

REVIEW OF THE GENUS *PURPURICENUS* DEJEAN (COLEOPTERA: CERAMBYCIDAE) IN NORTH AMERICA

TED C. MACRAE

Monsanto Company, 700 Chesterfield Parkway North,
St. Louis, Missouri 63198

Abstract.—Six North American species are recognized within the genus *Purpuricenus* Dejean: *P. humeralis* (Fabr.); *P. axillaris* Haldeman; *P. dimidiatus* LeConte; *P. opacus* (Knull); *P. linsleyi* Chemsak; and *P. paraxillaris* MacRae, NEW SPECIES. A lectotype is selected for *P. axillaris*. The genus is redescribed, and both sexes of all species are described, including the previously unknown male of *P. linsleyi*. New and existing biological data are summarized for each species, and variation and comparisons are discussed. Habitus illustrations, distributional maps, and a key to the species are provided. Interception of the Indomalayan *P. temminckii* (Guérin-Ménéville) in North America is documented.

Key Words.—Insecta, Coleoptera, Cerambycidae, Trachyderini, *Purpuricenus*, new species, taxonomy, key.

North American species of *Purpuricenus* Dejean (1821) are poorly represented in many collections, however, the use of fermenting bait traps (e.g., Champlain & Knull 1932) by several contemporary collectors has greatly increased the number of specimens available for study. While studying the cerambycid fauna of Missouri, specimens assignable to *P. axillaris* Haldeman collected in such traps were found to represent two species (MacRae 1994). Concurrently, I received a series of specimens from Texas which did not agree well with available descriptions. These specimens proved to be male *P. linsleyi* Chemsak, previously known from only two females. These events were the catalysts for this review.

Purpuricenus is represented in all faunal regions except the Neotropics but is most diverse in the Palearctic and Indomalayan regions. Aurivillius (1912) listed 31 Palearctic and Indomalayan species of *Purpuricenus* (*sensu lato*), however, at least 53 species are currently recognized from these regions (e.g., Gressitt 1951, Gressitt & Rondon 1970, Lee 1987, Cherepanov 1988, Hua et al. 1993, Bense 1995). The genus is also represented by five Afrotropical (Ferreira & Ferreira 1959), one Australian (Gressitt 1959), and five Nearctic species (Poole & Gentili 1996).

Cerambyx humeralis Fabr. (1798) was the first North American species included in *Purpuricenus* (Dejean 1821), and a second species was added when Haldeman (1847) described *P. axillaris* from Pennsylvania. Two western U.S. species were added when LeConte described *P. magnificus* from Arizona (LeConte 1875) and *P. dimidiatus* from California (LeConte 1884), but Leng (1886a) transferred the former to *Crioprosopus*. The distribution of the genus was extended to the Neotropics when Casey (1912) described *P. lecontei* from Honduras. Craighead (1923) described the larvae of *P. axillaris* and *P. humeralis*. Two more Nearctic species, both from Texas, were added to the genus when Knull (1954) transferred *Tragidion opacum* (Knull 1937) to *Purpuricenus* and Chemsak (1961) described *P. linsleyi*. Linsley (1962) reviewed the genus in North America, and Chemsak & Linsley (1974) once again restricted the Western Hemisphere occurrence of

this genus to North America by transferring *P. lecontei* to *Metaleptus*. *Purpuricenus* is currently placed in the tribe Trachyderini (Fragaso et al. 1987).

In this paper, *P. paraxillaris* MacRae, NEW SPECIES, is described, a lectotype is selected and described for *P. axillaris*, and the male of *P. linsleyi* is described for the first time. All remaining species and sexes are redescribed, biological data are summarized, and a key to the species, habitus illustrations, and distribution maps are provided. Interception of the Indomalayan *P. temminckii* (Guérin-Ménéville) in North America is also documented.

METHODS AND MATERIALS

The individuals and institutions cited provided 1639 specimens for examination. Specimens are retained by the cited collector if no collection is indicated. Collection abbreviations follow Arnett et al. (1993) except for the following: R. A. Androw, Pittsburg, PA (RAAC); L. G. Bezark, Sacramento, CA (LGBC); J. A. Green, Lima, OH (JAGC); D. J. Heffern, Houston, TX (DJHC); A. E. Lewis, Burbank, CA (AELC); D. G. Marqua, Fort Davis, TX (DGMC); Minnesota Dept. Agric., St. Paul (MNDA); Missouri Dept. Agric., Jefferson City (MODA); and Missouri St. Fruit Exp. Sta., Mountain Grove (MFES).

The generic bibliography includes works from all world areas but emphasizes North American citations. North American species citations are essentially complete with the possible omission of obscure locality records or catalogue listings. Exactly cited label data are enclosed within quotation marks (""). A forward slash (/) separates data from individual labels, and my notations are in parentheses (h = handwritten, p = printed). Measurements were made from the center of the frons to the elytral apex (length) and across the humeri (width) using a vernier caliper (0.05 mm precision). New state records (**bold type**) are indicated in the Distribution sections. Plant nomenclature follows Kartesz (1994).

GENUS PURPURICENUS DEJEAN

Purpuricenus Dejean, 1821: 105; Germar, 1824: 500; Latreille, 1829: 114; Audinet-Serville, 1833: 568; Mulsant, 1839: 32; Laporte, 1840: 431; LeConte, 1850: 10; Thomson, 1860: 190; Mulsant, 1862: 374; Mulsant, 1862-1863: 68; Thomson, 1864: 429; Fairmaire, 1864: 142; Pascoe, 1866; Lacordaire, 1869: 177; LeConte, 1873: 314; LeConte & Horn, 1883: 299; Gahan, 1906: 184; Blatchley, 1910: 1030; Aurivillius, 1912: 461; Schaufuss, 1916: 858; Planet, 1924: 186; Picard, 1929: 99; Plavilstshikov, 1940: 553; Knull, 1946: 230; Villiers, 1946: 101; Lepesme, 1948: 311; Gressitt, 1951: 316; Ferreira & Ferreira, 1959: 338; Linsley, 1962: 103; Arnett, 1963: 881; Gressitt & Rondon, 1970: 177; Hatch, 1971: 104; Klausnitzer & Sander, 1978: 134; Villiers, 1978: 311; Nakamura et al., 1981: 44; Cherepanov, 1982: 216; Lee, 1987: 130; Svacha & Danilevsky, 1987: 169; Cherepanov, 1988: 293; Plaza Lama, 1988: 93; Hua et al., 1993: 90, 213; Bense, 1995: 242; Downie & Arnett, 1996: 1234. Type species: *Cerambyx kaehleri* Linnaeus, 1758: 393 (designated Linsley 1962: 103).

Acanthoptera Latreille, 1829: 114.

Acanthopterus Guérin-Ménéville, 1844: 223.

Cyclodera White, 1846: 510. Type species: *C. quadrinotata* White, 1846: 510 (original monotypy).

Philagathes Thomson, 1864: 196. Type species: *P. laetus* Thomson, 1864: 197 (original monotypy).

Description.—Form moderate to large sized, cylindrical to robust. Head short; frons broad, subvertical, abruptly separated from anteocular spaces; genae long, medially produced; palpi short, apical segments each slightly wider distally; mandible apices acute; eyes finely faceted, deeply emarginate at antennal insertion, dorsal lobes widely separated; antennal tubercles prominently elevated, separated by longitudinal groove, antennae slender, antennomeres feebly expanded apically, antennomere 11 often elongate and appendiculate in males. Pronotum transverse, apex narrower than base, disc convex, densely punctate, with more or less distinct calluses, sides with distinct lateral tubercles; prosternum with intercoxal process convex, arcuate at apex, coxal cavities wide open behind; mesosternum not protuberant, intercoxal process convex, arcuate at apex; metasternum with episternum moderately broad, subparallel. Elytra elongate, parallel-sided, obtusely margined at sides, more densely punctate basally, apices subtruncate to emarginate, each elytron with 3 faintly indicated longitudinal costae becoming obsolete posteriorly. Legs slender, hind femora linear, often arcuate; tarsi broad, rather short, tarsomere 3 cleft almost to base. Abdomen normally segmented.

This genus is distinguished by its lateral pronotal tubercles, arcuate prosternal process, acute mandibles, obtusely margined elytral sides, faintly indicated elytral costae, and sparse pubescence.

KEY TO THE ADULTS OF NORTH AMERICAN SPECIES OF *PURPURICENUS*

1. Antennae much longer than body in male, nearly attaining or slightly surpassing elytral apices in female, third segment attaining base of elytra. 2
- 1'. Antennae reaching apical one-fourth of elytra in male, middle of elytra in female, third segment not or scarcely attaining lateral angle of pronotum; dorsal surface coarsely, deeply punctate; integument black or black and red in male, predominantly red in female; posterior femora not attaining elytral apices. Length, 11.20–18.70 mm. California, Oregon
..... *P. dimidiatus* LeConte
- 2(1). Elytra yellow, orange, or red at base, at least apical one-half black ... 3
- 2'. Elytra brunneous to dull-orange with at most apical one-third black, apical dark area extending obliquely, sinuately forward from lateral margin to suture. Length, 13.45–19.15 mm. Davis Mountains, Texas
..... *P. opacus* (Knull)
- 3(2). Elytra with apical dark area never approaching scutellum, posterior margins of basal elytral markings irregularly transverse, rarely somewhat oblique; basal punctures of elytra mostly without hairs 4
- 3'. Elytra with apical dark area extending to scutellum, or if not, then posterior margins of basal elytral markings distinctly oblique and basal punctures of elytra uniformly setiferous 5
- 4(3). Discal pronotal calluses indistinct, median callus lacking polished apical line, lateral tubercles small, angles obtuse; elytra with basal punctation fine, moderately sparse, apices subtruncate, angles not or weakly dentate, basal elytral markings yellow to orange. Length, 10.50–18.45 mm. Eastern U.S. *P. axillaris* Haldeman
- 4'. Discal pronotal calluses distinct, median callus prominent with polished apical line, lateral tubercles well developed, angles acute; elytra with basal punctation moderate, dense, apices emarginate, angles distinctly dentate, basal elytral markings orange to red-orange. Length, 12.10–22.60 mm. Eastern U.S. *P. paraxillaris* MacRae, NEW SPECIES

- 5(3'). Pronotal punctation very coarse; elytra with basal punctation very coarse, punctures large, lacking hairs; red elytral markings triangular, covering humeri but not enclosing scutellum. Length, 11.55–19.45 mm. North-eastern U.S., southeastern Canada *P. humeralis* (Fabricius)
- 5'. Pronotal punctation moderately coarse; elytra with basal punctation moderately coarse, punctures small, with hairs, females with red elytral markings covering basal one-third to one-half and extending obliquely to lateral margin, males with red markings variably reduced. Length, 13.10–21.40 mm. North-central to south-central Texas *P. linsleyi* Chemsak

Purpuricenus dimidiatus LeConte

(Figs. 1, 2, 10)

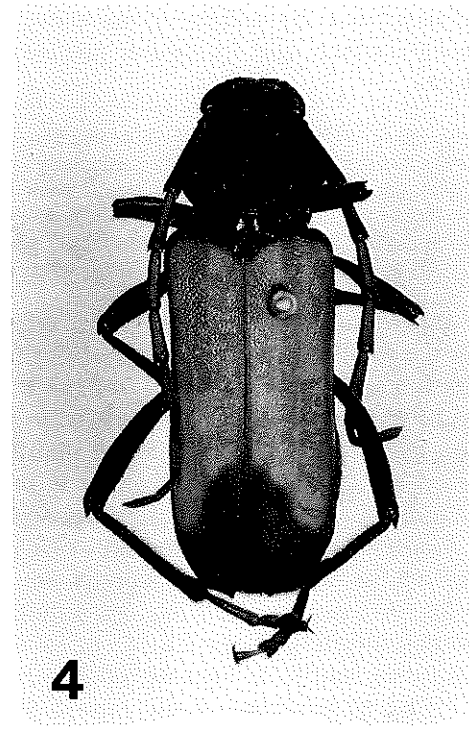
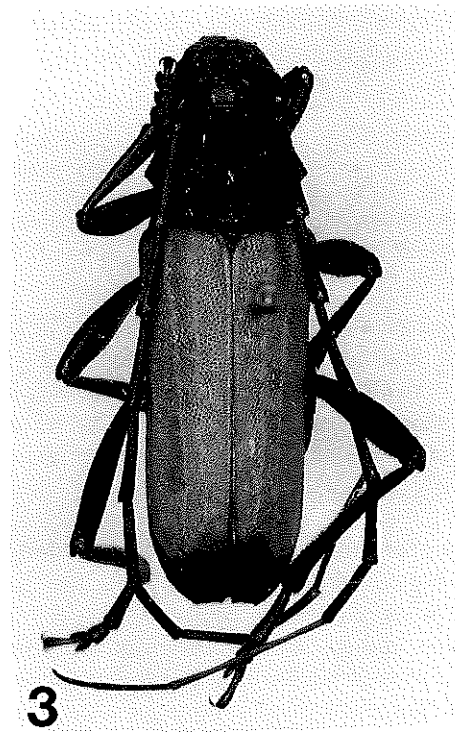
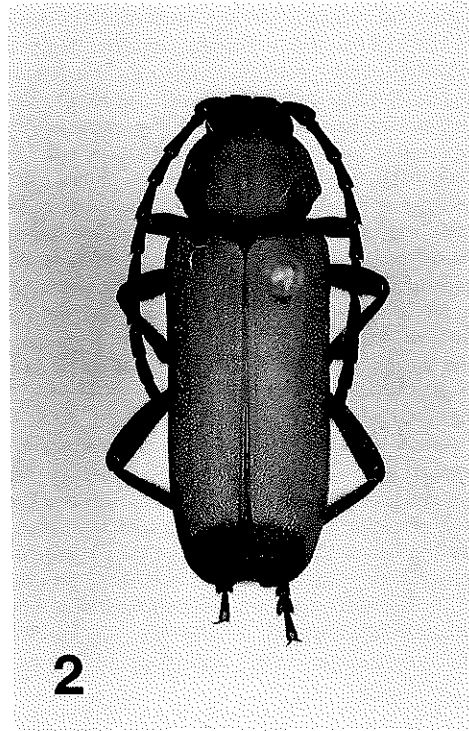
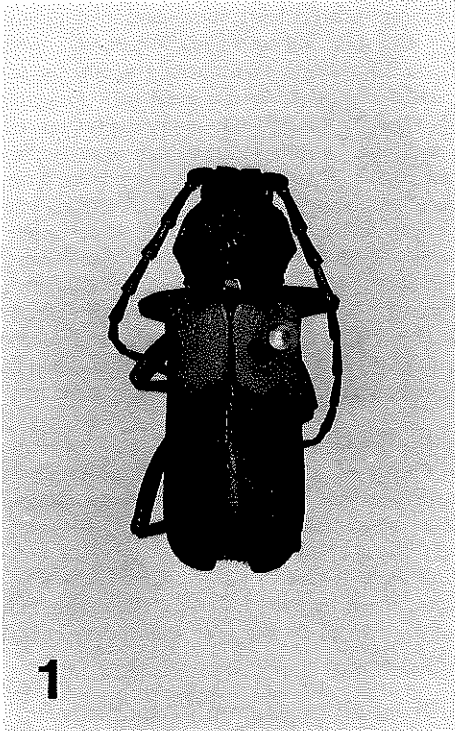
Purpuricenus dimidiatus LeConte, 1884: 23; Henshaw, 1885: 98; Leng, 1886b: 82; Aurivillius, 1912: 466; Garnett, 1918: 207; Leng, 1920: 279; Linsley, 1962: 104, figs. 32, 34; Hatch, 1971: 104, pl. X, fig. 7; Chemsak & Linsley, 1974: 182; Penrose & Westcott, 1974: 236; Hovore & Giesbert, 1976: 352; Skiles et al., 1978: 107; Chemsak & Linsley, 1982: 51; Papp, 1984: 211, fig. 705; Chemsak et al., 1992: 85; Monné & Giesbert, 1994: 150; Solomon, 1995: 471, fig. 186; Poole & Gentili, 1996: 150; Linsley & Chemsak, 1997: 318, 326, 427.

