The Male Genitalia of the New Zealand Plutellidae.

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INTRODUCTORY.

THE Plutellidae are usually considered to form a fairly well characterized family, though Forbes (*The Lepidoptera of New York and Neighbouring States.* Cornell University Memoir, 68, p. 337, 1923) prefers to treat the group as a subfamily of the Hyponomeutidae. The New Zealand representatives are but a fragmentary assemblage, but a study of the male genitalia shows that, on the whole, they exhibit certain well defined characters in common, and it is possible that the few striking exceptions may not have been correctly referred to the family.

The New Zealand Plutellids comprise 27 species, placed in 9 genera. All but two of the genera are endemic and all but three of the species. The non-endemic species belong to the genus *Plutella,* two of which, *P. sera* Meyr. and *P. psammochroa* Meyr., also occur in Australia, the remaining one being the cosmopolitan *P. maculipennis* Curt., without doubt accidentally introduced.

Usually the modification of the parts relative to the reproductive function extends to the eighth segment, sometimes to the seventh. In most instances the eighth segment is divided dorsally and ventrally and forms a pair of lateral flaps, between which lie the genitalia proper. Such flaps are not to be confused with the " coremata " of Pierce (*The Genitalia of the British Geometridae*); they are not pouch-like, but the simple results, modified a little in shape, of the dorsal and ventral splitting of the segment. Another fairly general character is the presence of a pair of lateral hair sacs attached to the vinculum. A pencil of hairs, usually long, is set in a shallow membranous pocket, the brush lying horizontally to the plane of the body with the tips projecting beyond the apices of the harpes. Probably these pockets are evertible so that the hairs, when functioning, are spread out in a radiating bunch. The harpes are, for the most part, entire and rather weakly chitinized, the supporting parts of the eighth segment rendering heavy chitinization unnecessary. The gnathos may be present or absent, and in no case is there an elaborate juxta.

Plutella Schrank.

A cosmopolitan genus, of which there are five species in New Zealand. Two of these, as noted above, are also found in Australia and one is the accidentally introduced world-wide pest, *P. maculipennis* Curt.

P. maculipennis Curt. (Fig. 1).

The tegumen is very small, consisting almost entirely of lateral pieces which bend round and embrace the anal tube, being partially fused at their apices beneath though free and forming a pair of small rounded lobes above. Vinculum fused with tegumen, moderate, with large saccus. Juxta a small plain folded plate. Aedeagus thin, rapier-like, entirely different from that of the other species. Harpes broad, entire, leaf-like, inner surface densely haired apically and with a small patch of stout, blunt erect spines near base; outwardly they bear, near the centre, a tuft of soft long hair. Hair sacs normal.

P. psammochroa Meyr. (Fig. 2).

Tegumen small, with small weak uncus and narrow lateral arms. Vinculum fused with tegumen, a strong caudal process and fairly long saccus. Gnathos a pair of thin processes with hairy apices, converging to meet on median line but not fusing; beneath these a flat quadrangular plate which is probably to be regarded as part of the gnathos. Aedeagus moderate in length, rather thin, apically dilated. Harpes large, entire, expanded apically, densely clothed within with weak hair on apical half. Hair sacs normal.

P. sera Meyr. (Fig. 3).

Tegumen weak; uncus absent. Vinculum fused with tegumen, narrow, with long thin saccus. Aedeagus long, moderately thick, cylindrical. Juxta absent. Harpes oblong, entire, inner surface thickly clothed on apical half with soft long hair and with a prominent central cone of shorter and coarser hair.

