

## AULACIDAE (HYMENOPTERA) IN THE MID-ATLANTIC STATES, WITH A KEY TO SPECIES OF EASTERN NORTH AMERICA

DAVID R. SMITH

Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, % National Museum of Natural History, MRC 168, Washington, DC 20560, U.S.A.

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*Abstract.*—Sixteen species of Aulacidae occur in eastern North America, 15 of which are found in the mid-Atlantic region, six species of *Aulacus*, including *A. schiffi*, n. sp., from Maryland, and nine species of *Pristaulacus*. Known hosts are wood-boring Coleoptera and Hymenoptera. A key is given for the species of eastern North America, and seasonal flight activity, distributions, and hosts are presented for each species occurring in the mid-Atlantic states. This study is based on 790 specimens of 13 species collected at ten sites in Maryland, Virginia, and West Virginia.

*Key Words:* *Aulacus*, *Pristaulacus*, parasitoids, Xiphodriidae, Buprestidae, Cerambycidae

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Species of Aulacidae are parasitoids of wood-boring insects. Hosts are not certain for many, but some *Aulacus* are associated with *Xiphodria* spp. (Hymenoptera: Xiphodriidae), and some *Aulacus* and most *Pristaulacus* are associated with wood boring Coleoptera, especially Buprestidae and Cerambycidae. Most are more commonly reared than collected in the field. From 13 years of Malaise trapping at various sites in Maryland, Virginia, and West Virginia, I have collected 790 specimens of 13 of the 15 species that occur in the mid-Atlantic states and of the 16 species that occur in eastern North America. This includes two new species, the previously described *A. impolitus* Smith (1991) and *A. schiffi* described below. Thirty aulacid species are known in North America north of Mexico, 9 of *Aulacus* and 21 of *Pristaulacus*. Here I give a key to eastern North American species, present seasonal flight activity based on my collections in the mid-Atlantic states, and review distributions and hosts for each species.

### MATERIALS AND METHODS

Most collections were made by Townes-style Malaise traps (Townes 1972), using 95% ethyl alcohol as a killing agent; for those in Allegany Co., Maryland, and Randolph Co., West Virginia, potassium cyanide was used as a killing agent; and those in Randolph Co. were Cornell-style Malaise traps. Traps were in continuous operation from March or April through October or November, depending on the site, and usually serviced every ten days to two weeks or sometimes longer intervals depending on the weather and time of season. Trapping was at ten collecting sites from the coastal plain to the Appalachians. The localities, dates of operation, and number of traps used per year are as follows: MARYLAND: Allegany Co., Green Ridge State Park, 5 mi E Flintstone (1991-1993; 6 traps); Garrett Co., Finzel Swamp, 1 km S Finzel (1992-1993, 2 traps); Prince George's Co., Beltsville Agricultural Research Center, 3-6 mi E Beltsville (1991-1993, 3 or 4 traps).

VIRGINIA: Essex Co., 1 mi SE Dunnsville (1991–1994, 12–16 traps); Clarke Co., University of Virginia Blandy Experimental Farm and State Arboretum of Virginia, 2 mi S Boyce (1990–1994, 5–11 traps); Louisa Co., 4 mi S Cuckoo (1987–1989, 4–12 traps); Fairfax Co., near Annandale (1982–1994, 1 trap [backyard]). WEST VIRGINIA: Tucker Co., Fernow Experimental Forest, 3 mi S Parsons (1991–1993, 20 traps); Hardy Co., 3 mi NW Mathias (1994, 2 traps); Randolph Co., south of Dolly Sods Picnic Area (1993, 3 traps). In the specimens examined sections, reference to these sites is by state and county, and years are given for inclusive dates only if one or several specimens were captured.

For references to original descriptions and synonyms, see Townes (1950) and Carlson (1979). The key is adapted from Townes (1950). Distribution records are from Townes (1950), from specimens in the National Museum of Natural History, or from collections I have examined (see acknowledgments). Information in the specimens examined sections are from my collections. Length measurements exclude the antennae and ovipositor. All figures are of females except for *Pristaulacus violaceus*. Specimens from my collections are in the National Museum of Natural History, Washington, D.C.

KEY TO GENERA AND SPECIES

- 1. Tarsal claws apparently simple, each with a minute subapical tooth near base, difficult to see; occipital carina absent; small species, length usually less than 7 mm (except *A. im-politus*); wings usually uniformly hyaline or slightly darkish (*Aulacus*) . . . . . 2
- Tarsal claws with two or more distinct subapical teeth; occipital carina present as a narrow rim or broad upturned flange; usually larger species, length more than 8 mm; wings various but commonly with dark spots and sometimes uniformly black or black with a yellow cross band (*Pristaulacus*) . . . . . 7
- 2. Frons without wrinkles; back of head without wrinkles in position of occipital carina; hind-coxa of female without a projecting ventral lobe; probably parasites of Coleoptera . . . . . 3
- Frons with reticulate ridges or with transverse

- wrinkles anteriorly (Figs. 7, 9, 12, 15); back of head with concentric wrinkles in position of occipital carina; hindcoxa of female with a ventral lobe projecting well beyond trochanter socket (as in Fig. 6); parasites of *Xiphodria* . . . . . 4
- 3. Head and mesosoma finely granular, dull; entirely reddish brown; ovipositor sheath about 0.8× forewing length; length, 7.5–9.0 mm (Figs. 1, 2) . . . . . *A. im-politus* Smith
- Head smooth and shining, mesosoma shiny with reticulations or ridges; almost entirely black; ovipositor sheath about 0.5× forewing length; length, 6 mm (Figs. 3–5) . . . . . *A. schiffi*, n. sp.
- 4. Reticulate or transverse wrinkling of frons coarse and extending almost to middle ocellus (Fig. 7); sides of pronotum with some coarse rugosities in addition to finer rugosities and some punctation; apex of metasoma usually black; mesosoma black, sometimes part of pronotum dark orange; head usually black . . . . . *A. pallipes* Cresson
- Wrinkling of frons mostly transverse, fine and confined mostly to its anterior portion, sometimes reticulate but rarely extending close to middle ocellus (Figs. 9, 12, 15); sides of pronotum punctate or shining and partly finely rugose, without coarse rugosities; metasoma pale, rarely blackish at apex; mesosoma orange to reddish or black; head usually pale, sometimes blackish dorsally . . . . . 5
- 5. Apical process of female hindcoxa (as in Fig. 6) more than 1.4× as long as wide; mesosoma black, sometimes pronotum partly orange; wrinkles on anterior part of frons irregular, more or less transverse, surface between wrinkles more punctate (Fig. 9) (ovipositor sheath about 0.9× forewing length; side of mesosoma dull, granular between sculpture . . . . . *A. digitalis* Townes
- Apical process of female hindcoxa less than 1.4× as long as wide; mesosoma usually pale; transverse wrinkles on anterior part of frons various, usually straighter, with surface shining or finely punctate (Figs. 12, 15) . . . . . 6
- 6. Hindfemur about 5× as long as wide; frons smooth and more distinctly punctate, without anterior fine longitudinal wrinkles or group of wrinkles (Fig. 12); side of mesosoma granular, dull between sculpturation; orange or with thorax all or partly and top of head sometimes blackish; forewing with cell 1 + 2Rs receiving vein 2m-cu usually well beyond its middle; ovipositor sheath about 0.5× as long as forewing (Fig. 10) . . . . . *A. lovei* Ashmead
- Hindfemur about 6× as long as wide; frons with more wrinkles and less distinctly punctate, usually with an anterior median fine lon-



