). Aedeagus swollen posteriorly, then taper-
 ing to sharp, sclerotized point
 *triplicia*
 Aedeagus not swollen posteriorly, apex
 rounded 26
 26(25). Aedeagus 1.0 mm. in length; terminal
 portion of costa with fine spines only .
 *gemella*
 Aedeagus 1.2 mm. in length; terminal
 portion of costa with wide area of heavy
 spines *lurida*

BASED ON FEMALE GENITALIA¹

1. Sterigma large, heavily sclerotized, longer
 than wide, and having large anterior
 median indentation 18
 Sterigma not as above, without anterior
 median indentation 2
- 2(1). Sterigma with very large posterior median
 indentation, extending about one-half
 of length of sterigma 3
 Sterigma with smaller posterior median
 indentation 4
- 3(2). Apophyses posteriores 1.3 to 1.8 mm. in
 length *ephyraria*
 Apophyses posteriores 2.3 to 2.4 mm. in
 length *cerasta*
- 4(2). Sterigma with part of lateral margins ex-
 tending dorsally 11
 Sterigma without lateral margins extend-
 ing dorsally 5
- 5(4). Sclerotized and striate area of ductus
 bursae extending not more than three-
 fourths of its length 6
 Sclerotized and striate area of ductus
 bursae extending almost to corpus
 bursae 8
- 6(5). Sclerotized and striate area extending for
 about one-half of length of ductus
 bursae *cypressaria*
 Sclerotized and striate area extending for
 two-thirds to three-fourths of length of
 ductus bursae 7
- 7(6). Apophyses posteriores 1.9 to 2.4 mm. in
 length *jacumbaria*
 Apophyses posteriores 2.7 to 3.1 mm. in
 length *dataria*
- 8(5). Sterigma more or less rectangular in out-
 line 9
 Sterigma oval or elliptical in outline . 10
- 9(8). Apophyses posteriores 2.0 mm. in length
 *providentia*
 Apophyses posteriores 2.2 to 3.0 mm. in
 length *obliquaria*
- 10(8). Sterigma with anterior end evenly
 rounded *sancitissima*
 Sterigma with anterolateral areas swollen,
 well separated by less heavily sclero-
 tized median portion *clivinaria*
- 11(4). Sterigma semicircular in outline . . *herse*
 Sterigma elliptical or rectangular in out-
 line 12
- 12(11). Sterigma longer than wide 13
 Sterigma wider than long or square in
 outline 15
- 13(12). Sterigma tending to be of greatest width
 posteriorly *pseudoherse*
 Sterigma not enlarged posteriorly . . 14
- 14(13). Sterigma rectangular in outline
 *fragilaria*
 Sterigma with median constriction and
 with posterior end rounded . . *sancta*
- 15(12). Sterigma round or elliptical in outline . 16
 Sterigma square or rectangular in outline
 *humaria*
- 16(15). Sclerotized and striate area of ductus
 bursae extending for one-half of its
 length *pergracilis*
 Sclerotized and striate area of ductus
 bursae extending almost to corpus
 bursae 17
- 17(16). Posterior indentation of sterigma with
 depth less than its width . . *perfectaria*
 Posterior indentation of sterigma deeper
 than wide *vellivolata*
- 18(1). Sterigma ovoid in outline; ductus bursae
 sclerotized and striate for about three-
 fourths of its length 19
 Sterigma rectangular in outline; ductus
 bursae sclerotized and striate to corpus
 bursae 20
- 19(18). Sterigma with posterior median indenta-
 tion *gemella*
 Sterigma without posterior median in-
 dentation *defectaria*

¹ The females of *angulata*, *encarsia*, and *monticola* are unknown.

mens with dark brown scales at ends of segments; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color pale brown or pale grayish brown, lightly overlain with brown and dark brown scales; cross lines dark brown, weakly indicated or obsolescent, with t. p. line tending to be most strongly indicated; t. a. line obsolescent in most specimens, in some indicated by a few dark brown scales and as nebulous light brown band, when present arising on costa one-fourth of distance from base, extending outward into cell, then sharply curving basad to more or less parallel costa to inner margin; median line absent from most specimens, when present extending from dark brown discal spot as light brown band to inner margin; t. p. line varying from being complete to being broken or obsolescent, subparalleling outer margin with two weak basal bends; subterminal area broad, with narrow band of ground color distal to t.p. line, followed by broad band of light brown scales, and with scattered dark brown scaling beyond that in some specimens; s. t. line absent; terminal line varying from being absent to being weakly represented, with or without dark brown intravenular dots; fringe concolorous with wing. Hind wings concolorous with forewings; basal line absent; intradiscal line represented in middle and lower portion of wing, straight, broad, dark brown; discal spot dark brown, situated either near or in extradiscal line; latter extending posteriad of discal spot, dark brown, more or less straight; subterminal area similar to that of forewing, with faint trace of pale s. t. line in some specimens; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Pale grayish brown, with variable amount of brown scaling on basal two-thirds of wings, tending to have less on hind wings than on forewings; maculation absent except for brown discal spots.

LENGTH OF FOREWING: 11 to 14 mm.

FEMALE: Similar to male; under surface of wings with less brown scaling basally, and with subterminal area of forewings brown or dark brown anteriorly.

LENGTH OF FOREWING: 12 to 14 mm.

MALE GENITALIA: Uncus short, projecting portion with width greater than its length,

lateral margins convex, tapering slightly to widely separated apices, width and depth of area between apices subequal; valves with costal portion large, lobate, with smooth, straight, subparallel margins, posteromedian section more heavily sclerotized than larger anterodistal area; outer portion of inner face of costa covered with slender setae; sacculus sclerotized, short, extending slightly more than one-fourth of length of costal margin, with anterior margin more or less straight, and with pointed apex bent slightly posteriorly; cristae inconspicuous, arising from widely separated patches, approximately 36 to 48 on each side; anellus with broad anterior portion having posterior margin rounded; aedeagus with pointed projection posteriorly on dorsal side; vesica unarmed. Abdomen without row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 1.9 to 2.1 mm. in length; sterigma more or less diamond-shaped in outline, with both anterior and posterior ends rounded; sterigma with very small, anterior, membranous projection; anterior portion of sterigma with steep ridge on each side paralleling each outer margin from central portion, then curving to meet outer margin near anterior end of sterigma; posterior margin of sterigma with deep, broad, median indentation, its width subequal to its length; ductus bursae with membranous portion slightly longer than posterior indentation of sterigma, with short, anterior, sclerotized, and weakly striate area, latter about one-fourth of combined lengths of ductus bursae and corpus bursae; ductus seminalis arising cephalad of anterior margin of membranous projection of sterigma; corpus bursae elongate, gently swollen; signum more or less elliptical, with irregular anterior margin and with raised spinose posterior margin.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown. The type series was collected in a cypress swamp, and Grossbeck presumed that the caterpillars fed on cypress.

TYPES: Grossbeck described *cypressaria* from a series of "thirty-odd examples," of which only 10 were designated as types. The specimens bearing his "type ♂" and "type ♀" labels are both in the collection of the American Museum of Natural History. The

former, with its genitalia on slide F.H.R. No. 6060, is hereby designated as the lectotype.

TYPE LOCALITY: Allen River to Deep Lake, Collier County, Florida; the species was collected in a cypress swamp. In 1925 the Allen River was renamed the Barron River.

DISTRIBUTION: Florida (see fig. 4). A single specimen labeled "Harris Co., Tex., March" has been examined that belongs to this species; this record should be verified.

TIME OF FLIGHT: March, April, May, June, August, and either September or October (one specimen). This indicates that there are probably two generations per year.

REMARKS: Forty-three specimens (32 males and 11 females, including the lectotype) and 14 genitalic dissections (10 males and four females) were studied. Virtually no freshly caught material of this species has been available for study, as most of the specimens were taken between 1911 and 1914. This lack presumably reflects no collecting in the correct ecological areas.

This species is quite distinct and easy to recognize, even though McDunnough (1920) and Forbes (1948) had difficulties in this respect. This taxon is the smallest species in the genus, it has the longest palpi, the longest pectinations of the male antennae, and the most widely spaced radial venation in the forewings.

The male genitalia of *cypressaria* are rather elemental in nature, as the valves have a simple, lobate costa and a pointed sacculus. Other characters that are diagnostic are the unarmed vesica and the absence of the row of bristles from A_3 .

The female genitalia are also rather simple. They can be recognized by the diamond-shaped sterigma, with the deep posterior indentation, by the evenly tapered corpus bursae, and by the elliptical signum.

***Anacamptodes jacumbaria* (Dyar)**

Plate 22, figure 2; text figures 1, 11, 34

Selidosema jacumbaria DYAR, 1908, p. 56.

Cleora jacumbaria: BARNES AND McDUNNOUGH, 1917a, p. 117.

Anacamptodes jacumbaria: McDUNNOUGH, 1920, p. 32, pl. 5, fig. 11 (male genitalia), pl. 8, fig. 5 (male); 1938, p. 164.

This small species can be recognized by the prominent and straight t. a. and t. p. lines,

and by the reddish brown color of the basal and subterminal areas of the wings. It occurs in southern California and Baja California.

MALE: Head with vertex white or whitish gray, scales between antennal bases and at back of head blackish brown; front blackish brown, with gray or grayish brown scales forming two small spots dorsally and narrow band ventrally; palpi rising to middle of eyes, grayish brown or brownish gray basally, becoming blackish brown distally; antennae with longest pectinations about 1.0 mm. in length. Thorax grayish brown above, with posterior tufts tending to become dark brown apically; below, and legs, pale brown or pale brownish gray; prolegs with anterior portion of basal segments having variable amount of dark brown scaling. Abdomen pale grayish brown above, with scattered brown scales, and with posterior margins of segments tending to be brown; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color pale grayish brown, with basal and subterminal areas more or less heavily overlain with brown and reddish brown scales; cross lines black, prominent; t. a. line extending from middle of cell or from cubital vein to inner margin near base of wing, straight or weakly sinuate, and shaded basally by broad brown or reddish brown band; median line weakly represented, branching off from t. p. line in middle of cell Cu_2 and extending to inner margin; discal spot absent; t. p. line arising in cell R_5 , straight or weakly sinuate, extending to just basad of center of inner margin; subterminal area broad, in some specimens roughly divisible into three subequal bands, basal one, next to t. p. line, dark brown or reddish brown, middle one of ground color overlain with brownish gray, and outer one darker grayish brown; s. t. line absent; terminal line black, narrow, with intravenular dots; fringe concolorous with wing. Hind wings concolorous with forewings; basal line present; intradiscal line weakly represented near anal angle; discal spot absent; extradiscal line and subterminal area similar to those of forewings; s. t. line weakly indicated, of ground color; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Pale gray or pale grayish brown, with variable amount of

brown scaling, hind wings with less dark scaling than forewings; without maculation except for weak terminal line.

LENGTH OF FOREWING: 13 to 17 mm.

FEMALE: Similar to male, but tending to have both upper and under surfaces of wings more heavily suffused with dark gray scales.

LENGTH OF FOREWING: 12 to 17 mm.

MALE GENITALIA: Uncus short, projecting portion with width of base subequal to its length, lateral margins more or less straight, tapering to widely separated apices, distance between points and depth of area between apices subequal; valves with costal portion elongate, slender, posteromedian margin concave, anterodistal margin concave basally and convex distally, with both sides roughly parallel; outer portion of inner face of costa covered with slender setae; sacculus heavily sclerotized, attenuate, basal portion with prominent shoulder, outer portion needle-like, gently curved, not attaining apex of costa; cristae small, inconspicuous; anellus scarcely differentiated; aedeagus with posterior end bluntly pointed; vesica with finely spiculate area and with weak spine. Abdomen without row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 1.9 to 2.4 mm. in length; sterigma more or less trapezoidal in outline, tapering posteriorly, slightly wider than long; anterior membranous projection slightly narrower than sterigma and subequal in length to it; sterigma with surface evenly rounded; posterior end of sterigma with broad, shallow, median indentation; ductus bursae with membranous portion almost as long as sterigma, with sclerotized and striate area extending from two-thirds to three-fourths of distance to corpus bursae, and with narrow, smoothly sclerotized band ventroposteriorly; ductus seminalis arising at anterior end of sclerotized and striate area; corpus bursae large, globular; signum round or slightly elliptical, variable in amount of ornamentation, outer margin dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Dyar described this species from three males and one female. He did not specify which specimen was the type, although he stated that it was U.S.N.M. No. 11702. This male has its genitalia mounted on slide

H.W.C. No. 827, and it is hereby designated as the lectotype.

TYPE LOCALITY: Thyce Camp, San Diego County, California.

DISTRIBUTION: The mountains of southern California, with most specimens being captured in Riverside and San Diego counties (see fig. 1). This species also occurs in northern Baja California, as it flies in the San Pedro Martir Range. It may be restricted to the Pinyon-Juniper Woodland and juniper woodlands of the Interior Angeles District of the Southern Cordilleran Biotic Province (Schick, 1965).

TIME OF FLIGHT: From late February into September, with one specimen dated November 24.

REMARKS: Ninety-three specimens (47 males and 46 females, including the lectotype) and 11 genitalic dissections (six males and five females) were studied. This species can be recognized by its small size, the prominent and more or less straight cross lines, and by the reddish brown shading in the basal and subterminal areas.

The male genitalia of this species are immediately distinguished from those of the preceding species by the elongate, curved, needle-like sacculus.

The female genitalia can be recognized by the trapezoidal sterigma and by the more elongate sclerotized area of the ductus bursae.

Anacamptodes dataria (Grote)

Plate 22, figure 3; text figures 1, 12, 35

Cymatophora (*Boarmia*) *dataria* GROTE, 1882b, p. 173; 1883, p. 87. RINDGE, 1955, p. 140.

Boarmia dataria: SMITH, 1891, p. 72.

Cleora dataria: DYAR, "1902" [1903], p. 325. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917a, p. 118.

Anacamptodes dataria: McDUNNOUGH, 1920, p. 32, pl. 5, fig. 3 (male genitalia), pl. 7, fig. 18 (male); 1938, p. 164.

This species can be recognized by the dark brownish gray wings, by the brown exterior shading of the complete and prominent cross lines, and by the fact that the median area of the forewings tends to be the darkest portion of the wing. It occurs from Arizona to Texas, and in northern Mexico.

MALE: Head with vertex and front white or grayish white, with scattered light brown

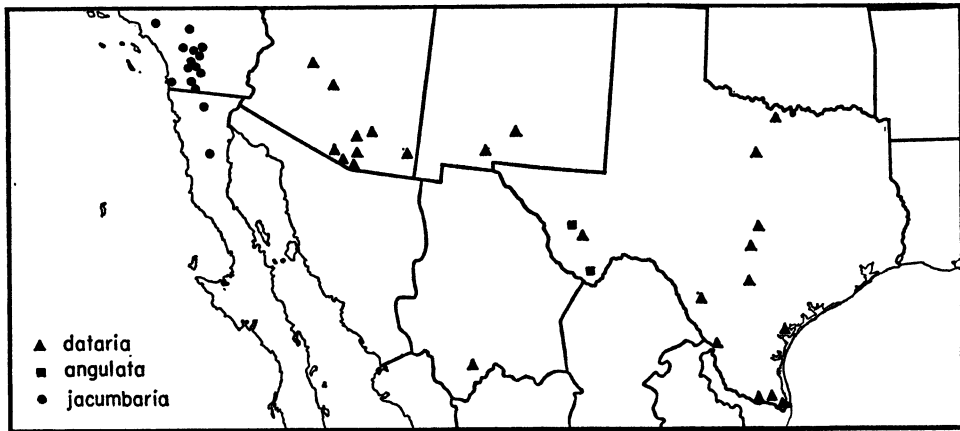


FIG. 1. Distribution of *Anacamptodes jacumbaria* (Dyar), *A. dataria* (Grote), and *A. angulata*, new species.

scales, and with dark brown scaling between bases of antennae and across middle of front; palpi small, just reaching front, grayish white, with scattered light and dark brown scales; antennae with longest pectinations about 0.9 mm. in length. Thorax above grayish white, with scattered light and dark brown scales, the latter tending to be concentrated posteriorly; below, and legs, pale grayish white or white, latter with variable amounts of dark brown scaling. Abdomen above grayish brown, with numerous light and dark brown scales, latter tending to be concentrated on posterior margins of segments, and with anterior portion of first segment blackish brown; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color light grayish brown, heavily overlain with dark brown and dark grayish brown scales, latter tending to be concentrated in median area; cross lines black or blackish brown, t. a. and t. p. lines complete and prominent; t. a. line arising from costal spot about one-third of distance from base, extending outward in cell for short distance, then turning sharply basad and subparallel-ing outer margin to inner margin, tending to have basal angle on cubital vein, and to be broadly shaded basally by more or less nebulous brown or dark brown band; discal spot large, dark, with white or pale gray scales in center; median line arising from rather nebulous costal spot antieriad of discal spot, extending from posterior margin of spot to inner

margin; t. p. line arising from costal spot about two-thirds of distance from base, extending more or less perpendicularly to costa to vein M_2 , then angled basally and extending, with two broad basal bends, to inner margin, and having t. p. line shaded distally by narrow strip of ground color and much broader band of reddish brown or dark brown; veins in outer portion of wing tending to be marked with brown scales; subterminal area broad, variable in maculation, ranging from unicolorous gray brown or dark brown to paler and contrasting with dark brown patches opposite cell and along costa before apex, and having well-defined white or light gray, scalloped, s. t. line; terminal line black or blackish brown, narrow, with intravenular dots; fringe concolorous with wing, tending to be darker at vein endings. Hind wings concolorous with forewings, some specimens with less dark scaling; basal line present; intradiscal line present in middle and lower portions of wing, tending to be somewhat nebulous; discal spot large, elliptical, with white or pale gray center; extradiscal line complete in most specimens, with outward tooth in cell M_1 , shaded distally like t. p. line; subterminal area broad, similar to that of forewing; terminal line black, prominent; fringe similar to that of primaries.

UNDER SURFACE OF WINGS: Pale gray, with variable amount of brownish gray scaling; costa with dark grayish brown scaling; without maculation except for large, dark

discal spots; some specimens with obsolescent terminal line and dark subterminal patch near apex of forewings.

LENGTH OF FOREWING: 14 to 16 mm.

FEMALE: Similar to male; upper surface of wings tending to have more grayish brown scaling; under surface tending to have more or less complete subterminal band.

LENGTH OF FOREWING: 16 to 19 mm.

MALE GENITALIA: Uncus short, projecting portion with width greater than its length, lateral margins sclerotized, tapering to widely separated apices, depth of area between points very shallow; valves with costa elongate, slender, posteromedian margin straight, anterodistal margin gently tapering toward base, with small swelling on inner surface near anterodistal margin about two-fifths of distance from base; outer portion of inner face of costa covered with slender setae, becoming slightly thicker basally and on swelling; sacculus heavily sclerotized, basal portion with prominent shoulder, outer portion attenuate, needle-like, sharply and evenly curved, tip pointing at anterodistal margin just posterior to small swelling; cristae inconspicuous, approximately 12 on each side; anellus very long and slender; aedeagus with posterior end rounded; vesica with inconspicuous, slender, weakly sclerotized strip. Abdomen without row of bristles on segment A₃.

FEMALE GENITALIA: Apophyses posteriores 2.7 to 3.1 mm. in length; sterigma more or less rectangular in outline, wider than long; anterior membranous projection slightly longer and narrower than sterigma, with sides more or less parallel; anterolateral parts of sterigma well sclerotized and rounded, with central area somewhat depressed and marked by small, steep ridge on both sides; posterior margin of sterigma with broad, shallow, V-shaped incision; ductus bursae with membranous portion longer than sterigma, then elongate, slender, tapering, lightly sclerotized and striate for less than three-fourths of length; ductus seminalis arising well cephalad of anterior margin of membranous projection of sterigma; corpus bursae abruptly and broadly swollen, with length of globular anterior portion less than narrow ductus bursae; signum variable in shape, usually round or elliptical, with irregular margins, posterior

part tending to be thickened and more or less dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Grote described *dataria* from an unspecified number of specimens of both sexes. There are single male examples in the collections of both the United States National Museum and the American Museum of Natural History, and a female is in the former institution. The male in the United States National Museum collection, with its genitalia mounted on slide E.L.T. No. 2065, is hereby designated as the lectotype.

TYPE LOCALITY: Arizona.

DISTRIBUTION: In the United States this species ranges from southern Arizona to eastern Texas (see fig. 1); it is known from the state of Chihuahua in Mexico. The widespread distribution in Texas indicates that the species occurs in the Trans-Pecos area, the Edwards Plateau, the Blackland Prairies, and the Rio Grande Plains of that state.

TIME OF FLIGHT: From March through September in Arizona, and extending from February into November in southern Texas. The species probably has at least two generations a year in Arizona.

REMARKS: One hundred specimens (53 males and 47 females, including the lectotype) and 11 genitalic dissections (six males and five females) were studied. This species is rather variable in the color and maculation of the upper surface of the wings. This variation appears to be individual rather than seasonal, based on the relatively small amount of material that is available.

The male genitalia of *dataria* can be separated from those of *jacumbaria* by the swelling on the outer margin of the costa and by the more sharply curved sacculus.

The female genitalia of the present taxon can be recognized by the rectangular sterigma and by the fact that the membranous posterior portion of the ductus bursae is longer than the sterigma.

Anacamptodes angulata, new species

Plate 22, figure 6; text figures 1, 13

This species is medium in size and gray in color, with a biconcave t. p. line, and with the median area of the forewings above not

darker than the adjacent areas. It is known only from western Texas.

MALE: Head with vertex and front gray, with black band between bases of antennae and with broad dark band across middle of front; palpi extending short distance beyond front, not rising to middle of eye, covered with mixture of light gray, dark gray, and brownish black scales; antennae with longest pectinations about 0.75 mm. in length. Thorax gray above, with grayish brown or brownish gray scales at end of collar, as narrow band across patagia in some specimens, and posteriorly; below, and legs, grayish white, latter with some brown scaling, particularly on prolegs. Abdomen gray above, first segment pale gray and with narrow black band anteriorly, remaining segments with numerous grayish brown and brownish black scales; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color light gray, overlain with grayish brown and brownish black scales; median area concolorous with, or paler than, adjacent areas; cross lines black, more or less complete but tending to be obsolescent anteriorly; course of t. a. and t. p. lines as in *dataria*, with lower part of t. p. line tending to be obscured by black shading between it and median line in some specimens; discal spot large, round or elliptical in outline, with center of ground color; median line extending from lower edge of discal spot, running near t. p. line and extending to inner margin; t. a. line shaded basally by grayish brown or dark gray band in lower part of wing; t. p. line with shade line distally, grayish brown or reddish brown; veins in outer part of wing ochraceous; subterminal area more or less heavily overlain with dark scales, particularly in upper part of wing; s. t. line weakly represented; terminal line black, very narrow or obsolescent, with small intravenular spots; fringe concolorous with wing, darkened at vein endings. Hind wings concolorous with forewings, but tending to be less heavily overlain with dark scales, particularly in area basad of extradiscal line; similar to those of *dataria* but with less black scaling; extradiscal line shaded distally by brown band; s. t. line present, crenulate; veins ochraceous.

UNDER SURFACE OF WINGS: Pale gray, overlain with brownish gray scales, these more numerous on forewings than on hind

wings; without maculation except for dark discal dots and narrow terminal line and indication of dark subterminal area in upper part of forewing; apex of forewings whitish gray.

LENGTH OF FOREWING: 15 (paratypes) to 16 (holotype) mm.

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *dataria*, differing chiefly as follows: larger in size, with combined lengths of uncus, tegumen, and saccus greater by one-fourth; uncus with deeper apical cleft; costa with longer but less prominent swelling in middle of anterodistal margin; setae on swelling not noticeably thicker than those elsewhere on inner face of costa; sacculus with weak shoulder, in form of small swelling, outer margin bent at right angle distally, with short, needle-like arm directed posteriorly and with tip curved outwardly; approximately six inconspicuous cristae on each side; anellus with sagittate posterior portion; aedeagus with pointed, lightly sclerotized, posterior end; vesica unarmed. Abdomen with reduced row of bristles on segment A₈, these apparently being deciduous.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Chisos Basin, Big Bend National Park, Texas, July 4, 1957 (R. Zweifel). Paratypes: Same data as type, one male; Fort Davis, Jeff Davis County, Texas, October 12, 1953 (R. H. Reid), three males. The holotype is in the collection of the American Museum of Natural History; the paratypes are in the collection of that institution and of C. W. Kirkwood.

DISTRIBUTION: This species is known only from the area of Jeff Davis and Brewster counties of western Texas (see fig. 1).

TIME OF FLIGHT: July and October.

REMARKS: Five specimens and three genitalic dissections have been studied. This species resembles *dataria* in appearance, but it is gray instead of brown, and the t. p. line is more sinuate. It can also be confused with *humaria*, which also flies in western Texas. The present species is lighter gray than *humaria* on both the upper and under surfaces. The genitalia of the male offer good characters for the separation of these species.

They are larger than those of *dataria*, and can be recognized by the unique, angulate margin of the sacculus arm.

***Anacamptodes clivinaria* (Guenée)**

Boarmia clivinaria GUENÉE, 1857, p. 245.

This is a large, dark gray species, which has a sinuate t. p. line, shaded outwardly with brown, on the forewings. It occurs in three subspecific populations in western North America.

***Anacamptodes clivinaria clivinaria* (Guenée)**

Plate 22, figure 5; text figures 2, 14

Boarmia clivinaria GUENÉE, 1857, p. 245. MORRIS, 1860, p. 57. PACKARD, 1876, p. 455. SMITH, 1891, p. 72. HULST, 1895, p. 105. OBERTHÜR, 1913, p. 271.

Cleora clivinaria: ANON., 1882, p. 24. GUMPPENBERG, 1892, p. 321. BARNES AND McDUNNOUGH, 1917a, p. 118; 1917b, p. 241 (*partim*, not pl. 25, fig. 7).

Selidosema clivinarium: DYAR, "1902" [1903], p. 324. SMITH, 1903, p. 77.

Anacamptodes clivinaria: McDUNNOUGH, 1920, p. 32; 1938, p. 164.

This population occurs from central California to southwestern Oregon. The adults are large, and the upper surface of the wings tends to have a rather mottled appearance and a strongly represented t. p. line, shaded outwardly by a brown band in the males.

MALE: Head with vertex and front white or whitish gray, with black or blackish brown scales between antennal bases and as broad band across front; palpi barely extending beyond front, grayish white basally, becoming grayish black or blackish brown distally; antennae with longest pectinations about 0.75 mm. in length. Thorax above whitish gray, with scattered brown scales, these forming faint band across patagia in some specimens; tip of collar brown; below, and legs, paler, latter more or less heavily overlain with dark brown or blackish brown scales. Abdomen above gray, more or less heavily overlain with brownish black and black scales, anterior portion of first segment with narrow black band, and with dark scales tending to be concentrated dorsally on posterior margin of each segment as paired spots or band; below paler.

UPPER SURFACE OF WINGS: Forewings

with ground color light gray or gray, more or less evenly overlain with dark gray, grayish brown and dark brown scales; cross lines black or brownish black, with t. a. and t. p. lines variable in intensity; t. a. line obsolescent in or absent from upper part of wing, extending to inner margin from cubital vein subparalleling costa, and with broad, basal shade band of brown or grayish brown; discal spot absent or obsolescent; median line narrow, extending from approximate location of discal spot to inner margin, subparalleling t. p. line; t. p. line obsolescent in upper part of wing, appearing as spot on vein M_1 , with prominent outward bend in cell M_1 , then becoming prominent and extending to inner margin with two broad basal bends, one on each side of vein Cu_2 , and having t. p. line shaded distally by narrow, prominent bands of reddish brown and dark brown scales; veins in outer portion of wing tending to be faintly ochraceous; subterminal area broad, with wide, rather nebulous band of ground color basally, followed by heavy suffusion of dark scales enclosing pale gray, scalloped, s. t. line; terminal line black, narrow, with intravenular spots; fringe concolorous with wing, tending to be darker at vein endings. Hind wings concolorous with forewings; basal line present; intradiscal line present in middle and lower portions of wing, tending to be broad and somewhat nebulous; discal spot elongate, large, with pale gray center, obsolescent in some specimens, absent from others; extradiscal line complete in many specimens, more or less straight, and shaded outwardly by prominent brown band; subterminal area similar to that of forewing, but with s. t. line straighter; terminal line prominent; fringe similar to that of forewing.

