On Some Larvae of the Genus Proterhinus (Coleoptera: Aglycyderidae)

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(Presented by O. H. Swezey at the meeting of March 4, 1940)

The genus *Proterhinus* includes 157 species of small, weevil-like Coleoptera confined in distribution to certain islands of the Pacific Ocean. Although several papers have been written, since 1878, concerning the adults and their relationship with other Rhynchophora, no pertinent information on the larvae was available until 1931, when Böving and Craighead[1] figured the larva of *Proterhinus anthracias* Perkins. It is with the purpose of making available information about the larvae of other species that the present paper has been prepared.

The larvae studied by Böving and Craighead, as well as those upon which the present discussion and descriptions are based, were collected and sent to the United States National Museum by Mr. O. H. Swezey of the Hawaiian Sugar Planters' Experiment Station, Honolulu, Hawaii. To Mr. Swezey should be credited most of the knowledge about the host plants of the species. Some live in the fronds and stems of ferns, some under bark, others in dead twigs, and at least one species mines in leaves. One species (from Samoa) was found on coconuts. In recent years information on the distribution of the species has increased, and now representatives of the genus are recorded from the Hawaiian and Marquesas Islands, from Samoa, and from Enderbury Island.

The anomalous nature of *Proterhinus* was recognized by early investigators of the group. In 1878 and 1879 Sharp,[2] working with the adults, concluded that they represented an aberrant type of Rhynchophora, the true position of which among the weevils was problematical. It was hoped that the present study of the larvae might bring to light evidence to show more clearly just where *Proterhinus* belongs among the weevils. This, however, has not been attained, the evidence gained from the larvae merely substantiating the belief that *Proterhinus* stands distinctly isolated from all other groups of Rhynchophora.

Among the more important characteristics that show the affinities between the larvae of *Proterhinus* and other Rhynchophora are:

[1] Böving, Adam G., and Craighead, F. C. An Illustrated Synopsis of the principal larval Forms of the Order Coleoptera. Ent. Amer., 11 (n. s.), 1931, 351 pp., 125 pls.

[2] Sharp, D. Descriptions of some new Species and a new Genus of rhynchophorous Coleoptera from the Hawaiian Islands. Ent. Soc. London, Trans., 1878, pp. 15-26.
Sharp, D. On some Coleoptera from the Hawaiian Islands. Ent. Soc. London, Trans., 1879, pp. 77-81.

absence of legs and urogomphi,[3] no molar part on mandible, absence of gular suture and gular area, presence of hypopharyngeal bracon, lack of hypopharyngeal sclerome, simple mala, and postmentum connected laterally with maxillary stipites. Other characteristics less definitive but present in the majority of weevil larvae are: three setae on postmentum, a seta and nearby sensory pore on inner margin of stipes just behind base of mala, and antenna with one article.

On the other hand, there are several characteristics by which *Proterhinus* larvae differ from those of other Rhynchophora. One of the more important of these is the location of the thoracic spiracle in the mesothorax instead of apparently intersegmentally between the prothorax and mesothorax as in the typical weevil larvae studied. The epipharyngeal rods are more primitive since they are represented by simple extensions from the postero-lateral margins of the labral sclerite instead of extending ventrally to the epipharyngeal membrane as in other rhynchophorous larvae, except *Belus*. In most weevil larvae there are one or two pairs of setae on the clypeus, but in *Proterhinus* these are absent.

