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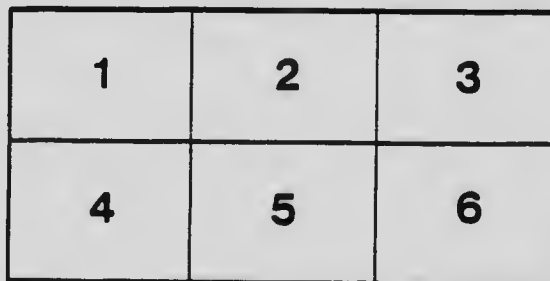
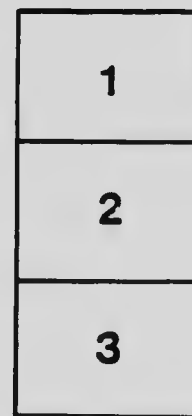
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STUDIES IN NORTH AMERICAN  
CLEORINI (GEOMETRIDAE)

BY

J. H. McDUNNOUGH, PH.D.  
*Chief, Division of Systematic Entomology*

BULLETIN NO. 18  
*(Technical)*

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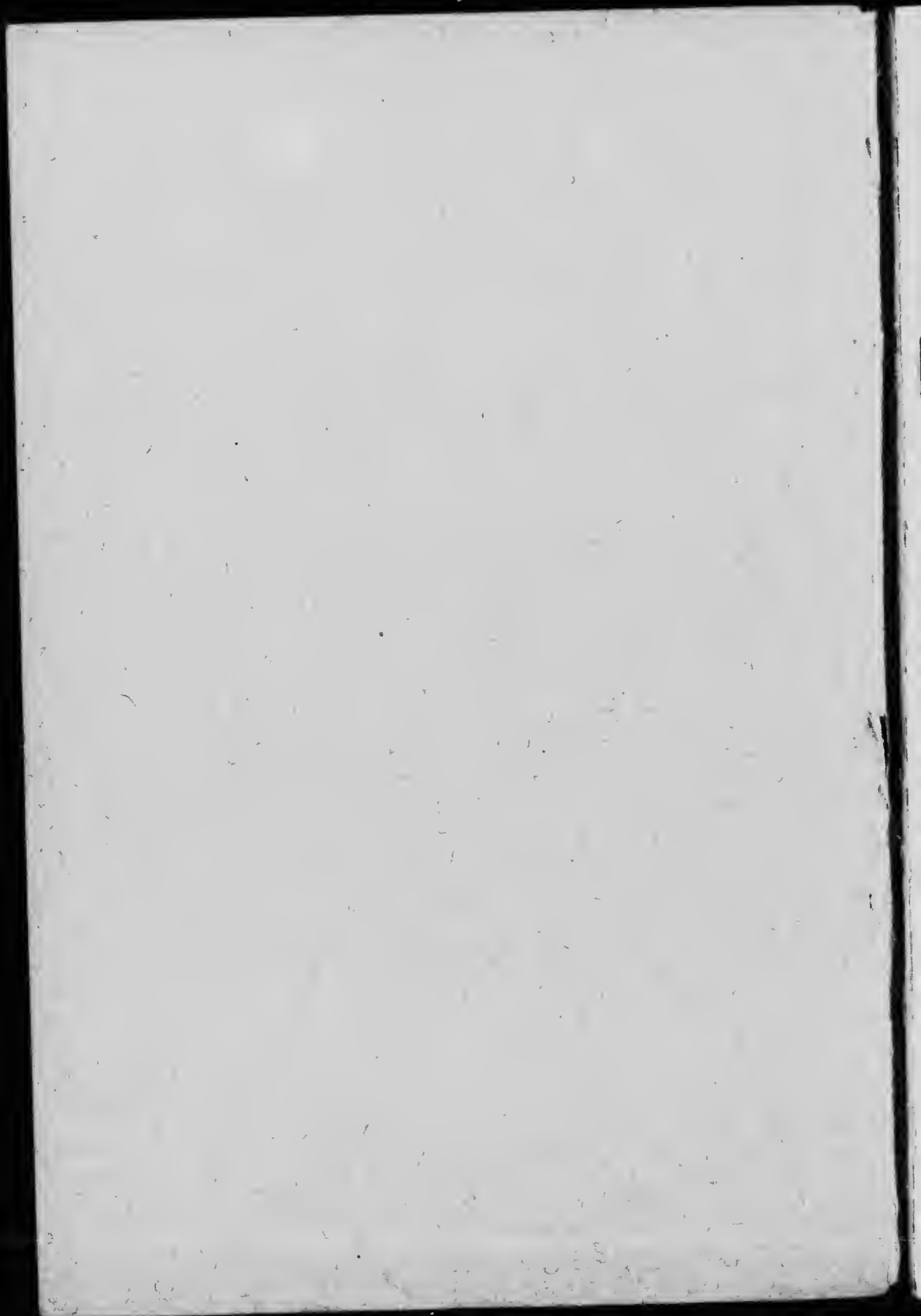
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# Studies in North American Cleorini.

By J. H. McDunnough, Ph. D.

*Chief, Division of Systematic Entomology.*

In the Barnes and McDunnough Check List (1917) the species belonging to this group were practically all included in the one genus, *Cleora* Curtis; some attempt was made to arrange the species according to similarity of maculation and a number of errors in the specific synonymy were corrected, but, as no careful study of the numerous species involved could be made at the time, it was considered better to lump them under one generic name than to follow the obviously erroneous arrangement proposed by Hulst in 1896 (*Trans. Am. Ent. Soc.* XXIII), based on Meyrick's Classification of European Geometrina (1892, *Trans. Ent. Soc. Lond.*, pp. 53-140), and followed with minor alterations in Dyar's List of North American Lepidoptera (1902).

Recently, inspired by Fierce's figures of the genitalia of the British members of this group (*Genitalia of British Geometridae*, 1914), I have made a study of the male genital organs of practically all our North American species, with a view to ascertaining how far these organs could be used from the standpoint of classification. The result has been surprisingly satisfactory and has served as further confirmation of an opinion to which I more and more incline and which has been so ably expressed by Mr. G. T. Bethune-Baker (1914, *Trans. Ent. Soc. Lond.*, p. 314), viz.: that in the male genitalia we have a structural feature which, while subject to innumerable small divergences in the individual species, remains in its salient characters remarkably constant throughout whole groups of closely related species and retains ancestral characters possibly longer than any other single organ. While much more extended studies than I have so far been able to make will be necessary before definitely stating such a postulate, still on the one hand a general similarity of genital structure should, I think, give rise in the mind of the investigator to the suspicion that a close relationship between the species involved is predicated; on the other hand a striking divergence in the genitalia of any two species (even when an apparent superficial resemblance exists) may be assumed to show either an entire lack of such relationship or a common origin only at some remote period.

Basing my groupings primarily on characters found in the genitalia I have extended my studies to other structural features, notably the pectinations of the antennae, the venation, the fovea at the base of primaries and the hair-pencil on the hind-tibia of the male. The present paper is the result of these studies. The greatest objection to the whole grouping is that it is frequently based on characters found in the male sex only; in the eyes of many taxonomists this is a grave disadvantage but in the Cleorid group, and in fact more or less throughout the whole of the Geometridae, where the female sex possesses, apart from venation, no structural characters common to the male sex which can be used as a basis of classification, it apparently cannot be avoided unless we are willing to lump the species into unwieldy genera, the members of which are obviously not closely associated when judged even by maculation alone.

To my mind the main aim of the taxonomist should be to study the structural characters of species with a view to the correct appreciation of their interrelationships and the gradual construction of a phylogenetic tree; if, therefore, characters from which such conclusions may be drawn occur only in a single sex I fail to see in this any adequate reason for disregarding them.

Before proceeding to a detailed discussion of the ground a few words on some of the structural features and their value are desirable.

(1) The Antennae.

With few exceptions which need not be discussed at the present moment, the male antennae are bipectinate for about three-quarters of their length, the apical fourth or fifth, however, being simple; the pectinations are generally of considerable length. Hulst has already noted with regard to the Geometridae in general that the pectinations may arise either proximally or distally on each antennal segment but has made no further use of this feature in his classification. In the group under discussion this variation in the point of origin of the antennal pectination is very marked, several further modifications being also included. A rather simple form is that exhibited in *umbrosaria* Hbn., in which each pectination broadens out at its base and occupies a good portion of the segment, being only slightly closer to the distal end of the segment than to the proximal except towards the apex of the antenna where it is much more distinctly distal. In a certain number of species the pectinations arise proximally (*porcellaria* Gn., *californaria* Pack., etc.), but in the far greater majority they are very evidently inserted at the distal end of the segment. In two instances (*sublimaria* Gn., *manitoba* Grossb.) we have the very interesting occurrence of a normally long distal pectination and a further short proximal one on each segment, a feature which is also found in the European *virgatella* and to which further reference will be made. In the above-mentioned forms each pectination is ribbon-like, finely ciliate (generally with a double row of cilia) and terminated by a single fairly stout bristle; in the apical section of the antenna there is a small bristle between the bases of each pair of pectinations. In a further well-defined group of species the pectinations are shorter and thicker (according to Hulst's terminology, claviform), their insertions on to the main stalk are broad and there is no distinct terminal bristle; at times the pectinations are very short (*spododia* Hbst.), but as a rule this type is well exemplified by *Merieisca graeca* Hbst.

(2) The Tidal Hair-Pencil.

A pencil of long hairs arising from the base of the hind-tibia in the males and generally concealed in a groove situated on the inner side of same has been used by Hulst, to a greater extent than is warranted, as a means of classification. In certain groups the hair-pencil appears to be a well-defined character; in others, notably some of the more primitive forms it possesses little classificatory value. Out of ten males of *umbrosaria* examined nine showed no trace of either hair-pencil or groove; the tenth specimen from Lakeland, Fla. there was a small but distinct black pencil of short hair present combined with a faint groove. The *lullata* group possesses a hair-pencil but in *livaria* Grt., which is undoubtedly property included here, the hair-pencil is only very occasionally to be found.

(3) The Fovea.

Hulst, following Meyrick, makes the presence or absence of a fovea of generic value; unfortunately he seems to have taken it for granted that a fovea existed in many species where a careful examination of a series of specimens has failed to reveal any trace of it to me. By fovea I understand a distinct circular or semicircular depression situated on the under-side of the primaries of the male on the costal side of vein 1; it is generally thinly sealed and can be readily seen as a small hyaline patch by holding the specimen to the light; it is sometimes very highly developed (*porcellaria* Gn., *opacaria* Hbst.) and causes then a slight distortion of the vein. I have not found it in any position other than as stated above although Meyrick asserts that it is situated in various sections of the basal portion of the wing. Care should be taken not to mistake the enlarged basal portion of either vein 1 or the cubitus for the fovea; in two specimens when the sealing covering these veins is rubbed off the appearance of a fovea is often simulated—this is probably the cause of Hulst's numerous errors in this connection.

I incline to agree with Meyrick that one of the primitive characteristics of this group is the lack of a fovea, that it later became developed, and that in still more recent forms it was again lost; along with other features it seems to possess a considerable amount of value in our classification.

#### 4. Venation.

It has been generally recognized that the venation in this group is unstable in so far as the principal branches of the primaries are concerned; this is not at all surprising when the dispersibility of the first three branches for a considerable distance beyond their point of origin is taken into consideration. In the individual species, however, the variation is attended by a certain regularity and is confined (with the exception of occasional freak specimens) within a rather narrow and easily defined limits. One of the main reasons, it seems to me, why European taxonomists have been unable to evolve a satisfactory system of classification for this group is because they have attempted to force into one or two genera a number of species of general superficial similarity which actually, if their slight variations in venation be regarded in conjunction with antennal and genital characters, have diverged from each other at a rather remote period.

In North America we have (omitting *Meyrickia* and its allies for the present) two very marked groups: the first and much the larger—presumably also the more recent—exhibits an entire loss of vein 11 (R<sub>1</sub>) on the primaries; the other small group retains this vein. The first group shows little variation in venation; vein 10 arises from the cell and is connected with 8+9 by a branch joining the latter vein normally just beyond the inception of vein 7, thus forming a long narrow areole; this cross vein, however, is lacking at times. The group has few representatives in Europe and has apparently developed from some of the older forms with the full number of veins.

The second group which retains vein 11 is, as already noted, comparatively small; it shows, however, the same variability with regard to the origin and anastomosis of vein 11 that has perplexed our European systematists. To me it would appear that we have in this group the remaining representatives of a circum-polar fauna, forced southward during the glacial period; in the most primitive forms veins 10 and 11 probably arose free from the cell but owing to crowded conditions in the coastal region, vein 11 gradually became connate with 10, then stalked and finally entirely coincident. In Europe this evolution in most instances has not proceeded beyond the stalked stage, the more ancestral forms still predominating there; to some of these older European forms certain of our North American species of the 12-veined group show remarkable similarity not only in venation but also in genitalic and antennal characters: for instance *californiana* Pack. is close to *expandata* L., *sublunaria* Gu. agrees with *cinetaria* Schiff., and *umbrosaria* Hbn. is undoubtedly allied to *punctualis* Scop. (*consortaria* Fabr.), thus affording further proof of an original common origin for the whole group. The fact that among the remaining North American species of this 12-veined group we find several species which while differing only slightly from one another in the position of vein 11, show a wide divergence in genitalic structure, would seem to indicate that these species are isolated remnants of a largely extinct fauna and that they represent various stages in the evolution of 11-veined forms from 12-veined ancestors, the intermediate steps being lost.

In species where veins 10 and 11 are stalked vein 11 shows further a tendency to either touch or anastomose with vein 12 for a short distance or else to become connected with the same by a short oblique cross-bar; as in the 10-veined groups the long narrow areole may be present but in most species this is not nearly as stable a feature as in the more recent forms; in general the range of venational variation in the North American 12-veined species corresponds closely with that given by Meyrick for the various European species (Trans. Ent. Soc. Lond., 1892, pp. 128-129).

*Sublanaria* Gn. and the *lallata* group are good representatives of the primitive type of venation in which 10 and 11 are both free; already in this latter group there is a marked tendency in the female sex for 11 to become either connate or slightly stalked with 10; a further development is represented by *lineata* Hlst., in which 11 is normally stalked in both sexes. *Californiaria* Pack. and *porcellaria* Gn. both show 10 and 11 on a short stalk; in *californiaria*, however, vein 11 anastomoses for a short distance with 12 immediately after the branching from 10, but in *porcellaria* the stalk of 10 + 11 is joined to 12 by a cross-bar before the separation of the veins. In *umbrosaria* Hbn. the stalk of 10 + 11 in the males is very long and reaches the base of vein 7; the cross-bars connecting 10 with 8 and 12 with the stalk are closely approached; in the only two females examined 11 was entirely absent, which may be the normal condition in this sex, showing a slightly advanced degree in development. The members of the genus *Melanolophia* Hlst. also show the short stalking of veins 10 and 11 as well as the usual anastomoses; in the hind-wings, however, they possess a very interesting character in the presence of a distinct ninth vein branching from vein 8 near its apex; this vein is constant in the male sex but sometimes wanting in the females, again exemplifying the tendency in the former sex to retain ancestral characters longer than do the females; in a number of males the anal vein sends a short apical branch to the inner margin. Vein 9 is also found in the *lallata* group which in other structural characters has sufficient similarity to the *Melanolophia* group to warrant the assumption that they are descendants of a common ancestor.

With regard to vein 8 on the secondaries I find that in the majority of the 12-veined species and a fair proportion of the 11-veined ones it is approximate to 7 for about half the length of the cell; in *sublanaria* and its relatives, however, it is only at the extreme base that these two veins are approached, the subsequent divergence being quite rapid; to a lesser extent a similar feature is exhibited in *porcellaria* and in the 11-veined group it is very marked in *pumpinaria* Gn., *nigricaria* B. & McD. and allied groups.

The *Mericisca* group which I omitted in the foregoing discussion and which differs, as previously noted, from the other Cleorids in the possession of claviform antennal pectinations, provides material for a very interesting study of the evolution of vein 11 of the primaries. The primitive form with veins 10 and 11 free is typified by *gracca* Hlst., the generic type, and *pepictaria* B. & McD.; these two species superficially show little resemblance, but in all structural features the relationship is extremely close; in *spodoidea* Hlst. veins 10 and 11 arise from a short stalk, vein 11 at once anastomosing with 12 for a considerable distance in the male sex. In the females, as usual, the evolution has progressed somewhat farther; the base of 11 is still present as a short cross-bar between 10 and the subcostal vein, but the apical portion of 12 beyond the anastomosis has disappeared and the apparent subcostal vein is more correctly designated as vein 11 + 12. In typical *configurata* Hlst. as exemplified by the type specimen from Colorado in the Hulst collection (kindly examined by Dr. A. Peterson) and by a small series from eastern Arizona in the Barnes collection, veins 10 and 11 arise from a short stalk; a number of other specimens of both sexes, supposed to be *configurata*, from various Arizona localities, lacked, however, vein 11 entirely, it having very evidently become fused with 12; these specimens on closer examination showed a somewhat different facies from typical *configurata* and further possessed slight but constant genitalic differences; I take it we have in this form (which doubtless merits a name) a species representing the highest point of specialization reached in the group, at the same time that a superficial resemblance to a more ancestral form is retained. *Lichenaria* Fears. is also 11-veined and on the same evolutionary plane as the previous species.

Regarding the phylogeny of the Cleorids I cannot at the present time do more than offer in a tentative way certain conclusions which I have formed, based on a comparative study of the various structural details mentioned in the previous pages. In general the tendency in the evolution of this group seems to have been towards simplification and reduction of characters peculiar to the male sex alone until in some of the later species we find only slight apparent differences (apart from genitalia) between the two sexes. The entire separation of veins 10 and 11 on the primaries and also the presence of vein 9 on the secondaries seems undoubtedly primitive. With respect to the antennae I would note that in all the 11-veined species the antennal pectination constantly arises from the apex of the segment, whilst in the 12-veined forms it is variable; in most cases it springs from the base of the segment but occasional cases have been found where it is apical; the former condition seems the primitive one. In this connection I omit the group with claviform antennae which appears to have little connection with the other groups and probably arose independently. The lack of fovea at the base of primaries is also primitive but this structure must have developed at a very early period only to disappear again in the recent forms, and should therefore be used with caution. The presence of certain abdominal hair-pencils and peculiar lateral organs in the eighth abdominal segment of the males characterises a few primitive genera; these features disappear very soon along with vein 9.

The North American genera which retain the greatest number of primitive characters are *Melanolophia* Hbst and *Galenara*, a new genus created for the *lallata* group; both of these very evidently originated in a common ancestor, both possess vein 9 of secondaries and the lateral abdominal organ (which I shall discuss more fully later); the antennal pectinations also arise in both from the base of the segment. In *Galenara* veins 10 and 11 of primaries are still free in the males, whilst in *Melanolophia* they are shortly stalked, 11 being usually joined to 12 by anastomosis or a cross-vein; vein 5 is also faintly but distinctly present and is fully as well developed as the discal cross-vein. The latter genus also possesses an abdominal hair-pencil arising from a pocket formed by the posterior edge of segment III. A tibial hair-pencil is present in both genera but much better developed in *Melanolophia* than in *Galenara*. From *Galenara* has developed on the one hand *Carphoides*, which retains the 9th vein but lacks the abdominal organ and tibial hair-pencil, and on the other hand *Vincutina*, in which vein 9 has disappeared but a large fovea is present.