UNDER SURFACE OF WINGS: Pale gray, with variable amount of brownish gray scaling, more prominent on forewings than on hind wings; without maculation except for large, dark, discal spots and terminal line; some specimens with faint, dark, subterminal patch near apex of forewings.

LENGTH OF FOREWING: 18 to 20 mm.

FEMALE: Similar to male, but with both surfaces of wings tending to be a more unicolorous gray, and the forewings to have more obsolescent maculation above.

LENGTH OF FOREWING: 18 to 19 mm.

MALE GENITALIA: Uncus of moderate length, tapering to widely separated apices, depth of area between points and distance between them subequal; valves with costa elongate, slender, weakly constricted medially; outer two-thirds of inner face of costa covered with slender setae; sacculus heavily sclerotized, basal portion with prominent shoulder, outer portion attenuate, needle-like, gently curved, with tip either straight or slightly recurved and extending almost to apex of costa; cristae inconspicuous, of about six to 14 on each side; aedeagus with posterior end rounded; vesica with irregular row of spines, in some specimens appearing as an inverted V, with left arm longer than right. Abdomen without row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 2.8 mm. in length; sterigma oval or elliptical in outline, longer than wide; anterior membranous projection slightly longer and narrower than sterigma, with narrow neck and rounded anterior portion; anterolateral areas of sterigma more or less raised, rounded, separated by less heavily sclerotized median portion; posterior end of sterigma tapered, with slender, V-shaped, median incision; ductus bursae with membranous portion very short, extending to middle of sterigma, then with slender, smoothly sclerotized, posterior section, becoming swollen and striate, striations extending almost to corpus bursae; ductus seminalis arising near corpus bursae; corpus bursae elongate, globular; signum elliptical, wider than long, central area smoothly sclerotized and usually with six to nine moderately strong teeth, lateral and posterior margins thickened and with strong teeth.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Guenée described *clivinaria* from a single male specimen, which apparently has been lost (Oberthür, 1913).

TYPE LOCALITY: California.

DISTRIBUTION: From central and northern California into southwestern Oregon (see fig. 2). This species is found in the Sierra Nevada Mountains from Kern County, California, northward, and from Santa Clara County and the San Francisco Bay area, but it appears to be rather uncommon. It seems

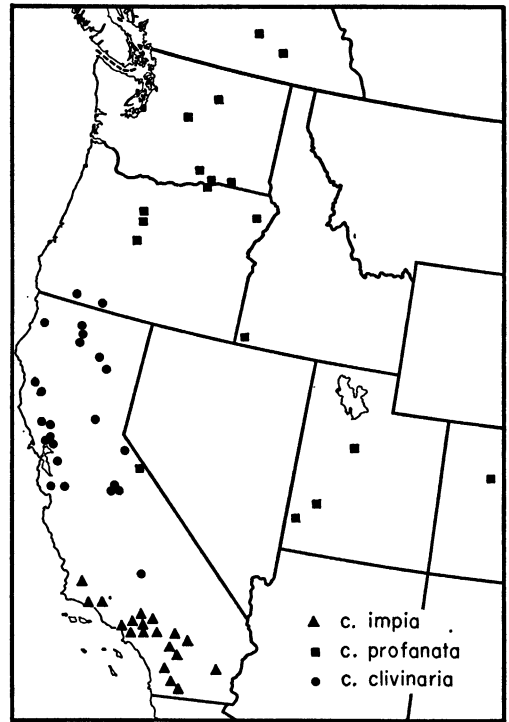


FIG. 2. Distribution of *Anacamptodes clivinaria* (Guenée).

to be primarily associated with the Pacific Maritime and Sierra Nevada provinces (Schick, 1965).

TIME OF FLIGHT: March, April, May, June, and July.

REMARKS: Sixty-six specimens (55 males and 11 females) and four genitalic dissections (three males and one female) have been examined. The male genitalia of *clivinaria* can be recognized from those structures of the preceding species by the very long sacculus of the valves; the female genitalia can be identified by the elongate sterigma.

We will probably never know for certain whether or not this is the species that Guenée described. I agree with the statement by Barnes and McDunnough (1917b, p. 241) that their concept of the species fits Guenée's original description better than any other member of this group from California. Barnes and McDunnough illustrated (1917b, pl. 25, fig. 7) a specimen from San Bernardino, California. This illustration has since served as a basis for identifying the species. Lacking any proof that the Barnes and McDunnough

determination is in error, I accept that illustration as representing *clivinaria*.

There is some variation within this species in California. Specimens from the Sierra Nevada Mountains and the coastal area of the San Francisco Bay region northward into Oregon tend to have the t. p. line more sinuate and more strongly represented, as well as a more prominent brown shade line distad thereto, than do examples from southern California. It is highly probable that the type of this species came from somewhere in central California, rather than from the mountains of southern California. In fact Guenée, in his description of *clivinaria*, mentioned the fact that the outer line of the forewing is followed by "*un filet d'un brun clair*," which is a diagnostic character of this subspecies as now defined.

The population from the mountains of southern California is left, therefore, without a name; it is described below.

***Anacamptodes clivinaria impia*, new subspecies**

Plate 22, figure 4; text figures 2, 36

Cleora clivinaria: BARNES AND McDUNNOUGH, 1917b, p. 241 (*partim*), pl. 25, fig. 7 (male).

Anacamptodes clivinaria: McDUNNOUGH, 1920, p. 32 (*partim*); 1938, p. 164 (*partim*).

The population from the mountains of southern California has paler and less contrastingly colored wings and a straighter and more weakly represented t. p. line than are found in nominate *clivinaria*.

MALE: Similar to males of nominate *clivinaria*, differing mainly as follows: upper surface of wings with ground color light gray, overlain with grayish brown and brown scales, wings appearing paler and less contrastingly colored than those of nominate *clivinaria*; cross lines brownish gray; t. a. line obsolescent; t. p. line weakly represented, partially interrupted in some specimens, with posterior shade line grayish brown or brownish gray, tending to be rather inconspicuous; hind wings similar to forewings in color and maculation. Under surface similar to that of nominate *clivinaria*.

LENGTH OF FOREWING: 18 to 21 mm.; holotype, 20 mm.

FEMALE: Similar to female of nominate *clivinaria*.

LENGTH OF FOREWING: 18 to 21 mm.; allotype, 18 mm.

MALE GENITALIA: Similar to those of nominate *clivinaria*.

FEMALE GENITALIA: Similar to those of nominate *clivinaria*, differing mainly as follows: apophyses posteriores 2.3 to 2.8 mm. in length; posterior median incision of sterigma tending to be slightly deeper.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, upper Santa Ana River, San Bernardino County, California, June 7, 1948 (G. H. and J. L. Sperry); allotype, female, same data but July 31, 1948. Paratypes, all from California, and listed by counties: *Los Angeles County*: Buckhorn Flats, Angeles Crest Highway, San Gabriel Mountains, July 23, 1948, elevation 6500 feet (C. I. Smith), one male; same data, June 3, 1950, elevation 6800 feet (C. A. Hill), five males; same data, June 1, 1963, elevation 6500 feet (R. H. Leuschner), one male; Cloudburst Canyon, San Gabriel Mountains, May 21, 1942, elevation 4500 feet (C. Henne), 10 males and one female; Singing Springs, San Gabriel Mountains, May, 1949 (C. Hill), two males; Glendale, May 11, 1950 (C. Hill), two males and three females; Tanbark Flats, San Gabriel Mountains, June 20, 1952 (M. Cazier, W. Gertsch, and R. Schrammel), one female; Wrightwood, July 2, 12, 1964 (C. Hill), two males; Opid's Camp, Angeles National Forest, July 16, 1917, elevation 4480 feet (V. Duran), July 12, 1933, one male, one female; Mount Wilson, August 5, 9, 1923, two males; Beverly Hills, October 1-10, 1928, one male; Santa Monica, February 1, 15, 22, 1931, two males, one female; Valyermo, July 17, 1933, elevation 3900 feet, one female; Los Angeles (Coquillett), one female. *Riverside County*: Idyllwild, May 18, 1937 (H. Little), one male; Chuckawalla Springs, Chuckawalla Mountains, December 30, 1939, one male; Soboba Hot Springs, June 16, 1947 (C. W. Kirkwood), one male. *San Bernardino County*: Same data as types, May 19, 1947, June 1, 1949, July 18, 1946, July 18, 1947, July 25, 1948, five males; Cajon Valley, June 30, 1938 (G. H. and J. L. Sperry), one male; Lytle Creek, July 1, 1937 (G. H. and J. L. Sperry), one male and one female; Morongo Valley, May 11, 1937 (G. H. and J. L. Sperry),

one male; San Bernardino, June 1-7, photograph (Barnes and McDunnough, 1917b, pl. 25, fig. 7), one male. *San Diego County*: Guatay, July 9, 1953 (W. J. and J. W. Gertsch), one male; Boulder Oaks, Laguna Mountains, May 18, 1963, elevation 3500 feet (R. H. Leuschner), one female; Pine Valley, April 17, 1950 (E. C. Johnston), one male; Palomar Mountain, July 3, 1945 (Comstock and Martin), one male. *Santa Barbara County*: Clear Creek, Cuyama Canyon, March 7, 1937 (Ross, Leech, and Cazier), one male; Summerland, March 23, 1959, April 4, 1963, April 15, 1949, June 25, 1949 (C. W. Kirkwood), two males, two females; Santa Barbara, June 21, 1938 (C. W. Kirkwood), one female. *Ventura County*: Pine Mountain summit, 30 miles north of Ojai, April 12, 1958, elevation 5000 feet (R. Leuschner), one male; Camp Ozena, Upper Cuyama, June 9, 1963, July 7, 1964 (C. W. Kirkwood), one male, one female.

The holotype and allotype are in the collection of the American Museum of Natural History; the paratypes are in the collections of that institution, the Canadian National Collection, the Los Angeles County Museum, the United States National Museum, and of C. W. Kirkwood, R. H. Leuschner, and the author.

DISTRIBUTION: Southern California, primarily in the mountainous areas, extending up the coast into Ventura and Santa Barbara counties (see fig. 2).

TIME OF FLIGHT: February through August, October, and December.

REMARKS: Sixty-six specimens (49 males and 17 females) and six genitalic dissections (three males and three females) have been studied. The adults of this population are rather constant in the coloration of the wings and in the maculation. There is some variation in strength and course of the t. p. line; the line is invariably thinner and it tends to be straighter than that found in nominate *clivinaria*.

Anacamptodes clivinaria profanata

(Barnes and McDunnough), new combination

Plate 22, figure 7; text figures 2, 15, 37

Cleora profanata BARNES AND McDUNNOUGH, 1917b, p. 242, pl. 25, fig. 3 (lectotype male), pl. 30, fig. 6 (male genitalia).

Anacamptodes profanata: McDUNNOUGH, 1920,

p. 33; 1938, p. 164. BLACKMORE, 1927, p. 42. JONES, 1951, p. 132.

This population occurs from Colorado and Utah into British Columbia to the east of the Cascade and Sierra Nevada ranges. Compared with those of nominate *clivinaria*, the adults are smaller in size and the upper surface of the wings has a smoother, less mottled appearance.

MALE: Similar to males of nominate *clivinaria*, differing mainly as follows: upper surface of wings with ground color pale gray, overlain with grayish brown and brown scales, wings appearing less contrastingly colored than in nominate *clivinaria*; cross lines dark brown or brownish black; t. a. line present, shaded basally by gray or grayish brown band; t. p. line slender, similar in course to that of nominate *clivinaria* in most specimens, with posterior shade line dull brown or grayish brown; hind wings similar to forewings in color and maculation. Under surface similar to that of nominate *clivinaria*.

LENGTH OF FOREWING: 15 to 19 mm.

FEMALE: Similar to that of nominate *clivinaria*.

LENGTH OF FOREWING: 17 to 18 mm.

MALE GENITALIA: Similar to those of nominate *clivinaria*, but differing mainly as follows: costa tending to be slightly thinner, with its inner face tending to have slightly thinner setae, and with smaller area at apex of costa with slender setae; sacculus with slightly less pointed shoulder basally, and with outer, needle-like portion tending to be slightly longer; cristae about three to 30 on each side; vesica with either very few and inconspicuous spines or small group or row of spines.

FEMALE GENITALIA: Similar to those of nominate *clivinaria*.

EARLY STAGES: Undescribed.

FOOD PLANTS: This subspecies has been reared on mountain mahogany (*Cercocarpus*) in Idaho, and on *Purshia tridentata* De Candolle in northeastern Oregon. Both the above plants belong to the Rosaceae.

TYPES: This taxon was described from three males and one female. One of the male types was illustrated with the original description; this specimen is in the collection of the United States National Museum, and it is hereby designated as the lectotype. Its geni-

talia are mounted on slide E.L.T. No. 2067.

DISTRIBUTION: From Utah and Colorado north into south-central British Columbia, occurring east of the Cascade and Sierra Nevada ranges in eastern California, Oregon, and Washington (see fig. 2). Apparently this species is an inhabitant of the Great Basin area.

TIME OF FLIGHT: April, May, June, and July.

REMARKS: One hundred twenty specimens (100 males and 20 females, including the lectotype) and 14 genitalic dissections (12 males and two females) have been studied. The adults of *profanata* form a smaller and less contrastingly marked population compared with nominate *clivinaria*. The t. p. line, and its distal shade line, are not so prominent in this taxon as in the nimotypical one, but these characters are more strongly represented than in the larger and paler *impia*.

Anacamptodes sanctissima
(Barnes and McDunnough)

Plate 22, figure 8; text figures 3, 16, 38

Cleora sanctissima BARNES AND McDUNNOUGH, 1917b, p. 241, pl. 25, fig. 6 (lectotype male), pl. 30, fig. 5 (male genitalia).

Anacamptodes sanctissima: McDUNNOUGH, 1920, p. 33; 1938, p. 164.

This species occurs in California and northern Baja California. It is similar to *clivinaria impia*, but it is smaller and has more clearly defined maculation.

MALE: Head, thorax, and abdomen similar to those of *clivinaria*, but with dorsal surface of abdomen having more prominent band on posterior margin of each segment.

UPPER SURFACE OF WINGS: Forewings with ground color pale gray, overlain with grayish brown scales; cross lines black, prominent in most specimens, with t. a. and t. p. lines tending to be more or less subparallel and widely separated, from 1.7 to 2.7 mm. apart in most specimens; course of cross lines as in *clivinaria* but with t. p. line almost straight, and tending to arise at, or shortly below, vein R_5 ; cross lines shaded by dark gray or grayish brown bands; discal spot absent; median line tending to be in center of median area in some specimens; subterminal area broad, with prominent s. t. line of ground color; terminal line and fringe similar to those of

clivinaria. Hind wings similar to those of *clivinaria*, but with intradiscal line and discal spot less strongly represented, and extradiscal line shaded distally by dark gray or grayish brown band.

UNDER SURFACE OF WINGS: Pale gray, with variable amount of grayish brown scaling, more prominent on forewings than on hind wings; without maculation except for rather poorly defined discal dots and terminal line.

LENGTH OF FOREWING: 15 to 18 mm.

FEMALE: Similar to male, but with both surfaces of wings tending to be a more unicolorous gray, and to have somewhat less prominent maculation.

LENGTH OF FOREWING: 15 to 20 mm.

MALE GENITALIA: Very similar to those of *clivinaria*, differing mainly as follows: valves with costa tending to be slightly wider, to have both sides parallel in outer one-half of costa, then constricted basally, producing an angle on outer margin; setae on inner face of valve slightly heavier; cristae fewer in number; vesica armed with spinose area, latter between one-sixth and one-seventh of length of aedeagus. Abdomen without row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 2.0 to 2.5 mm. in length; sterigma oval or elliptical in outline, longer than wide; anterior membranous projection longer than sterigma, with anterior portion sharply swollen; anterolateral areas of sterigma raised and rounded but not differentiated from central area; posterior end of sterigma tapered, with sharply pointed, V-shaped, median incision, its depth less than its width; ductus bursae with membranous portion shorter than sterigma, and with elongate, slender, well-sclerotized, and finely striate area extending almost to corpus bursae; ductus seminalis arising near swollen portion of corpus bursae; corpus bursae swollen, globular; signum elliptical, wider than long, central area smoothly sclerotized and with a few small teeth, posterior margin thickened and with strong teeth.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: This species was described from three males and one female. One of the male types was illustrated with the original de-

scription; this specimen is in the collection of the United States National Museum, and it is hereby designated as the lectotype. Its genitalia are mounted on slide E.L.T. No. 2066.

TYPE LOCALITY: San Bernardino, San Bernardino County, California.

DISTRIBUTION: Northern Baja California and California (see fig. 3). Specimens have been examined from as far north as San Benito and Monterey counties of the latter state.

TIME OF FLIGHT: This species has been captured in every month of the year.

REMARKS: One hundred eighteen specimens (106 males and 12 females, including the lectotype) and 20 genitalic dissections (16 males and four females) have been examined. Both *sanctissima* and *clivinaria impia* occur in southern California, and they fly together in some localities. The present species can be separated from *impia* by its smaller size, grayer coloration, more prominent and more widely separated cross lines on the forewings, and by the fact that the t. p. line is straighter.

There is some variation within *sanctissima*. Some of this appears to be geographic, as specimens from more arid areas tend to be paler and to have a slightly brownish tinge to the shade line distad to the t. p. line. Some of it seems to be seasonal, as specimens caught in mid-winter and in the early spring months tend to be larger and darker gray in color.

The genitalia of *sanctissima* show a very close similarity to those of *clivinaria*. The character by which to separate these species in the male most easily is the amount of spining in the vesica. The female structures of the present species can be recognized by the different configuration of both the sterigma and the signum.

Anacamptodes obliquaria (Grote)

Plate 23, figures 1, 2; text figures 3, 17, 39

Cymatophora (*Boarmia*) *obliquaria* GROTE, 1883, p. 124. RINDGE, 1955, p. 150.

Boarmia obliquaria: SMITH, 1891, p. 72.

Alcis obliquaria: DYAR, "1902" [1903], p. 321. SMITH, 1903, p. 76.

Cleora obliquaria: BARNES AND McDUNNOUGH, 1916, p. 185, pl. 13, figs. 15, 16 (male and female); 1917a, p. 117. WRIGHT, 1920, p. 488.

Anacamptodes obliquaria: McDUNNOUGH, 1920, p. 32, pl. 5, fig. 5 (male genitalia); 1938, p. 164.

Cymatophora (*Boarmia*) *rufaria* GROTE, 1883, p. 125.

Boarmia rufaria: SMITH, 1891, p. 72.

Cleora rufaria: DYAR, "1902" [1903], p. 326. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1916, p. 185 (synonym of *obliquaria*); 1917a, p. 117.

Anacamptodes rufaria: McDUNNOUGH, 1920, p. 32; 1938, p. 164.

This species is one of moderate size, the males being light gray with a well-defined pattern, and the females darker gray, with

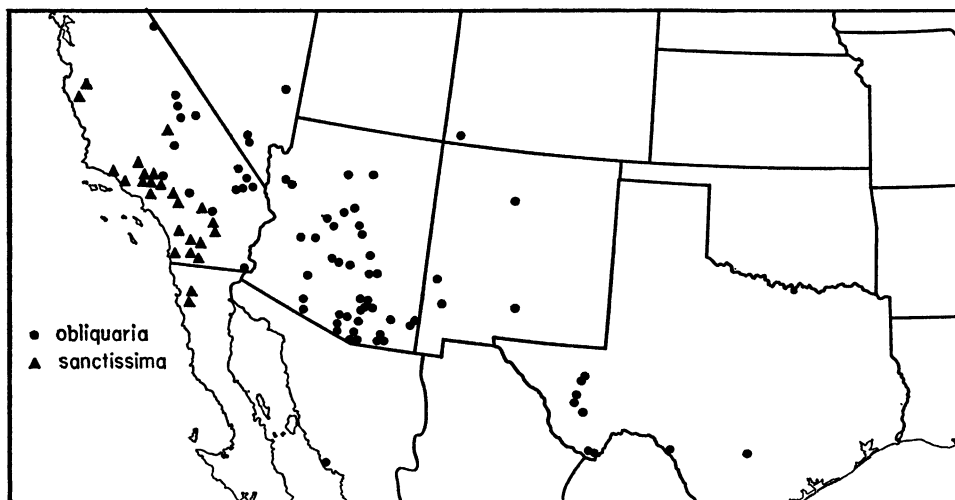


FIG. 3. Distribution of *Anacamptodes sanctissima* (Barnes and McDunnough) and *A. obliquaria* (Grote).

the pattern more or less obscured. The cross lines of the forewings are closer together than in *sanctissima*, and they are broadly shaded with brown. This taxon occurs from southern California to Texas.

MALE: Head with vertex white or pale grayish white, with scattered gray or grayish brown scales in some specimens, and with brownish black scales between antennal bases; front brownish black or brownish gray, with pale gray band across top and bottom; palpi barely extending beyond front, variable in color, with mixed pale gray, brownish gray, and brownish black scaling; antennae with longest pectinations between 0.8 and 0.9 mm. in length. Thorax and abdomen similar to those of *clivinaria*.

UPPER SURFACE OF WINGS: Forewings with ground color light gray or grayish white, variably overlain with grayish brown and dark brown scales; cross lines black, prominent in most specimens, with t. a. and t. p. lines rather close together, about 1.1 to 1.5 mm. apart in cubital cell in most specimens; course of cross lines as in *sanctissima* but with t. p. line tending to have two shallow but broad basal bends; t. p. line prominently shaded distally by broad brown or faintly orange-brown band; median line lying near t. p. line; subterminal area similar to that of *clivinaria*, with brownish black scaling in cells R_5 , M_1 , and M_2 ; terminal line and fringe similar to those of *sanctissima*, but with extra-discal line tending to be weakly concave and shaded distally with broad brown or faintly orange-brown band.

UNDER SURFACE OF WINGS: Pale gray, with variable amount of grayish brown scaling, more prominent on forewings than on hind wings; without maculation except for discal spots and terminal line.

LENGTH OF FOREWING: 14 to 18 mm.

FEMALE: Similar to male, but with upper surface of wings uniformly suffused with dark grayish brown scales, almost obliterating maculation; under surface more heavily suffused with dark scales also.

LENGTH OF FOREWING: 15 to 19 mm.

MALE GENITALIA: Very similar to those of *clivinaria*, differing mainly as follows: valves with costa having swelling near base on inner margin; inner face of costa with elongate,

slender setae near apex, becoming shorter and slightly thicker anteriorly; sacculus with large shoulder, and with outer portion extending as far as, or slightly beyond, apex of costa; vesica armed with single, large spine, occupying about one-fourth to one-third of length of aedeagus. Abdomen with rudimentary row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 2.2 to 3.0 mm. in length; sterigma more or less rectangular in outline, longer than wide, some specimens with median constriction; anterior membranous projection slightly longer than sterigma, with anterior portion swollen; surface of sterigma rounded, with dorsal sclerotized projection on each side near anterior end; posterior end of sterigma rounded, with prominent median indentation; ductus bursae with membranous portion slightly shorter than sterigma, and with elongate, slender, well-sclerotized, and finely striate area extending almost to corpus bursae; ductus seminalis arising near swollen portion of corpus bursae; corpus bursae large, swollen; signum elliptical, wider than long, central area smoothly sclerotized and with a few small teeth, outer margins thickened and with strong teeth.

EARLY STAGES: Undescribed.

FOOD PLANT: *Sapindus drummondii* Hooker and Arnott; reared by Mr. R. O. Kendall from Brewster County, Texas.

TYPES: Grote had at least two males and one female before him when he described *obliquaria*. One of the males is in the collection of the American Museum of Natural History (Rindge, 1955); a second male (without an abdomen) and the female are in the United States National Museum collection. The first-mentioned male is hereby designated as the lectotype.

Rufaria was described from a single female; this specimen is in the collection of the United States National Museum.

TYPE LOCALITIES: Arizona, for both *obliquaria* and *rufaria*.

DISTRIBUTION: This species is common in Arizona. It is also found, in fewer numbers, in southern and eastern California, southern Nevada, southern Utah, southern Colorado, New Mexico, and Texas (see fig. 3); in Mexico it is known from Sonora. It occurs in the Sonoran zone from the Mohave Desert of

California to the Trans-Pecos area and the Edwards Plateau in Texas.

TIME OF FLIGHT: From February into December.

REMARKS: Five hundred eighty-eight specimens (411 males and 177 females, including both primary types) and 31 genitalic dissections (21 males and 10 females) have been examined. There is some seasonal variation in the color and size of *obliquaria*. Specimens caught in the early spring months tend to be slightly larger and to be a darker gray than are examples taken later in the year.

This species is similar to *sanctissima*, but it can be recognized by its paler color, by the fact that the cross lines are closer together, and that the t. p. line is shaded distally by a prominent band of brown or orange-brown.

The genitalia are similar to those of the preceding species. The most obvious difference between the males is the presence of the large spine in the vesica of *obliquaria*. The female genitalia of the present species can be recognized by the more or less rectangular shape of the sterigma, by the long membranous posterior portion of the ductus bursae, and by the fact that the signum has a thickened rim all around.

Anacamptodes providentia, new species

Plate 23, figure 3; text figure 5

This species is small and pale, with weakly defined maculation which somewhat resembles that of *ephyraria* Walker, but the genitalia are almost indistinguishable from those of *obliquaria*. It is known only from southeastern California.

MALE: Head with vertex white or pale grayish white, with grayish brown scales between antennal bases; front grayish brown, with pale gray band across top and bottom; palpi barely extending beyond front, with mixed pale gray and brownish gray scaling; antennae with longest pectinations between 0.8 and 0.9 mm. in length. Thorax pale grayish white above, with scattered grayish brown scales, these tending to be concentrated on collar and posteriorly; below, and legs, paler, latter with some brown scaling. Abdomen above pale grayish white, with scattered brownish gray and brownish black scales, anterior margin of first segment with narrow black band, posterior margins of all segments

narrowly grayish brown, and with dark scales tending to be concentrated dorsally on posterior margins of some segments as paired spots; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color pale gray, more or less evenly overlain with grayish brown scales; cross lines dark brownish gray, narrow, tending to be obsolescent in cells but represented on veins; course of cross lines apparently as in *sanctissima*, but closer together, and with t. p. line having two broad basal bends; t. p. line shaded distally by broad band of brownish gray; discal spots large, brownish gray, with center of ground color or white; subterminal area, terminal line, and fringe similar to those of *obliquaria*, but with s. t. line absent or obsolescent. Hind wings similar to those of *sanctissima*, but with large, prominent, ocellate, discal spot.

UNDER SURFACE OF WINGS: Pale gray, with variable amount of grayish brown scaling, more prominent on forewings than on hind wings; without maculation except for discal spots and terminal line.

LENGTH OF FOREWING: 13 to 16 mm.; holotype, 14 mm.

FEMALE: Similar to male, but slightly more heavily overlain with dark brownish gray scales above, and with brownish gray scales below; under surface with faint, dark, subterminal band on upper part of forewings.

LENGTH OF FOREWING: 15 (allotype) to 16 mm.

MALE GENITALIA: Very similar to those of *obliquaria*, but with costal section of valves tending to be slightly thinner and having more noticeable basal constriction, and with sacculus evenly curved and slightly shorter, measuring between 1.5 and 1.6 mm. in length between apex of sacculus and base of valve at midline in a straight line (as opposed to 1.8 and 1.9 mm. for same measurement in *obliquaria*). Abdomen with rudimentary row of bristles on segment A_3 .

FEMALE GENITALIA: Very similar to those of *obliquaria* but smaller, with apophyses posteriores 2.0 mm. in length, with sterigma slightly narrowed anteriorly, and with signum smaller and with fewer and smaller marginal teeth.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, and allotype, female, Providence Mountains, San Bernardino County, California, May 7, 1939 (L. M. Martin). Paratypes: Same data as types, four males, one female; Needles, San Bernardino County, California, April 4, 1937 (R. H. Andrews and L. M. Martin), one female; Blythe, Riverside County, California, November 9, 1936 (G. H. and J. L. Sperry), one male. The holotype and allotype are in the collection of the Los Angeles County Museum; the paratypes are in the collections of that institution, of the American Museum of Natural History, and of C. W. Kirkwood.