P. megalynta Meyr. (Fig. 4).

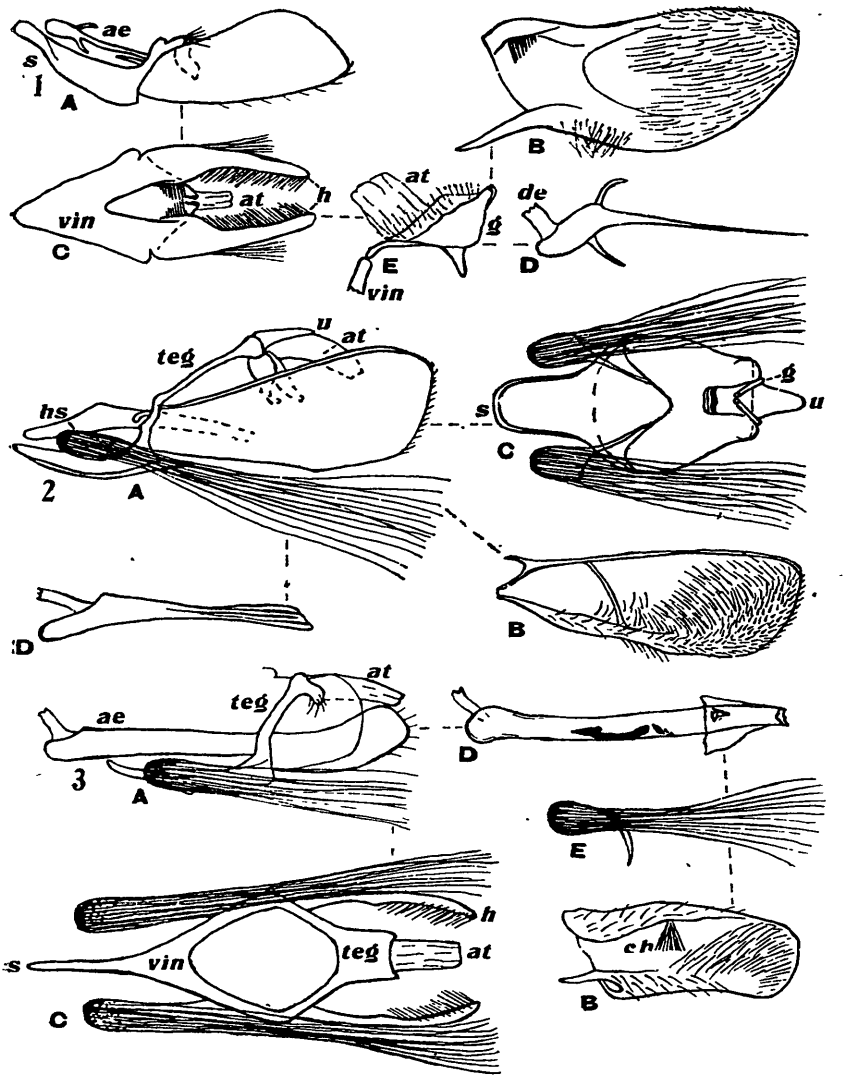
The male genitalia of *P. megalynta*—except for the eighth segment and the hair sacs, which are of the normal generic type—are very highly specialized. The tegumen, vinculum and harpes are solidly fused into a single strongly chitinized piece within which lies the large curved and sharply pointed aedeagus. On the dorsal line the part which I take to be the remains of the harpes is open down to the base, where the anal tube protrudes; on the ventral line there is complete fusion except at the apex, where there is a v-shaped cleft supporting the point of the aedeagus. No structures representing the gnathos or juxta can be made out, and the whole apparatus is a striking instance of specialization by reduction and fusion.

Circoxena Meyr.

Endemic and monotypic. The genitalia are highly specialized and depart widely from the ordinary Plutellid type.

C. ditrocha Meyr. (Fig. 5).

Genitalia very small. Tegumen broad, apex truncate, indented laterally just below apex. Gnathos a pair of clavate processes with rows of backwardly projecting barbules. Vinculum narrow, fused



LETTERING

(ae, aedeagus; at, anal tube; c, colon; ch, central cone of hair on harpes of *Plutella sera;* de, ductus ejaculatorius; fs, fused genitalia of *Plutella megalynta;* g, gnathos; h, harpe; hs, hair sac; j, juxta; ps, paddle-shaped scales on tegumen of *Orthenches porphyritis;* s, saccus; sg, surgonopod; teg, tegumen; u, uncus; vin, vinculum; 7, seventh segment; 8, eighth segment.)