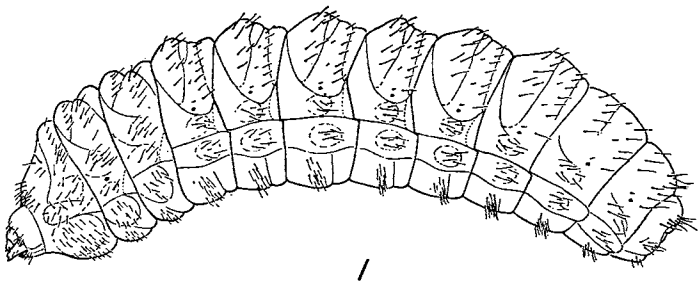
Van Emden[4] has suggested that *Proterhinus* shows affinities with *Belus*. In the latter the head is deeply retracted, the frontal sutures are indistinct, and the body is hairy. *Proterhinus* agrees with *Belus* in these particulars but differs from it in having the thoracic spiracle clearly in the mesothorax (apparently intersegmental in *Belus*), the antenna with one article (two in *Belus*), the labrum and epipharynx sparsely setose (thickly in *Belus*), the maxillary palpus with two articles (three in *Belus*), and the spiracle with a dorsal air tube (simple in *Belus*). Moreover, in *Belus* the prementum and postmentum have numerous setae, only one pair and three pairs, respectively, being present in *Proterhinus*.

[3] There are weevil larvae with elaborate, corneous extensions from the ninth abdominal segment, but this condition is exceptional.

[4] Emden, Fritz Van. On the taxonomy of Rhynchophora larvae (Coleoptera). Roy. Ent. Soc. London, Trans., 87, 1, 1938, pp. 1-37, 108 figs.

Plate 1

Fig. 1. *Proterhinus swezeyi.* Larva, lateral view. X15.
Fig. 2. *Proterhinus longulus.* Clypeus and labrum. X85.
Fig. 3. *Proterhinus swezeyi.* Antenna. X225.
Fig. 4. *Proterhinus longulus.* Left thoracic spiracle. X325.
Fig. 5. *Proterhinus longulus.* Epipharynx. X85.
Fig. 6. *Proterhinus abnormis.* Left mandible, dorsal view. X70.
Fig. 7. *Proterhinus longulus.* Right mandible, dorsal view. X85.
Fig. 8. *Proterhinus longulus.* Head, dorsal view. X40.
Fig. 9. *Proterhinus longulus.* Head, lateral view. X40.
Fig. 10. *Proterhinus longulus.* Head, ventral view. X40.



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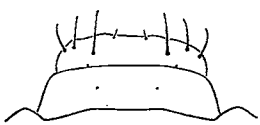

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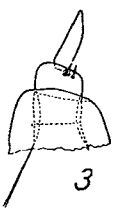

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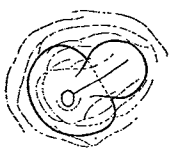

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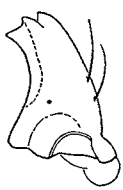

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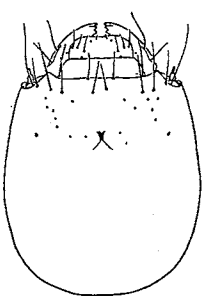

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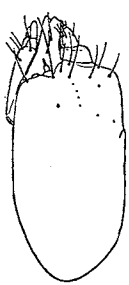

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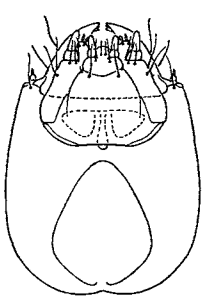

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PROTERHINUS

Before *Proterhinus* can be placed more definitely with relation to other weevils, intermediate forms must be found. A study of the larvae of *Aglycyderes* would, perhaps, prove helpful but the larvae of this genus are unknown at present.

GENERIC CHARACTERS OF LARVAE

The larvae of *Proterhinus,* as exemplified by the eleven species studied, may be characterized as follows:

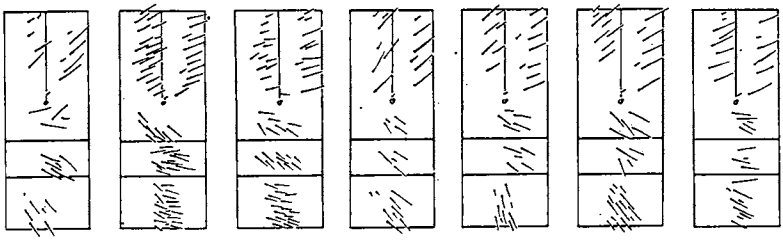
Body cylindrical (Fig. 1), legless, gently curved or straight, only slightly more robust anteriorly, and sparsely clothed with setae of medium length and short, colorless asperities. Entire larva uniformly white[5] with exception of head capsule and mandibles, which are colored as described below.

