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PARASITIC WASPS OF THE CATOLACCUS GROUP IN THE AMERICAS
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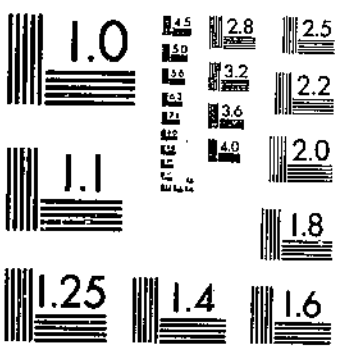

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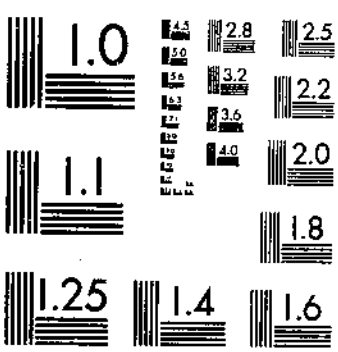

MICROCOPY RESOLUTION TEST CHART
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Technical Bulletin No. 1093

Parasitic Wasps of the CATOLACCUS Group in the Americas[1]

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Catolaccus and the genera closely related to it contain a large number of primary and secondary parasites of other insects. The species of *Catolaccus* itself are secondary parasites, emerging from the cocoons of ichneumonid or braconid parasites of Lepidoptera or Coleoptera. The *Heterolaccus* species are primary parasites of bruchids and weevils, attacking predominantly the many species of *Anthonomus*. *H. hunteri* (Crawford) is a widely distributed primary parasite of *Anthonomus grandis* Boh. (boll weevil); in most of the published information *hunteri* is treated as a parasite of this weevil. However, *hunteri* also attacks several species of *Anthonomus*, including *thurberiae* Pierce (wild-cotton boll weevil) and *eugenii* Cano (pepper weevil). It was imported into Hawaii in 1934 for the control of the pepper weevil. *H. hunteri* also attacks a number of other weevils, as well as bruchids. It has been recorded as a primary parasite of the larva of *Pectinophora gossypiella* (Saund.) (pink bollworm), but that record might well be re-investigated.

Another species of *Heterolaccus*, *townsendi* (Cwfd.), parasitizes *Anthonomus vestitus* Boh. (Peruvian cotton boll weevil) in South America; and *H. grandis*, a new species described in this paper, has been reared from the boll weevil in Nicaragua. *H. fragariae* (Roh.) is a primary parasite of *Anthonomus signatus* Say (strawberry weevil).

The species of *Pseudolaccus* parasitize dipterous gall makers, *americanus* Gah. developing as a primary parasite of *Asphondylia websteri* Felt (alfalfa gall midge). The one known American species of *Scymnophagus*, *townsendi* Ashm., parasitizes the minute coccinellid beetles of the genera *Scymnus*, *Hyperaspis*, *Pentilia*, *Cryptognatha*, and *Azya*. Those beetles prey on scale insects in the Neotropical region, and are often heavily parasitized by *Scymnophagus*.

The species of *Protolaccus*, a new genus described here, parasitize both phytophagous syrphids, such as *Mesogramma polita* Say, and predaceous syrphids, such as *Baccha* and *Syrphus*. The species of *Protolaccus*, as far as is known, are restricted to the Neotropical region.

None of the life histories of the species included in the *Catolaccus* group of genera have been worked out, but all reared specimens have come from the pupae or prepupae of their hosts. The egg of *Pseudo-*

[1] Hymenoptera, Pteromalidae.

catolaccus asphondyliae Masi (a Palearctic species) was figured by Parker (*12*), and the egg of *Heterolaccus hunteri* by Pierce, Cushman, and Hood (*13*).

HISTORY OF THE GENUS CATOLACCUS

Catolaccus was described from Sweden in 1878 by Thomson (*15*), with one included species, *cavigena* Thoms. This species cannot be placed with much exactitude from Thomson's characterization alone, and most authors who have treated the genus subsequently have stated that they had not seen a specimen of this genotype species. However, the characterizations of *Catolaccus* given by Howard in 1886 (*8*) and Cresson in 1887 (*6*) are both in agreement with the characters of the genotype.

Ashmead in 1893 (*1*), 1894 (*2*), 1896 (*3*), and 1904 (*4*), however, defined *Catolaccus* and used the generic name in a rather ambiguous way. He referred to it an assortment of species that can hardly be considered congeneric, and he evidently misinterpreted Thomson's characterization of the genus. All the species Ashmead described in *Catolaccus* have subsequently been transferred to other genera. Crawford in 1908 (*5*), although stating that the current usage of the generic name *Catolaccus* was not satisfactory, keyed out the North American species that he considered to belong in this genus, as defined by Ashmead. All these species have subsequently been transferred to other genera. Schmiedeknecht in 1909 (*14*) attempted to combine Thomson's original characterization of *Catolaccus* and Ashmead's recharacterization of it, with the result that the genus became all but unrecognizable.

In 1913 Kurdjumov (*9*) published the results of his careful study of nearly all the types of the genotype species of the Pteromalinae. He was able to examine the principal European collections as well as those in the U. S. National Museum. He saw Thomson's type of *cavigena*, stated that it was the same species as the much better known *Pteromalus ater* Ratz., and correctly placed the genus *Catolaccus* in a key to the genera of the Pteromalinae. He stated flatly that "Ashmead's classification of the subfamily Pteromalinae is a step backwards." This is a well-justified conclusion. As an example, the genus *Neocatolaccus* Ashmead, which he described as being closely related to *Catolaccus*, actually falls in the tribe Metastenini, not the Pteromalini, in which *Catolaccus* is placed.

In 1927 A. B. Gahan, of the Bureau of Entomology and Plant Quarantine, made a study of many of the important chalcid collections in Europe. He brought back to the U. S. National Museum many authentically determined specimens of Palearctic chalcidoids, including a pair determined as *Pteromalus ater* by Ruschka. Mr. Gahan also brought back another specimen of *ater*, which he had compared with Ratzeburg's type in Eberswalde, Germany.[2] Specimens in the Mayr collection, studied by Mr. Gahan in Vienna, confirmed the synonymy of *cavigena* with *ater*. These specimens, and the accompanying notes on synonymy, which Mr. Gahan brought

[2] The Ratzeburg collection was destroyed during World War II.

back from Europe in 1927, have formed the basis for the definition of *Catolaccus* used in this bulletin.

This study of *Catolaccus* and its allied genera was undertaken in an attempt to define more clearly the limits of these genera, representatives of which are constantly being received for identification. The classification finally arrived at, and used here, is an extension of Kurdjumov's treatment in his key to the genera of the subfamily Pteromalinae (*9*). A reworking of the section of his key covering the *Catolaccus* group of genera was necessary because many of our American species that should fall within this generic group could not be placed to genus with Kurdjumov's key.

TAXONOMY OF THE GENERA

The genera of the *Catolaccus* group agree in their general appearance as well as in several morphological characters. One of these characters is obvious: The genae are deeply excavated at the bases of the mandibles to make a pair of grooves into which the mandibles can fit when they are spread apart. These grooved cheeks are present in *Catolaccus* Thomson, *Heterolaccus* Masi, *Pseudocatolaccus* Masi, *Scymnophagus* Ashmead, and *Protolaccus* new genus.

These genera also have the following characters in common: The tip of the apical antennal segment is rounded, rather than pointed; the head is as wide as or only slightly wider than the thorax; the antennae are inserted at or slightly below the center of the face; the apex of the antennal scape reaches at most to the level of the anterior ocellus; the face is not produced below the antennal bases; the genae are acarinate laterally; the parapsidal grooves are incomplete; the front femora are not enlarged; each hind tibia bears one apical spur; the propodeum bears well-marked lateral folds and usually a globose neck; the abdomen is sessile, and its shape, from the dorsal aspect, is ovate-acuminate, and the ovipositor is not exserted.

This group of genera, as is true throughout the Pteromalidae, is characterized entirely from the females.

A few other genera of the Pteromalini also have the cheeks excavated at the bases of the mandibles, but those genera are excluded from the *Catolaccus* group by other characters. *Schizonotus* Ratzeburg has somewhat excavated cheeks, but the abdomen is circular in dorsal outline rather than ovate-acuminate. *Conomorium* Masi has slightly excavated cheeks, but the abdomen in this genus is also circular in outline. In *Dibrachoides* Kurdjumov the cheeks are deeply excavated, but the genae are laterally carinate and the head is much wider than the thorax. *Chrysoglyphe* Ashmead has the cheeks slightly excavated, but the antennal scapes are very long, their apices considerably exceeding the vertex.

In the genus *Zatropis* Crawford the cheeks at the bases of the mandibles are somewhat recessed and flattened (pl. II, figs. *A*, *Aa*), but they are not excavated; compare pl. II, figs. *B*, *Ba*, which shows the genae as they are in *Catolaccus* and the other genera of this group.

The character of the excavated cheeks is not a fundamental one, as it is found in genera referable to other tribes of the Pteromalidae. *Acanthometapon* Ashmead and *Psilocera* Walker (= *Metopon* Walker) have deeply grooved cheeks, but their petiolate abdomens refer them

to the tribe Sphegigasterini. In *Sisyridivora* Gahan (which, having a petiolate abdomen, is also referred to the Sphegigasterini), the cheeks are deeply excavated. *Perniphora* Ruschka has grooved cheeks, but the characters of the legs place it in the tribe Cleonymini. Slightly grooved cheeks are likewise present in *Pseudomicromelus* Gahan and Fagan (= *Micromelus* Dalla Torre), but that genus, having the apical antennal segment acutely pointed, belongs in the tribe Merisini. However, the grooved cheeks constitute the most convenient character for recognizing the members of the *Catolaccus* group of genera, if the other characters of that group are kept in mind.