FIG 1.—*Plutella maculipennis* Curt. A, male genitalia, lateral view. B, harpe, inner view. C, genitalia, ventral view. D, aedeagus. E, tegumen, lateral view.

FIG. 2.—*P. psammochroa* Meyr., A, male genitalia, lateral view. B, harpe, inner view. C, vinculum and tegumen, caudal view. D, aedeagus.

FIG. 3.—*P. sera* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, tegumen and vinculum, dorsal view. D, aedeagus. E, hair sac.

with tegumen, lateral arms strongly angled, saccus small. Aedeagus hardly chitinized, irregular, surrounded by a hood-like membranous structure with a chitinous apex, possibly the modified manica. Harpes simple, entire, leaf-like.

Orthenches Meyr.

The dominant Plutellid genus in New Zealand, containing twelve species. A few others are to be found in Australia and India. Unfortunately, material of only four species has been available for dissection, the greater number being rare and poorly represented in collections. In the four forms referred to surprising differences manifest themselves for members of the same genus. The hair sacs are absent in all the species dealt with.

O. glypharcha Meyr. (Fig. 6).

All the organs are weakly chitinized. Tegumen fused with vinculum, forming a weak ring, slightly expanded dorsally where it is clothed with long hair; saccus moderately narrow. Anal tube extending far beyond tegumen, half hidden in long hair. Gnathos absent. Aedeagus moderate, thrust well beyond harpes, anellus with dense hair on median portion directed obliquely backwards. Harpes weakly chitinized, entire, deeply concave, especially towards base; a finger-like process on upper basal angle.

O. similis Philp. (Fig. 7).

Genitalia asymetrical in harpes and vinculum. Tegumen fused with vinculum, uncus consisting of a pair of thin processes at dorso-lateral angles of tegumen, their apices being angled downwards. Gnathos a pair of finger-like processes, bent downwards but with the apices recurved and bearing a tuft of long hair. Vinculum with lateral arms narrow; saccus a large asymmetrical pointed concave plate. Aedeagus moderate, swollen basally. Harpes narrow, entire, the pointed processes from upper basal angles asymetrical (see figs.).

O. saleuta Meyr. (Fig. 8).

Tegumen very small and weak, fused with broad U-shaped vinculum; saccus moderate. Anal tube projecting far beyond apex of tegumen. Gnathos absent, but probably indicated by a pair of slight processes carrying a few hairs. Aedeagus long, moderately stout, projecting beyond harpes. Harpes cleft into two widely-diverging prongs, upper basal angles produced into long thin structures which project dorsally past aedeagus and are then rectangularly bent caudally, the apices resting between the paired cuculli.

O. porphyritis Meyr. (Fig. 9).

The eighth segment is split on the ventral line only, the dorsal line having but a small indentation. Tegumen weak and narrow, dorsal part armed with long paddle-shaped scales. Anal tube long