Types.—Holotype, male (Fig. 1); data: "Cal. (p) / *P. dimidiatus* Lec. (h) / Type (p) 3911 (h) (red label)"; deposited: Museum of Comparative Zoology, Cambridge. LeConte misstated the sex and length of this specimen, but in all other respects it agrees well with the original description. The type locality is Yreka, California.

Male.—Form small-medium sized, somewhat robust, subcylindrical; integument black, opaque, vertex between eyes and antennae dark-orange, pronotum with apical and basal margins broadly black, disc dark orange, basal one-third of elytra red-orange with basal margin dark brown to black, posterior margins of red-orange markings irregularly transverse, extending slightly further posteriorly in the lateral areas, legs dark brown, pubescence dark. Head with front shining, very coarsely, closely punctate, punctures slightly finer and sparser near base of antennae, obscurely clothed with short, suberect hairs; vertex slightly shining, coarsely, deeply, densely punctate, pubescence very short, sparse, suberect, a few longer, suberect hairs scattered near eyes; antennal tubercles prominent, antennae reaching apical one-fourth of elytra, each segment moderately shining, moderately punctate, finely, densely clothed with short, appressed hairs, antennomeres 1–3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly shorter than apical width, 3 1.2× longer than 1, 4–11 subequal in length and slightly shorter than 1. Pronotum 1.4× wider across lateral tubercles than long, slightly constricted before base; weak lateral tubercles just behind middle; surface slightly shining, coarsely, deeply, contiguously punctate, anterolateral areas with punctures finer, denser, smaller than those on disc; pubescence very short, obscure, suberect; disc strongly convex with 5 inconspicuous calluses, median callus glabrous; prosternum with transverse impression, apical margin shining, transversely wrinkled, moderately finely, densely punctate within and behind impression,

→

- Figures 1–4. *Purpuricenus* spp. (dorsal views).
 Figure 1. *P. dimidiatus* LeConte (holotype male).
 Figure 2. *P. dimidiatus* LeConte (female).
 Figure 3. *P. opacus* (holotype male).
 Figure 4. *P. opacus* (allotype female).



surface very slightly shining, moderately clothed with short, suberect hairs; meso- and metasternum slightly shining, finely, densely punctate, thinly clothed with short, suberect hairs, longer hairs more numerous along posterior margin of metasternum. Elytra $2.1\times$ longer than humeral width; surface slightly shining, coarsely, moderately deeply, slightly cribrately punctate over basal half, punctures smaller than largest of pronotal disc, separated by much less than their width, more finely punctate over apical half, very obscurely clothed with very short suberect hairs in basal half, hairs slightly more distinct and dense toward apex; apices rotundate-truncate. Scutellum slightly longer than wide, weakly impressed longitudinally, densely clothed with short, appressed hairs, apex moderately narrowly rounded. Legs shining, moderately elongate, slender, femora moderately, shallowly punctate; sparsely clothed with short, subdepressed hairs, metafemora not attaining elytral apices; tibiae shining, more finely, densely punctate, moderately clothed with short, subdepressed hairs; metatarsomere I slightly longer than combined length of 2-3. Abdomen slightly shining, finely, moderately sparsely punctate, sternites with impunctate apical margin, pubescence short, subdepressed, moderately dense with longer, suberect hairs more numerous toward apex, apical edge of sternites glabrous, last sternite broadly, shallowly emarginate at apex. Length, 13.75 mm; width, 4.60 mm. Described from male holotype (MCZC) (Fig. 1).

Female.—Differs from male as follows: form somewhat broader; head, antennae, and legs black, disc and lateral areas of pronotum red-orange, narrowly black along apical and basal margins, elytra red-orange with less than apical one-fifth black, metasternum with 2 elongate, dark-orange spots in front of coxae; antennae reaching middle of elytra, antennomere 3 slightly longer than 1, 4-11 subequal in length and slightly shorter than 1; anterolateral areas of pronotum moderately coarsely punctate, punctures slightly smaller than those on disc; abdomen with apex of last sternite broadly, shallowly emarginate, slightly notched medially. Length, 16.70 mm; width, 5.50 mm. Described from female from California, Amador Co., 1.6 km SE of Ione, emerged 14 Jun 1987 from living branch *Quercus wislizenii* A. de Candolle, R. L. Penrose (TCMC) (Fig. 2).

Diagnosis.—This species is distinguished from all other North American *Purpuricenus* by its shorter antennae which reach the apical one-fourth of the elytra in males and the middle of the elytra in females, its coarsely, deeply punctate elytral surface, and its shorter posterior femora which do not reach the elytral apices.

Variation.—The pronotal and elytral markings vary from orange to red and exhibit considerable variation in degree of development, particularly in males. Females nearly always have a red pronotum with at most the basal and apical margins narrowly black, and the elytra are black on the apical one-fifth to one-half. In males the pronotum may be mostly red to wholly black, and the elytra vary from red on the basal one-half to completely black. Males measured 11.20-18.25 mm (14.37 ± 1.29 mm, $n = 37$) and females 11.70-18.70 mm (15.48 ± 1.49 mm, $n = 40$) in length.

Distribution.—This species is not common in collections, but it occurs throughout the foothills and mountains of California and into southwestern Oregon (Fig. 10). It has also been recorded from northwestern Oregon (Hood River, Hood River Co.) by Penrose & Westcott (1974) and northeastern Oregon (LaGrande, Union Co.) by Hatch (1971). Assuming that the latter record is not based on an introduced or mislabeled specimen, it is the only record documenting the species' occurrence east of the Cascade Mountains.

Biology.—Hovore & Giesbert (1976) discussed this species' habit of partially girdling the base of living *Quercus dumosa* Nuttall before boring upward into the stems. At least two seasons are required for development. Skiles et al. (1978) found it infesting *Q. dumosa*, *Q. agrifolia* Née, and *Q. dunnii* Kellogg in southern California, and R. L. Penrose reared a large series of adults from girdled branches of living *Q. wislizenii* in the central Sierra Nevada foothills (Amador Co., near Ione). One adult examined was reared from *Q. virginiana* P. Miller (probably a misidentification of *Q. agrifolia*), and several adults examined were collected on

Salix sp., another potential larval host (Penrose & Westcott 1974). Specimens collected on *Adenostoma fasciculatum* Hooker & Arnott, *Juniperus californica* Carrière, and *Purshia tridentata* (Pursh) de Candolle surely represent incidental captures. Unlike all other North American *Purpuricenus*, it is unclear whether this species is attracted to fermenting bait. Penrose & Westcott (1974) reported two adults from oriental fruit moth bait pots hung in peach orchards in Hood River Co., Oregon, and another specimen from Josephine Co., Oregon taken in such a trap was examined. It is not known how attractive this bait is, and none of the remaining specimens examined are known to have been taken in bait traps. Seasonal occurrence: 17 May–6 Sep (median 75% 12 Jun–15 Jul, $n = 69$).

Material Examined.—In addition to Types, 76 specimens: CALIFORNIA. AMADOR Co.: 1.6 km SE of Ione, emerged 9 Jun 1987 from living branch *Quercus wislizenii*, R. L. Penrose, 1 ♀; same data except 14 Jun 1987, 2 ♂♂, 2 ♀♀ (& TCMC); 15 Jun 1987, 2 ♀♀; 20 Jun 1987, 3 ♀♀; 26 Jun 1987, 3 ♀♀; 12 Jun 1991, 1 ♂; emerged 26 Jun 1993 from girdled branch *Quercus wislizenii*, 1 ♀; same data except Jul 1993, 1 ♀; 3.2 km S of Ione, emerged 26 Jun 1987 from living branch *Quercus wislizenii*, R. L. Penrose, 2 ♀♀; same data except 28 Jun 1987, 1 ♂ 1 ♀; 23 May 1988, 1 ♂; 15 Jun 1988, 1 ♀; 3 Jul 1988, 1 ♂, 2 ♀♀; 10 Jul 1988, 1 ♀. CALAVERAS Co.: Camp Wolfboro, 11 Jul 1939, 1 ♀ (EMEC). EL DORADO Co.: El Dorado Hills, 6 Jun 1992, E. M. Fisher, 1 ♀ (LGBC); Lake Tahoe, 1 ♀ (UCDC). LOS ANGELES Co.: Big Pines, 7 Jul 1935, *Salix* sp., 2 ♂♂ (LACM); Crystal Lake, 29 Jun 1950, W. O. Marshall, 1 ♀ (UCDC); Glendale, 21 Jul 1948, 1 ♂ (UCDC); 25.6 km E of Lake Hughes, 22 Jun 1961, F. G. Andrews, 2 ♂♂ (CDAE); 6.4 km W of Lake Hughes, 1 Jul 1963, F. G. Andrews, 1 ♂ (CDAE); Los Angeles, no date, Coquillett, 1 ♂ (USNM); Pasadena, Jun 1947, A. Fenyes, 1 ♂ (AELC); Santa Monica Mts, nr Sepulveda, Mulholland Dr, 22 Jul 1956, R. L. Westcott, 1 ♂; Sierra Madre, 6 Jul 1945, A. Fenyes, 1 ♂ (CMNH); Tanbark Flats, 19 Jun 1950, S. C. Daniels, 1 ♀ (EMEC); same loc., 12 Jul 1952, B. Tinglof, 1 ♀ (LACM). MARIN Co.: 11 Jun 1905, F. W. Nunenmacher, 1 ♂ (USNM); Lagunitas, 14 Jul 1928, E. H. Nast, 1 ♂ (EMEC). MENDOCINO Co.: 8 km N of Branscomb, Wilderness Lodge, 22 Aug 1982, C. Reid, 1 ♂ (EMEC); Castle Peak, 6 Sep 1958, S. M. Fidel, 1 ♀ (UCDC); Ryan Creek, 11 Jul 1946, 1 ♂ (EMEC); same data except 15 Jul 1946, 1 ♂. PLACER Co.: Roseville, 23 Jun 1981, 1 ♀ (LGBC). PLUMAS Co.: Bucks Lake, 14 Jul 1949, *Salix* sp., E. I. Schlinger, 1 ♂ (UCDC); Johnstonville, 1 Aug 1965, M. R. Gardiner, 1 ♀ (EMEC); Meadow Valley, 29 Jun 1924, F. C. Hadden, 1 ♂ (FMNH); 6.4 km W of Quincy, 22 Jun 1949, R. G. Howell, 1 ♂ (EMEC). RIVERSIDE Co.: East Anza, 17 May 1954, thistle, J. Donovan, 1 ♀ (CDAE); Joshua Tree National Park, Upper Covington Flat, emerged 17 Jun 1979 from *Quercus* sp. collected 8 May 1979, A. E. Lewis, 2 ♂♂; Pinyon Flat, 1211 m (4000 ft), 5 Jun 1958, *Purshia tridentata*, G. H. Nelson, 1 ♂; same data except 13 Jun 1964, *Juniperus californicus*, 1 ♂; Poppet Flat, 31 May 1940, *Salix* sp., R. L. Usinger, 1 ♂ (EMEC). SACRAMENTO Co.: Upper Sunrise Park, emerged 3 Jul 1991 from girdled branch *Quercus* sp., R. L. Penrose, 1 ♀. SAN BERNARDINO Co.: Cajon Pass, Jun 1949, 1 ♀ (UCDC); same loc., 25 Jun 1966, *Adenostoma fasciculatum*, G. H. Nelson, 1 ♀. SAN DIEGO Co.: Balboa Park, 25 Aug 1935, 1 ♀ (FMNH); Boulevard, 12 Jun 1951, D. J. & J. N. Knull, 1 ♂ (FMNH); Cuyamaca Rancho State Park, 9 Jul 1959, beating *Q. dumosa*, G. H. Nelson, 1 ♂. SANTA BARBARA Co.: Sunset Valley, 14 Jul 1938, M. A. Cazier, 1 ♀ (EMEC). SANTA CLARA Co.: Los Gatos, 26 Jun 1918, reared *Q. virginiana*, R. D. Hartman, 1 ♀ (EMEC). SISKIYOU Co.: no date, 1 ♂ (CMNH). TULARE Co.: Exeter, 25 Aug 1938, 1 ♀ (EMEC); Sequoia National Park, 609–1828 m (2000–6000 ft), 20 Jun 1929, A. T. McClay, 1 ♀ (UCDC). TUOLUMNE Co.: Mather, 24 Aug 1957, M. E. Irwin, 1 ♂ (UCDC). COUNTY UNKNOWN: no date, 1 ♂ (LACM); Newton, 14 Jul 1949, D. J. & J. N. Knull, 1 ♂ (FMNH). OREGON. JACKSON Co.: Siskiyou Pass, 8 Jul 1970, *Quercus* sp., R. L. Westcott, 1 ♀. JOSEPHINE Co.: 3.2 km E of Grants Pass, 7 Jul 1970, oriental fruit moth bait pot, R. L. Westcott, 1 ♂. KLAMATH Co.: Klamath, 2 Jul, 1 ♂ (CMNH).

Purpuricenus opacus (Knull)

(Figs. 3, 4, 10)

Tragidion opacum Knull, 1937: 306; Chemsak, 1977: 178.

Purpuricenus opacus, Knull, 1954: 129; Linsley, 1962: 105; Chemsak & Linsley,

1982: 51; Chemsak et al., 1992: 85; Monné & Giesbert, 1994: 150; Poole & Gentili, 1996: 150.