Figs. 1-5. *Aulacus implitus*. 1, Lateral view. 2, Dorsal view of head and anterior mesosoma. Length, ca. 8 mm. *A. schiffi*. 3, Lateral view. 4, Mesosoma, lateral view. 5, Dorsal view of head and anterior mesosoma. Length, 6 mm.

gitudinal wrinkle, or group of wrinkles (Fig. 15); side of mesosoma shinier between scul-  
 pturation; entirely orange yellow; forewing with  
 cell 1 + 2Rs receiving vein 2m-cu at or a little  
 beyond its middle; ovipositor sheath about

0.75× as long as forewing (Fig. 13) . . . . .  
 . . . . . *A. burquei* Provancher  
 7. Forewing black or black with a yellow cross  
 band (Figs. 16-18) . . . . . 8  
 - Forewing hyaline, subhyaline or suffused

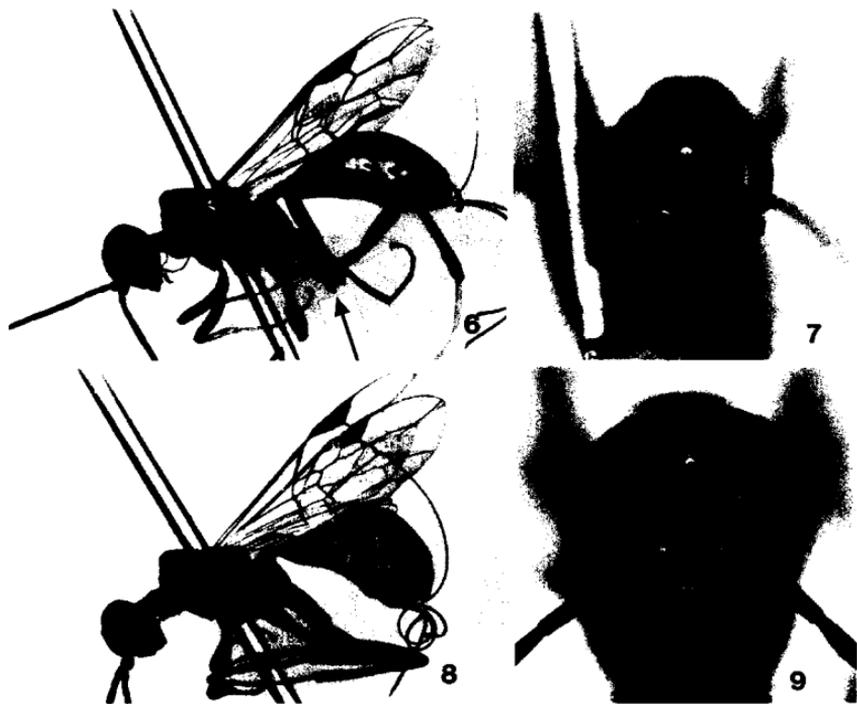
- with reddish brown, with or without dark spots or bands (Figs. 23, 28, 30, 34, 37) . . . 9
8. Forewing with a median yellowish cross band; tibiae and tarsi black (Figs. 16, 17) . . . . .  
 . . . . . *P. fasciatus* (Say)  
 - Forewing entirely black; tibia and tarsi yellow (Fig. 18) . . . . . *P. violaceus* (Bradley)
9. Tarsal claws with a subapical large tooth and a subapical small tooth; forewing uniformly hyaline or slightly blackish, without spots (Fig. 23) (hindfemur black to dark brown) . . 10  
 - Tarsal claws with three to four subapical teeth, of which the basal tooth is small; forewing nearly always with a dark spot below stigma and often with dark apical spot (Figs. 28, 30, 34, 37) . . . . . 11
10. Side of mesosoma and hindcoxa polished with moderately coarse sculpture (Fig. 20); propleuron not distinctly punctured, shiny; posterior half of top of head with sparse fine punctures; hindtarsus whitish to light brown; apical half of female metasoma ferruginous, sometimes a little infuscate; first metasomal tergum (excluding the partly fused second tergum) of female about 1.5× as long as wide, of male about 1.9× as long as wide . . . . .  
 . . . . . *P. rufitarsis* (Cresson)  
 - Side of mesosoma and hindcoxa rather opaque and finely sculptured (Fig. 22); propleuron distinctly punctured; posterior half of top of head with dense fine punctures; hindtarsus dark brown; apical half of female metasoma black; first metasomal tergum (excluding the partly fused second tergum) of female about 1.3× as long as wide, of male about 1.5× as long as wide . . . . .  
 . . . . . *P. bilobatus* (Provancher)
11. Front margin of pronotum with a forward projecting, triangular tooth just above its midlength . . . . . 12  
 - Front margin of pronotum without a distinct tooth near its midlength (but sometimes with an indistinct tooth near top) . . . . . 13
12. Upper face of hindcoxa smooth, without cross wrinkles; tarsal claws with three subapical teeth; forewing with large dark spot below stigma and small apical dark spot (as in Fig. 30); hindfemur black, tibiae and fore- and midfemora yellow; occipital carina a narrow rim, less than 0.2× diameter of first flagellar segment (Fig. 25) . . . . . *P. flavicrurus* (Bradley)  
 - Upper face of hindcoxa with cross wrinkles; tarsal claws with four subapical teeth; forewing with small dark spot below stigma and small dark spot at central basal area (Fig. 28); femora and tibiae concolorous, legs beyond trochanters fulvous to black; occipital carina produced as a flange, somewhat reflexed, about 0.3× diameter of first flagellar segment (Fig. 27) . . . . . *P. niger* (Shuckard)
13. Upper side of hindcoxa smooth, without cross wrinkles; propleuron without distinct punctures (substigmatal spot of forewing large, Fig. 30) . . . . . *P. strangaliae* (Rohwer)  
 - Upper side of hindcoxa with more or less distinct cross wrinkles; propleuron with weak to strong punctures . . . . . 14
14. Occipital carina a reflexed flange that is about 0.4× as wide as basal flagellar segment and head behind eyes in dorsal view strongly convex (Fig. 33); wings slightly blackish, substigmatal spot broad (Fig. 34) . . . . .  
 . . . . . *P. resutorivorus* (Westwood)  
 - Occipital carina a narrow rim, not more than 0.2× as wide as basal flagellar segment and head behind eyes in dorsal view less strongly convex (Fig. 36); wings hyaline, with narrow substigmatal spot (Fig. 37) . . . . . 15
15. Head from above narrowing behind eyes, distance from eye to occiput less than eye length (Fig. 36); mesoprescutum with distinct distinct, high transverse ridges (widely distributed in eastern North America) . . . . .  
 . . . . . *P. stigmatarius* (Cresson)  
 - Head from above long and with sides almost parallel behind eyes, distance from eye to occiput more than eye length; mesoprescutum smooth, without or with very weak transverse ridges (Maine, Ontario, Manitoba) . . . . .  
 . . . . . *P. canadensis* (Townes)

*Aulacus burquei* (Provancher)  
 (Figs. 13–15, 38)

Diagnosis.—Uniformly orange to yellow; fine transverse wrinkles of frons confined to anterior region and mostly shining between, usually with fine median longitudinal carina; side of mesosoma shiny between sculpturation; hindfemur about 6× longer than wide; projecting ventral lobe of female hindcoxa about 1.2× longer than wide; ovipositor sheath about 0.7× length of forewing.