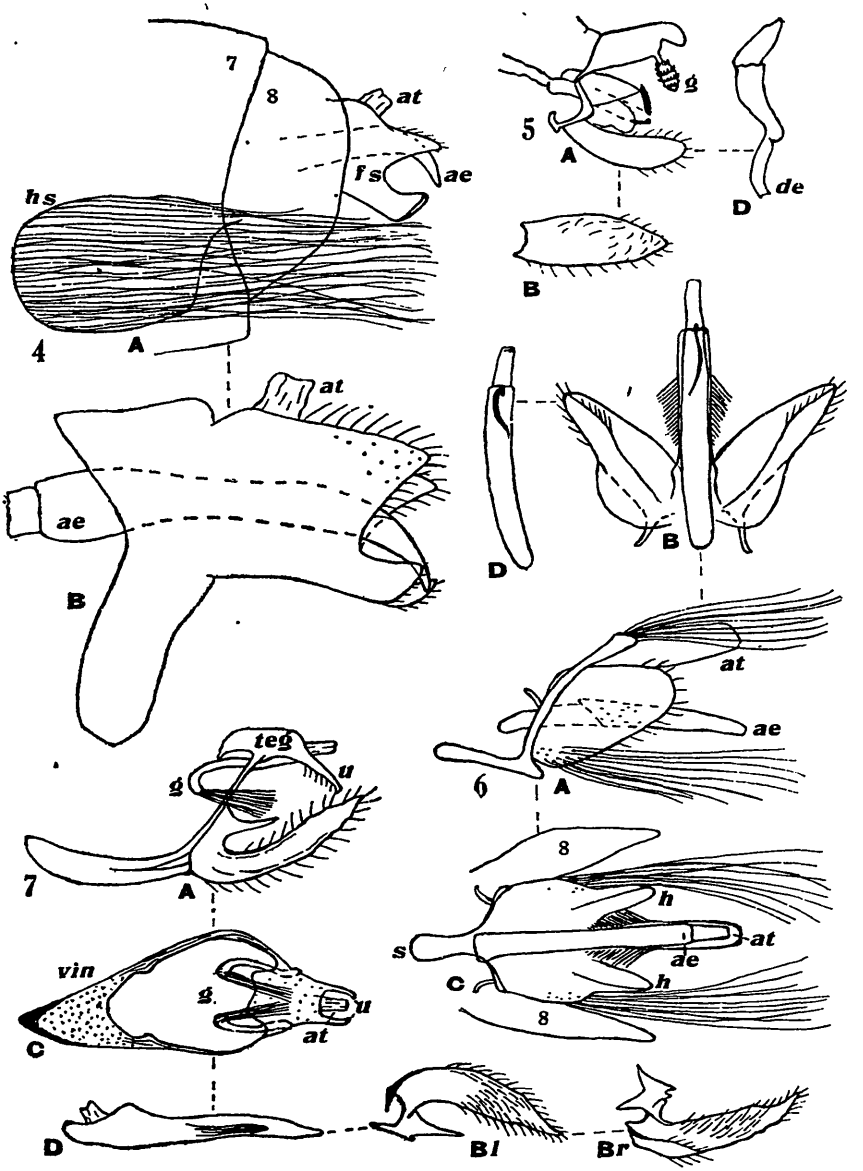


FIG. 4.—*P. megalynta* Meyr. A, male genitalia, lateral view. B, genitalia, lateral view, eighth segment removed.

FIG. 5.—*Circoxena ditrocha* Meyr. A, male genitalia, lateral view. B, harpe, inner view. D, aedeagus.

FIG. 6.—*Orthenches glypharcha* Meyr. A, male genitalia, lateral view. B, harpe, and aedeagus, dorsal view. C, genitalia, ventral view. D, aedeagus.

FIG. 7.—*O. similis* Philp. A, male genitalia, lateral view. Bl, left harpe. Br, right harpe. C, tegumen and vinculum, dorsal view. D, aedeagus.

and firm, projecting well beyond the genitalia. Vinculum fused with tegumen, narrow, and with moderately-long and narrow saccus. Aedeagus moderately long and stout, apically hairy and with a pair of short strong curved spines directed ventrally. Juxta absent. Harpes broad, entire, a two-pronged projection from upper basal angle, a brush of long hairs from lower basal angle, area without and clothed within on apical half with short stout scales.

Cadmogenes Meyr.

Endemic and monotypic. Specimens of *C. literata* Meyr. have not been available for examination.

Phylacodes Meyr.

Endemic and monotypic. The genitalia exhibit close affinity to *Protosynaema.*

P. cauta Meyr. (Fig. 10).

Tegumen with broad rounded uncus and large pointed surgonopods. Gnathos a pair of large clavate structures, flat within and with an armature of backwardly projecting barbules. Vinculum narrow, fused with tegumen, saccus long and thin. Aedeagus large, cylindrical. Harpes simple, entire, weakly chitinized and with feeble short hairs.

Protosynaema Meyr.