The two European genera *Cleora* Curt. (type, *cinclaria* Schiff.) and *Aleis* Curt. (type, *repandata* L.) must also be ranked as primitive genera; both typically have veins 10 and 11 of primaries free and both possess a small fovea; *Cleora* shows the double bipectinations already commented upon; this may possibly be the remains of a more primitive antennal type with equal double bipectinations; by the elimination of either the upper or lower pair we obtain both types of structure found in existing genera; in *Cleora* the elimination of the basal pair may be taken to be in progress. In *Aleis* the pectinations arise from the apex of the segment, differing in this respect from the North American *californaria* Pack., which genitally is very close to the type species of *Aleis*. Not only do the pectinations originate basally (retention of a primitive character) but in the venation *californaria* shows an advance over *repandata* in that veins 10 and 11 are short-stalked and 11 is joined to 12; further the hair-pencil of *repandata* is only represented by occasional vestigial traces. In genitalia *Cleora* and *Aleis* are widely distinct nor can I see much resemblance between either of them and the preceding genera; the connecting links (if there ever were any) were evidently eliminated ages ago.

*Latipennis* Hbst. is probably best placed in the *Aleis* group although evidently not directly derived from *californaria*; the genitalia are rather widely different, a tibial hair-pencil is present and the antennal pectinations arise apically; in the three specimens (1 ♂, 2 ♀'s) examined vein 11 was stalked on

12, the connection with 10 being lost. *Dryococtis* Hbn. (*Boarmia* Tr., *Cynatophora* Hbn., Tentamen) (type, *robocaria* Schiff.) is not represented on this continent; it is less primitive than the preceding genera; it possesses a small fovea, the bases of the antennal pectinations occupy a large portion of each segment but towards the apex of the antenna are more distinctly distal than proximal; the venation is rather advanced, vein 11 being almost always eliminated. In *umbrosaria* Hbn. we have, however, a form less specialized than *robocaria*; the fovea is absent, a tibial hair-pencil is very rarely developed and in the males at least 11 is present on a long stalk with 10; the Palaearctic *punctinidis* Scop. (*consortaria* Fabr.) is very closely allied to our North American species in all respects, although strangely enough the lack of fovea seems to have been overlooked by European systematists.

*Porclectaria* Gn. (*indicataria* Wlk.) represents another isolated group which possibly may have some remote ancestral relationship to *Cleora*, as both show a lesser approximation between veins 7 and 8 of secondaries than do the other groups. The long abdomen in the males, extending beyond the secondaries, is, however, rather reminiscent of *Melanotiphia*, and the general type of genitalia, while abundantly distinct, would indicate more affinity to this genus than to any other. The palpi are much longer than in the previous groups, the fovea is enormously developed but the venation is fairly primitive, 10 and 11 being short-stalked, with a cross-bar from the stalk to vein 12.

The genus *Ectropis* (type, *crepuscularia*) is evidently more highly specialized than any of the preceding genera; the doubly fasciculate antennae have developed in all probability from the doubly bipectinate form which was supposed to be the ancestor of *Cleora*; the comparatively simple genitalia with no armature on the claspers and with the loss of the gnathos is characteristic of all the more highly specialized species and does not represent a primitive condition.

*Aethaloida* (*Aethalodes* Hbst. proce.) (type, *packardaria*) has developed along considerably different lines from the other 12-veined genera and is not strictly speaking *Cleorine*; the short areole with 8, 9 and 10 stalked from its apex and the lack of proboscis are quite characteristic; the antennae are also pectinate to the apex.

In the 11-veined group the difficulty in finding any character, apart from genitalia, which may be used to classify the numerous species is much greater than in the preceding group since the pectinations of the antennae arise constantly from the apex of the segment and the venation is uniform. The closely allied genera *Pterotuca* Hbst. (type, *curiosa* Hbst.) and *Hulstina* Dyar (type, *trilineata* Dyar = *formosata* Hbst.) may be fairly satisfactorily separated from the main group by the lack of a fovea and the much greater length of the palpi which are roughly scaled and project almost beak-like beyond the front. The remaining species arrange themselves very readily, according to genitalia, into four distinct groups. The first of these, the *larraria-humaria* group, has a free, curved sacculus, terminating in a point, and generally a short bifid upturned nucus; in addition to this the fovea is lacking and a strong hair-pencil is present in all but one species (*jacumba* a Dyar) so that the group appears a very natural one. I have been unable to arrive at any satisfactory conclusion regarding its origin; connecting links with the primitive forms seem to be missing. The second and third groups contain the majority of the species which Hulst has included under *Scidosema*; in all a fovea is present and generally a hair-pencil is lacking. The genitalia indicate the distinct origin; the one group (*polygrammaria-arectaria* group) probably arising from *Cleora*-like ancestors, has a long tegumen with long, narrow valves, attached only to its extreme base; the costa is thickened, the apical portion projecting free and armed with several spines and the aedeagus is long and narrow. The second group, for which the term *Gleba* Hbst. (type, *cognataria* Hbn.) may be used, has a broader, shorter tegumen with broader valve-attachment; the armature consists of an apical spined area

situated on the ventral side of the valve; the penis is short and chunky. I am uncertain as to the origin. The fourth group consists merely of *pampinaria* and a few close allies and represents a more highly specialized type than the preceding group. The fovea is very greatly developed and the antennal pectinations are distinctly shorter; in the genitalia the tegumen is very narrow and attached to the valves at its base by bent rods; there is no armature. It has seemingly arisen from an ancestral form very similar to the ancestor of *Ectropis*.

*Aethalura* n.n. (*Aethaloptera* Hbst. procc.) (type, *anticecia* Wlk. may be recognized by the ciliate male antennae. In North America it only includes the type species but the European *punctularia* Hbn. certainly should be associated with it; the genitalia are practically identical. The genus is rather highly specialized and possibly separated from the ancestors of *Gleba* at a comparatively early period.

I have made no attempt to definitely define or limit this group in the following classification; more extended studies of the whole *Geometrinae* are necessary before this is possible. Several genera not included at present, such as *Paraphia* Gn., will probably eventually be placed here; certain others, such as *Meris* Hbst., *Somatolophia* Hbst. and *Stergumataca* Hbst. seem, according to genitalia, to have more affinities with the *Ellophia* group than with the present one.

The history of the generic terms employed is fairly simple. For those who accept Hubner's Tentamen the monotypical genus *Cymatophora* Hbn. (1895) (type, *robolaria* Schiff.) has priority over all others. In the Verzeichniss (1826, p. 316) Hubner used the term *Dryococtis* in the same sense as *Cymatophora* of the Tentamen; the type of this genus was apparently first designated as *robolaria* by Hbst. (1896, Trans. Am. Ent. Soc., XXIII, 331). Treitschke in 1827 (Schmett., Eur. VI (1), 187) created the genus *Boarmia* for the whole group, a name generally in use at the present time by most continental authors; the type of *Boarmia* was first specified by Duponchel in 1829 (Hist. Nat. Lep. Fr. VII (2), 103) as *robolaria*; later type citations by Westwood (1810), Guenée and Hbst. are invalid. The three terms *Cymatophora* Hbn., *Dryococtis* Hbn. and *Boarmia* Fr. are therefore identical; accepting Sberhorn and Front's dates for the issue of the Verzeichniss as correct it would seem that *Boarmia* is antedated by *Dryococtis* and must fall into the synonymy; it is a matter of opinion as to the employment of Hubner's terms; personally speaking, as I do not recognize the Tentamen, I should employ *Dryococtis*.

In 1825 Curtis (Brit. Ent. II, 88) created the genus *Chora* with type designated as *cinctaria* Schiff.; in 1826 he erected *Aleis* (l. c. III, 303) with type *repandata* Linn.

Besides *Dryococtis* Hubner erected several other genera in the Verzeichniss which have been largely employed in this group. *Schidosema* (1825, Verz., 299) with type specified by Hbst. in 1896 (Trans. Am. Ent. Soc., XXIII, 351) as *criectaria* Vill. *plumosaria* Schiff. has been misapplied in our North American lists; the type is a 12-veined species with veins 10 and 11 free and with the pectinations of ♂ antennae arising from base of segment; it is apparently quite primitive. *Deileptaria* Hbn. (1826, Verz., 316) with type *bictaria* is also not represented in North America. The type is 12-veined, without fovea, 10 and 11 being on short stalk, 11 anastomosing with 12—the antennal pectinations arise from base of segment.

#### SPECIES NOT EXAMINED.

- Boarmia lamiaria* Strecker, 1899, Lep. Rhop. Het. Suppl. II, 16. Calif.  
*Cymatophora depromaria* Grote, 1883, Can. Ent. XV, 87. Ariz.  
*Cymatophora separataria* Grote, 1882, Can. Ent. XV, 124. Ariz.  
*Cymatophora griscaria* Grote, 1883, Can. Ent. XV, 121. Ariz.  
*Cymatophora pulmonaria* Grote, 1881, Pap. I, 167. Ariz.

*Exelis? fumida* Warren, 1904, Nov. Zool. XI, 581. Colo.

*Boarmia fuliginaria* Hulst, 1888, Ent. Auer. III, 214. Ill.

Of the above species only the type specimens are known: Strecker's type is in the Field Museum, Chicago, Grote's are in the Brooklyn Institute of Arts and Sciences, Hulst's in Rutgers College Collection, New Brunswick, N.J., and Warren's in the Tring Museum, Tring, England.

*Lamiaria* will probably fall into *Hulstina* or *Pterotaca* along with *depromaria* Grt., of which I have a doubtfully identified Arizona ♀ before me. *Separataria* seems allied to the *purpararia* group of *Stenopoeipia* and *gracaria* from my remembrance of the type is close to *dionaria* B. & McD.; *pulmonaria* is a large striking species of heavy build of which only the ♀ is known, rendering a generic reference doubtful. *Fumida* would seem, from Warren's mention of the peculiar claviform antennae and the 12-veined primaries, to fall into the *Merivisea* group, differing, however, in the presence of a fovea. I have seen a photograph of the type, but cannot identify it. With regard to *fuliginaria* I suggested, after examining the type (1916, Contributions, III (3), 184), that it might be a melanic form of *indicataria*. A sketch of the venation of the type received through the kindness of Dr. A. Peterson shows, however, that it belongs in the 11-veined group which at once precludes the above reference. If the locality given (Illinois) be correct the only 11-veined species which would come into consideration would be *pampinaria*, *polygrammaria* and possibly *eribataria* and *cognataria* but I hesitate to make any such reference until I have had opportunity to personally study the specimen in question.

On Plates VII and VIII will be found illustrations of those species of North American Cleorids which have, up to the present time, never been figured; references to existing figures are marked in the text with an asterisk.

In conclusion I would express my warm thanks to Dr. Wm. Barnes of Decatur, Ill., for the very generous manner in which he has loaned specimens and permitted slides to be made of rare species contained in his collection; without this aid the present paper would have been much less complete.



## KEY TO GENERA.

- |  |      |
|--|------|
| 1. Male antennae bipectinate.....  | 2    |
| Male antennae ciliate.....   | 17   |
| Male antennae claviform.....   | 18   |
| 2. Primaries twelve-veined.....  | 3    |
| Primaries eleven-veined.....   | 12   |
| 3. Vein 9 on secondaries present in ♂; no fovea; pectinations at base of segment.....                  | 4    |
| Vein 9 on secondaries absent in ♂; fovea generally present.....  | 6    |
| 4. Lateral abdominal organ in male absent..... <i>Carphoides</i>                                       | (3)  |
| Lateral abdominal organ in male present.....   | 5    |
| 5. Vein 11 of primaries normally free; no abdominal hair-tuft..... <i>Galeana</i>                      | (2)  |
| Vein 11 of primaries joined to 12; hair-tuft present on 3rd abdominal segment..... <i>Melanolophia</i> | (1)  |
| 6. Proboscis absent..... <i>Aethaloidia</i> ( <i>Aethalodes</i> , procc.)                              | (21) |
| Proboscis present.....   | 7    |
| 7. Veins 10 and 11 normally free; fovea present.....   | 8    |
| Veins 10 and 11 stalked; 11 joined to 12.....  | 9    |
| 8. Antennae of male doubly bipectinate..... <i>Chora</i>   | (3)  |
| Antennae of male singly bipectinate from base of segment..... <i>Vincinina</i>                         | (4)  |
| Antennae of male singly bipectinate from apex of segment..... <i>Aleis</i> (European)                  |      |
| 9. Fovea present in male; stalk of 10 and 11 short.....  | 10   |
| Fovea absent in male; stalk of 10 and 11 long..... <i>Pseudobourmia</i>                                | (12) |
| 10. Antennal pectination from apex of segment..... <i>Ultraleis</i>                                    | (11) |
| Antennal pectination from base of segment.....   | 11   |
| 11. Vein 11 joined to 12 after separating from 10..... <i>Neoleis</i>                                  | (10) |
| Vein 12 connected with stalk of 10 and 11..... <i>Protobourmia</i>                                     | (8)  |
| 12. Fovea present in male.....   | (13) |
| Fovea absent in male.....  | (15) |
| 13. Fovea large; antennal pectination short; tegumen long, narrow..... <i>Vitinella</i>                | (15) |
| Fovea normal; antennal pectination long.....   | 14   |
| 14. Tegumen long; valves attached at base only..... <i>Stenoporpia</i>                                 | (14) |
| Tegumen short, chunky; valves with broad attachment..... <i>Glana</i>                                  | (13) |
| 15. Palpi long, rough-sealed, projecting well beyond front.....  | 16   |
| Palpi short, upturned and appressed to front..... <i>Anacamptodes</i>                                  | (16) |
| 16. Uncus broad, spatulate..... <i>Hulstina</i>  | (17) |
| Uncus pointed; female frequently with shortly pectinate antennae..... <i>Pterotaca</i>                 | (18) |
| 17. Primaries twelve-veined..... <i>Ectrapis</i>   | (19) |
| Primaries eleven-veined..... <i>Aethalua</i> ( <i>Aethaloptera</i> , procc.)                           | (20) |
| 18. Venation twelve-veined; 10 and 11 free..... <i>Moricisca</i>                                       | (5)  |
| Venation 12-or 11-veined; 10 and 11 stalked or 11 absent.....  | (19) |
| 19. Vein 11 lengthily anastomosed with 12; antennal pectinations very short..... <i>Mecrisma</i>       | (7)  |
| Vein 11 absent or not joined to 12; antennal pectinations moderate..... <i>Parapheromia</i>            | (6)  |

## 1. MELANOLOPHIA (Pl. (Plate X, fig. 1).

Hulst, 1896, Trans. Am. Ent. Soc., XXIII, 357. Orthotype, *canadaria* Gn.)  
 Dyar, 1902, List N. Am. Lepid., 326.

Pupa moderate, smooth-scaled, upright, 3rd joint conical, exposed; tongue developed; front smooth; thorax loose-scaled; antennae bipectinate in ♂ with simple apical section, each pectination with single terminal bristle and arising from base of segment; ciliate in ♀; abdomen in male sex with lateral tufts of hair arising from beneath segment III and a medioventral bunch of spines on anterior margin of same segment; on each side of the 8th abdominal segment an organ is present consisting of long-stalked overlapping barbed scales arising from a bent chitinous rod and protected outwardly by a covering of broad flat scales which arise both from the rod and from the posterior margin of the 7th segment; between these two side-organs medioventrally arises a tuft of feathery scales; hind-tibia in ♂ with dense hair-pencil. Primaries without fovea at base in both sexes; 12-veined, 10 and 11 short-stalked, 11 frequently anastomosing with 12 for a greater or lesser distance, 10 generally connected with 9, forming long narrow areole; hind wings with vein 8 approximate to 7 for half length of cell, vein 9 present as a short apical branch from 8, wanting in some ♂♂; 4 with an occasional short fork just before apex, 5 present but quite weak.

This genus possesses in the ♂ sex a number of peculiar structural features hardly met with again in the whole group; the hair pencils arising from lateral pockets formed by the 3rd abdominal sclerites are quite unique. The lateral organs in the 8th abdominal segment (Pl. I, fig. 8a) are confined to this genus and the following one; this peculiar structure is well concealed by the body scaling and very easily overlooked; its use is not clear to me. The bristle-tuft of the 3rd abdominal segment is found frequently in the male sex throughout the group but I have been unable to make any particular classificatory use of it; it is at times difficult to see as the bristles are of the same colour as and scarcely thicker than the hair-like scales which occur on the abdomen. The variation in venation is generally confined to vein 11 and its greater or lesser anastomosis with 12; very rarely the portion of 11 before the anastomosis is lost, in which cases 11 appears stalked on 12; this is, however, an abnormal condition. Occasionally an extra subcostal vein is thrown off from 12 and rarely the connection between 10 and 9 is lacking. In the ♀'s the short 9th vein of the secondaries may be missing and the apical fork of the anal vein is seldom present. The male genitalia have a short, somewhat hooked uncus, a long, moderately broad, rather rectangular tegumen with the valves broadly attached so that the base of the costa is close to the base of the gnathos; the valve armature consists of spines arising from the apex of a thickened sacculus; at times it is asymmetrical, the left bunch of spines developing into a long rod-like, free-projecting structure of variable length even in the same species. The base of the costa is clothed with spine-like hairs, with a tuft of long fine hair arising from a projecting area near its base. The gnathos is broad with a tendency for the lateral edges to be produced into points; the aedeagus is long, narrow, sharply pointed apically.

Representatives of this genus occur in practically every portion of North America; the species prove to be more numerous than was suspected and while they possess a great superficial resemblance to each other may be readily separated on genitalic characters. *imitata* Wlk. is a Pacific Coast species ranging from Southern Alaska to California where it is apparently confined to the higher altitudes of the Sierras; in the more southern Rocky Mountain region it is replaced by *centralis* McD. In the East there are two distinct species which have heretofore been confused under the name *canadaria* Gn.; typical *canadaria* is seemingly the rarer species and more restricted in its distribution; it occurs in Eastern Ontario, Quebec and the Maritime Provinces extending southward to Pennsylvania and New Jersey; *signataria* Wlk. (*jectaria* Wlk.) is found more commonly in the same territory but has spread westward as far as Manitoba, Iowa and Illinois; more extended collecting will be necessary to definitely define the western and southern limits of both species. In the Gulf States another species occurs for which I use at present the name *imperfectaria* Wlk., this name having been based on East Florida material collected by Doubleday.

The early stages of most of the species are unknown: Dr. Dyar has published the life-history of *imitata* (1905, Psyche, XII, 58) and Smith records the larva of *canadaria* (1910, New Jersey Sta. Rep. 504) on spruce, pine, etc. The larvae are probably all coniferous feeders which would rather tend to confirm the idea that the genus is a primitive one.

**Melanolophia canadaria** Guenée. (Plate I, fig. 6).

*Tephrosia canadaria* Guenée, 1857, Sp. Gen. Lep. Fal. I, 263; Packard, 1876, Mon. Fal. U.S. 245 (*partim*); Holland, 1903, Moth Book, 311, Pl. XLIV, fig. 7\*; Smith, 1910, New Jersey Sta. Rep. 591 (*larva*); Oberthur, 1913, Etudes Lep. Comp. VII, 281, Pl. CLXX, No. 1668.\*

Oberthur's beautifully executed figure of the type specimen leaves no doubt as to the application of the name: the species is best recognized by its uniform gray color without any of the ruddy shades which characterize the following species. In the ♂ genitalia the armature (harpes) of the valves is practically symmetrical, consisting of a stout curved spine and a number of smaller spines arising from the apex of a thickened chitinous fold on the sacculus.

Smith records the larva as feeding on tamarack, spruce, pine, hemlock and *Myrica* but, as far as I know, the early stages are not recorded in literature.

**Melanolophia signataria** Walker. (Plate I, figs. 3, 8; Plate VII, fig. 2).

*Boarmia signataria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 350.  
*Boarmia? ejectaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 189; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am., III (1), 39, 41.  
*Boarmia? patularia* D'Urban, 1861, Can. Nat. & Geol. VI, 39.  
*Tephrosia canadaria* Packard, 1876, Mon. Fal. U.S., 425 (*partim*).