Head capsule (Figs. 8, 9, 10) broadly oval, slightly longer from posterior margin to base of clypeus than broad, widest at middle,

[5] Swezey reports that the living larva of *P. abnormis* is "yellowish when full grown and ready to pupate." Swezey, O. H. Notes on *Proterhinus abnormis,* a leaf-miner in leaves of *Broussaisia arguta.* Hawaii Ent. Soc. Proc., 4, (3), 1921, pp. 470-471, 1 fig.

Plate 2

Fig. 11. *Proterhinus abnormis.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 12. *Proterhinus dispar.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 13. *Proterhinus subplanatus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 14. *Proterhinus epitretus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 15. *Proterhinus swezeyi.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 16. *Proterhinus xanthoxyli.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 17. *Proterhinus longulus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 18. *Proterhinus dispar.* Epipharynx. X120.
Fig. 19. *Proterhinus abnormis.* Distal half of right maxilla, dorsal view. X160.
Fig. 20. *Proterhinus epitretus.* Epipharynx. X80.
Fig. 21. *Proterhinus dispar.* Distal half of right maxilla, dorsal view. X145.
Fig. 22. *Proterhinus subplanatus.* Distal half of right maxilla, dorsal view. X145.
Fig. 23. *Proterhinus epitretus.* Distal half of right maxilla, dorsal view. X125.
Fig. 24. *Proterhinus swezeyi.* Distal half of right maxilla, dorsal view. X115.
Fig. 25. *Proterhinus longulus.* Distal half of right maxilla, dorsal view. X115.
Fig. 26. *Proterhinus abnormis.* Labium and maxillae, ventral view. X125.
Fig. 26A. *Proterhinus abnormis.* Second article of labial palpus. X285.
Fig. 27. *Proterhinus xanthoxyli.* Distal half of right maxilla, dorsal view. X125.



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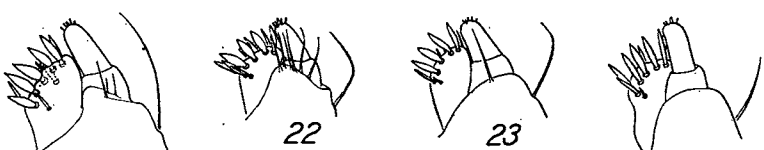

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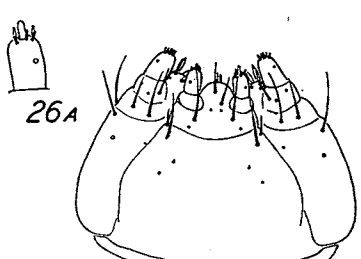


26A 25 26 27

PROTERHINUS

and about twice as long as thick. Epicranial and frontal sutures not developed. Hypopharyngeal bracon present, tentorial bridge in same plane as ventral surface of head. Anterior, exposed portion of epicranium brown, the retracted posterior two-thirds white. Anterior dorsal margin strongly declivous to base of clypeus and, on each side, with eight setae of medium length. Posterior to latter a group of very short setae differing in position and number with the individual larva. Immediately ventral to ocellus one prominent seta.

Clypeus and labrum (Fig. 2) well developed and free. Clypeus more than twice as wide as long, without setae but with a pair of sensilla. Labrum twice as wide as long, with four setae on each side, the anterior one short, the posterior three of medium length.

Epipharynx (Fig. 5) membranous, with six setae on each side; three antero-laterals, two antero-medians and one epipharyngeal seta.[6] Epipharyngeal rods extending backward from the inner, latero-posterior margins of labral sclerite and varying slightly in shape between species (cf. Figs. 18 and 20).

One ocellus with convex lens on ventral antero-lateral angle of head, immediately below antenna. Antenna (Fig. 3) with one article, connected to head by a basal membrane, with three setae laterally and terminally with a prominent cone-shaped sensillum subequal in length to article. Article produced into two apodemes, within the head, to at least one of which a muscle is attached.