Distribution.—Indiana, Maine, Maryland, Michigan, New Hampshire, New York, Nova Scotia, Ontario, Pennsylvania, Quebec, Virginia.

Specimens examined.—Total: 63. MARYLAND: Prince George's Co., 3–15.V to 14–24.VI (10). VIRGINIA: Clarke Co., 22–31.V.1991, 3–15.VI.1992 (3; plus several reared by N. Schiff from *Acer*



Figs. 6-9. *Aulacus pallipes*. 6, Lateral view (arrow shows projecting ventral lobe of hindcoxa of female). 7, Anterior view of head. Length, ca. 7 mm. *Aulacus digitalis*. 8, Lateral view. 9, Anterior view of head. Length, ca. 7 mm.

branches containing *Xiphydria maculata*, maple branches collected 7.IV.1993, emerged 27.IV.1993 in lab); Essex Co., 15-28.V.1993, 10-27.VII.1993, 11-21.VI.1994 (4); Fairfax Co., 1-5.V to 25.VI-1.VII, most in May (39); Louisa Co., 13-27.V to 13-27.VII, most in May (7).

Hosts.—*Xiphydria maculata* Say (Xiphydriidae) in *Acer*. Above rearing from Clarke Co. From *Xiphydria* in *Acer* (Maryland); collected while ovipositing in *Acer* (New Hampshire); from *Xiphydria maculata* in *Acer* (Pennsylvania) (Townes 1950). From *Xiphydria maculata* in *Acer* and from *Carpinus caroliniana* Walt. in Indiana (Deyrup 1984).

Discussion.—Flight records for this spe-

cies are from the first of May to the end of June, with the peak flight from mid-May through the first third of June (Fig. 38). Its flight coincides with the flight time of its host, *Xiphydria maculata*, which I have also collected at each of the above sites at about the same time. Deyrup (1984) reported both *A. burquei* and *A. digitalis* parasitizing *X. maculata* in Indiana. Even though there are several morphological differences separating the species, he found no ecological difference to explain the co-existence of both species. I have found both *Aulacus* species in the same habitats in the same traps. Nathan Schiff (personal communication) has also reared both species from *Acer* branches taken from the same site (see Clarke Co. records).

*Aulacus digitalis* Townes  
(Figs. 8, 9)

Diagnosis.—Head brownish, darker above and behind; mesosoma dark brown to blackish; metasoma reddish with first segment black basally; legs light brown to blackish with second trochanters, extreme apices of femora, fore- and midtibiae, and tarsi paler; transverse wrinkles on frons confined to anterior part irregular, suffused with fine punctures; side of mesosoma dull between sculpturation; hindfemur about 5× longer than wide; projecting ventral lobe of female hindcoxa 1.4× or more longer than wide; ovipositor sheath about 0.9× forewing length

Distribution.—Connecticut, Indiana, Maryland, Massachusetts, Ohio, Ontario, Pennsylvania, Quebec, Virginia, West Virginia.

Specimens examined.—Total: 13. MARYLAND: Allegany Co., 10–20.VI.1993 (1); Prince George's Co., 24.V–3.VI.1991 (2). VIRGINIA: Clarke Co. (specimens reared by N. Schiff from *Acer* branches containing *Xiphydria maculata*, maple branches collected 7.IV.1993, emerged 27.IV.1993 in lab); Essex Co., 10–23.VI.1993 (2); Fairfax Co., 22–29.V to 12–20.VI (7); Louisa Co., 19–29.VI.1988 (1).

Hosts.—*Xiphydria maculata* in *Acer*, including the rearing above from Clarke Co. Emerged from dead wood (Connecticut); from *Xiphydria maculata* in *Acer saccharinum* L. (Connecticut); "reared from host in *Malus pumila*" (Connecticut); reared from host in dead *Acer* (Connecticut); reared from host in *Acer saccharum* Marsh. (West Virginia) (Townes 1950). From *Xiphydria maculata* in *Acer* from Indiana (Deyrup 1984).

Discussion.—I have found this species from the end of May to the end of June, a similar seasonal pattern as in *A. burquei* (see discussion under *A. burquei*).

*Aulacus impolitus* Smith  
(Figs. 1, 2)

Diagnosis.—Entirely reddish brown to orange; head and mesosoma dull, with fine,

granular surface sculpture; female hindcoxa without projecting ventral lobe; ovipositor sheath about 0.8× forewing length.

Distribution.—Virginia.

Specimens examined.—Total: 52. VIRGINIA: Clarke Co., 26.IV–9.V to 3–15.VI (51); Louisa Co., 13–27.V.1987 (1).

Host.—Unknown.

Discussion.—This species flies in May. Only three or four of the 52 specimens were taken in late April or early June. Most are from Clarke Co., from where the species was described (Smith 1991), and from traps set among willows and shrubbery around ponds and from traps set at the edge of an 80-year-old, elm-oak-hickory woodlot. It belongs to a group of *Aulacus*, characterized in the first half of the second couplet of the preceding key, that probably parasitizes wood-boring Coleoptera.

*Aulacus lovei* (Ashmead)  
(Figs. 10–12, 38)

Diagnosis.—Color variable, usually orange brown to brown with top of head, mesosoma (mesoscutellum usually pale orange), and most of legs blackish to dark brown; metasoma reddish with base of first segment black; fine transverse wrinkles on frons confined to anterior portion, sometimes suffused with fine punctures; side of mesosoma dull between sculpturation; hindfemur about 5× longer than wide; projecting ventral lobe of female hindcoxa about 1.1× longer than broad; ovipositor sheath about 0.5× forewing length.

Distribution.—Connecticut, Georgia, Indiana, Maryland, Massachusetts, New Brunswick, New Jersey, New York, Nova Scotia, Ontario, Pennsylvania, Quebec, Tennessee, Vermont, Virginia, West Virginia.

Specimens examined.—Total: 33. MARYLAND: Allegany Co., 10–20.VI.1993 (2). VIRGINIA: Essex Co., 25.V–5.VI to 12–24.VI (8); Fairfax Co., 9–15.VI to 24–30.VI (4); Louisa Co., 15–27.V to 22.VI–3.VII (3). WEST VIRGINIA: Tucker Co., 9–19.VI to 9–19.VII (15); Hardy Co., 26.VI–4.VII.1994 (1).



Figs. 10-15. *Aulacus lovei*. 10, Lateral view. 11, Lateral view of mesosoma. 12, Anterior view of head. Length, ca. 6 mm. *Aulacus burquei*. 13, Lateral view. 14, Lateral view of mesosoma. 15, Anterior view of head. Length, ca. 8 mm.