The species has generally been considered to be a form of *canadaria* but the male genitalia show it to be a good species. The harpes are asymmetrical, that on the right hand side being similar to *canadaria*; on the left side however the sacculus has become produced into a long free arm, spined on the underside; the length of the arm is apparently variable, the two figures given (figs. 3 and 8) showing the extent of this variation. Superficially the species is difficult to separate from *canadaria* as the two are practically identical in maculation; generally speaking *signataria* shows considerable ruddy or yellowish-brown tinges which are lacking in the previous species. As regards the nomenclature, the name *ejectaria* is without doubt correctly applied as I have examined the type in the D'Urban collection, at Guelph; the type of *signataria* in the British Museum I have not seen for a number of years and at the time I examined it I did not realize that two species were involved; Mr. L. B. Prout has, however, had the kindness to examine the types and tells me that the name *signataria* may be used for the present species.

**Melanolophia imperfectaria** Walker. (Plate I, fig. 5; Plate VII, fig. 1).

*Tephrosia imperfectaria* Walker, Cat. Lep. Het. Brit. Mus. XXI, 107.

This name, following Hulst (1895, Ent. News, VI, 42) has been placed in the synonymy of *canadaria* Gn.; a perfectly good species occurs, however, in the Gulf States and as *imperfectaria* was described from an East Florida ♀ I use this name tentatively rather than create a new name which may prove a synonym. Mr. Prout writes me that the type ♀ is very rubbed and gives rather the impression of being referable to *canadaria* than to the present form for which, he adds, *bostar* Druce may be the correct name. This southern species has a very decided

olive-green suffusion on both wings, especially in fresh males, and the black sprinkling of dots is decidedly heavy. The genitalia are quite similar to those of *signataria* but the lateral edges of the gnathos are drawn out into long sharp points.

**Melanolophia imitata** Walker. (Plate I, fig. 1; Plate VII, fig. 8).

*Boromia imitata* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 395.

*Tephyrosia canadaria* Packard, 1874, Proc. Bost. Soc. Nat. Hist. XVI, 33 (*err. det.*); idem, 1876, Mon. Phal. U.S., 425 (*partim*).

*Melanolophia canadaria* var. *subguericata* Dyar, 1904, Proc. U.S. Nat. Mus. XXVII, 910.

*Melanolophia canadaria* Dyar, 1905, Psyche XII, 58 (*larva*).

*Melanolophia imitata* Barnes & McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 211.

Hulst erroneously determined this species (1895, Ent. News VI, 42) as equal to *Drepanulatrix californiaria* Pack. with which it has nothing in common. The genitalia are quite distinct from those of the Eastern species, the harpe consisting of a very strong bunch of spines symmetrically placed on both valves. In coloration there is considerable variation in the species, northern specimens (Ketchikan, Alaska) and those from high southern altitudes (Tulare Co., Calif.) being quite pale compared with Vancouver Island specimens which are considerably tinged with purple. Inland records of the species include Priest River, Idaho, and Rossland, B.C.

**Melanolophia centralis** McDunnough. (Plate I, fig. 4; Plate VII, fig. 7).

*Melanolophia centralis* McDunnough, 1920, Can. Ent. II, 165.

As noted in the description, the species is very similar superficially to *imitata*; the long curved single spine composing the harpe is the distinctive feature of the genitalia.

## 2. GALENARA gen. nov. (Plate IX, fig. 4; Plate X, fig. 2).

(Type, *Aleis lallata* Hulst.)

Palpi moderate, upturned, appressed; front smooth-scaled; metathorax with distinct divided scale-tuft; antennae bipectinate in ♂ with simple apex, pectinations long and arising from base of segment; abdomen in ♂ without hair-pencils but with the lateral organ of the eighth segment as in *Melanolophia*; clust. of bristles on 3rd abdominal segment medioventrally; hind tibia in ♂ with or without hair-pencil. Primary setae on fore a. 12-xy line 1, 10 and 11 in ♂ free from the cell, in ♀ generally short-stalked, 10 usually anastomosing with 9 to form areole; hind wings with 8 approximate to 7 for half length of cell, 9 present as short apical branch of 8, 5 absent.

The presence of vein 9 on secondaries and of the lateral abdominal organ shows undoubtedly a close relationship between this genus and *Melanolophia*—a relationship which is substantiated by the male genitalia. The shape and mode of attachment of the valves and tegumen in *Galenara* are similar to those of *Melanolophia*, the sacculus has been somewhat reduced and the harpe consists of a rounded raised patch of spines situated in a similar position to that of *Melanolophia* species; the gnathos is broad, rounded and scabinate; the aedocagus is armed either with a bundle of spines or with a single stout cornutus.

Members of this genus only occur in the South Western States and probably extend down into Mexico. Nothing is known of the early stages but it is not improbable that the larvae will be found to feed on conifers.

**Galenara lallata** Hulst. (Plate I, fig. 7).*Aleis lallata* Hulst, 1898, Can. Ent. XXX, 193.*Cleora lallata* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 184, Pl. XIII, fig. 12.\*

This species is the largest of the genus, occurring in the mountains of the Arizona-New Mexico border; the specific distinctions have been already noted in the "Contributions." The genitalia are heavily chitinized; the spines of the harpe numerous and the cornutus very stout.

**Galenara glaucaria** Grossbeck. (Plate II, fig. 1; Plate VII, fig. 10).*Cleora? glaucaria* Grossbeck, 1912, Jour. N.Y. Ent. Soc. XX, 291.

The species is very similar to the preceding one in maculation; it is rather smaller in size and the ground color of the primaries has a bluish-gray tint wanting in *lallata*; the brown shades beyond the t.p. line are also either wanting or obsolescent. The genitalia are less strongly chitinized than in *lallata* and the spined area of the harpe is situated closer to the apex of the valve. *Glaucaria* has as yet only been found in the vicinity of the Santa Catalina Mts., Arizona.

**Galenara lixaria** Grote. (Plate II, fig. 3).*Boarmia lixaria* Grote, 1882, Trans. Kan. Acad. Sci., VIII, 52.*Cleora lixaria* Hulst, 1896, Trans. Am. Ent. Soc., XXIII, 357; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 185, Pl. XIII, fig. 11.\*

This species is distinguished from the two preceding ones by the outward angle in the median shade of primaries and by the usual lack of a hair-pencil on the hind tibia of the male. In the genitalia the armature of the vesica consists of a bunch of spines and not of a single stout cornutus. *Lixaria* is the most widespread and commonest species of the genus, occurring throughout Arizona and western New Mexico.

3. **CARPHOIDES** gen. nov.(Type, *Aethytera lineata* Hulst.)

Very similar to *Galenara* but lacking the lateral abdominal organ in the male as well as the tuft of bristles and the tibial hair-pencil. Primaries without fovea, 12-veined, 10 and 11 either free or short-stalked; 1 on scrobalis vein 9 present, 5 wanting.

Very obviously a derivative from *Galenara*, being rather more highly specialized in certain directions. The genitalia show points of similarity to *Galenara* and *Melanotophia*, the valve-armature, besides the circular patch of spines of the former genus, retaining the thickened sacculus with its usual bunch of spines of the latter genus. The mens has undergone certain modifications, being reduced in size and slightly bifid at its apex but the tegumen has retained the characteristic shape of the previous genera; the aedocagus is rather chunky and is armed with a weak bunch of cornuti.

Of the two species included in the genus *lineata* shows a slight stalk of veins 10 and 11 whilst in *inconspicuaris* they are free.

**Carphoides lineata** Hulst. (Plate II, fig. 2).

*Attheyctera lineata* Hulst. 1898, Can. Ent. XXX, 192; Grossbeck, 1907, Trans. Am. Ent. Soc. XXXIII, 311; Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (1), 35, Pl. XVI, fig. 11.\*

A distinctly rare species occurring, as far as at present known, beyond the Rocky Mountain divide in Colorado and New Mexico; the linear nature of the maculation renders the species easily recognizable.

**Carphoides inconspicuaris** Barnes & McDunnough. (Plate I, fig. 2).

*Parceclsa inconspicuaris* Barnes and McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (1), 30, Pl. II, fig. 18.\*

The great similarity of genitalia between this species and *lineata* shows a very close relationship which was tentatively suggested in the original description. The species is only known from south-eastern Arizona but probably extends into Mexico.

4. **VINEMINI** n. nov.

(Type, *Cidaria opacaria* Hulst.)

Similar to *Galenara* but with the addition of a large fovea at the base of primaries; vein 9 of secondaries is wanting; the tibial hair-pencil is well-developed.

The genitalia show a close relationship to both *Melanolophia* and *Galenara*; the shape of the valves, especially of the costal portion, and of the tegumen is typically *Melanolophoid*; the gnathos, the harpe and the aedeagus armature remind one of *Galenara*; in addition a pencil of specialized hair arises from the base of each valve.

**Vinemina opacaria** Hulst. (Plate I, fig. 9; Pl. VII, fig. 17).

*Cidaria opacaria* Hulst. 1881, Bull. Brook. Ent. Soc. IV, 27.  
*Cleora opacaria* Hulst. 1896, Trans. Am. Ent. Soc. XXIII, 357.

This very distinct species is confined, like the preceding one, to the southwestern States beyond the Rocky Mountain divide.

5. **MERICISCA** Hulst. (Plate IX, fig. 1; Plate XI, fig. 4).

Hulst. 1896, Trans. Am. Ent. Soc. XXIII, 356. (Orthotype, *M. graeca* Hulst.)  
Dyar, 1902, List. N. Am. Lepid., 325.

Palpi short, slightly upturned, smooth-scaled; tongue present; front smooth; thorax loosely scaled with slight divided tuft on n; sathorax; antennae of ♂ bipectinate with simple apex, each pectination being claviform, without single terminal bristle and arising from near apex of segment; antennae of ♀ filiform; abdomen smooth-scaled, in ♂ without hair-pencils or bristle tufts; hind tibia in ♂ without hair pencil. Primaries without fovea in ♂, 12-veined, 10 and 11 free from the cell, 10 at times anastomosing with 9 to form areole; secondaries with 5 wanting, 8 approximate to 7 for half the length of cell.

The two species included in this genus, *graeca* Hulst. and *perpictaria* B. & McD., are superficially rather dissimilar but agree so closely in all structural details, especially genitalia, as to render their near relationship without question.

In the ♂ genitalia the uncus is narrow and pointed apically; the tegumen is J and rounded at its junction with the uncus, narrowing considerably basally; gnathos is well-developed, either pointed or square; the attachment of the

valves is broad, they themselves are rather short, curved inward and armed with a patch of spines at apex of sacculus and another closely associated patch near the costal margin; the aedeagus is long, narrow and unarmed.

Nothing is known of the early stages of any of the species.

**Meriscia perpictaria** Barnes & McDunnough. (Plate II, fig. 11).

*Chlora perpictaria* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep., N. Am. III (1), 33, Pl. II, fig. 11.\*

The species is at present only known from the type locality, Paradise, Ariz., where it appears fairly abundant.

**Meriscia gracea** Hulst. (Plate II, fig. 4; Plate VIII, fig. 11).

*Meriscia gracea* Hulst., 1896, Trans. Am. Ent. Soc. XXIII, 356.

The type locality of the species is Glenwood Springs, Colo.; besides specimens from this locality (including a type) there is a single  $\sigma$ , somewhat darker in color from the Huachuca Mts. Arizona, in the Barnes Collection. The species is decidedly rare.

6. **PORAPHROMIA** gen. nov. (Plate IX, fig. 3; Plate XI, figs. 1, 2).

(Type, *Aleis lichnaria* Pears.)

A female *Meriscia* with hair-pencil on  $\delta$  hind-tibia. Vein 11 of primaries is either stalked with 10 or on 10 without wing. Pectinations of  $\delta$  antennae shorter than in *Meriscia* but similar to *lichnaria*.

The name of the genus, *lichnaria* Pears., lacks vein 11 constantly, it having been replaced with 12, the subcostal vein, as noted in the introduction, would therefore be characterized as vein 11 + 12. *Configurata* Hulst., which on account of the similarity of genitalia is included here, possesses, as is usually pointed out, vein 11 short-stalked on 10 in the typical form; an Arizona female, however, agreeing exactly with *lichnaria* in venation. In this case, therefore, the presence or absence of vein 11 can scarcely be considered of generic value.

The genitalia are quite similar to those of *Meriscia*, the gnathos however being as in the valve-armature much heavier.

**Poraphromia configurata** Hulst. (Plate II, figs. 5, 6; Plate VII, figs. 9, 19).

*Meriscia configurata* Hulst., 1898, Can. Ent. XXX, 195.

*Chlora configurata* Dyar, 1902, List. N. Am. Lepid. 326.

The species was based on a Colorado specimen; a long series received from Dr. Wm. Barnes contained an Arizona specimen identified as this species by the late J. A. Grossbeck after a comparison with the type specimen in the Rutgers Collection. This specimen and the majority of the Arizona specimens in the same collection all showed on examination a total lack of vein 11; three  $\sigma$  specimens under the same name, however, possessed vein 11 shortly stalked on 10 and on close examination showed slight points of distinction in colour and maculation as well as in the  $\sigma$  genitalia. Dr. A. Peterson has been kind enough to examine the type specimen and forward me a sketch of the venation which shows that vein 11 is present in the type; typical *configurata*, therefore, is the 12-veined form (Plate VII, fig. 19) occurring in South Colorado and along the Arizona-New Mexico border.

The 11-veined form, found more generally in Arizona, may prove to be a good species but for the present I prefer to treat it as a geographical race for which I propose the name *falsata*. Apart from venation this race (Plate VII, fig. 9) may be distinguished by the tendency of the t.p. line on both wings to form slight outward projections along the veins; the median shade bends towards the t.a. line above the inner margin rather than towards the t.p. line and the subterminal space before the anal angle is rather prominently shaded with whitish. In the genitalia *falsata* has the whole surface of the harpe thickly covered with long spines whilst in typical *configurata* the long spines are confined to the costal edge, the interior ones being shorter and weaker. The Holotype of *falsata* is a specimen in the Barnes Collection from Farmerlee, Cochise Co., Ariz.; paratypes from Redington, Ariz., Tucson, Ariz. and Cochise Co., Ariz. are in the Barnes Collection and in the Canadian National Collection at Ottawa.

**Parapheromia lichenaria** Fearsall. (Plate II, fig. 8; Plate VII, fig. 3).

*Aleis lichenaria* Fearsall, 1906, Bull. Brooklyn Inst. Arts Sci., I (8), 215.

The species seems wide-spread and common in Arizona and New Mexico.

7. **MERISMA** gen. nov. (Plate IX, fig. 2; Plate XI, fig. 3.)

(Type, *Aleis spododea* Hulst.)

Differs from the preceding genus in the very short pectinations of the 7 antennae and the fact that vein 11, arising either connate or very short-stalked with 10, at once anastomoses with 12, separating again near apex of same.

In the ♀'s the apical portion of 12 has disappeared and in a single ♂ examined the basal portion of 11 between 10 and 12 was wanting, the venation agreeing with that of *Parapheromia*. The genus is intermediate as regards venation between *Mericisca* and *Parapheromia*, illustrating very clearly the method by which a vein has become eliminated.

The genitalia are quite highly specialized in certain directions; the uncus and gnathos are strong, narrow and well-produced and the armature of the valves has entirely disappeared, a feature that is only found in a few specialized species.

**Merisma spododea** Hulst. (Plate II, fig. 7; Plate VII, fig. 5).

*Aleis spododea* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 345; Dyar, 1903, Proc. Ent. Soc. Wash. V, 226.

This species, to my mind, represents the furthest point of development of the *Mericisca* group. The reduction of the male antennal pectinations and the disappearance of the valve-armature must be regarded as evidence of specialization rather than of a primitive type. The development of the venation has not yet attained quite such a high plane, although it has been shown that a tendency towards the entire loss of vein 11 is distinctly present. The species is not rare in the South Western States.

8. **PROTOBOARMIA** gen. nov. (Plate X, fig. 3).

(Type, *Boarmia porecharia* Gn.)

Palpi long, slightly upturned, projecting well beyond front, rough-scaled; tongue present; front and thorax rather rough-scaled; abdomen long, extending in ♂ beyond hind-wings, with bristle-tuft on 3rd segment medioventrally; hind tibia in ♂ with hair-pencil. Primaries with



large fovea at base in  $\sigma$ ; 12-veined, 10 and 11 short-stalked, the stalk connected with 12, 16 generally forming with 9 a long narrow areole; secondaries with 8 approximate to 7 for rather less than half the length of cell.

The long palpi, the large fovea and the venation characterize the genus sufficiently; the type species, *porcellaria* Guér., is the sole species included and seems, as already stated, to be a survival of some primitive group. The genitalia are quite distinctive; they show most resemblance to the *Melanolepna* type but in the gnathos the lateral apices are drawn out to long rods, the ventral portion becoming atrophied; the armature of the valves has wandered up to the apical portion and is partially concealed by a chitinous costal fold; the uncus is distinctly bilobed.

**Protozoarmia porcellaria** Guér. (Plate III, fig. 2; Plate VII, fig. 6).

*Boarmia porcellaria* Guér., 1857, Spec. Gen. Fhal. I, 252; Walker, 1869, Cat. Lep. Het. Brit. Mus. XXI, 350; Packard, 1876, Mon. Fhal. U.S. 155; Hulst, 1895, Ent. News, VI, 42, 105, (*err. det.*); Oberthur, 1913, Et. Lep. Comp. VII, 274.

*Chora porcellaria* Barnes & McDunnough, 1918, Cont. Nat. Hist. Lep. N. Am. IV (2), 153.

*Boarmia indicataria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 346; Hulst, 1895, Ent. News, VI, 11.

*Chora indicataria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357.

*Boarmia filaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 347; Packard, 1876, Mon. Fhal. U.S. 156.

*Alcis maestosa* Hulst, 1898, Can. Ent. XXX, 193.

*Chora maestosa* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 185.

The species is wide-spread, extending in Canada from coast to coast and along the Atlantic seaboard as far south as Florida. The nomenclature is that of the Southern States with *filaria* Wlk. and *maestosa* Hulst. as synonyms; for the northern, paler form, the name *indicataria* Wlk. may be used. Packard confused this species with *ambrosaria* Hbn. in his monograph, his figure of the venation (Pl. V, fig. 3) being apparently drawn from a specimen of this species; Dyar, following Packard, lists it from Kaslo, B.C. as *ambrosaria* (1901, Proc. U.S. Nat. Mus. XXVII, 901.)

The larva is described by Guér. from one of Abbot's unpublished drawings as feeding on *Porcellia (Asimina) pygmaea*, a dwarf paw-paw; there is no assurance however that this is the correct food-plant as in Allot's manuscripts very frequently the larvae and adults are erroneously associated. My own experience with ova laid by  $\sigma$ 's captured in Maine, in July, was that the young larvae on hatching in ten days refused all food plants offered them and perished.

9. **CLEORA** Curtis. (Plate IX, fig. 8; Plate X, fig. 6.)

Curtis, 1825 Ill. Brit. Ent. II, 88. (Orthotype, *cinctaria* Schuff.)

Stephens, 1831, Ill. Brit. Ent. Haust. III, 180 (*partim*).

Warren, 1894, Nov. Zool. I, 434.

Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 356 (*partim*).

Palpi moderate, slightly upturned; front smooth-scaly with slight tufts anteriorly and between antennae; metathorax with distinct divided scales tuft; antennae in  $\sigma$  doubly bipennate, with simple apex, a very small pectination at base of each segment and a moderately long one situated apically; pectinations terminated by single bristles; antennae of  $\sigma$  filiform; hind tibia in  $\sigma$  without hair-pencil. Primaries with small fovea at base in  $\sigma$ , 12-veined, 10 and 11 normally free, 10 frequently forming with 9 long narrow areole; secondaries with 8 approximate to 7 for only a short distance at base.

This generic term was totally misapplied by Guenée, Packard and Mhyrick and was not employed at all by the continental European writers of the middle of last century who almost invariably adopted Treitschke's later term *Boarmia*.