KEY TO THE GENERA

1. Antenna with 2 ring segments and 6 funicle segments 2
   Antenna with 3 ring segments and 5 funicle segments 3
2. Costal cell of forewing relatively broad and setose (pl. II, fig. *C*); antennae inserted at level of ventral margins of compound eyes ..... *Catolaccus* Thomson
   Costal cell of forewing relatively narrow and asetose or very nearly so (pl. II, fig. *E*); antennae inserted considerably dorsad of ventral margins of compound eyes ..... *Heterolaccus* Masi
3. Propodeum without globose neck (pl. I, fig. *E*); stigmal vein with enlarged knob (pl. II, fig. *F*); postocellar line shorter than ocellocular ..... *Pseudocatolaccus* Masi
   Propodeum with globose neck (pl. I, fig. *B*); stigmal knob not enlarged (pl. II, fig. *H*); postocellar line longer than ocellocular 4
4. Marginal vein of forewing thickened (pl. II, fig. *D*) ..... *Scutophagus* Ashmead
   Marginal vein of forewing slender (pl. II, fig. *H*) ..... *Protolaccus*, new genus

Genus CATOLACCUS Thomson

(Pl. I, fig. *D*; pl. II, figs. *B*, *C*)

Catolaccus Thomson, 1878, Hym. Scand., v. 5, p. 146; Howard, 1886, Ent. Amer. 2: 37; Cresson, 1887, Synopsis Hym. of Amer. N. of Mex., p. 77; Dalla Torre 1898, Cat. Hym., v. 5, p. 108; Schmiedeknecht, 1909, Genera Insectorum fasc. 97, pp. 328, 330, 355 (*in part*); Kurdjumov, 1913, Rev. Russe d'Ent. (Ent. Obozr.) 13: 5; Viereck, 1917, Conn. State Geol. and Nat. Hist. Survey Bul. 22, p. 469; Gahan and Fagan, 1923, U. S. Natl. Mus. Bul. 124, p. 27; Schmiedeknecht, 1930, Hym. Nord- u. Mitteleuropas, ed. 2, p. 435; Masi, 1937, Festschr. Prof. Dr. Embrik Strand, v. 3, p. 369; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 557; Nikolskaya, 1952, Akad. Nauk. U. S. S. R., Chalc. fauna, p. 223.

Type.—*Pteromalus* (*Catolaccus*) *cavigena* Thomson; monobasic.

The usages of the generic name *Catolaccus* by Ashmead (*4*) and by Crawford (*5*) were misapplications.

Description.—Head semiglobose, when measured from anterior aspect only slightly wider than high; compound eyes relatively small, so that height of compound eye only slightly greater than width of malar space and width of cheek posterior to eye almost as great as width of eye; antennae inserted at level of ventral margins of compound eyes; apices of scapes not reaching level of ventral margin of anterior ocellus; antenna with 2 ring segments, the second always much longer than the first; 6 funicle segments present, all of approximately the same length, the first slightly narrowed at the base, following segments equal in width; occiput not excavated and its margin either carinate or acarinate. Anterior margin of pronotum acarinate; pronotum slightly narrower than mesonotum at tegulae; a deep, oblique, almost straight groove present on either side of pronotum, just above coxa; costal cell of forewing broadened and setose; disc of forewing setose almost to point of divergence of vestigial veins Rs and M; marginal and stigmal veins approximately equal in length; postmarginal vein as long as marginal or slightly longer. Propodeum with lateral folds and a globose neck; median carina extending at most from base of propodeum to base of neck, often abbre-

viated or wanting; gaster ovate-acuminate in dorsal outline, approximately as long as the head and thorax combined; first gastral tergite broadly angularly produced on meson; following tergites not emarginate at meson of posterior margins.

KEY TO AMERICAN SPECIES

1. Occipital margin carinate 2
   Occipital margin acarinate 3
2. Median carina and lateral folds of propodeum complete (pl. I, fig. *D*) *aeneoviridis* (Girault)
   Median carina and lateral folds becoming obsolete in about the middle of propodeum (pl. I, fig. *F*) ..... *victoria*, new species
3. Median carina of propodeum entirely wanting; thorax black *kansensis* (Girault)
   Median carina of propodeum present; thorax very dark metallic blue *cyanoideus*, new species

CATOLACCUS AENEOVIRIDIS (Girault)

(Pl. I, fig. *D*)

Arthrolytus aeneoviridis Girault, 1911, Canad. Ent. 43: 351, 372; Morrill, 1916, Ariz. Comn. Agr. and Hort. Ann. Rpt. 8: 45; Girault, 1917, Desc. Hym. Chalc. Var. cum Obs., pt. V, p. 3; Girault, 1918, Ent. News 29: 131; Girault, 1920, U. S. Natl. Mus. Proc. 58: 212.

Dibrachys aeneoviridis (Girault) Fink, 1932, Jour. Agr. Res. 44: 555.

Catolaccus aeneoviridis (Girault) Wilson, 1932, Fla. Ent. 16: 39; Wilson, 1933, Fla. Ent. 17: 3, 7; Haseman, 1933, Mo. Agr. Expt. Sta. Bul. 320, p. 7; Sorenson, 1934, Utah Acad. Sci. Proc. 11: 250; Basinger, 1935, Calif. Dept. Agr. Mo. Bul. 24: 233; Doner, 1936, Ent. Soc. Amer. Ann. 29: 226, 234; Knowlton, 1937, Jour. Econ. Ent. 30: 379; Knowlton and Allen, 1937, Jour. Econ. Ent. 30: 784; Copenhafer and Parker, 1938, Kans. Ent. Soc. Jour. 11: 46; Smith, 1938, Kans. Acad. Sci. Trans. 41: 185; Underhill, 1943, Va. Agr. Expt. Sta. Bul. 349, p. 7, 12; Elmore and Howland, 1943, U. S. Dept. Agr. Tech. Bul. 841, p. 15; Clancy, 1946, Jour. Econ. Ent. 39: 328; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 557.

Dibrachys meteori Gahan, 1913, U. S. Natl. Mus. Proc. 46: 436; Vickery, 1915, Jour. Econ. Ent. 8: 391; Girault, 1917, Desc. Hym. Chalc. Var. cum Obs., pt. V, p. 3 [*meteori*=*aeneoviridis* Girault]; Vickery, 1925, Wash. Ent. Soc. Proc. 27: 139; Luginbill, 1928, U. S. Dept. Agr. Tech. Bul. 34, p. 74; Fink, 1932, Jour. Agr. Res. 44: 555.

Female.—Length, 2.0–3.0 mm. Head and thorax shining black; antennal scape dark brown, lighter at base; flagellum tan; wing veins yellow; coxae black, shading to brown at apices; femora dark brown, apices yellow; tibiae brown in the middle, yellow at bases and apices; each tarsus with basal four segments yellow, apical segment brown; propodeum black; gaster brown with rather faint metallic blue or green iridescence.

Head and thorax sparsely clothed with inconspicuous silvery hairs; antennae inserted slightly below middle of face; relative proportions of parts of antenna: Scape 64, pedicel 14, ring segments 2, 7, funicle segments 16, 16, 14, 14, 12, 12, club 24; height of compound eye 1⅔ times that of width of malar space; lateral ocellus located 2⅔ times its own diameter from occipital margin; postocellar line 1⅓ times as long as ocellocular line; occipital margin carinate. Maximum dorsal width of pronotum slightly more than ⅞ that of mesoscutum at tegulae; mesepimeral ridge with a single row of rather closely set hairs; posterior coxa with a few short hairs borne on anterolateral angle and 5 long bristles near the posterolateral angle; mesoscutum 5 times as long as pronotum at meson and ⅝ as long as mesoscutellum; mesoscutum 2⅛ times as wide as long; costal cell of forewing widened and setose ventrally; radial cell with a few scattered setae on ventral side; stigmal vein 1⅛ times as long as postmarginal; marginal vein 1¼ times as long as stigmal; submarginal vein 3 times as long as stigmal; a small area surrounding stigmal vein asetose; spaces behind postmarginal and marginal veins otherwise densely setose. Propodeum with a dense patch of short hair at either lateral margin and a small tuft of longer hair near either posterolateral angle; lateral folds and median carina well developed; first gastral tergite at meson as long as 3 following tergites; gaster as long as head and thorax combined.

Male.—Length 1.5–2.5 mm. Relative proportions of parts of antenna: Scape 48, pedicel 12, ring segments 1, 3, funicle segments 24, 24, 20, 20, 18, 18, club 32; gaster ⅔ as long as head and thorax combined.

Type locality.—Ames, Iowa.

Types.—Lectotype female in collection of Illinois Natural History Survey, Urbana, Ill.; paratypes U. S. National Museum No. 12199.

Distribution.—Throughout the United States and southern Canada; Bermuda.