In addition to the type series, a pair of specimens of this species labeled Grover City, California, June 27, 1948 (W. B. Andahl), are in the American Museum of Natural History, *ex* collection G. H. and J. L. Sperry. This locality in coastal San Luis Obispo County is in the Idrian District of the Californian Province (Schick, 1965), which is a very different biotic province from that in which the types of *providentia* were taken. This record may be correct, but it seems unlikely; it should be verified before it is accepted.

DISTRIBUTION: This species is known only from the eastern portions of San Bernardino and Riverside counties, California (see fig. 5). This is the Yuman District of the Sonoran Province (Schick, 1965).

TIME OF FLIGHT: April, May, and November.

REMARKS: Eleven specimens (seven males and four females) and six genitalic dissections (five males and one female) have been examined. The genitalia of this species are very similar to those of *obliquaria*, but the two taxa are easily distinguished by their size, color, and maculation. The present species is smaller and paler than *obliquaria*, the cross lines are less strongly represented, with the t. p. line more sinuous in course, and the discal spots are much larger and more prominent.

It is interesting to note that two of the three males that were dissected had virtually no trace of the row of bristles on segment A_3 of the abdomen, while the third had this row weakly indicated. The last specimen has the row incomplete, as only those setae in the central portion of the row are represented.

This rudimentary condition is also found in *obliquaria*, and it forms the transition to the following group, where the row of bristles is well developed.

***Anacamptodes sancta*, new species**

Plate 23, figure 4; text figures 5, 18, 40

This species has gray wings and a relatively straight t. p. line. It resembles *sanctissima* in appearance, but the males have both the row of bristles on the ventral surface of the third abdominal segment and a tibial hair pencil. This taxon is known only from Arizona.

MALE: Head with vertex and front pale grayish white, with narrow black band between bases of antennae and with very broad black or brownish black band across front; palpi rising to middle of eye, covered with mixed pale gray, dark gray, and brownish black scales; antennae with longest pectinations about 0.75 mm. in length. Thorax grayish white above, with scattered black scales; tip of collar black in many specimens; beneath gray; legs grayish white, with variable amount of brown and brownish black scaling; hind tibia with hair pencil. Abdomen pale gray, variably overlain with grayish brown and brownish black scales above, latter tending to be concentrated on posterior portions of segments producing bands, and with base of first segment with black stripe.

UPPER SURFACE OF WINGS: Forewings with ground color light gray, variably overlain with dark gray and dark brownish gray scales, particularly in outer portion of wing; cross lines black, similar to those of *sanctissima*; discal spot absent or obsolescent; t. p. line varying from almost straight to weakly biconcave; cross lines shaded by dark grayish brown band, varying in strength from prominent to obsolescent; outer portion of subterminal area heavily shaded with dark brownish gray scales, divided by scalloped s. t. line of ground color; terminal line narrow, black, with intravenular spots; fringe concolorous with wing, slightly darkened opposite vein endings. Hind wings concolorous with forewings; basal line present; intradiscal line variable in intensity, present in lower one-half of wing in most specimens; discal spot weakly represented; extradiscal

line obsolescent in upper portion of wing, curved anteriorly, then extending straight across wing, and shaded distally by dark grayish brown band; outer portion of wing similar to that of forewing but with s. t. line straighter and with terminal line more strongly represented.

UNDER SURFACE OF WINGS: Pale grayish white, overlain with brownish gray scales, these more prominent on forewings than on hind wings; without maculation except for discal dots on secondaries and for narrow terminal line.

LENGTH OF FOREWING: 15 to 18 mm.; holotype, 17 mm.

FEMALE: Similar to male but tending to be somewhat more heavily overlain with dark gray scales above and below.

LENGTH OF FOREWING: 15 to 18 mm.; allotype, 16 mm.

MALE GENITALIA: Uncus of moderate length, tapering to widely and deeply separated apices, depth of area between points slightly greater than distance between them; valves with costa elongate, basal portion narrowed; outer portion of inner face of costa covered with slender setae, these becoming thicker on slight swelling at middle of outer margin; sacculus heavily sclerotized, basal portion with prominent shoulder, outer part attenuate, needle-like, sharply curved, and with apex shortly recurved, not attaining apex of costa; cristae inconspicuous, variable in number; aedeagus with posterior end bluntly pointed; vesica with small row of spines. Abdomen with prominent row of bristles on segment A_3 .

FEMALE GENITALIA: Apophyses posteriores 2.1 to 2.4 mm. in length; sterigma roughly square or rectangular in outline, with constriction of lateral margins anteriorly of middle and with bluntly tapering posterior portion; anterior membranous projection large, square or rectangular, subequal in size to sterigma; sterigma with lateral margins extended dorsally from anterior part; posterior end of sterigma with prominent, V-shaped incision; ductus bursae with membranous portion extending to anterior margin of sterigma, followed by sclerotized and striate section gradually increasing in width anteriorly, not reaching corpus bursae; ductus seminalis arising at anterior end of

sclerotized area; corpus bursae large, globular; signum elliptical, slightly wider than long, central area with several teeth or small ridges, outer margin thickened and variably dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, and allotype, female, Chiricahua National Monument, Cochise County, Arizona, July 15, 1948 (C. and P. Vaurie). Paratypes, all from Arizona: Same data as types, one male and eight females; Southwestern Research Station of the American Museum of Natural History, 5 miles west of Portal, Cochise County, elevation 5400 feet, April 21, 25, 1956 (Cazier and Ordway), two males, June 24, 1957 (M. Statham), one female, July 5, 1956 (C. and M. Cazier), one male; Prescott, Yavapai County, elevation 5400 feet, various dates between June 22 and July 21, 1961 (R. F. Sternitzky), three males and nine females; Mayer, Yavapai County, elevation 4300 feet, February 13, March 8, and April 5, all 1961 (R. F. Sternitzky), three males; Todd's Lodge, Oak Creek Canyon, Coconino County, June 15-17, 1946 (G. H. and J. L. Sperry), three males and one female; Sedona, Coconino County, April 12, 1954 (O. Buchholz), one male; Payson, Gila County, July 1, 1956 (L. M. Martin, J. A. Comstock, and W. A. Rees), five males; Pine Camp Ground, Pine, Gila County, elevation 5395 feet, June 24, 1957 (L. M. Martin, R. J. Ford, W. A. Rees), one male; Tonto Creek Camp Ground, near Kohls Ranch, Gila County, June 28, 1956 (L. M. Martin, J. A. Comstock, W. A. Rees), one female; Hualpai Mountain Park, Mohave County, elevation 7000 feet, May 3, 1963, July 20, 1957 (R. H. Leuschner), three males and two females.

The holotype and allotype are in the collection of the American Museum of Natural History; the paratypes are in the collections of that institution, of the Los Angeles County Museum, of R. H. Leuschner, and of C. W. Kirkwood.

DISTRIBUTION: Arizona (see fig. 5).

TIME OF FLIGHT: The adults begin flying as early as mid February and are on the wing through the month of July.

REMARKS: Forty-seven specimens (25 males and 22 females) and 10 genitalic dis-

sections (six males and four females) have been studied. This species closely resembles *sanctissima* in appearance but can be separated from it by the presence of the tibial hair pencil in the male.

The genitalia of this species are also similar to those of the *clivinaria-obliquaria* group. The present taxon can be separated from that complex by the presence of the prominent row of bristles on segment A_3 in the males. The female genitalia can be recognized by the rectangular membranous projection of the sterigma, by the median constriction, and by the more tapered posterior margin of the sterigma.

GROUP II

All the species in this group have a biconcave t. p. line on the upper surface of the forewings. The males of each species have a hair pencil in the swollen hind tibia. The adults vary in size from very small to large, with the length of the forewings ranging from 11 to 22 mm. The wings are various shades of pale gray or dark gray on the upper surface, and in several species they are suffused with a purplish gray. The maculation is distinct in most species, and the sexual dimorphism present in many species of group I is not noticeable.

The male genitalia of this group are similar to those of group I in that they have, in each species, a short and squat uncus, but they can be separated by the presence of the prominent row of bristles on the ventral surface of the third segment. The dorsal, spine-like projections of the uncus are like those of group I. The aedeagus may or may not have spines in the vesica; the species are about evenly divided numerically as to this character.

The female genitalia of the species of this group are similar to those of group I. However, most of the species have the lateral margins of the sterigma extending dorsally as pointed or rounded projections.

There are 10 species in group II; one of them is polytypic. The species of this group are to be found primarily in eastern North America and Mexico. Three species are found in eastern North America, from southern Canada to Florida and Texas. One is from the southeastern United States; another is

known only from southern Texas. Three taxa are found in Mexico, and one of these extends south into Costa Rica. One species is found on Hispaniola, the only known taxon in this genus to be found in the Antilles. The last species is found in California and Baja California, and it has recently been introduced into Hawaii.

Anacamptodes pergracilis (Hulst)

Plate 23, figures 5, 6; text figures 4, 19, 41

Synelys pergracilis HULST, 1900, p. 105. DYAR, "1902" [1903], p. 292. SMITH, 1903, p. 30. RINDGE, 1955, p. 152.

Cleora pergracilis: BARNES AND McDUNNOUGH, 1917a, p. 118. GROSSBECK, 1917, p. 98.

Anacamptodes pergracilis: McDUNNOUGH, 1920, p. 32, pl. 5, fig. 7 (male genitalia), pl. 8, fig. 7 (male); 1938, p. 164. KIMBALL, 1965, p. 182, pl. 6, fig. 12 (female).

This is a small (male) to medium-sized (female) pale gray species that has either reddish brown or dark brown scaling in the basal and outer portions of the wings. It occurs in the southeastern United States.

MALE: Head with vertex and front white or grayish white, with narrow band of dark brown scales between bases of antennae and with broad band of brownish gray and dark brown scales across front; palpi extending beyond front, rising to middle of eye, whitish gray basally, becoming brownish black distally; antennae with longest pectinations about 1.0 or 1.1 mm. in length. Thorax white or grayish white above and below, with grayish brown scales on collar and across patagia in narrow band; legs grayish white, with brownish black scales on prolegs. Abdomen white or grayish white, with narrow black band at base of first segment above, and with pale brownish gray scaling on posterior margins of segments dorsally in some specimens.

UPPER SURFACE OF WINGS: Forewings with ground color grayish white, with much of basal and outer areas of wings broadly overlain with pale brown, reddish brown, or brownish black scales; cross lines blackish brown, narrow, complete in most specimens; t. a. line arising on costa between one-fourth and one-third of distance from base, angled outwardly past radial vein, then sharply curved posteriorly and extending in curve

toward base of wing, with weak inward bends on veins; discal spot and median line absent or obsolescent; t. p. line arising on costa two-thirds of distance from base, curving outwardly in cells R_5 and M_1 , with basal bend on vein M_1 , turning basad and, with two broad basal loops, reaching inner margin approximately in center; both t. a. and t. p. lines broadly shaded with dark scales; subterminal area broad, many specimens with dark scaling in cells R_5 and M_1 ; s. t. line, when present, of ground color; terminal line absent from some specimens, incompletely represented in others, and with large, black or blackish brown, intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; basal line present; intradiscal line weakly indicated or obsolescent; discal spot large, dark brown, with center of ground color; extradiscal line complete, weakly represented in anterior part of wing in some specimens, with basal bend near anal angle, and shaded distally like t. p. line; subterminal area, terminal line, and fringe similar to those of forewing but with s. t. line tending to be more strongly represented.

UNDER SURFACE OF WINGS: Pale gray, with forewings overlain with pale brownish gray scales; without maculation except for discal dots and terminal intravenular spots.

LENGTH OF FOREWING: 11 to 15 mm.

FEMALE: Similar to male but larger; under surface of wings with broad subterminal band and, in some specimens, traces of t. p. line on forewing.

LENGTH OF FOREWING: 13 to 18 mm.

MALE GENITALIA: Similar to those of *dataria*, differing mainly as follows: uncus with lateral margins tending to be more convex and with apices farther apart; valves with costa more slender and with slightly narrowed and sclerotized base, having small but prominent swelling slightly basad of middle of anterodistal margin; outer one-half of inner face of costa covered with slender setae, and with spines on swelling; sacculus with outer, needle-like portion very slender, tip pointing at anterodistal margin just posteriad of swelling; vesica either unarmed or with a poorly defined group of small weakly sclerotized spines.

FEMALE GENITALIA: Apophyses posteriores 2.9 to 3.5 mm. in length; sterigma

elliptical in outline, wider than long, with anterolateral margins extending dorsally; anterior membranous projection slightly longer than sterigma; sterigma with anterolateral areas slightly swollen; posterior end of sterigma rounded, with broad, shallow, median indentation; ductus bursae with membranous portion slightly longer than sterigma, followed by short, smoothly sclerotized section, then by weakly sclerotized and striate area, extending about one-half of length of ductus bursae, gradually increasing in width anteriorly; ductus seminalis arising about midway between smoothly sclerotized area and corpus bursae; latter relatively small; signum elliptical, slightly wider than long, central area either smoothly sclerotized or with a few weak teeth, lateral and posterior margins thickened and with strong teeth.

EARLY STAGES: Undescribed.

FOOD PLANT: *Taxodium distichum* Linnaeus.

TYPE: Hulst apparently described this species from a single specimen; this male is now in the collection of the American Museum of Natural History (Rindge, 1955, p. 152). It is not in the best of condition, as the head, some of the thorax, all the abdomen, and the left hind wing are missing. However, the three wings that are left are in excellent condition, and they enable one to recognize the species without difficulty.

TYPE LOCALITY: South Florida, according to the original description. The type is without any locality data.

DISTRIBUTION: This species is widespread in Florida but apparently not very common. It is also known to occur in eastern Virginia, Georgia, Louisiana, and in Texas (see fig. 4), and it will probably be found in the intervening states wherever its food plant occurs.

TIME OF FLIGHT: Specimens have been examined that were captured from December through September; in addition, Kimball (1965, p. 182) reported November. Most material was taken in March, April, and May, which undoubtedly indicates when the collectors were active, rather than being a true picture of the time of flight of the moth.

REMARKS: Forty-nine specimens (17 males and 32 females, including the type) and 13 genitalic dissections (eight males and five females) have been studied. This species can

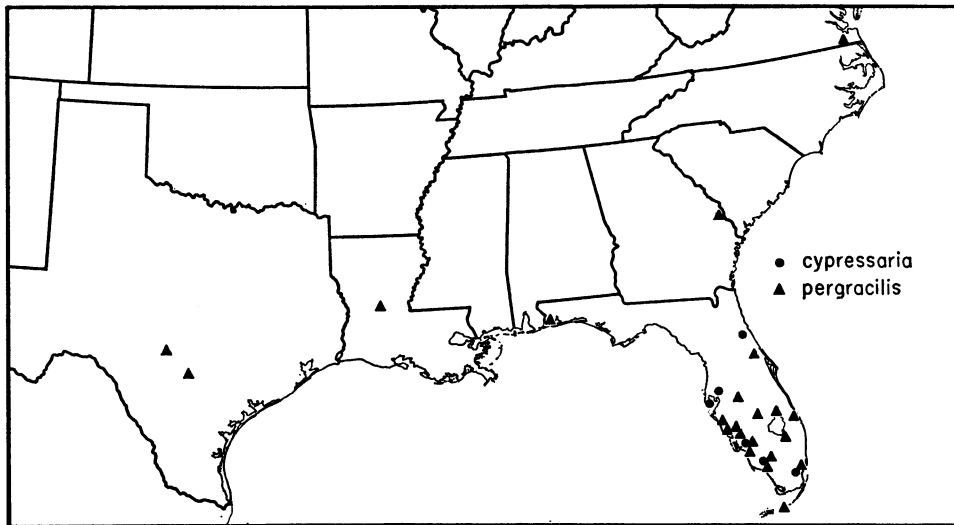


FIG. 4. Distribution of *Anacamptodes cypressaria* (Grossbeck) and *A. pergracilis* (Hulst).

be recognized by the broad, pale median area of the upper surface of the wings and by its small size.

The genitalia of *pergracilis* are similar to those of *dataria*. The male structures of the present species can be recognized by the narrower costa, with the constricted basal portion, by the more prominent and spinose swelling on the outer margin of that structure, and by the presence of the row of bristles on segment A_3 .

The female genitalia can be separated from the same structures of *dataria* by the longer apophyses posteriores, the more posterior point of origin of the ductus seminalis, and by the thicker posterior margin of the signum.

This species is dimorphic in its coloration (Grossbeck, 1917, p. 98; Kimball, 1965, p. 182). Possibly such dimorphism is seasonal, but we do not have enough dated specimens to be certain that it is so. Specimens caught in mid-winter and in the early spring months are broadly suffused with reddish brown in the basal and outer portions of the wings; examples from the summer months have the cross lines shaded with dark brown.

***Anacamptodes perfectaria* McDunnough**

Plate 23, figures 7, 8; text figures 5, 20, 42

Anacamptodes defectaria McDUNNOUGH (nec Guenée), 1920, p. 30 (*partim*), pl. 8, fig. 9 (holotype of *perfectaria*).

Anacamptodes perfectaria McDUNNOUGH, 1940, p. 92, fig. 2 (male genitalia).

This is a small to moderate-sized species that occurs in Texas and northern Mexico. It is pale in color and has a strongly sinuate t. p. line that is shaded distally by brown.

MALE: Head, thorax, and abdomen similar to those of *pergracilis* but tending to have more dark scaling; antennae with longest pectinations about 0.8 to 0.9 mm. in length; abdomen above with first segment paler than others, and with paired brownish gray spots posteriorly on each segment in most specimens.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray or pale gray, variably overlain with grayish brown, dark brown, and ochraceous brown scales; cross lines black, represented by spots on costa, narrow, complete in most specimens, with t. a. and t. p. lines strongly shaded by brown bands; t. a. line arising on costa about one-third of distance from base, crossing radial vein at right angle to costa, curving outwardly for short distance in cell, then extending to inner margin in gentle curve; median line arising on costa one-half of distance from base, swinging outward to form outer margin of large, more or less circular, discal spot, with inner margin of spot obsolescent in some specimens; median line continuing posteriorly to inner margin, roughly paralleling

t. p. line; t. p. line arising on costa two-thirds to three-fourths of distance from base, curving outwardly in cell R_5 and on vein M_2 , with basal bend on vein M_1 , turning and reaching inner margin just distad of middle after prominent basal bends on veins Cu_1 and $2A$, with dual outwardly directed points in cells Cu_1 and Cu_2 ; veins tending to be ochraceous in outer part of wing; subterminal area narrower than in preceding species, tending to have dark scaling opposite outward points of t. p. line; s. t. line of ground color, crenulate, obsolescent in some specimens; terminal line black, slender, in some obsolescent, with strong intravenular dots; fringe concolorous with wing, with large dark areas at vein endings. Hind wings concolorous with forewings; basal line present; intradiscal line more or less weakly indicated in lower portion of wing; discal spot large, weakly indicated in some specimens, with center of ground color; extradiscal line complete, with outwardly directed points on radial vein and in cell M_1 , then gently concave to anal vein; extradiscal line shaded distally like t. p. line; subterminal area similar to that of forewing but with s. t. line tending to be more strongly represented; terminal line and fringe similar to those of forewing but with former tending to be more strongly represented.

UNDER SURFACE OF WINGS: Pale gray, with forewings above middle of cell Cu_2 overlain with brownish gray scales; forewings with large discal spot and subterminal band in upper part of wing; hind wings with discal spot obsolescent or absent; all wings with narrow terminal line, obsolescent in some specimens, and intravenular spots.

LENGTH OF FOREWING: 12 to 17 mm.

FEMALE: Similar to male, but with upper surface of wings more heavily and more evenly overlain with dark grayish brown scales, and with maculation less clearly represented; under surface with subterminal band of forewings tending to be more sharply defined.

LENGTH OF FOREWING: 15 to 20 mm.

MALE GENITALIA: Similar to those of *dataria*, differing mainly as follows: uncus longer, with width of projecting part equal to its length; valves with costa weakly capitate, with small swelling on inner surface

near anterodistal margin about three-fifths of distance from base; inner face of terminal portion of costa covered with slender setae on distal one-half, these becoming thicker on swelling; sacculus with raised transverse ridge at shoulder, outer portion laterally flattened and slightly concave on inner surface, tapering distally to sharply and evenly curved point, with tip pointing at swelling on anterodistal margin of costa; anellus enlarged distally; vesica unarmed.

FEMALE GENITALIA: Apophyses posteriores 2.4 to 2.9 mm. in length; sterigma small, elliptical or rectangular in outline, wider than long, with median lateral margins extended dorsally; anterior membranous projection longer and narrower than sterigma; posterior end of sterigma with broad, shallow, median indentation; ductus bursae with membranous portion longer than sterigma, and with elongate, slender, sclerotized, and finely striate area extending almost to corpus bursae; ductus seminalis arising near swollen portion of corpus bursae; corpus bursae swollen, globular; signum elliptical, wider than long, variable in size and ornamentation, central area with numerous small teeth, lateral and posterior margins thickened and with many strong teeth.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: The holotype male is in the Canadian National Collection, Ottawa; the allotype female is in the collection of the United States National Museum.

TYPE LOCALITY: Brownsville, Cameron County, Texas.

DISTRIBUTION: Texas (see fig. 5) and northern Mexico (the state of San Luis Potosi). Virtually all the specimens examined have been from the Rio Grande plains area of southern Texas. A few examples have been taken in the adjacent sections of the Blackland Prairies and the Edwards Plateau areas of that state.

TIME OF FLIGHT: The moths fly in every month of the year.

REMARKS: One hundred sixty-one specimens (107 males and 54 females, including the holotype) and 29 genitalic dissections (15 males and 14 females) have been studied. This species can be distinguished from *pergracilis* by its larger size, paler coloration,

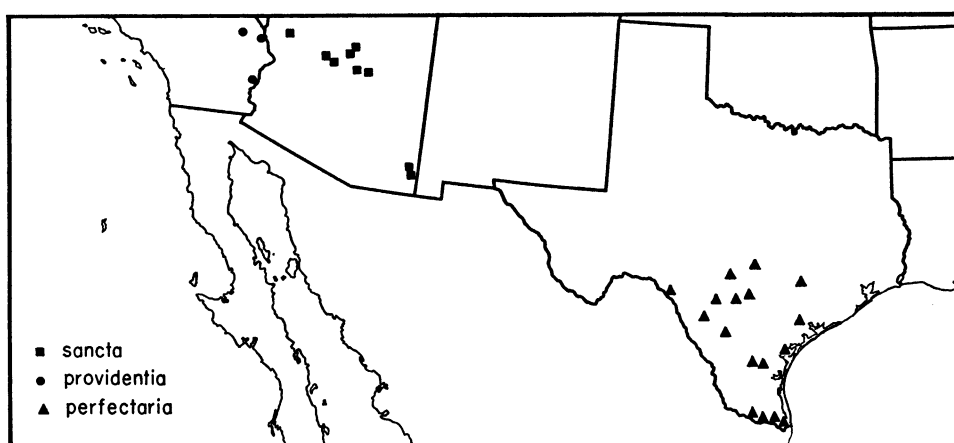


FIG. 5. Distribution of *Anacamptodes providentia*, new species, *A. sancta*, new species, and *A. perfectaria* McDunnough. The last species also occurs in San Luis Potosi, Mexico.

and by the fact that the t. p. line is much more strongly sinuous in its course.

The genitalia of *perfectaria* are similar to those of *pergracilis*. The male structures can be recognized by the broad, sharply curved sacculus and by the different shape of the costa. In the female, the genitalic structures of the present taxon can be separated from those of *pergracilis* by the different shape of the sterigma and by the fact that the ductus bursae is longer and sclerotized for a greater length in *perfectaria*.

***Anacamptodes encarsia*, new species**

Plate 23, figure 9; text figure 21

This species can be separated from *perfectaria* by genitalic characters. In size, color, and maculation these two taxa are very similar. The present species is known only from Yucatan, Mexico.

MALE: Head, thorax, and abdomen similar to those of *perfectaria* but with fewer dark scales, and with front whitish gray, without broad, dark, transverse band across center; antennae with longest pectinations about 0.75 mm. in length.

UPPER SURFACE OF WINGS: Very similar to those of *perfectaria*, tending to differ as follows: less heavily overlain with dark scales; cross lines thinner, usually one scale in width (as opposed to two or more scales in width in most places on many specimens of *perfectaria*); forewings with cross lines more

sharply angled basally, with t. p. line reaching inner margin just basad of middle; t. a. and t. p. lines narrowly shaded with dark brownish gray; subterminal area wider, with less strongly crenulate s. t. line; terminal line interrupted in middle of cells, with intravenular spots set in from margin of wing by width of three or four scales on forewings, and by two or three scales on hind wings; hind wings with extradiscal line with outwardly directed points on veins R and M₁, then noticeably concave to anal margin.

UNDER SURFACE OF WINGS: Similar to that of *perfectaria*; forewings with strong subterminal band and with prominent discal spot; terminal line and intravenular spots more strongly represented than in *perfectaria*.

LENGTH OF FOREWING: 14 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *perfectaria*, differing mainly as follows: valves more strongly capitate, narrowest in middle, gradually increasing in width toward sacculus, with sclerotized basal area extending to small swelling on inner surface near antero-distal margin about three-fifths of distance from base, leaving membranous circular area at end of costa; membranous area covered with slender setae, these becoming thicker and shorter on swelling and on sclerotized area; sacculus without separate, shoulder-like protuberance, curving evenly from junction from costa, outer portion broadly

flattened, of equal width almost to end, then sharply tapered to point, latter directed at swollen area of costa; vesica unarmed.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Holotype, male, Pisté, Yucatan, Mexico, June 4, 1959 (C. and P. Vaurie); in the collection of the American Museum of Natural History.

DISTRIBUTION: This species is known only from the unique type, taken in central Yucatan.

TIME OF FLIGHT: June.

REMARKS: One specimen and one genitalic dissection have been examined. This species and *perfectaria* are very much alike in size, color, maculation, and genitalia, as far as can be determined from the single specimen of *encarsia*. More material of the present species is needed so that the degree of individual variation within this taxon can be ascertained.

With the limited material on hand, it is probably safest to separate the two species by means of the male genitalia. The more noticeable differences are to be found in the shape of the costa and sacculus.

Anacamptodes vellivolata (Hulst)

Plate 24, figures 1, 2; text figures 6, 22, 43

Cymatophora humaria PACKARD (*nec* Guenée), 1876, p. 435, (*partim*), pl. 11, fig. 22 (male).

Synopsia humaria: GUMPENBERG, 1892, p. 330 (*partim*).

Macaria vellivolata HULST, 1881, p. 34. ANON., 1882, p. 23. Rindge, 1955, p. 155.

Semiothisa vellivolata: HULST, 1887, p. 223.

Cleora vellivolata: DYAR, "1902" [1903], p. 326. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1916, p. 185; 1917a, p. 117. GROSSBECK, 1917, p. 99. MOORE, 1955, p. 71.

Anacamptodes vellivolata: McDUNNOUGH, 1920, p. 31, pl. 5, fig. 1 (male genitalia); 1938, p. 164. FORBES, 1928, p. 603; 1948, p. 56, fig. 77 (right valve of male genitalia). JERREL AND JAKES, 1944, p. 465. FERGUSON, 1954, p. 316, pl. 16, fig. 6 (male). PRENTICE, 1963, p. 455, fig. 286 (distribution in Canada). KIMBALL, 1965, p. 181, pl. 6, fig. 16 (male).

Anacamptodes vellivolata (*sic!*): PROCTER, 1938, p. 239; 1946, p. 278.

This is a large, bluish or purplish gray species with reddish brown shadings to the

transverse lines of the forewings, and with a unicolorous abdomen. It occurs in eastern North America.

MALE: Head with vertex and front brownish gray, with dark brown or blackish brown scales between bases of antennae and as wide band across front; palpi rising to middle of eye, covered with dark gray and brownish gray scales; antennae with longest pectinations about 0.9 mm. in length. Thorax and abdomen unicolorous brownish gray; below, and legs, slightly paler, latter with some dark brown scaling.