Types.—Holotype, male (Fig. 3), data: "Davis M. Tex (p) VII-4-36 (h) / J. N. Knull Collr. / J. N. Knull Collection (p) / Holotype *Tragidion opacum* Knull (h) (red label) / *Purpuricenus opacus* Knull det. J. Knull (p)." Allotype, female (Fig. 4), data: "Jeff Davis Co VII-12-50 Tex. / D. J. & J. N. Knull Collrs. / ALLOTYPE (red label) / J. N. Knull Collection / *Purpuricenus opacus* Knull det. J. Knull (p)." Types deposited: Field Museum of Natural History, Chicago.

Male.—Form medium-sized, subcylindrical; integument black, opaque, elytra brunneus, basal margin lightly infuscated with black, apical dark area restricted to apical one-fifth, extending obliquely, sinuately from lateral margin to suture; pubescence dark. Head with front shining, moderately coarsely, densely punctate, punctures becoming finer and sparser near base of antennae, sparsely clothed with short, recurved hairs; vertex slightly shining, coarsely, densely punctate, pubescence short, sparse, recurved, a few longer, suberect hairs scattered near eyes; antennal tubercles prominent, antennae exceeding elytral apices by nearly 4 segments, each segment moderately shining, finely, moderately densely punctate, finely, densely clothed with short, appressed hairs, antennomeres 1–3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly longer than apical width, 3 1.4× longer than 1, 4–10 subequal in length and slightly shorter than 3, 11 longest, appendiculate, slightly curved apically. Pronotum 1.4× wider across lateral tubercles than long, constricted before base; moderate lateral tubercles just behind middle, angles subacute; surface slightly shining, coarsely, contiguously, slightly irregularly punctate, anterolateral areas with punctures finer, dense, smaller than those on disc; pubescence short, sparse, recurved, a few longer, suberect hairs scattered throughout basal area; disc convex, with 5 distinct calluses, median callus most prominent with glabrous apex; prosternum dull, with transverse impression, nearly impunctate in front of impression, very finely, densely punctate within and behind impression, moderately clothed with short, suberect hairs; meso- and metasternum slightly shining, finely, densely punctate, thinly clothed with short, subdepressed hairs, longer, suberect hairs more numerous along posterior margin of metasternum. Elytra 2.2× longer than humeral width; surface dull, moderately coarsely punctate over basal half, punctures smaller than largest of pronotum, separated by much less than their width, surface over apical half alutaceous, more finely punctate; pubescence short, subdepressed, a single hair arising from anterior edge of each puncture, hairs becoming denser toward apex; apices subemarginate, sutural angles subacutely dentate, outer angles obtusely dentate. Scutellum slightly longer than wide, weakly impressed longitudinally, densely clothed with short, appressed hairs, apex narrowly rounded. Legs shining, elongate, slender, femora moderately, shallowly punctate, sparsely clothed with short, subdepressed hairs, metafemora slightly exceeding elytral apices; tibiae shining, more finely, densely punctate, moderately clothed with short, subdepressed hairs; metatarsomere 1 slightly longer than combined length of 2–3. Abdomen shining, finely, moderately sparsely punctate, pubescence short, subdepressed, moderately dense with longer, suberect hairs toward apex, apical edge of sternites glabrous, last sternite broadly subemarginate at apex. Length, 19.05 mm; width, 6.00 mm. Described from male holotype (FMNH) (Fig. 3).

Female.—Differs from male as follows: elytra dull-orange near base, becoming brunneus near apical dark area, basal margin from scutellum to humerus narrowly black, apical one-third of elytra dark; antennae not quite reaching elytral apices, antennomere 3 slightly longer than 1, 4–11 subequal in length and slightly shorter than 1; anterolateral areas of pronotum moderately coarsely punctate, punctures slightly smaller than those on disc; abdomen with apex of last sternite broadly truncate, shallowly emarginate medially. Length, 15.60 mm; width, 5.75 mm. Described from female allotype (FMNH) (Fig. 4).

Diagnosis.—This species is distinguished from all other North American *Purpuricenus* by its brunneus to dull-orange elytra with only the apical one-third or less black.

Variation.—The elytra vary from brunneus to dull-orange, the basal margin of the elytra may be narrowly black, fuscous, or unmarked, and the apical dark area extends variously forward from the

lateral margin to the apical one-fifth to one-third of the sutural margin. Linsley (1962) indicated that color variation was sexually dimorphic, however, no sexual dimorphism was observed in the fairly large series examined. Males measured 13.45–20.70 mm (16.62 ± 1.52 mm, $n = 48$) and females 15.00–19.15 mm (16.86 ± 1.14 mm, $n = 19$) in length.

Distribution.—This species is known only from the Davis Mountains of western Texas (Fig. 10). D. G. Marqua collected a large series near Limpia Canyon at the Davis Mountains Resort, and F. T. Hovore (personal communication) collected two males near Kit Carson Rocks at W base of Sawtooth Mt, 26–29 Jun 1979.

Biology.—The larval host is unknown, but adults have been beaten only from *Quercus* spp. D. G. Marqua collected this species in fermenting bait traps placed in a dry oak woodland dominated by *Q. emoryi* Torrey, *Q. pungens* Liebmann var. *vaseyana* (Buckley) C. H. Muller, *Juniperus deppeana* Steudel, and *Pinus remota* (Little) D. K. Bailey & Hawksworth. Seasonal occurrence: 24 Jun–26 Jul (median 75% 29 Jun–11 Jul, $n = 65$). Appearance of this species may be dependent upon the occurrence of adequate summer rains. D. G. Marqua trapped only one specimen during the dry years of 1986–1990. In 1991 frequent rains occurred during June and July, and 24 specimens were trapped. Dry conditions resumed in 1992, and seven specimens were trapped that year, one was trapped in 1993, and none were trapped 1994–1998 despite the continued placement of traps.

Material Examined.—In addition to Types, 66 specimens: TEXAS. JEFF DAVIS Co.: 12 Jul 1950, D. J. & J. N. Knull, 1 ♀ (FMNH); same data except 4 Jul 1953, 6 ♂♂, 2 ♀♀; 6 Jul 1953, 11 ♂♂, 3 ♀♀ (EMEC, FMNH); Davis Mts, 3 Jul 1955, D. J. & J. N. Knull, 2 ♂♂ (EMEC, FMNH); same data except 11 Jul 1955, 2 ♂♂, 3 ♀♀ (FMNH, AELC); 25 Jun 1959, 1 ♂ (FMNH); Davis Mts Resort, Limpia Cyn at Yellow Knife Trail, 1768 m (5800'), 26 Jun 1991, fermenting bait trap, D. G. Marqua, 1 ♂; same data except 24 Jun 1991, 1 ♂ (TCMC); 27 Jun 1991, 3 ♂♂; 29 Jun 1991, 3 ♂♂, 1 ♀; 2 Jul 1991, 2 ♂♂; 4 Jul 1991, 1 ♀ (TCMC); 5 Jul 1991, 1 ♂; 6 Jul 1991, 1 ♂; 7 Jul 1991, 3 ♂♂, 1 ♀; 8 Jul 1991, 2 ♂♂, 1 ♀; 12 Jul 1991, 1 ♂; 16 Jul 1991, 1 ♀; 28 Jul 1991, 1 ♀; 30 Jun 1992, 1 ♀; 7 Jul 1992, 1 ♂; 8 Jul 1992, 1 ♂; 9 Jul 1992, 1 ♂; 10 Jul 1992, 1 ♀; 13 Jul 1992, 1 ♀ (EMEC); 22 Jul 1992, 1 ♂ (EMEC); 8 Jul 1993, 1 ♀; 28.8 km W of Ft Davis, 8 Jul 1961, *Quercus* sp., R. L. Westcott, 3 ♂♂ (& RLPC).

Purpuricenus axillaris Haldeman

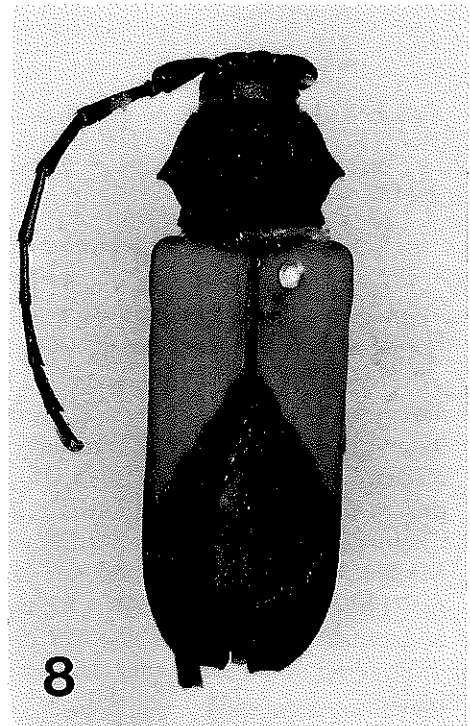
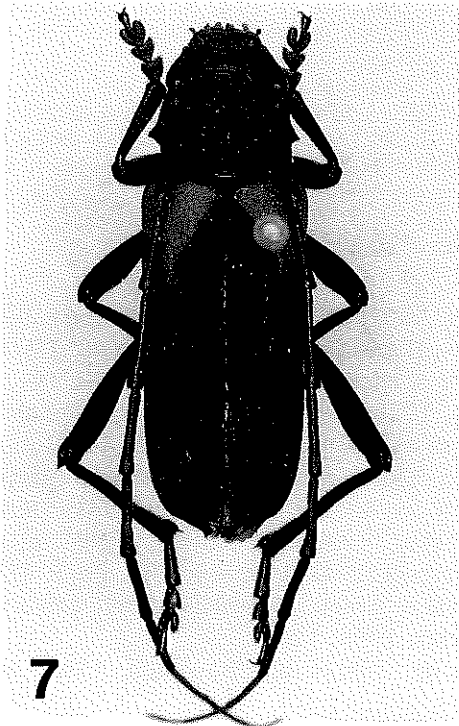
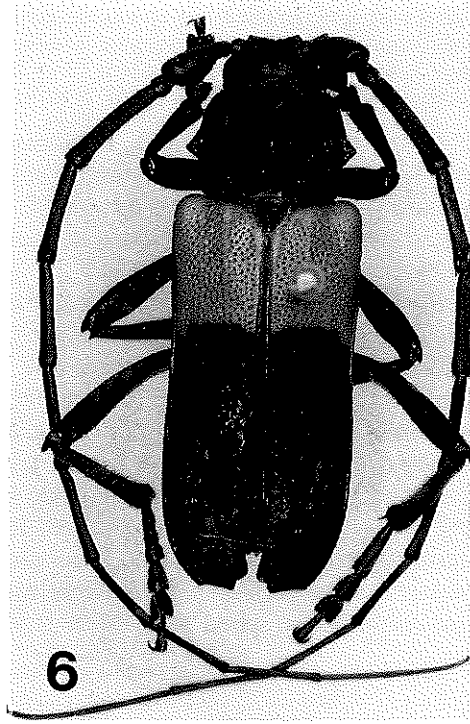
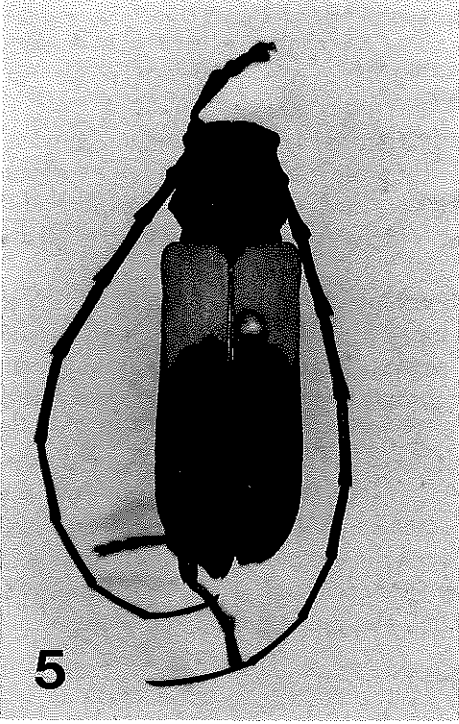
(Figs. 5, 11)

Purpuricenus axillaris Haldeman, 1847: 31; LeConte, 1850: 11; Bland, 1861: 94; Henshaw, 1885: 98; Hamilton, 1890: 238; Hamilton, 1895: 368; Wolcott, 1900: 470; Blatchley, 1910: 1031 (part); ?Fisher & Kirk, 1912: 311; Aurivillius, 1912: 466 (part); Leng, 1920: 279; Craighead, 1923: 79; Blackman & Stage, 1924: 98–99, pl. IX, fig 36; Kirk & Knull, 1926: 41 (part); Leonard, 1928: 449; Frost & Dietrich, 1929: 436 (part); Knull, 1946: 230 (part); Linsley, 1962: 105 (part), fig. 34 (part); ?Bayer & Shenefelt, 1969: 16, fig. 25; Rice, 1982 (1981): 460; Chemsak & Linsley, 1982: 51; Chemsak et al., 1992: 85; ?Skillman, 1994: 210; MacRae, 1994: 236 (part); Monné & Giesbert, 1994: 150; Solomon, 1995: 473 (part); Poole & Gentili, 1996: 150; Downie & Arnett, 1996: 1234 (part); Linsley & Chemsak, 1997: 255, 257, 427; Schiefer, 1998: 120.

Purpuricenus humeralis var. *axillaris*, Leng, 1886b: 82; Bowditch, 1896: 34 (part).

Purpuricenus sp., MacRae, 1994: 236; Yanega, 1996: 126, fig. 223.

Types.—Haldeman's types, or specimens compared to them, were placed in the



LeConte Collection, now residing in the Museum of Comparative Zoology, Cambridge (Darlington 1961). The LeConte collection contains five specimens bearing "axillaris" labels and LeConte's characteristic colored discs. However, only specimens 1 (male) and 3 and 4 (female) agree with Haldeman's original description and LeConte's subsequent description (LeConte 1850). Specimen 1 is designated as lectotype, male (Fig. 5); data: "(pink disc) / *P. axillaris* Hald. (h) / J. L. LeConte Collection / MCZ #4966 / LECTOTYPE *Purpuricenus axillaris* Haldeman ♂ T. C. MacRae 1995 (red label) (p)"; specimens 3 and 4 are designated paralectotypes and bear labels similar to the lectotype. Specimen 2 has the base of the elytra red (original description states "brownish-orange") and measures 20.8 mm in length (original description states "6-9" long" (" = 1/12 inch), or 12.7-19.1 mm). Specimen 5 also has the base of the elytra red, and it bears a pale green disc (LeConte's code for CO, KS, MT, ND, NE, SD, and WY) (type locality is Pennsylvania). Specimens 2 and 5 represent the species described in this paper as *P. paraxillaris* and are designated paratypes of that species.