Hosts.—Probably always a secondary parasite, although reported to have been reared directly from the following Lepidoptera: *Acleris minuta* (Rob.), *Ancylis comptana comptana* (Froel.), *A. c. fragariae* (W. and R.), *Archips rosaceana* (Harr.), *Bedellia somnulentella* (Zell.), *Bucculatrix thurberiella* Busck, *Callisto geminatella* (Pack.), *Celama sorghiella* (Riley), *Coleophora malivorella* Riley, *C. pruniella* Clem., *Diaphania nitidalis* (Stoll), *Dichomeris marginella* (F.), *Laphygma exigua* (Hbn.), *L. frugiperda* (A. and S.), *Oidaematophorus palaceus* (Zell.), *Rhyacionia frustrana* (Coms.), and *Zelleria haimbachi* Busck. It has been reared from the following hymenopterous primary parasites of Lepidoptera and Coleoptera: *Apanteles aristoteliae* Vier., *A. congregatus* (Say), *A. flaviconche* Riley, *A. marginiventris* (Cress.), *Apanteles* sp., *Bathyplectes curculionis* (Thoms.), *Campoletis argentifrons* (Cress.), *Casinaria limenitidis* (How.), *Hormius basalis* (Prov.), *Hyposoter pilosulus* (Prov.), *Macrocentrus* sp., *Meteorus acronyctae* Mues., *Meteorus* sp., and *Rogas laphygmae* Vier.

Catolaccus victoria, new species

Female.—Length 1.5–2.0 mm. Head and thorax black; antennal scape brown, shading to tan at base; flagellum tan; wing veins light yellow; coxae and femora brown with very faint metallic iridescence; tibiae brown at bases, apices tan; tarsi tan; propodeum black; gaster brown with faint metallic green or blue iridescence.

Head and thorax sparsely clothed with silvery-gray hairs; antennae inserted below center of face; relative lengths of parts of antenna: Scape 44, pedicel 10, ring segments 2, 3, funicle segments 11, 10, 10, 10, 10, 10, club 22; height of compound eye 1⅝ times as great as length of malar space; dorsal length of head at meson ⅓ as great as its maximum width; lateral ocellus located 3 times its diameter from occipital margin; postocellar line 1⅓ times as long as ocellocular line; occipital margin carinate. Maximum dorsal width of pronotum 7/10 as great as width of mesonotum at tegulae; mesepimeral ridge with a single row of very fine hairs; posterior coxa with a few short hairs on the anterolateral angle and 2 long bristles borne near the posterolateral angle; mesoscutum 4 times as long as pronotum at meson and ¾ as long as mesoscutellum; mesoscutum 2⅓ times as wide as long; costal cell of forewing widened and setose ventrally; radial cell asetose; stigmal and postmarginal veins equal in length; marginal vein 1¼ times as long as stigmal; submarginal vein 3 times as long as stigmal; dorsal surface of disc of forewing setose distad from point of divergence of vestigial veins Rs and M; areas behind marginal and postmarginal veins densely setose. Propodeum with relatively few setae at either lateral margin; lateral folds and median carina well developed at anterior margin of propodeum, but becoming obsolete midway between its anterior and posterior margins; first gastral tergite at meson as long as 3 following tergites; gaster as long as head and thorax combined.

Male.—Length 1.2–1.8 mm. Relative proportions of parts of antenna: Scape 40, pedicel 8, ring segments 1, 2, funicle segments 16, 16, 16, 16, 14, 14, club 24; gaster slightly shorter than head and thorax combined.

Type locality.—Victoria, Tex.

Types.—U. S. National Museum. No. 61974.

Described from the holotype female, allotype male, and 16 female and 8 male paratypes reared from *Apanteles* sp. (probably *websteri*

Mues.) cocoons collected on *Amphiachyris dracunculoides* leaves by J. D. Mitchell; the chalcids emerged Sept. 15, 1919.

Host.—Probably a secondary parasite of geometrid larvae.

Catolaccus kansensis (Girault)

Habrocytus kansensis Girault, 1917, Desc. Hym. Chalc. Var. cum Obs., pt. V, p. 3.
Arthrolytus kansensis (Girault) Girault, 1920, U. S. Natl. Mus. Proc. 58: 211.
Catolaccus kansensis (Girault) Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 558.

Female.—Length 2.8–3.0 mm. Head and thorax shining black; antennal scape black, yellow-brown at base; flagellum dark brown; wing veins brown; coxae shining black; femora dark brown with apices tan; tibiae with bases and apices tan, dark brown in the middle; tarsi tan shading to brown at apices; propodeum shining black; gaster black with faint metallic blue iridescence.

Head and thorax sparsely clothed with golden hair; relative lengths of parts of antenna: Scape 64, pedicel 16, ring segments 2, 8, funicle segments 16, 16, 14, 14, 12, 12, club 24; height of compound eye 1⅔ times as great as width of malar space; median length of head, from dorsal aspect, ⅓ as great as width of head; lateral ocellus located 2½ times its own diameter from occipital margin; postocellar line 1⅓ times as long as ocellocular line; occipital margin acarinate. Maximum dorsal width of pronotum slightly more than 9/10 as great as width of mesoscutum at tegulae; mesepimeral ridge with a single row of sparsely set hairs; posterior coxa with fairly dense, short hair along anterolateral margin and 4 long bristles borne near posterolateral angle; mesoscutum and mesoscutellum equally long, and pronotum at meson ¾ as long as either; mesoscutum 2¼ times as wide as long; costal cell of forewing widened and setose ventrally; radial cell bare; postmarginal and stigmal veins equal in length; marginal vein 1⅓ times as long as stigmal; submarginal vein twice as long as marginal; area around stem of stigmal vein asetose; spaces behind marginal and postmarginal veins otherwise setose. Propodeum with a tuft of long hair near either posterolateral angle; lateral folds strong anteriorly and posteriorly, interrupted in the middle; median propodeal carina wanting; first gastral tergite at meson longer than 3 following tergites when abdomen normally extended; gaster slightly shorter than head and thorax combined.

Male.—Unknown.

Type locality.—Riley Co., Kans.

Type.—U. S. National Museum No. 20874.

Distribution.—Idaho, Iowa, Kansas, Louisiana, Mississippi, South Carolina, Wisconsin.

Hosts.—Has been reared from infested cotton squares, from sumac infested with *Gracilaria rhoifoliella* Cham., and from *Coleophora pruniella* Clem. material; it probably is a secondary parasite.

Catolaccus cyanoideus, new species

Female.—Length 2.2–3.2 mm. Head and thorax dark metallic blue; antennal scape very dark brown with faint blue iridescence; pedicel and funicle segments dark brown basally, shading to tan at apices; club tan with first segment usually darkened at base; wing veins brown; coxae usually entirely dark metallic blue, sometimes shading to brown at apices; femora brown; apices light tan; fore tibiae tan; middle and hind tibiae tan at bases and apices, brown in the middle; tarsi tan, apical segment of each brown; propodeum and gaster usually dark metallic blue, but gaster sometimes dark brown with faint metallic blue iridescence.

Head and thorax sparsely clothed with golden hair; antennae inserted slightly below center of face; relative lengths of parts of antenna: Scape 66, pedicel 20, ring segments 3, 6, funicle segments 15, 14, 14, 14, 12, 12, club 30; height of compound eye 1⅔ times as great as length of malar space; maximum width of head slightly less than 3 times as great as dorsal length of head at meson; lateral ocellus located 3 times its diameter from occipital margin; length of ocellocular line ¾ as great as length of postocellar line; occipital margin acarinate. Maximum dorsal width of pronotum 9/10 as great as width of mesoscutum at tegulae; anterior

dorsal margin of pronotum acarinate; mesepimeral ridge with a single row of hairs; posterior coxa with a few short hairs on anterolateral angle and 5 long bristles borne near posterolateral angle; mesoscutum slightly more than 4 times as long as pronotum at meson and $\frac{5}{6}$ as long as mesoscutellum; mesoscutum $2\frac{1}{4}$ times as wide as long; costal cell of forewing widened and setose both dorsally and ventrally; radial cell with a few dorsal setae; marginal and stigmal veins equally long; postmarginal vein $\frac{1}{5}$ longer than marginal; submarginal vein almost 3 times as long as marginal; areas posterior to marginal and postmarginal veins densely setose. Propodeum with relatively dense setae at either lateral margin; lateral folds complete; median carina extending from base of propodeum to base of neck; first gastral tergite at meson as long as 3 following tergites; first and second gastral tergites dorsally glabrous; following tergites minutely reticulated; gaster slightly longer than head and thorax combined

Male.—Length 2.0–2.5 mm. Face dark metallic green; relative proportions of parts of antenna: Scape 44, pedicel 14, ring segments 2, 5, funicle segments 12, 12, 12, 12, 10, 10, club 24; gaster only $\frac{1}{2}$ as long as head and thorax combined.

Type locality.—Bangor, Maine.

Types.—U. S. National Museum No. 61975.