Host.—*Xiphydria* (Xiphydriidae), mostly from *Carpinus* and *Tilia*. From *Xiphydria tibialis* in *Betula* (Maryland); from host in *Carpinus caroliniana* Walt. (Connecticut,

Maryland, Pennsylvania); from *Carpinus* (Maryland); from host in *Tilia* (New York); from host in *Tilia americana* L. (Pennsylvania); from *Xiphydria* in *Tilia* (Pennsyl-

vania); from *Xiphydria attenuata* [= *X. abdominalis* Say] in *Tilia americana* (Pennsylvania) (mostly from Townes, 1950). Though *X. tibialis* may be a host for *A. lovei*, the most common *Xiphydria* species recorded from *Tilia* is *X. abdominalis* (Say) and from *Carpinus*, *X. champlaini* Rohwer and *X. scafa* Smith. Some or all may serve as hosts.

Discussion.—The flight time is from the end of May to mid-July, with most specimens taken from mid- to the end of June (Fig. 38). The flight is slightly later than those of *A. burquei* and *A. digitalis* and coincides with the flight time of *Xiphydria tibialis* Say, which was also taken at each of the above localities on about the same dates. *Xiphydria tibialis* is relatively common in traps, but I have also collected a few *X. scafa* and *X. abdominalis*. All three species normally fly later than does *X. maculata*.

*Aulacus pallipes* Cresson  
(Figs. 6, 7)

Diagnosis.—Color variable, usually black with legs dark brown and apices of tibiae and tarsi yellowish; metasoma reddish with basal part of first tergum black and apical third blackish; ridges and reticulations of frons coarse and extending almost to middle ocellus; side of mesosoma dull between sculpturation; hindfemur about 5× longer than wide; projecting ventral lobe of female hindcoxa about 1.3× longer than wide; ovipositor sheath about as long as forewing.

Distribution.—British Columbia, Idaho, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Brunswick, New York, Northwest Territories, Ontario, Pennsylvania, Quebec, Rhode Island, Washington, Virginia, West Virginia.

Specimens examined.—Total: 2. MARYLAND: Garrett Co., 30.VI–10.VII.1993 (1). WEST VIRGINIA: Tucker Co., 19–29.VI.1993 (1).

Hosts.—*Xiphydria mellipes* Harris in

*Betula*. Reared records include *X. mellipes* from *Betula lutea* Michx. f., *Betula nigra* L., yellow birch or birch, and *Xiphydria* sp. from *Betula* sp., mostly from northern states (Townes 1950). Some labels record the host as *Xiphydria mellipes* without the host tree (Massachusetts, Missouri, New York, Virginia).

Discussion.—This species is associated with *X. mellipes* Harris, a more northern species that attacks *Betula*. Both collection localities were in the Appalachians at over 2600 ft. elevation. *Xiphydria mellipes* was also collected at the Tucker Co. site.

*Aulacus schiffi* Smith, NEW SPECIES  
(Figs. 3–5)

Diagnosis.—Almost entirely black with scape, pedicel, narrow posterior bands on metasomal segments and part of legs brownish; frons and top of head smooth, shining, with very few fine punctures; mesosoma shining between sculpturation; ovipositor sheath about 0.5× forewing length.

Female.—Length, 6.0 mm. Antenna black, scape and pedicel pale brown to orange; head black, mandible brownish; mesosoma black; metasoma black with brownish, narrow posterior bands on terga; legs black with following pale brown: trochanters, outer surface of forefemur, apex of midfemur; fore- and midtibia, extreme base of hindtibia, and tarsi. Wings clear hyaline; veins and stigma black. Antenna 14-segmented; 2nd flagellar segment longer than 1st and 3rd flagellar segments. Frons and top of head smooth and shining, without surface sculpture or wrinkles, but with few very fine widely scattered punctures; occipital carina absent and back of head without wrinkles in position of occipital carina. Side of mesosoma shiny between coarse ridges and reticulations; mesoprescutum with transverse ridges; mesonotal lateral lobes and mesoscutellum reticulate. Vein 2m-cu in forewing present. Hindcoxa without projecting ventral lobe; inner side of hindcoxae without a channel. Ovipositor about 0.5× as long as forewing.



Figs. 16-18. *Pristaulacus fasciatus*. 14, Forewing. 15, Lateral view. Length, ca. 16 mm. *Pristaulacus violaceus*. 18, Lateral view, male. Length, ca. 13 mm.

Male.—Unknown. See discussion.

Holotype.—Female, labeled "MARYLAND: Prince George's Co., Beltsville Agric. Res. Center, 39°02'N 76°52'W, D. Barriner and T. Smith," "26-VI-6-VII-1993, coniferous forest, Malaise trap #1." Deposited in the National Museum of Natural History, Washington, D.C.

Host.—Unknown. Belongs to the group of *Aulacus* that probably parasitize wood-boring Coleoptera.

Discussion.—A male from "Thwartway Island, St. Lawrence Is. National Park, Ontario," "A. Carter, Aug. 2, 1976, Malaise trap code 4276-N" may be the male of this species. It is similar to the female except for the legs which are entirely yellow orange beyond the coxae.

This species belongs in the group of *Aulacus* characterized in the first half of couplet two of the preceding key. Besides *A.*

*impolitus* and *A. schiffi*, three other species belong here, *A. dispilis* Townes (Texas), *A. brevicaudus* (Cushman) (Oregon, California), and *A. aneurus* Walkley (New Mexico). The shiny, impunctate, smooth texture of the frons and top of the head place *A. schiffi* close to *A. brevicaudus*. The frons and top of the head of all other species are dull and minutely granular (*A. aneurus*, *A. impolitus*), or have large scattered deep punctures (*A. dispilis*); the forewing of *A. dispilis* has an apical dark spot, and the head and mesosoma are reddish; *A. impolitus* is entirely reddish brown; *A. brevicaudus* also has a black head and thorax but differs from *A. schiffi* by the orange metasoma and orange legs beyond the trochanters; and *A. aneurus* Walkley is mostly black but has very fine transverse striae on the mesosotum, whereas the mesonotum of *A. schiffi* has very coarse transverse ridges.

The holotype was taken in a trap in a coniferous forest habitat in a opening on the east bank of Beaver Dam Lake.

**Etymology.**—This species is named for my colleague Dr. Nathan Schiff, Bee Research Laboratory, U.S.D.A., Beltsville, Maryland.

*Pristaulacus bilobatus* (Provancher)  
(Figs. 21–23)

**Diagnosis.**—Most likely confused with *P. rufitarsis*, the only two species without dark spots in the forewing and the tarsal claws with two subapical teeth. Black; metasoma reddish with apical segments black; fore- and midtibiae and tarsi and sometimes fore- and midfemora brownish; forewing uniformly hyaline, without black spots; tarsal claws with two subapical teeth; propleuron punctured, side of mesosoma rather dull, punctured, and finely sculptured.

**Distribution.**—Michigan, New Hampshire, New Jersey, New York, Nova Scotia, North Carolina, Ohio, Ontario, Pennsylvania, West Virginia, Wisconsin.

**Specimens examined.**—None.

**Hosts.**—Most rearing records give the host as *Melanophila fulvoguttata* (Harris) (Buprestidae), or as *Melanophila*, and reared from hemlock, *Tsuga canadensis* (L.) Carr. (Townes 1950).