A small endemic genus of three species, the genitalia of which agree well in main features.

P. steropucha Meyr. (Fig. 12).

Tegumen with moderate uncus, which is apically truncate, and small surgonopods. Vinculum fused with tegumen, narrow, with moderately long and narrow saccus. Gnathos a pair of conical processes, flat within and densely covered on apical half with short basally-directed barbules. Aedeagus stout with short ventral projection near apex. Juxta absent. Harpes rather narrow, regularly curved, entire, with short coiled process on upper basal angle.

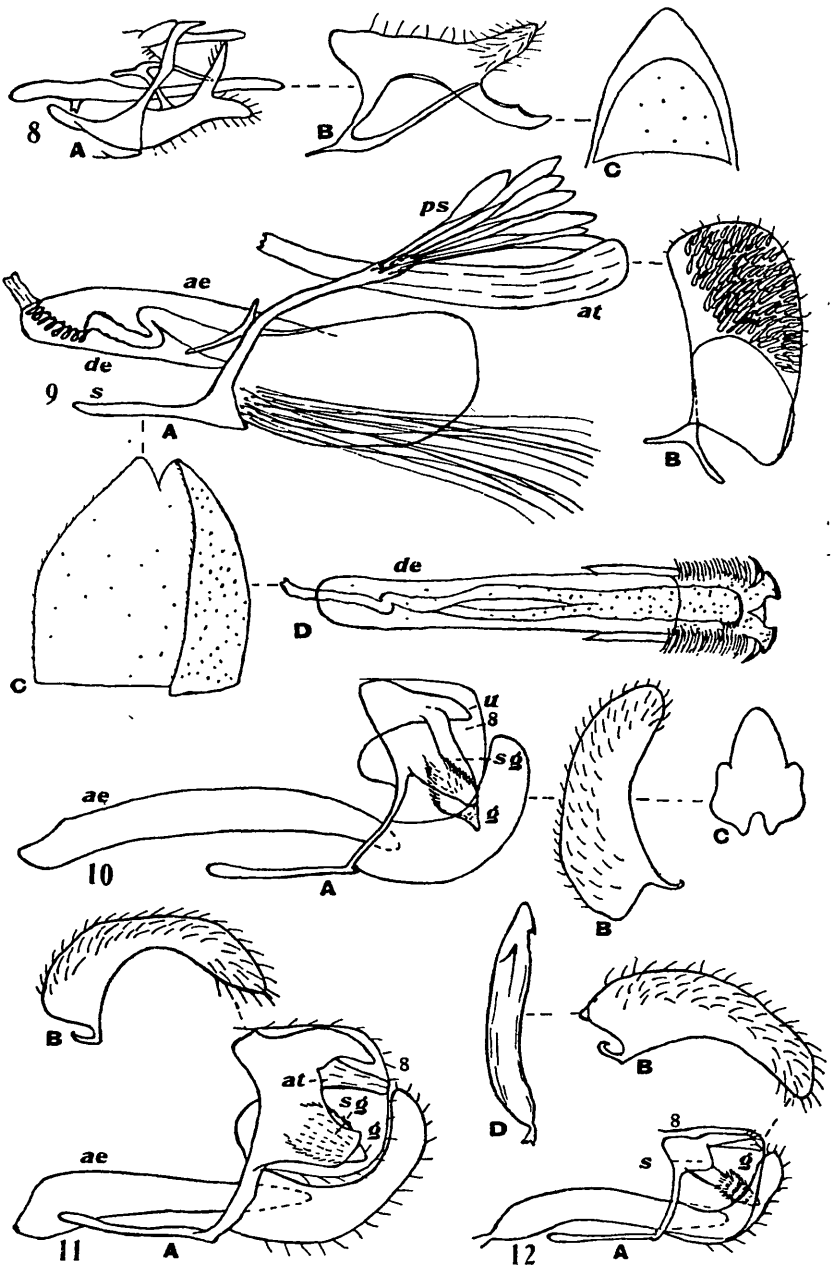
FIG. 8.—*O. saleuta* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, vinculum.