Described from 30 female and 6 male specimens as follows: Holotype female, allotype male, and 6 female paratypes, Bangor, Maine, Oct. 4, 1923, reared from *Aeronicta impressa* (Wlkr.) under Gypsy Moth Lab. No. 12146J5d; 1 male and 1 female paratypes, Lexington, Mass., Aug. 1, 1931, reared from *Vanessa atalanta* (L.) under Gypsy Moth Lab. No. 10040T2; 1 female paratype, Hampden, Maine, June 7, 1933, reared from *Hyposoter fugitivus* (Say) under Gypsy Moth Lab. No. 12126U1; 5 female paratypes, Montgomery Co., Ohio, July 5, 1944, reared from *Ancylis comptana fragariae* (W. & R.) (strawberry leaf roller) N. D. Blackburn; 3 female and 1 male paratypes, Higgins Lake, Mich., June 20, 1932, reared from *Apanteles* sp. cocoons, F. M. Gaige; 14 female and 3 male paratypes, Sioux City, Iowa, reared from *Apanteles* sp. cocoons, C. N. Ainslie, under Webster No. 24202.

Hosts.—Although several rearings of this species were said to have been from Lepidoptera directly, it is probable that *cyanoideus* is always a secondary parasite, emerging from *Apanteles*, *Hyposoter*, or other primary parasites of Lepidoptera.

Genus HETEROLACCUS Masi

(Pl. I, figs. *A*, *C*; pl. II, figs. *E*, *G*)

Heterolaccus Masi, 1937, Festschr. Prof. Dr. Embrik Strand, v. 3, pp. 369–371.

Type. Heterolaccus mauritanus Masi; monobasic.

Description.—Head moderately transverse, when measured from anterior aspect at least $1\frac{1}{3}$ times as wide as high; compound eyes relatively large, height of an eye approximately twice as great as width of malar space; antennae inserted at or near center of face, always well above the level of ventral margins of compound eyes; apices of scapes reaching or slightly exceeding level of ventral margin of anterior ocellus; antenna with 2 ring segments, the second as long as or slightly longer than the first; 6 funicle segments present; occiput excavated, its margin acarinate. Anterior dorsal margin of pronotum carinate or acarinate, a deep but vaguely defined sinuate groove present on either side of pronotum, above coxa; costal cell of forewing relatively narrow and asetose or nearly so; radial cell asetose; stigmal vein much shorter than marginal. Propodeum with median carina present or absent; lateral folds and globose neck present; gaster slender, elongate, usually much narrower than propodeum.

KEY TO AMERICAN SPECIES

1. Pronotum with a strong, transverse carina extending across the anterodorsal margin ..... *grandis*, new species
   Pronotum anteriorly acarinate 2
2. Thoracic notum clothed with mixed silvery and golden flattened hairs; gaster as broad at base as propodeum ..... *fragariae* (Rohwer)
   Thoracic notum clothed with silvery hairs only; gaster much narrower at base than propodeum 3
3. Upper surface of forewing around apex of stigmal vein asetose (pl. II, fig. *E*); lateral folds of propodeum complete (pl. I, fig. *A*) ..... *hunteri* (Crawford)
   Upper surface of forewing around apex of stigmal vein setose (pl. II, fig. *G*); lateral folds of propodeum interrupted in the middle (pl. I, fig. *C*) 4
4. Surface sculpture on face between scrobe cavity and compound eye and that in scrobe cavity itself equally strong; anterior tibiae yellow with very faint tan shading near bases; Peru ..... *townsendi* (Crawford)
   Surface sculpture on face between scrobe cavity and compound eye much weaker than in the scrobe cavity itself; anterior tibiae tan shaded with brown near bases; West Indies ..... *vulgaris* (Ashmead)

HETEROLACCUS GRANDIS, new species

Female.—Length 4.0–5.5 mm. Head and thorax shining black; antennal scape, pedicel, and ring segments yellow or light tan; funicle and club brown; coxae black, shading to tan at apices; trochanters tan; femora tan with apices light yellow; tibiae and basal tarsal segments light yellow or white; apical segment of each tarsus tan; tegulae and wing veins yellow; propodeum black, with a faint metallic blue luster in some specimens; gaster red-brown with iridescent red, blue, or blue-green reflections.

Face densely clothed with short, slightly flattened, silvery hairs; apex of antennal scape reaching level of ventral margin of anterior ocellus, relative lengths of parts of antenna: Scape 74, pedicel 16, ring segments 4, 4, funicle segments 22, 20, 20, 20, 18, 16, club 36; height of compound eye 2½ times as great as width of malar space; postocellar line only slightly longer than ocelloocular line. Thorax clothed dorsally with rather long, flattened, silvery hairs; a single row of shorter, flattened hairs on mesepimeral ridge and a tuft of similar hairs under either tegula; hind coxa with numerous short, flattened hairs on anterior surface and 7 or 8 long bristles near the posterolateral angle; pronotum with a slightly irregular, transverse carina extending across anterior dorsal margin, this carina slightly widened and its termination forming a toothlike structure at either dorso-lateral angle; mesoscutum twice as wide as long, its median length 4 times that of pronotum at meson; mesoscutellum and scutum equally long; submarginal vein of forewing 1½ times as long as marginal; stigmal vein slightly more than ¼ as long as marginal; postmarginal vein ½ as long as marginal. Propodeum very minutely shagreened; lateral folds present only on basal half (as in Catolaccus, pl. I, fig. *F*); median carina interrupted in the middle and a vague carina extending laterally from this point to either lateral fold; gaster elongate, slender, much narrower than propodeum and 1½ times as long as head and thorax combined; basal 3 tergites of gaster smooth, posterior margin of each deeply notched at meson of posterior margin; following gastral tergites lightly reticulated and setose.

Male.—Length 3.0–3.5 mm. Head and thorax black; gaster dark brown with iridescent green or blue luster and a large white spot near base; head and thorax combined 1¼ times as long as gaster.

Type locality.—Managua, Nicaragua.

Types.—U. S. National Museum No. 61976.

Described from 8 female and 2 male specimens as follows: Holotype female and 6 female paratypes, reared May 2, 1944, from *Anthonomus grandis* Boh., A. Hurtado; allotype male and 1 female paratype, Managua, Nicaragua, March 24, 1952, A. Hurtado; 1 male paratype, Chinandega, Nicaragua, Jan. 16, 1953, reared from *A. grandis*, Horvilleur.

Host.—So far as is known, this is a primary parasite of *Anthonomus grandis* Boh.

HETEROLACCUS FRAGARIAE (Rohwer), new combination

Catolaccus fragariae Rohwer, 1934, Wash. Ent. Soc. Proc. 36: 44; Bissell, 1938, Jour. Econ. Ent. 31: 536; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 558.

Female.—Length 1.5–2.0 mm. Head subshining black; thorax dull black; antennal scape yellow; pedicel and flagellum tan; coxae black with very faint metallic blue reflections; femora tan; tibiae yellow with vague tan shading near bases; tarsi yellow with apical segment of each darkened; wing veins tan; propodeum shining black; gaster brown with metallic green or blue reflections.

Head clothed with slightly flattened, silvery hairs; thoracic notum with slightly longer, golden and silvery, flattened hairs; apex of antennal scape reaching slightly above level of ventral margin of anterior ocellus; relative lengths of parts of antenna: Scape 52, pedicel 12, ring segments 1.5, 2, funicle segments 10, 10, 11, 11, 11, 11, club 28; height of compound eye twice as great as width of malar space; postocellar line 1¾ times as long as ocellocular line. Anterior margin of pronotum acarinate; mesepimeral ridge virtually bare, with only 2 or 3 very inconspicuous hairs; no tuft of hair beneath tegula; hind coxa with a single row of hairs along anterolateral angle; 3 long bristles borne near posterolateral angle; mesoscutum 10 times as long as pronotum at meson and slightly more than twice as wide as long; mesoscutum and mesoscutellum equally long; area around stigmal vein and behind apical half of marginal vein densely setose; submarginal vein 1⅝ times as long as marginal; marginal and postmarginal veins equal in length; stigmal vein ⅔ as long as marginal. Propodeum with lateral folds well developed at base and apex, obsolete in the middle; median carina strongly developed; equally strong, transverse carinae extending from midpoint of median carina to either lateral fold; gaster as wide as propodeum; basal 3 gastral tergites smooth and shining; posterior margin of first tergite broadly-angularly produced on meson; 2 following tergites with posterior margins straight and entire; fourth and following tergites minutely reticulated and very sparsely setose.

Male.—Length 1.2–1.5 mm. Gaster brown with green or brassy iridescent reflections and a large white spot near base; relative lengths of parts of antenna: Scape 34, pedicel 8, ring segments 2, 2, funicle segments 8, 8, 8, 9, 9, 9, club 24; gaster slightly shorter than head and thorax combined.

Type locality.—Knoxville, Tenn.

Types.—U. S. National Museum No. 24163.

Distribution.—Delaware, Georgia, Tennessee.

Hosts.—*Anthonomus signatus* (Say), *Apion decoloratum* Smith; this evidently is a primary parasite.

HETEROLACCUS HUNTERI (Crawford), new combination

(Pl. I, fig. *A*; Pl. II, fig. *E*)

Catolaccus hunteri Crawford, 1908, Wash. Ent. Soc. Proc. 9: 160; Cushman, 1911, Jour. Econ. Ent. 4: 490, 502–503; Pierce, Cushman, and Hood, 1912, U. S. Dept. Agr., Bur. Ent. Bul. 100, p. 42, 51, 54–66; Hunter and Pierce, 1912, U. S. Dept. Agr., Bur. Ent. Bul. 114, p. 141; Worsham, 1914, Ga. State Bd. Ent. Bul. 39, pl. vi; Pierce, 1917, Calif. State Hort. Comm. Mo. Bul. 6: 291; Fenton and Dunnam, 1929, U. S. Dept. Agr. Tech. Bul. 112, p. 68; Marlatt, 1933, U. S. Dept. Agr. Rept. Chief Bur. Ent. 1933, p. 25; Strong, 1934, U. S. Dept. Agr. Rpt. Chief Bur. Ent. 1934, p. 5; Hixson, 1935, Okla. Agr. Expt. Sta. Rpt. 1932–34, p. 272; Rude, 1937, Jour. Econ. Ent. 30: 811; Swezey, Fullaway, *et al.*, 1939, Hawaii. Ent. Soc. Proc. 10: 351; Berry, 1947, Jour. Econ. Ent. 40: 804; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 558; Gahan, 1951, Canad. Ent. 83: 175.