UPPER SURFACE OF WINGS: Forewings with ground color bluish or dull purplish gray, with broad, somewhat nebulous, reddish brown shading to t. a. and t. p. lines, and with some scattered dark scaling in basal and subterminal areas; cross lines variable in intensity, ranging from black, complete and prominent, to obsolescent; t. a. line arising on costa one-fourth to one-third of distance from base, crossing radial vein at acute outward angle, then sharply angled in cell and curving to inner margin; median line weaker and more diffuse than other cross lines, arising in middle of costa, curving outward to include rather poorly defined but large discal spot, then extending posteriorly, becoming very close to or merging with t. p. line above inner margin; t. p. line arising on costa two-thirds to three-fourths of distance from base, extending at right angle to costa to cell M_1 , with inward scallops on veins R_5 and M_1 , then curving and subparalleling outer margin, with two basal bends, and swinging sharply outwardly to meet inner margin; subterminal area darker in color than median area, with s. t. line obsolescent; terminal line represented by dark intravenular spots, set back from wing margin two to four scale rows in many specimens; fringe concolorous with wing. Hind wings concolorous with forewings; basal line absent or obsolescent; intradiscal line varying from obsolescent to complete, when present tending to be rather broad and nebulous; discal spot large, elliptical, obsolescent in some specimens; extradiscal line complete, basically straight in course but tending to be weakly concave in cells; extradiscal line broadly shaded outwardly with reddish brown; subterminal area, terminal line, and fringe similar to those of

forewing but with s. t. line tending to be more strongly represented.

UNDER SURFACE OF WINGS: Unicolorous grayish brown, with discal spot of forewings weakly indicated; t. p. line and faint subterminal band in anterior part of wing weakly indicated in some specimens.

LENGTH OF FOREWING: 15 to 20 mm.

FEMALE: Similar to male, but with maculation less strongly defined above; under surface darker gray, with all discal dots represented, and with dark, nebulous, subterminal band on all wings.

LENGTH OF FOREWING: 16 to 21 mm.

MALE GENITALIA: Similar to those of *perfectaria*, differing mainly as follows: uncus with broader base; costa with basal portion sclerotized, with constriction in outer margin and with small swelling on inner margin, both at about one-third of length of costa; distal portion of costa weakly convex on outer margin, and with weak swelling on inner face near outer margin about middle of costa; inner face of terminal one-half of costa covered with elongate setae, these becoming shorter and slightly thicker on swelling; sacculus with prominent projection distad of base of costa, continuing anteriorly as broad ridge to dorsal margin of sacculus, outer portion needle-like, very long, broadly curving posteriorly, and with apex recurved outwardly, extending at least as far as apex of valves in most specimens; cristae with approximately 30 to 35 setae on each side; vesica either unarmed or with weakly defined row of spines.

FEMALE GENITALIA: Apophyses posteriores 2.4 to 2.9 mm. in length; sterigma rounded or slightly elliptical in outline, with median lateral margins extended dorsally; anterior membranous projection roughly rectangular in outline, slightly longer than sterigma; sterigma with anterior end varying from flat and truncate to having anterolateral areas swollen and with depressed median area; posterior end of sterigma rounded, with prominent median indentation; ductus bursae with membranous portion extending to about anterior margin of sterigma, and with elongate, slender, slightly laterally compressed, sclerotized, and finely striate area extending almost to corpus bursae, with dorsal surface tending to be more mem-

branous than ventral side; ductus seminalis arising posteriad of swollen portion of corpus bursae; corpus bursae swollen, globular; signum elliptical, wider than long, in some specimens only slightly so, variable in size and ornamentation, central area with some small teeth, lateral and posterior margins thickened and with many strong teeth.

EARLY STAGES: The eggs and all larval instars were described by McDunnough (1920, p. 31). The mature caterpillar is cylindrical, with a prominent, warty, lateral flange and raised subdorsal warts. The body is reddish brown, heavily mottled and banded with purple, especially laterally, so that the reddish brown is largely restricted to large, diamond-shaped, dorsal patches. Yellow patches around the spiracles are bordered posteriorly by black. The species overwinters in the pupal stage in the north.

FOOD PLANTS: Various conifers, primarily pine. The larvae also feed on spruce, tamarack (larch), and fir (Prentice, 1963, p. 455).

TYPE: Hulst described *vellivolata* from a single female; this specimen is in the collection of the United States National Museum. It is type no. 34279; its genitalia are mounted on slide E.L.T. No. 2064.

TYPE LOCALITY: Florida.

DISTRIBUTION: Eastern North America (see fig. 6). The species occurs from southern Florida and eastern Texas north to southern Canada. In Canada it extends from Newfoundland west to central Saskatchewan (Prentice, 1963, fig. 286). Jones (1951, p. 132) recorded it from central British Columbia, but this record needs to be verified.

TIME OF FLIGHT: In the south the adults are on the wing throughout the year. In the north they fly from April into August.

REMARKS: Two hundred twenty specimens (170 males and 50 females, including the type) and 18 genitalic dissections (eight males and 10 females) have been examined. This species cannot be confused with any of the preceding taxa. Both it and *pergracilis* occur in the southeastern United States; the present taxon is much larger and darker than *pergracilis*.

The male genitalia of *vellivolata* can be distinguished from these structures of all the preceding species by the more complex costa and by the longer sacculus. The female



FIG. 6. Distribution of *Anacamptodes vellivolata* (Hulst) and *A. ephyraria* (Walker) in the United States.

genitalia can be recognized by the larger and more heavily sclerotized sterigma and their having a deeper posterior median indentation.

There is some variation within this species as to the maculation. Some specimens have the t. a. and t. p. lines of the forewings weakly represented, and these examples tend to be rather evenly colored and to have a relatively straight extradiscal line on the secondaries. Other individuals have the cross lines more heavily represented and tend to have the upper surface of the wings more contrastingly colored and to have a curved extradiscal line. Specimens from Florida and the southeastern United States often fall into the first category, whereas series of examples from Texas and New Jersey, for instance, have both types. Northern specimens, such as

those from Quebec, Ontario, and Wisconsin, tend to have a well-defined pattern, with the median area of the forewings and the basal portion of the hind wings above usually lighter in color than the adjacent areas. Unfortunately we do not have series of specimens from the central portion of the range of *vellivolata*, so that the extent and distribution of the two types of maculation cannot be ascertained at present.

***Anacamptodes monticola*, new species**

Plate 24, figure 3; text figure 23

This species is similar to *vellivolata* but can be distinguished from that taxon by the broader subterminal areas of all wings above, and by the genitalia. It occurs on the island of Hispaniola.

MALE: Head and thorax similar to those of

vellivolata but with shorter palpi and with collar grayish brown distally.

UPPER SURFACE OF WINGS: Forewings similar to those of *vellivolata* but with t. a. line absent and with t. p. line situated more basally, thus leaving broader subterminal area; median line arising basad of middle of costa, crossing into cell at right angle to costa, then subparalleling t. p. line to middle of cubital cell, curving outwardly and meeting t. p. line above anal vein, then angled basally to inner margin; discal spot obsolescent, midway between median and t. p. lines; t. p. line arising on costa three-fifths of distance from base, extending at right angle to costa to vein M_2 , then curving and subparalleling outer margin, with two basal bends, swinging posteriorly to meet middle of inner margin; subterminal area very broadly suffused with reddish brown scales distad of t. p. line, extending about one-third of width of subterminal area, with dull grayish brown scaling posteriad of reddish brown band in upper portion of wing; s. t. and terminal lines absent, but with faint grayish brown intravenular spots; fringe concolorous with wing. Hind wings similar to those of *vellivolata* but tending to be paler basally; discal spot absent; intradiscal line weakly represented; extradiscal line in middle of wing, straight in course; outer portion of wing like that of forewings but with terminal intravenular spots more strongly represented.

UNDER SURFACE OF WINGS: Unicolorous brownish gray, with inner margin of forewings paler; without maculation.

LENGTH OF FOREWING: 17 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *vellivolata*, differing mainly as follows: uncus larger, less tapering posteriorly; costa slightly broader, with apex more truncate; sacculus with very slender base, enlarging to about twice thickness of base on posterior side to form very prominent shoulder, then sharply narrowed to needle-like outer portion, curving posteriorly and extending to shortly beyond swelling on outer margin of costa; vesica unarmed.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Holotype, male, Hotel Montaña, Jarabacoa, La Vega, Dominican Republic,

March 31, 1953 (J. A. Ramos); this specimen is in the collection of the United States National Museum. The town is misspelled "Jarabadoa" on the label of the specimen.

DISTRIBUTION: Jarabacoa is a small town in the central part of the Dominican Republic, lying just west of the north-south extension of the Cordillera Central. Presumably *monticola* is a montane species on Hispaniola.

TIME OF FLIGHT: March.

REMARKS: One specimen and one genitalic dissection have been examined. This species is similar to *vellivolata*, but it can be recognized by the more basal position of the t. p. and extradiscal lines, thus making a noticeably wider subterminal area on all wings above. The reddish brown shading distad of the outer cross lines is wider in *monticola* than it is in *vellivolata*.

The male genitalia of this species are quite similar to those of *vellivolata*. These structures can be recognized, in the present taxon, by the shorter sacculus.

Anacamptodes ephyraria (Walker)

Plate 24, figure 4; text figures 6, 24, 44

Boarmia ephyraria WALKER, 1860, p. 349. GROTE AND ROBINSON, 1868, p. 82. GROTE, 1873, p. 159.

Selidosema ephyraria: DYAR, "1902" [1903], p. 325. BARNES AND McDUNNOUGH, 1914, p. 211.

Cleora ephyraria: BARNES AND McDUNNOUGH, 1917a, p. 118. MOORE, 1955, p. 71.

Anacamptodes ephyraria: McDUNNOUGH, 1920, p. 30, pl. 5, fig. 4 (male genitalia), pl. 8, fig. 10 (male); 1938, p. 164. FORBES, 1928, p. 603; 1948, p. 56, fig. 80 (right valve of male genitalia). PROCTER, 1938, p. 239; 1946, p. 278. JONES AND KIMBALL, 1943, p. 116. FERGUSON, 1954, p. 315, pl. 16, fig. 16 (lectotype male). PRENTICE, 1963, p. 454, fig. 285 (distribution in Canada). KIMBALL, 1965, p. 181, pl. 6, fig. 11 (male).

Tephрина expressaria WALKER, 1862, p. 1657. PACKARD, 1876, p. 276. GUMPPENBERG, 1887, p. 338.

Selidosema expressaria: DYAR, "1902" [1903], p. 325 (synonym of *humaria*). SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1914, p. 211.

Cleora expressaria: BARNES AND McDUNNOUGH, 1917a, p. 118 (synonym of *ephyraria*).

Anacamptodes expressaria: McDUNNOUGH, 1920, p. 30; 1938, p. 164. FORBES, 1948, p. 57. FERGUSON, 1954, p. 315.

Cleora takenaria PEARSALL, 1909, p. 119. BARNES AND McDUNNOUGH, 1917a, p. 118 (synonym of *ephyraria*).

Anacamptodes takenaria: McDUNNOUGH, 1920, p. 30; 1938, p. 164. FORBES, 1928, p. 603; 1948, p. 57.

Cymatophora humaria auct. nec Guenée: PACKARD, 1876, p. 435 (*partim*).

This relatively small, pale species occurs in eastern North America. The abdomen has all segments concolorous.

MALE: Head with vertex and front whitish gray or pale grayish white, with narrow band of brownish black scales between bases of antennae and as wider band across front; palpi rising to middle of eye and extending beyond anterior margin of eye by more than one-half of diameter of eye, grayish white, with variable number of brown and brownish black scales; antennae with longest pectinations about 0.75 mm. in length. Thorax above varying from whitish gray to gray, with tip of collar darker in many specimens; below, and legs, whitish gray, latter with variable amount of brown scaling. Abdomen whitish gray, above with posterior portions of segments brownish gray, tending to become darker posteriorly, basal portion of first segment with obsolescent black band in some specimens.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray or grayish white, variably overlain with ochraceous brown and dark gray scales; cross lines narrow, black, complete in most specimens, arising from large costal spots; t. a. line arising one-fourth to one-third of distance from base, with spot extending to radial vein, line produced outwardly in cell, then curving basally to inner margin, with basal tooth or thickening on cubital vein; median line arising in middle of costa, with costal spot more or less angled outwardly, the line curving distally around large discal spot, and becoming more or less obsolescent posteriorly; t. p. line arising two-thirds of distance from base, with spot extending to vein R_5 , line extending to vein M_1 , sharply curved outwardly to vein M_2 , then turning basally and subparallel-ing outer margin, with two basal bends, to inner margin; t. a. and t. p. lines variably shaded with brown scales, this shading partially obsolescent in some specimens; subterminal area with area of dark brown scales opposite outward bend of t. p. line in upper part of wing; s. t. line of ground color, out-

wardly scalloped, obsolescent in some specimens; terminal line incomplete, represented by large dark brown or brownish black intra-venular spots, set back from wing margin one or two scale rows in some specimens; fringe concolorous with wing, with areas opposite vein endings slightly darkened. Hind wings concolorous with forewings; basal line weakly represented or obsolescent; intradiscal line broad, diffuse, becoming stronger posteriorly; discal spot large, elongate, with center of ground color; median area of wing posteriad of discal spot heavily suffused with dark scales; extradiscal line reduced or obsolescent in anterior part of wing, with outwardly directed teeth on veins R and M_1 , thence concave to anal margin; outer portion of wing similar to same area of forewing but tending to be slightly more contrastingly colored and to have terminal line more completely represented.

UNDER SURFACE OF WINGS: Pale grayish white, with brownish gray scaling more prominent on forewings than on hind wings; without maculation except for large, dark, discal dots and partial representation of terminal line; forewings with broad, brownish gray, nebulous, subterminal band in upper part of wing, with outer margin and apex pale grayish white.

LENGTH OF FOREWING: 10 to 15 mm.

FEMALE: Similar to male.

LENGTH OF FOREWING: 11 to 15 mm.

MALE GENITALIA: Uncus moderately long, with length of projecting portion equal to width of base, lateral margins tapering, and with prominent apical cleft; valves with costal portion large, lobate, with smooth margins, slightly narrowed basally, and with posteromedian section more heavily sclerotized than larger anterodistal area; outer portion of inner face of costa covered with numerous slender setae; sacculus sclerotized, without shoulder, anterior margin concave near base, apical section short, relatively thick, gently curved at tip, extending to about middle of adjacent costal margin; cristae prominent, very long; aedeagus with sclerotized posterior end; vesica armed with row of short spines, in length latter shorter than width of aedeagus.

FEMALE GENITALIA: Apophyses posteriores 1.3 to 1.8 mm. in length; sterigma small,

roughly V-shaped, with lateral margins weakly extended dorsally; anterior membranous projection equal in size to sterigma; sterigma with anterior end tapered, with marginal ridges; posterior end of sterigma with very large, V-shaped, median incision extending one-half of length of sterigma; ductus bursae with posterior membranous portion extending to anterior margin of sterigma, and with short, sclerotized, and finely striate area extending about one-half of length of ductus bursae; ductus seminalis arising at anterior end of sclerotized area of ductus bursae; corpus bursae small to moderate in size; signum round, central area with variable number of small teeth, posterior one-half of signum with margin thickened, with variable number of medium to large teeth around entire circumference.

EARLY STAGES: Forbes (1948, p. 57) described the larva of this species from hemlock.

FOOD PLANTS: This species is apparently a rather general feeder. The known food plants include maple, willow, ash, chokecherry, birch, elm, oak, gooseberry, balsam fir (Prentice, 1963, p. 454), and hemlock (Forbes, 1948). Kendall has reared *ephyraria* on *Amorpha canescens* (Nuttall) Pursch in Brazoria County, Texas.

TYPES: Walker described *ephyraria* from specimens of both sexes; they are in the collection of the British Museum (Natural History). The male figured by Ferguson (1954, pl. 16, fig. 16) is hereby designated as the lectotype.

Expressaria was described from a single male; this specimen of Walker's is also in the British Museum (Natural History).

Pearsall named *takenaria* from a type male, a type female, and two male and one female paratypes; these specimens are in the collection of the American Museum of Natural History. Pearsall's type male is hereby designated as the lectotype.

TYPE LOCALITIES: Nova Scotia (*ephyraria* and *expressaria*); Big Indian Valley, Catskill Mountains, New York (*takenaria*).

DISTRIBUTION: Eastern North America. In Canada the species extends from Nova Scotia (although Ferguson, 1954, p. 315, never caught it there) to Saskatchewan (Prentice, 1963, fig. 285). In the United

States (see fig. 6) it is found from North Dakota east to Maine, and south to Pennsylvania. It occurs in the Midwest, extending as far south as Texas, and east to Florida.

TIME OF FLIGHT: Most of the northern specimens have been taken in July and August, with a few June and September records. There is one New Jersey specimen labeled April; the two Florida records are for January and May.

REMARKS: Four hundred sixty specimens (367 males and 93 females, including the types of *takenaria*) and 18 genitalic dissections (13 males and five females) have been studied. This species was confused with *humaria* for many years; not until 1914 did Barnes and McDunnough straighten out the synonymy of the two species. Some of the references in the literature before that date under the name *humaria* undoubtedly refer to *ephyraria*.

The present species is unlike any of the preceding taxa; it is most likely to be confused with *humaria*. *Ephyraria* is a paler species, with the upper surface of the wings being grayish white and not having the brownish or purplish tinge that is to be found in *humaria*. There are good genitalic differences between these two species.

The genitalia of *ephyraria* are similar to those of *cypressaria*. The male structures, in the present species, can be recognized by the longer uncus, by the longer, more heavily sclerotized, and more curved sacculus, by the row of spines in the vesica, and by the row of bristles on segment A₃. The female genitalia can be separated by the shorter apophyses posteriores and by the larger posterior indentation of the sterigma.

There is some variation within *ephyraria* in the coloration of the upper surface of the wings. Specimens from the northwestern portion of the range (North Dakota and Minnesota, for example) tend to have the wings more heavily suffused with dark gray scales than do examples from other parts of the range.

Anacamptodes herse (Schaus), new combination

Plate 24, figure 5; text figures 25, 45

This is a small species that resembles *ephyraria* in appearance, but it is more contrastingly colored, and the upper and lower

surfaces of the wings have a pearly reflection. It occurs in Central America.

MALE: Head, thorax and abdomen similar to those of *ephyraria* but with palpi not projecting so far forward, and with basal portion of first segment of abdomen with black band; antennae with longest pectinations about 0.75 mm. in length.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, with basal and subterminal areas variably overlain with reddish brown and grayish brown scales, and all wings with pearly reflection; veins tending to be ochraceous; cross lines like those of *ephyraria*, with t. a. and t. p. lines more heavily shaded by reddish brown bands, with median line tending to be more complete, and with t. p. line curving outwardly to meet inner margin; median area of ground color, contrasting with adjoining areas; outer portion of wing similar to that of *ephyraria* but tending to be more heavily overlain with dark scales, and with s. t. line more strongly represented. Hind wings similar to those of *ephyraria* but with less dark scaling basad of extradiscal line, with this area appearing similar to median area of forewing of present species; basal line present; intradiscal line slender; s. t. line more strongly represented than in *ephyraria*.

UNDER SURFACE OF WINGS: White or whitish gray, with pearly reflection, and with scattered brownish gray scales, these more numerous on forewings than on hind wings; forewings with large, elongate, dark brown, discal spot, and with broad, dark brown, subterminal band extending to outer angle; hind wings with small discal spot and incomplete subterminal band.

LENGTH OF FOREWING: 14 to 15 mm.

FEMALE: Similar to male (as far as can be determined from limited and worn material available) but not so contrastingly colored above.

LENGTH OF FOREWING: 15 to 18 mm.

MALE GENITALIA: Similar to those of *ephyraria*, differing mainly as follows: uncus with broader base and with smaller apical cleft; costa elongate, slender, slightly narrowed basally; outer portion of inner face of costa covered with numerous slender setae, these tending to become slightly thicker toward anterior end of outer margin of costa;

sacculus without shoulder, short, apical portion with apex pointed and curved inwardly; cristae inconspicuous, short; vesica armed with very long, slender, serrate, spinose process, in length about three times longer than width of aedeagus.

FEMALE GENITALIA: Apophyses posteriores 2.8 to 2.9 mm. in length; sterigma small, roughly semicircular in outline, with rounded anterior margin; anterior membranous projection longer than sterigma, with narrow basal section; posterior end of sterigma flatly M-shaped, with shallow, V-shaped, median indentation; ductus bursae with posterior membranous portion longer than sterigma, and with sclerotized and finely striate area extending almost to corpus bursae, anterior part of ductus bursae increasing in width dorsally; ductus seminalis arising at junction of sclerotized ductus bursae and corpus bursae; corpus bursae very large, at least as long as sclerotized portion of ductus bursae; signum large, elliptical, wider than long, central area with variable number of small teeth, outer margin thickened and with numerous strong teeth.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Schaus apparently described this species from a single male; it is in the collection of the United States National Museum. It bears type no. 17711, and the genitalia are mounted on slide H.W.C. No. 395.

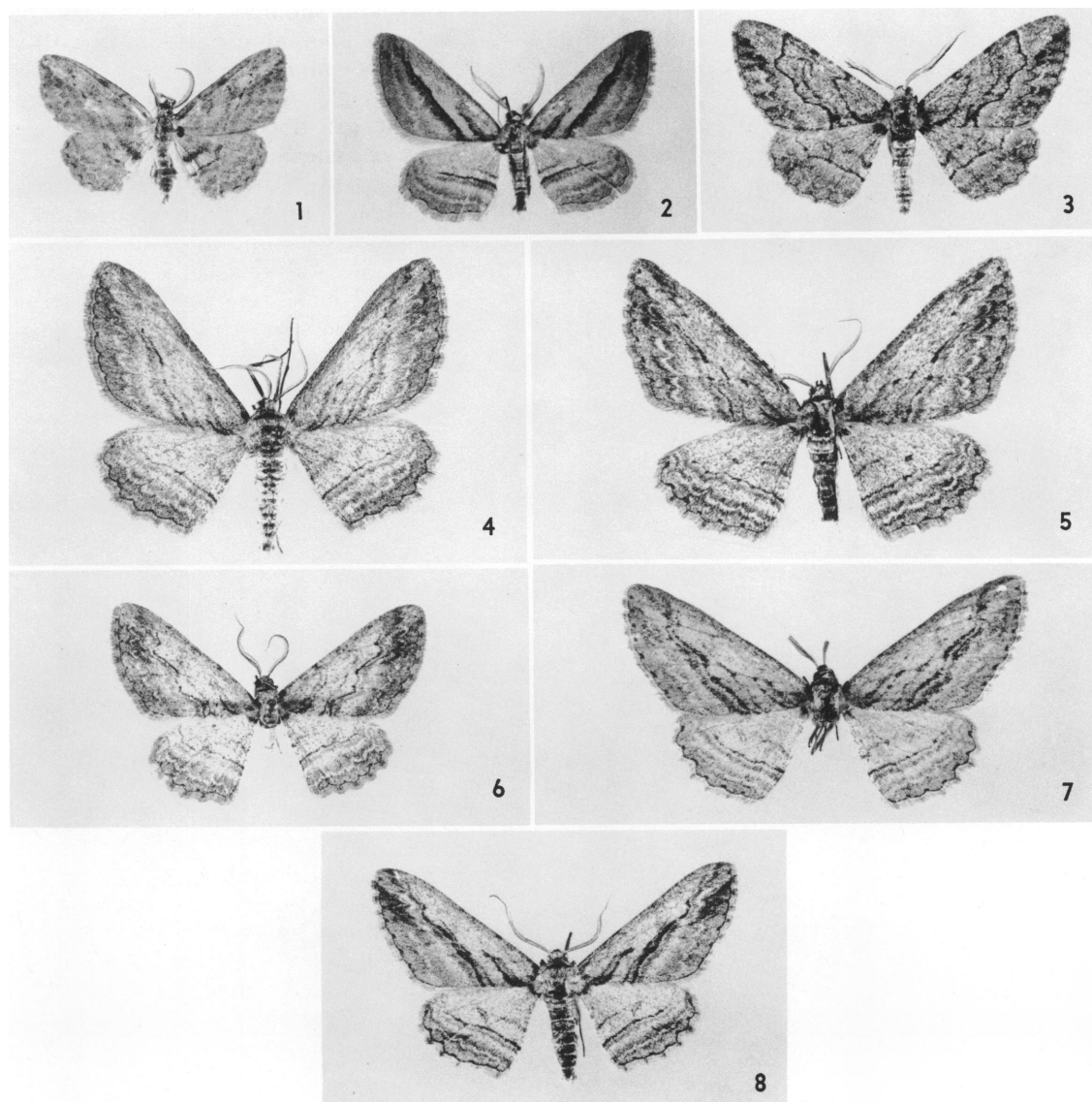
TYPE LOCALITY: Avangarez, Costa Rica; there is no such name listed in the index to the Map of Hispanic America of the American Geographical Society (1945). There is an Abangarez, which is a canton of the province of Guanacaste, on the west coast of Costa Rica.

DISTRIBUTION: Costa Rica (the province of Guanacaste) and Mexico (the states of Oaxaca and Veracruz).

TIME OF FLIGHT: July and September.

REMARKS: Seven specimens (five males and two females, including the type) and five genitalic dissections (three males and two females) have been studied. This species is similar in appearance to the North American *ephyraria*, and can be distinguished from it by the characters given above.

The male genitalia of *herse* are similar to



1. *Anacamptodes cypressaria* (Grossbeck), cotype, male, Allen River to Deep Lake, Florida, April 12, 1912 (A.M.N.H.)

2. *Anacamptodes jacumbaria* (Dyar), male, Hemet, California, July 20, 1934 (G. H. and J. L. Sperry; A.M.N.H.)

3. *Anacamptodes dataria* (Grote), male, Paradise, Arizona, May 20 (A.M.N.H.)

4. *Anacamptodes clivinaria impia*, new subspecies, holotype, male, Upper Santa Ana River, San Bernardino County, California, June 7, 1948 (G. H. and J. L. Sperry; A.M.N.H.)

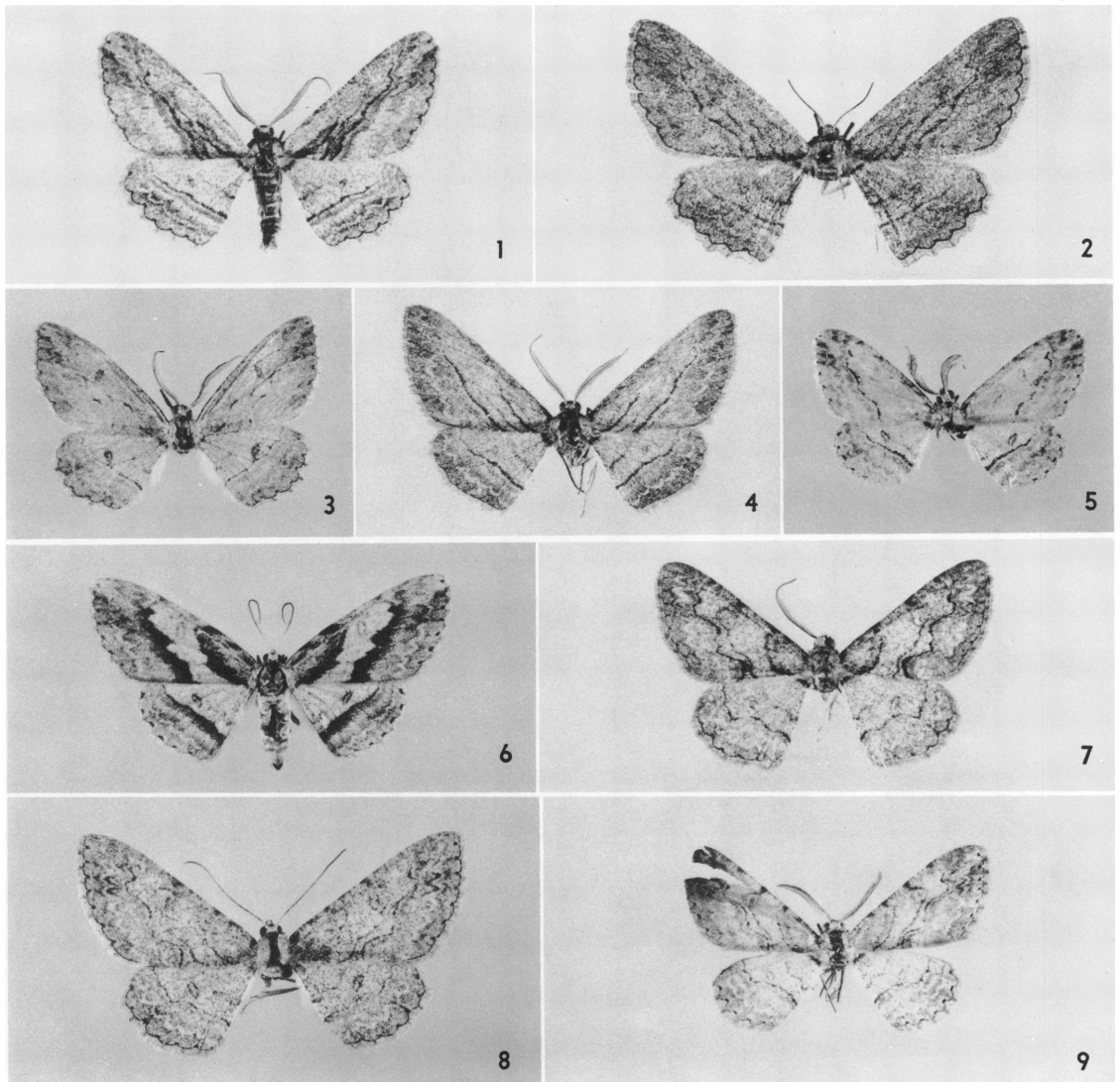
5. *Anacamptodes clivinaria clivinaria* (Guenée), male, Anderson Springs, Cobb Mountain, Lake County, California, May 7, 1955 (R. H. Leuschner; A.M.N.H.)

