

## The Male Genitalia of the New Zealand Lyonetiidae.

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MODERN systematists are not in agreement as to the rank of the group of Lepidoptera here dealt with. For instance, Meyrick (4), Comstock (1), and Forbes (2) treat it as a family; Tillyard (7) reduces it to subfamily rank, while Imms (3) would apparently follow the earlier opinion of Meyrick and not recognize even subfamily status. For the purpose of the present paper, however, the exact systematic value of the group is of little importance. The New Zealand genera are too few and too little representative to base conclusions of much value upon, even on a survey of the whole of the characters, while in the case of the male genitalia a confusing position arises from the extraordinary generic differences present, some groups having the parts of ordinary structure and simplicity while others exhibit the most intricate complexity, a complexity made still more difficult of comprehension by the absence of symmetry.

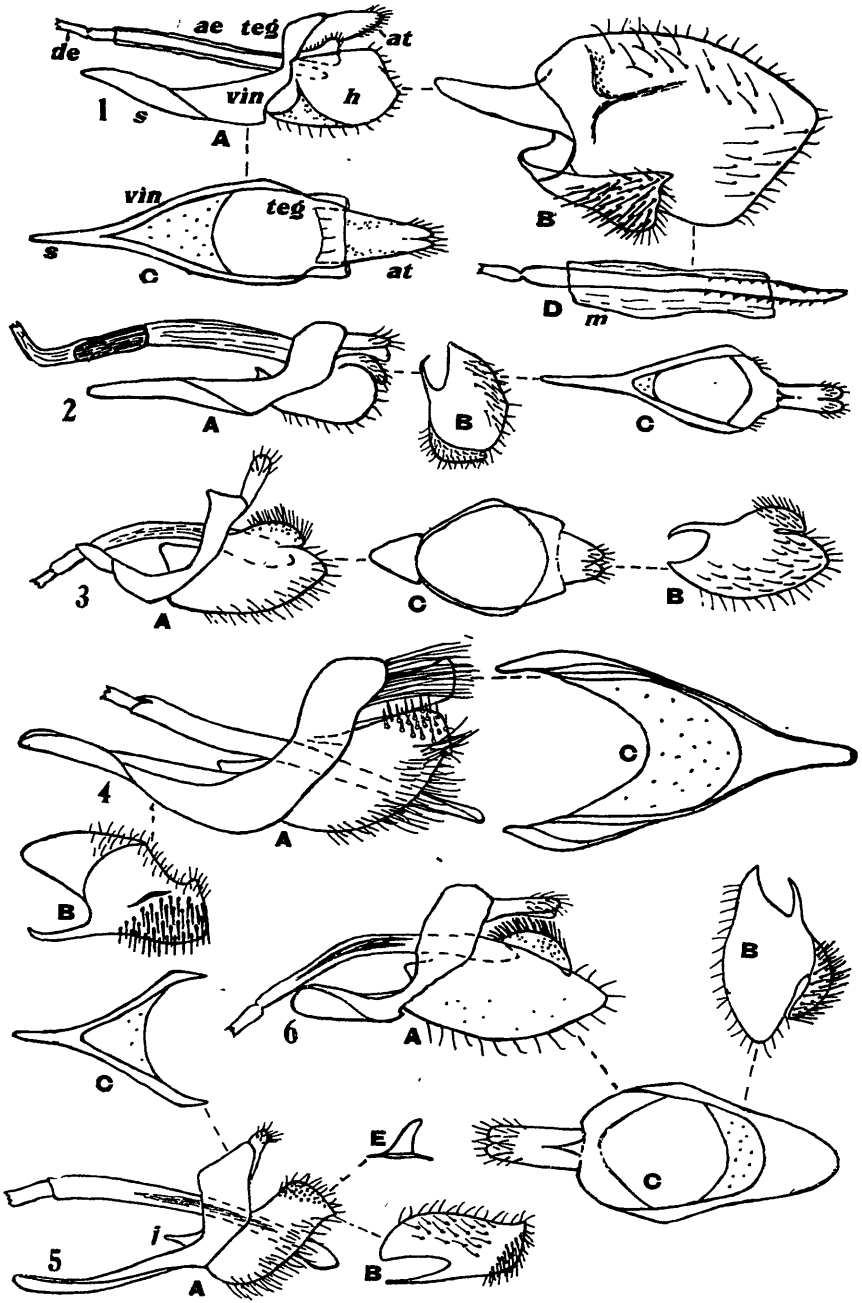
In this connection, however, the writer would suggest that one at least of the most specialized genera, i.e. *Dryadaula*, belongs to the Tineidae proper, the genitalia characters pointing to a close affinity with *Sagephora*. In creating the genus *Dryadaula* Meyrick (5) followed this course but in more recent work he has assigned the genus to the Lyonetiidae.