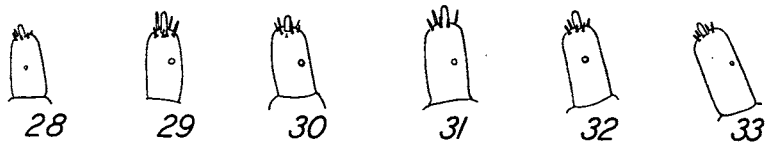
Mandible brown, with two teeth (Fig. 7) but with a lamellate projection from dorsal tooth or one from each tooth (Fig. 6), giving mandible the appearance of having three or four teeth. Mandible externally with two well-developed setae.

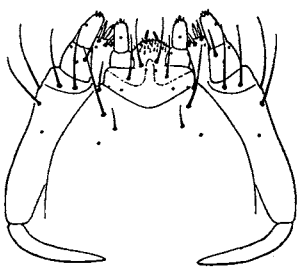
Maxilla (Fig. 36) with transversely directed, comparatively long, slender cardo, rectangular stipes, and truncate mala. Cardo without setae. Stipes with four setae arising near base of palpus

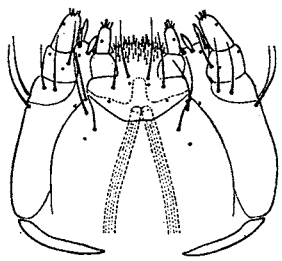
[6] The naming of these setae is in accord with the terms applied by Van Emden, l. c., p. 3.

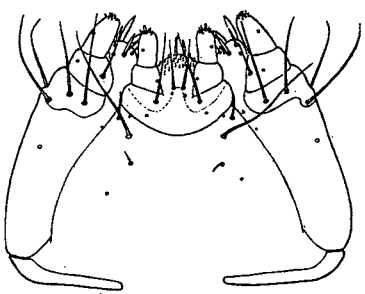
Plate 3

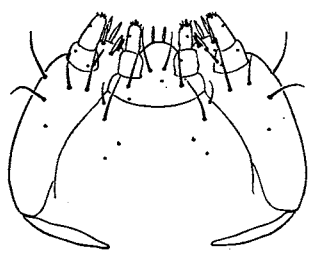
Fig. 28. *Proterhinus dispar.* Second article of labial palpus. X175.
Fig. 29. *Proterhinus subplanatus.* Second article of labial palpus. X285.
Fig. 30. *Proterhinus epitretus.* Second article of labial palpus. X235.
Fig. 31. *Proterhinus swezeyi.* Second article of labial palpus. X235.
Fig. 32. *Proterhinus xanthoxyli.* Second article of labial palpus. X260.
Fig. 33. *Proterhinus longulus.* Second article of labial palpus. X235.
Fig. 34. *Proterhinus dispar.* Labium and maxillae, ventral view, X80.
Fig. 35. *Proterhinus subplanatus.* Labium and maxillae, ventral view. X115.
Fig. 36. *Proterhinus epitretus.* Labium and maxillae, ventral view. X115.
Fig. 37. *Proterhinus swezeyi.* Labium and maxillae, ventral view. X80.
Fig. 38. *Proterhinus xanthoxyli.* Labium and maxillae, ventral view. X115.
Fig. 39. *Proterhinus longulus.* Labium and maxillae, ventral view, X85.

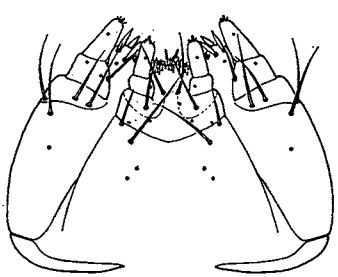


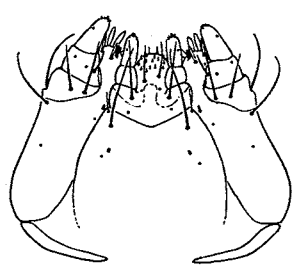












PROTERHINUS

and one minute seta and accompanying sensory pore near inner margin just proximal to base of mala. Mala broad, bearing eleven setae, of which four are on ventral face, the remainder along the dorsal inner margin. Palpus with two articles, basal one broader than long and on its ventral face with one seta near inner margin and two sensory pores. Terminal article longer than broad, bluntly conical, bearing one sensory pore on ventral face; apex with about seven sensilla, one distinctly broader than others. Dorsal surface of maxilla near base of palpus with (Fig. 22) or without (Fig. 24) long, slender spinules.