I use it here in a very restricted sense for those species which possess in the ♂ antennae, besides the normal apically-placed pectination, a small pectination at the base of each segment; it thus included *ciuctaria* Schiff. and the two North American species *sublunaria* Gn. and *manitoba* Grossb.

The venation is quite primitive, 10 and 11 being generally free; Mhyrick (1892, Trans. Ent. Soc. Lond. p. 130) records only two cases out of thirty-three specimens of *ciuctaria* examined in which 11 anastomosed with 12; these may have been ♀'s, a sex which I have had no opportunity of examining. The male genitalia differ markedly from those of the *Melanolophia* and *Meriscisa* groups: the uncus is drawn out to a long narrow point, the basal portion broadening gradually; the tegumen is diamond-shaped rather than rectangular; the valves are broad, curved inward apically with the sacculus forming a strongly chitinized fold beneath which arises a short spine and a serrated plate of chitin to form the harpe; the aedeagus is short and chunky.

**Cleora sublunaria** Guenée. (Plate II, fig. 12).

*Boarmia sublunaria* Guenée, 1857, Spec. Gen. Fhal. I, 248; Packard, 1876, Mon. Fhal. U.S. 142; Hulst, 1895, Ent. News, VI, 11, (err. det.); Oberthur, 1913, Et. Lep. Comp. VII, 273, Pl. CLXVIII, fig. 1641.\*

*Boarmia transfixaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 317; Packard, Mon. Fhal. U.S. 135 (err. det.); Barnes & McDunnough, 1911, Cont. Nat. Hist. Lep. N. Am. II (5), 211.

*Boarmia atrolucaria* Hulst, 1888, Ent. Amer. III, 211.

*Cleora arcuaria* Broadwell, 1907, Can. Ent. XXXIX, 180.

The species is distinctly rare; it is reported from various New Jersey localities and probably occurs throughout the southern New England and Northern Atlantic States, extending westward into Pennsylvania and Kentucky. As pointed out by Guenée *sublunaria* is very closely allied to the European *ciuctaria* Schiff. but there are certain small differences in the ♂ genitalia which warrant specific separation.

**Cleora manitoba** Grossbeck. (Plate II, fig. 10).

*Scidosema manitoba* Grossbeck, 1911, Can. Ent. XLIII, 225; Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (1), 35, Pl. XVI, fig. 1.

As far as I know, the species has only been captured in the type locality Winnipeg, Man. There is considerable variation in the colour of the median area; in some specimens it forms a broad pale band across the wing; in other it is not differentiated from the general purplish ground colour.

10. **NEOALCIS** gen. nov. (Plate IX, fig. 9; Plate X, fig. 1).

(Type, *Boarmia californiaria* Pack.)

Palpi moderate, upturned; front smooth, slightly tufted above base of palpi; thorax smooth scaled, without distinct posterior tufts; abdomen without hair-pencils or bristles; antennae in ♂ bipectinate with simple apex, pectinations long, arising from base of segment and terminating in single bristle; in ♀ ciliate; hind tibia in ♂ swollen but without hair pencil or with a mere vestige of one at base. Primaries in ♂ with fovea, 12-veined, 10 and 11 stalked, 11 anastomosing with 12 for short distance immediately beyond the fork, 10 generally anastomosing with 11 to form narrow acule; secondaries strongly emarginate with 8 approximately 7 for half the length of cell.

As already pointed out the distinctions between this genus and the European *Aleis* Curtis consist in the basal origin of the antennal pectinatus, the normal staking of veins 10 and 11 and the absence of a tibial hair-pencil.

In a long series examined the variations in venation consisted in 10 being free from 9 and in the very occasional elimination of the basal portion of 11 before the anastomosis with 12, giving the appearance of 11 stalked on 12.

The genitalia show great similarity to those of *Aleis*: the uncus is hood-shaped, the gnathos moderately developed, the valves curved as in *Cleora* but with a less developed sacculus and with the armature consisting of a broad pointed chitinous patch projecting inward from the basal portion of costa; a peculiar feature is the presence of a well developed furca, the prongs united at the base to form a plate; the aedeagus is rather short and furnished with a single strong bent spine.

**Neoaleis californiaria** Packard. (Plate II, fig. 9).

- Boarmia californiaria* Packard, 1871, Proc. Bost. Soc. Nat. Hist., XIII, 387.  
*Cymatophora californiaria* Packard, 1876, Mon. Phal. U.S., 111, Pl. XI, fig. 25.\*  
*Aleis californiaria* Hulst, Trans. Am. Ent. Soc., XXIII, 315.  
*Hemecrophila latifasciaria* Packard, 1871, Proc. Bost. Soc. Nat. Hist., XVI, 33;  
 id., 1876, Mon. Phal. U.S., 117, Pl. XI, fig. 28.\*  
*Aleis latifasciaria* Hulst, Trans. Am. Ent. Soc., XXIII, 315.

The species is common along the Pacific Coast, and quite variable in coloration; two of the commoner forms of color variation are well figured in Packard's monograph. Nothing is known of the life history of the species.

#### 11. ULTRALCIS gen. nov. (Plate IX, fig. 6).

(Type, *Aleis latipennis* Hulst.)

Allied to *Neoaleis*, differing in that the antennal pectinations are inserted at apex of segment, a tibial hair-pencil is present in the ♂ sex and vein 11 of primaries is constantly stalked on 12, the basal portion of 11, showing the connection with 10, having been eliminated. There is also a bristle tuft on the 3rd male abdominal segment. The genitalia show general similarity to those of *Aleis*, the armature of the valves however has been modified to two stout spines, arising close together near apex of sacculus; the furca is reduced to a narrow rod-like structure with bifurcate apex, attached to the chitinous membrane and not projecting free, and the aedeagus is very heavily armed apically with hooks. The genus very evidently represents a higher type of specialization evolved from a *Neoaleis*-like form.

**Ultralcis latipennis** Hulst. (Plate III, fig. 1; Plate VII, fig. 12).

*Aleis latipennis* Hulst., 1896, Trans. Am. Ent. Soc., XXIII, 316.

Few specimens are known of this species; the type was captured at Easton, Washington and since then it has been taken at various localities on Vancouver Is., B.C. (Duncan, Departure Bay, Wellington).

#### 12. PSEUDOBOARMIA gen. nov. (Plate IX, fig. 7; Plate X, fig. 3).

(Type, *Cymatophora umbrosaria* Hbn.)

Palpi scarcely exceeding front; slightly upturned, rough-scaled below; tongue developed; frons flat, smooth-scaled; thorax rough-scaled, without tufts; antennae in ♂ lengthily bipectinate with simple apex, pectinations with single terdinal bristle, broad at base, occupying the entire

ventral portion of each segment in mid-section of antennae; in ♂ slightly ciliate; abdomen smooth, without bristles ventrally; hind tibia of ♂ either without or with a short hair-pencil at base. Primaries in ♂ without fovea, 12-veined, 10 and 11 on long stalk, the stalk anastomosing with 12 just prior to forking of veins, 10 normally free but occasionally anastomosed with 9 to form areole; in ♀ 11 frequently absent; secondaries with 8 approximate to 7 for rather less than half the length of cell.

The genus typifies a more primitive form than *Dryococtis* Hbn. (*Boarmia* Tr.), the differences including the lack of a fovea and the presence of vein 11 on a long stalk with 10 in the ♂ sex. In the genitalia the uncus is rather short and pointed; on each side of it the apex of the tegumen is drawn out into two thin arms, terminating in long spines which curve over and extend beyond the tip of the uncus; the tegumen is broadly oval in shape, narrowed considerably at base; the valves in shape and attachment are much as in *Cloaca*, the sacculus is armed with a few weak spines and there is a broad spinel area centrally; the aedeagus tapers gradually to a point and is armed with two patches of weak spines. The European *punctinialis* Scop. (*consortaria* Fabr.) must be included in the genus.

**Pseudoboarmia umbrosaria** Hubner. (Plate III, fig. 3).

*Cymatophora umbrosaria* Hubner, 1806-1816, Samml. Exot. Schmett. I\*; Packard, 1876, Mon. Phal. U.S., 439, Pl. XI, fig. 23 (*partim*).

*Scidosema umbrosarium* Hulst., 1896, Trans. Am. Ent. Soc. XXIII, 335; Pearsall, 1906, Can. Ent. XXXVIII, 178.

*Cloaca umbrosaria* Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 98; Barnes & McDunnough, 1918, Cont. Nat. Hist. Lep. N. Am. IV (2), 154.

*Boarmia gnopharia* Guenée, Spéc. Gen. Phal. I, 251, Pl. V, fig. 10\*; Hulst., 1895, Ent. News, VI, 12; Oberthur, 1913, Et. Lep. Comp. VII, 271.

*Scidosema gnophosarium* Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (4), 19, Pl. VIII, fig. 15.\*

The species has been frequently confused with *porcellaria* Gn. (*indicataria*) which accounts for a number of erroneous northern and western records; it is doubtful if it occurs north of the southern part of New York State. Guenée separated *gnopharia* from *umbrosaria* on the presence of terminal dark shades on the meseside, but this feature appears variable, being generally distinct in the ♀ sex and often wanting in the ♂'s; Florida specimens seem to show constantly a tibial hair-pencil in the ♂ sex and it is possible when more and better preserved material can be examined that the southern race may be differentiated from the more northerly one and both names employed.

The life history is unknown except for Guenée's short characterization of the larva, based presumably on an unpublished drawing by Abbot; the larva is said to feed on oak.

13. **GLENA** Hulst. (Plate XI, fig. 6.)

*Glena* Hulst., 1896, Trans. Am. Ent. Soc. XXIII, 358. (Orthotype, *coagulataria* Hbn.)

*Monroa* Warren, 1901, Nov. Zool. XI, 555. (Orthotype, *quiquadlinearia* Pack.)

Palpi short, porrect, projecting only slightly beyond front; tongue developed; front smooth; antennae in ♂ lengthly bipennate with short simple apical section, pectinations arising from apex of segment; in ♀ ciliate, the cilia protected by projecting scales, giving a serrate appearance; abdomen smooth, without bristle-tuft ventrally; hind tibia in ♂ normally without hair-pencil. Primaries with small fovea in ♂ sex only, 11-veined, 11 coincident with 10; secondaries with 8 approximate to 7 for half the length of cell.

Hulst's characterization of this genus is incorrect in several particulars: the type species possesses no fovea in the  $\sigma^2$  sex, nor hair pencil in the  $\sigma^1$ ; Hulst originally included *Texanaria* along with *cognataria* in the genus; this species, however, actually does possess a fovea in both sexes and is distinctly not congeneric with *cognataria*.

Warren's diagnosis of *Monroa* was equally unfortunate; the generic association of *quinquelinearia* Fack. and *pinmosaria* Fack. is erroneous as is also the statement that a tongue and fovea are wanting; in *quinquelinearia* both are distinctly present and in all structural features this species shows so much similarity to *cognataria* that a retention of the generic name is impossible.

The genitalia are of a type which shows more similarity to that of *Melicisca* than to anything else. The uncus is short, the extremity blunt with a slight notch at apex; the tegumen is broadly oval and the attachment of the valves is also broad; the sacculus is continued towards the apex of the valve by a raised band of spines; the aedeagus is rather broad and short and armed with a bunch of fine spines and often a further single long stout spine; both of these may be either entirely lacking or considerably reduced.

The species *pecata* Swett and *furfuraria* Hulst. are included here as the type of genitalia is essentially the same; they are both however decidedly atypical, not only in maculation but also in certain structural features. Vein 8 of the secondaries is approximate to 7 for a comparatively short distance in both species and in *pecata* there is further a distinct tibial hair-pencil in the  $\sigma^2$ .

### *Glena cognataria* Hubner. (Plate III, fig. 1.)

- Anagoga cognataria* Hubner, 1825, Zutr. Exot. Schmett. III, 31, figs. 519, 550.\*  
*Tephrosia cognataria* Fackard, 1876, Mon. Thal. U.S. 421, Pl. XI, fig. 41.\*  
*Glena cognataria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 358; Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 99.  
*Aspilotes rufararia* Walker, Cat. Lep. Het. Brit. Mus. XXVI, 1685; Hulst, 1895, Ent. News, VI, 42.  
*Alcis baribada* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 346; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 185.  
*Scidosema nubicolor* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 355; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 181.  
*Anisobes unatillaria* Streecker, 1899, Lep. Rhop. Het. Suppl. II, 9; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 172.  
*Glena unatillaria* Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 99.  
*Scidosema insaria* Dyar, 1909, Proc. Ent. Soc. Wash. XI, 27.

The species seems to be generally distributed throughout the entire Atlantic Coast States from Maine to Florida; according to the specimens before us, the northern form is rather darker in ground color but with fewer dark shade-lines than the Florida form; as the species shows in any case considerable variation in maculation there seems to be little necessity for racial names.

### *Glena cribrataria* Guenée. (Plate III, fig. 6.)

- Tephrosia cribrataria* Guenée, 1857, Spec. Gen. Lep. IX, 260, Pl. III, fig. 9\*;  
 Fackard, 1876, Mon. Thal. U.S. 421, Pl. XI, fig. 43\*;  
 id., 1890, 5th Rep. U.S. Ent. Comm. 811 (aria).  
*Chora cribraria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357.

A rare species and apparently confined to the Atlantic Coast region; Guenée's type came from Georgia but the most of the records seen refer to the New England States. The genitalia show the species to be very closely allied to *cognataria*.

In his monograph Packard quotes Guenée regarding the larva, stating that it feeds on poplar, but later (i.e. 841) gives the food plant as spruce; Guenée's data were probably not reliable.

**Glena quinquelinearia** Packard. (Plate III, fig. 5).

*Cymatophora quinquelinearia* Packard, 1874, 6th Rep. Feab. Acad. Sci. 51; id. 1876, Mon. Phal. U.S. 432, Pl. XI, fig. 18.\*

*Alcis quinquelinearia* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 345.

*Monroa quinquelinearia* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 240, Pl. XXV, fig. 8, Pl. XXX, fig. 4.\*

The type material of the species was taken in Texas, probably by Boll or Belfrage; it extends northward into western Colorado (Glenwood Spgs.) and westward into S.E. Arizona (Paradise), where it forms a rather smaller and paler race. The life history is unknown.

**Glena interpunctata** Barnes & McDunnough.

*Monroa interpunctata* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 240, Pl. XXV, fig. 9, Pl. XXX, fig. 3.\*

An Arizona species of which, apart from the type lot, no specimens are known.

**Glena nigricaria** Barnes & McDunnough. (Plate III, fig. 8).

*Scridoscema nigricaria* Barnes & McDun. 1913, Cont. Nat. Hist. Lep. N. Am. II (3), 129, Pl. VII, fig. 11.

In spite of the great superficial dissimilarity between this species and the preceding ones, the genitalia are of exactly the same type. The species is not rare in S.E. Arizona and probably extends into Mexico; *nepia* Druce seems closely allied.

**Glena rusticaria** Barnes & McDunnough. (Plate III, fig. 9).

*Cleora rusticaria* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 244, Pl. XXIX, fig. 9.\*

The species is only known from Glenwood Spgs., Colorado; the close relationship to *nigricaria* is brought out by the genitalia.

**Glena furfuraria** Hulst. (Plate III, fig. 10; Plate VII, fig. 13).

*Boarmia furfuraria* Hulst, 1888, Ent. Amer. III, 214.

*Cleora furfuraria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357.

*Furfuraria* can scarcely be considered to be quite a typical member of the genus, although the genitalia show a marked resemblance to those of *nigricaria*; in maculation it rather approaches *pexata* Swett. The species occurs in several of the South Western States (Colo., Ariz.).

**Glena pexata** Swett. (Plate III, fig. 11; Plate VII, fig. 16).

*Cleora pexata* Swett, 1907, Journ. N.Y. Ent. Soc. XV, 53.

The species is placed tentatively in this genus on account of the general similarity of genitalia; the other structural features point to a rather more primitive form than that which is typical for the genus. *Perata* is not rare in Arizona but nothing definite is known concerning its range or habits.

#### 14. **STENOPORPIA** gen. nov.

(Type, *Cleora anellula* B. & McD.)

Similar to *Glena* but differing very decidedly in the form of the male genitalia. The uncus may be either pointed or hook-shaped; the gnathos is narrow apically with a tendency to obsolescence; the tegumen is broad and rounded apically, narrowing considerably towards the base; the valves are narrowly attached to the base of the tegumen only, being long, rather narrow, with a tendency to become connected across their basal section by a thin membrane; their armature consists of a small bunch of spines situated at the apex of a thickened costa; there is usually a hair-point at the base of each valve; the aedeagus is long, narrow and without any decided armature. Vein 8 of the secondaries is approximate to 7 for only a short distance at the base.

The species included in this genus are rather diverse in appearance and fall naturally into several groups; the type of genitalia is, however, essentially the same in all cases. Most of the species are decidedly rare and nothing is known of their early stages.

**Stenoporpia dissonaria** Hulst. (Plate IV, fig. 4; Plate VIII, fig. 8).

*Aleis dissonaria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 345.

Apart from the type specimen I only know of a single ♂ from Piedra, Colorado, in the Barnes Collection; the species belongs in a group with *anastomosaria* Grossb. and *polygrammaria* Pack.

**Stenoporpia anastomosaria** Grossbeck. (Plate IV, fig. 5; Plate VII, fig. 14).

*Scidosema anastomosaria* Grossbeck, 1908, Jour. N.Y. Ent. Soc. XVI, 29.

The species is apparently not rare in Arizona; the heavy black anastomosis of the median and t.p. lines of primaries toward the inner margin and the pale grey ground colour are characteristic.

**Stenoporpia polygrammaria** Packard. (Plate IV, fig. 9).

*Cymatophora polygrammaria* Packard, 1876, Mon. Plal. U.S. 139, Pl. XI, fig. 19.\*

*Scidosema polygrammaria* Fearsall, 1906, Can. Ent. XXXVIII, 179.

*Cleora pampinaria* Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (1), 19, Pl. VIII, fig. 6.\* (err. det.)

Rare in the New England and Atlantic States, apparently, however, rather wide-spread as a single specimen was captured by myself at Decatur, Ill. and erroneously figured as *pampinaria*, to which it has considerable superficial resemblance. A specimen is also before me from Aweme, Man. As pointed out by Packard the even grey color of the wings and the punctiform discal dot are characteristic. The male before me differs from all other species in this genus in the possession of a tibial hair-pencil but this may be variable as Fearsall records the type as without.

**Stenoporpia dionaria** Barnes & McDunnough. (Plate IV, fig. 2).

*Cleora dionaria* Barnes & McDunnough, 1918, Cont. Nat. Hist. Lep. N. Am. IV (2), 153, Pl. XX, fig. 6.\*

A few specimens, including the types, in the Barnes Collection are, as far as I know, the only existing ones of this species. It should be readily recognized by the figure.

**Stenoporpi pulchella** Grossbeck. (Plate IV, fig. 10).

*Stilbosoma pulchella* Grossbeck, 1909, Can. Ent. XLI, 156; Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (4), 35, Pl. XVI, fig. 7.\*

Apart from the Arizona localities mentioned in the original description the species has been taken at Palm Springs, S. Calif. It is a typical desert species, closest to *dionaria* in general maculation; both these species are rather aberrant members of the genus.

**Stenoporpi anellula** Barnes & McDunnough. (Plate IV, fig. 3).

*Clora anellula* Barnes & McDunnough, 1917, Cont. Nat. Hist. N. Am. III (4), 212, Pl. XXV, fig. 4, Pl. XXXI, fig. 4.\*

I have chosen this species as the generic type as it seems in some ways intermediate between the *polygrammaria* group and the *purpuraria* group which comprises the largest and most distinctly marked species of the genus. The figure of the genitalia given in the "Contributions" should be compared with that of *interpunctata* on Pl. XXX, fig. 3 of the same work in order to understand the salient differences of structure of these organs.