The Lyonetiidae are represented in New Zealand by 30 species—only 18 of which have been available for examination. Of these 30 species, one, *Bedellia somnulentella* Z., is a cosmopolitan form, while three others, *Cateristis eustyla* Meyr., *Opogona comptella* Walk., and *Hieroxestis amoscopa* Meyr. are common to Australia and New Zealand. The species studied below fall into two well defined sections, those with simple genitalia and those in which the organs are highly specialized. The former group will be considered first.

### **Erechthias** (Figs. 1 to 6).

Eleven New Zealand species have been described. Though the genus is well represented in Australia all the New Zealand forms are endemic.

Tegumen fused with vinculum but area of fusion not strongly chitinized. A true uncus is not present, but the anal tube, which extends some distance beyond the tegumen, is protected dorsally, and to some extent laterally, by a membranous shield, which is usually divided into two small lobes apically. A few short hairs clothe these lobes and there are generally lateral fringes of rather long hairs. This description applies to most of the genera at present under consideration. In most species the vinculum has a rather long and narrow saccus but in *E. fulguritella* Walk. and *E. macrozyga* Meyr. it



FIGS. 1-6.

is shorter and broader. Harpes broad, leaf-like, usually with curved densely spined costal lobe, which may be variously situated from apex to base. Juxta a plain folded triangular plate. Aedeagus thin, fairly long, slightly curved, sometimes with apical longitudinal series of small barbs.

The genitalia of this and the following genus closely approach the simpler types of the Tineidae, e.g., *Prothnodes*.

### **Hectacma** (Figs. 7 to 9).

A small endemic genus of five species.

The three species examined were found to be very consistent in genitalia characters, differing from each other in minor details only. The general plan closely follows that of *Erechthias*, but the vinculum is shorter and broader, the juxta more rounded and the aedeagus shorter and more strongly curved.

### **Bedellia** (Fig. 10).

Of this small but widely spread genus there are two species on the New Zealand list, one being endemic and the other, *B. somnulentella* Z., accidentally introduced. Only the latter species has been available for dissection.

Tegumen narrow, weak, fused with vinculum, which is broad, deep and strongly chitinized. Attached to the distal margins of the vinculum is a pair of membranous flaps bearing a dense tuft of long hair-scales which project caudally considerably beyond the large harpes. Harpes long, broad, obliquely truncate on lower apical angle. Aedeagus moderate, thin.