Zatropis hunteri (Crawford) Crawford, 1921, Wash. Ent. Soc. Proc. 23: 171.

Female.—Length 2.8–4.0 mm. Head shining black; thorax dull black; antennae yellowish-tan; scape sometimes lighter in color than flagellum; coxae shining black, often with faint metallic blue luster; femora brown with apices tan or yellow; tibiae tan or yellow with light brown shading near bases; tarsi tan or yellow with apical segment of each tarsus darkened; wing veins yellow; propodeum shining black; gaster dark brown with faint metallic blue or green iridescence.

Head and thorax densely clothed with flattened silvery hairs; apex of antennal scape reaching level of anterior ocellus; relative proportions of parts of antenna: Scape 70, pedicel 16, ring segments 4, 4, funicle segments 16, 16, 16, 16, 14, 14, club 34; height of compound eye 1⅘ times as great as width of malar space; postocellar line 1⅓ times as long as ocellocular line. Anterior margin of pronotum acarinate; mesepimeral ridge with a single row of closely set, silvery hairs, a very small tuft of 10 to 12 hairs present below tegula; hind coxa with flattened hairs densely set along anterolateral angle; 6 to 8 long bristles borne near posterolateral angle; mesoscutum 6 times as long as pronotum at meson, and slightly longer than mesoscutellum; mesoscutum twice as wide as long; forewing with area around stigmal vein and behind marginal vein, on dorsal side, asetose; submarginal vein twice as long as marginal; stigmal vein ⅗ as long as marginal; postmarginal vein 1½ times as long as stigmal. Propodeum minutely shagreened, lateral folds complete (pl. I, fig. *A*); median carina extending from anterior margin of propodeum to base of neck; a rather vague, transverse carina extending from midpoint of median carina to midpoint of either lateral fold; gaster elongate, slender, much narrower than propodeum and from 1¼ to 1⅓ times as long as head and thorax combined; basal 3 gastral tergites smooth, a median notch in posterior margin of each; following 3 tergites minutely reticulated, margins entire; each gastral tergite with a patch of flattened hairs on either ventrolateral area.

Male.—Length 2.0–2.5 mm. Head and thorax black, subshining; gaster brown with metallic blue or blue-green iridescence and a large white spot near base; tibiae very slightly or not at all darkened near bases; relative proportions of parts of antenna: Scape 42, pedicel 12, ring segments 2, 2; funicle segments 12, 12, 12, 12, 12, 12, club 30; gaster as long as head and thorax combined.

Type locality.—Mineola, Tex.

Types.—U. S. National Museum No. 10063.

Distribution.—Arizona, Arkansas, California, Delaware, Georgia, Louisiana, Mississippi, North Carolina, Ohio, South Carolina, Texas, Virginia; Mexico; Guatemala; Hawaii (introduced from Guatemala for biological control of *Anthonomus eugenii* Cano).

Hosts.—A primary parasite of bruchids and weevils: *Acanthoscelides bisignatus* (Horn), *A. compressicornis* (Schaef.), *Anthonomus aeneolus* Dietz, *A. albopilosus* Dietz, *A. disjunctus* Lec., *A. eugenii* Cano, *A grandis* Boh., *A. heterothecae* Pierce, *A. nebulosus* Lec., *A. nigrinus* Boh., *A. squamosus* Lec., *A. thurberiae* Pierce, *Gerstaeckeria nobilis* (Lec.), *Rhynchaenus pallicornis* (Say), *Smicraulax tuberculatus* Pierce, *Tachypterellus quadrigibbus* (Say), *Zygobaris xanthoxyli* Pierce; undetermined bruchid in seeds of *Sphaeralcea incana.* Has been thought also to parasitize the larvae of *Pectinophora gossypiella* (Saund.).

Heterolaccus townsendi (Crawford), new combination

(Pl. I, fig. *C*; pl. II, fig. *G*)

Catolaccus townsendi Crawford, 1912, U. S. Natl. Mus. Proc. 43: 172; Timberlake, 1913, Jour. Econ. Ent. 6: 308; Berry, 1947, Jour. Econ. Ent. 40: 801, 803–804; Gahan, 1951, Canad. Ent. 83: 175 [*townsendi*=*hunteri* Crawford].

Since there are small but consistent differences between *townsendi* and *hunteri*, I do not agree with Mr. Gahan that the two are synonymous. It may eventually be shown that the two are geographical subspecies, rather than species. However, as long as they can be separated I prefer to treat them as distinct species. There are in the U. S. National Museum collection long series of each, although all the specimens of *townsendi* came from a small area in Peru.

Female.—Length 2.0–4.2 mm. Head shining black; thorax subshining black; antennae tan; scape and pedicel may be slightly lighter than flagellum; coxae shining black without metallic luster; femora brown with apices yellow; fore and mid tibiae tan with bases and apices yellow; hind tibiae yellow; tarsi yellow with

apical segment of each tarsus slightly darkened; propodeum shining black; gaster brown with iridescent metallic green or blue luster.

Head and thorax densely clothed with flattened, silvery hairs; antennae inserted slightly below middle of face; apex of scape reaching level of anterior ocellus; relative proportions of parts of antenna: Scape 64, pedicel 14, ring segments 3, 3, funicle segments 16, 16, 16, 16, 16, 14, club 32; height of compound eye 1⅘ times as great as width of malar space; postocellar line 1⅘ times as long as ocellocular line. Anterior margin of pronotum acarinate; mesepimeral ridge with a row of relatively widely set, flattened hairs; tuft below tegula made up of 6 to 8 hairs; hind coxa with flattened hairs set densely along anterolateral angle; 6 to 8 long bristles borne near posterolateral angle; mesoscutum 6 times as long as pronotum at meson and slightly longer than mesoscutellum; mesoscutum twice as wide as long; area around stigmal vein of forewing setose, and dorsal space behind marginal vein asetose; submarginal vein 1½ times as long as marginal; stigmal vein ½ as long as marginal; postmarginal vein 1⅔ times as long as stigmal. Propodeum with lateral folds interrupted in the middle; median carina interrupted in the middle; a short, obscure, transverse carina crossing median carina at this point (pl. I, fig. *C*); gaster much narrower than propodeum and from 1½ to 1⅔ times as long as head and thorax combined; 3 basal gastral tergites smooth dorsally; posterior margin of each with a median notch; posterior tergites minutely reticulated and hairy; each gastral tergite with a dorsolateral patch of silvery hair.

Male.—Length 2.6–2.8 mm. Gaster brown with iridescent blue or green reflections and a large white spot near base; fore and mid tibiae only very slightly darkened near bases; relative proportions of parts of antenna: Scape 52, pedicel 12, ring segments 2, 2, funicle segments 14, 14, 14, 12, 12, 12, club 34; gaster as long as head and thorax combined.

Type locality.—Department of Piura, Peru.
Types.—U. S. National Museum No. 14613.
Distribution.—North and middle coastal departments of Peru.
Host.—*Anthonomus vestitus* Boh.

Heterolaccus vulgaris (Ashmead), new combination

Catolaccus vulgaris Ashmead, 1894, Linn. Soc. London, Jour. Zool. 25: 164; Dalla Torre, 1898, Cat. Hym., v. 5, p. 108; Schmiedeknecht, 1909, Genera Insectorum, fasc. 97, p. 356.

It is unfortunate that the only available specimens of this species are those Ashmead had when he described it. Longer series of specimens might show that this is a subspecies of the *hunteri* complex.

Female.—Length 3.0 mm. Head shining black; thorax subshining black; antennal scape and pedicel tan; flagellum brown; coxae black with very faint metallic green iridescence; femora dark brown with apices tan; tibiae and tarsi tan; apical segment of each tarsus slightly darkened; wing veins tan; propodeum shining black; gaster dark brown with metallic blue-green reflections.

Head and thorax clothed with flattened, silvery hairs; apex of antennal scape not quite reaching level of ventral margin of anterior ocellus; relative proportions of parts of antenna: Scape 52, pedicel 14, ring segments 2, 2, funicle segments 10, 12, 12, 10, 10, 10, club 30; height of compound eye 1⅘ times as great as width of malar space; postocellar line 1⅘ times as long as ocellocular line. Anterior margin of pronotum acarinate; mesepimeral ridge with a single row of widely set, flattened hairs; tuft below tegula composed of 6 hairs; hind coxa with flattened hairs densely set along anterolateral angle; 4 long bristles borne near posterolateral angle; length of pronotum at meson ⅓ as long as mesoscutum, the latter twice as wide as long; mesoscutellum as long as mesoscutum; submarginal vein of forewing 1⅘ times as long as marginal, the latter 2⅕ times as long as stigmal; postmarginal vein 1⅔ times as long as stigmal. Propodeum as in *townsendi;* gaster narrower than propodeum and 1⅗ times as long as head and thorax combined.