Male.—Form medium sized, fairly slender, subcylindrical; integument black, opaque, basal one-third of elytra orange, posterior margins of orange markings more or less transverse, irregular, extending slightly further posteriorly in the lateral portions; pubescence dark. Head with front slightly shining, finely, densely punctate, moderately clothed with short, recurved hairs; vertex dull, shallowly, confluent punctate, pubescence short, sparse, recurved, a few longer, suberect hairs scattered near eyes; antennal tubercles distinct but not prominent, antennae exceeding elytral apices by about 4 segments, each segment slightly shining, finely, moderately densely punctate, moderately clothed with short, appressed hairs, antennomeres 1-3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly longer than apical width, 3 1.6× longer than 1, 4-10 subequal in length and slightly shorter than 3, 11 longest, appendiculate, slightly curved apically. Pronotum 1.4× wider across lateral tubercles than long, constricted before base; small lateral tubercles just behind middle, angles obtuse; surface dull, finely, shallowly punctate, anterolateral areas with punctures distinctly smaller and more widely separated than those on disc; pubescence short, sparse, recurved toward median callus, a few longer, suberect hairs scattered along basal portion; disc convex, with 5 weak calluses; prosternum dull, with transverse impression, finely punctate, punctures coarser on prosternal process, moderately clothed with suberect hairs; mesosternum slightly shining, finely, densely punctate, thinly clothed with moderately long, subdepressed hairs; metasternum alutaceous, finely, densely punctate, thinly clothed with moderately long, subdepressed hairs. Elytra 2.2× longer than humeral width; surface dull, finely, shallowly punctate over basal half, punctures separated by at least their width, surface over apical half more densely punctate; short, subdepressed hairs sparsely scattered primarily near sutural and along lateral margins in basal half, pubescence moderately dense and uniform across posterior dark areas; apices subtruncate, sutural and outer angles obtuse, not dentate. Scutellum slightly longer than wide, weakly impressed longitudinally, finely, densely clothed with short appressed hairs, apex narrowly rounded. Legs shining, elongate, slender; femora finely, sparsely, shallowly punctate, sparsely clothed with appressed hairs, metafemora extending to elytral apices; tibiae shining, more finely, densely punctate, moderately clothed with appressed hairs; metatarsomere 1 slightly longer than combined length of 2-3. Abdomen shining, sparsely, shallowly punctate, thinly clothed with mixture of short, appressed hairs and longer, suberect hairs; apical edge of sternites glabrous, last sternite broadly, shallowly emarginate at apex. Length, 15.15 mm; width, 4.85 mm. Described from male lectotype (Fig. 5).

←

Figures 5-8. *Purpuricenus* spp. (dorsal views).

Figure 5. *P. axillaris* Haldeman (lectotype male).

Figure 6. *P. paraxillaris* MacRae, NEW SPECIES (holotype male).

Figure 7. *P. humeralis* (Fabricius) (male).

Figure 8. *P. linsleyi* Chemsak (paratype female).

Female.—Differs from male as follows: antennae extending just past elytral apices, antennomeres 3–11 decreasing in length, antennomere 11 straight, not appendiculate, anterolateral areas of pronotum almost as coarsely punctate as disc; abdomen with apex of last sternite broadly subtruncate. Length, 14.15 mm; width, 4.55 mm. Described from female paralectotype (specimen 3).

Diagnosis.—The transversely-shaped orange elytral markings may resemble that of *P. paraxillaris*, however, *P. axillaris* may be distinguished by its weak discal pronotal calluses with the median callus lacking a polished apex, the small, obtuse lateral pronotal tubercles, the fine, sparse basal punctation of the elytra, the not or weakly dentate elytral sutural angles, and its smaller size (average length 3 mm less than *P. paraxillaris*).

Variation.—The elytral base is usually orange but varies from yellow to red-orange in some specimens. Males measured 10.85–17.55 mm (14.35 ± 1.43 mm, $n = 135$) and females 10.50–18.45 mm (14.38 ± 1.47 mm, $n = 171$) in length. Specimens from the extreme southwestern part of the species' range tend to be larger. Males from Oklahoma measured 12.40–17.55 mm (14.96 ± 1.27 mm, $n = 52$) and females 12.30–18.45 mm (15.38 ± 1.39 mm, $n = 49$) in length, while males from more northeastern localities measured 10.85–16.80 mm (13.96 ± 1.39 mm, $n = 83$) and females 10.50–16.85 mm (13.97 ± 1.32 mm, $n = 122$) in length. The orange markings of the elytra in the Oklahoma specimens also tends to extend a little further posteriorly, to slightly past the middle of the elytra.

Distribution.—Eastern United States (Fig. 11). Specimens were examined from the following states: **Arkansas**, Connecticut, District of Columbia, **Florida**, Georgia, Illinois, Indiana, **Kansas**, **Kentucky**, Maryland, Massachusetts, Mississippi, Missouri, New Jersey, New York, Ohio, **Oklahoma**, Pennsylvania, Virginia, **West Virginia**, and Wisconsin. It has been recorded from Texas, but no specimens were examined from that state. This record may refer to *P. paraxillaris*.

Biology.—All of the reared specimens examined emerged from *Carya*, including the one reported by Rice (1982) from standing dead *C. prob. alba* (L.) Nuttall ex Elliot [= *C. tomentosa* (Lamarck ex Poiret) Nuttall] in Missouri. Blackman & Stage (1924) illustrated what is apparently this species and reported that it burrows in and sometimes girdles small limbs of dead *C. glabra* (P. Miller) Sweet in New York. All of the remaining host-associated specimens examined were collected on *Carya*, with the exception of a single specimen collected on dead *Quercus* sp. In contrast, all specimens examined that were reared from *Quercus* are *P. paraxillaris*. *Purpuricenus axillaris* apparently prefers *Carya* (Juglandaceae), but *P. paraxillaris* primarily infests *Quercus* and *Castanea* (Fagaceae). Assuming this, the records of Hamilton (1895), Bowditch (1896), Wolcott (1900), and Leonard (1928), all reporting specimens reared or collected from *Carya*, should refer to *P. axillaris*. The larval description (Craighead 1923) also likely refers to this species since it was based on larvae collected from *Carya* twigs at State College, Pennsylvania by A. B. Champlain. Craighead (1923) described the larval twig-girdling habits in *Carya* as similar to those of *Anelaphus villosus* (Fab.), and Blackman & Stage (1924) described the larval burrow in detail. Development is completed in one year (Craighead 1923) or two years (Blackman & Stage 1924). Craighead (1923) also noted it has been collected in *Quercus*, but this probably refers to *P. paraxillaris*. The majority of the specimens examined were collected in fermenting bait traps. In Missouri, it was trapped in dry to mesic, upland oak/hickory forests. Seasonal occurrence: 22 May–29 Aug (median 75% 14 Jun–27 Jul, $n = 190$). Specimens from Arkansas occurred 19 Jun–17 Aug (median 75% 6–25 Jul, $n = 57$), those from Maryland occurred 21 Jun–10 Aug (median 75%

28 Jun–29 Jul, $n = 29$), and those from Missouri occurred 22 May–16 Jul (median 75% 2–30 Jun, $n = 37$).

Material Examined.—In addition to Types, 365 specimens: ARKANSAS. *NEVADA Co.*: Aug 1973, bait trap, E. Gage, 1 ♂ (UADE). *PULASKI Co.*: Little Rock, 6 Jul 1997, 1 ♂, 2 ♀♀, hanging sugar trap, B. Baldwin (DJHC); same data except 9 Jul 1997, 1 ♂; 14 Jul 1997, 2 ♀♀; 15 Jul 1997, 1 ♀; 20 Jul 1997, 8 ♂♂, 5 ♀♀; 24 Jul 1997, 3 ♂♂, 4 ♀♀; 27 Jul 1997, 1 ♂; 6 Aug 1997, 1 ♀; 10 Aug 1997, 1 ♂. *WASHINGTON Co.*: 8 Jul 1973, bait trap, W. D. Wylie, 1 ♂ (UADE); same data except 13 Jul 1973, 1 ♀; 15 Jul 1973, 1 ♀; 17 Aug 1973, 1 ♀; 18 Jul 1973, 4 ♂♂; 20 Jul 1973, 2 ♂♂, 1 ♀; 21 Jul 1973, 2 ♂♂; 23 Jul 1973, 1 ♀; 25 Jul 1973, 2 ♀♀ (& UGCA); 8 Aug 1973, 1 ♂; 17 Aug, 1973, 1 ♀; 29 Jun 1974, 1 ♂; 5 Jul 1974, 1 ♀; 6 Jul 1974, 1 ♂, 1 ♀; 14 Jul 1974, 2 ♂♂, 2 ♀♀; Fayetteville, 27 Jul 1973, UV light trap, L. McCaul, 1 ♀ (UADE). *COUNTY UNKNOWN*: no date, 1 ♂, 1 ♀ (FMNH). CONNECTICUT. *NEW LONDON Co.*: Lyme, 29 Aug 1916, reared from *Carya* sp., A. B. Champlain, 1 ♀ (USNM); same loc., 22 Jul 1918, reared from *Carya* sp., W. S. Fisher, 1 ♀ (USNM); same loc., 29 Jul 1918, flying, W. S. Fisher, 1 ♀ (USNM). *WINDHAM Co.*: S Woodstock, 8 Jun 1897, reared from *Carya* sp., 1 ♂ (USNM). DISTRICT OF COLUMBIA. no date, 1 ♀ (INHS); Washington, no date, 1 ♂ (RUIC); same loc., no date, M. L. Linell, 4 ♂♂, 2 ♀♀ (INHS, USNM); Washington, Rock Creek, 14 Jun 1902, C. E. Burden, 3 ♀♀ (USNM). FLORIDA. *LIBERTY Co.*: Torreya State Park, 25 May 1986, M. Stevens, 1 ♀ (FSCA). GEORGIA. *WALKER Co.*: 8.1 km SE of Villanow, 8 Jun 1969, leaves dead *Quercus* sp., R. L. Westcott, 1 ♀. ILLINOIS. *ST CLAIR Co.*: 6 Aug 1902, G. W. Bock, 1 ♀ (UMRM). INDIANA. *CLARK Co.*: State Forest, 9 Jun 1936, N. M. Downie, 1 ♀ (FMNH); same loc., 21 Jun 1936, sweeping, Montgomery, 1 ♀ (PURC). *ORANGE Co.*: Orleans, 6 Jun 1934, S. A. Summerland, 1 ♂ (UADE); same data except 20 Jul 1935, 1 ♂. KANSAS. *COUNTY UNKNOWN*: no date, T. B. A., 1 ♂ (PURC). KENTUCKY. *LAUREL Co.*: London, 9 Jul 1959, flight, C. J. Hay, 1 ♀ (PMNH). MARYLAND. *ALLEGANY Co.*: Green Ridge State Forest, 10 Aug 1990, J. D. Glaser, 1 ♂; same data except 27 Jun 1986, 1 ♀ (GHNC); 17 Jul 1990, 1 ♂ (JAGC); 28 Jun 1994, 1 ♂; 20 Jul 1994, 1 ♂; 19–25 Jul 1995, 1 ♂, 3 ♀♀; Polish Mt, 7 Jul 1986, J. D. Glaser, 1 ♀; same data except 8 Jul 1986, 1 ♂ (DJHC); 27 Jul 1986, 1 ♂; 2 Jul 1987, 1 ♂; 3 Jul 1987, 1 ♂, 1 ♀; 6 Jul 1987, 2 ♀♀; 8 Jul 1987, 1 ♀; 14–20 Jul 1987, 1 ♂ (GHNC); 25 Jul 1987, 1 ♀; 27 Jul 1987, 1 ♂; 29 Jul 1987, 1 ♀; 30 Jul 1987, 1 ♂, 1 ♀. *BALTIMORE Co.*: Prettyboy Reserve, 23 Jul 1981, fermenting bait trap, J. D. Glaser, 1 ♂; same data except 29 Jul 1981, 1 ♀; 6 Aug 1981, 1 ♂; 20–24 Jul 1982, 1 ♂. *MONTGOMERY Co.*: Glen Echo, no date, R. M. Fouts, 1 ♀ (USNM). *WASHINGTON Co.*: Bear Pond Mts, 21 Jun 1994, J. D. Glaser, 2 ♀♀; same data except 25 Jun 1994, 3 ♀♀; 26 Jun 1994, 1 ♀; 12–19 Jul 1994, 2 ♂♂, 1 ♀; Sideling Hill, 2 Aug 1984, J. D. Glaser, 1 ♀. MASSACHUSETTS. *NORFOLK Co.*: Brookline, no date, 2 ♂♂ (SEMC, USNM); same loc., 1 Jul 1895, 1 ♀ (USNM). MISSISSIPPI. *OKTIBBEHA Co.*: Agric College (= Mississippi State Univ), Jun 1916, J. A. Thomas, 1 ♂ (USNM). MISSOURI. *BOONE Co.*: Rock Bridge State Park, emerged 6 Jun 1979 from dead *Carya* sp., M. E. Rice, 1 ♂. *CLAY Co.*: Watkins Mill State Park, 9 Jun 1978, reared from *Carya* sp., M. E. Rice, 1 ♂. *JEFFERSON Co.*: Sunridge Tower County Park, 11.4 km N of Hillsboro, hwy 21, T42N R4E S36 (SW ¼), 24 Jun 1985, fermenting bait trap, T. C. MacRae, 1 ♀; same data except 1 Jul 1985, 1 ♂; 8 Jul 1985, 1 ♀; 2 Jun 1986, 1 ♀; 19 Jun 1986, 1 ♂; Valley View Glades Natural Area, 6.2 km NW of Hillsboro, hwy B, T41N R4E S30, 11 Jun 1987, fermenting bait trap, T. C. MacRae, 1 ♀; same data except 15 Jun 1987, 1 ♂; 16 Jun 1996, 1 ♀; Victoria Glades Natural Area, 3.8 km SE of Hillsboro, T40N R5E S14, 16 Jul 1984, fermenting bait trap, T. C. MacRae, 1 ♀; same data except 2 Jun 1986, 4 ♂♂, 5 ♀♀ (& DJHC); 5 Jun 1986, 1 ♂; 16 Jun 1986, 3 ♂♂; 23 Jun 1986, 2 ♂♂; 26 Jun 1986, 1 ♀; 22 May 1987, 1 ♂; 1 Jun 1987, 1 ♂; 16 Jun 1996, 1 ♀; 23 Jun 1996, 1 ♀; 30 Jun 1996, 1 ♀; 14 Jul 1996, 1 ♀, 22 Jun 1997, 1 ♀; 30 Jun 1997, 1 ♂, 2 ♀♀. *POLK Co.*: 6.4 km SE of Flemington, emerged 17 Jun 1989 from dead *Carya* sp., M. E. Rice, 1 ♂. *ST LOUIS Co.*: Wildwood, 1.6 km E of hwy 109 on Rocky Ridge Rd, T44N R3E S12, 16 Jun 1996, fermenting bait trap, T. C. MacRae, 1 ♂. *WAYNE Co.*: 5.2 km WSW of Patterson, County Rd 332, 21 Jun 1988, UV light, H. M. Webber, 1 ♂ (FSCA); Williamsburg, 29 May 1983, M. J. Fujan, 1 ♂ (TCMC). NEW JERSEY. *BURLINGTON Co.*: Masonville, 4 Jul, R. J. Simm, 1 ♂ (USNM). *MORRIS Co.*: Boonton, 21 Jun 1901, G. M. Greene, 1 ♀ (USNM). NEW YORK. *TOMPKINS Co.*: Ithaca, 24 Jul 1936, H. I. Scudder, 1 ♂ (FSCA); same loc., 15 Jul 1940, J. N. Belkin, 1 ♂ (FSCA). *COUNTY UNKNOWN*: no date, 1 ♂ (MCZC, Horn Collection), 1 ♂, 3 ♀♀ (CMNH). OHIO. *JACKSON Co.*: Jackson Twp, 11 Jul 1931, C. F. Walker, 1 ♀ (OSUC). *VINTON Co.*: Lake Hope State Park, emerged 9 Jun 1988 from *Carya* sp., 1 ♂ (RAAC); same loc., 24 Jun 1988, fermenting bait, 1 ♀ (RAAC);