### **Opogona** (Fig. 11).

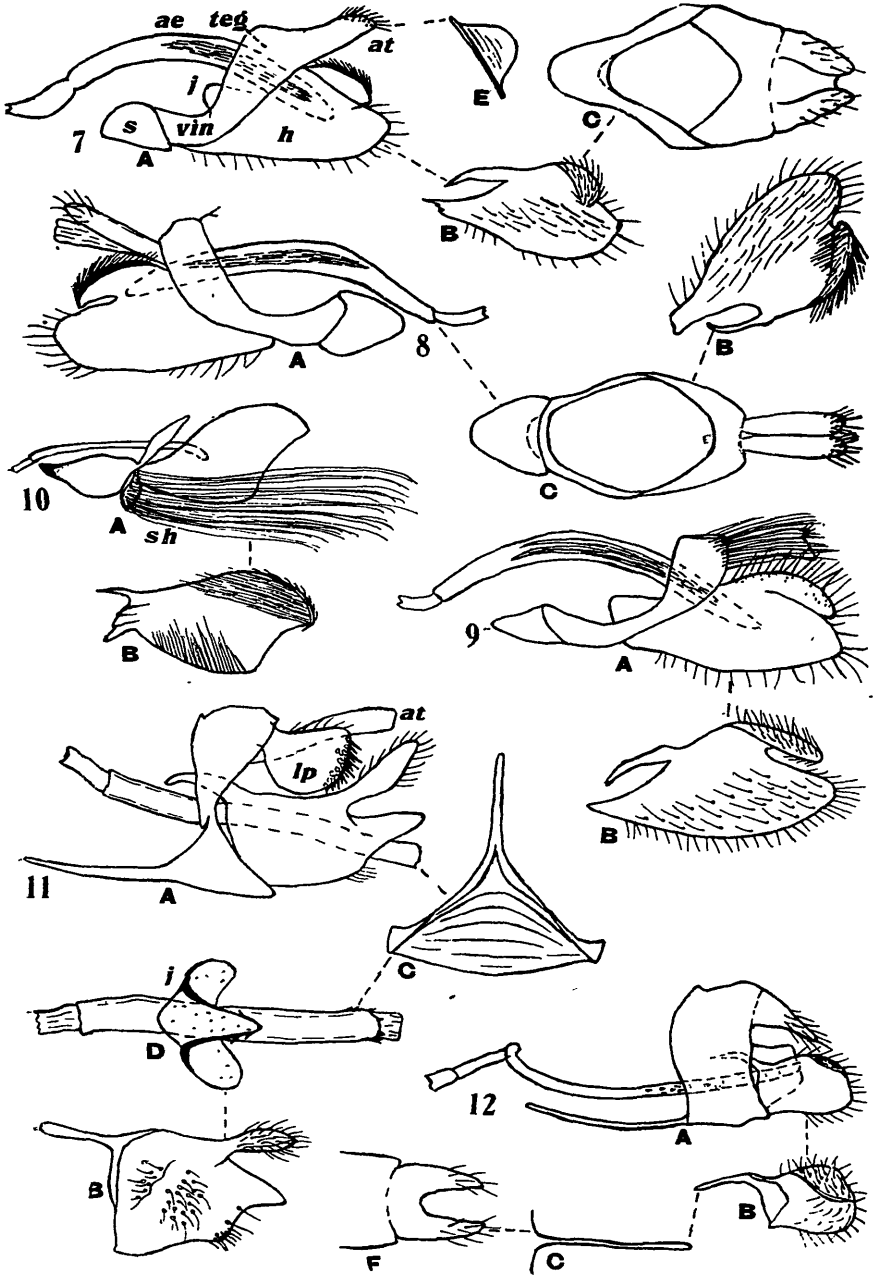
No endemic members of this genus have been found in New Zealand. The Australian *O. comptella* Walk. has been accidentally introduced.

Tegumen like that of *Hieroxestis omoscopa* Meyr. (see below), except that the uncal region is strongly emarginate. A similar pair of lateral flaps project distally but they are more firmly and broadly attached basally. They are not continuous with the margin but rise

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(Lettering: a, anus; ae, aedeagus; ap, apical plates of tegumen; at, anal tube; c, colon; de, ductus ejaculatorius; h, harpe; j, juxta; lh, left harpe; lp, lateral process of tegumen; m, manica; mc, membranous curtain beneath anal tube; rh, right harpe; s, saccus; sh, brush of sensory hairs beyond vinculum; teg, tegumen; u, uncus; vin, vinculum.)

- FIG. 1.—*Erechthias hemichlistra* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, tegumen and vinculum. D, aedeagus.  
 FIG. 2.—*E. externella* Walk. A, male genitalia, lateral view. B, harpe, from within. C, tegumen and vinculum.  
 FIG. 3.—*Erechthias macrozyga* Meyr. A, male genitalia, lateral view. B, harpe, from within. C, tegumen and vinculum.  
 FIG. 4.—*E. acrodina* Meyr. A, male genitalia, lateral view. B, harpe, from within. C, vinculum.  
 FIG. 5.—*E. choraadota* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, vinculum. E, juxta.  
 FIG. 6.—*E. fulguritella* Walk. A, male genitalia, lateral view. B, harpe, inner view. C, tegumen and vinculum.