**Discussion.**—Though recorded from West Virginia and North Carolina, I did not collect *P. bilobatus*. Because it is mainly associated with buprestids in hemlock, it may occur only at higher elevations in habitats where I have not collected. Townes (1950) records this species from the end of May to mid-August.

*Pristaulacus fasciatus* (Say)  
(Figs. 16, 17)

**Diagnosis.**—Entirely black; wings black with yellowish cross band immediately anterior to stigma.

**Distribution.**—Arkansas, District of Columbia, Georgia, Illinois, Indiana, Mary-

land, Michigan, Mississippi, Missouri, Pennsylvania, Texas, Virginia.

**Specimens examined.**—Total: 4. MARYLAND: Prince George's Co., 17.VII–2.VIII.1991 (1). VIRGINIA: Clarke Co., 21.VII–1.VIII.1991, 8–25.VIII.1992 (2); Essex Co., 1–14.VIII.1992 (1).

**Hosts.**—Reared from *Carya ovata* (Mill.) K. Koch (Pennsylvania) (Townes 1950).

**Discussion.**—This is a late flying species, from the end of July into August. It is not commonly collected.

*Pristaulacus flavicrurus* (Bradley)  
(Figs. 24, 25, 39)

**Diagnosis.**—Black; metasoma reddish with base and apex black; hindfemur black, tibiae and fore- and midfemora yellowish; forewing with large substigmatal and small apical dark spots; front margin of pronotum with forward projecting tooth at midlength; tarsal claws with three subapical teeth; upper face of hindcoxa smooth, without cross wrinkles; occipital carina a narrow rim.

**Distribution.**—Georgia, Maryland, Michigan, New York, North Carolina, Ohio, Ontario, Pennsylvania, South Carolina, Vermont, Virginia, West Virginia.

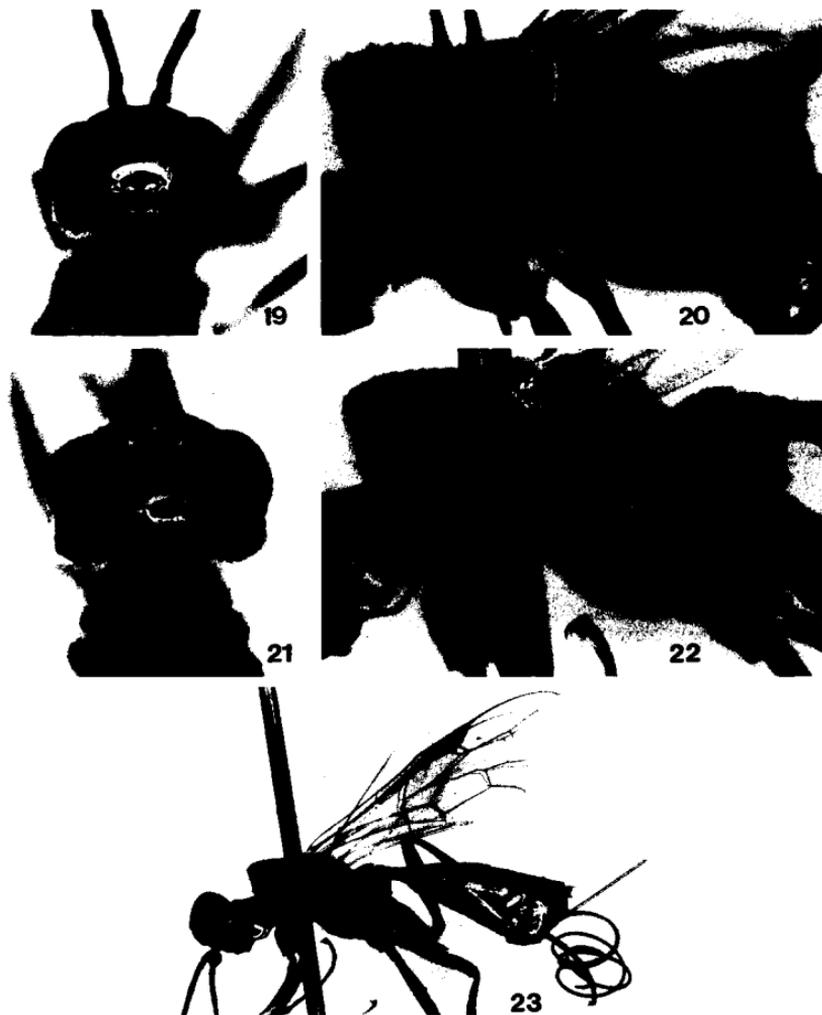
**Specimens examined.**—Total: 45. MARYLAND: Allegany Co., 21–30.VI.1993 (1); Garrett Co., 10–20.VI to 30.VI–9.VII (11); Prince George's Co., 10–23.VI to 15–25.VI (5). VIRGINIA: Clarke Co., 15–24.VI to 25.VI–5.VII (7); Fairfax Co., 13–19.VI.1993 (1). WEST VIRGINIA: Tucker Co., 9–19.VI to 19–28.VII (20).

**Hosts.**—Unknown.

**Discussion.**—Flight records are from the first of June to the end of July, with most specimens collected from mid-June to the first of July (Fig. 39).

*Pristaulacus niger* (Shuckard)  
(Figs. 26–28)

**Diagnosis.**—Black; metasoma reddish only on first and second segments; legs usually orange beyond coxae (variable, sometimes blackish); forewing with small sub-



Figs. 19–23. *Pristaulacus rufitarsis* 19, Head, dorsal view. 20, Lateral view of mesosoma. Length, ca. 11 mm. *Pristaulacus bilobatus*. 21, Head, dorsal view. 22, Lateral view of mesosoma. 23, Lateral view. Length, ca. 9.5 mm.

stigmal and small basal central spots; front margin of pronotum with forward projecting tooth at midlength; tarsal claws with four subapical teeth; upper face of hindcoxa with cross wrinkles; occipital carina with

rather broad, somewhat reflexed, flange about  $0.3\times$  width of first flagellar segment.