Male.—Length 2.2 mm. Gaster brown, with very faint metallic green iridescence and a large white spot near base; relative proportions of parts of antennae: Scape 44, pedicel 10, ring segments 1.5, 1.5, funicle segments 10, 10, 10, 10, 9, 9, club 30; gaster as long as head and thorax combined.

Type locality.—St. Vincent Island, British West Indies.
Types.—U. S. National Museum No. 2449.
Distribution.—Grenada Island, St. Vincent Island, British West Indies.
Host.—Unknown.

Genus SCYMNOPHAGUS Ashmead

(Pl. II, fig. *D*)

Scymnophagus Ashmead, 1904, Carnegie Mus. Mem. 1: 319, 321; Schmiedeknecht, 1909, Genera Insectorum, fasc. 97, p. 328, 330, 335; Kurdjumov, 1913, Rev. Russe d'Ent. (Ent. Obozr.) 13: 6 [*Scymnophagus*=*Xenocrepis* Foerster]; Gahan and Fagan, 1923, U. S. Natl. Mus. Bul. 124, p. 131; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 556.

Type.—*Scymnophagus townsendi* Ashmead; monobasic.

Kurdjumov (*9*) stated that *Scymnophagus* was a synonym of *Xenocrepis* Foerster, but the two are separable by several generic characters, the most obvious of which is the grooved cheeks. The genae are deeply excavated in *Scymnophagus*, but they are not at all excavated in *Xenocrepis*.

In this bulletin the species *Tripolycystus cryptognathae* Grlt. is placed as a synonym of *Scymnophagus townsendi*. *T. cryptognathae* is the only American species that has been referred to the genus *Tripolycystus* Dodd (Girault *7*). I have not seen specimens of *sulcatus* Dodd, the Australian species that is the genotype of *Tripolycystus*, but the brief description of the genus agrees with the characterization of a genus that might be the same as *Scymnophagus*. However, it would not be safe to synonymize *Tripolycystus* with *Scymnophagus* on the basis of the description alone, particularly as the grooved cheeks are not mentioned and it is not made clear whether or not the abdomen of *Tripolycystus* is petiolate.

Description.—Head transverse, wider than high and slightly wider than thorax at tegulae; height of compound eye 1½ times as great as width of malar space; antennae inserted in center of face, well above level of ventral margins of compound eyes; apex of antennal scape slightly exceeding level of ventral margin of anterior ocellus; antenna with 3 ring segments and 5 funicle segments; occiput only slightly excavated, its margin acarinate. Pronotum with anterior dorsal margin acarinate, much narrower than mesonotum at tegulae; a deep, vaguely defined and sinuous groove present on either side of pronotum above coxa; costal cell of forewing relatively narrow (pl. II, fig. *D*), asetose dorsally, very sparsely setose ventrally; radial cell asetose, marginal vein thickened and longer than stigmal vein; postmarginal vein longer than marginal; scutellum with a deep cross-furrow just before apex. Propodeum coarsely sculptured; median carina vague or wanting, lateral folds well developed, straight; large, globose neck present; gaster ovate-acuminate, slightly narrower than propodeum; first gastral tergite occupying almost half the dorsal surface of gaster.

SCYMNOPHAGUS TOWNSENDI Ashmead

(Pl. II, fig. *D*)

Scymnophagus townsendi Ashmead, 1904, Carnegie Mus. Mem. 1: 319; Gahan and Peck, 1940, Wash. Acad. Sci. Jour. 30: 316 [*mexicana* Girault=*townsendi*]; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 556.
Xenocrepis mexicana Girault, 1916, Ent. News 27: 227.
Tripolycystus cryptognathae Girault, 1920, U. S. Natl. Mus. Proc. 58: 211; Taylor, 1935, Bul. Ent. Res. 26: 88 [*cryptognathus*]. *New synonymy.*

Female.—Length 1.5–1.7 mm. Head and thorax shining black; antennae tan, with pedicel sometimes slightly darkened on dorsal side; coxae brown at

bases, shading to tan at apices; femora tan with apices yellow; tibiae and tarsi yellow; wing veins tan; propodeum very dark metallic blue; gaster very dark brown; first gastral tergite with metallic blue-green iridescent luster.

Head clothed with short, inconspicuous, golden hairs; thoracic notum with very few, slightly longer, golden hairs; relative proportions of parts of antenna: Scape 35, pedicel 10, ring segments 1.25, 1.25, 1.5, funicle segments 6.5, 8, 8, 8, 8, club 24; height of compound eye 1½ times as great as width of malar space; malar furrow deep, well marked from base of mandible to compound eye; postocellar line 1⅓ times as long as ocellocular line. Maximum dorsal width of pronotum ¾ as great as width of mesonotum at tegulae; median length of pronotum ⅓ as great as length of mesoscutum; median lengths of mesoscutum and mesoscutellum equal; mesoscutum twice as wide as long; mesepimeral ridge with only 3 or 4 hairs; space below tegula smooth, shining, asetose; hind coxa with 2 or 3 irregular rows of fairly long hairs along anterolateral angle; 4 or 5 long bristles borne near posterolateral angle; submarginal vein of forewing 2⅔ times as long as marginal; stigmal vein ¾ to ⅘ as long as marginal; postmarginal vein 1½ times as long as marginal. Propodeum with median carina vaguely indicated, virtually or wholly wanting in some specimens, lateral folds well developed, straight; transverse carinae absent; gaster smooth and asetose dorsally; posterior margins of tergites entire; first gastral tergite as long as following 4 tergites combined; gaster slightly longer than head and thorax combined.

Male.—Length 1.0–1.2 mm. Head faintly metallic blue; thorax shining black; gaster colored as in female; relative proportions of parts of antenna: Scape 26, pedicel 10, ring segments 1.25, 1.25, 1.5, funicle segments 8, 8, 8, 8, 8, club 22; gaster slightly longer than head and thorax combined, slightly narrower than propodeum.

Distribution.—California, Georgia, Indiana, South Carolina, Virginia, Washington, Wisconsin; San Luis Potosí and Nuevo Leon, Mexico; Trinidad, British West Indies; Yokahama, Japan.

Hosts.—A primary parasite of coccinellids, emerging from the pupae: *Azya trinitatis* Marsh., *Cryptognatha nodiceps* Marsh., *C. similima* Sicard, *Hyperaspis lateralis* Muls., *Hyperaspis* sp., *Pentilia insidiosa* Muls., *Scymnus guttulatus* Lec., *Scymnus* sp.

Genus PSEUDOCATOLACCUS Masi

(Pl. I, fig. *E*; Pl. II, fig. *F*)

Pseudocatolaccus Masi, 1908, Portici Lab. Zool. Gen. e Agr. Bol. 3: 138; Schmiedeknecht, 1909, Genera Insectorum, fasc. 97 p. 328, 330, 355; Kurdjumov, 1913, Rev. Russe d'Ent. (Ent. Obozr.) 13: 7; Gahan and Fagan, 1923, U. S. Natl. Mus. Bul. 124, p. 123; Masi, 1937, Festschr. Prof. Dr. Embrik Strand, v. 3, p. 369; Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 559; Nikolskaya, 1952, Akad. Nauk. U. S. S. R., Chalc. Fauna, p. 226.

Type.—*Pseudocatolaccus asphondyliae* Masi; monobasic.

Description.—Head transverse, wider than high and slightly wider than thorax at tegulae; height of compound eye approximately equal to width of malar space; antennae inserted at, or very slightly below, middle of face; antenna with 3 ring segments, the third of which is the longest, and 5 funicle segments; ocellocular line longer than postocellar line; occiput broadly excavated, its margin acarinate. Pronotum much narrower than mesonotum at tegulae; antero-dorsal margin of pronotum acarinate; deep, medianly angled groove present on either side of pronotum, just above coxa; costal cell of forewing broadened, asetose or sparsely setose ventrally, asetose dorsally; radial cell bare; stigmal vein slightly shorter than marginal and with enlarged knob; postmarginal vein longer than stigmal; scutellum with very obscure cross-furrow before apex. Propodeum (pl. I, fig. *E*) with surface irregularly carinulate, interstices smooth and shining; median carina of propodeum wanting, lateral folds strong, complete; neck wanting; gaster as wide as propodeum and slightly longer than head and thorax combined.

The male antenna has 2 ring segments and 6 funicle segments.

PSEUDOCATOLACCUS AMERICANUS Gahan

Pseudocatolaccus americanus Gahan, 1919, Ent. Soc. Amer. Ann. 12: 164, Peck *in* Muesebeck *et al.*, 1951, U. S. Dept. Agr. Monog. 2, p. 559.

Female.—Length 2.0–2.5 mm. Head dark iridescent blue or blue-green; thorax dark iridescent green, in occasional specimens head and thorax with bronzy or dark violaceous reflections; antennae tan, dorsal side of pedicel may be darkened; wing veins yellow; coxae dark brown; femora brown with apices tan; tibiae light brown with bases and apices yellow or tan; tarsi yellow or tan; propodeum shining metallic green; basal gastral tergite metallic blue-green; following tergites dark brown with metallic green or blue-green iridescent reflections.