FIG. 9.—*O. porphyritis* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, eighth segment, obliquely ventral view. D, aedeagus.

FIG. 10.—*Phylacodes cauta* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, tegumen and uncus, dorsal view.

FIG. 11.—*Protosynaema quaestuosa* Meyr. A, male genitalia, lateral view. B, harpe, inner view.

FIG. 12.—*P. steropucha* Meyr. A, male genitalia, inner view. B, harpe, inner view. D, aedeagus.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FIGS. 8—12

P. quaestuosa Meyr. (Fig. 11).

Tegumen with moderate rounded uncus and large quadrangular surgonopods. Vinculum fused with uncus, narrow, saccus similar to *P. steropucha* but shorter and less pointed. Aedeagus moderate, swollen basally. Juxta absent. Harpes entire, like *P. steropucha* but narrower and more strongly curved.

P. eratopis Meyr. (Fig. 13).

Tegumen moderate with short rounded uncus and extended base. Vinculum fused with tegumen, narrow, saccus moderately long and thin. Gnathos longer and more pointed than in the other species. Aedeagus large, with ventral projection near apex. Harpes broad, entire, little curved.

Doxophyrtis Meyr.

Endemic and monotypic. The genitalia are highly specialized and reduced, recalling those of *Plutella megalynta* though there are great differences in detail.

D. hydrocosma Meyr. (Fig. 14).

The genitalia are almost completely hidden within the eighth segment which is in turn withdrawn into the seventh. The seventh sternite projects much beyond the rest of the body but is cleft deeply on the ventral line so as to form a pair of flaps. The eighth segment also takes the usual form of lateral flaps but they are of small size. Tegumen and vinculum narrow, fused, but open both dorsally and ventrally, thus forming two lateral bands which are only slightly concave, just enough to allow of the aedeagus passing through. The vinculum is cleft into two prongs ventrally and near its junction with the tegumen each arm has a small rounded process engaging another on the aedeagus. The apices of the tegumen are dilated and hairy, the hairy area extending to the median line. The anus is situated between the dilated apices. Aedeagus with lower half stout, upper half much thinner and rectangularly bent. Harpes absent. Hair sacs large but hairs short and somewhat clavate. It is possible that what is here regarded as the tegumen and vinculum is really the much modified harpes, the ninth segment having completely disappeared. The relation of the parts to the aedeagus and the hairiness of the upper portion gives some support to this view, but there is no definite evidence on either side.

Dolichernis Meyr.

Endemic. Contains two species, widely differing in genitalic characters.

D. chloroleuca Meyr. (Fig. 15).

Tegumen large, fused with small vinculum. Gnathos elaborate, tongue-like, a pair of curved prongs directed caudally and the body