6. *Anacamptodes angulata*, new species, paratype, male, Fort Davis, Jeff Davis County, Texas, October 12, 1953 (R. H. Reid; A.M.N.H.)

7. *Anacamptodes clivinaria profanata* (Barnes and McDunnough), male, Eureka, Utah, April 24, 1910 (T. Spalding; A.M.N.H.)

8. *Anacamptodes sanctissima* (Barnes and McDunnough), male, Acton Junction, Mint Canyon, Los Angeles County, California, February 8, 1947 (A.M.N.H.)

All figures $\times 1.5$



1, 2. *Anacamptodes obliquaria* (Grote). 1. Male, Organ Pipe Cactus National Monument, Arizona, April 14, 1947 (G. H. and J. L. Sperry; A.M.N.H.). 2. Female, same data (A.M.N.H.)

3. *Anacamptodes providentia*, new species, holotype, male, Providence Mountains, San Bernardino County, California, May 7, 1939 (L. M. Martin; L.A.M.)

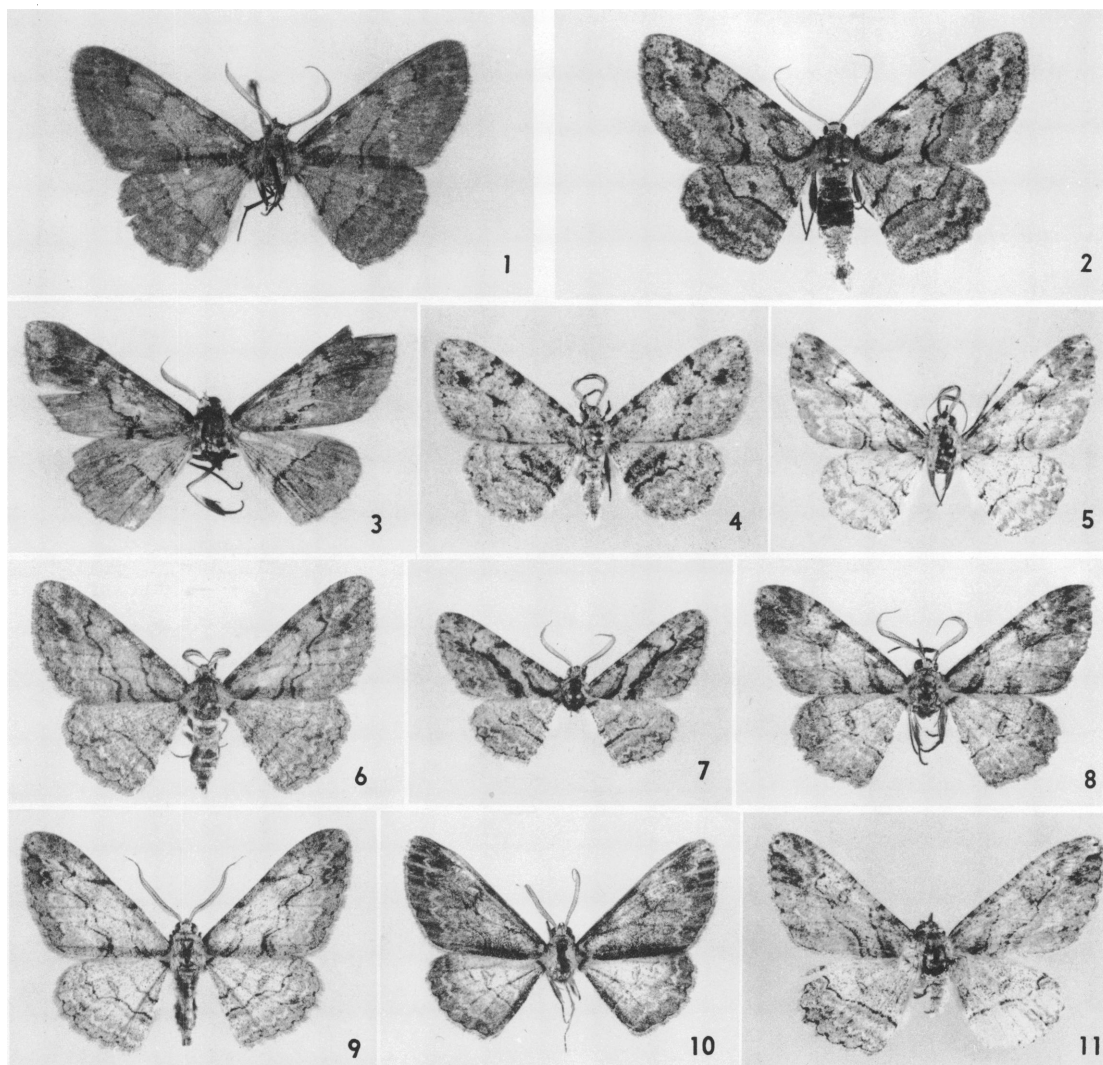
4. *Anacamptodes sancta*, new species, holotype, male, Chiricahua National Monument, Cochise County, Arizona, July 15, 1948 (C. and P. Vaurie; A.M.N.H.)

5, 6. *Anacamptodes pergracilis* (Hulst). 5. Male, Big Pine Key, Florida Keys, Florida, April 8, 1949 (A.M.N.H.). 6. Female, Lakeland, Florida, May 6, 1912 (A.M.N.H.)

7, 8. *Anacamptodes perfectaria* McDunnough. 7. Male, Mercedes, Hidalgo County, Texas, March 10, 1959 (H. Schmalzried; A.M.N.H.). 8. Female, Pharr, Texas, May 10, 1948 (O. Buchholz; A.M.N.H.)

9. *Anacamptodes encarsia*, new species, holotype, male, Pisté, Yucatan, Mexico, June 4, 1959 (C. and P. Vaurie; A.M.N.H.)

All figures $\times 1.5$



1, 2. *Anacamptodes vellivolata* (Hulst). 1. Male, Port Sewall, Martin County, Florida, March 16–20; 1950 (L. J. Sanford; A.M.N.H.). 2. Male, Spring, Harris County, Texas, February 27, 1963 (A. Blanchard, A.M.N.H.)

3. *Anacamptodes monticola*, new species, holotype, male, Hotel Montaña, Jarabacoa, Dominican Republic, March 31, 1953 (J. A. Ramos; U.S.N.M.)

4. *Anacamptodes ephyraria* (Walker), male, Big Indian Valley, Catskill Mountains, New York, August 8, 1909 (R. F. Pearsall; A.M.N.H.)

5. *Anacamptodes herse* (Schaus), male, Salina Cruz, Oaxaca, Mexico, September, 1906 (U.S.N.M.)

6. *Anacamptodes humaria humaria* (Guenée), male, Clove Valley, Staten Island, New York, April 25, 1913 (A.M.N.H.)

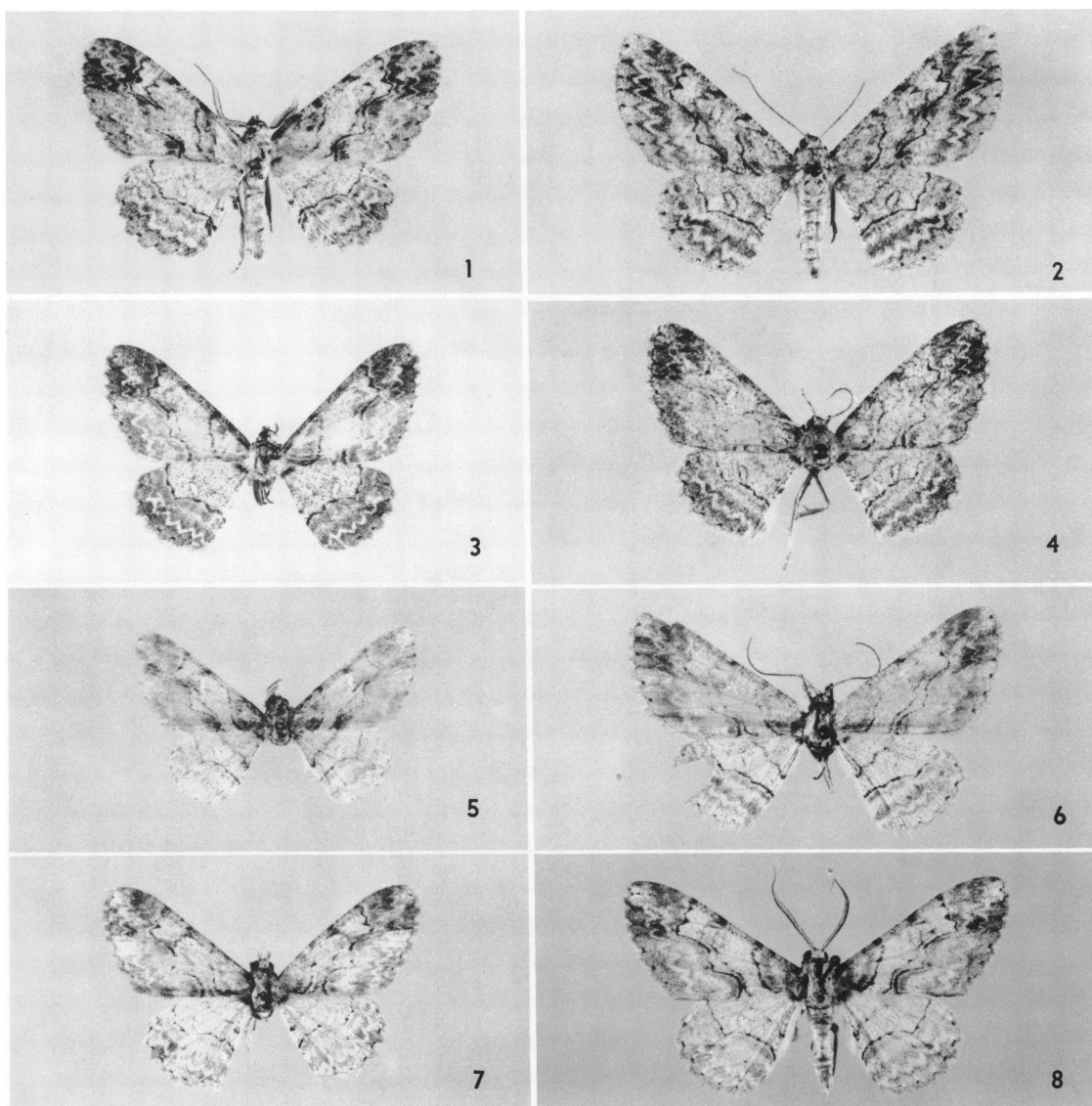
7. *Anacamptodes humaria pallida*, new subspecies, holotype, male, Palo Pinto County, Texas, July 12, 1940 (L. H. Bridwell; A.M.N.H.)

8. *Anacamptodes pseudoherse*, new species, paratype, male, 25 miles east of Mazatlan, Sonora, Mexico, August 20, 1960 (R. Zweifel; A.M.N.H.)

9, 10. *Anacamptodes fragilaria* (Grossbeck). 9. Male, Rancho La Sierra, Arlington, Riverside County, California, August 1, 1952 (A. H. Rindge; A.M.N.H.). 10. Melanic male, Honolulu, Hawaii, March 10, 1965 (B. Mather; A.M.N.H.)

11. *Anacamptodes cerasta*, new species, paratype, male, Guaycura Hotel grounds, La Paz, Baja California Sur, Mexico, December 6, 1961 (Cary-Carnegie Expedition; A.M.N.H.)

All figures $\times 1.5$



1, 2. *Anacamptodes defectaria* (Guenée). 1. Male, Port Sewall, Martin County, Florida, January 19–23, 1950 (L. J. Sanford; A.M.N.H.). 2. Female, Fernandino, Florida, August 26, 1941 (Mrs. Forsyth; A.M.N.H.).

3, 4. *Anacamptodes gemella gemella*, new subspecies. 3. Holotype, male, Mercedes, Hidalgo County, Texas, February 9, 1959 (H. Schmalzried; A.M.N.H.). 4. Allotype, female, same data, December 7, 1958 (A.M.N.H.).

5, 6. *Anacamptodes gemella tethe*, new subspecies. 5. Holotype, male, Colonia Yucatan, Yucatan, Mexico, August 19, 1952 (J. and D. Pallister; A.M.N.H.). 6. Allotype, female, same data, August 17, 1952 (A.M.N.H.).

7. *Anacamptodes triplicia*, new species, holotype, male, Jalapa, Veracruz, Mexico, September (C. C. Hoffmann; A.M.N.H.).

8. *Anacamptodes lurida* (Schaus), male, Chejel, Guatemala, July (Schaus and Barnes; U.S.N.M.)

All figures $\times 1.5$

those of *ephyraria* but can be recognized by the more slender costa and sacculus, and by the very long spinose process in the aedeagus. The female genitalia of the present taxon can be distinguished by the semicircular shape of the sterigma, and by the large corpus bursae.

Anacamptodes humaria (Guenée)

Boarmia humaria GUENÉE, 1857, p. 246.

This polytypic species is somewhat intermediate in size and color between *vellivolata* and *ephyraria*. Good genitalic characters are present to separate these three species. It occurs over the eastern two-thirds of the United States and, uncommonly, in south-eastern Canada.

Anacamptodes humaria humaria (Guenée)

Plate 24, figure 6; text figures 7, 26, 46

Boarmia humaria GUENÉE, 1857, p. 246. MORRIS, 1860, p. 57. WALKER, 1860, p. 342. ANON., 1882, p. 24. SMITH, 1891, p. 72. OBERTHÜR, 1913, p. 271.

Cymatophora humaria: PACKARD, 1876, p. 435 (*partim*; not pl. 11, fig. 22). GROTE, 1882a, p. 49. BEUTENMÜLLER, 1890, p. 222. SMITH, 1890, p. 338.

Synopsisia humaria: GUMPPENBERG, 1892, p. 330.

Selidosema humarium: HULST, 1896, p. 355. DYAR, "1902" [1903], p. 325 (*partim*). SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1914, p. 210. GROSSBECK, 1917, p. 96.

Selidosema humaria: SMITH, 1910, p. 503.

Cleora humaria: BARNES AND McDUNNOUGH, 1917a, p. 117. MOORE, 1955, p. 71.

Anacamptodes humaria: McDUNNOUGH, 1920, p. 30, pl. 5, fig. 2 (male genitalia); 1938, p. 164. FORBES, 1928, p. 603; 1948, p. 56, fig. 78 (right valve of male genitalia). PROCTER, 1938, p. 239; 1946, p. 278. JONES AND KIMBALL, 1943, p. 116. FERGUSON, 1954, p. 315, pl. 16, fig. 5 (male). PETERSON, 1962, p. 115, pl. 1, fig. 8 (eggs). PRENTICE, 1963, p. 455. KIMBALL, 1965, p. 181, pl. 6, fig. 15 (male).

Boarmia intraria GUENÉE, 1857, p. 246. MORRIS, 1860, p. 57. WALKER, 1860, p. 343. OBERTHÜR, 1913, p. 271, pl. CLXVIII, fig. 1641 (female).

Cymatophora intraria: PACKARD, 1876, p. 435 (synonym of *humaria*). GROTE, 1882a, p. 49.

Synopsisia intraria: GUMPPENBERG, 1892, p. 330.

Selidosema intraria: DYAR, "1902" [1903], p. 325.

Cleora intraria: BARNES AND McDUNNOUGH, 1917a, p. 117.

Anacamptodes intraria: McDUNNOUGH, 1920, p. 30; 1938, p. 164.

Boarmia intractaria WALKER, 1860, p. 349. GROTE AND ROBINSON, 1868, p. 82 (synonym of *momaria* Guenée). GROTE, 1873, p. 159. PACKARD, 1876, p. 435 (synonym of *humaria*).

Synopsisia intractaria: GUMPPENBERG, 1892, p. 330.

Selidosema intractarium: DYAR, "1902" [1903], p. 325.

Cleora intractaria: BARNES AND McDUNNOUGH, 1917a, p. 117.

Anacamptodes intractaria: McDUNNOUGH, 1920, p. 30; 1938, p. 164.

Boarmia illaudata WALKER, 1860, p. 397. GROTE AND ROBINSON, 1868, p. 82 (synonym of *momaria* Guenée).

Selidosema illaudatum: DYAR, "1902" [1903], p. 325 (synonym of *humarium*).

Cleora illaudata: BARNES AND McDUNNOUGH, 1917a, p. 117.

Anacamptodes illaudata: McDUNNOUGH, 1920, p. 30; 1938, p. 164.

The nominate subspecies is smaller and paler than *vellivolata*. The abdomen above has a black basal band, and the first segment is paler than the remaining ones. This subspecies occurs east of the Rocky Mountains but not in the northern Blackland Prairies of Texas.

MALE: Head similar to that of *vellivolata*, but with front flatter and with palpi slightly shorter; antennae with longest pectinations about 0.75 mm. in length. Thorax and abdomen similar to those of *ephyraria* but tending to be slightly darker; upper surface of first abdominal segment paler than other segments and with strong black band basally.

UPPER SURFACE OF WINGS: Forewings with ground color pale bluish or dull purplish gray, with clearly defined reddish brown shading of moderate width to t. a. and t. p. lines, and with dark gray and grayish black scaling, particularly in subterminal area; cross lines black, narrow, complete, with median line weakly represented; course of cross lines as in *vellivolata*, but with median line situated more basal of t. p. line, and with t. p. line not so sharply curved to meet inner margin in many specimens; subterminal area more contrastingly marked than in *vellivolata*, with more dark scales shading both outer border of more prominent, scalloped s. t. line and outward bow of t. p. line; outer portion of wing similar to that of *vellivolata* but with intravenular dots nearer

wing margin. Hind wings similar to those of *vellivolata*, but with basal line present and with extradiscal line tending to be straighter and more weakly represented.

UNDER SURFACE OF WINGS: Unicolorous pale grayish brown, with scattered brownish gray scales, more numerous on forewings than on hind wings; maculation absent except for discal spots, these tending to be small or obsolescent on hind wings, and for weak terminal line and intravenular spots; faint subterminal band weakly indicated in some specimens.

LENGTH OF FOREWING: 11 to 17 mm.

FEMALE: Similar to male, but with upper surface of wings tending to be slightly less contrasting in color; under surface with maculation more strongly represented.

LENGTH OF FOREWING: 13 to 17 mm.

MALE GENITALIA: Similar to those of *sancta*, differing mainly as follows: uncus tending to be slightly longer; valves with elongate costa having longer basal swelling on inner margin, and with swelling near middle of outer margin; sacculus with prominent shoulder, and with relatively short outer section; vesica armed with row of spines.

FEMALE GENITALIA: Apophyses posteriores 2.4 to 3.2 mm. in length; sterigma small, somewhat variable in shape, roughly square or rectangular in outline but with lateral margins tending to be more or less concave; anterior membranous projection longer than sterigma, more or less rectangular in outline; sterigma with anterior portion flat or with anterolateral areas weakly raised; posterior margin of sterigma rounded, or in form of two rounded lobes, separated by V-shaped, median indentation; ductus bursae with posterior membranous portion longer than sterigma, and with elongate, slender, sclerotized, and finely striate area extending almost to corpus bursae; ductus seminalis arising at anterior end of sclerotized ductus bursae; corpus bursae elongate, weakly swollen; signum variable in size and shape, round or elliptical, central area with small teeth, lateral and posterior margins thickened and with numerous strong teeth.

EARLY STAGES: The eggs have been illustrated by Peterson (1962, pl. 1, fig. 8). FORBES (1948, p. 56) gave a brief descriptive note on the larva and pupa.

FOOD PLANTS: A general feeder on decid-

uous plants (Forbes, 1948) and white birch (Prentice, 1963, p. 455). There are specimens in the collection of the United States National Museum that have been reared from alfalfa, asparagus, clover, dewberry, hickory, pear, pecan, persimmon, and soybeans.

TYPES: Guenée described *humaria* from a single male; this specimen is in the collection of the United States National Museum. It lacks both the head and abdomen, but the wings are well preserved.

Guenée described *intraria* from one male and one female. The female is in the collection of the United States National Museum; its genitalia are on slide H.W.C. No. 1185. This specimen is designated as the lectotype.

Walker described *intractaria* from a single male and *illaudata* from a single female; these specimens are in the collection of the British Museum (Natural History).

TYPE LOCALITIES: "Géorgie américaine" (*humaria*); "Environs de Baltimore" (*intraria*); East Florida (*intractaria*); "—" (*illaudata*).

DISTRIBUTION: Eastern North America. The species is found in the southeastern United States from eastern Texas to Florida, and extends up the Atlantic coast to Massachusetts; no specimens have been seen from Vermont or Maine. In Canada, it occurs in New Brunswick, Nova Scotia, and Manitoba (Prentice, 1963, p. 455); two specimens have been examined from Alberta. It occurs in the central United States, extending west to the Black Hills of Wyoming, and down the eastern side of the Rocky Mountains in Colorado, New Mexico, and western Texas (see fig. 7).

TIME OF FLIGHT: In the southern portion of its range, *humaria* seems to fly throughout the year; in the northern part, from April into September.

REMARKS: Three hundred forty-four specimens (265 males and 79 females, including both of Guenée's types) and 35 genitalic dissections (24 males and 11 females) have been studied. This species resembles *vellivolata*, but it is smaller, it has shorter pectinations on the male antennae, it is paler and has a narrower and more sharply defined reddish brown band to the t. a. and t. p. lines, and the first segment of the abdomen above had a prominent black band basally and then is paler than are the remainder of the segments.

The male genitalia of *humaria* can be sep-

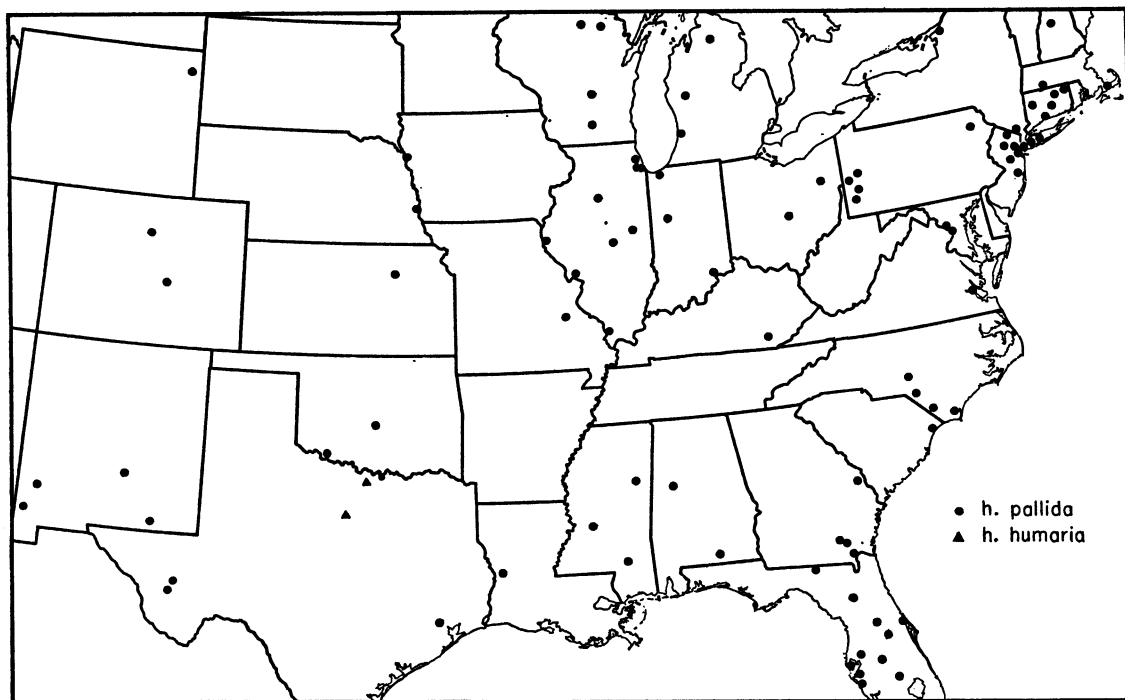


FIG. 7. Distribution of *Anacamptodes humaria* (Guenée) in the United States.

parated from those of *vellivolata* by the shorter sacculus arm and by the prominent row of spines in the vesica. The female genitalic structures of these two species are similar, but those of *humaria* can be recognized by the concave lateral margins of the sterigma.

***Anacamptodes humaria pallida*, new subspecies**

Plate 24, figure 7; text figure 7

This is a small-sized and pale-colored population that occurs in northeastern Texas.

MALE: Head, thorax, and abdomen similar to those of nominate *humaria* but with fewer dark scales; antennae with longest pectinations 0.6 to 0.7 mm. in length.

UPPER SURFACE OF WINGS: Ground color grayish white or pale gray, overlain with brownish gray and pale reddish brown scales, particularly in subterminal area; maculation as in nominate *humaria*, but with t. a. and t. p. lines tending to be more prominent, closer together, and for t. p. line to be slightly straighter in some specimens.

UNDER SURFACE OF WINGS: Similar to that of nominate *humaria* but paler.

LENGTH OF FOREWING: 12 to 14 mm.; holotype, 12 mm.

FEMALE: Unknown.

MALE GENITALIA: Similar to those of nominate *humaria*.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Palo Pinto County, Texas, July 12, 1940 (L. H. Bridwell), *ex* collection G. H. and J. L. Sperry. Paratypes, all from Texas: Same data as holotype, 10 males; Montague County, August 3, 1940 (L. H. Bridwell), one male. The holotype is in the collection of the American Museum of Natural History; the paratypes are in the collections of that institution and of the Los Angeles County Museum.

DISTRIBUTION: Northeastern Texas, in the northern portion of the Blackland Prairies (see fig. 7).

TIME OF FLIGHT: July and August.

REMARKS: Twelve male specimens and two genitalic dissections have been examined. This population can be separated from nominate *humaria* by its smaller size and paler color. It is more likely to be confused with *perfectaria*, which also occurs in Texas. The latter species is to be found south of the

known distribution of *pallida*. The present taxon, compared with *perfectaria*, is smaller, has narrower and more pointed wings, and tends to have straighter t. p. and extradiscal lines; good genitalic differences are present between these two taxa.

There is a problem as to whether *pallida* should be called a full species or be placed as a subspecies of *humaria*. Based on maculation, this taxon could very well be placed as a distinct species. The male genitalia of *humaria* and *pallida* are very similar, which indicates conspecificity or a very close relationship; it is on this basis that *pallida* is placed as a subspecific population.

Anacamptodes pseudoherse, new species

Plate 24, figure 8; text figures 27, 47

In appearance this species closely resembles *herse*, but it tends to be grayer. There are good genitalic differences by which to separate these two species. The present taxon occurs in much of Mexico.

MALE: Head, thorax and abdomen similar to those of *herse*.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, variably overlain with dark grayish brown and reddish brown scales, particularly in basal and subterminal areas; veins tending to be ochraceous; cross lines and outer portion of wing like those of *herse*. Hind wings similar to those of *herse*.

UNDER SURFACE OF WINGS: Similar to that of *herse*.