Head and thorax clothed with inconspicuous silvery hairs; antennae inserted in center of face; apex of scape not reaching level of ventral margin of anterior ocellus; relative proportions of parts of antenna: Scape 46, pedicel 14, ring segments 2, 2, 3, funicle segments 12, 12, 12, 10, 10, club 25; height of compound eye 1⅓ times as great as width of malar space; postocellar line ⅔ as long as ocellocular line. Maximum dorsal width of pronotum ⅝ as great as width of mesonotum at tegulae; median length of pronotum ⅓ as great as length of mesoscutum, the latter twice as wide as long; scutellum 1⅓ times as long as mesoscutum; forewing with submarginal vein slightly less than twice as long as marginal vein, marginal 1⅔ times as long as stigmal, postmarginal 1⅔ times as long as stigmal; mesepimeral ridge with a single, slightly irregular row of inconspicuous hairs; space below tegula smooth and shining, asetose; hind coxa with 2 or 3 irregular rows of short, weak hairs along anterolateral angle; 4 or 5 long bristles borne near posterolateral angle. Propodeum with a dense patch of long, silvery hair at either lateral margin; first gastral tergite with surface smooth and a very minute notch at meson of posterior margin, following tergites minutely reticulated and posterior margins entire; gaster slightly longer than head and thorax combined.

Male.—Length 1.75–2.0 mm. Head and thorax bright metallic green, occasionally blue-green; propodeum shining metallic blue-green; gaster brown; first tergite with metallic blue-green reflections; relative proportions of parts of antenna: Scape 22, pedicel 12, ring segments 1, 1, funicle segments 10, 10, 11, 11, 11, 11, club 20; apex of scape slightly exceeding level of ventral margin of anterior ocellus; gaster slightly shorter than head and thorax combined and narrower than propodeum.

Type locality.—Tempe, Ariz.

Types.—U. S. National Museum No. 22299.

Distribution.—Arizona, Idaho, Texas.

Hosts.—A primary parasite of *Asphondylia websteri* Felt. It has also been reared from undetermined galls on *Bidens frondosa*, a beggar-tick.

Genus PROTOLACCUS, new genus

(Pl. I, fig. *B*; pl. II, fig. *H*)

Description.—Head almost round when viewed in anterior aspect, only very slightly wider than high; height of compound eye slightly less than twice as great as width of malar space; antennae inserted very near center of face, well above level of ventral margins of compound eyes; antenna with 3 ring segments, the third of which is the longest, and 5 funicle segments; postocellar line longer than ocellocular: occiput slightly excavated, its border acarinate. Pronotum slightly narrower than mesonotum at tegulae and its anterior margin carinate; deep, curved groove on either side of pronotum above coxa; costal cell of forewing narrow, asetose; radial cell asetose; marginal vein not thickened and much longer than stigmal vein, the latter not having a greatly enlarged knob; postmarginal vein slightly longer than stigmal; space behind marginal vein asetose dorsally, ventrally with 1 or 2 irregular rows of bristles; scutellum entirely lacking a cross-furrow near apex. Propodeum minutely reticulated, surface dull; median carina strong, extending from base of propodeum to base of neck, lateral folds present only on anterior half of propodeum; transverse carinae extending from midpoint of median carina to end of either lateral carina; propodeal neck well developed, globose; posterior margin of first gastral segment produced on dorsal meson as a

right-angled projection; following 2 tergites each with a notch at meson of posterior margin; fourth tergite with a smaller median notch; following tergites with posterior margins entire; gaster longer than head and thorax combined.

The antenna of the male has 2 ring segments and 6 funicle segments.

Type.—*Neocatolaccus syrphidis* Girault; present designation.

In Kurdjumov's key to the genera of the Pteromalinae (*9*) this genus will run to *Merisoides* Masi. *Protolaccus*, however, differs in several significant characteristics from *Merisoides* as described by Masi (*10*). In *Protolaccus* the antennae are inserted far above the level of the ventral margins of the compound eyes, but in *Merisoides* they are inserted at that level; in *Protolaccus* the marginal vein of the forewing is much longer than the stigmal vein, but in *Merisoides* the two are of nearly the same length; in *Protolaccus* the propodeum has a median carina and transverse carinae and the lateral folds extend only half the length of the propodeum, but in *Merisoides* the propodeum lacks both median and transverse carinae and the lateral folds are complete.

As originally described, *Merisoides* was said to be related to *Callitula* Spinola (=*Micromelus* Wlkr.) and *Homoporus* Foerst., both of which are now placed in the tribe Merisini. *Protolaccus* clearly belongs in the Pteromalini. It is probable that the proper placement of *Merisoides* is in the Merisini, but there is no information available about this genus in addition to that given in its original description. *Merisoides* was characterized for a species described from a single specimen, and that specimen has since been lost (Masi *11*).

KEY TO SPECIES

Femora dark brown to black with faint metallic luster, apices tan ..... *syrphidis* (Girault)

Femora entirely yellow ..... *bacchadis*, new species

PROTOLACCUS SYRPHIDIS (Girault), new combination

(Pl. I, fig. *B*; pl. II, fig. *H*)

Neocatolaccus syrphidis Girault, 1916, Ent. News 27: 403.

Female.—Length 1.5–2.0 mm. Head black with faint metallic blue luster; thorax dull black dorsally, faintly metallic blue laterally; apex of mesoscutellum metallic blue; antennal scape and pedicel yellow; flagellum light to dark brown; wing veins tan, coxae dark metallic blue; femora dark brown to black with faint metallic blue luster, apices tan; tibiae tan with apices yellow; tarsi yellow; propodeum black with metallic blue highlights; gaster dark brown with metallic blue luster.

Head and thorax clothed with flattened silvery hairs; antennae inserted slightly below center of face; apex of scape reaching level of ventral margin of anterior ocellus; relative lengths of parts of antenna: Scape 52, pedicel 10, ring segments 1, 2, 3, funicle segments 15, 14, 14, 12, 10, club 30; height of compound eye 1¾ times as great as width of malar space; malar furrow present, but obscure; postocellar line 1½ times as long as ocellocular line. Maximum dorsal width of pronotum ⅔ as great as width of mesoscutum at tegulae; median length of pronotum ⅓ as great as length of mesoscutum, the latter twice as wide as long; mesoscutellum ⅚ as long as mesoscutum; submarginal vein of forewing 1⅔ times as long as marginal; stigmal vein ½ as long as marginal; postmarginal vein ⅛ longer than stigmal; 1 irregular row of bristles on ventral side of wing behind marginal vein; mesepimeral ridge with a single row of short, flattened hairs; space below tegula smooth, shining, asetose; hind coxa with a patch of flattened hairs near dorsolateral angle, these hairs continued down anterolateral angle of coxa as a single row; 5 or 6 long bristles near posterolateral angle of coxa. Propodeum

with surface reticulated, subshining; neck shining; median carina complete, extending from base of propodeum to base of neck; transverse carinae sharp in median area of propodeum, becoming less well marked near lateral folds; a patch of relatively long, slender hairs borne at either lateral margin of propodeum; gaster slightly narrower than propodeum, 1½ times as long as head and thorax combined.

Male.—Length 1.5–2.0 mm. Head and mesoscutum dark metallic blue-green; mesoscutellum black with apex dark metallic blue-green; front and middle coxae from very dark brown to black; hind coxae dark metallic blue; front and middle legs beyond coxae yellow; hind femora brown with apices yellow; hind legs beyond coxae otherwise yellow; propodeum very dark metallic blue-green; gaster brown with a large yellow spot near base; apex of antennal scape reaching level of vertex; relative proportions of parts of antenna: Scape 50, pedicel 9, ring segments 2, 2, funicle segments 16, 16, 16, 16, 14, 12, club 26; gaster narrower than propodeum and slightly shorter than head and thorax combined.

The statement in the original description that this species has 2 apical spurs on the hind tibia is incorrect.

Type locality.—Trinidad, British West Indies.

Types.—U. S. National Museum No. 20224.

Distribution.—Cuba, Trinidad, British West Indies, Mexico, Guatemala, Panama Canal Zone, Venezuela.

Hosts.—A primary parasite of syrphid flies, emerging from the puparia; it has been reared from *Syrphus* (*s. l.*) sp. and *Baccha* sp.

PROTOLACCUS BACCHADIS, new species

Female.—Length 2.0–2.5 mm. Head and thorax dark metallic green, blue-green, or blue; antennal scape and pedicel tan or yellow; flagellum very light brown; wing veins tan; coxae black, with metallic green or blue reflections, shading to tan or yellow at apices; legs beyond coxae yellow; propodeum shining black with metallic green or blue-green reflections; gaster very dark brown with metallic green or blue-green reflections.

Head and thorax clothed with short, flattened, silvery hairs; antennae inserted slightly below middle of face; apex of scape reaching level of ventral margin of anterior ocellus; relative proportions of parts of antenna: Scape 58, pedicel 12, ring segments 2, 2, 4, funicle segments 18, 14, 12, 12, 10, club 26; height of compound eye 1¾ times as great as width of malar space; malar furrow present, well marked; postocellar line 1½ times as long as ocellocular line. Maximum dorsal width of pronotum ⅝ as great as width of mesonotum at tegulae; length of pronotum at meson ⅛ as great as length of mesoscutum, the latter twice as wide as long; mesoscutum and mesoscutellum equally long; submarginal vein of forewing 1½ times as long as marginal; marginal vein 2⅓ times as long as stigmal; postmarginal vein ⅔ as long as marginal; 1 irregular row of bristles on ventral side of wing behind marginal vein; mesepimeral ridge with a single row of short, closely set hairs; space below tegula smooth, shining, asetose; hind coxa with a patch of hair at dorsolateral angle, these hairs continued down anterolateral angle as a single row; 6 long bristles borne near posterolateral angle. Propodeum with surface reticulated, dull or subshining; neck subshining; median carina rather vaguely indicated, only discernible in some specimens, although clearly marked in others; transverse carinae vague; gaster as wide as propodeum, varying from as long as to ¾ as long as head and thorax combined.