Distribution.—Alabama, Colorado, Florida, Georgia, Louisiana, Manitoba, Maryland, Massachusetts, Michigan, Minnesota,



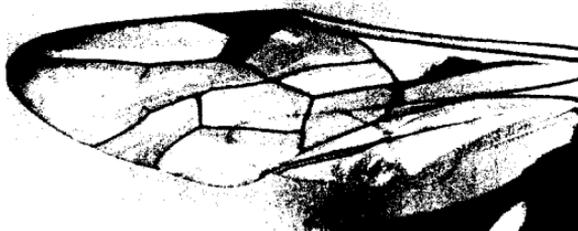
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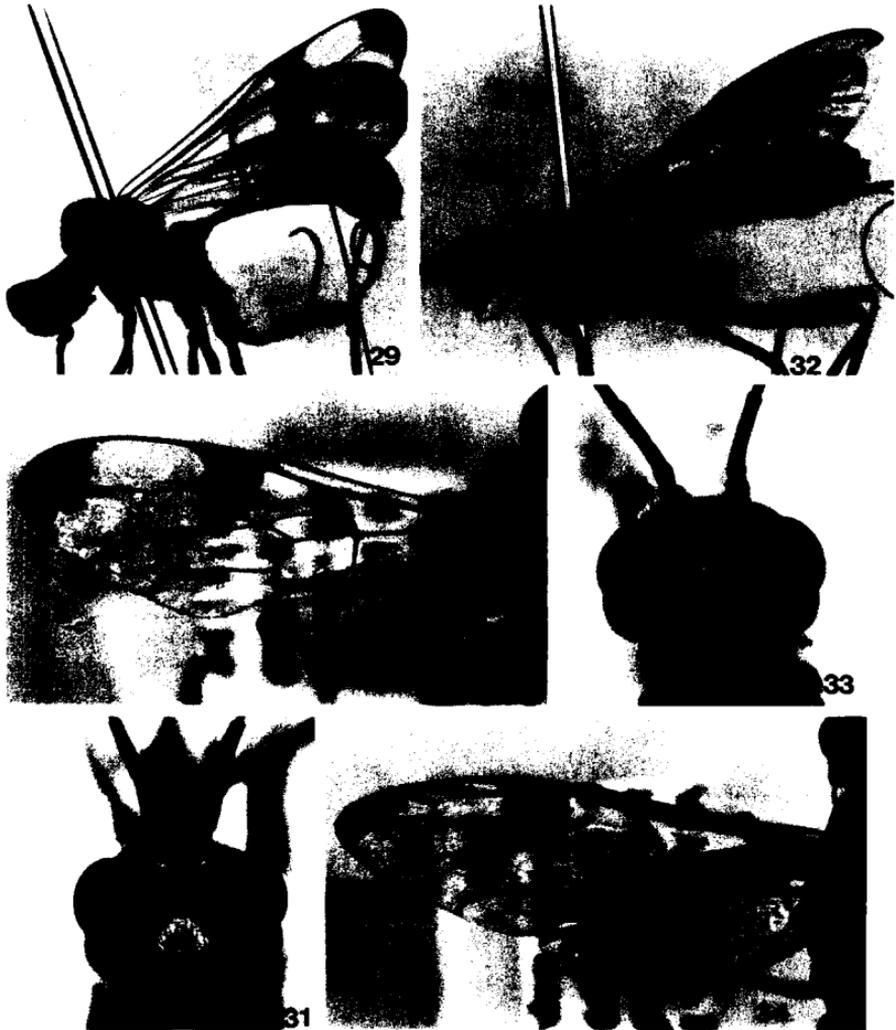


Figs. 24–28. *Pristaulacus flavicrurus*. 24, Lateral view. 25, Head, dorsal view. Length, ca. 11 mm. *Pristaulacus niger*. 26, Lateral view. 27, Head, dorsal view. 28, Forewing. Length, ca. 13 mm.

New York, North Carolina, Ontario, Pennsylvania, Quebec, Texas, Virginia.

Specimens examined.—Total: 6. VIRGINIA: Essex Co., 11.X–5.XI.1991 (1); Fairfax Co., 19–26.VI to 19–26.VII (5).

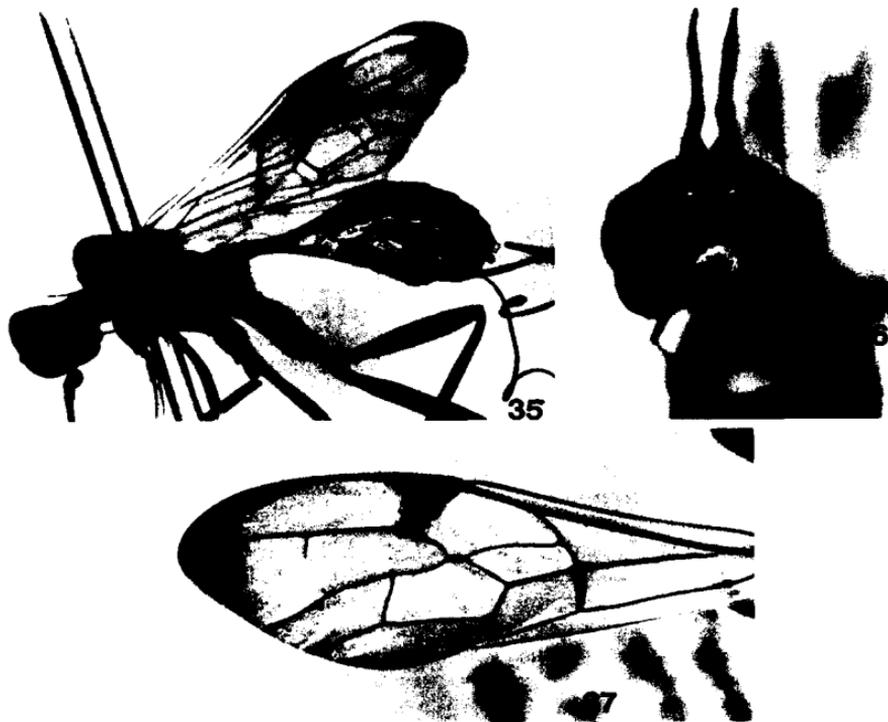
Hosts.—Has been collected on and reared from *Pinus* (Townes 1950). Haack and Wilkinson (1987) reared *P. niger* from *Pinus elliottii* Engelm. in Florida as well as the following Cerambycidae which they re-



Figs. 29-34. *Pristaulacus strangaliae*. 29, Lateral view. 30, Forewing. 31, Head, dorsal view. Length, ca. 12 mm. *Pristaulacus resutorivorus*. 32, Lateral view. 33, Head, dorsal view. 34, Forewing. Length, ca. 11 mm.

garded as suspected hosts: *Neacanthocinus obsoletus* (Olivier), *Tylocerina nodosus* (F.), *Monoctonus titillator* (F.), and *Xylotrechus sagittatus sagittatus* (Germar). I have seen records from *Pinus rigida* Mill. (New York), *Pinus echinata* Mill. (Georgia), *Pi-*

*nus virginiana* Mill. (Virginia), *Pinus taeda* L. (North Carolina), and *Abies balsamea* (L.) Mill. and *Larix laricina* (Du Roi) K. Koch (Minnesota). Specimens from Louisiana are labeled "ex loblolly pine infested with cerambycids," and specimens from



Figs. 35–37. *Pristaulacus stigmaterus*. 35, Lateral view. 36, Head, dorsal view. 37, Forewing. Length, ca. 9 mm.

Georgia are labeled “ovipositing on southern pine beetle infested Virginia pine” and “ovipositing on southern pine beetle infested white pine.”

Discussion.—Most collection records are from mid-June to mid-July. The one record from Essex Co. is the latest I have trapped an aulacid.

*Pristaulacus resutorivorus* (Westwood)  
(Figs. 32–34)

Diagnosis.—Black; metasoma mostly reddish with black above at apex; legs beyond first trochanters dark reddish to black; wings slightly blackish with large substigmal and small apical dark spots; front margin of pronotum without forward projecting tooth; upper face of hindcoxa with cross wrinkles; head short behind eyes and

strongly convex; occipital carina a reflexed flange about  $0.4\times$  width of basal flagellar segment.