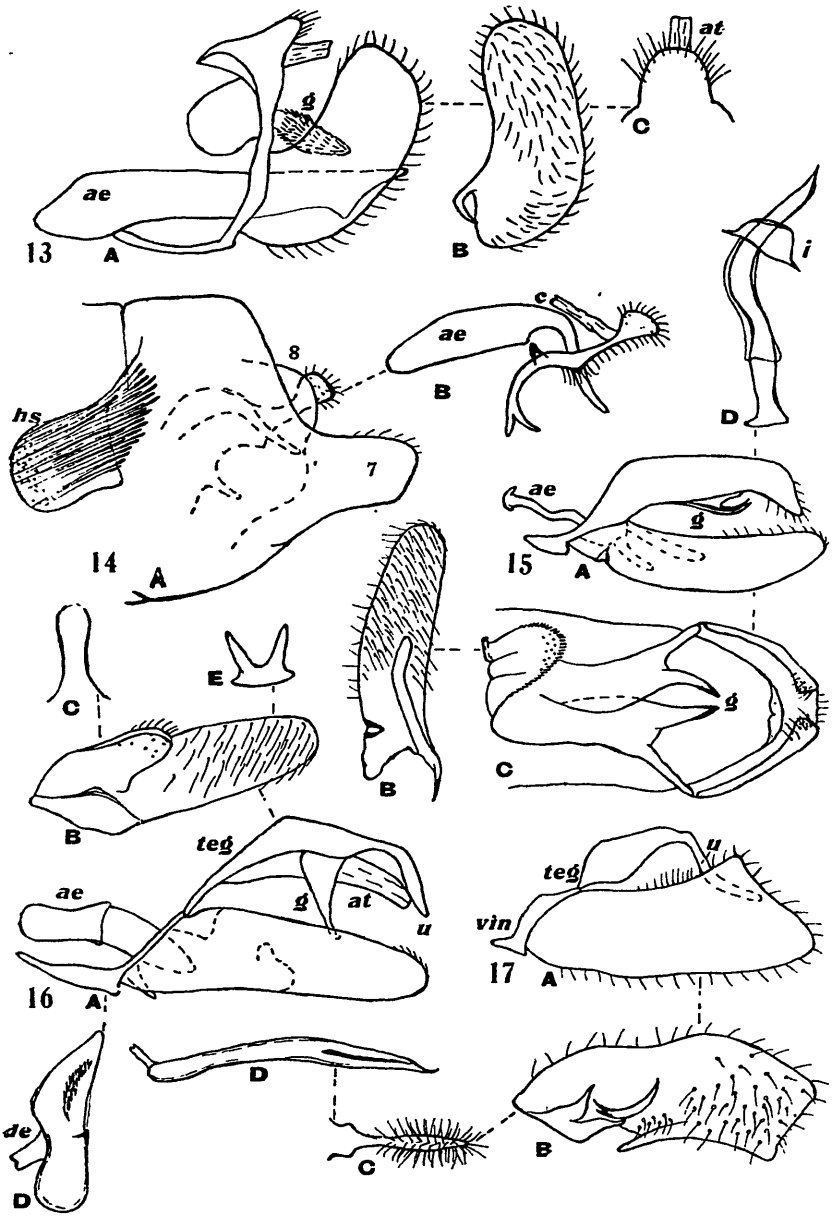

FIG. 13.—*P. eratopis* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, uncus, dorsal view.

FIG. 14.—*Doxophyrtis hydrocosma* Meyr. A, male genitalia, lateral view. B, genitalia, lateral view, eighth segment removed.

FIG. 15.—*Dolichernis chloroleuca* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, tegumen, ventral view. D, aedeagus.

FIG. 16.—*D. jubata* Philp. A, male genitalia, lateral view. B, harpe, inner view. C, uncus, dorsal view. D, aedeagus. E, juxta.

FIG. 17.—*Thambotricha vates* Meyr. A, male genitalia, lateral view. B, harpe, inner view. C, uncus, dorsal view. D, aedeagus.

of the organ sweeping in the opposite direction to end in a broad recurved plate between the harpes. Aedeagus short, sinuate, bent. Juxta a plain cap-like structure embracing the aedeagus. Harpes long, narrow, entire, with long finger-like lobe arising from upper basal angle within.

D. jubata Philp. (Fig. 16).

Tegumen narrow with moderately long angled spatulate uncus. Vinculum imperfectly fused with tegumen, with thin arms and moderate saccus. Gnathos without armature, forming a plain ring upturned at apex. Aedeagus short and thick. Harpes large, weak, entire, with a broad flap on lower margin within at about half and a fold on upper basal angle. Between the bases is a pair of short horn-like lobes; these are fused with the harpes but appear to be the modified juxta.

Thambotricha Meyr.

Endemic and monotypic. The genitalia are simple but depart widely from the Plutellid type.

T. vates Meyr. (Fig. 17).

The eighth segment is not modified. Tegumen not fused with vinculum, uncus long and hairy. Vinculum very small with slight saccus. Gnathos absent. Aedeagus thin, acutely pointed. Harpes broad, sharply angled at upper apical corner, entire, several irregular processes or folds within towards base.