same loc., 1 Jul 1990, 1 ♀ (RAAC); same loc., 27 Jul 1993, fermenting bait trap, J. A. Green, 1 ♂; same data except 7 Jul 1993, 1 ♂, 3 ♀♀ (& LGBC); 17 Jul 1993, 3 ♂♂, 3 ♀♀; Zaleski, 18 Jun 1994, sugar trap, J. A. Green, 1 ♂, 7 ♀♀; same data except 25 Jun 1994, 4 ♀♀; 11 Jul 1994, 2 ♀♀; 30 Jul 1994, 2 ♀♀; 13 Aug 1994, 1 ♂, 1 ♀; Zaleski State Forest, 15–23 Jun 1994, R. A. Androw, 1 ♂, 10 ♀♀; same data except 22 Jun–2 Jul 1994, 3 ♀♀; 2–7 Jul 1994, 7 ♀♀; 12–20 Jul 1994, 2 ♂♂; 20–27 Jul 1994, 2 ♂♂; 1 ♀; 27 Jul–3 Aug 1994, 1 ♂; 3–11 Aug 1994, 1 ♂. *COUNTY UNKNOWN*: no date, 1 ♀ (CMNH). OKLAHOMA. *LATIMER Co.*: Jun 1982, K. Stephan, 1 ♂; same data except Jul 1982, 1 ♀; Jul 1983, 7 ♂♂, 4 ♀♀ (& CDAE, FSCA); Aug 1983, 1 ♂; Jun 1984, 6 ♂♂, 4 ♀♀ (FSCA); Jun 1985, fermenting bait trap, 6 ♂♂, 2 ♀♀ (FMNH, FSCA); Jul 1985, fermenting bait trap, 1 ♂, 5 ♀♀ (FSCA); Jun 1986, 3 ♂♂, 4 ♀♀ (FSCA); Jun 1987, 6 ♂♂, 9 ♀♀ (DENH, FSCA, GHNC); Jul 1987, 8 ♂♂, 2 ♀♀ (FSCA); Aug 1987, 1 ♀ (FSCA); Jun 1988, 4 ♂♂, 2 ♀♀ (FSCA); Jun 1989, 2 ♀♀ (FSCA); Jul 1989, 1 ♂, 3 ♀♀ (FSCA); same loc., 6 Jul 1987, K. E. M. Galley, 1 ♂, 3 ♀♀ (CUIC); nr Red Oak, 25 Jun–15 Jul 1990, fermenting bait trap, G. Mooney, 1 ♂ (DJHC); 6.4 km W of Red Oak, 1–4 Jul 1987, sweep, D. Chandler, 1 ♀ (DENH); 8 km W & 1.6 km S of Red Oak, 2–15 Jul 1993, fermenting bait trap, K. Stephan, 12 ♂♂, 10 ♀♀ (DJHC, EGRC, TCMC); 9.7–11.3 km SW of Red Oak, 18–25 Jun 1989, fermenting bait trap, G. Mooney & D. J. Heffern, 1 ♀ (DJHC); same data except 4–8 Jul 1989, 1 ♂, 3 ♀♀ (& EGRC). PENNSYLVANIA. *ADAMS Co.*: Arendtsville, 7 Aug 1928, S. W. Frost, 1 ♀ (CUIC). *ALLEGHENY Co.*: Pittsburg, 29 Jun, H. G. Klages, 1 ♀ (CMNH); same data except 22 Jul, 1 ♂. *CENTRE Co.*: State College, 7 Apr 1911, F. C. Craighead, 1 ♂ (FMNH); same data except 5 Feb 1912, 1 ♂ *DAUPHIN Co.*: Rush Twp, 19 Aug, A. B. Champlain, 1 ♂ (PADA); Clark's Valley, 7 Jul 1940, A. B. Champlain, 1 ♀ (PADA); same loc., 11 Jul 1937, taken in bait pails, R. M. Baker, 1 ♀ (PADA); same data except 23 Jul 1937, 1 ♀. *NORTHAMPTON Co.*: Heckton Mills, 8 Jul 1910, P. R. Meyers, 1 ♀ (USNM). *PHILADELPHIA Co.*: Franklord, no date, H. W. Wenzel, 1 ♂, 1 ♀ (OSUC). *TIOGA Co.*: no date, 1 ♀ (UMMZ). *WESTMORELAND Co.*: Jeanette, 20 Jun, H. G. Klages, 1 ♀ (CMNH); same data except 1 Jul, 1 ♀. *COUNTY UNKNOWN*: no date, 1 ♂ (MCZC, Horn Collection), 1 ♂ (CMNH); no date, Hubbard & Schwarz, 1 ♂ (AMNH); Alleghen, no date, 1 ♀ (MCZC, Horn Collection), 1 ♂ (CMNH). VIRGINIA. *ROCKINGHAM Co.*: 6.4 km E of Timberville, 19 Jun 1985, J. M. Coffman, 1 ♀ (DJHC); same data except 23 Jun 1985, 1 ♀. *COUNTY UNKNOWN*: no date, 1 ♂ (INHS). WEST VIRGINIA. *PENDELTON Co.*: 8.1 km NW of Ruddle, 13 Aug 1992, malaise trap, J. D. Hacker, 1 ♀ (RAAC). WISCONSIN. *COUNTY UNKNOWN*: no date, 1 ♀ (MCPM).

Purpuricenus paraxillaris MacRae, NEW SPECIES

(Figs. 6, 12)

Purpuricenus humeralis, Bland, 1862: 276 (part); Hamilton, 1890: 238 (part).

Purpuricenus humeralis var. *axillaris*, Lugger, 1884: 204; Bowditch, 1896: 34 (part).

Purpuricenus axillaris, Smith, 1900: 289; Blatchley, 1910: 1031 (part); Aurivillius, 1912: 466 (part); Champlain et al., 1925: 139; Kirk & Knull, 1926: 41 (part); Champlain & Kirk, 1926: 290; Frost & Dietrich, 1929: 436 (part); Knull, 1932: 63; Champlain & Knull, 1932: 257; Knull, 1934: 210; Knull, 1946: 230 (part), fig. 72; Linsley, 1962: 105 (part), figs. 33, 34 (part); Papp, 1984: 211, fig. 703; Rice et al., 1985: 21; MacRae, 1994: 236 (part); Solomon, 1995: 473 (part); Downie & Arnett, 1996: 1234 (part), fig. 127.50; Yanega, 1996: 126, figs. 222a, 222b; Linsley & Chemsak, 1997: 259, 276, 318, 320, 322, 427.

Types.—Holotype, male (Fig. 6); data: "MO: Jefferson Co. Victoria Glades (Natural Area, 3.8 km SE of Hillsboro, T40N R5E S14) (p) June 25 (h), 19 (p) 84 (h), Coll: T. C. MacRae (p) / Fermenting liquid (h) / HOLOTYPE *Purpuricenus paraxillaris* ♂ T. C. MacRae (red label) (p);" deposited: Museum of Comparative Zoology, Cambridge.

Paratypes (544 specimens): no data, 1 ♂, 1 ♀ (MCZC, LeConte Collection); same data as holotype except 2 Jul 1984, 2 ♂♂, 1 ♀; 12 Jul 1984, 2 ♂♂; 23 Jul 1984, 1 ♀; 20 Jun 1985, 1 ♂, 1 ♀; 24 Jun

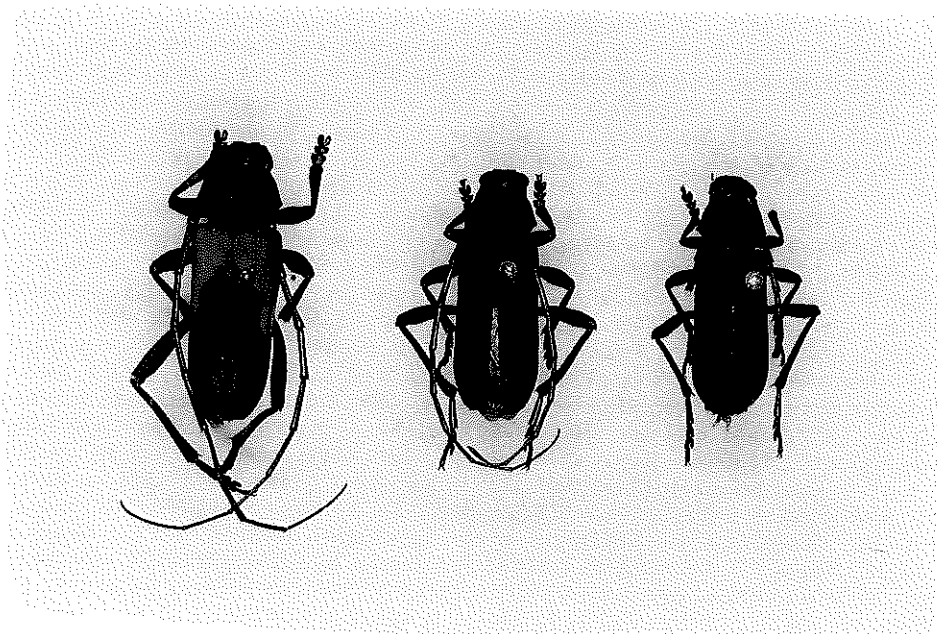


Figure 9. *P. linsleyi* (Chemsak) males illustrating variation in the elytral maculae.

1985, 1 ♂, 4 ♀♀ (& DJHC, FSCA); 27 Jun 1985, 1 ♂, 2 ♀♀; 1 Jul 1985, 1 ♂; 8 Jul 1985, 1 ♀; 11 Jul 1985, 1 ♂; 15 Jul 1985, 1 ♀; 28 May 1986, 1 ♀; 2 Jun 1986, 6 ♂♂, 9 ♀♀ (& EMEC); 5 Jun 1986, 2 ♂♂; 19 Jun 1986, 1 ♂, 1 ♀; 23 Jun 1986, 2 ♀♀; 26 Jun 1986, 1 ♂; 29 May 1987, 1 ♀; 1 Jun 1987, 1 ♀; 4 Jun 1987, 2 ♀♀; 8 Jun 1987, 2 ♂♂, 2 ♀♀; 11 Jun 1987, 2 ♂♂, 1 ♀; 15 Jun 1987, 3 ♂♂, 1 ♀; 18 Jun 1987, 1 ♀; 16 Jun 1996, 1 ♀; 23 Jun 1996, 2 ♂♂ (& RLWC); 30 Jun 1996, 1 ♀, 22 Jun 1997, 2 ♀♀; 30 Jun 1997, 1 ♀. DISTRICT OF COLUMBIA. Washington, no date, 2 ♂♂ (CMNH). FLORIDA. *HILLSBOROUGH Co.*: Tampa, 19 Apr 1984, H. D. Baggett, 1 ♂ (FSCA); same data except 27 Apr 1984, bait trap, 1 ♂. *LAFAYETTE Co.*: 4.8 km S of Mayo, 15–21 May 1995, D. J. Heffern, 1 ♂, 1 ♀. *MARION Co.*: Citra, NW 24th Avenue, 8–14 May 1993, fermenting sweet bait, F. W. Skillman, Jr., 1 ♂, 2 ♀♀ (& TCMC); same data except 15 May 1993, 1 ♀; 16 May 1993, 3 ♂♂. ILLINOIS. *PIATT Co.*: Monticello, 13 Jun 1933, W. V. B., 1 ♀ (INHS). *WILL Co.*: New Lenox, 10 Aug 1917, 1 ♀ (FMNH). *COUNTY UNKNOWN*: no date, 1 ♂, 2 ♀♀ (CMNH, INHS). INDIANA. *KNOX Co.*: Bicknell, 8 Jun 1936, S. A. Summerland, 1 ♀ (FSCA); Nesbit's Orchard, 2 Jun 1942, in bait trap, S. A. Summerland, 1 ♂ (UADE). LOUISIANA. *ST TAMMANY Par.*: 6.6 km NE of Abita Springs, S24 T6S R12E, 4 Jul 1984, V. A. Brou, 1 ♀ (LSUC); same data except 8 Jun 1985, 1 ♂ (EGRC); 11 Jun 1985, 1 ♀; 16 Jun 1985, 1 ♀ (EGRC). MARYLAND. *ALLEGANY Co.*: Green Ridge State Forest, 1–6 Jul 1982, bait, J. D. Glaser, 1 ♂; same data except 25–29 Jul 1982, 2 ♂♂, 1 ♀; 4–17 Aug 1982, 1 ♂; 12 Aug 1984, 1 ♀; 15 Jul 1986, 1 ♀; 17 Jul 1986, 1 ♀; 22 Jul 1986, 1 ♀; 29 Jul 1986, 2 ♂♂, 1 ♀; 10 Aug 1986, 1 ♂; 19 Jul 1987, 1 ♂; 20 Jul 1987, 1 ♀; 21 Jul 1987, 1 ♂, 1 ♀; 22 Jul 1987, 2 ♂♂ (& GHNC); 25 Jul 1987, 2 ♂♂, 1 ♀; 28 Jul 1987, 2 ♂♂, 1 ♀; 29 Jul 1987, 1 ♂, 1 ♀; 30 Jul 1987, 1 ♂, 2 ♀♀; 10–14 Jul 1989, 5 ♂♂, 3 ♀♀; 12 Jul 1990, 2 ♂♂, 1 ♀ (JAGC), 15 Jul 1990, 1 ♂ (LGBC); 17 Jul 1990, 1 ♂ (LGBC); 19 Jul 1990, 3 ♂♂, 2 ♀♀; 23 Jul 1990, 2 ♂♂; 25 Jul 1990, 4 ♀♀; 29 Jul 1990, 1 ♀; 30 Jul 1990, 1 ♀; 2 Aug 1990, 2 ♂♂, 5 ♀♀; 8 Aug 1990, 2 ♀♀; 5 Jul 1993, 1 ♀; 15 Jul 1993, 3 ♂♂, 1 ♀; 20 Jul 1993, 3 ♂♂, 3 ♀♀; 25 Jul 1993, 1 ♀; 28 Jun 1994, 1 ♀; 19–25 Jul 1994, 4 ♀♀; 20 Jul 1994, 1 ♀; 28 Jul 1994, 1 ♂; Polish Mt, 2 Jul 1986, J. D. Glaser, 1 ♂, 1 ♀; same data except 30 Jun 1986, 2 ♂♂ (& DJHC); 4 Jul 1986, 3 ♂♂; 5 Jul 1986, 1 ♂; 6 Jul 1986, 1 ♂; 7 Jul 1986, 1 ♂; 8 Jul 1986, 1 ♀; 16 Jul 1986, 1 ♂; 18 Jul 1986, 2 ♂♂ (& RAAC); 19 Jul 1986, 1 ♂; 20 Jul 1986, 1 ♂, 1 ♀; 22 Jul 1986, 2 ♂♂ (GHNC, RAAC); 25 Jul 1986, 1 ♀ (DJHC); 25 Jun 1987, 2 ♂♂; 2 Jul 1987, 1 ♀; 4 Jul 1987, 4 ♂♂; 5 Jul 1987, 2 ♂♂, 3 ♀♀; 6 Jul 1987, 1 ♂, 1 ♀; 7 Jul 1987, 1 ♂, 1 ♀; 8 Jul 1987, 3 ♂♂, 1 ♀; 17 Jul 1987, 1 ♀; 18 Jul 1987, 2