FIGS. 7-12.

from just within it, that is to say, from the position of the normal gnathos, with which organ they may be homologous. Vinculum fused with tegumen but junction very apparent. Harpes broad, divided into sacculus and cucullus of about equal length. Aedeagus moderate, fairly stout, apically barbed. Juxta closely embracing aedeagus, a cone with a few apical barbs and a pair of rounded lateral pieces.

### **Hieroxestis** (Figs. 12 and 13).

Two species are found in New Zealand, one, *H. hapsimacha* Meyr., being endemic, and the other, *H. omoscopa* Meyr., being found in Africa and also in Australia, from which latter country it has probably been introduced into New Zealand. The genitalia are so entirely different that it becomes necessary to describe each species separately.

**H. omoscopa** Meyr. Tegumen with short broad uncus, fused with vinculum but greatly constricted at point of union. On the dorso-lateral area are a pair of large, somewhat rounded chitinous flaps, their distal margins beneath being armed with several rows of short thick spines. These flaps are only chitinously connected with the tegumen narrowly at their upper angles, but have slight membranous attachment at their lower corners; the structures are very freely moveable. In all probability these organs fulfil the functions of surgonopods, but it is doubtful if they can be regarded as homologues of such structures, which are direct outgrowths of the lateral distal margins of the tegumen. The saccus is short and very broad, though appearing to be less broad than it is owing to the curving of its margins. Aedeagus short, thin, pointed. Harpes with short sacculus a long cucullus. Beneath the anal tube there is a membranous curtain or semisheath, tending to become more chitinous on the meson.

**H. hapsimacha** Meyr. Tegumen with deeply bifid uncus, very broad and passing into equally broad vinculum without constriction; saccus very long and thin. Aedeagus very long and thin. Juxta a plain folded plate. Harpes without cleft, short and broad.

It will be noted that there is hardly a feature in common between the foregoing two species of *Hieroxestis*. In describing *hapsimacha* Meyrick (6) erected for its reception the genus *Amphixystis*, but he afterwards treated this new genus as a synonym of *Hieroxestis*. In

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- FIG. 7.—*Hectacma chionodira* Meyr. A, male genitalia. B, harpe, inner view. C, tegumen and vinculum. E, juxta.
- FIG. 8.—*H. stilbella* Dbl. A, male genitalia, lateral view. B, harpe, from within. C, tegumen and vinculum.
- FIG. 9.—*H. chasmatis* Meyr. A, male genitalia, lateral view. B, harpe, from within.
- FIG. 10.—*Bedellia somnulenta* Z. A, male genitalia, lateral view. B, harpe, from within.
- FIG. 11.—*Opogona comptella* Walk. A, male genitalia, lateral view. B, harpe, from within. C, vinculum. D, aedeagus and juxta.
- FIG. 12.—*Hieroxestis hapsimacha* Meyr. A, male genitalia, lateral view. B, harpe, from within. C, saccus. F, uncus.

view of the general dissimilarity in the male genitalia it becomes a question whether the discarded genus should not be restored. As however, I am unacquainted with the other species of *Hieroxestis* I do not here propose to make any change.

### **Eschatotypa** (Figs. 14 and 15).

An endemic genus containing two species.