Labium (Fig. 36) with prementum free, postmentum united with maxillae. Postmentum without pigmented area but each side with three setae and a sensory pore, the most posterior seta (hereafter spoken of as third seta on postmentum) varying in length with the species or groups of species. Prementum with an indistinctly pigmented, transverse basal sclerite with indefinite anterior margin. One seta immediately behind palpus and a pair of sensory pores between bases of palpi. Ligula indistinctly separated from prementum, with a pair of setae near base and with two pairs of slender setae terminally. Surface of ligula with or without asperities. Palpus with two articles, each with a sensory pore. Terminal article (Fig. 29) with about six sensilla arising from the blunt apex, one distinctly broader and longer than remainder and varying specifically in proportionate length with article.

Hypopharynx membranous.

Spiracles (Fig. 4) on mesothorax and on first eight abdominal segments subequal in size, the thoracic slightly larger; each with single, oval air tube.

Prothorax with tergum indistinctly divided into two transverse areas, prescutum and scutoscutellum. Prescutum with setae of medium length, scutoscutellum with sparsely set setae in a transverse band and with dense short asperities on posterior half. Pedal lobe not prominent, rather densely set with setae of varying lengths. Sternum setose.

Mesothorax and metathorax identical except for lack of functional spiracle on metathorax. Each with three tergal folds. Lateroterga and pleura indistinctly developed, each with setae. Pedal lobes not prominent, with setae of various lengths. Sterna with setae.

First six abdominal segments nearly identical in size and in number and arrangement of setae. Each segment feebly divided, dorsally, into four transverse areas: prescutum, scutum, scutellum, and postscutellum. Setae on prescutum and scutellum varying in number with the species. One short seta always present immediately above spiracle. Latero-tergal and pleural lobes

indistinctly developed, setose. Sternum feebly divided into eusternum and sternellum, setae on the former varying in number with the species.

Seventh abdominal segment divided into only two tergal folds, eighth undivided. Each with approximately the same number of setae, slightly fewer than on anterior segments.

Ninth much shorter than preceding abdominal segments, tapering and bearing an incomplete band of setae but without other armature. Tenth abdominal segment reduced to one dorsal and two ventro-lateral lobes around anus.

Proterhinus abnormis Perkins. Figures: 6, 11, 19, 26, 26A.

Mandible with lamellate projection from each tooth. Third seta on postmentum minute. Ligula without asperities. Labial palpus with second article short and with principal terminal sensillum about one-third length of article. Maxilla, dorsally, at base of palpus, with two spinules of medium length. Prescutum of typical abdominal segment, on each side, with about five setae, scutellum with about six setae, eusternum with about seven setae. Anterior abdominal segments with dorsal ampullae.

Material: 17 larvae "leaf miner in *Broussaisia,* Mt. Kaala, 3500 ft., Oahu, Feb. 11, 1928 (O. H. Swezey)".

Proterhinus phyllobius Perkins.

Although larvae, associated with reared adults determined as *P. phyllobius* Perkins, were studied carefully, no differences were found to distinguish them from the larvae of *abnormis.* The description of the latter will apply, therefore, to *phyllobius.*

Material: 5 larvae "leaf miner in *Broussaisia,* Kaumuahona, Oahu, Feb. 1928 (O. H. Swezey)"; 6 larvae "ex *Broussaisia,* Haula, Oahu, 1-6-34 (O. H. Swezey)."