♂♂, 2 ♀♀; 19 Jul 1987, 1 ♂, 5 ♀♀; 20 Jul 1987, 1 ♂, 3 ♀♀; 21 Jul 1987, 2 ♂♂, 1 ♀; 22 Jul 1987, 3 ♂♂; 23 Jul 1987, 1 ♂, 3 ♀♀; 24 Jul 1987, 1 ♂; 25 Jul 1987, 5 ♂♂, 5 ♀♀; 26 Jul 1987, 1 ♂, 2 ♀♀; 27 Jul 1987, 1 ♂, 1 ♀; 28 Jul 1987, 2 ♂♂; 29 Jul 1987, 3 ♂♂, 2 ♀♀; 30 Jul 1987, 2 ♂♂, 4 ♀♀; 1 Aug 1987, 1 ♀; 2 Aug 1987, 1 ♂; 3 Aug 1987, 2 ♂♂, 2 ♀♀; Rocky Gap State Park, 26 Jul 1984, J. D. Glaser, 1 ♂; Sideling Hill, 27 Jul 1991, J. D. Glaser, 1 ♀. **BALTIMORE Co.**: Prettyboy Reserve, 14 Jul 1981, bait trap, J. D. Glaser, 1 ♂; same data except 13 Jul 1981, 1 ♀ (DJHC); 15 Jul 1981, 1 ♂, 2 ♀♀ (& DJHC); 16 Jul 1981, 1 ♂, 1 ♀ (DJHC); Sparrows Point, 30 Jun 1933, J. W. Green, 1 ♂ (AMNH). **GARRETT Co.**: Mt Etna, 28 Jun 1952, E. L. Wilson, 1 ♂ (GHNC). **WASHINGTON Co.**: Bear Pond Mts, 21 Jun 1994, J. D. Glaser, 1 ♀; same data except 25 Jun 1994, 1 ♀; 28 Jun 1994, 1 ♂; 12-19 Jul 1994, 1 ♂, 5 ♀♀; 20 Jul 1994, 2 ♂♂; Sideling Hill, 15-21 Jul 1983, J. D. Glaser, 1 ♀; same data except 20 Jul 1984, 1 ♂; 22 Jul 1984, 1 ♀ (DJHC). **COUNTY UNKNOWN**: no date, 1 ♂ (UMSP). **MISSOURI. BARRY Co.**: 6.4 km W of Exeter, 13 Jun 1937, W. F. Blair, 1 ♂ (UMMZ). **CARTER Co.**: Mark Twain National Forest, Pinewoods Lake, 6 Jun 1987, found dead, T. C. MacRae, 1 ♀. **JEFFERSON Co.**: Hillsboro, 5 Aug 1979, A. Littahorsky, 1 ♀ (TCMC); Sunridge Tower County Park, 11.4 km N of Hillsboro, hwy 21, T42N R4E S36 (SW ¼), 12 Jun 1986, fermenting bait trap, T. C. MacRae, 1 ♂; same data except 19 Jun 1986, 1 ♂, 1 ♀; Valley View Glades Natural Area, 6.8 km NE of Hillsboro, hwy B, T41N R4E S30, 8 Jun 1987, fermenting bait trap, T. C. MacRae, 1 ♂, 2 ♀♀; same data except 15 Jun 1987, 1 ♂; 30 Jun 1996, 1 ♂. **VERNON Co.**: 13 Jun 1963, D. & J. McReynolds, 1 ♀ (FSCA). **NEW JERSEY. ATLANTIC Co.**: Da Costa, 4 Jul, H. W. Wenzel, 1 ♀ (OSUC). **BERGEN Co.**: Fort Lee District, no date, 1 ♂ (CMNH). **BURLINGTON Co.**: Masonville, 4 Jul, R. J. Simm, 1 ♂, 1 ♀ (USNM). **MERCER Co.**: Trenton, no date, 1 ♂ (FMNH). **NEW YORK. COUNTY UNKNOWN**: no date, 1 ♀ (AMNH). **OHIO. HOCKING Co.**: Neotoma, 24 Jul 1932, C. F. Walker, 1 ♀ (OSUC). **VINTON Co.**: 19 Jul 1993, J. A. Green, 1 ♂ (LGBC); Lake Hope State Park, 6 Jul 1993, fermenting bait trap, J. A. Green, 1 ♀; same data except 7 Jul 1993, 2 ♂♂, 1 ♀; 17 Jul 1993, 5 ♂♂, 1 ♀; same loc., 24-30 Jul 1993, R. A. Androw, 2 ♀♀; Zaleski, 18 Jun 1994, sugar trap, J. A. Green, 5 ♀♀; same data except 30 Jul 1994, 1 ♂; Zaleski State Forest, 15-23 Jun 1994, R. A. Androw, 4 ♀♀; same data except 22 Jun-3 Jul 1994, 2 ♀♀; 12-20 Jul 1994, 1 ♀; 20-27 Jul 1994, 1 ♀; 27 Jul-3 Aug 1994, 1 ♀. **WAYNE Co.**: 26 Jul 1941, R. W. Rings 1 ♂ (OSUC); same data except 4 Aug 1941, 1 ♀. **OKLAHOMA. LATIMER Co.**: Jul 1983, K. Stephan, 5 ♀♀; same data except Jul 1982, 1 ♂ (FSCA); Jun 1984, 1 ♂, 3 ♀♀ (& FSCA); Jun 1986, 3 ♂♂, 1 ♀ (FSCA, GHNC, UGCA); Jun 1987, 2 ♀♀ (DENH, GHNC); Jul 1987, 1 ♂ (FSCA); Jun 1988, 1 ♂, 6 ♀♀ (& FSCA); Jun 1989, 1 ♀ (FSCA); Jul 1989, 1 ♀ (FSCA); nr Red Oak, 10-30 Jun 1990, bait trap, G. Mooney, 1 ♂, 1 ♀ (DJHC, RAAC); 8 km W & 1.6 km S of Red Oak, 2-15 Jul 1993, K. Stephan, 2 ♂♂, 3 ♀♀ (CSUC, DJHC); 9.7-11.3 km SW of Red Oak, 18-25 Jun 1989, bait trap, Mooney & Heffern, 3 ♂♂, 3 ♀♀ (DJHC, JAGC). **OKLAHOMA Co.**: Luther, 35°38'36" N, 97°12'45" W, 8 Jun 1986, banana bait in hickory-oak forest, C. Harp, 1 ♂ (OSEC); same data except 9 Jun 1986, 2 ♂♂; 10 Jun 1986, 1 ♂, 1 ♀. **PAYNE Co.**: Cushing, 15 Jun 1932, W. D. Davis, 1 ♀ (OSEC). **PENNSYLVANIA. ADAMS Co.**: Arendtsville, 12 Jul 1927, S. W. Frost, 1 ♂ (FMNH); same data except 24 Jun 1928, 1 ♂ (CUIC). **ALLEGHENY Co.**: Pittsburg, 16 Jun, H. G. Klages, 1 ♀ (CMNH); same data except 6 Jul, 1 ♀. **BERKS Co.**: Reading, 11 Mar 1921, J. N. Knull, 1 ♂ (FMNH). **DAUPHIN Co.**: Hummelstown, 6 Jul, J. N. Knull, 1 ♀ (FMNH); same data except 6 Jul, 1 ♂ (UMSP); 10 Jun, 1 ♂; 20 Jul, 1 ♀ (CUIC); 28 Aug, 1 ♂, 2 ♀♀ (& OSUC); 17 May 1919, 1 ♀; 14 Mar 1920, 1 ♀; 19 May 1920, 1 ♀; 23 May 1920, 1 ♀; 19 Mar 1921, 1 ♂, 2 ♀♀; 2 Jun 1922, 1 ♀; 10 Jul 1922, 1 ♀; 3 Jun 1923, 1 ♂; 27 Jun 1923, 1 ♀; no date, reared from *Quercus alba* L., 1 ♀ (OSUC); same loc., 6 Jul 1925, Kirk & Champlain, 1 ♂ (FMNH); same data except 13 Jul 1925, 1 ♀; 30 Jun 1926, 2 ♂♂; Inglenook, 28 Jun 1921, Champlain & Knull, 1 ♀ (PADA); same loc., 9 Aug 1927, J. N. Knull, 1 ♂ (FMNH); same data except 30 Aug 1927, 1 ♀; Manada Gap, 10 Jun 1919, J. N. Knull, 1 ♀ (FMNH); same data except 15 Jun 1919, 1 ♀ (PADA); Clark's Valley, 11 Aug 1932, 3 ♂♂, 1 ♀ (USNM); same loc., 11 Jul 1937, bait pails, R. M. Baker, 1 ♀ (PADA); same data except 28 Jul 1937, 1 ♂ (USNM); 1 Aug 1937, 1 ♀ (USNM); same loc., 20 Jul 1932, A. B. Champlain, 1 ♀ (PADA); 12 Jul 1936, 1 ♀ (PADA); Rush Twp, 19 Aug, 1 ♂ (USNM); same loc., 14 Jul, A. B. Champlain, 1 ♂ (PADA); same data except 15 Jul, 1 ♂; 21 Jul, 1 ♂; 23 Jul, 1 ♀; 24 Jul, 1 ♂; 29 Jul, 1 ♀; 2 Aug, 1 ♂; 9 Aug, 1 ♀; 11 Aug, 3 ♂♂, 1 ♀ (CUIC, UMSP, USNM); 5 Aug, Japanese beetle trap, 1 ♀; same loc., 7 Jul, J. N. Knull, 1 ♂, 1 ♀ (FMNH); same data except no date, reared from *Quercus prinus* L., 2 ♀♀. **DELAWARE Co.**: Broomall, 21 Jul 1934, M. Robinson, 1 ♀ (AMNH). **FRANKLIN Co.**: 1931, J. O. Pepper, 1 ♂, 1 ♀ (CUCC); Chambersburg, 27 Jul 1925, J. A. Reeves, 1 ♂ (SEMC); same data except 4 Aug 1924, 1 ♂ same loc., 1931, bait pan, J. O. Pepper, 1 ♂, 1 ♀ (CUCC); 1.6-3.2 km W of

Fannetsburg, 15 Jul 1989, sugar bait, J. E. Wappes, 2 ♂♂, 2 ♀♀ (TAMU); Mont Alto, 3 Jul, J. N. Knull, 1 ♂ (CSUC); same data except 4 Jul, 2 ♂♂ (SEMC, USNM); Jul 1932, 2 ♀♀ (EMEC, FMNH); 3–4 Jul 1932, 2 ♂♂ (AELC, LACM); 4 Jul 1934, 1 ♂, 2 ♀♀ (AMNH); same loc., 17 Aug 1931, bait pan, J. O. Pepper, 2 ♂♂, 1 ♀ (CUCC); same loc., 4 Jul 1932, J. G. Shanafelt, 6 ♂♂, 1 ♀ (AELC, LACM); same data except 7 Aug 1932, 1 ♀ (LACM); same loc., 4 Jul 1932, 1 ♀ (EMEC); St Thomas, 13 Jul 1932, J. O. Pepper, 1 ♂ (CUCC); same data except Aug 1932, 4 ♂♂, 2 ♀♀ (CDAE, FSCA, LSUC). *PERRY Co.*: South Fork Camp, 25 Jul 1937, bait pails, H. B. Kirk, 2 ♂♂ (PADA); same data except 18 Aug 1937, 1 ♂; 10 Jul 1938, 1 ♂. *SCHUYLKILL Co.*: Hawk Mt Scout Reservation, nr Summit Station, 28 Jul 1982, from tree stump, T. L. Scheifer, 1 ♀ (MEMU). *COUNTY UNKNOWN*: no date, 1 ♀ (AMNH). *TENNESSEE. BLOUNT Co.*: Chilhowee Mt, 6 Jun 1955, D. J. & J. N. Knull, 1 ♀ (FMNH). *TEXAS. ANDERSON Co.*: Engling Wdfl Mgmt Area, Jun 1990, 1 ♂ (DJHC). *BRAZOS Co.*: College Station, 6 Jun 1964, feeding on trunk sap *Fraxinus pennsylvanica* Marshall, S. G. Wellso, 2 ♂♂, 1 ♀ (MERC); College Station, Lick Creek Park, 15–25 May 1996, hanging sugar bait trap, E. G. Riley, 9 ♂♂, 1 ♀, same data except 25 May–4 Jun 1986, 6 ♂♂, 2 ♀♀ (& TAMU); 4–8 Jun 1996, 1 ♂, 1 ♀; 4–16 Jun 1996, 3 ♂♂. *SAN JACINTO Co.*: 8 km W of Shepard, May 1994, fermenting bait trap, D. J. Heffern, 2 ♂♂, 2 ♀♀ (& CSUC); same data except 31 May–10 Jun 1994, 2 ♂♂, 1 ♀; 24–29 Jun 1994, 1 ♂. *VIRGINIA. ARLINGTON Co.*: Glen Carlyn Park, 19 Jun 1913, E. Shoemaker, 1 ♀ (USNM). *BOTETOURT Co.*: Cloverdale, 19 Jun 1934, M. L. Bobb, 1 ♂ (VPIC). *MONTGOMERY Co.*: Poverty Hollow, 2 Jul 1977, F. D. Fee, 1 ♀ (FSCA). *WEST VIRGINIA. MONONGALIA Co.*: Morgantown, no date, 1 ♀ (WVUC); same data except 1 Jun 1922, 1 ♂. *PENDLETON Co.*: Franklin, S Bridge Potomac River, Aug 1926, P. N. Musgrave 1 ♂ (INHS).