**Stenoporpi vernata** Barnes & McDunnough.

*Clora vernata* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 243, Pl. XXV, fig. 5, Pl. XXXI, fig. 2.\*

The type specimens are the only ones known to me.

**Stenoporpi excelsaria** Strecker. (Plate VIII, fig. 4).

*Bourcilia excelsaria* Strecker, 1899, Lep. Rhop. Het. Suppl. II, 10.

Since the description of the species from material captured in Washington State, occasional specimens (mostly ♀'s) have been taken on Vancouver Island, B.C. Two males before me from Glenwood Spgs., Colo. seem referable here; they are the only male specimens I have seen. The genitalia of these are very close to those of the preceding species.

**Stenoporpi albescens** Hulst. (Plate IV, fig. 7; Plate VIII, fig. 2).

*Stilbosoma albescens* Hulst., 1896, Trans. Am. Ent. Soc. XXIII, 355.

This is one of the rarest species among the Pacific Coast Cleorids; the type came from Seattle, Wash., and the species has since been taken sparingly on Vancouver Island, B.C. It belongs in the *dejecta* group.

**Stenoporpi purpuraria** Barnes & McDunnough. (Plate IV, fig. 1).

*Stilbosoma purpuraria* Barnes & McDunnough, 1913, Cont. Nat. Hist. Lep. N. Am. II (3), 129, Pl. VII, fig. 5.\*



A few specimens from Arizona in the Barnes Collection are the only ones I have seen of this species; it is, as noted in the description, closely allied to the Mexican *noctiluca* Druce.

**Stenoporpia dejecta** Hulst. (Plate IV, fig. 8; Plate VIII, fig. 12).

*Aleis dejecta* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 345.

The type in the Rutgers College Collection is worn; when fresh, the species is a very beautiful one with contrasting purplish and white shades; it looks very much like a pale *purpuraria*. In the Barnes Collection are a few specimens from various localities in the Sierra Nevada Mts., Calif. (Truckee, Shasta Retreat).

**Stenoporpia satisfacta** Barnes & McDunnough. (Plate IV, fig. 6).

*Chora satisfacta* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 244, Plate XXV, figs. 1, 2.\*

Closely allied to the two preceding species and with the same purplish ground colour; the species was referred by Taylor doubtfully to *Schizosema s. purpuraria* Grt. (1908, Can. Ent. 55).

#### 15. VITRINELLA gen. nov. (Plate XI, fig. 8).

(Type: *Boarmia pampinaria* Gu.)

Palpi moderate, ascending, 2nd joint broadly sected, 3rd knob-like, smooth; front smooth; meta-borax with slight divided scale tuft; antennae in ♂ bipectinate, with simple apex; the pectinations from apex of segment and considerably shorter than usual; in ♀ ciliate; hind tibia in ♂ generally with hair-pencil. Primaries with very large fovea at base, divided into two portions, the upper one less transparent than lower one; 11-veined, vein 11 coincident with 12; on secondaries vein 8 approximate to 7 at base only.

The genitalia indicate a highly specialized form; the tegumen is very long and narrow and the valves are attached to the extreme base by a couple of curved chitinous rods; the uncus is truncate and the gnathos long, narrow and well developed; the valves are narrow and without armature; the aedeagus is rounded apically and possesses a very complicated armature consisting of several spined areas and a single stout spine.

A few species included in this genus are all very similar in genitalia; the slight specific differences are to be found in the variation of the armature of the aedeagus.

**Vitrinella pampinaria** Guenée. (Plate V, fig. 13).

*Boarmia pampinaria* Guenée, 1857, Spec. Gen. Lep. IX, 245.

*Cynalophora pampinaria* Packard, 1876, Mon. Phal. U.S. 132, Pl. XI, fig. 20; id., 1890, 5th Rep. U.S. Ent. Comm. 574 (*larva*).

*Chora pampinaria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357; Smith, 1910, Ins. New Jersey, 503, fig. 210\*; Holland, 1903, Moth Book, 311, Plate XLIV, fig. 1\*; Oberthur, 1913, Et. Lep. Comp. VII, 271, Pl. CLXVIII, fig. 1640\*; Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 99.

*Boarmia frugaliaria* Guenée, 1857, Spec. Gen. Lep. IX, 246.

*Boarmia collecta* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 397.

*Phibalapteryx criosata* Walker, 1862, Cat. Lep. Het. Brit. Mus. XXVI, 1917; Barnes & McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 240.

*Boarmia fraudulencia* Zeller, 1872, Verh. Zool. Bot. Ges. Wien, XXII, 492.

*Chora pampinaria* var. *nubifera* Swett, 1913, Can. Ent. XI, 75.

This is one of our best known and widest spread species, extending from coast to coast and from Canada to Florida and Texas. It is subject to considerable variation, some of the most striking ones having received names: *eriosata* Wlk. is a form with pale ground colour and striking black cross-lines; *nubiferaria*, according to Mr. Swett, is a melanic aberration.

The larva is well-known and the final stage has been both described and figured but the full life history has apparently never been worked out. It is a very general feeder.

**Vitrinella atristrigaria** Barnes & McDunnough.

*Cleora atristrigaria* Barnes & McDunnough, 1913, Cont. Nat. Hist. Lep. N. Am. II (3), 130, Plate VII, figs. 1, 3.\*

There is some doubt in my mind as to whether this may not eventually prove to be a race of *pampinaria*, occurring in the extreme south. The type specimens are distinct enough in appearance with their olivaceous tinge and contrasting red-brown and black subterminal shades but somewhat similar forms may occasionally be found in series from more northerly localities. The single dissection of the male genitalia available shows slight differences in the armature of the aedeagus; a stout single spine which is present in *pampinaria* is reduced to a small chitinous patch and the spined areas of the apex of the vesica are composed of finer spines in *atristrigaria*.

**Vitrinella addendaria** Grossbeck. (Plate V, fig. 11).

*Aleis addendaria* Grossbeck, 1908, Jour. N.Y. Ent. Soc. XVI, 28; Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (1), 33, Pl. XV, fig. 14.\*

The species is only known from Utah; it is apparently a Rocky Mountain development of the *pampinaria* type; the genitalia are essentially the same but in the armature of the aedeagus the single spine of *pampinaria* is still stouter and the number of spines in the apical patches of the vesica somewhat reduced.

**Vitrinella ocellaria** Barnes & McDunnough. (Plate V, fig. 15).

*Cleora ocellaria* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (1), 215, Plate XXV, fig. 10.\*

*Ocellaria* may be distinguished structurally from the other members of the genus by the lack of a hair-pencil on the ♂ hind-tibia. The genitalia are so similar to those of *pampinaria* that it is impossible without more material for dissection to point to any characteristic points of distinction.

The two types from central California are the only specimens known to me; the species is easily recognized by its pale grey ground colour and general dotted appearance.

16. **ANACAMPTODES** gen. nov. (Plate IX, fig. 5).

(Type, *Boarmia humaria* Gn.)

Palpi moderate, upturned, with minute 3rd joint; antennae in ♂ bipectinate with simple apical section, pectinations from apex of segment, in ♀ simple; thorax smooth-scaled with metathoracic tuft undivided; abdomen smooth with small bristle-tuft centro-ventrally on 3rd segment; hind-tibia in ♂ swollen, with groove and generally with concealed hair-pencil. Primaries without fovea in ♂, 11-veined, vein II coincident with 10, 10 from cell, generally forming with 9 a long narrow areole.

The genus includes a number of our best known species and while the lack of a fovea, the presence of a hair-pencil and the absence of vein 11 are good points of distinction, the genitalia of the males show even more strikingly characteristic features. The sacculus is drawn out apically into a long, free, straight or curved arm; the gnathos is absent and the armature of the valves is lacking; generally the uncus is short and bifid apically, the two points being bent upward to form short hooks; in two cases (*larraria* and *emasculata*), however, it ends in a simple short point. The aedeagus is without cornuti.

**Anacamptodes larraria** Guenée. (Plate V, fig. 8).

*Boarmia larraria* Guenée, 1857, Spec. Gen. Phid. IX, 247; Oberthur, 1913, Et. Lep. Comp. VII, 272, Pl. CLXVIII, fig. 1642.\*

*Cymatophora larraria* Packard, 1876, Mo. Flal. U.S. 457, Pl. XI, fig. 21\* (partim).

*Cleora larraria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357.

Packard confused the two species, *larraria* Gu. and *ephyraria* Wlk., in his monograph, treating them as large and small forms of *larraria*; he figured, however, on Plate XI, the true species; Saunders' larval description (Can. Ent. VI, 32) apparently applies to *ephyraria*, judging by Packard's note (l. c. 438). The true *larraria* has been bred at Ottawa by Mr. C. H. Young and the following description is drawn up from inflated full grown specimens.

Head small, flat, lobes rather broad and gently rounded posteriorly, pale, reddish, shading into much deeper reddish-brown laterally and apically. Body cylindrical, smooth, with slight excrescences laterally on the 2nd abdominal segment and dorsally on the 8th, pale green, the thoracic segments with a broad dorsal band of purplish-brown; the entire 2nd abdominal segment shows this same purple-brown colour which is continued dorsally and ventrally on the 3rd abdominal segment, leaving the lateral portions pale; traces of dark shades appear dorsally on the other abdominal segments, particularly heavy on the 8th and 9th segments. Spiracles pale, brown-ringed, the warts on the 2nd abdominal segment situated just posterior to spiracle. Tubercles small, the dorsal and sub-spiracular ones on the pale segments ringed with brown, those of the 8th abdominal segment somewhat larger and situated on the hump. Bases of legs and prolegs heavily tinged with purple-brown.

The species appears to be double-brooded, hibernation taking place in the pupal stage. It occurs generally throughout eastern Canada, extending westward into Manitoba and Saskatchewan and southward into New York and Pennsylvania. As noted above, the genitalia show a peculiarity of the uncus in that it is simple and pointed as in the previous genera; there are also hair-pencils at the base of the valves; the free sacculus however and other points of genital structure agree with the generic definition.

**Anacamptodes emasculata** Dyar. (Plate V, fig. 9; Plate VIII, fig. 3).

*Scidosema humarium* var. *emasculatum* Dyar, 1905, Proc. U.S. Nat. Mus. XXVII, 910.

*Cleora emasculatum* Taylor, 1908, Can. Ent. XI, 100.

Appears to be common generally throughout British Columbia; in the structure of the genitalia it agrees with *larraria*, in contradistinction to the remaining members of the genus. A distinct tibial hair-pencil is present in the ♂'s, concealed in a groove, a fact overlooked by Dr. Dyar and corrected by Rev. G. H. Taylor.

**Anacamptodes fragilaria** Grossbeck. (Plate V, fig. 10).

*Cleora fragilaria* Grossbeck, 1909, Can. Ent. XII, 194; Barnes & McDunnough, 1912, Cont. Nat. Hist. Lep. N. Am. I (4), 19, Plate VIII, fig. 14\*.

The species is common and wide-spread throughout southern California; the genitalia are typical of the genus.

**Anacamptodes defectaria** Guenée. (Plate VIII, fig. 9).

- Boarmia defectaria* Guenée, 1857, Spec. Gen. Fal. IX, 247; Oberthur, 1913, Et. Lep. Comp. VII, 274.  
*Cicora defectaria* Barnes & McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 241; McDunnough, 1917, in Grossbeck, Bull. Am. Mus. Nat. Hist. XXXVII, 97 (*larva*).  
*Boarmia albignaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 348.

A southern species, common in Florida and southern Texas, and presumably in all the Gulf States. Packard and Hulst both listed the species erroneously as a synonym of *humaria* Gn. The larva feeds on oak and shows the lateral protuberances of the 2nd abdominal segment which appear to be characteristic of this genus.

**Anacamptodes ephyria** Walker. (Plate V, fig. 4; Plate VIII, fig. 10).

- Boarmia ephyria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 349; Barnes & McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 241.  
*Boarmia expressaria* Walker, 1862, Cat. Lep. Het. Brit. Mus. XXVI, 1657.  
*Boarmia larraria* Saunders, 1874, Can. Ent. VI, 32 (*larva*).  
*Cicora takenaria* Fearsall, 1909, Can. Ent. XLI, 149.

Packard considered this species to be a small form of *larraria* from which however it is quite distinct in both maculation and genital organs; Fearsall has clearly pointed out the distinctive features of the markings in his description of *takenaria*: in the genitalia the free end of the sacculus is short, straight and pointed, a feature only found otherwise in *plumosaria* Pack; in the other members of the genus the free arm is long and curved. Saunders' larval description under *larraria* Gn. should doubtless be transferred to this species. *Ephyria* is common throughout the Eastern States, extending northward to Canada and westward through Ontario into Manitoba.

**Anacamptodes humaria** Guenée. (Plate V, fig. 2).

- Boarmia humaria* Guenée, 1857, Spec. Gen. Fal. IX, 246.  
*Cymatophora humaria* Packard, 1876, Mon. Fal. U.S. 435 (*partim, nec fig.*).  
*Scidosema humarium* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 355; Barnes & McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 240; Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 96.  
*Boarmia fulvaria* Guenée, 1857, Spec. Gen. Fal. IX, 246; Oberthur, 1913, Et. Lep. Comp. VII, 274, Pl. CLXVIII, fig. 1641.\*  
*Boarmia intractaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 349.  
*Boarmia illudata* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 397.

This species was confused with several others by both Packard and Hulst which renders the localities given in Packard's monograph of doubtful value; in the states of New York and Pennsylvania *humaria* is moderately common and there is a single specimen before me from Ottawa, Ont. Grossbeck records it from Florida and it probably extends westward through the Ohio valley region. It is very similar in maculation to the following species but considerably smaller in size; the rather even purplish-grey ground colour separates it from other members of the genus.

**Anacamptodes vellivolata** Hulst. (Plate V, fig. 1).*Macaria vellivolata* Hulst., 1881, Bull. Brook. Ent. Soc. IV, 31.*Clora vellivolata* Hulst., 1896, Trans. Am. Ent. Soc. XXIII, 357; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 185; Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 99.*Cymatophora humaria* Packard, 1876, Mon. Phal. U.S. II, XI, fig. 22\* (*err. det.*)

Hulst's type of this species was a pale form from Florida with extended red-brown areas much as in *pygmaealis* Stkr.; northern specimens, as exemplified by Packard's figure (Plate XI, fig. 22), show less of this red-brown shading but seem otherwise identical in maculation; for the present I treat them as belonging to one species. *Vellivolata* extends up the Atlantic Coast from Florida to the New England States and in the spring of 1919 I captured several specimens in the vicinity of Ottawa, Ont., constituting a new record for the district. From ova obtained the larva was bred to maturity, the pupa hibernating. The following description of the stages was drawn up.

*Ocum.* Conical; base flat; sides tapering gradually towards apex which is half the width of base; faintly and finely reticulated with vertical and horizontal ridging; colour yellow. Length, slightly over 1 mm.; width of base, under .5 mm.

Length of stage, 10 days (June 1 - June 11).

*Stage I.* Head orange-suffraneous, lobes unpronounced. Prothoracic segment largely the colour of the head; body dirty-green to olivaceous-brown, rather flat, with a distinct lateral flange of a dull creamy colour; traces of dotted pale dorsal, sublorsal and stigmatal lines, the latter almost entire. Tubercles small, black. Length 3 mm.

*Stage II.* General appearance short, chunky. Head dull orange-suffraneous with traces of darker marbling. Body olive-brown, paler anteriorly, with pale ochreous-olive flange and pale indistinct sublorsal, lateral and spiracular stripes bordered with a line deeper in colour than the ground colour, giving a general appearance of numerous longitudinal stripes. Beneath purplish-brown with traces of pale longitudinal lines. Tubercles minute, black. Length 5 mm.

*Stage III.* Much as before. Colour of body tends towards olive-green rather than olive-brown, lateral flange moderate developed; markings as in previous stage. Length 8 mm.

*Stage IV.* Much as before. Head red-brown; body olive-brown with pale yellow flange. Thoracic segments darker shaded; traces of the longitudinal dark lines of the preceding stages still present. Below the flange the body is flat and purplish coloured.

*Stage V.* Strikingly different in appearance. Head red-brown, mottled with yellow, apical and central portion of lobes tinged with brighter red. Body cylindrical with prominent warty lateral flange and raised sublorsal warts. Colour, red-brown, heavily mottled and banded with purple, the latter colour being predominant on both sides of the segmental incisure and forming a broad band of dark colour, the red-brown areas being often restricted to large diamond-shaped dorsal patches. The dark lines of the previous stage are still present giving a general striped effect; the yellow flange line of the preceding stages is restricted to patches below and around the spiracle, becoming frequently suffused with red-brown; a blackish patch borders on the yellow area posteriorly, being situated below and slightly behind the spiracle. Tubercle II prominent, black, situated on a ridge running transversely across the posterior dorsal portion of each segment; other tubercles small. Length 20-30 mm.

Food Plant. *Pinus* spec.

**Anacamptodes plumosaria** Packard. (Plate V, fig. 6).

*Cymatophora plumosaria* Packard, 1871, 6th Rep. Feab. Acad. Sci. 51; id. Mon. Phal. U.S. 131, Plate XI, fig. 17.\*

This species was erroneously placed as a synonym of *larraria* by Hulst; few specimens of the true *plumosaria* are known; it was originally described from material from Alabama and I have seen further specimens from Hastings, Fla. in the Barnes Collection.

**Anacamptodes cypressaria** Grossbeck.

*Schizosema cypressaria* Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 96.

*Cypressaria*, to judge by the description, must be very close to *plamosaria*. I have not examined the species however. The larva is probably a pine feeder.

**Anacamptodes pergracilis** Hulst. (Plate V, fig. 7; Plate VIII, fig. 7).

*Synclys pergracilis* Hulst, 1900, Can. Ent. XXXII, 105.

*Clora pergracilis* Grossbeck, 1917, Bull. Am. Mus. Nat. Hist. XXXVII, 98.

*Pergracilis* is quite common in southern Florida, but has as yet not been recorded from localities outside of this state. There is considerable variation, as pointed out by Grossbeck, in the depth of the ground colour and the extent of the subterminal red-brown shades. *Momaria* Gn., doubtfully placed in our 1917 List under *pergracilis*, should be dropped; Packard states (Mon. 137) that, according to Guenée, the species is Australian.

**Anacamptodes jacumbaria** Dyar. (Plate V, fig. 11; Plate VIII, fig. 5).

*Schizosema jacumbaria* Dyar, 1908, Proc. Ent. Soc. Wash. X, 56.

A rare species, known only from a few specimens from Southern California. The tibial hair-pencil of the ♂, as pointed out by Dr. Dyar, is absent, although the groove is plainly visible; the type of genitalia is essentially that of the present genus. Superficially the species resembles *quinqulinaria* Pack.

**Anacamptodes dataria** Grote. (Plate V, fig. 3; Plate VII, fig. 18).

*Cymatophora dataria* Grote, 1882, Can. Ent. XIV, 173.

*Clora dataria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357.

Differs from the following species in the much more irregular course of the postmedian line and prominent discal ringlet. Not rare in Arizona.

**Anacamptodes obliquaria** Grote. (Plate V, fig. 5).

*Cymatophora obliquaria* Grote, 1883, Can. Ent. XV, 124.

*Aleis obliquaria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 345.

*Cymatophora rufaria* Grote, 1883, Can. Ent. XV, 125; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), Pl. XIII, figs. 15, 16.\*

The general maculation of the species is rather dissimilar to that of the majority of the species included under this generic head; the genitalia however are of the well known type. The species is quite common in Arizona and presumably will be found in the neighbouring states.

**Anacamptodes clivinaría** Guenée.

*Boarmia clivinaría* Guenée, 1857, Spec. Gen. Falh. IX, 215; Oberthur, 1913, Etudes Lep. Comp. VII, 271; Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 241, Plate XXV, fig. 7.\*

The type of this species appears to be lost; the species figured in the "Contributions" from San Bernardino Co., Calif. may hold the name for the present

as it agrees as well with the original description as anything I have seen. No examination of the genitalia has been made but from the general similarity of maculation with *obliquaria* the generic reference seems fairly safe.