The genitalia are very complicated and difficult to understand. The two species differ in details but the general structure is much the same. The seventh and eighth segments are modified and must therefore be taken into account. The seventh sternite is slightly asymmetrical and has the posterior margin deeply and widely indented. The eighth tergite is long and is sharply bent downwards at about one half, the effect being to make it scoop-shaped. Within these sclerites, but not wholly covered by them, lie the eighth sternite and the genitalia proper. The tegumen is extraordinarily modified, no part answering to uncus or gnathos being present, and the lateral arms, which are directed very obliquely basad, bear a complicated series of stays or bands. On the dorso-lateral areas are a pair of spine-covered plates; possibly these may function in some degree as harpes, there being no trace of these latter organs. The vinculum is represented by a pair of smooth weak quadrangular plates, fused to the apical portion of the lateral arms of the tegumen and directed more or less obliquely towards the meson. The eighth sternite is strongly chitinized and appears to take up the position and function ordinarily assumed by the vinculum. Its distal end is broadly expanded and provided with various asymmetrical protuberances, while basally it is divided into two long arms which are attached at their extremities to the arms of the tegumen. It projects beyond the other parts of the genitalia, taking up the normal position of the harpes. Lying within the arms of the tegumen are the anal tube and the aedeagus, the latter being a strongly curved thin spring-like structure having associated with it certain parts which may represent the much modified juxta and anellus. In *E. melichrysta* Meyr. the aedeagus, though following the same general semicircular curve as in *E. derogatella* Walk., is curiously bent at several points. The association of the colon with the aedeagus is quite unusual, its almost invariable position being beneath the dorsal area of the tegumen.

It is interesting to note, in view of the total absence of the harpes in the male, that the seventh segment in the female, within which the eighth and ninth are normally withdrawn, has the sternite divided into two harpe-like lobes. It is possible that these structures may, in some degree, act as substitutes for the harpes of the male.

### **Eugennaea** (Fig. 16).

The genitalia of this monotypic endemic genus are asymmetrical and highly specialized. When in a normal position they occupy about half of the abdomen, extending back into the fifth segment. Owing to their extreme modification it is with difficulty that the various parts can be made out. The tegumen is asymmetrical; at its