Distribution.—Alberta, British Columbia, California, Colorado, Connecticut, District of Columbia, Georgia, Idaho, Maine, Maryland, Mississippi (?), Michigan, Montana, Ontario, Oregon, Pennsylvania, Quebec, Virginia, Washington.

Specimens examined.—Total: 18. MARYLAND: Allegany Co., 30.VI–9.VII to 10–19.VII (3). VIRGINIA: Clarke Co., 30.VI–9.VII.1992, 17–30.VI.1993 (2); Essex Co., 6–14.VI.1991 (1); Fairfax Co., 11–17.V to 6–12.VIII (12).

Hosts.—Notes on specimens associate this species with *Pinus* (Townes 1950). Carlson (1979) gave *Arhopalus productus* (LeConte) (Cerambycidae) as a question-

able host record. His record is probably from specimens labeled "em. in Athens Ga., ex *Arhopalus productus* in Doug.-fir lumber of new house" from Vancouver, B. C., and from Jackson, Mississippi "ex lumber of new house yielding *Arhopalus productus*." I have seen specimens labeled *Pinus lambertiana* Dougl. (Oregon) and *Pseudotsuga menziesii* (Mirb.) Franco (as *P. taxifolia*) (Montana). One specimen from Georgia is labeled "ovipositing on southern pine beetle infested Virginia pine."

Discussion.—Specimens have been caught from mid-May to the first of August, with most from the first of June to mid-July.

*Pristaulacus rufitarsis* (Cresson)

(Figs. 19, 20)

Diagnosis.—Black; metasoma reddish; legs black with tarsi reddish orange and sometimes fore- and midtibiae dark orange; wings uniformly hyaline, without dark spots; tarsal claws with two subapical teeth; propleuron and side of mesosoma shining and not distinctly punctured, polished with moderately coarse sculpture.

Distribution.—Alaska, Alberta, Arizona, British Columbia, California, Colorado, Idaho, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Brunswick, New Hampshire, New Mexico, New York, North Carolina, Northwest Territories, Ontario, Oregon, Pennsylvania, Prince Edward Island, Quebec, Saskatchewan, Vermont, Virginia, Washington, Wyoming, Yukon Territory.

Specimens examined.—Total: 5. MARYLAND: Prince George's Co., 17.VII-2.VIII.1991, 25.VII-8.VIII.1992 (2). VIRGINIA: Essex Co., 28.VI-11.VII.1991, 28.VII-13.VIII.1993 (2); Fairfax Co., 12-18.VI.1988 (1).

Hosts.—Buprestidae and Cerambycidae mostly from conifers. Reared from *Chrysothris caurina* Horn (Buprestidae) in *Pinus ponderosa* Dougl. ex Laws. (California); from *Melanophila fulvoguttata* (Buprestidae) in *Tsuga canadensis* (New Hampshire); from *Melanophila drummondi*

(Kirby) in *Abies concolor* (Gord. & Glend.) Lindl. (California); from *Saperda calcarata* Say (Cerambycidae) in *Populus tremuloides* Michx. (Colorado); other records from *Pinus arizonica* (Engelm.) Shaw (Arizona) and *Tsuga mertensiana* (Bong.) Carr. (Oregon) (Townes 1950; Carlson 1979). From *Graphisurus* sp. (Cerambycidae) (Carlson 1979). I have seen specimens labeled "ex *Chrysophana placida* [Buprestidae] in cone of *Pinus attenuata*" (California); from *Licobedrus decurrens* Torr., *Abies concolor*, and *Pinus lambertiana* (California), and *Pinus flexilis* James (Idaho).

Discussion.—I have found this species from mid-June to the first of August. It is not common in collections.

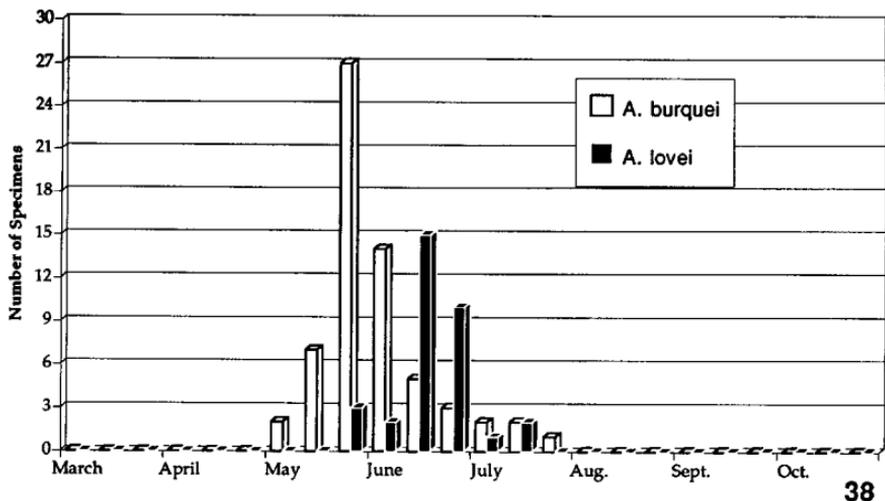
*Pristaulacus stigmaterus* (Cresson)

(Figs. 35-37, 40)

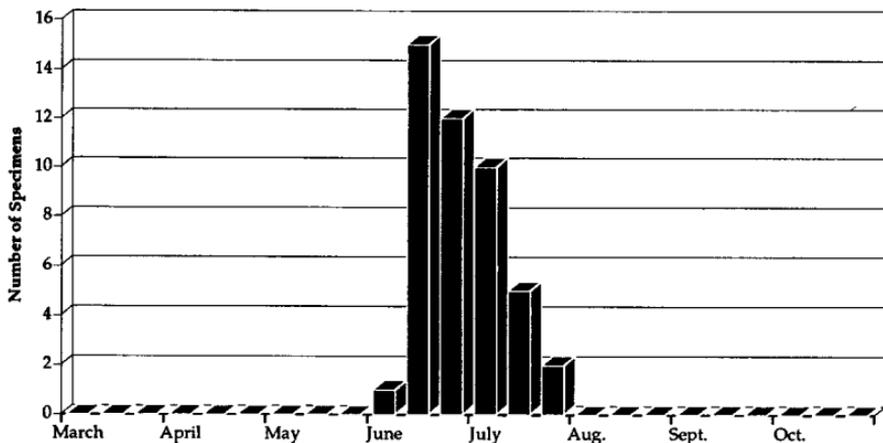
Diagnosis.—Black; metasoma reddish with apex black; legs orange beyond coxae with hindfemur darker brownish; forewing hyaline with small substigmatal and apical dark spots; front margin of pronotum without forward projecting tooth; tarsal claws with three subapical teeth; upper face of hindcoxa with numerous cross wrinkles; head behind eyes not strongly convex; occipital carina a narrow rim, 0.2× or less width of basal flagellar segment.

Distribution.—Arkansas, Connecticut, Georgia, Maryland, Massachusetts, Michigan, Missouri, New York, Ohio, Ontario, Quebec, Rhode Island, Virginia, West Virginia.