**Anacamptodes sanctissima** Barnes & McDunnough.

*Chloa sanctissima* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 211, Plate XXV, fig. 6; Plate XXX, fig. 5.\*

A Californian species which is only known to me from the type material.

**Anacamptodes profanata** Barnes & McDunnough.

*Chloa profanata* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 242, Plate XXV, fig. 3; Plate XXX, fig. 6.

What appears to be this species has been taken recently in southern British Columbia (Osoyoos) which extends the distribution of the species considerably. It is apparently an inhabitant of the semi-arid region west of the continental divide. It differs from the preceding species in the duller browner ground-colour and the more irregular postmedian line.

17. **HULSTINA** Dyar.

Dyar, 1903, Proc. Ent. Soc. Wash. V, 178. (Orthotype, *H. terlinata* Dyar.)

Palpi variable in length, porrect, at times projecting considerably beyond front; tongue obsolete (typical) or present; fore tibiae thorax smooth-scaled; antennae in ♂ bipectinate with simple apex, pectinations at apex of segment; in ♀ ciliate with projecting setae covering the cilia and giving a serrate appearance; hind tibia in ♂ without hair-penel. Primaries without fovea in ♂, 11-veined in ♀; 11-veined in ♂ with 10, 10 either free or anastomosing with 9 to form areole.

The generic name *Hulstina* has been employed in place of the preoccupied *Athalodes* Hulst, owing to a misstatement in the original characterization that the venation of the two type species was similar; the usage in our 1917 Check List along with *packardaria* Hulst is consequently erroneous. *Athalodes* is a highly specialized genus of the 42-veined group and is not typically Chorid; *Hulstina* is an 11-veined genus, created for *terlinata formosata* Hulst. Along with this species, in which the tongue is lacking, I have included several others, in which a tongue is present, on account of the obvious similarity of genitalia.

The menis is very broad and truncate apically and the armature of the valves consists of single spines of variable length projecting inward from the middle or apex of costa. In the type species the palpi appear rather shorter than in the other members of the genus.

**Hulstina formosata** Hulst. (Plate VI, fig. 8; Plate VIII, fig. 6).

*Chloa formosata* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 357; Crossbeck, 1907, Trans. Am. Ent. Soc. XXXIII, 343.

*Hulstina terlinata* Dyar, 1903, Proc. Ent. Soc. Wash. V, 178.

*Terlinata* was primarily separated from *formosata* on the ground that a proboscis was absent in the former and present in the latter; after an examination of the type of the latter and of specimens in the Barnes Collection taken by Bruce at the same time as the type, I am unable to agree that a tongue is present in *formosata*. The species is known from western Colorado and Utah.

**Hulstina wrightiaria** Hulst. (Plate VI, fig. 1).

*Boarmia wrightiaria* Hulst, 1888, Ent. Amer. III, 215.

*Selidosema wrightiaria* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 355; Grossbeck, 1912, Jour. N.Y. Ent. Soc. XX, 290.

A southern Californian species very close in genitalic structure to *formosata* but in maculation approaching *inconspicua*. The differences have been discussed by Grossbeck.

**Hulstina inconspicua** Hulst. (Plate VI, fig. 2; Plate VII, fig. 1).

*Chloroclystis inconspicua* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 261.

*Selidosema inconspicua* Grossbeck, 1912, Jour. N.Y. Ent. Soc. XX, 290.

*Selidosema aethalodaria* Dyar, 1908, Proc. Ent. Soc. Wash. X, 57.

*Clora aethalodaria* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (3), 181.

The salient features of the species, both in maculation and structure, have already been dealt with by Grossbeck. The species is common in southern California.

**Hulstina exhumata** Swett.

*Clora exhumata* Swett, 1918, Lepidopterist, II, 82.

The species is unknown to me but has been associated with the two preceding species by the author; it is probably correctly placed. It is recorded from southern California.

18. **PTEROTAEA** Hulst.

Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 319. (Orthotype, *P. cariosa* Hulst.)

Palpi correct, projecting considerably beyond front, rough-scaled; tongue developed; antennae in ♂ bipectinate with simple apex, pectinations long and arising from apex of segment; in ♀ shortly bipectinate or serrate; hind tibiae in ♂ with hair-pencil. Primaries without fovea in both sexes, 11-veined, 11 convergent with 10 which generally forms, by anastomosis with 9, a long, narrow areole; on secondaries vein 8 approximate to 7 for half the length of cell.

The genus was erected by Hulst on the strength of the pectinate antennae found in the ♂ sex; this character, however, is only an extreme development of the projecting scales, found in many ♀'s, which act as a protection to the cilia and on account of the marked similarity of genitalia several species are here included which only show this serrate form of antenna. The genus appears to be a well defined one, comprising a few species peculiar to the Pacific Coast and probably closer to *Hulstina* than to any other genus.

The genitalia are quite distinctive; the uncus is short, narrow and terminates bluntly; the gnathos is narrow but well-developed; the valvae are very broad with an apical armature of spines arising from a broad chitinous plate, in several instances (*cariosa* and *newcombii*) this armature being asymmetrical; the transtilla is broadly developed but the opposing arms do not unite; the aedeagus is slender with weak cornuti.

The species *memoriata* Pears. and *obliviscata* B. & McD. cannot be included here as they differ in important details; they will be treated of later in the paper.

**Pterotaea cariosa** Hulst. (Plate VI, fig. 10).

*Pterotaea cariosa* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 319.



The species is very little known; apart from the unique type  $\sigma$  in the Rutgers College Collection from Soda Springs, Calif., there is a pair in the Barnes Collection from Sonoma Co., Calif. The armature of the valves is asymmetrical, the spines on the right side arising from the apical portion of the chitinous patch whilst on the left side they are situated in the lower angle.

**Pterotaea newcombi** Swett. (Plate VI, fig. 7; Plate VII, fig. 15).

*Clarea newcombi* Swett, 1914, Can. Ent. XLVI, 290.

Very evidently the southern representative of *curiosa* as it shows the same asymmetry of valve-armature. It is recorded from various localities in the vicinity of San Bernardino.

**Pterotaea melanocarpa** Swett. (Plate VI, fig. 12).

*Clarea melanocarpa* Swett, 1916, (Nov.), Lepidopterist, I, 5.

*Pterotaea tremularia* Barnes & McDunnough, 1916 (Dec.), Cont. Nat. Hist. Lep. N. Am. III (1), 27, Pl. II, fig. 4.\*

The synonymy as suggested in the foot note (Contributions, III, 27) proves correct. The species occurs in the mountainous districts of southern California.

**Pterotaea serrataria** Barnes & McDunnough. (Plate VI, fig. 9).

*Pterotaea serrataria* Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (1), 28, Pl. II, fig. 9.\*

Known only from the type specimens from San Diego Co., Calif.

### 19. **ECTROPIS** Hubner. (Plate XI, fig. 7).

*Ectropis* Hubner, 1826, Verz. bek. Schmett. 316; Meyrick, 1892, Trans. Ent. Soc. Lond. 191; Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 358. (Logotype, *crepuscularia* Schiff.)

*Tephrosia* Boisduval, 1810, Ind. Meth. 198; Guenee, 1857, Spec. Gen. Phal. IX, 258. (Logotype, *crepuscularia* Schiff.)

Palpi short, porrect, slightly projecting beyond front; thorax rough-scaled without tufts; antennae of  $\sigma$  fasciculate, with two pairs of fascicles on each segment, in  $\sigma$  ciliate; hind tibia in  $\sigma$  without hair-pencil. Primaries in  $\sigma$  with fovea, 12-veined, veins 7, 8 & 9 stalked, vein 10 arising from 8 a short distance beyond the apex of cell, 10 and 11 long-stalked, 10 frequently anastomosing with 9 to form areole; on secondaries 8 approximate to 7 only at extreme base.

The venation is quite characteristic, the staking of 10 and 8 frequently being the best means of separating the  $\sigma$ 's of *crepuscularia* from the very similar ones of *pareclaria* Gu.

The early larval stages show a marked difference in maculation to those of our other North American genera (as far as is known) and may afford good clues to the origin and correct relationship of the genus.

**Ectropis crepuscularia** Schifferrmuller. (Plate III, fig. 7).

*Phalaena crepuscularia* Schifferrmuller, 1776, Syst. Verz. Wien, 101.

*Cymatophora crepuscularia* Packard, 1876, Mon. Phal. U.S. 428, Pl. XI, fig. 21.\*

*Ectropis crepuscularia* Hulst, 1896, Trans. Am. Ent. Soc. XXIII, 358; Holland, 1903, Moth Book, 311, Plate XLIV, fig. 9\*; Barnes & McDunnough, 1912, Psyche, XX, 17 (*larva*).

- Tephrosia occidentaria* Guenée, 1857, Spec. Gen. Ital. IX, 266; Hulst, 1895, Ent. News, VI, 41.
- Boarmia signaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 346.
- Tephrosia spatiosaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 403.
- Tephrosia intrataria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 403.
- Boarmia eucuraria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 488; D'Urban, 1861, Can. Nat. & Geol. VI, 39 (as *cucuraria*); Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (1), 39, 40.
- Tephrosia abraexaria* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 403; Hulst, 1895, Ent. News, VI, 41.
- Boarmia divisaia* Walker, 1860, Cat. Lep. Het. Brit. Mus. XXI, 489; Hulst, 1895, Ent. News, VI, 72; Barnes & McDunnough, 1916, Cont. Nat. Hist. Lep. N. Am. III (1), 41.
- Boarmia fernaldaria* Hulst, 1888, Ent. Amer. III, 215.
- Tephrosia fumataria* Minot, 1869, Proc. Bost. Soc. Nat. Hist. XIII, 84.

I have treated our North American species as identical with the European one; if it be necessary to keep it distinct, the name *occidentaria* Gu. would apply. Superficially our North American form cannot be separated from European specimens of *crepuscularia* although biologically it seems to possess certain distinctive features if Tutt's remarks on the subject (1898, Trans. Ent. Soc. Lond. 17) are based on facts. Tutt claims that *crepuscularia* is definitely single-brooded whereas *histortata*, the other closely allied European species, is double-brooded; for this reason (p. 14) he seems to consider the Nearctic form to be referable to *histortata* rather than to *crepuscularia*. There is no doubt that the North American species is double or even triple-brooded, according to locality, and it would also seem that the more northern specimens are darker grey than southern specimens. The matter is one that will require careful study of the forms of a single locality before decision is possible. The genitalia appear to show no characters on which a distinction might be based.

The species is subject to considerable variation; the dark-banded form has received the name *abraexaria* Wlk; it is rather rare in the East but in a series from southern Alaska nearly half the specimens belonged to this form. *Fumataria* Minot is a rare melanic form.

## 20. AETHIALURA n.n.

(Type, *Tephrosia anticaria* Wlk.)

*Aethaloptera* Hulst, (nec Brauer, 1875) 1896, Trans. Am. Ent. Soc. XXIII, 358.

Pdpi moderate, parrict; tongue developed; front smooth; antennae of ♂ fasciculate, two pairs of fascicles to each segment, of ♀ ciliate; hind tibia in ♂ with hair-pencil. Primaries with fovea at base in ♂ only; 11-veined, U absent, 10 from cell, at times slightly anastomosing with 12; secondaries with 8, approximate to 7 for half the length of cell.

The genus appears to be a good one although Hulst's characterization of the ♂ as possessing a fovea was an error. It is the only 11-veined genus with fasciculate antennae. The genitalia are quite distinct, the uncus being reduced to a short knob, a gnathos lacking, and the valves very broad apically with the costa projecting beyond the valvula. Only a single Nearctic species is included but the European *punctularia* must also be placed here as the genitalia are almost identical with those of *anticaria*.

**Aethalura anticaria** Walker. (Plate VI, fig. 5).

*Tephrosia anticaria* Walker, 1860, Cat. Lep. Het. Brit. Mus., XXI, 104; Packard, 1876, Mon. Phal. U.S., 123, Plate XI, fig. 12;\* Barnes and McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), Plate XXIII, fig. 12.\*

*Tephrosia submararia* Walker, 1860, Cat. Lep. Het. Brit. Mus., XXI, 106; Hulst, 1895, Ent. News, VI, 42.

*Athaloptera tuberculata* Hulst (nec Walker), 1896, Trans. Am. Ent. Soc., XXIII, 358; Dyar, 1904, Proc. U.S. Nat. Mus., XXVII, 911; Barnes and McDunnough, 1914, Cont. Nat. Hist. Lep. N. Am. II (5), 214.

*Athaloptera anticaria fumata* Barnes & McDunnough, 1917, Cont. Nat. Hist. Lep. N. Am. III (4), 245, Plate XXIII, fig. 11.\*

The species is common in the northern States and extends in Canada from coast to coast; the suokier form from British Columbia with enlarged discal dot has received the name *fumata* B. & McD.

The larva has not been described; it will probably prove to be a feeder on birch like its near European relation, *punctularia*.

In conclusion it becomes necessary to discuss several species which have been excluded from some of the previously-mentioned genera and which, while probably allied to the Cleorids, do not seem to be quite typical enough in structure to be treated of in the main portion of the paper.

21. **AETHALOIDA** n.n. (Plate XI, fig. 9).

*Athalodes* Hulst. (nec Kriechbammer, 1890) 1896, Trans. Am. Ent. Soc., XXIII, 315. (Orthotype, *Hemcrophila packardiana* Hulst.)  
Dyar, 1903, Proc. Ent. Soc. Wash., V, 178.

Palpi slender, short, slightly applanate; tongue lacking, front flat, smooth; antennae in ♂ bipectinate to apex, pectinations long, plumose and arising from base of segments, in ♀ ediate; hind tibia in ♂ without hair-pencil. Pennaries without fovea, 12-veined, 10 forming long areole by anastomosis with stalk of 8+9, 11 from areole shortly before apex, 7 from below apex of areole, 10 separating considerably beyond apex of same, 12 anastomosing shortly with areole near base; secondaries with 8 approximate to 7 for fully half the length of cell.

The genus appears to be a highly specialized one, having developed probably from some *Meis*-like form; the areole is apparently a constant feature, the venation also being constant in all specimens examined; the antennal pectinations from the base, the lack of a fovea in both sexes together with the absence of any proboscis are good characters.

The genitalia are unique; the valves are unarmed and the transtilla forms on each side a slender, free-projecting, rod-like, pointed, chitinous arm; a gnathos is absent.

Dyar has already pointed out that the term *Athalodes* is preoccupied; since *Haltina* must be applied in another sense I propose the above term.

**Aethaloida packardaria** Hulst. (Plate VI, fig. 4; Plate VII, fig. 11).

*Homocrophila packardaria* Hulst, 1888, Ent. Amer. III, 217.

*Selidoscma lachrymosa* Hulst, 1898, Can. Ent. XXX, 194; Fearsall, 1910, Can. Ent. XLII, 314.

*Selidoscma homopteroides* Hulst, 1901, Jour. N.Y. Ent. Soc. VIII, 219.

The species is not rare in southern California and must extend northward at least as far as Oregon as the type of *homopteroides* was taken in that state (Gold Hill).

## 22. NEPTEROTAEA gen. nov. (Plate XI, fig. 5).

(Type, *Pterotaca obliviscata* B. & McD.)

Palpi short, porrect, scarcely exceeding front; tongue present; antennae in ♂ shortly bipectinate, pectinations arising from base of segment and not terminated by a single bristle, in ♀ with very short pectinations; hind tibia in ♂ without hair-pencil. Primaries without fovea, 11-veined, 11 absent, distinct short areole present, veins 7-10 arising from its apex; secondaries with vein 8 approximate to 7 for half length of cell.

The genus will include the two species, *memoriata* Fears. and *obliviscata* B. & McD., placed originally in *Pterotaca* on account of the pectinate nature of the ♀ antennae; they differ however from the characterization of this genus in several features; the pectinations of the ♂ antennae arise from the base of the segment and lack the terminal bristle; the palpi are quite short; the venation, while 11-veined, shows a distinct short areole with the radial veins arising from its apex. The genitalia are slightly reminiscent of *Mericisca*, the valvula is, however, broadest at the apex and the aedeagus very chunky.

**Nepterotaea obliviscata** Barnes & McDunnough.

*Pterotaca obliviscata* Barnes & McDunnough, 1918, Cont. Nat. Hist. Lep. N. Am. IV (2), 152, Plate XXI, fig. 21.\*

The species has recently been taken quite commonly in the vicinity of the type locality, Paradise, Arizona.

**Nepterotaea memoriata** Fearsall. (Plate VI, fig. 3).

*Pterotaca memoriata* Fearsall, 1906, Bull. Brooklyn Inst. Arts, Sci. I (8), 217; Barnes & McDunnough, 1918, Cont. Nat. Hist. Lep. N. Am. IV (2), Plate XXI, fig. 18.\*

Also a southern Arizona species which of recent years has appeared in some numbers in material from Paradise, Arizona.

## 23. GLENOIDES gen. nov.

(Type, *Tephrosia texanaria* Hulst.)

Palpi short, bushy; front smooth; antennae bipectinate in ♂ with simple apex, pectinations arising from apex of segment; in ♀ slightly serrate; hind tibia in ♂ with no hair-pencil. Primaries with distinct fovea in both sexes; 11-veined, 11 coincident with 10.

The species was included by Hulst in his genus *Glena* but the ♀ of the type species, *cognataria*, is without fovea in the ♀ sex. Aside from this feature and the general superficial dissimilarity of the two species, the genitalia show little similarity of structure. In *texanaria* there is no armature of the valves but a furca is present at the base on each side, thickly covered with short blunt spines; the aedeagus shows a row of teeth along its outer margin.

**Glenoides texanaria** Hulst. (Plate VI, fig. 6; Plate VIII, fig. 1).

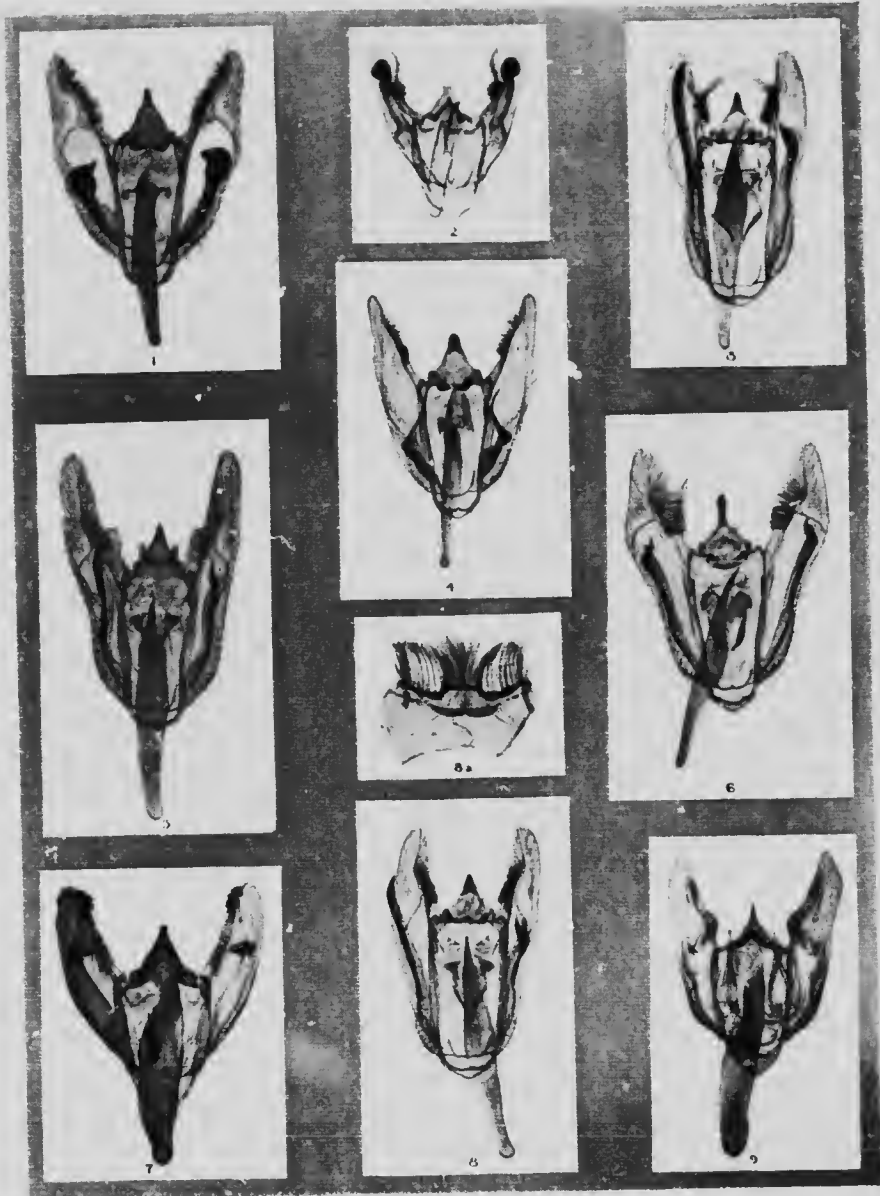
*Tephrosia texanaria* Hulst. 1888, Ent. Amer. III, 216.