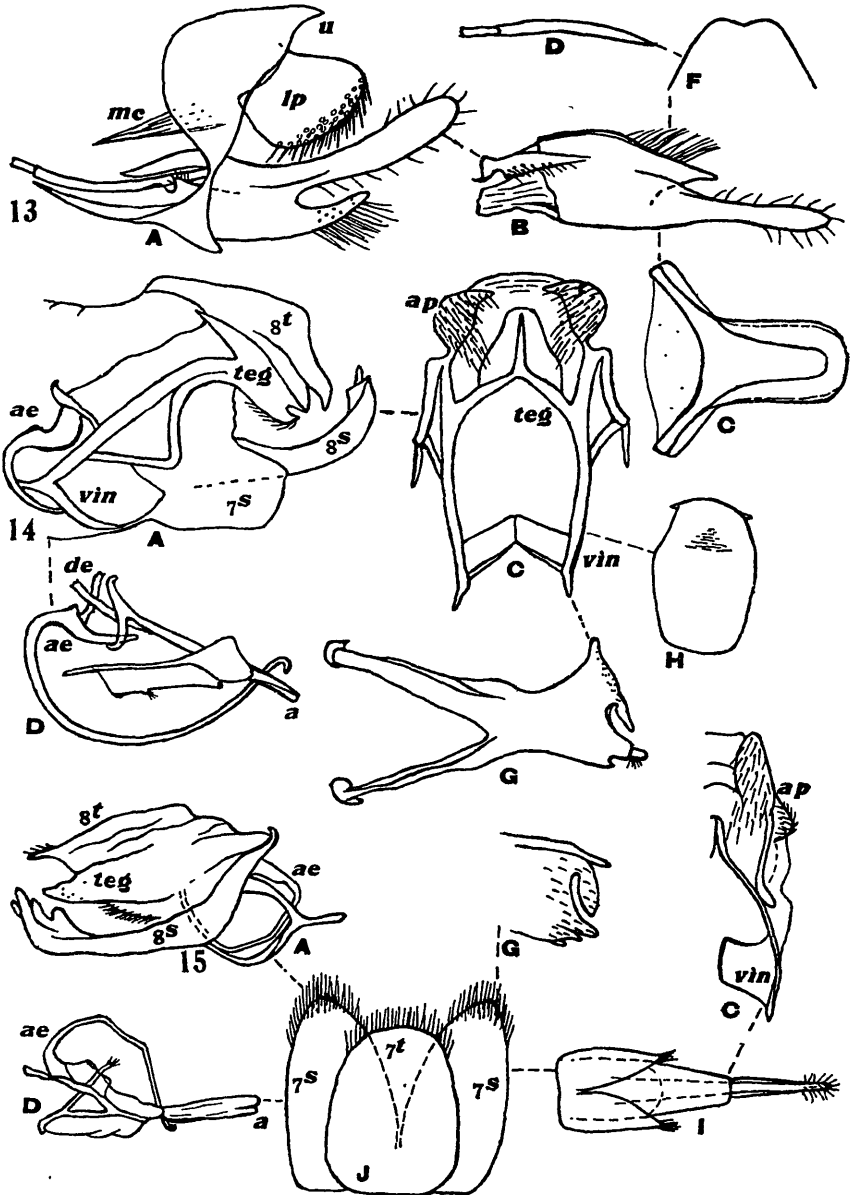
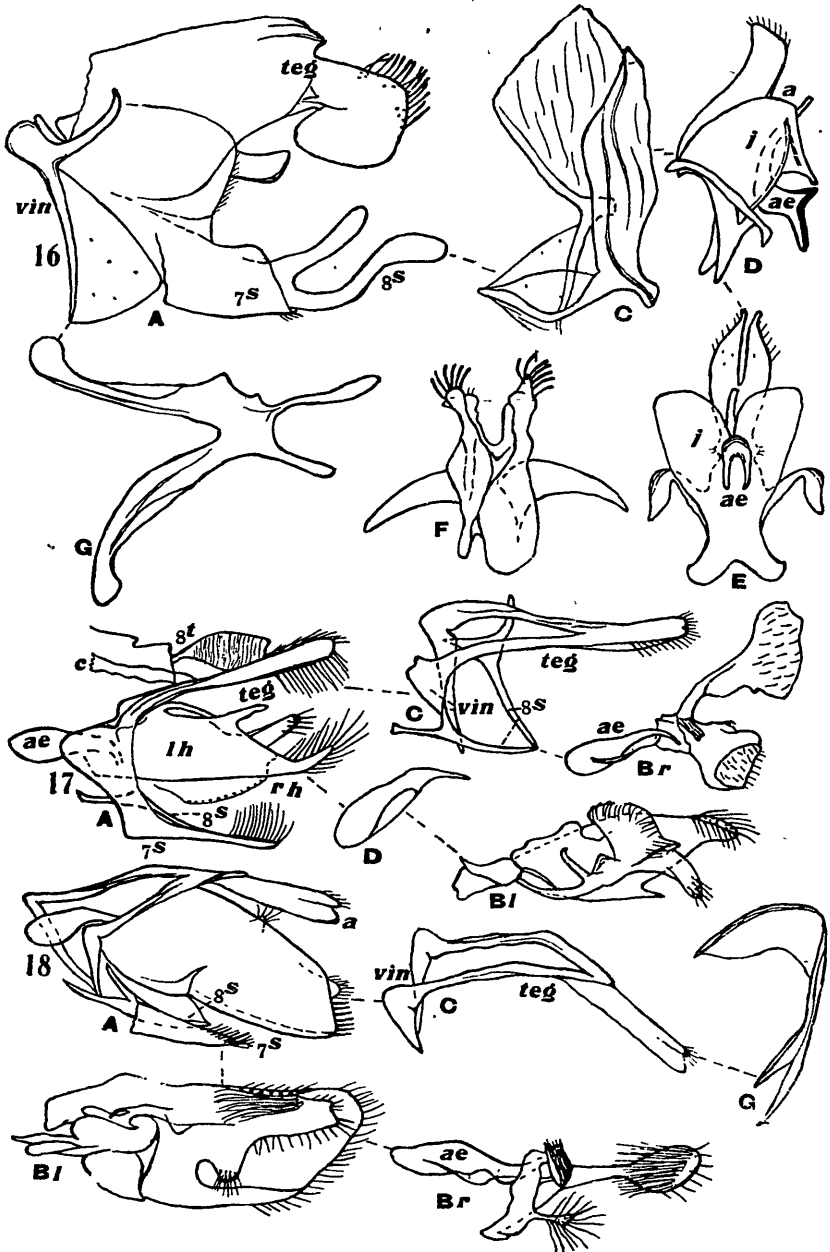


FIG. 13.—*H. omoscopa* Meyr. A, male genitalia, lateral view. B, harpe, from within. C, vinculum. D, aedeagus. F, uncus.