LENGTH OF FOREWING: 14 to 18 mm.; holotype, 14 mm.

FEMALE: Similar to male but not so contrastingly colored above, and with heavier black subterminal band below.

LENGTH OF FOREWING: 14 to 20 mm.; allotype, 18 mm.

MALE GENITALIA: Similar to those of *humaria*, differing mainly as follows: uncus broader; valves with costa relatively short and broad, inner margin straight, outer margin extended into prominent point about two-thirds of distance from base, and with broad basal portion more heavily sclerotized than terminal section; apical portion of inner face of costa covered with slender setae, latter becoming thicker and shorter anteriorly and on outwardly directed point, and absent from sclerotized basal portion of costa; sacculus

with small basal swelling, terminal portion gradually tapered to gently curving point; cristae of from 12 to 26 elongate setae on each side; aedeagus 1.0 to 1.1 mm. in length; vesica armed with row of from three to seven spines.

FEMALE GENITALIA: Apophyses posteriores 2.5 to 3.2 mm. in length; sterigma wider posteriorly than anteriorly; anterior membranous projection slightly longer than sterigma, with anterior portion tending to be swollen; sterigma with anterolateral areas slightly swollen and projecting anteriorly, with median area more lightly sclerotized; lateral margins extended dorsally from middle of sterigma; posterior part of sterigma enlarged, posterior margin tending to be rounded, and with large, rather shallow, median indentation; ductus bursae with elongate membranous portion extending anteriorly of sterigma, followed by short, tapering, smoothly sclerotized section, and then by tubular striate area extending laterally and dorsally to corpus bursae, this sclerotized area tending to be very finely serrate or dentate in many specimens; ductus seminalis arising from membranous area posteriorly of corpus bursae; corpus bursae large, globular; signum round or elliptical, median area with numerous small teeth, outer margin thickened and dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, and allotype, female, Iguala, Guerrero, Mexico, August, 1932 (C. C. Hoffmann). Paratypes, all from Mexico, and listed by states: *Territory of Baja California*: Arroyo San Bartolo, November 13, 1961 (Cary-Carnegie Expedition), one male; Pulpito Bay, April 2, 1962 (C. F. Harbison), one male. *Coahuila*: Saltillo, May 23, 1952 (Cazier, Gertsch, and Schrammel), one male. *Durango*: 10 miles west of El Salto, August 5, 1964, elevation 9000 feet (J. E. H. Martin), one female. *Guerrero*: Iguala, August, 1932 (C. C. Hoffmann), three males; same locality, no date, one male; same locality, elevation 2400 feet, June, 1906, five males and three females; La Granja, July, 1931 (C. C. Hoffmann), one male; Sierra de Guerrero, June, 1913 (R. Muller), one male. *Jalisco*: Guadalajara, two females. *Morelos*: Cuernavaca, June, July, and August, 1906,

three males and two females. *Puebla*: Tehuacan, September 13–16, 1937 (C. C. Hoffmann), four males; Matamoros, November 1, 1920 (C. C. Hoffmann), one female. *Sinaloa*: Mazatlan, July 22, 1954 (Cazier, Gertsch, and Schrammel), one male and two females; same locality, July 26–30, 1959 (C. and P. Vaurie), one male and two females; Los Mochis, October 22, 1961 (Cary-Carnegie Expedition), one female; 5 miles north of Mazatlan, July 30, 1964 (W. C. McGuffin), two females. *Sonora*: Minas Nuevas, August 7, 1952 (C. and P. Vaurie), 13 males; north end, Tiburon Island, July 9, 1952 (C. and P. Vaurie), one male; Navojoa, August 3, 1952 (C. and P. Vaurie), one male; 25 miles east of Mazatlan, August 20, 1960 (R. Zweifel), seven males and one female; Bahia San Carlos, February 17–18, 1963 (P. H. Arnaud, Jr.), three males; 10 miles west of Alamos, July 21, 1954 (Cazier, Gertsch, and Bradts), one male and one female. *Tamaulipas*: Abasolo, May 17, 1952 (Cazier, Gertsch, and Schrammel), one male. *Veracruz*: Orizaba (C. C. Hoffmann), one female; same locality, April, 1909 (R. Muller), one female; same locality, September, 1948, one female. *Oaxaca*: One male. *Yucatan*: Chichen Itza, July 16–19, 1952 (J. and D. Pallister), five males and eight females; Cordeleria Mayapan, June 28, 1952 (J. and D. Pallister), one male; Uxmal, June 16–18, 1959 (P. and C. Vaurie), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; the paratypes are in the collections of that institution, of the United States National Museum, of the Canadian National Collection, of the Carnegie Museum, and of the San Diego Natural History Museum.

DISTRIBUTION: This species is widespread throughout much of Mexico.

TIME OF FLIGHT: February, and April through November.

REMARKS: Eight-nine specimens (59 males and 30 females) and 23 genitalic preparations (11 males and 12 females) have been studied. This species is very similar to *herse* in size, pattern, and color. The present taxon tends to be slightly grayer, with less reddish brown scaling, and it lacks some or all of the pearly luster to the wings. The best way to separate the two species is by the genitalia.

The male genitalia of this species can be distinguished from those of the preceding species by the shorter and heavier valves, and by the fact that the spines in the vesica are fewer but larger. The female genitalia can be separated from those of *humaria* by the larger sterigma, and by the fact that the posterior portion of that structure is swollen; from those of *herse* by the entirely different shape of the sterigma.

Anacamptodes fragilaria (Grossbeck)

Plate 24, figures 9, 10; text figure 8

Cleora fragilaria GROSSBECK, 1909, p. 194. BARNES AND McDUNNOUGH, 1917a, p. 118.

Cleora fragillaria (sic!) BARNES AND McDUNNOUGH, 1912, p. 19, pl. 8, fig. 14 (male).

Anacamptodes fragilaria: McDUNNOUGH, 1920, p. 29, pl. 5, fig. 10 (male genitalia); 1938, p. 164. COMSTOCK AND DAMMERS, 1946, p. 17, pls. 3–5. ZIMMERMAN, 1958, p. 38, figs. 12–15 (not female genitalia).

This is a medium to large-sized, pale gray species with relatively weak maculation. It occurs in southern California, Baja California, and the Hawaiian Islands.

MALE: Head with vertex and front whitish gray, with dark grayish brown scaling between bases of antennae and forming band of varying width across front; palpi rising to middle of eye, whitish gray, becoming largely dark brownish gray posteriorly; antennae with longest pectinations 0.7 to 0.8 mm. in length. Thorax pale grayish white above, with end of collar dark gray, and with faint, slender band across patagia in some specimens; below white; legs faintly ochraceous white, with scattered brown scales, and with forelegs heavily suffused with brownish black scales. Abdomen pale grayish white above, with scattered grayish brown scales, posterior margins of segments weakly marked with ochraceous or grayish brown bands, base of first segment with narrow black band in some specimens; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color pale grayish white, with scattered dark gray and dark grayish brown scales, these tending to be concentrated along costa and in subterminal area; veins faintly ochraceous; cross lines narrow, black, incompletely represented in some specimens, with t. a. and t. p. lines narrowly and incompletely shaded

with grayish brown or dull reddish brown; course of lines as in *humaria*; outer portion of wing similar to that of *humaria* but more contrastingly marked and with s. t. line more strongly represented. Hind wings concolorous with forewings; maculation similar to that of *humaria* but with extradiscal line tending to be slightly more irregular in course.

UNDER SURFACE OF WINGS: Whitish gray, with grayish brown scaling, this being more concentrated on forewings than on hind wings; maculation absent except for discal dots, being larger on primaries and small or obsolescent on secondaries, and intravenular marginal spots; forewings with dark subterminal band, varying in size.

LENGTH OF FOREWING: 13 to 20 mm.

FEMALE: Similar to male, but with maculation above more weakly represented and with less dark shading to t. a. and t. p. lines, wings thus appearing more evenly colored. Under surface tending to have heavier discal spots and broader subterminal band, latter extending to upper part of hind wings in some specimens.

LENGTH OF FOREWING: 16 to 22 mm.

MALE GENITALIA: Similar to those of *pseudoherse*, differing mainly as follows: valves tending to be slightly shorter and wider, with prominent point on outer margin situated slightly more basad, and with basally curving ridge extending from point toward area of posterior attachment of valve; sacculus with more prominent basal swelling; aedeagus 0.9 mm. in length.

FEMALE GENITALIA: Similar to those of *pseudoherse*, differing mainly as follows: apophyses posteriores 2.8 to 2.9 mm. in length; sterigma more or less rectangular in shape, anterolateral areas not differentiated.

EARLY STAGES: These have been described and illustrated by Comstock and Dammers (1946, p. 17, pls. 3-5). The mature larva has a great range of variation in color and markings, ranging from light cream or pinkish with darker pink crenulations to dark maroon with dark brown-maroon markings. The spiracles are yellow with black rims. There are two longitudinal whitish lines medially on the abdomen. The head is concolorous with the body, and it is blotched with dark brown. The fifth segment has a pair of pyramidal tubercles, and there is a somewhat similar tubercle

above and slightly behind the spiracle on the same segment. The larvae pupated in the debris on the floor of the breeding cage.

FOOD PLANTS: This species is a very general feeder. Comstock and Dammers gave a list of 15 food plants from southern California; Zimmerman (1958, p. 38) listed 36 more from the Hawaiian Islands.

TYPES: Grossbeck described *fragilaria* from a series of 10 males and two females; of these, his male type, female type, and six male cotypes are in the collection of the American Museum of Natural History. Two male cotypes are in the collection of the United States National Museum; one female cotype is in the San Diego Natural History Museum. Grossbeck's specimen with his male type label is hereby designated as the lectotype.

TYPE LOCALITY: San Diego, San Diego County, California.

DISTRIBUTION: This species is common in southern California, and it extends up the coast as far north as the San Francisco Bay area. It also occurs along the Colorado River in Yuma County, Arizona (see fig. 8), and in the state of Baja California.

This species has been introduced into Hawaii. The first specimens were found in light traps at Pearl Harbor in 1944 (Zimmerman, 1958, p. 38).

Most of the distributional data given in Comstock and Dammers (1946) are in error.

TIME OF FLIGHT: In southern California the adults have been taken in every month of the year. Most of the specimens, however,

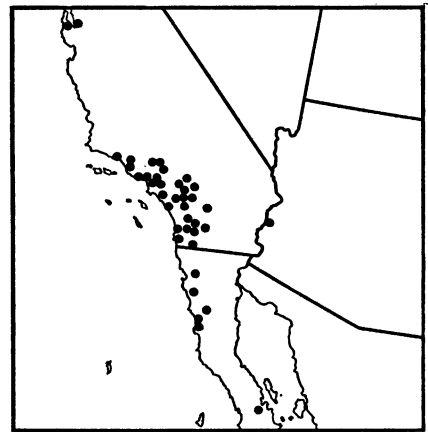


FIG. 8. Distribution of *Anacamptodes fragilaria* (Grossbeck) in continental North America.

were captured in the summer and fall months.

REMARKS: Four hundred ninety-eight specimens (351 males and 147 females, including the lectotype) and 23 genitalic preparations (13 males and 10 females) have been examined. Most specimens of this more or less evenly gray-colored species are easy to recognize.

The genitalia of *fragilaria* and *pseudoherse* show a very close relationship. In the male structures the configuration of the valve and sacculus show specific differences, and the aedeagus of *fragilaria* is smaller than that structure in *pseudoherse*. In the female structures, the differences in the shape of the sterigma are diagnostic.

Bryant Mather collected some specimens of *fragilaria* in Honolulu, Hawaii, March 10–11, 1965. Included in this series were two males and one female that had melanistic wing coloration; these are the only known melanic individuals for this entire genus. The males had the forewings evenly suffused by blackish gray, obscuring all maculation except for the pale s. t. line, although very faint traces of the cross lines and discal spot can be found. The hind wings were pale gray, becoming grayish black distally; the s. t. line was present, and the extradiscal line and discal spot were visible. The female was more evenly suffused with grayish black scales on all wings than were the males; the maculation was obliterated except for the faint s. t. line and discal spots.

GROUP III

The wing pattern of the species of this group is similar to that of group II, as all members have a biconcave t. p. line. The males of each species also have a well-developed hair pencil in the swollen hind tibia. The taxa of group III are recognized by genitalic characters.

The very long and usually slender uncus of each species is characteristic of the male genitalia of this group. The uncus is deeply cleft; each apical portion has from one to five dorsal projections, with three to five being the usual number. The aedeagus has spines in the vesica in most of the species, although they are absent from one taxon. All species have the row of bristles on the ventral surface of the third segment.

The sterigma of the female genitalia is a large, well-sclerotized structure, longer than wide, and has either large anterior or posterior indentations, or both. None of the species has the lateral margins extended dorsally. The signum is rounded or elliptical, and the margins tend to be thickened and dentate.

The adults vary in size from medium to large, with the length of the forewings ranging from 13 to 22 mm. The upper surface of the wings is usually pale gray in color, and some species have a pearly luster or reflection on both surfaces of the wings. The maculation is distinct in most species, and sexual dimorphism is represented by a reduction in the brown shading to the cross lines in the females.

There are five species in group III, and one of them is polytypic. Two are found in the United States. One is widespread over the southeastern part of the country; the second is restricted to the Rio Grande Valley of southern Texas. The remaining three taxa are found from Mexico to Costa Rica. One is restricted to the Territory of Baja California. One species is found in the Mexican states of Veracruz and Yucatan; the subspecies of the taxon from southern Texas is found in Veracruz, Yucatan, Sinaloa, and Durango. The remaining taxon is known from Guatemala and Costa Rica.

Anacamptodes cerasta, new species

Plate 24, figure 11; text figures 28, 48

This species is very similar to *pseudoherse* in size, color, and pattern, but there is a difference in the course of the t. p. line. The genitalia of the two species are very distinct. The present taxon occurs in the Territory of Baja California.

MALE: Head, thorax, and abdomen similar to those of *pseudoherse*; antennae with longest pectinations about 0.9 mm.

UPPER SURFACE OF WINGS: Similar to those of *pseudoherse*, differing mainly as follows: wings slightly paler and more ochraceous in coloration; forewings with median line tending to be geminate; discal spot tending to be smaller; t. p. line outwardly convex in cell Cu₁, with longer, gentler concave curve in lower part of wing (t. p. line in *pseudoherse* outwardly convex in cell Cu₂); subterminal

area with fewer dark scales; hind wings tending to have slightly smaller discal dot.

UNDER SURFACE OF WINGS: Similar to that of *pseudoherse* but with less extensive subterminal band, slightly smaller discal spots, and with faint trace of extradiscal line on hind wings.

LENGTH OF FOREWING: 14 to 16 mm.; holotype, 16 mm.

FEMALE: Similar to male but with more gray scaling, tending to obscure maculation above; under surface with larger subterminal band and discal spots.

LENGTH OF FOREWING: 16 to 17 mm.; allotype, 16 mm.

MALE GENITALIA: Uncus sclerotized, longer than wide, anterior portion somewhat bulbous, apices elongate, with from two to four heavy spines projecting posteriorly from each apical lobe, and with depth of area between lobes very much longer than wide; valves with basal two-thirds of costa narrow, heavily sclerotized, and with apical region broadly swollen, rounded, membranous, and having band of spines along curved, raised ridge between these two areas; sacculus sclerotized, short, extending about one-fourth of length of costa, with anterior margin either straight or very weakly concave, and with pointed apex; cristae inconspicuous, fewer than 12 in number on each side; anellus slender; aedeagus with posterior end not sclerotized; vesica unarmed. Abdomen with row of bristles (perhaps deciduous) on segment A₃.

FEMALE GENITALIA: Apophyses posteriores 2.3 to 2.4 mm. in length; sterigma more or less oval in outline, with membranous posterior margin; anterior membranous projection long and slender, longer than sterigma; surface of sterigma with several ridges, and with very long, broad, V-shaped incision from posterior margin extending about one-half of length of sterigma; ductus bursae with short membranous area posteriorly, and with elongate anterior portion gradually increasing in width, sclerotized and striate for relatively short distance, about 0.75 mm. in length; ductus seminalis arising anteriorly of sclerotized and striate area; corpus bursae elongate, slender; signum rounded, but with anterior side flattened and weakly concave medially, central area with numerous fine

teeth, lateral and posterior margins evenly dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, and allotype, female, Guaycura Hotel grounds, La Paz, Baja California Sur, Mexico, October 20, 1961 (Cary-Carnegie Expedition). Paratypes, same data as types, various dates between October 20 and December 6, 1961, six males and three females. Both the primary types and four paratypes are in the collection of the Carnegie Museum; five paratypes are in the collection of the American Museum of Natural History.

DISTRIBUTION: The Territory of Baja California, known only from La Paz.

TIME OF FLIGHT: October, November, and December.

REMARKS: Eleven specimens (seven males and four females) and six genitalic dissections (four males and two females) have been studied. The upper surface of the wings of *cerasta* tends to be slightly more ochraceous than that of *pseudoherse*, and the lower portion of the t. p. line of the two species is different.

The male genitalia of this species are very distinctive in that they have spinose tips to the apices of the uncus, and in the nature of the reduced and heavily sclerotized basal portion of the costa. The female genitalia can be separated from those of the preceding species by the configuration of the sterigma, with its very deep posterior indentation.

The type series was collected in an ultraviolet light trap and most of the specimens are somewhat worn.

Anacamptodes defectaria (Guenée)

Plate 25, figures 1, 2; text figures 9, 29, 49

Boarmia defectaria GUENÉE, 1857, p. 247. MORRIS, 1860, p. 57. GROTE AND ROBINSON, 1868, p. 81. GROTE, 1873, p. 159. OBERTHÜR, 1913, p. 271.

Cymatophora defectaria: PACKARD, 1876, p. 435 (synonym of *humaria*).

Synopsia defectaria: GUMPPENBERG, 1892, p. 330.

Selidosema defectarium: DYAR, "1902" [1903], p. 325.

Selidosema defectaria: BARNES AND McDUNOUGH, 1914, p. 211 (valid species).

Cleora defectaria: BARNES AND McDUNNOUGH, 1917a, p. 118. GROSSBECK, 1917, p. 97.

Anacamptodes defectaria: McDUNNOUGH, 1920, p. 30, pl. 5, fig. 12 (male genitalia) (*partim*; not pl. 8, fig. 9); 1938, p. 164; 1940, p. 92 (*partim*; not fig. 3). FORBES, 1948, p. 57, fig. 79 (right valve of male genitalia). PETERSON, 1962, p. 115, pl. 1, fig. 7 (eggs). KIMBALL, 1965, p. 181, pl. 6, fig. 10 (male).

Boarmia albigenaria WALKER, 1860, p. 348.

Cymatophora albigenaria: PACKARD, 1876, p. 435 (synonym of *humaria*).

Synopsia albigenaria: GUMPPENBERG, 1892, p. 330.

Selidosema albigenarium (*sic*): DYAR, "1902" [1903], p. 325.

Selidosema albigenaria: BARNES AND McDUNNOUGH, 1914, p. 211 (synonym of *defectaria*).

Cleora albigenaria: BARNES AND McDUNNOUGH, 1917a, p. 118.

Anacamptodes albigenaria: McDUNNOUGH, 1920, p. 30; 1938, p. 164.

This is a large, pale gray species that has prominent cross lines strongly shaded with brown. It occurs in the southeastern United States, rarely extending north as far as the District of Columbia and New Jersey, and west to Texas and Kansas.

MALE: Head with vertex and front whitish gray, most specimens without dark scales between bases of antennae, front with dark gray and brownish gray scales forming band of varying width; palpi rising to middle of eye and projecting forward one-half of diameter of eye, whitish gray, with numerous dark gray and brownish gray scales; antennae with longest pectinations about 1.0 mm. in length. Thorax whitish gray above, some specimens with scattered ochraceous and dark gray scales; below, and legs, pale grayish white, latter with variable number of blackish brown scales, particularly on forelegs. Abdomen whitish gray, upper surface with ochraceous or grayish ochraceous scales on posterior margin of each segment forming either paired spots or band, base of first segment with narrow black band.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, variably overlain with ochraceous brown, grayish brown and brownish black scales; cross lines narrow, black, tending to become obsolescent anteriorly, and strongly shaded by prominent

ochraceous brown to dark brown bands; course of lines as in *humaria*, but with t. p. line more strongly biconcave and nearer to t. a. line above inner margin, with outward bulge of t. p. line tending to have separate outward points in cells Cu_1 and Cu_2 ; discal dot white; outer portion of wing similar to that of *humaria*, but with s. t. line tending to be more strongly represented and extending full length of wing; terminal line obsolescent but with prominent, black, intravenular dots. Hind wings concolorous with forewings, with basal one-half tending to be paler than outer portion; similar to those of *humaria*, but with median line less strongly represented, and with more prominent s. t. line.

UNDER SURFACE OF WINGS: Whitish gray, with forewings above veins Cu and Cu_2 more or less heavily overlain by grayish brown scales; maculation absent except for discal dots, broad subterminal band, and terminal intravenular dots, all more strongly represented on forewings than on hind wings.

LENGTH OF FOREWING: 13 to 20 mm.

FEMALE: Similar to male but less contrastingly colored, with less brown scaling above, particularly in bands bordering t. a., t. p., and extradiscal lines; under surface with heavier discal spots and subterminal bands.

LENGTH OF FOREWING: 16 to 22 mm.

MALE GENITALIA: Uncus very long and slender, at least twice as long as wide, apical portion with long, narrow split extending almost one-half of length of uncus, and with apex of each tip having single dorsal projection; valves with costa of even width, having broad, flattened, sclerotized, basal portion, apical section more membranous, the two separated by prominent, raised, diagonal ridge; inner face of apical section thickly set with elongate setae; sacculus with moderately strong shoulder, well separated from costa, length from costa to shoulder equal to shortest distance from shoulder to anterior margin of sacculus, terminal portion sharply tapered, relatively short, and gently curved; cristae consisting of band of 12 to 18 elongate setae on each side; aedeagus with elongate, pointed, sclerotized posterior end; vesica armed with row of slender spines.

FEMALE GENITALIA: Apophyses posteriores 2.5 to 2.8 mm. in length; sterigma longer than

wide, ovoid in outline, wider posteriorly; anterior membranous projection extending from membranous area as slender neck, followed by large round process; sterigma with prominent anterior median indentation, with lateral margins thickened, posterior end rounded and less heavily sclerotized than remainder of sterigma; ductus bursae with prominent, well-sclerotized, ventral surface of ostium bursae, followed by short membranous area not extending cephalad of anterior indentation of sterigma, and with elongate anterior portion gradually increasing in width, sclerotized and striate area not extending to corpus bursae; ductus seminalis arising near anterior end of sclerotized and striate area, approximately three-fifths to three-fourths of length of ductus bursae; corpus bursae large, globular; signum round or elliptical, median area with numerous small teeth, margins thickened and evenly dentate but with anterior margin tending to be less strongly so.

EARLY STAGES: All larval instars were described in Grossbeck (1917, p. 97). The mature caterpillar is pale brown, shading laterally into greenish, and striate with fine, wavy, longitudinal lines. Segment A_2 has a red-brown, moderate, subdorsal hump and black, lateral warts. The tubercles of segment A_8 are small and pale. The spiracles are ochraceous, tinged with red brown.

The eggs have been illustrated by Peterson (1962, p. 115, pl. 1, fig. 7).

FOOD PLANTS: Oak (Grossbeck, 1917, p. 97); poplar and willow (Forbes, 1948, p. 57); sweet cherry. In Texas, R. O. Kendall has reared this species from the following hosts: *Quercus virginiana* Miller, *Q. stellata* Wengenhein, *Diospyros virginiana* Linnaeus, *Sapindus drummondii* Hooker and Arnott, and *Juglans microcarpa* Berlander.

TYPES: Guenée described *defectaria* from one male and one female. There is a male in the collection of the United States National Museum from the Guenée collection, and it is hereby designated as the lectotype. The original female may be lost.

Walker described *albigenaria* from a series of seven specimens, including both sexes. Six of these are now in the collection of the British Museum (Natural History) (Fletcher, *in litt.*). The male labeled "E. D. 154. E. Doubleday. St. John's Bluff. E. Florida. 40.-

14.1.20" is hereby designated the lectotype. The remaining three males and two females are designated as lectoparatypes.

TYPE LOCALITIES: "Amérique septentrionale" (*defectaria*); St. John's Bluff, east Florida (*albigenaria*).

DISTRIBUTION: The southeastern United States (see fig. 9). The species extends from Florida up the Atlantic coast as far as the District of Columbia and southern New Jersey; these latter individuals are probably migrants or strays, not natives. To the west of Florida, the taxon occurs to central Texas and eastern Kansas, and north through Missouri, Kentucky, and Ohio.

TIME OF FLIGHT: The adults have been taken in every month of the year.

REMARKS: Four hundred twenty-two specimens (317 males and 105 females, including the lectotype of *defectaria*) and 28 genitalic dissections (17 males and 11 females) have been studied. Throughout most of its range, *defectaria* is an easily recognized species. Its large size, pale coloration, and the brown shading of the cross lines are characteristic. In the western portion of its range, however, *defectaria* tends to be smaller and darker, particularly in Texas. In this state it can be easily confused with both *perfectaria* McDunnough and the following species, as all three closely resemble one another in appearance. The last two species tend to be found in the Rio Grande Plains area, whereas *defectaria* tends to be found north of that area. The only certain way to separate these three taxa is by an examination of their genitalic structures.

The male genitalia of *defectaria* can be distinguished from those of the preceding species by the very long and narrow uncus. The prominent shoulder of the sacculus and the pointed and sclerotized posterior end of the aedeagus are additional diagnostic characters. The female genitalia can be recognized by the fact that the large sterigma has a prominent anterior median indentation and no posterior incision.

Anacamptodes gemella, new species

This species is very similar to *defectaria*, but the upper surface of the wings tends to be slightly darker and to have more prominent, darker brown shade lines to the t. a. and t. p.

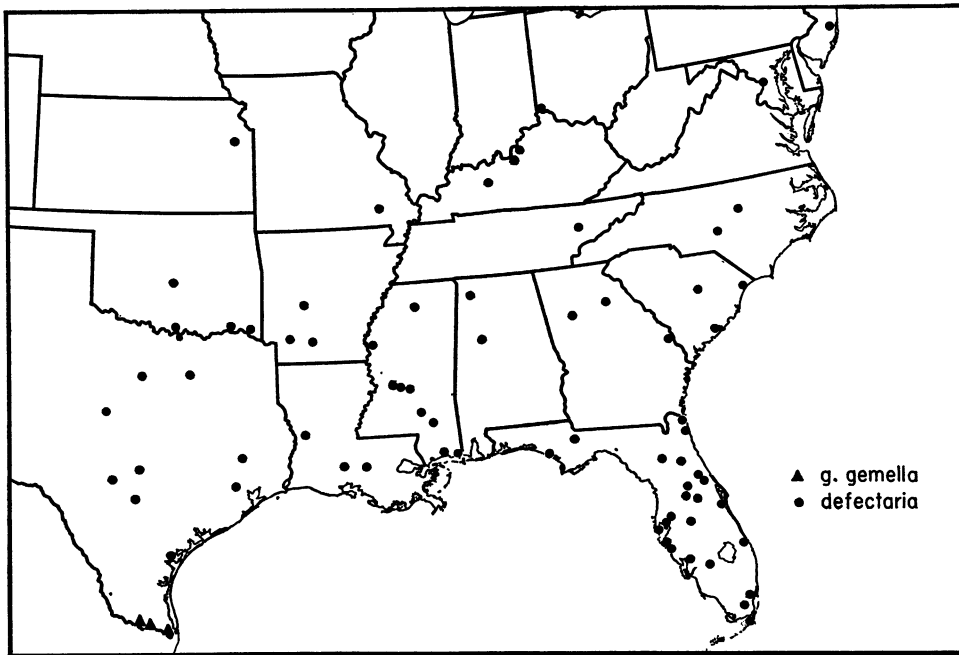


FIG. 9. Distribution of *Anacamptodes defectaria* (Guenée) and *A. gemella gemella*, new subspecies.

lines. The safest way to recognize this species is by a study of the genitalia. It occurs in two subspecific populations, one in southern Texas and the other in Mexico.

***Anacamptodes gemella gemella*, new subspecies**

Plate 25, figures 3, 4; text figures 9, 30, 50

Anacamptodes defectaria McDUNNOUGH (nec Guenée), 1940, p. 92 (*partim*), fig. 3 (male genitalia).