*Glena texanaria* Hulst. 1896, Trans. Am. Ent. Soc. XXIII, 358; Grossbeck, 1917,  
Bull. Am. Mus. Nat. Hist. XXXVII, 99.

Known only from Florida and Texas. The species looks rather like a diminutive member of the genus *Anacamptodes* but the genitalia are too distinct to warrant this reference.

## PLATE I.

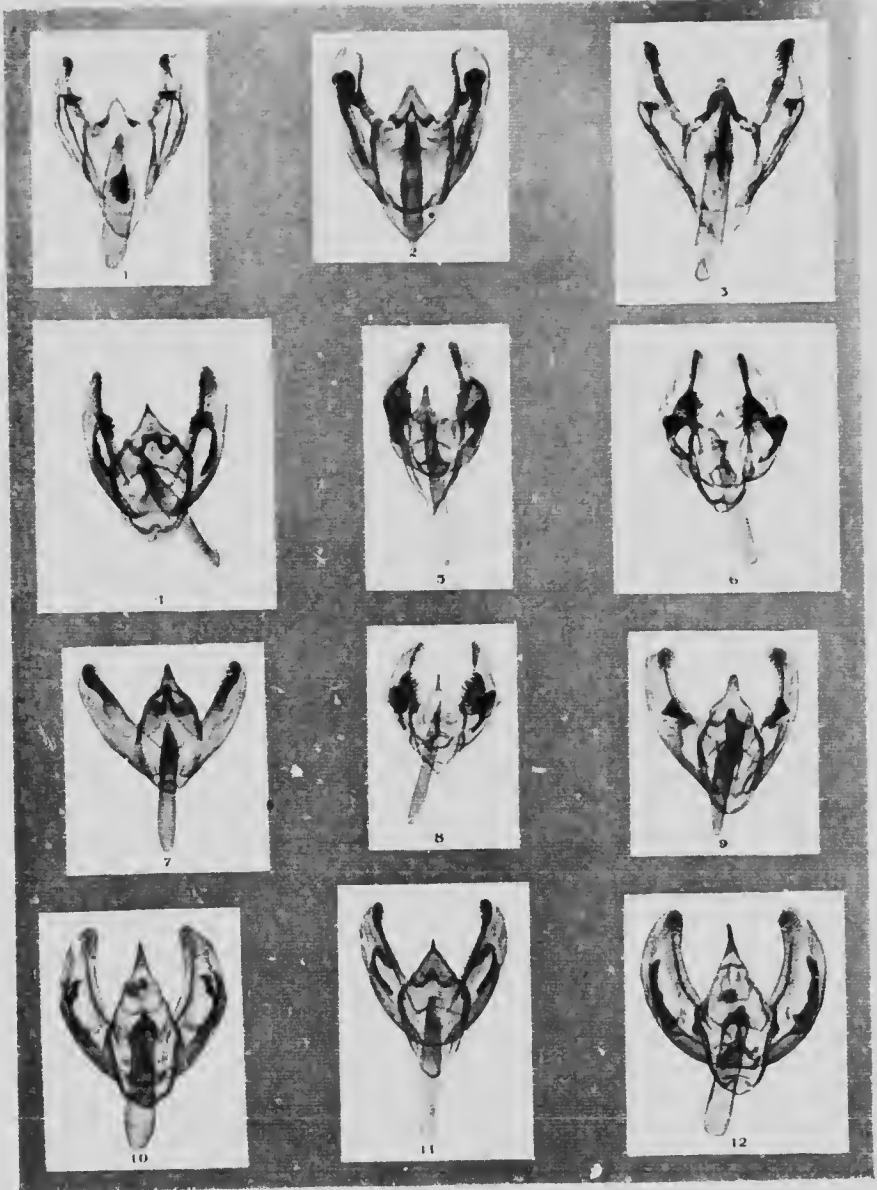
1. Male genitalia of *Melanolophia imitata* Wlk.
2. " *Carphoides inconspicua* B. & McD.
3. " *Melanolophia signataria* Wlk.
4. " *Melanolophia centralis* McD.
5. " *Melanolophia imperfectaria* Wlk.
6. " *Melanolophia canadaria* Gu.
7. " *Galerana lullata* Hbst.
8. " *Melanolophia signataria* Wlk.
- 9a. Abdominal organ of *Melanolophia signataria* Wlk.
9. Male genitalia of *Vocamine opavaria* Hbst.



## PLATE II.

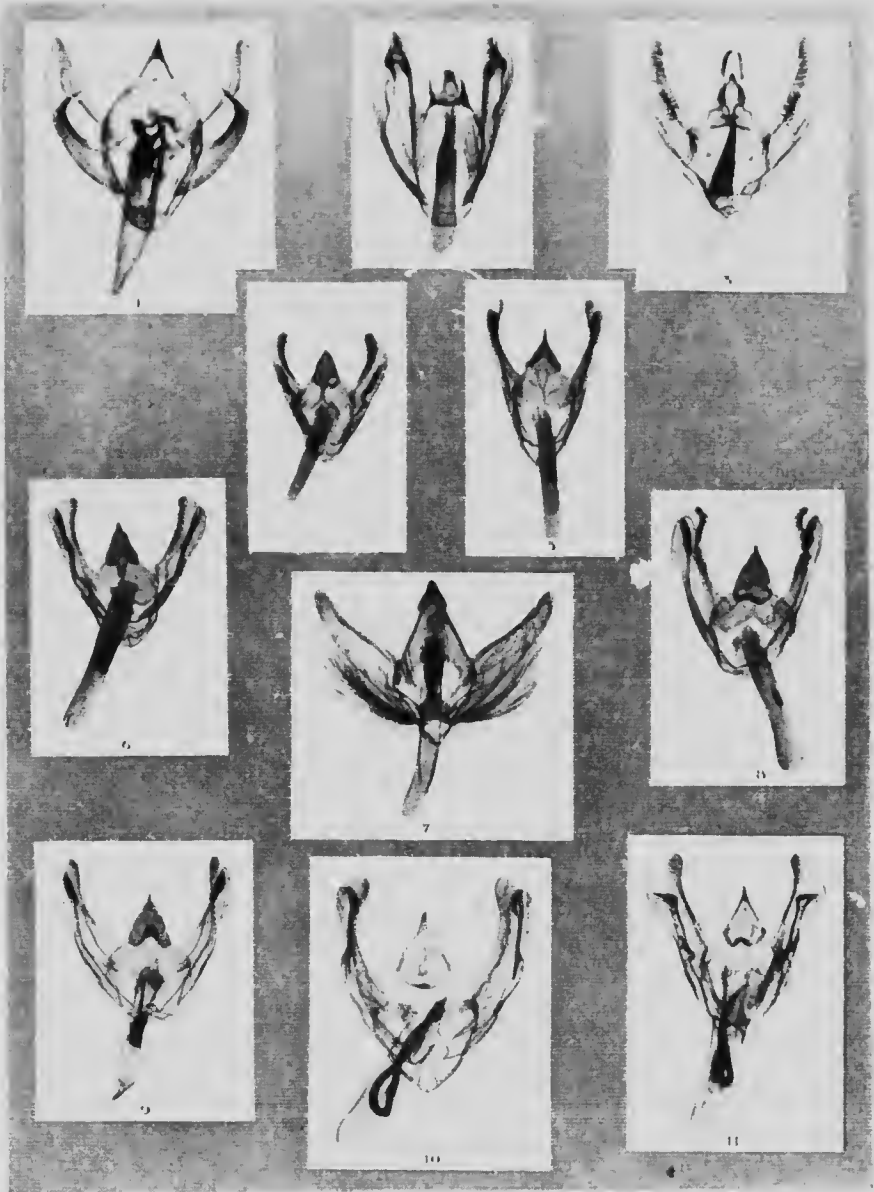
1. Male genitalia of *Galenara glaucaria* Grossb.
2. " *Carpoides lineata* Hbst.
3. " *Galenara bisaria* Grt.
4. " *Merisica querc* Hbst.
5. " *Parapheromia configurata* Hbst.
6. " *Parapheromia configurata falsata* McD.
7. " *Merisica spododa* Hbst.
8. " *Parapheromia lichentaria* Pears.
9. " *Xcodleis californiana* Pack.
10. " *Cleora matulda* Grossb.
11. " *Merisica perpietaria* B. & McD.
12. " *Cleora sabulotaria* Gn.





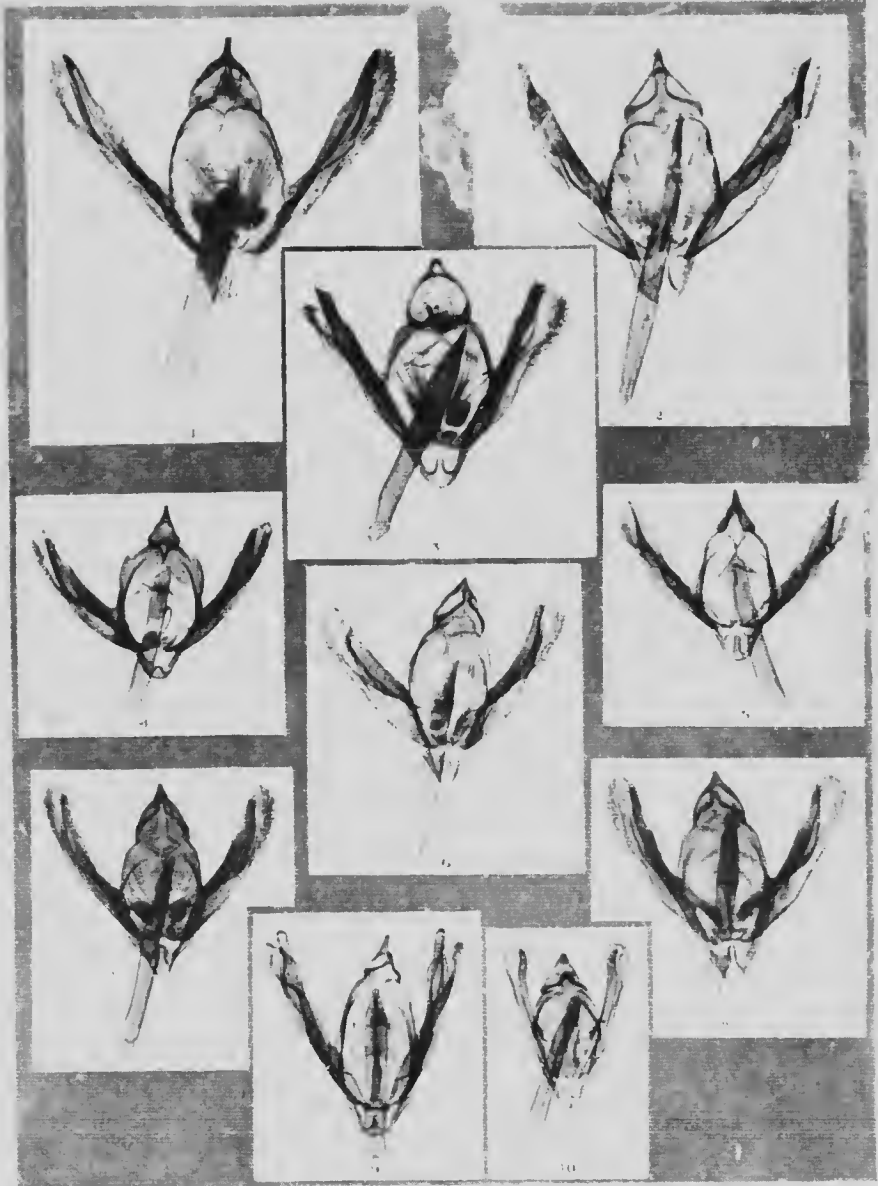
## PLATE III.

1. Male genitalia of *Utracis latipennis* Hist.
2. " *Protobuarcia porclara* Gu.
3. " *Pseudobuarcia androsaria* Hbn.
4. " *Glana coquatarea* Hbn.
5. " *Glana quinqueclimaria* Pack.
6. " *Glana cribralata* Gu.
7. " *Ectropus ex pascularia* Hill.
8. " *Glana nigricaria* B. & McD.
9. " *Glana rusticaria* B. & McD.
10. " *Glana fuscicaria* H.
11. " *Glana perata* Swett.



## PLATE IV.

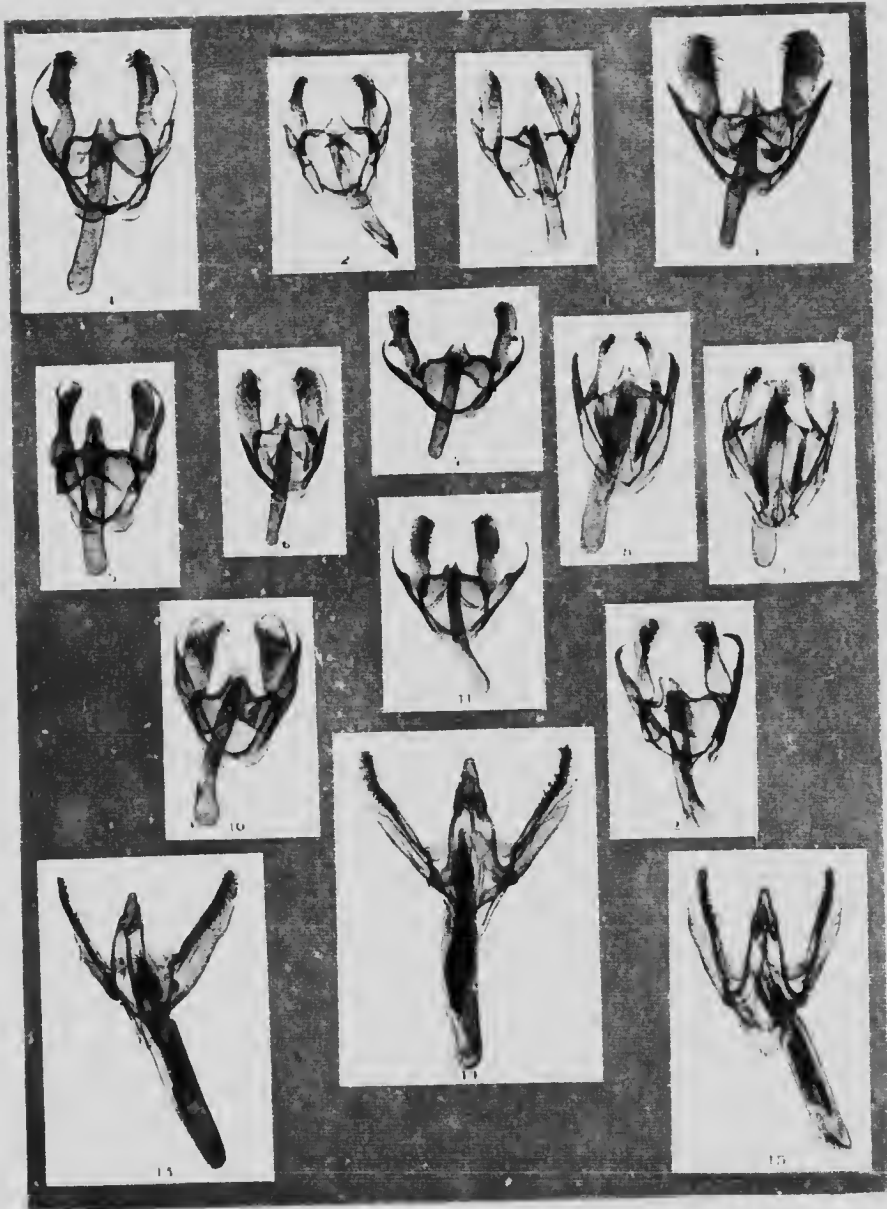
1. Male genitalia of *Stenoporpia purpuraria* B. & McD.
2. " *Stenoporpia danarum* B. & McD.
3. " *Stenoporpia umellala* B. & McD.
4. " *Stenoporpia dissimaria* Hbst.
5. " *Stenoporpia anastomiasaria* Grossl.
6. " *Stenoporpia satyriata* B. & McD.
7. " *Stenoporpia albescens* Hbst.
8. " *Stenoporpia dejecta* Hbst.
9. " *Stenoporpia polygrammaria* Pack.
10. " *Stenoporpia palehalla* Grossl.



## PLATE V.

1. Male genitalia of *Anacamptodes reticulata* Illst.
2. " *Anacamptodes fumaria* Gn.
3. " *Anacamptodes daturin* Grt.
4. " *Anacamptodes ephyraria* Wlk.
5. " *Anacamptodes obliquaria* Grt.
6. " *Anacamptodes planosaria* Pack.
7. " *Anacamptodes pregracilis* Illst.
8. " *Anacamptodes laccaria* Gn.
9. " *Anacamptodes rufusculata* Dyar.
10. " *Anacamptodes fragilaria* Grossb.
11. " *Anacamptodes jacubarin* Dyar.
12. " *Anacamptodes defectaria* Gn.
13. " *Vitriocla paupinaria* Gn.
14. " *Vitriocla adductaria* Grossb.
15. " *Vitriocla ocularia* B. & McD. (dorsal view).