Proterhinus dispar Sharp. Figures: 12, 18, 21, 28, 34.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum of medium length. Labial palpus with second article slender and with terminal sensillum about one-fifth length of second article. Ligula with numerous asperities. Maxilla, dorsally, with three spinules of medium length. Prescutum of typical abdominal segment, on each side, with about nineteen setae, scutellum with about twelve setae, eusternum with about eighteen setae. Abdomen without dorsal ampullae.

Material: 12 larvae "ex *Wikstroemia foetida,* Lanihuli, Oahu, 9-16-28 (O.H.S.)"; 5 larvae "in bark of dead *Wikstroemia,* Pauoa Flats, Oahu, 4-23-34 (O. H. S.)".

Proterhinus subplanatus Perkins. Figures: 13, 22, 29, 35.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum long. Labial palpus with second article slender and

with principal terminal sensillum about one-fourth length of article. Ligula with many long asperities. Maxilla, dorsally, with six or more long spinules. Prescutum of typical abdominal segment, on each side, with about thirteen setae, scutellum with about eleven setae, eusternum with about eighteen setae. Abdomen without dorsal ampullae.

Material: 10 larvae "ex *Straussia,* Marsh Trail, Oahu, 12-30-33 (O. H. Swezey)".

Proterhinus anthracias Perkins.

No specific differences could be found between larvae of this species and *P. subplanatus.*

Material: 3 larvae "Dead bark of *Straussia,* Halemanu, Kauai, Mar. 9, 1928 (O. H. Swezey)".

Proterhinus epitretus Perkins. Figures: 14, 20, 23, 30, 36.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum of medium length. Principal terminal sensillum of labial palpus about one-fourth length of second article. Ligula densely set with asperities. Maxilla, dorsally, with a single spinule. Prescutum of typical abdominal segment, on each side, with about seven setae, scutellum with about six setae, eusternum with about nine setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Cibotium.*"

Proterhinus obscurus perobscurus Perkins.

Larvae associated with reared adults of this species have been studied but no characters of a specific nature have been found to separate them from the larvae of *P. epitretus.*

Material: 15 larvae "ex *Perrottetia,* Mt. Tantalus, Oahu, 9-8-29 (O. H. S.)".

Proterhinus swezeyi Perkins. Figures: 1, 3, 15, 24, 31, 37.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum minute. Principal terminal sensillum of labial palpus about one-fourth length of second article. Ligula without asperities. Maxilla, dorsally, without spinules. Prescutum of typical abdominal segment, on each side, with about seven setae, scutellum with about nine setae, eusternum with about ten setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex pith of dead twigs of *Broussaisia,* Mt. Kaala, 3500 ft., Oahu, Feb. 11, 1928 (Swezey)".

Proterhinus xanthoxyli Perkins. Figures: 16, 27, 32, 38.

Mandible with lamellate projection from dorsal tooth. Third seta on postmentum minute. Labial palpus with principal terminal sensillum about one-fourth length of second article. Ligula densely set with asperities. Maxilla, dorsally, with a single

spinule. Prescutum of typical abdominal segment, on each side, with about nine setae, scutellum with about seven setae, eusternum with about fourteen setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Xanthoxylum,* Palikea, Waianae Mts., Oahu, Feb. 3, 1935 (O. H. Swezey)".

Proterhinus longulus Sharp. Figures: 2, 4, 5, 7, 8, 9, 10, 17, 25, 33, 39.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum minute. Labial palpus with second article slender and with principal terminal sensillum short, about one-sixth length of article. Ligula with few asperities. Maxilla, dorsally, with a single spinule. Prescutum of typical abdominal segment, on each side, with about eight setae, scutellum with about seven setae, eusternum with about nine setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Phegopteris polycarpa,* Puu Kalena, Oahu, 9-11-32 (O. H. S.)".

Proterhinus excrucians Perkins.

Larvae associated with reared adults of this species have been examined but no characters have been found to separate them from larvae of *P. longulus.*

Material: 10 larvae "ex *Gouldia,* Mt. Olympus, Oahu, 3-31-35 (O. H. S.)".