The nominate subspecies flies in southern Texas. It is relatively small and dark.

MALE: Head, thorax, and abdomen similar to those of *defectaria*, but with thorax tending to have more ochraceous scaling on collar and posteriorly.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, overlain variably with reddish brown, dark grayish brown, and brownish black scales, and with faint pearly luster; cross lines narrow, black, and strongly shaded by prominent reddish brown or dark brown bands; course of lines as in *defectaria*; outer portion of wing similar to that of *defectaria* but tending to be slightly darker, and with basal part of fringe tending to be gray except opposite intravenular spots.

Hind wings like those of *defectaria* but tending to have more reddish brown scaling next to extradiscal and s. t. lines.

UNDER SURFACE OF WINGS: Similar to that of *defectaria*; some specimens tending to have veins of ground color crossing broad subterminal band, and to have more prominent intravenular dots.

LENGTH OF FOREWING: 13 to 18 mm.; holotype, 16 mm.

FEMALE: Similar to male but less contrastingly colored, with less brown scaling above, particularly in bands bordering t. a., t. p., and extradiscal lines; under surface with heavier dark markings.

LENGTH OF FOREWING: 15 to 18 mm.; allotype, 16 mm.

MALE GENITALIA: Similar to those of *defectaria*, differing mainly as follows: uncus with apex of each tip having from two to five dorsal projections; valves with costa enlarged apically, about twice as wide distally as sclerotized basal portion, slightly longer in proportion to length of basal section, and having less prominent, raised, diagonal ridge separating two areas; sacculus with small shoulder, length from costa to shoulder about

one-third of shortest distance from shoulder to anterior margin of sacculus, and with terminal portion more elongate and having greater curvature; aedeagus with posterior end bluntly pointed or rounded, not swollen, and with ventroposterior area of small, posteriorly directed, toothlike projections.

FEMALE GENITALIA: Apophyses posteriores 2.6 to 2.7 mm. in length; sterigma longer than wide, ovoid in outline, wider posteriorly; anterior membranous projection extending from membranous area as broad neck, followed by rounded process; sterigma with prominent anterior median incision, with lateral margins thickened, posterior end rounded and with median indentation, tending to be swollen on each side thereof as far as ostium bursae; ductus bursae with lightly sclerotized ventral surface of ostium bursae, followed by short membranous area extending to about anterior indentation of sterigma, and with elongate, tubular portion scarcely increasing in width anteriorly, sclerotized and striate area not extending to corpus bursae; ductus seminalis arising near anterior end of sclerotized and striate area; corpus bursae large, globular; signum round, median area with a few small teeth, margins thickened and evenly dentate but with anterior margin tending to be less strongly so.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Mercedes, Hidalgo County, Texas, February 9, 1959 (H. Schmalzried); allotype, female, same data, December 7, 1958. Paratypes, all from Texas: Same data as types, various dates in January, March, June through December, 1958–1959, one male without dates, 36 males and eight females; Pharr, Hidalgo County, April 9 to July 7, 1948 (O. Buchholz), four males; Brownsville, Cameron County, January 22, 1925, March 6, four males; same locality, October 20, 1938 (G. H. and J. L. Sperry), four males; same locality, November 10, 1928 (F. H. Benjamin), one male; same locality, January 20 and February 1, 1937 (T. N. Freeman), two males.

All the type material is in the collection of the American Museum of Natural History except for some paratypes that are in the Canadian National Collection.

DISTRIBUTION: Southern Texas, known

from only Hidalgo and Cameron counties (see fig. 9).

TIME OF FLIGHT: The adults probably fly throughout the year, as examples have been studied that were caught in every month except February.

REMARKS: Sixty specimens (52 males and eight females) and 11 genitalic dissections (nine males and two females) have been studied. This species is very similar to *defectaria*, but it occurs to the south of that species. It does fly with *perfectaria*, and these two species also resemble each other in appearance. They are easy to separate on genitalic characters, however, as they are in different groups of the genus. With the males it is often possible to remove the scales from the top of the end of the last segment in order to examine the uncus, which will allow placement as to group, and thus separate *perfectaria* and *gemella*.

The genitalia of this species are quite similar to those of *defectaria*. The male structures in the present taxon can be recognized by the differences in the valves and by the dentate area of the aedeagus. The female genitalia can be determined from the fact that the sterigma has both anterior and posterior median indentations.

Anacamptodes gemella tethe, new subspecies

Plate 25, figures 5, 6; text figure 51

This Mexican population is larger and paler than the nominate subspecies.

MALE: Similar to male of nominate *gemella* but paler owing to less gray scaling on upper surface of wings, and with more pronounced pearly luster; under surface with less maculation and with stronger pearly luster.

LENGTH OF FOREWING: 13 mm. (holotype).

FEMALE: Similar to male but with less brown shading to cross lines on upper surface; under surface with heavier maculation.

LENGTH OF FOREWING: 18 (holotype) to 20 (paratype) mm.

MALE GENITALIA: Similar to those of nominate *gemella*, but with sacculus having more prominent shoulder and with terminal portion slightly longer; aedeagus longer and with more pointed posterior end.

FEMALE GENITALIA: Similar to those of nominate *gemella*, but tending to have ostium bursae situated slightly more anteriorly.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Colonia Yucatan, Yucatan, Mexico, August 19, 1952 (J. and D. Pallister), and allotype, female, same data, August 17, 1952. Paratypes, all from Mexico: Jalapa, [Veracruz], one female; 5 miles north of Mazatlan, Sinaloa, July 30, 1964 (W. C. McGuffin), one female; 10 miles west of El Salto, Durango, August 5, 1964, elevation 9000 feet (J. E. H. Martin), one female.

The holotype and allotype are in the collection of the American Museum of Natural History; the paratypes are in the collections of the United States National Museum and of the Canadian National Collection.

DISTRIBUTION: The Mexican states of Durango, Sinaloa, Veracruz, and Yucatan.

TIME OF FLIGHT: July and August.

REMARKS: Five specimens and four genitalic dissections have been studied. This subspecies appears very similar to *herse*, *pseudoherse*, and the following species, all of which fly in the same general area. The only certain way of distinguishing these taxa is by means of the genitalia.

***Anacamptodes triplicia*, new species**

Plate 25, figure 7; text figures 31, 52

This species is very much like *defectaria* and *gemella* in appearance, but it has a stronger pearly luster on the wings. The safest way to identify it is by means of the genitalia. This taxon is known from Veracruz, Mexico.

MALE: Head, thorax, and abdomen similar to those of *defectaria*; antennae with longest pectinations about 1.0 mm. in length.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, variably overlain with ochraceous brown and dark brown scales, and with a strong pearly luster; pattern similar to that of *defectaria*, but tending to have t. p. line more zigzag in course from costa to cell M_2 and to be obsolescent in cell Cu_1 ; terminal line absent except for intravenular spots. Hind wings similar to those of *defectaria*, but with extradiscal line tending to be more strongly concave in lower portion of wing.

UNDER SURFACE OF WINGS: Whitish gray, with a few scattered brown scales, and with faint pearly reflection; discal dots present,

brown on forewings, white and elongate on hind wings; with broad, dark brown subterminal band on forewings, tending to be reduced in or absent from cell M_3 ; intravenular dots weakly represented or obsolescent.

LENGTH OF FOREWING: 15 (holotype) to 17 (paratype) mm.

FEMALE: Similar to male but with less brown scaling, thus appearing less contrasting in maculation above; under surface with heavier maculation.

LENGTH OF FOREWING: 18 mm. (allotype).

MALE GENITALIA: Similar to those of nominate *gemella*, differing mainly as follows: uncus with apex of each tip having from three to five dorsal projections; valves with apical portion of costa slightly smaller, being about one-half again as wide distally as sclerotized basal portion and shorter in proportion to length of basal section; sacculus with moderate shoulder, length from costa to shoulder about one-half of shortest distance from shoulder to anterior margin of sacculus, and with terminal portion elongate and having marked curvature; aedeagus slightly enlarged near terminal end, then tapering to sclerotized point, and with ventroposterior area of small, posteriorly directed toothlike projections.

FEMALE GENITALIA: Apophyses posteriores 2.4 mm. in length; sterigma longer than wide, roughly rectangular in outline but with posterior margin rounded; anterior membranous projection short, projecting from lightly sclerotized, anterior area extending width of sterigma and becoming more heavily sclerotized medially in median indentation of sterigma; sterigma with lateral margins of broad, shallow, median indentation thickened, posterior end lightly sclerotized, rounded, with large, median, V-shaped indentation extending two-fifths of length of sterigma; ductus bursae with large, membranous ostium bursae extending anteriorly to posterior margin of median indentation of sterigma, and with elongate, slightly tapering, sclerotized, and striate area extending almost to corpus bursae; ductus seminalis arising near anterior end of sclerotized and striate area; corpus bursae large, globular; signum rounded, median area with several moderately strong teeth, margins thickened and more or less evenly dentate.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Jalapa, Veracruz, Mexico, September (C. C. Hoffmann); allotype, female, Orizaba, [Veracruz], Mexico; paratype, male, Coatepec, [Veracruz], Mexico. The holotype is in the collection of the American Museum of Natural History; the other two specimens are in the collection of the United States National Museum.

DISTRIBUTION: This species is known only from the state of Veracruz, with the specimens having been taken at approximately 4000 to 4700 feet in elevation.

TIME OF FLIGHT: September.

REMARKS: Three specimens and three genitalic dissections have been studied. This species is very similar in appearance to *herse*, *pseudoherse*, and *tethe*; the genitalia should be used to separate these taxa.

The genitalia of this species show similarities to those of both *defectaria* and *gemella*. The valves of the present taxon are similar to those of the latter in that the terminal area of the costa is enlarged. The aedeagus is like that of *defectaria* in that it has a well-sclerotized and sharply pointed posterior end, but it also possesses the spiculate area that is to be found in *gemella*. The female genitalia are similar to those of *gemella* in that both have the sterigma with anterior and posterior indentations. The present taxon can be recognized by the much larger posterior incision.

Anacamptodes lurida (Schaus), new combination

Plate 25, figure 8; text figures 32, 53

Alcis lurida SCHAUS, 1913, p. 348.

This species closely resembles *tethe* and *triplicia* in appearance. The genitalia should be used as a means for the separation of these taxa. The present species occurs in Guatemala and Costa Rica.

MALE: Head, thorax, and abdomen similar to those of *triplicia*; some specimens with wider band of dark scales across front; antennae with longest pectinations about 0.75 mm. in length.

UPPER SURFACE OF WINGS: Very similar to those of *triplicia*, but with t. p. line tending to be complete in most specimens, and with terminal line weakly represented.

UNDER SURFACE OF WINGS: Whitish gray,

with a few scattered brown scales, and with faint pearly reflection; discal spot of forewing large, dark brown, from hind wings absent; subterminal band of forewings dark brown, broad, extending to outer angle, with patch of whitish gray at apex and in cell M_2 along outer margin; hind wings without maculation except for intravenular terminal dots, some specimens with trace of subterminal band anteriorly.

LENGTH OF FOREWING: 14 to 18 mm.

FEMALE: Similar to male but with less brown scaling, thus appearing less contrasting in maculation above; under surface with heavier maculation.

LENGTH OF FOREWING: 17 to 21 mm.

MALE GENITALIA: Similar to those of *gemella*, differing mainly as follows: uncus with apex of each tip having three or four dorsal projections; valves with apical portion of costa broadly swollen, slightly more than twice as wide as sclerotized basal portion, and with wider area of heavier spines on inner face of costa; sacculus with shoulder well separated from costa, this length slightly less than shortest distance from shoulder to anterior margin of sacculus, and with elongate terminal portion relatively straight and flat except for curved apex; aedeagus with posterior end bluntly pointed or rounded, not swollen, and with ventroposterior area of small, posteriorly directed, toothlike projections.

FEMALE GENITALIA: Apophyses posteriores 2.7 to 2.8 mm. in length; sterigma longer than wide, with rectangular anteroventral portion and with oval or elliptical posterodorsal section; anterior membranous projection rounded, subequal in length to length of sterigma, projecting from lightly sclerotized, anterior area extending width of sterigma and becoming weakly lobate and more heavily sclerotized medially in median indentation of sterigma; sterigma with lateral margins of broad, evenly rounded, median indentation thickened and extending ventrally from area that extends posteriorly, caudal margin weakly sclerotized and rounded, with large, median, U-shaped indentation extending about two-fifths of length of sterigma; ductus bursae with large, membranous ostium bursae extending anteriorly to posterior margin of median indentation of sterigma, and with

elongate, slightly tapering, sclerotized, and striate area extending laterally and dorsally to corpus bursae; ductus seminalis arising posteriad of corpus bursae; corpus bursae large, globular; signum weakly elliptical, median area with approximately 14 small teeth, margins thickened and dentate, anteriorly reduced.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Schaus described *lurida* from a single male specimen. It is U.S.N.M. No. 17875, and its genitalia are mounted on slide E.L.T. No. 2068.

TYPE LOCALITY: Sixola River, [Limón], Costa Rica.

DISTRIBUTION: Costa Rica (the province of Limón) and Guatemala (the provinces of Baja Verapaz and Izabal). As far as can be determined from the limited material that is available, this species is found at elevations from near sea level up to 4500 feet.

TIME OF FLIGHT: May, June, and July.

REMARKS: Seventeen specimens (11 males

and six females, including the type) and six genitalic dissections (four males and two females) have been studied. Although the upper surface of the wings of *lurida* and *triplicia* are very similar, certain differences are to be found on the under side of the wings. In *lurida* the discal spot and subterminal band of the forewing are more heavily represented than they are in *triplicia*. However, it is probably advisable to study the genitalia to make certain of the identification.

The male genitalia of *lurida* can be separated from those of the preceding species by the shape of both the valves and longer aedeagus. In the present species the latter is about 1.2 mm. in length; in *triplicia*, 1.1 mm.; and in nominate *gemella*, about 1.0 mm. The spinose area in *lurida* is composed of smaller and more widely spaced teeth than those in the preceding species. The female genitalia of the present taxon can be recognized by the large, V-shaped, posterior indentation of the sterigma.

LIST OF THE SPECIES OF THE GENUS *ANACAMPTODES*,
WITH THEIR KNOWN DISTRIBUTION

(Synonymic names are indented below valid names.)

GROUP I

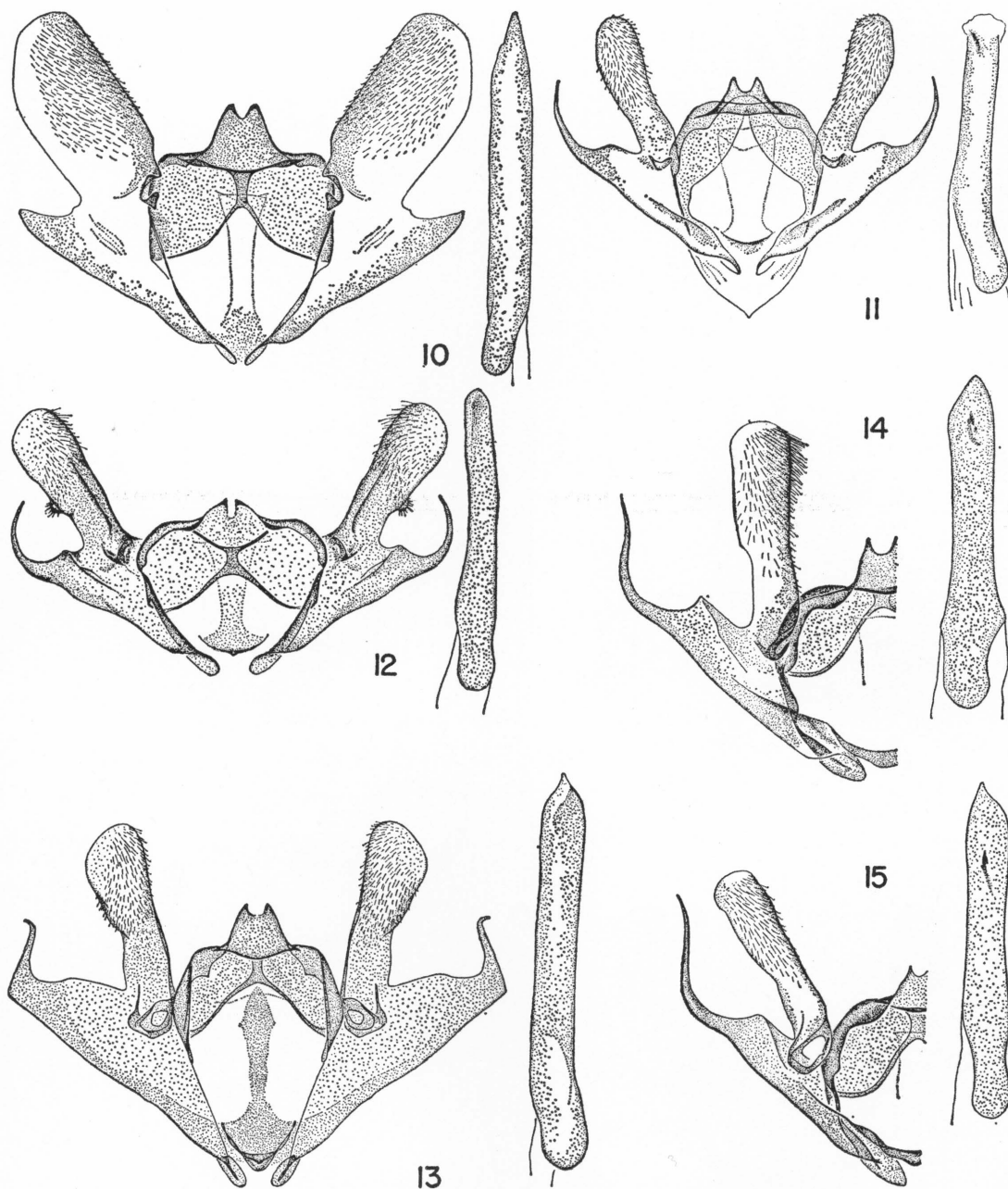
- | | |
|--|---|
| 1. <i>cypressaria</i> (Grossbeck) | Southeastern United States |
| <i>plumosaria</i> auct. | |
| 2. <i>jacumbaria</i> (Dyar) | Southern California, northern Baja California |
| 3. <i>dataria</i> (Grote) | Arizona, New Mexico, Texas, Chihuahua |
| 4. <i>angulata</i> , new species | Western Texas |
| 5. <i>clivinaria</i> (Guenée) | |
| a. <i>c. clivinaria</i> (Guenée) | Central California, Oregon |
| b. <i>c. impia</i> , new subspecies | Southern California |
| c. <i>c. profanata</i> (Barnes and McDunnough) | Utah and Colorado, north to British Columbia |
| 6. <i>sanctissima</i> (Barnes and McDunnough) | California, northern Baja California |
| 7. <i>obliquaria</i> (Grote) | Southern California to Texas, Sonora |
| <i>rufaria</i> (Grote) | |
| 8. <i>providentia</i> , new species | Southern California |
| 9. <i>sancta</i> , new species | Arizona |

GROUP II

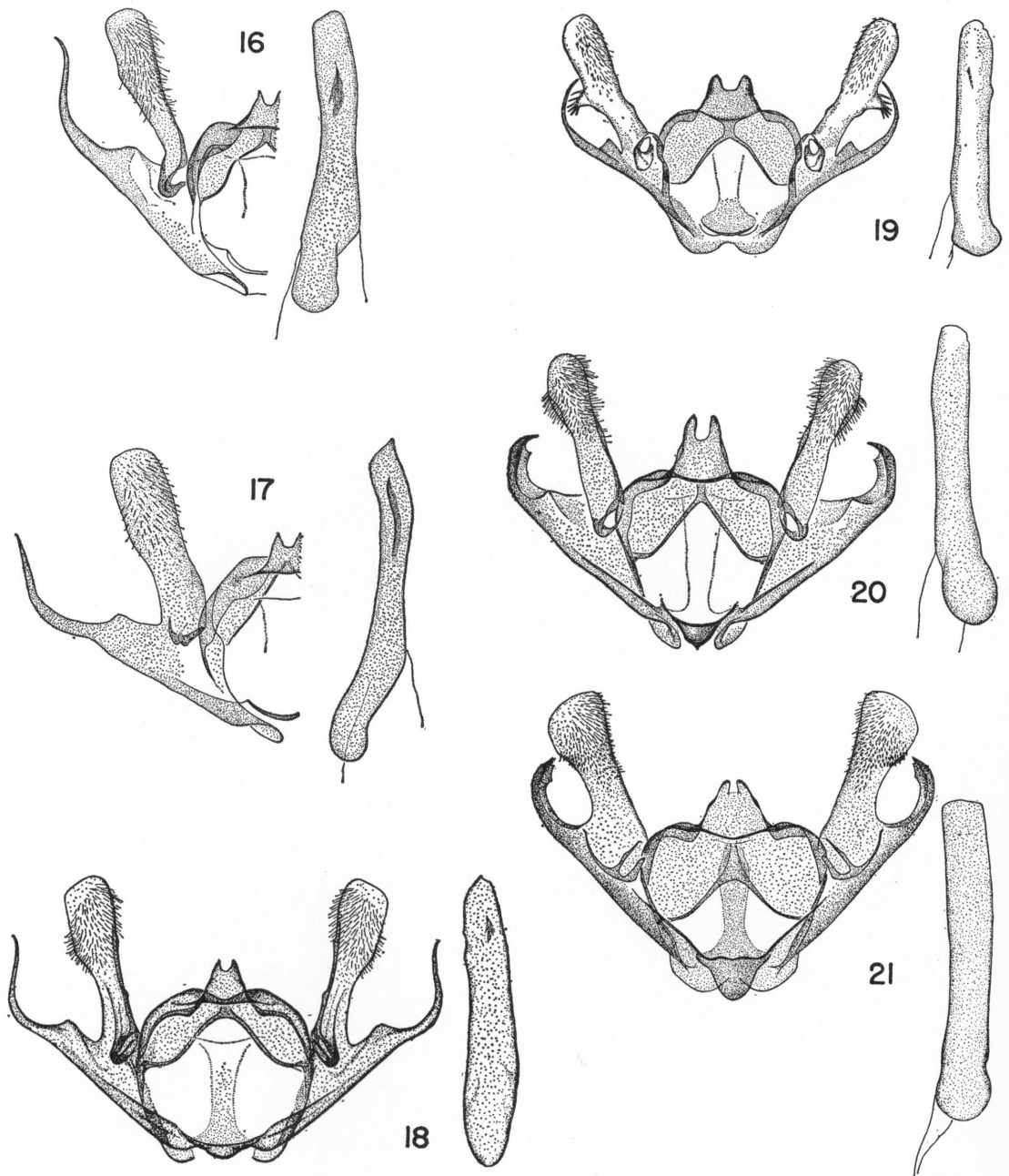
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|---------------------------------------|--|
| 10. <i>pergracilis</i> (Hulst) | Southeastern United States |
| 11. <i>perfectaria</i> McDunnough | Texas |
| 12. <i>encarsia</i> , new species | Yucatan |
| 13. <i>vellivolata</i> (Hulst) | Eastern North America |
| <i>humaria</i> auct. | |
| 14. <i>monticola</i> , new species | Hispaniola |
| 15. <i>ephyraria</i> (Walker) | Eastern North America |
| <i>expressaria</i> (Walker) | |
| <i>takenaria</i> (Pearsall) | |
| 16. <i>herse</i> (Schaus) | Costa Rica, Mexico |
| 17. <i>humaria</i> (Guenée) | |
| a. <i>h. humaria</i> (Guenée) | Eastern and central North America |
| <i>intraria</i> (Guenée) | |
| <i>intractaria</i> (Walker) | |
| <i>illaudata</i> (Walker) | |
| b. <i>h. pallida</i> , new subspecies | North-central Texas |
| 18. <i>pseudoherse</i> , new species | Mexico |
| 19. <i>fragilaria</i> (Grossbeck) | California, southwestern Arizona, Baja California,
Hawaiian Islands |

GROUP III

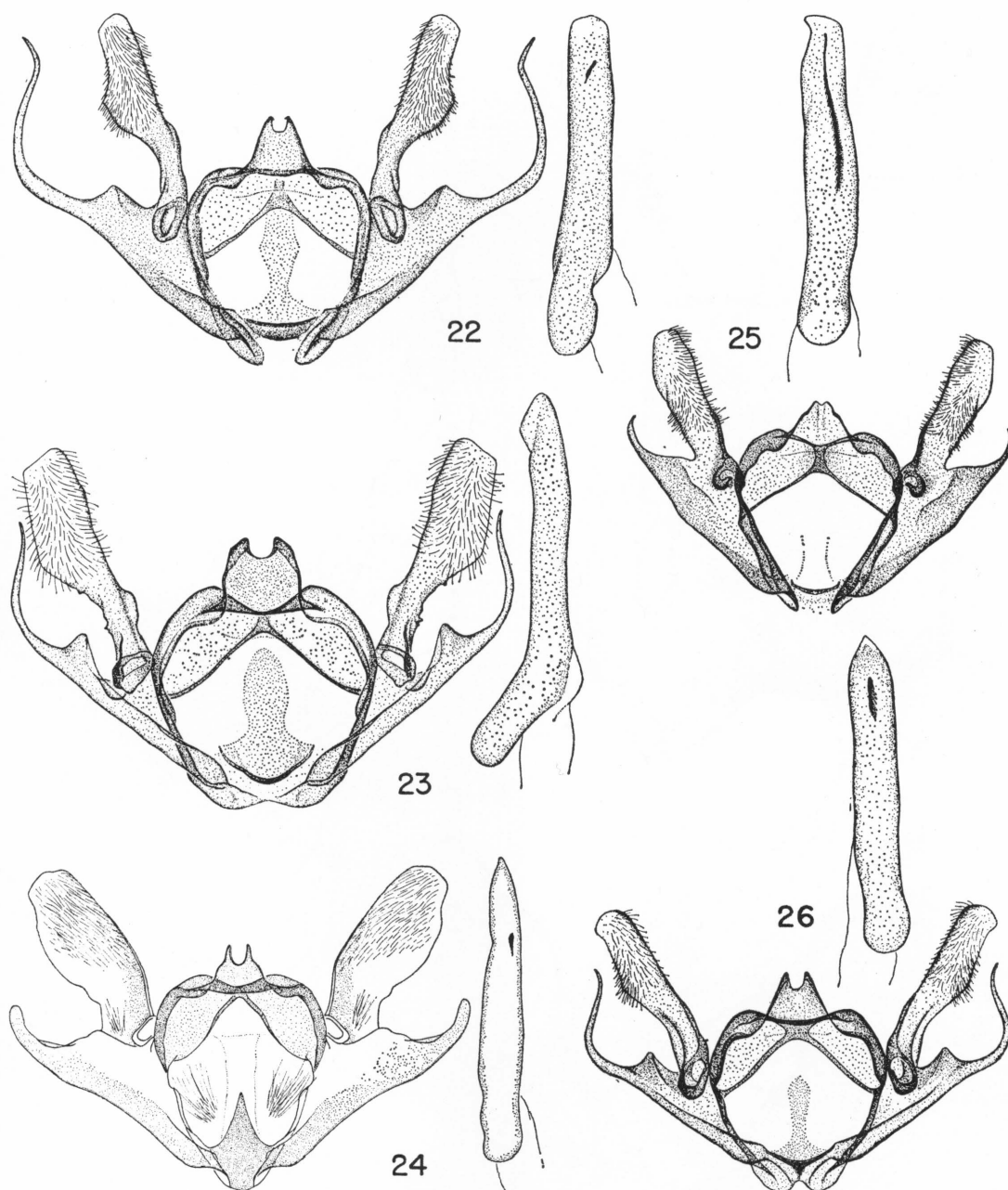
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| 20. <i>cerasta</i> , new species | Territory of Baja California |
| 21. <i>defectaria</i> (Guenée) | Southeastern United States |
| <i>albigenaria</i> (Walker) | |
| 22. <i>gemella</i> , new species | |
| a. <i>g. gemella</i> , new subspecies | Southern Texas |
| b. <i>g. tethe</i> , new subspecies | Durango, Sinaloa, Veracruz, Yucatan |
| 23. <i>triplicia</i> , new species | Veracruz |
| 24. <i>lurida</i> (Schaus) | Guatemala, Costa Rica |