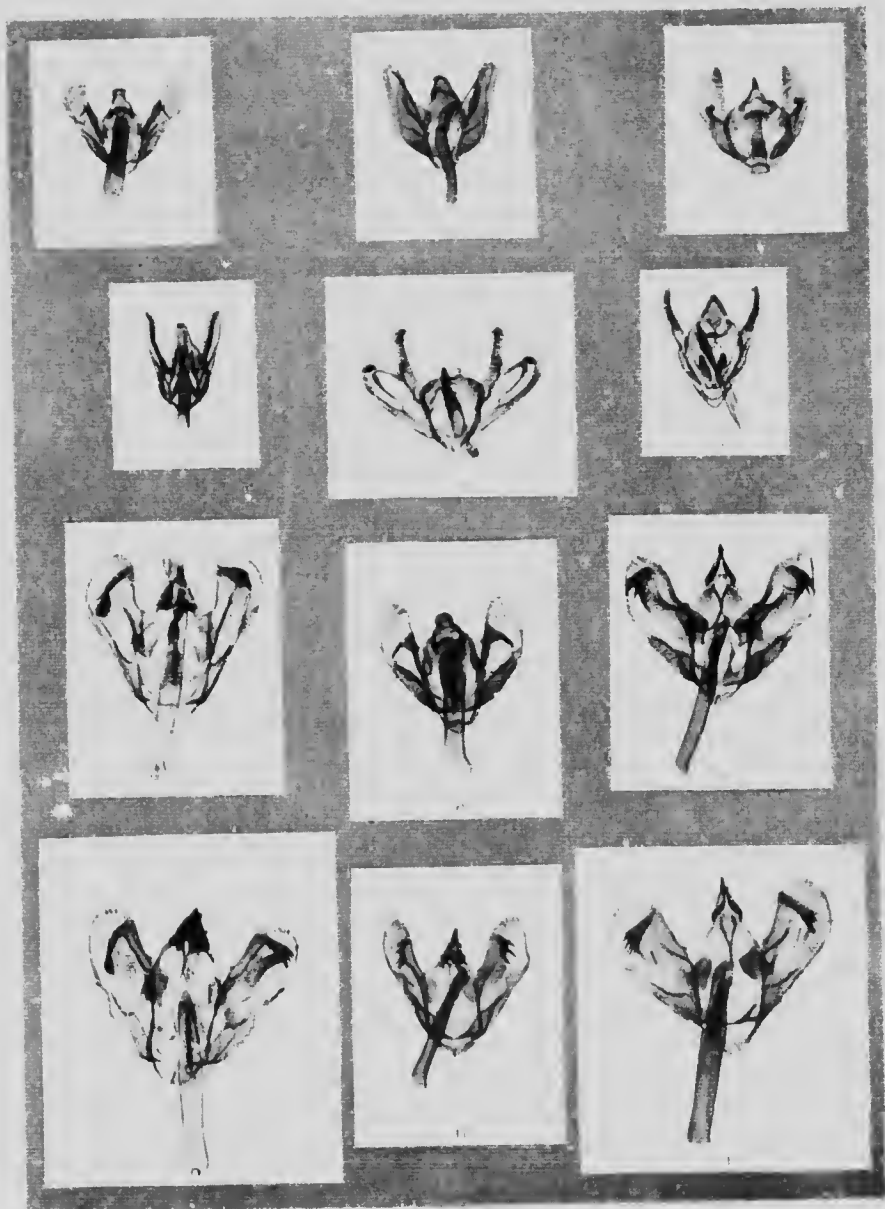
PLATE V.



## PLATE VI

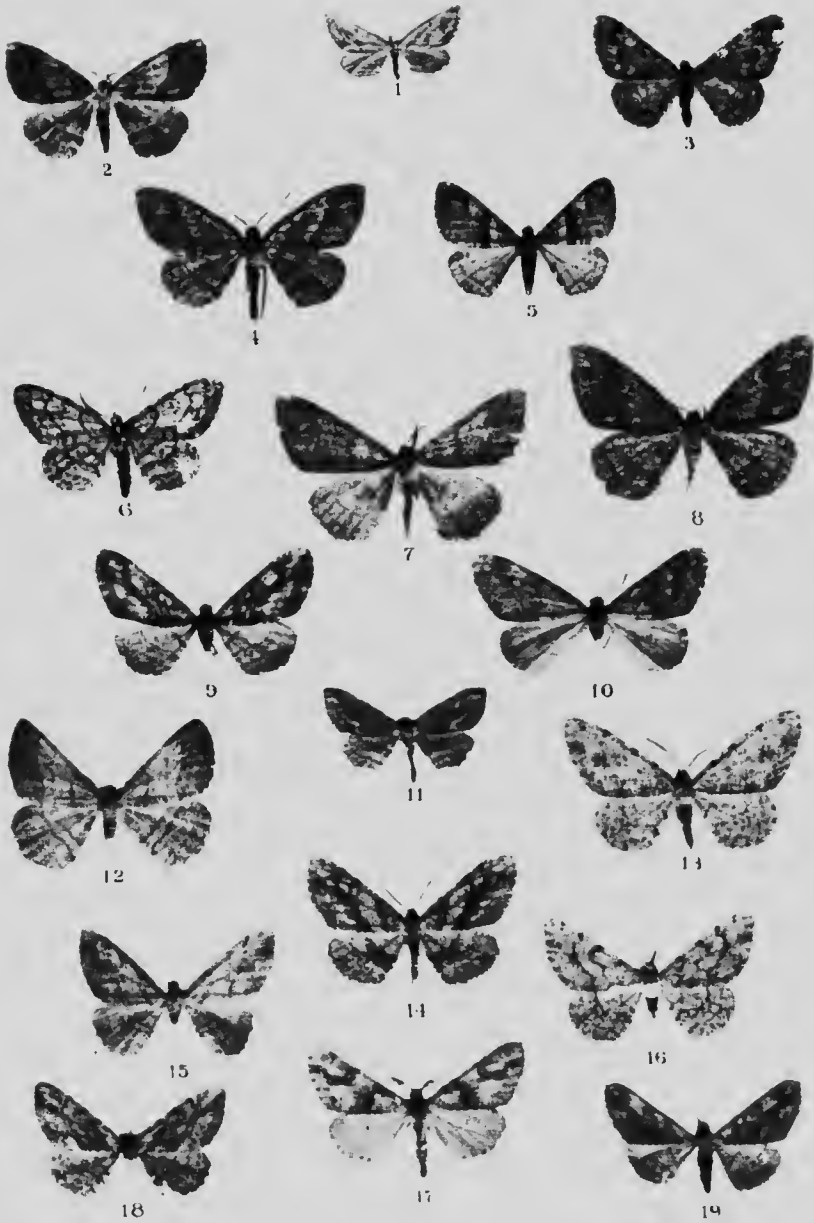
- |     |  |
|-----|--|
| 1.  | Male genitalia of <i>Halstina areolaris</i> Illst. |
| 2.  | " <i>Halstina incanspicua</i> Illst.               |
| 3.  | " <i>Neptalata emarginata</i> Pears.               |
| 4.  | " <i>Aethaloida packardiana</i> Illst.             |
| 5.  | " <i>Aethaloida antecaria</i> Wlk.                 |
| 6.  | " <i>Gibboides leucaria</i> Illst.                 |
| 7.  | " <i>Pterolata nevadensis</i> Sw. et.              |
| 8.  | " <i>Halstina furcata</i> Illst.                   |
| 9.  | " <i>Pterolata scrutator</i> B. & McD.             |
| 10. | " <i>Pterolata curiosa</i> Illst.                  |
| 11. | " <i>Pterolata agestaria</i> Grosh.                |
| 12. | " <i>Pterolata melanocarpa</i> Swett.              |





## PLATE VII.

- |   |                            |
|---|----------------------------|
| 1. <i>Hulstina inconspicua</i> Hulst., ♀                      | San Diego, Calif.          |
| 2. <i>Melanolophia signataria</i> Wlk., ♂                     | Ottawa, Can.               |
| 3. <i>Parapheromia lichenaria</i> Peurs., ♀                   | Paradise, Ariz.            |
| 4. <i>Melanolophia imperfectaria</i> Wlk., ♂                  | San Benito, Texas.         |
| 5. <i>Merisna spolodia</i> Hulst., ♀                          | White Mts., Ariz.          |
| 6. <i>Protoharmia parecharia indentaria</i> Wlk., ♀           | Ottawa, Can.               |
| 7. <i>Melanolophia centralis</i> McD., ♀ (Paratype)           | Glenwood Spgs., Colo.      |
| 8. <i>Melanolophia imitata</i> Wlk., ♂                        | Wellington, B.C.           |
| 9. <i>Parapheromia configurata falsata</i> McD., ♀ (Paratype) | Santa Catalina Mts. Ariz.  |
| 10. <i>Galenara glaucaria</i> Grossb., ♀                      | Redington, Ariz.           |
| 11. <i>Aethaloida packardaria</i> Hulst., ♀                   | San Diego, Calif.          |
| 12. <i>Ultraleis latipennis</i> Hulst., ♀                     | Duncan, B.C.               |
| 13. <i>Glens farfararia</i> Hulst., ♂                         | Palmerlee, Ariz.           |
| 14. <i>Stenoporpia anastomusaria</i> Grossb., ♀               | Palmerlee, Ariz.           |
| 15. <i>Pterotaen neocambi</i> Swett, ♀                        | San Bernardino Mts., Ariz. |
| 16. <i>Glens perata</i> Swett, ♀                              | Palmerlee, Ariz.           |
| 17. <i>Vinemina opacaria</i> Hulst., ♀                        | Paradise, Ariz.            |
| 18. <i>Anacamptodes dataria</i> Grt., ♀                       | Redington, Ariz.           |
| 19. <i>Parapheromia configurata</i> Hulst., ♀                 | White Mts., Ariz.          |



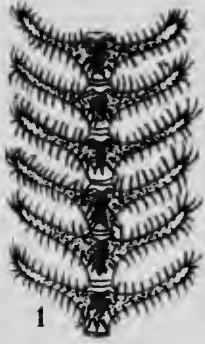
## PLATE VIII.

- |   |                                  |
|---|----------------------------------|
| 1. <i>Glenodes texanaria</i> Hulst. ♂       | Kerrville, Tex. (Coll. Barnes).  |
| 2. <i>Stenoporpia albescens</i> Hulst. ♂    | Wellington, B.C.                 |
| 3. <i>Anacamptodes emaculata</i> Dyar. ♂    | Wellington, B.C.                 |
| 4. <i>Stenoporpia excelsaria</i> Stkr. ♂    | Wellington, B.C. (Coll. Barnes). |
| 5. <i>Anacamptodes jacambaria</i> Dyar. ♂   | San Diego, Calif. "              |
| 6. <i>Hulstina formosata</i> Hulst. ♂       | Eureka, Utah "                   |
| 7. <i>Anacamptodes pergracilis</i> Hulst. ♂ | Venice, Fla.                     |
| 8. <i>Stenoporpia dissimaria</i> Hulst. ♂   | Piedra, Colo. (Coll. Barnes).    |
| 9. <i>Anacamptodes defectaria</i> Gn. ♂     | Brownsville, Tex.                |
| 10. <i>Anacamptodes ephyrcaria</i> Wlk. ♂   | Menck Lake, Que.                 |
| 11. <i>Melicisca grueca</i> Hulst. ♂ (Type) | Colorado (Coll. Barnes).         |
| 12. <i>Stenoporpia dejecta</i> Hulst. ♂     | Truckee, Calif. (Coll. Barnes).  |



## PLATE IX.

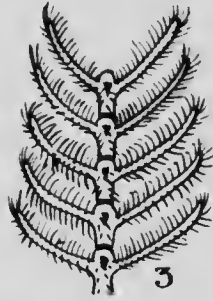
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|----|----------------------------------|--------------------------|--|
| 1. | Central segments of ♂ antenna of | <i>Merisena gracilis</i> | Hbst.                                  |
| 2. | "                                | "                        | <i>Merisna spodioca</i> Hbst.          |
| 3. | "                                | "                        | <i>Paraphromia lichénaria</i> Pears.   |
| 4. | Apical                           | "                        | <i>Galenara lallata</i> Hbst.          |
| 5. | Central                          | "                        | <i>Anacamptodes ephyraria</i> Wlk.     |
| 6. | "                                | "                        | <i>Utraleis latipennis</i> Hbst.       |
| 7. | "                                | "                        | <i>Pseudoboutemion ambrosaria</i> Hbn. |
| 8. | "                                | "                        | <i>Cleora sublanaria</i> Gn.           |
| 9. | "                                | "                        | <i>Neocalcis californiaria</i> Pack.   |



1



2



3



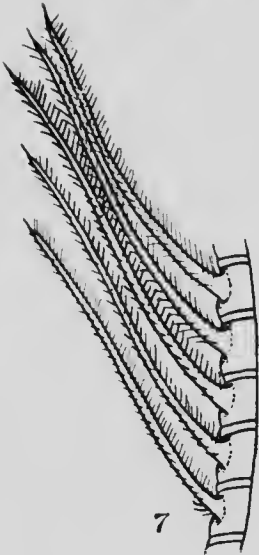
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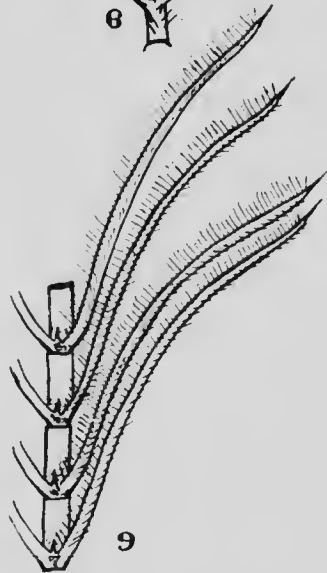
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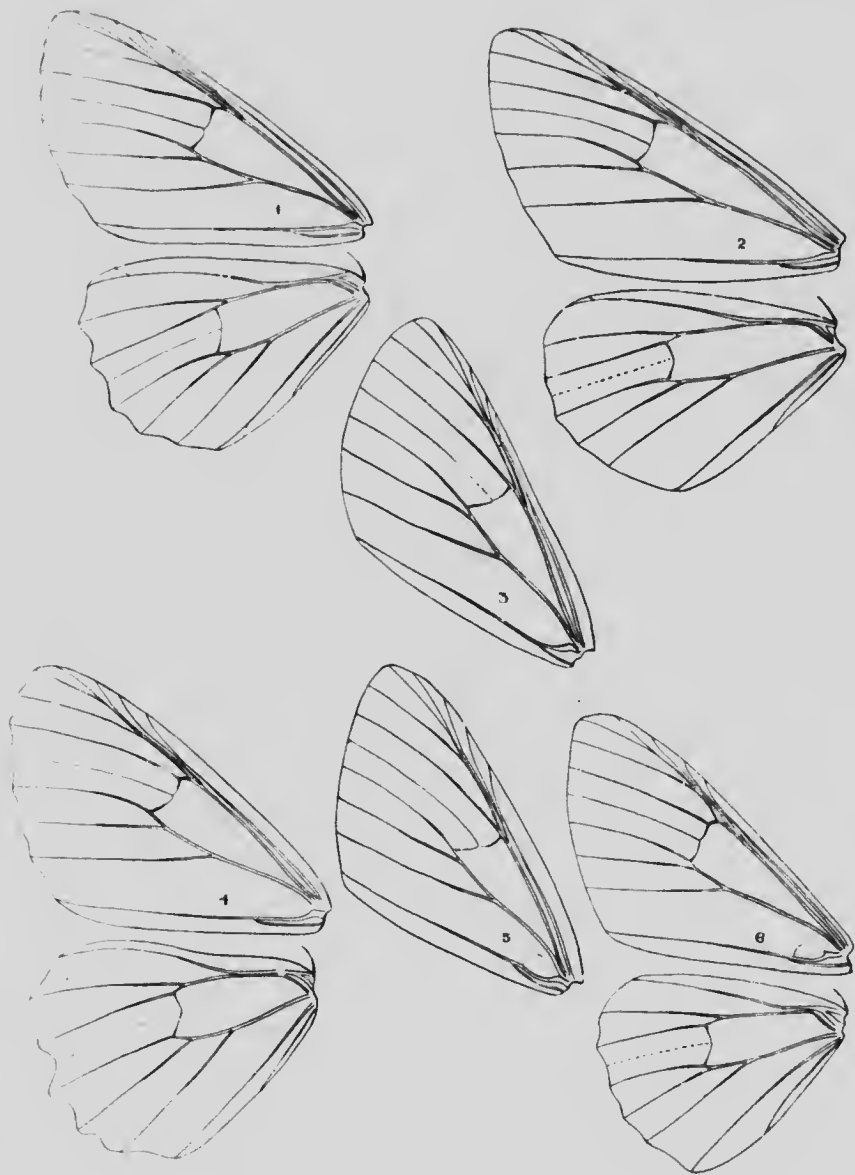
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## PLATE X.

1. Venation of fore and hind wings of *Melanolophia canadaria* Gn.
2. " " " " *Galnara lizaria* Grt.
3. " fore wing of *Pseudoboarmia umbrosaria* Hbn.
4. " fore and hind wings of *Neoleis californiaria* Pack.
5. " forewing of *Protoboarmia porcellaria* Gn.
6. " fore and hind wings of *Cleora subannaria* Gn.

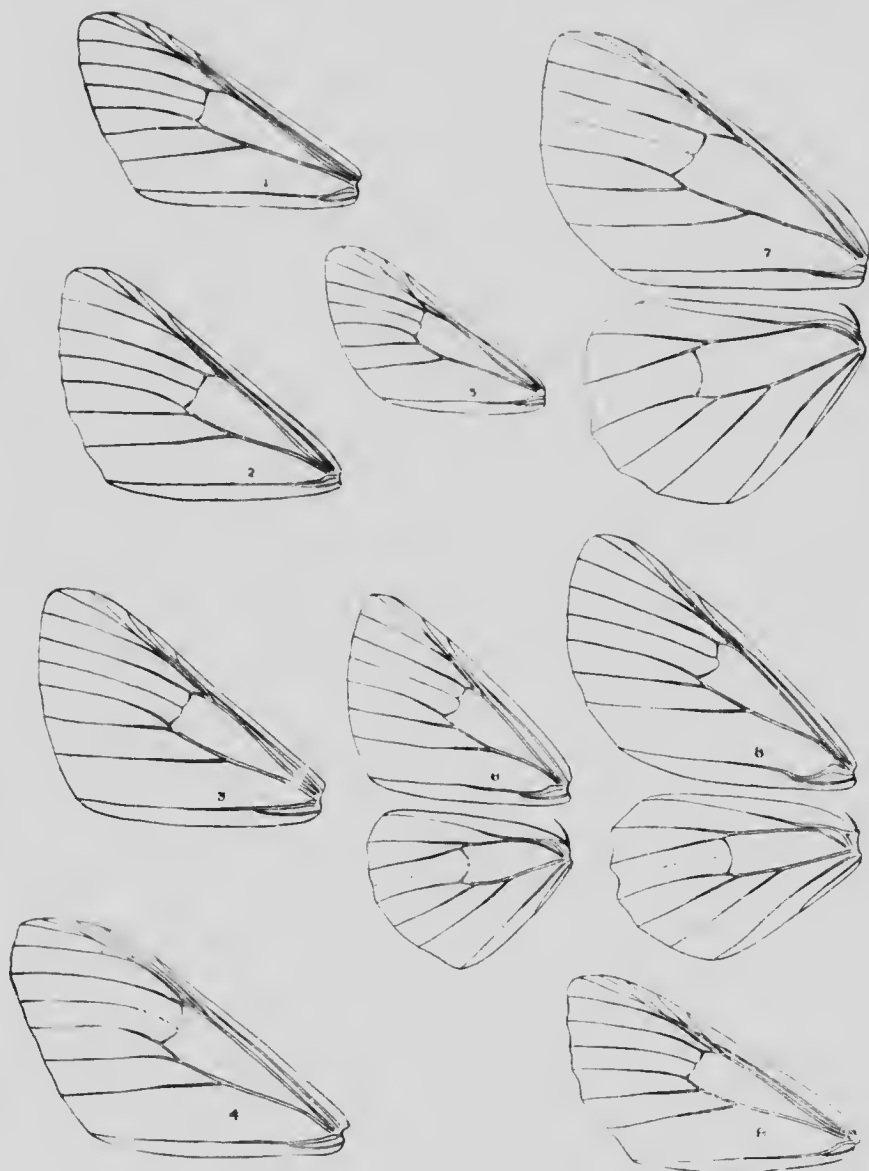


PLATE X.



## PLATE XI.

1. Venation of forewing of *Paraphronia rodfigurata* Hbst.
2. " " *Paraphronia helenaria* Pears.
3. " " *Melicisma spulohia* Hbst.
4. " " *Acirrisca graeca* Hbst.
5. " " *Nepterota no moriata* Pears.
6. " fore and hindwings of *Glena cognataria* Hbn.
7. " " *Ectropis cepascalaria* Schiff.
8. " " *Vitrinella pampinaria* Gn.
9. " fore wing of *Acthaloia packardaria* Hbst.





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