Male.—Length 1.5–2.2 mm. Head and thorax very dark metallic green, with mesoscutellum usually black; antennal scape white at base, shading to tan at apex; gaster brown with a large white spot near base; apex of scape reaching level of vertex; relative proportions of parts of antenna: Scape 52, pedicel 10, ring segments 2, 2, funicle segments 18, 18, 14, 14, 14, 14, club 26; gaster slightly narrower than propodeum and varying from ¾ as long as to almost as long as head and thorax combined.

Type locality.—Mayaguez, Puerto Rico.

Types.—U. S. National Museum No. 62051.

Described from 36 female and 4 male specimens as follows: Holotype female and 6 female paratypes, Mayaguez, Puerto Rico, Apr. 28,

1939, reared from puparia of *Baccha capitata* Loew, H. K. Plank; allotype male and 6 female paratypes, Isabela and Lares, Puerto Rico, Aug.–Sept. 1935, F. Sein; 2 male paratypes, Baraguá, Cuba, Aug. 30, 1929, reared from *Mesogramma polita* (Say), T. C. Scaramuzza; 3 female paratypes, San Sebastian, Puerto Rico, Jan. 18, 1940, reared from undetermined syrphid puparium, Martorell; 5 female paratypes, Santiago de las Vegas, Cuba, Apr. 20, 1931, reared from syrphid (*Baccha*?) puparium, A. Otero; 1 male and 9 female paratypes, Mayaguez, Puerto Rico, July 1908, reared from syrphid predaceous on "coffee aphid," Fawcett; 6 female paratypes, San Pedro de Montes de Oca, Costa Rica, June 1931, reared from undetermined syrphid puparia, C. H. Ballou.

Hosts.—This species is a parasite of both predaceous and phytophagous syrphid flies, emerging from the puparia. Several specimens emerge from a single syrphid puparium, through several emergence holes. Dissection of syrphid puparia from which specimens of this species had emerged showed no signs that they had been occupied by some other parasite on which this one might have developed as a secondary parasite. It is fairly certain, therefore, that *bacchadis* is a primary parasite.

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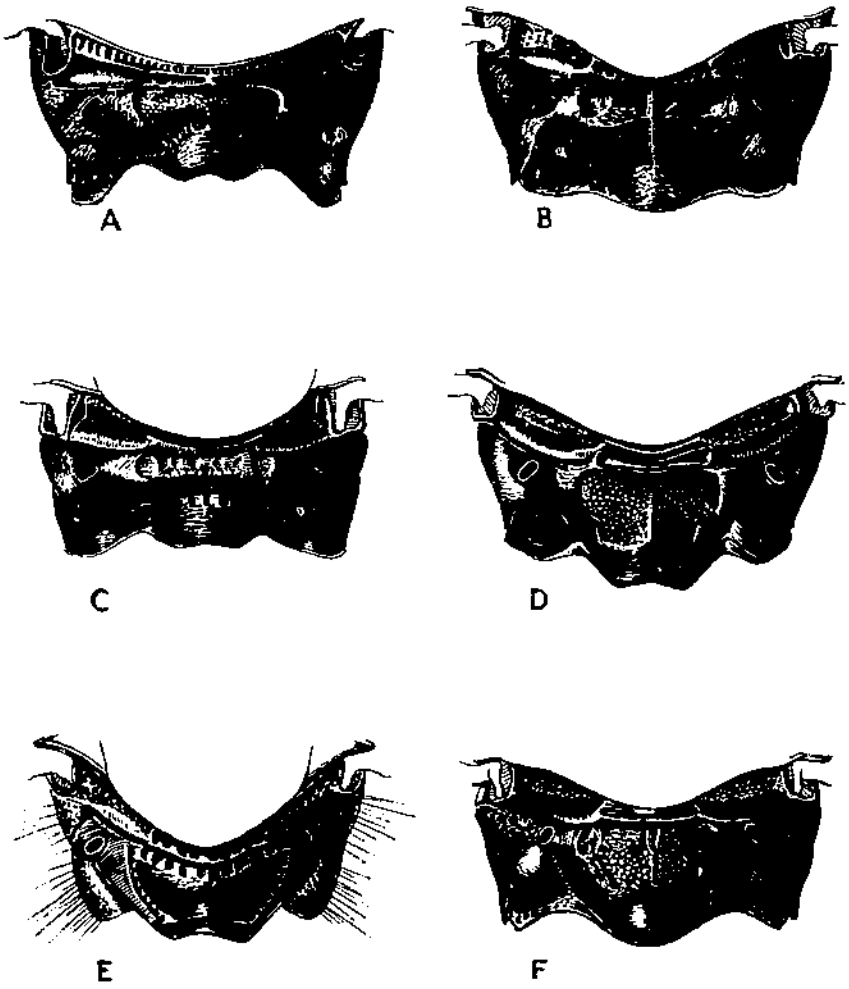

Plate I.—Posterior aspect of the propodeum of species of the *Cotolaccus* group of genera: *A*, *Heterolaccus hunteri*; *B*, *Prololaccus syrphidis*; *C*, *Heterolaccus townsendi*; *D*, *Cotolaccus aeneoviridis*; *E*, *Pseudocotolaccus asphondyliae*; *F*, *Cotolaccus victoria*.

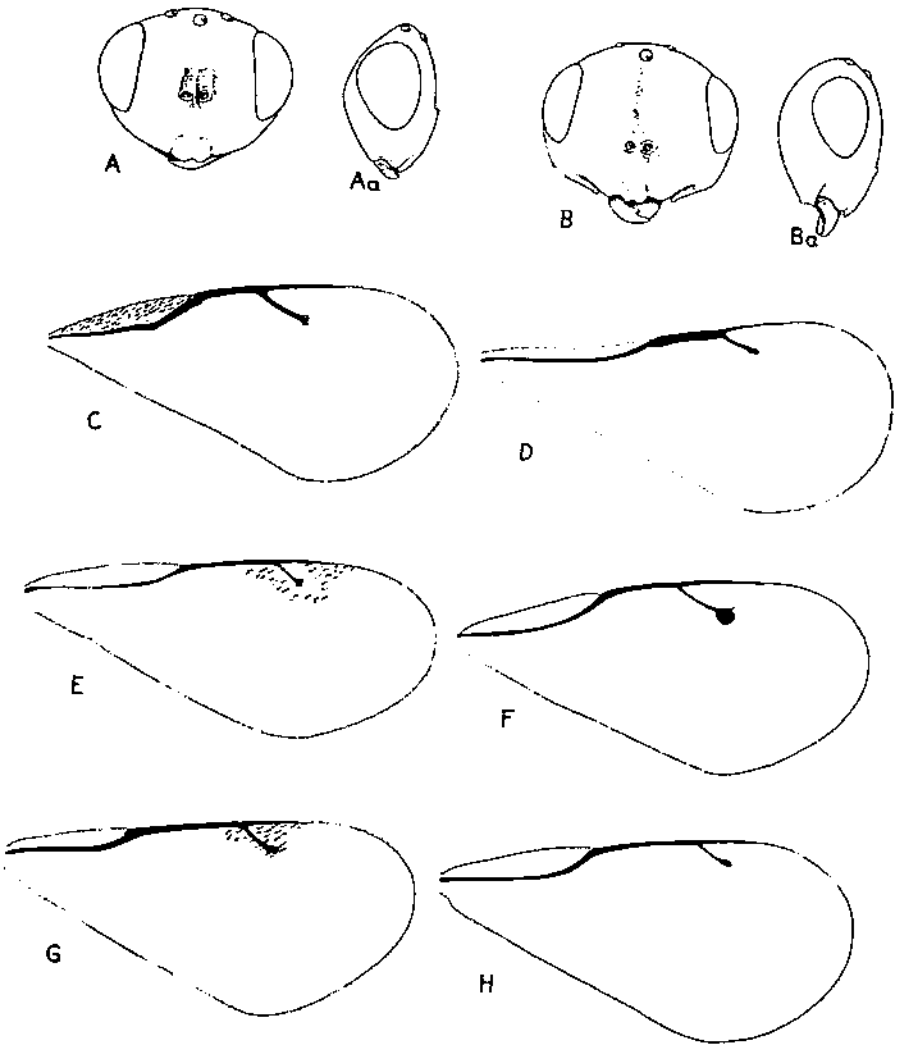

Plate II.—*A*, anterior and *Aa*, lateral aspect of head of *Zatropis catalpae*; *B*, anterior and *Ba*, lateral aspect of head of *Catolaccus ater* (=*C. cavigena*); Forewing, *C*, of *C. ater*; *D*, of *Scymnophagus townsendi*; *E*, of *Heterolaccus hunteri*; *F*, of *Pseudocatolaccus asphondyliae*; *G*, of *Heterolaccus townsendi*; *H*, of *Protolaccus syrphidis*.

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