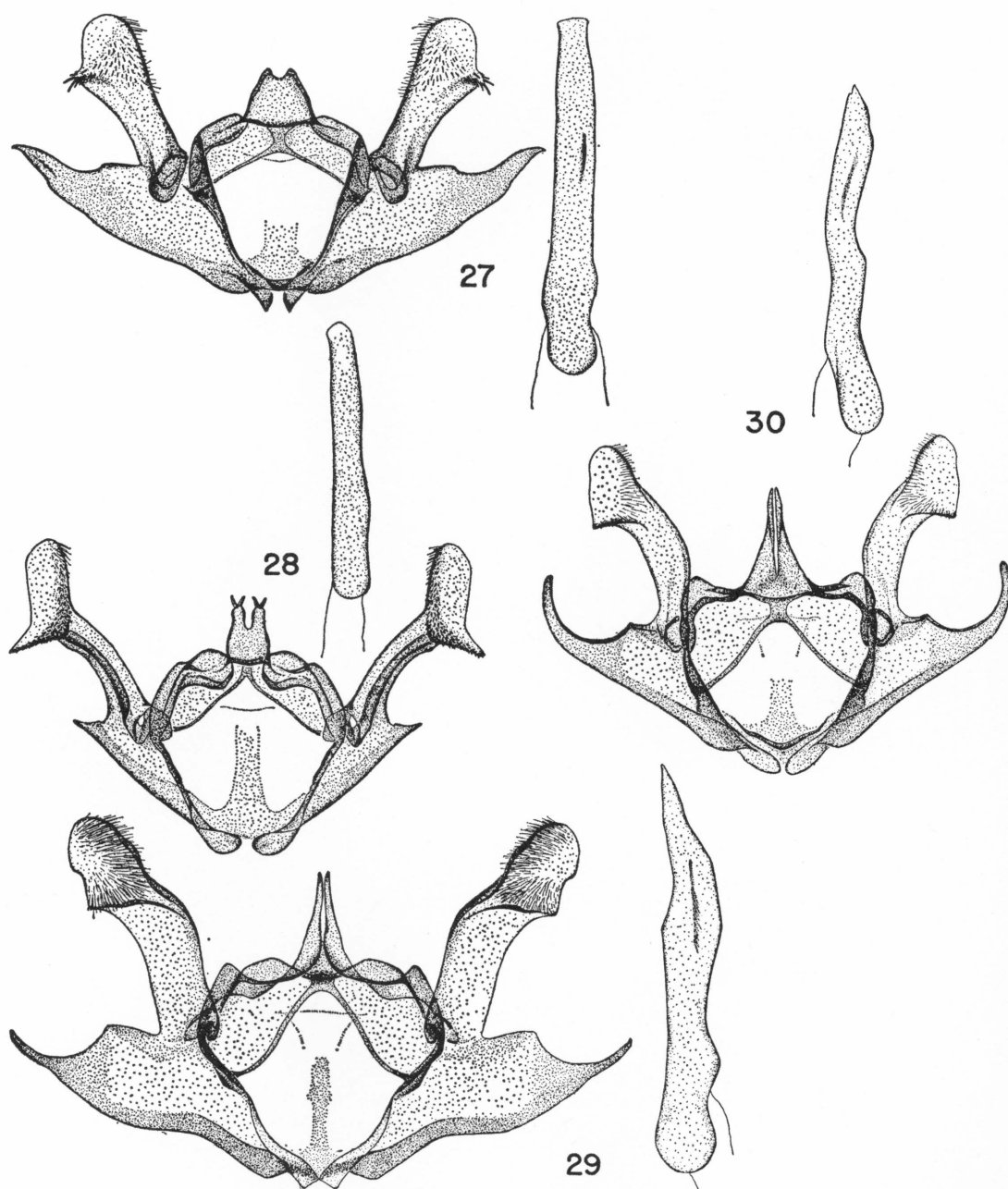
FIGS. 10-15. Male genitalia. 10. *Anacamptodes cypressaria* (Grossbeck), Stemper, Florida, April 19, 1911 (A.M.N.H.). 11. *A. jacumbaria* (Dyar), Los Encinos, Sierra San Pedro Martir, Baja California, June 2, 1961 (D. Patterson; A.M.N.H.). 12. *A. dataria* (Grote), Palo Duro County, Texas, July 12, 1940 (L. H. Bridwell; A.M.N.H.). 13. *A. angulata*, new species, holotype, Chisos Basin, Brewster County, Texas, July 4, 1957 (R. Zweifel; A.M.N.H.). 14. *A. clivinaria clivinaria* (Guenée), Anderson Springs, Lake County, California, May 7, 1955 (R. H. Leuschner; A.M.N.H.). 15. *A. clivinaria profanata* (Barnes and McDunnough), Glenwood Springs, Colorado, May (A.M.N.H.).



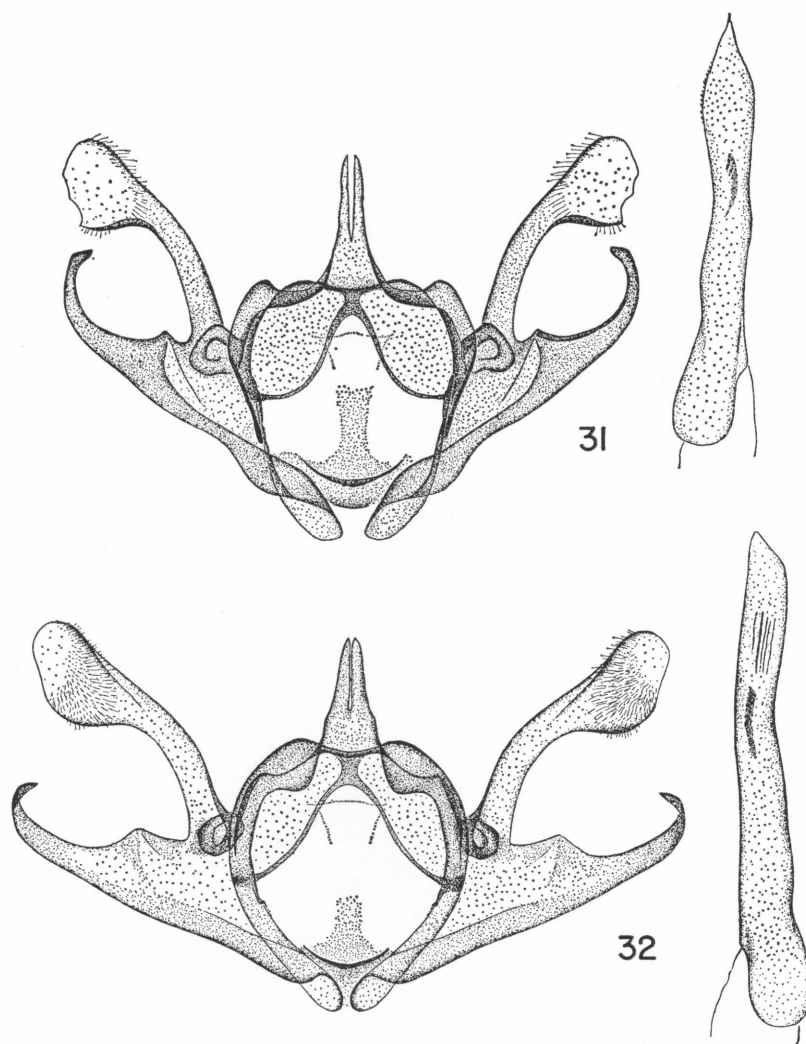
FIGS. 16-21. Male genitalia. 16. *Anacamptodes sanctissima* (Barnes and McDunnough), Las Cruces Canyon, Baja California, April 10, 1936 (Meadows; A.M.N.H.). 17. *A. obliquaria* (Grote), San Antonio, Texas (A.M.N.H.). 18. *A. sancta*, new species, paratype, Southwestern Research Station of the American Museum of Natural History, Arizona, April 21, 1956 (Cazier and Ordway; A.M.N.H.). 19. *A. pergracilis* (Hulst), Big Pine Key, south Florida, April 8-11, 1949 (L. J. Sanford; A.M.N.H.). 20. *A. perfectaria* McDunnough, Mercedes, Hidalgo County, Texas, March 10, 1959 (H. Schmalzried; A.M.N.H.). 21. *A. encarsia*, new species, holotype, Pisté, Yucatan, June 4, 1959 (C. and P. Vaurie; A.M.N.H.).



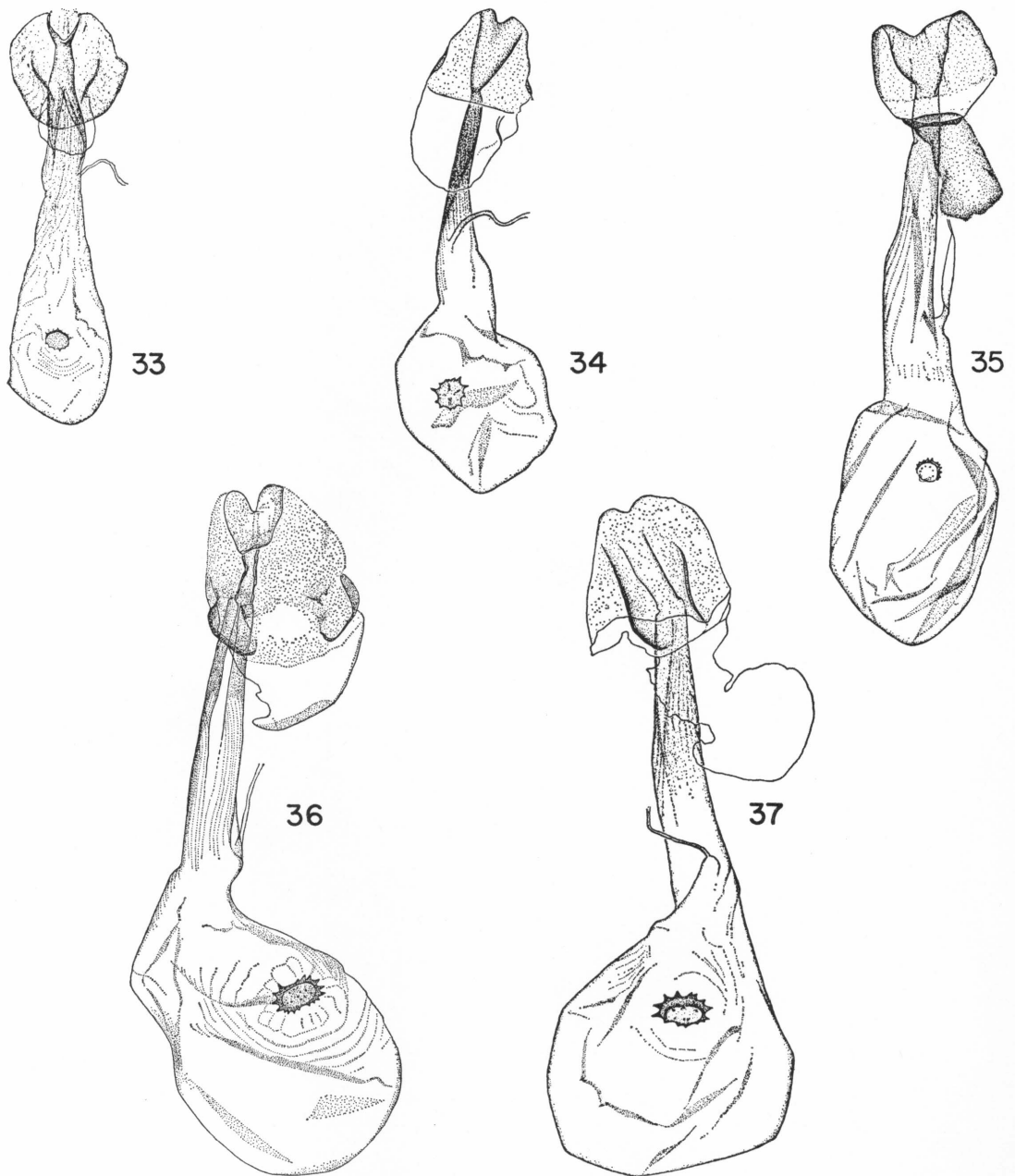
FIGS. 22-26. Male genitalia. 22. *Anacamptodes vellivolata* (Hulst), Eglington, Ontario, June 30, 1923 (A.M.N.H.). 23. *A. monticola*, new species, holotype, Hotel Montaña, Jarabacoa, Dominican Republic, March 31, 1953 (J. A. Ramos; U.S.N.M.). 24. *A. ephyraria* (Walker), Long Prairie, Todd County, Minnesota, July 10, 1963 (J. Schrenk; A.M.N.H.). 25. *A. herse* (Schaus), Avangarez, Costa Rica, July (Schaus and Barnes; U.S.N.M.). 26. *A. humaria humaria* (Guenée), Fort Davis, Jeff Davis County, Texas, July 29, 1964 (A. Blanchard; A.M.N.H.).



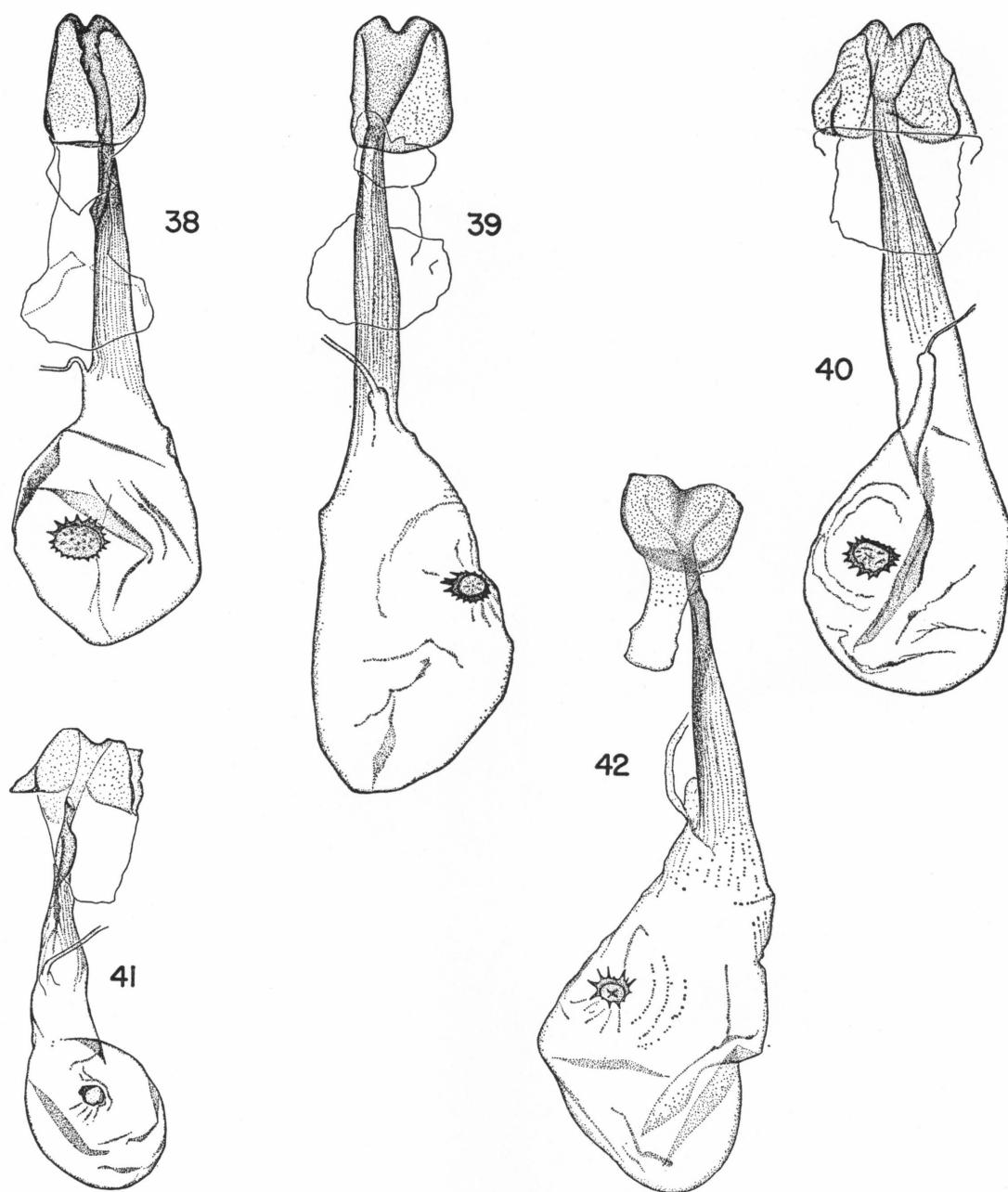
FIGS. 27-30. Male genitalia. 27. *Anacamptodes pseudoherse*, new species, paratype, Sierra de Guerrero, Mexico, June, 1913 (R. Muller; U.S.N.M.). 28. *A. cerasta*, new species, holotype, La Paz, Baja California Sur, October 20, 1961 (Cary-Carnegie Museum Expedition; C.M.). 29. *A. defectaria* (Guenée), University of Kansas Natural History Reservation, Douglas County, Kansas, April 19, 1961 (N. McFarland; A.M.N.H.). 30. *A. gemella gemella*, new subspecies, holotype, Mercedes, Hidalgo County, Texas, February 9, 1959 (H. Schmalzried; A.M.N.H.).



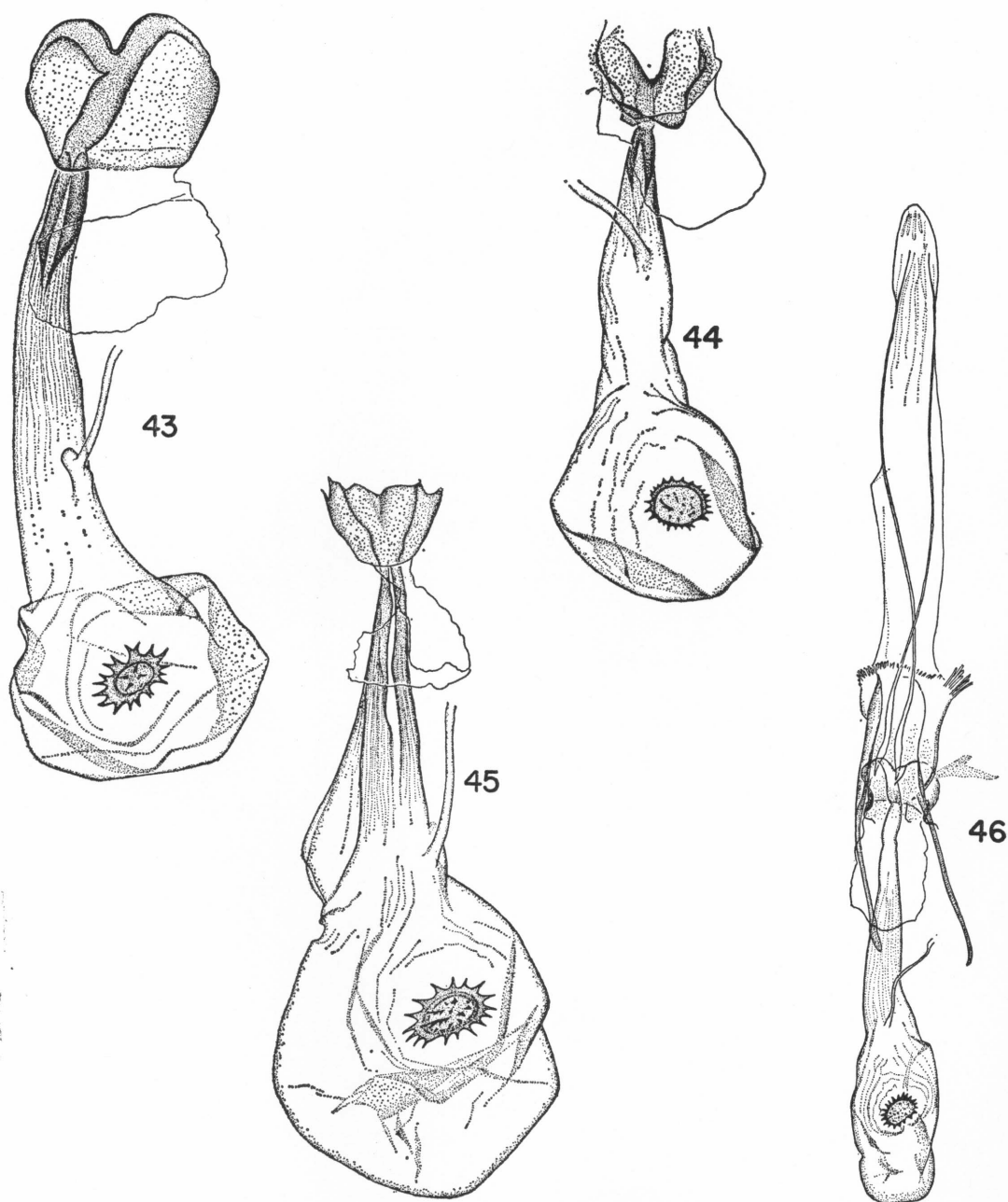
FIGS. 31, 32. Male genitalia. 31. *Anacamptodes triplicia*, new species, paratype, Coatepec, Mexico (U.S.N.M.). 32. *A. lurida* (Schaus), Cayuga, Guatemala (Schaus and Barnes; U.S.N.M.).



FIGS. 33-37. Female genitalia. 33. *Anacamptodes cypressaria* (Grossbeck), Fort Myers, Florida, April 21 (F. M. Jones; A.M.N.H.). 34. *A. jacumbaria* (Dyar), Palm Springs, Riverside County, California, April 20, 1956 (A. H. Rindge; A.M.N.H.). 35. *A. dataria* (Grote), Welder Wildlife Foundation, San Patricio County, Texas, April 20, 1963 (A. Blanchard; A.M.N.H.). 36. *A. clivinaria impia*, new subspecies, paratype, Lytle Creek, California, July 1, 1937 (G. H. and J. L. Sperry; A.M.N.H.). 37. *A. clivinaria profanata* (Barnes and McDunnough), allotype, Glenwood Springs, Colorado, May, 1895 (W. Barnes; U.S.N.M.).



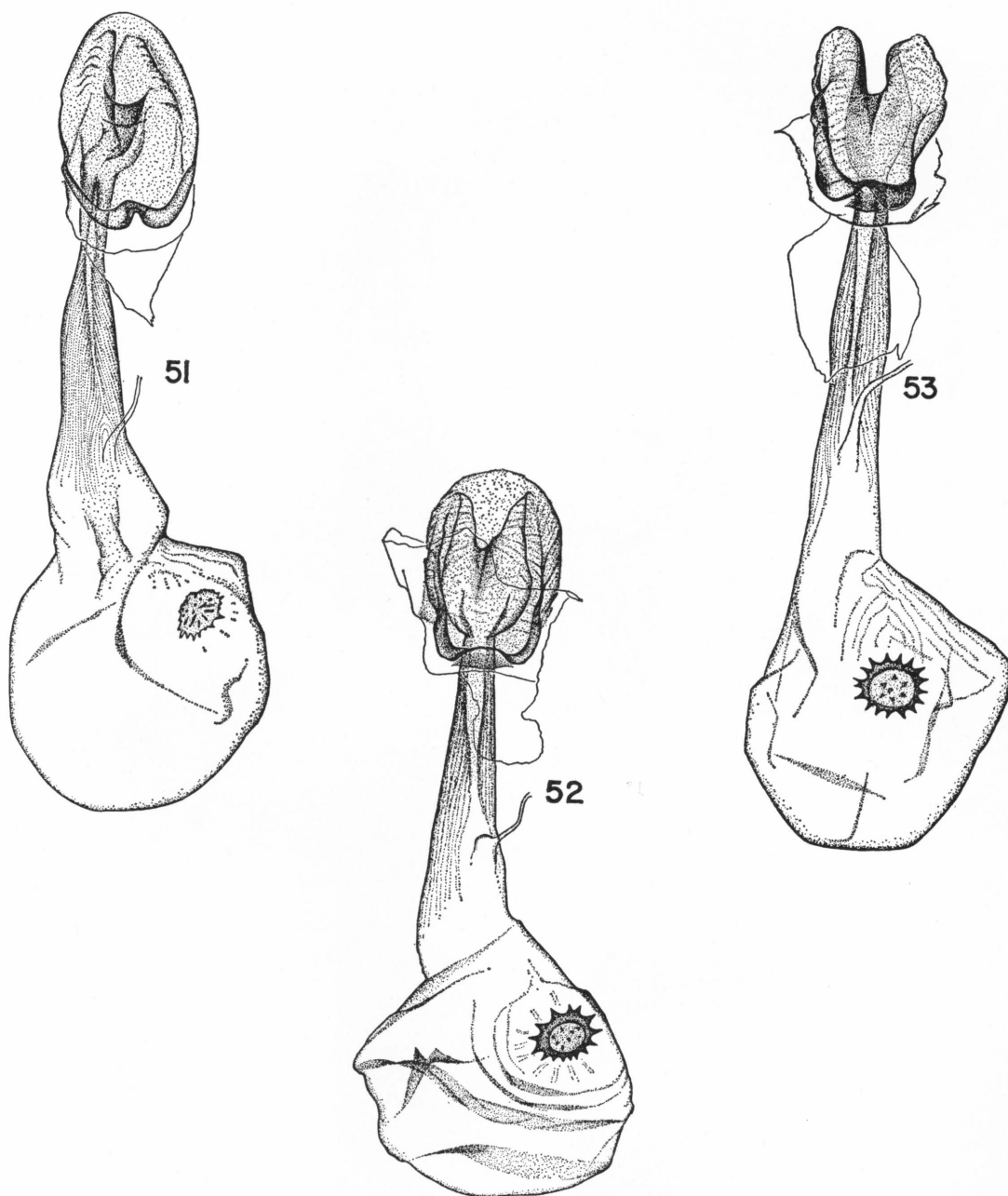
FIGS. 38-42. Female genitalia. 38. *Anacamptodes sanctissima* (Barnes and McDunnough), Santo Tomas, Baja California, July 8, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 39. *A. obliquaria* (Grote), Tuba City, Coconino County, Arizona, August 12, 1948 (C. and P. Vaurie; A.M.N.H.). 40. *A. sancta*, new species, paratype, Chiricahua National Monument, Cochise County, Arizona, July 15, 1948 (C. and P. Vaurie; A.M.N.H.). 41. *A. pergracilis* (Hulst), Siesta Key, Sarasota County, Florida, January 9, 1951 (C. P. Kimball; A.M.N.H.). 42. *A. perfectaria* McDunnough, Bexar County, Texas, June 9, 1962 (R. O. and C. A. Kendall; A.M.N.H.).



FIGS. 43-46. Female genitalia. 43. *Anacamptodes vellivolata* (Hulst), Coldspring, San Jacinto County, Texas, June 1, 1963 (A. Blanchard; A.M.N.H.). 44. *A. ephyraria* (Walker), Orange Mountains, New Jersey, July 23 (F. Lemmer; A.M.N.H.). 45. *A. herse* (Schaus), La Gloria Cardel, Veracruz, July 14, 1939 (J. Camelo G.; U.S.N.M.). 46. *A. humaria humaria* (Guenée), Elizabeth, New Jersey, July 5 (O. Buchholz; A.M.N.H.), showing papilles anales and apophyses posteriores.



FIGS. 47-50. Female genitalia. 47. *Anacamptodes pseudoherse*, new species, paratype, Guadalajara, Mexico (U.S.N.M.). 48. *A. cerasta*, new species, allotype, La Paz, Baja California Sur, October 20, 1961 (Cary-Carnegie Museum Expedition; C.M.). 49. *A. defectaria* (Guenée), Florida City, Florida, May 26, 1940 (A.M.N.H.). 50. *A. gemella gemella*, new subspecies, allotype, Mercedes, Hidalgo County, Texas, December 7, 1958 (H. Schmalzried; A.M.N.H.).



FIGS. 51-53. Female genitalia. 51. *Anacamptodes gemella telhe*, new subspecies, allotype, Colonia Yucatan, Yucatan, August 17, 1952 (J. and D. Pallister; A.M.N.H.). 52. *A. triplicia*, new species, allotype, Orizaba, Mexico (U.S.N.M.). 53. *A. lurida* (Schaus), Cayuga, Guatemala, May (Schaus and Barnes; U.S.N.M.).

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