FIG. 14.—*Eschatotypa derogatella* Walk. A, male genitalia, lateral view. C, tegumen and vinculum. D, aedeagus and attachments. G, eighth sternite. H, eighth tergite.

FIG. 15.—*E. melchrysa* Meyr. A, male genitalia, lateral view. C, tegumen and vinculum, right half. D, aedeagus and attachments. G, eighth sternite, apical portion. I, seventh segment of female with ovipositor extruded. J, seventh segment of female, enlarged.



FIGS. 16—18.

broad apex there are a pair of irregular quadrangular plates, margined dorsally and caudally with rather long narrow scales. Behind these plates is another pair, curved and pointed, and directed rectangularly outwards. The lateral arms of the tegumen are broad and fuse with the vinculum at a sharp angle, the arms of the latter bending in to meet on the meson, from which point to each angle there stretches a smooth sheet of stiff membrane, an arrangement somewhat similar to that in *Eschatotypa*. The eighth sternite forms an irregular strongly chitinous sclerite, consisting mainly of two basal and two apical prongs, both pairs being quite asymmetrical. The aedeagus and its attachments consist of a short and stout structure occupying a median basal position in relation to the rest of the genitalia. The aedeagus itself is short and strongly curved, its base being bifid. The juxta is relatively large and has two broad lateral flaps and a broad excised basal portion. Above the aedeagus is a chitinous plate which expands into a strongly bifid leaf-like structure apically, while basally it divides into two arms which are sharply angled downwards and embrace the whole organ laterally. The anal opening is above the apex of the aedeagus at the base of the leaf-like part noted above, a structural peculiarity shared with the preceding genus. No trace of the harpes is to be found, though possibly some of the parts surrounding the aedeagus may be the highly modified remains of these organs.

### **Dryadaula** (Figs. 17 and 18).

A small genus confined to Australia and New Zealand. The three New Zealand species are endemic.

It has been pointed out above that the genitalia characters of *Dryadaula* closely approach those of *Sagephora* (Tineidae). There seems to be little doubt that there is a real and close relationship between the two genera though they have been hitherto frequently placed in different families. The various organs connected with the genitalia in *Dryadaula* are extraordinarily modified, such modification extending to the sixth and seventh segments, which are reduced and of weak chitination. There is no true uncus and the anal tube, which projects far beyond the margin of the tegumen, is in a measure protected as described under *Erechthias*. The tegumen consists of a narrow band and is fused with the vinculum, which is also narrow; the point of union is marked by a sharp angle. Embracing the vinculum is another narrow and asymmetrical band of chitin with the left apex divided into two prongs (in *D. myrrhina* Meyr.

FIG. 16.—*Eugennaea laquearia* Meyr. A, male genitalia, lateral view. C, tegumen (apical portion removed) and vinculum. D, aedeagus and attachments, lateral view. E, juxta and aedeagus. F, apical part of tegumen. G, eighth sternite.

FIG. 17.—*Dryadaula myrrhina* Meyr. A, male genitalia, lateral view. Bl, left harpe, from within. Br, right harpe and aedeagus. C, tegumen, vinculum and eighth sternite, obliquely lateral view. D, aedeagus.

FIG. 18.—*D. pactolia* Meyr. A, male genitalia, lateral view. Bl, left harpe, from within. Br, right harpe, and aedeagus. C, tegumen and vinculum, obliquely lateral view. G, eighth sternite.

both apices are pronged); this is the modified eighth sternite. The left harpe, viewed from without, appears to be a broad scoop-shaped organ, with the margins fringed with spines on the apical half. When examined from within, however, a very intricate structure is seen to repose in the concavity of the outer part, a structure so complicated that to attempt a description would be futile. The right harpe is much smaller than the left, and though complex and quite different from the usual type it does not reach the extreme specialization of its fellow. The aedeagus, which is attached to the right harpe, is short and flask-shaped, its apical part being sharply bent.

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