Male.—Form moderately large, robust, subcylindrical; integument black, opaque, basal one-third of elytra red-orange, posterior margins of red-orange markings more or less transverse, irregular, extending a little further posteriorly in the lateral portions; pubescence dark. Head with front shining, shallowly, irregularly punctate, moderately clothed with short recurved hairs, vertex between antennal tubercles and eyes coarsely, confluent punctate, pubescence short, sparse, recurved, a few longer, suberect hairs scattered near eyes; antennal tubercles very prominent, acute; antennae exceeding elytral apices by about 4 segments, each segment slightly shining, finely, moderately densely punctate, moderately clothed with short, appressed pubescence, antennomeres 1–3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly longer than apical width, 3 1.6× longer than 1, 4–10 subequal in length and slightly shorter than 3, 11 longest, appendiculate, slightly curved apically. Pronotum 1.4× wider across lateral tubercles than long, constricted before base; prominent, lateral tubercles just behind middle, angles subacute; surface slightly shining, coarsely, confluent punctate, punctation of anterolateral areas irregular; pubescence sparse, recurved towards median callus, a few longer, suberect hairs scattered laterally and along apical and basal margins; disc convex, with 5 distinct calluses, median callus most prominent, glabrous and shining at apex; prosternum dull, with transverse impression, finely, densely punctate, punctures coarser on prosternal process, moderately clothed with suberect hairs; mesosternum slightly shining, finely, densely punctate; metasternum slightly shining, finely, densely punctate, thinly clothed with moderately long, subdepressed hairs. Elytra 2.1× longer than humeral width; surface slightly shining, coarsely, deeply punctate on basal half, basal punctures smaller than largest of pronotum, separated by slightly less than their width, apical half subalutaceous, more finely, densely punctate; short, subdepressed hairs sparsely scattered primarily near suture and along lateral margins in basal half, pubescence moderately dense and uniform across apical dark areas; apices emarginate, sutural and outer angles distinctly dentate. Scutellum slightly longer than wide, broadly, deeply impressed longitudinally, finely, densely clothed with short appressed hairs, apex narrowly rounded. Legs elongate, slender; femora shining, sparsely, shallowly punctate, sparsely clothed with short appressed hairs, metafemora extending nearly to elytral apices; tibiae shining, more finely and densely punctate, moderately clothed with short, appressed hairs; metatarsomere 1 slightly longer than combined length of 2–3. Abdomen shining, sparsely, shallowly punctate, thinly clothed with mixture of short, appressed hairs and longer, suberect hairs; apical margin of sternites glabrous, last sternite broadly, shallowly emarginate at apex. Length, 19.20 mm; width, 6.50 mm. Described from male holotype (Fig. 6).

Female.—Differs from male as follows: antennae extending just past elytral apices, antennomeres 3–11 decreasing in length, antennomere 11 straight, not appendiculate, anterolateral areas of pronotum almost as coarsely punctate as disc; abdomen with apex of last sternite broadly subtruncate. Length, 19.00 mm; width, 6.00 mm. Described from female paratype from Missouri, Jefferson Co., Hillsboro, 5 Aug 1979, A. Littahorsky (TCMC).

Diagnosis.—The transversely-shaped red-orange elytral markings may resemble that of *P. axillaris*, however, *P. paraxillaris* may be distinguished by its well-developed discal pronotal calluses, the polished apical line on the median callus, the distinct lateral pronotal tubercles, the moderately dense basal punctation and distinctly dentate apical angles of the elytra, and its larger size (average length 3 mm greater than *P. axillaris*). Specimens with the posterior margin of the red-orange markings somewhat oblique may be distinguished from *P. linsleyi* by the coarser pronotal and elytral punctation and basal elytral punctures which lack setae.

Variation.—The red-orange elytral markings may extend posteriorly to a greater or lesser degree and may be orange rather than the more typical red-orange. A few specimens exhibit variable red infuscation of the pronotum, and a small male from Missouri is nearly black with only small lateral, post-humeral spots on the elytra. Males measured 12.10–22.60 mm (17.91 ± 1.79 mm, $n = 228$) and females 12.70–21.85 mm (18.00 ± 1.56 mm, $n = 242$) in length. Specimens from the western and southern edges of its range tend to be larger than those from more northeastern localities. Males from Florida, Louisiana, Oklahoma, and Texas measured 13.95–22.60 mm (19.09 ± 1.92 mm, $n = 38$) and females 15.20–21.85 mm (18.88 ± 1.43 mm, $n = 30$) in length. These include the largest specimens seen of any species in the genus. Males from more northeastern localities measured 12.10–21.25 mm (17.68 ± 1.67 mm, $n = 190$) and females 12.70–21.35 mm (17.88 ± 1.53 mm, $n = 212$) in length.

A small series from Atascosa Co., Texas (not designated paratypes) represents the southwesternmost known population of this species and superficially resembles *P. linsleyi* in that the posterior margins of the red-orange elytral markings are somewhat oblique. However, their punctation, pronotal tubercles, and other characters clearly identify them as *P. paraxillaris*. These specimens were collected only about 50 km south of the nearest known *P. linsleyi* locality, suggesting that the two species are distinct. They may represent a subspecies of *P. paraxillaris*, however, I am hesitant to describe them as such until additional material becomes available for study.

Distribution.—Eastern United States (Fig. 12). Specimens were examined from localities in the following states: District of Columbia, Florida, Illinois, Indiana, Louisiana, Maryland, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Virginia, and West Virginia.

Biology.—The few reared specimens examined emerged from *Quercus prinus* (Knull 1932) and *Q. alba*. *Purpuricenus* "axillaris" has been reported as girdling branches of *Q. bicolor* Willdenow in Hummelstown, Pennsylvania (Champlain et al. 1925); reared from *Q. stellata* Wangenheim (Knull 1932) at Clark's Valley, Pennsylvania, abundant in bait traps (Champlain & Knull 1932) at Mont Alto, Pennsylvania; and reared from *Castanea dentata* (Marshall) Borkhausen (Knull 1934). However, all of the specimens examined that were collected in Pennsylvania by Knull or Kirk, and all but two of those collected by Champlain, are actually *P. paraxillaris*. In contrast, all of the host-associated specimens examined from *Carya* are *P. axillaris*. As a result, these and other reports referring to *P.* "axillaris" on *Quercus* probably refer to *P. paraxillaris*. Assuming this, additional host records for this latter species are Lugger (1884), who reared it from *Q. coccinea* Muenchhausen in Maryland, and Bowditch (1896), who collected it on fallen *Q. rubra* L. Champlain et al. (1925) reported the larvae did considerable damage to the lower branches of *Q. bicolor*, often pruning branches over 5 cm (2 in) in diameter. The specimens reported by Rice et al. (1985) on *Fraxinus pennsylvanica* in Texas are also *P. paraxillaris*, however, this collection may represent an adult food source as they were found feeding on trunk sap. A majority of the remaining specimens examined were collected in fermenting bait traps. In

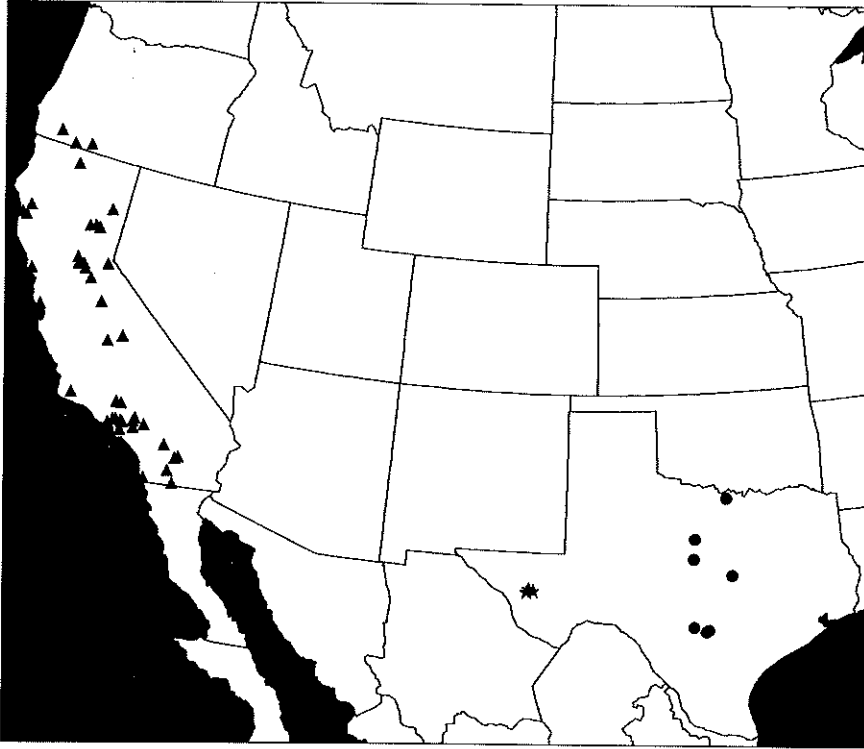


Figure 10. Known geographical distribution of *Purpuricenus dimidiatus* LeConte (▲), *P. opacus* (Knull) (★) and *P. linsleyi* Chemsak (●).

Maryland, where the largest series was collected, traps were placed in oak/hickory forest (J. D. Glaser, personal communication). In Missouri, adults were trapped in dry to dry-mesic, upland forests adjacent to dolomite glades dominated by *Q. stellata*, *Q. marilandica* Müenchhausen, *Q. prinoides* Willdenow, *C. alba*, *C. glabra*, and *C. ovata* (P. Miller) K. Koch. Seasonal occurrence: 19 April–30 Aug (median 75% 10 Jun–30 Jul, $n = 392$). Specimens from Maryland occurred 21 Jun–12 Aug (median 75% 8 Jul–29 Jul, $n = 183$), those from Missouri occurred 28 May–23 Jul (median 75% 2 Jun–2 Jul, $n = 78$), and those from Pennsylvania occurred 3 Jun–30 Aug (median 75% 4 Jul–11 Aug, $n = 81$).

Material Examined.—In addition to the type material (545 specimens), 9 specimens not designated paratypes: TEXAS. ATASCOSA Co.: 6.4 km N of Leming, 1–8 Jun 1996, baited, D. W. Sundberg, 2 ♂♂, 1 ♀ (DJHC); 8 km N of Leming, Jun 1997, sugar trap, D. W. Sundberg, 2 ♂♂, 4 ♀♀ (DJHC).

Purpuricenus humeralis (Fabricius)

(Figs. 7, 13)

Cerambyx humeralis Fabricius, 1798: 143; Fabricius, 1801: 274.

Purpuricenus sp., Fitch, 1845: 254, pl. 3, fig. 2.

Purpuricenus humeralis, Haldeman, 1847: 31; LeConte, 1850: 11; Bland, 1861: 94; Bland, 1862: 276 (part); Lugger, 1884: 204; Henshaw, 1885: 98; Leng, 1886a: pl. 2, fig. 11; Leng, 1886b: 82; Hamilton, 1890: 238 (part); Hamilton,

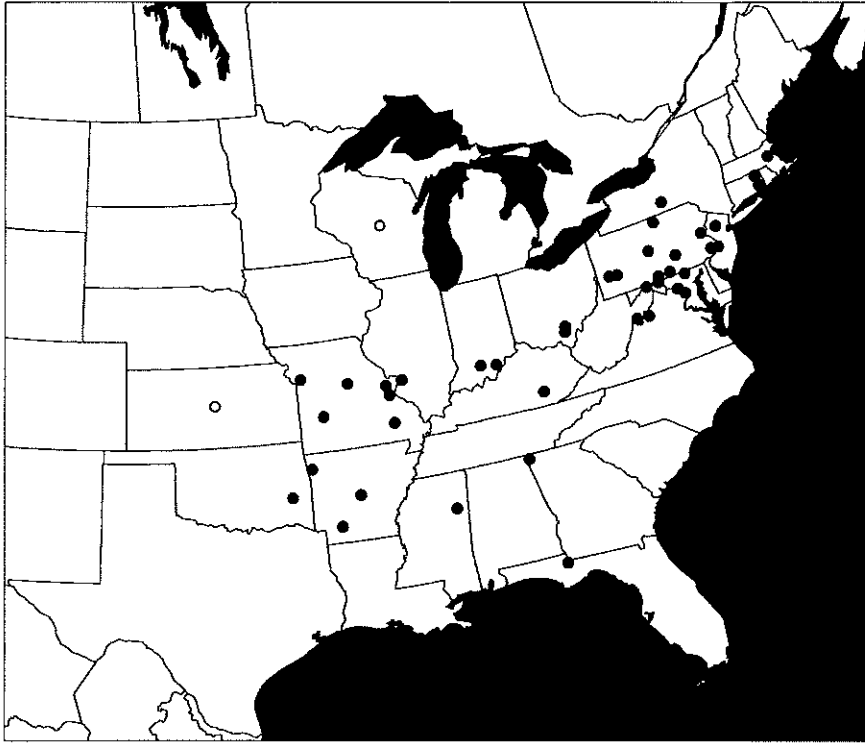


Figure 11. Known geographical distribution of *Purpuricenus axillaris* Haldeman (○ = state record only).

1895: 368; Beutenmuller, 1896: 76; Wickham, 1897: 149; Smith, 1900: 289; Blatchley, 1910: 1030; Fisher & Kirk, 1912: 311; Aurivillius, 1912: 466; Frost, 1920: 26; Leng, 1920: 279; Craighead, 1923: 79, Kirk & Knull, 1926: 41; Champlain & Kirk, 1926: 290; Leonard, 1928: 449; Frost & Dietrich, 1929: 436; Knull, 1932: 63; Champlain & Knull, 1932: 257; Sherman, 1946: 127; Knull, 1946: 230, fig. 72; Linsley, 1962: 106, fig. 34 (part); Chagnon & Robert, 1962: 266; Zimsen, 1964: 165; Bayer & Shenefelt, 1969: 16, fig. 25; Gosling, 1974: 71, fig. 16; Stein & Tagstead, 1976: 33; Headstrom, 1977: 362, fig. 511; Turnbow & Franklin, 1980: 341; Chemsak & Linsley, 1982: 51; Papp, 1984: 210, fig. 704; Bosquet, 1991: 286; Chemsak et al., 1992: 85; Dearborn & Donahue, 1993: 59; MacRae, 1994: 236; Monné & Giesbert, 1994: 150; Poole & Gentili, 1996: 150; Downie & Arnett, 1996: 1234; Yanega, 1996: 126, fig. 224; Linsley & Chemsak, 1997: 243, 247, 252, 256, 259, 264, 292, 318, 325, 427.