Specimens examined.—Total: 203. MARYLAND: Allegany Co., 10-19.VI to 10-19.VII (18); Garrett Co., 30.VI-9.VII.1992, 21-30.VI.1993 (3); Prince George's Co., 3-15.V to 27.VI-10.VII (23). VIRGINIA: Clarke Co., 10-21.V to 15-24.VI (60); Essex Co., 30.IV-13.V to 12-24.VI (53); Fairfax Co., 22-28.V to 5-11.VI (4); Louisa Co., 13-26.V to 1-12.VII (28). WEST VIRGINIA: Randolph Co., 8-18.VII.1993 (1); Tucker Co., 30.V-9.VI to 9-18.VII (3); Hardy Co., 15.V-10.VI to 5-18.VII (10).



38



39

Figs. 38, 39. 38, Seasonal flight activity of *Aulacus burquei* and *A. lovei*. 39, Seasonal flight activity of *Pristaulacus flavicrurus*. Both graphs based on cumulative data from all collections.

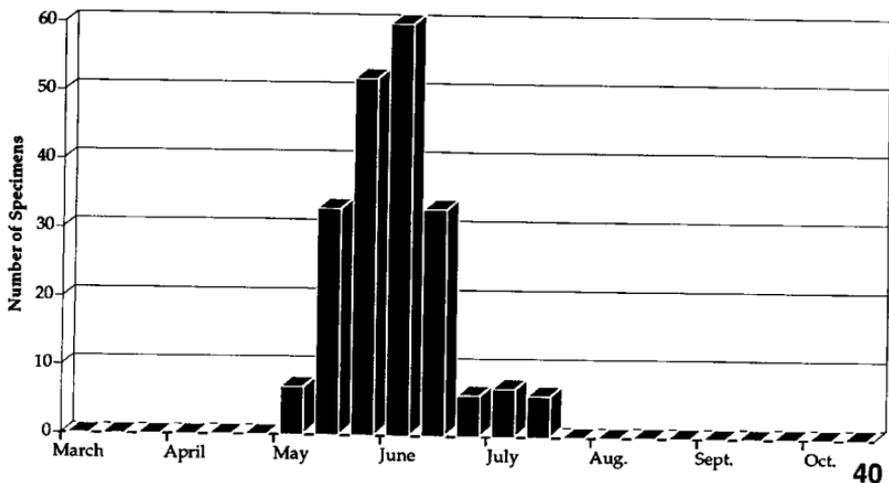
Hosts.—Unknown. I have seen specimens labeled “*Myrica certifera*” (Connecticut) and “elm spanworm associate” (Georgia).

Discussion.—This species flies from the first of May to the first of June, with the peak flight from mid-May to mid-June (Fig. 40). It is the second most commonly collected species of *Pristaulacus* and occurs in the

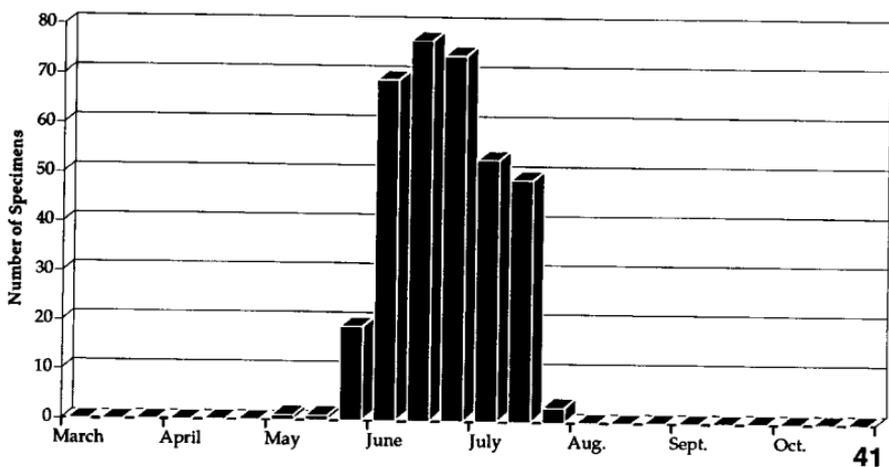
same habitats as *P. strangaliae*, but the flight period is slightly earlier than that species.

*Pristaulacus strangaliae* (Rohwer)  
(Figs. 29–31, 41)

Diagnosis.—Black; metasoma reddish with apex black; legs orange beyond coxae with hindfemur darker brownish; forewing



40



41

Fig. 40, 41. 40, Seasonal flight activity of *Pristaulacus stigmaterus*. 41, Seasonal flight activity of *Pristaulacus strangaliae*. Both graphs based on cumulative data from all collections.

hyaline with large substigmatal and small apical dark spots; front margin of pronotum without forward projecting tooth; tarsal claws with three subapical teeth; upper face of hindcoxa smooth, without cross wrinkles.

Distribution.—Connecticut, District of Columbia, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, New Brunswick, New Hampshire, New Jersey,

New York, North Carolina, Nova Scotia, Ohio, Ontario, Pennsylvania, Prince Edward Island, Quebec, Rhode Island, Virginia, West Virginia.

Specimens examined.—Total: 345. MARYLAND: Allegany Co., 31.V–10.VI to 20–29.VII (61); Garrett Co., 31.V–10.VI to 10–19.VII (7); Prince George's Co., 16–23.V to 8–20.VII (92). VIRGINIA: Clarke

Co., 1-11.VI to 1-14.VII (7); Essex Co., 4-17.V to 12-24.VI (18); Fairfax Co., 2-8.VI to 18-24.VI (4); Louisa Co., 13-26.V to 19-29.VI (47). WEST VIRGINIA: Tucker Co., 31.V-9.VI to 9-19.VII (105); Hardy Co., 5-10.VI to 5-18.VII (4).

Hosts.—Records are from Cerambycidae in deciduous trees. Reared from *Anoplo-dera proxima* (Say) (Cerambycidae) in *Fagus* (Pennsylvania); from *Anoplo-dera mutabilis* in *Alnus* (Pennsylvania); from *Anoplo-dera rubrica* (Say) in *Tsuga* (Pennsylvania); from *Anoplo-dera rubrica* in *Carpinus* (Pennsylvania); from *Ostrya* (Connecticut); collected from dead branches of *Carpinus* (Townes 1950). I have seen specimens labeled "reared from dead elm and birch infested by *Leptura rubrica* [Cerambycidae], *Typocerus velutinus* [Cerambycidae]" (Pennsylvania); *Carpinus caroliniana* (Pennsylvania, Maryland); *Ostrya virginiana* (Mill.) K. Koch (Connecticut); and "birch log" (Maine).

Discussion.—This is the most common species of aulacid and is prevalent in woods and forest situations. It flies from the first of May to the end of July, with the peak flight from the first of June to mid-July (Fig. 41). Though in the same habitats as *P. stigmaterus*, the flight time is slightly later.

*Pristaulacus violaceus* (Bradley)  
(Fig. 18)

Diagnosis.—Black with tibiae and tarsi yellow; wings uniformly black.

Distribution.—District of Columbia, Ohio, Virginia.

Specimens examined.—none.

Hosts.—Unknown.

Discussion.—I did not collect this species. There is one record from the District of Columbia and one record from Nelson County, Virginia, July 24, 1927.

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