Types.—Zimsen (1964) records one specimen (sex unspecified) in the Fabricius Collection (Department of Entomology, Zoological Museum, University of Copenhagen, Copenhagen, Denmark) (not examined). The type locality is "America boreali."

Male.—Form medium-sized, subcylindrical; integument black, opaque, humeral area of elytra with red markings, posterior margins of markings straight, extending obliquely from before apex of scu-

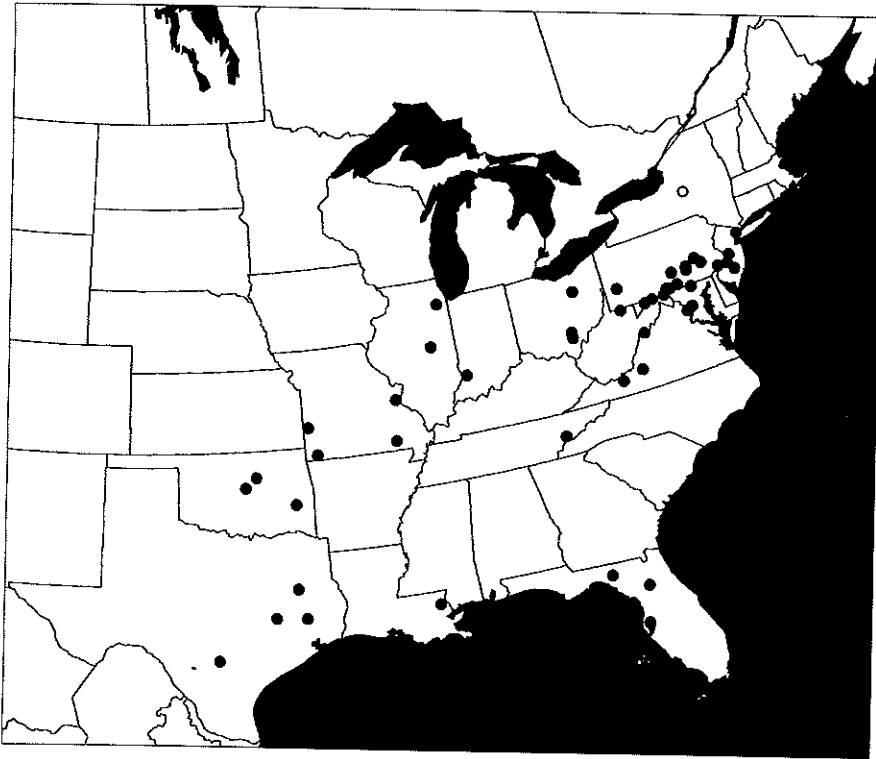


Figure 12. Known geographical distribution of *Purpuricenus paraxillaris* MacRae, NEW SPECIES (○ = state record only).

tellum to basal two-fifths of lateral margin; pubescence dark. Head with front shining, coarsely, densely punctate, punctures becoming finer and sparser near base of antennae, sparsely clothed with short, recurved hairs; vertex slightly shining, coarsely, densely punctate, pubescence short, sparse, recurved, a few longer, suberect hairs scattered near eyes; antennal tubercles prominent, antennae exceeding elytral apices by about 4 segments, each segment moderately shining, finely, moderately densely punctate, finely, densely clothed with short, appressed hairs, antennomeres 1-3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly longer than apical width, 3 1.5× longer than 1, 4-10 subequal in length and slightly shorter than 3, 11 longest, appendiculate, slightly curved apically. Pronotum 1.5× wider across lateral tubercles than long, constricted before base; moderate lateral tubercles just behind middle, angles narrowly acute; surface dull, very coarsely, deeply, contiguously punctate, anterolateral areas with punctures very fine and dense, distinctly smaller than those on disc; pubescence short, sparse, recurved, a few longer, suberect hairs scattered throughout basal area; disc convex, with 5 distinct calluses, median callus most prominent with apex acute, glabrous; prosternum dull, with transverse, impunctate band along apical edge, very finely, densely punctate behind, moderately clothed with short, suberect hairs; meso- and metasternum slightly shining, finely, densely punctate, thinly clothed with short, subdepressed hairs, longer, suberect hairs more numerous along posterior margin of metasternum. Elytra 2.1× longer than humeral width; surface dull, coarsely, deeply punctured over basal one-third, punctures smaller than largest of pronotum, separated by less than their width, apical half subalutaceous, more finely, densely punctate; red elytral markings without pubescence except for a few short, suberect hairs scattered primarily along epipleural margins, dark areas moderately clothed with short, subdepressed hairs; apices obliquely subtruncate, sutural and outer angles obtuse, weakly dentate. Scutellum much longer than wide, distinctly impressed longitudinally, densely clothed with short, appressed hairs, apex acutely rounded. Legs elongate, slender; femora shining, moderately, shallowly punctate, sparsely clothed with short, subdepressed hairs, metafemora slightly exceeding elytral apices; tibiae shining, more finely, densely

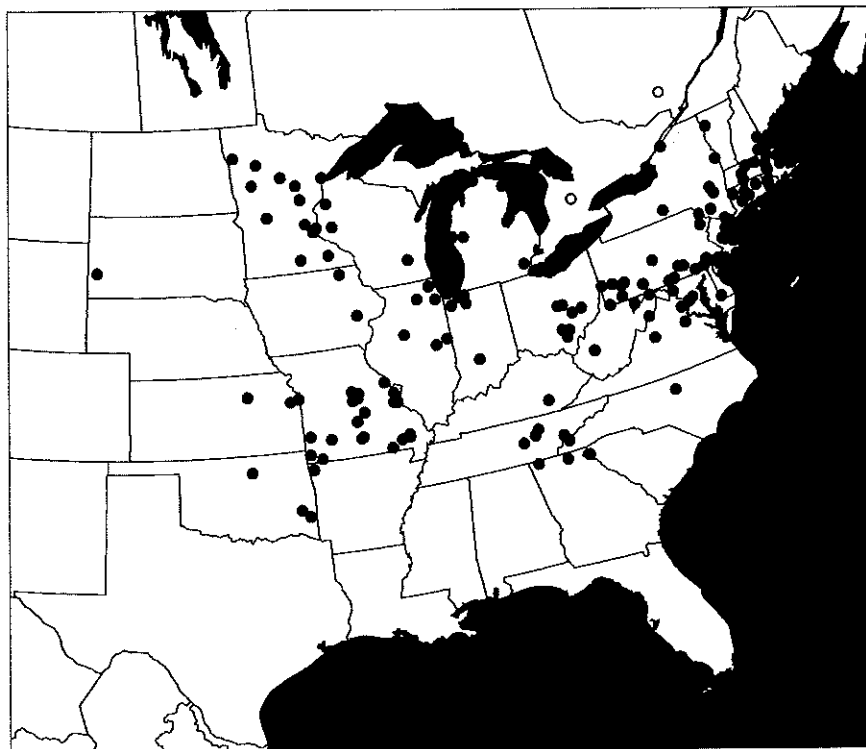


Figure 13. Known geographical distribution of *Purpuricenus humeralis* (Fabricius) (○ = provincial record only).

punctate, moderately clothed with short, subdepressed hairs; metatarsomere 1 slightly longer than combined length of 2–3. Abdomen shining, finely, sparsely punctate, pubescence short, subdepressed, moderately dense with longer, suberect hairs toward apex of each sternite; apical edge of sternites glabrous, last sternite broadly subtruncate at apex. Length, 15.20 mm; width, 5.75 mm. Described from male from Pennsylvania, Franklin Co., 6.4 km W of Fannetsburg, 23 Jul 1988, J. E. Wappes (FSCA) (Fig. 7).

Female.—Differs from male as follows: antennae slightly surpassing elytral apices, antennomere 3 1.2× longer than 1, 4–11 subequal in length and slightly shorter than 1; anterolateral areas of pronotum coarsely, contiguously punctate, punctures subequal in size to those on disc; abdomen with apex of last sternite broadly, shallowly emarginate. Length, 16.50 mm; width, 5.55 mm. Described from female from Pennsylvania, Franklin Co., 4.8 km W of Roxbury, 20 Aug 1989, sugar bait, J. E. Wappes (FSCA).

Diagnosis.—The triangular red elytral markings that reach but do not surround the scutellum distinguish this species from most congeners. *P. humeralis* may resemble some male specimens of *P. linsleyi* with reduced red elytral markings but can be distinguished by their coarser pronotal punctation, coarse, non-confluent, non-setiferous elytral basal punctures which are larger than those of the pronotum, and smaller size.

Variation.—The basal elytral markings are usually red but may be red-orange or rarely orange. However, the shape of the macula is constant throughout the range of the species, as are punctation and the degree of development of the pronotal tubercles. Males measured 11.85–19.45 mm (15.51 ± 1.84 mm, $n = 57$) and females 11.55–19.15 mm (15.95 ± 1.71 mm, $n = 82$) in length.

Distribution.—Eastern U.S. and southeastern Canada (Fig. 13). Specimens were examined from the following states/provinces: USA: Arkansas, Connecticut, **Delaware**, **District of Columbia**, Georgia, Illinois, Indiana, Iowa, Kansas, **Kentucky**, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, New Hampshire, **North Carolina**, Ohio, Oklahoma, Pennsylvania, Rhode Island, **South Carolina**, **South Dakota**, Tennessee, **Vermont**, **West Virginia**, **Wisconsin**; CANADA: Ontario, Quebec. The species has also been recorded from North Dakota and Manitoba. It is more northerly in distribution than *P. axillaris* and *P. paraxillaris*. Linsley (1962) erroneously recorded this species from Texas. This record is based on a male specimen (USNM) of *P. linsleyi*. Specimens labeled "Envir de Guadalajara, Estat de Jalisco, M. Diguët, 1901" (EMEC) and "Eur." (INHS) surely represent introduced or mislabeled specimens.

Biology.—This species appears to be the most polyphagous of North American *Purpuricenus*, with the following reported host associations: *Carya* sp. (Bland 1861); reared from *Acer saccharinum* L. [= *A. dasycarpum* Ehrhart] (Lugger 1884); *Quercus* spp. stumps (Beutenmuller 1896; Fisher & Kirk 1912); sprouts of *A. rubrum* L. (Frost 1920); *Quercus* sp., *Betula* sp., and *Castanea* sp. (Craighead 1923); reared from dead *Morus rubra* L., *Quercus* sp., *Carya* sp., *Alnus incana* (L.) Moench ssp. *rugosa* (Du Roi) Clausen, and *Cercis canadensis* L. (Kirk & Knull 1926); reared from dead *Robinia pseudoacacia* L. seedling (Knull 1932); and *Q. ellipsoidalis* E. J. Hill (Bayer & Shenefelt 1969). In Missouri, adults were reared from dead branches of *Acer saccharum* Marshall and collected on cut logs of *Carya ovata*, trunks of dead *Carya* sp. and fire-injured *Quercus* sp. (MacRae 1994), and slash of *A. rubrum*, *C. alba*, *Q. lyrata* Walter, and *Q. palustris* Muenchhausen. Specimens collected on *Q. coccinea* and *Q. rubra* were also examined. Dearborn & Donahue (1993) reported it from "fir," and a specimen collected on *Pinus virginiana* P. Miller log was examined, however, these are probably incidental associations. Additional adult records include flowers of *Sambucus* sp. (Bland 1861), *Ceanothus americanus* L., and *Rhus* sp., but the species does not appear to visit flowers regularly. Craighead (1923) described the larva, noting the larval habits were similar to those of *Knolliana cincta* (Drury), and Stein & Tagstead (1976) reported that it requires two years to complete development. Many of the specimens examined were collected in fermenting bait traps. In Missouri, it was trapped in dry post oak savannah, dry-mesic to mesic oak/hickory forest, and wet bottomland hardwood forest. Seasonal occurrence: 14 May–12 Sep (median 75% 8 Jun–20 Jul, $n = 330$). Specimens from Missouri occurred 9 May–16 Aug (median 75% 26 May–9 Jul, $n = 40$), and those from Pennsylvania occurred 28 May–20 Aug (median 75% 13 Jun–2 Aug, $n = 76$).

Material Examined.—516 specimens: USA. ARKANSAS. BENTON Co.: 18 Jun 1933, S. A. Summerland, 1 ♂ (UMMZ). CONNECTICUT. HARTFORD Co.: Hartford, 1897, 1 ♂ (PMNH). LITCHFIELD Co.: Cornwall, 1 Jul 1925, Chamberlain, 1 ♂ (CUIC). MIDDLESEX Co.: North Plain, Jul 1943, S. C. Ball, 1 ♀ (PMNH). NEW HAVEN Co.: Mt Carmel, 8 Jul 1960, 1 ♂ (AELC). WINDHAM Co.: Danielson, Jul 1902, 1 ♀ (PMNH). DELAWARE. SUSSEX Co.: Lewes, 5 Jul 1968, Rajehman, 1 ♂ (NCSU). DISTRICT OF COLUMBIA. no date, 4 ♀♀ (CMNH); Washington, Rock Creek, 10 Jun 1906, 1 ♂ (USNM). GEORGIA. UNION Co.: hwy 180, 7.7 km NE of jct hways 129 & 19, 4–5 Jun 1981, R. L. Penrose, 4 ♀♀. WALKER Co.: 8.1 km SE of Villanow, 8 Jun 1969, leaves of dead *Quercus* sp., R. L. Westcott, 1 ♀. ILLINOIS. CHAMPAIGN Co.: Champaign, Jul, 1 ♀ (INHS). COOK Co.: Chicago, 16 Jun, J. F. Petersen, 1 ♂ (FMNH); same loc., 18 Jul 1905, C. Selinger, 1 ♂ (GHNC);

same loc., 7 Jul 1923, E. Liljebblad, 1 ♂ (UMMZ). *DEKALB Co.*: no date, 1 ♀ (INHS). *LAKE Co.*: Ravinia, 4 Jul 1907, 1 ♀ (INHS). *TAZEWELL Co.*: East Peoria, 12 Sep 1927, A. T. McClay, 1 ♂ (UCDC). *VERMILION Co.*: 27 Jun 1926, K. F. Auden, 1 ♂ (INHS). *COUNTY UNKNOWN*: no date, 3 ♂♂, 5 ♀♀ (INHS, UMSP). *INDIANA. LAKE Co.*: 20 Jun 1902, W. S. B., 4 ♂♂, 2 ♀♀ (PURC, TAMU); Hessville, 24 Jun 1904, 1 ♀ (FMNH); same loc., 4 Jun 1908, E. Liljebblad, 1 ♂ (UMMZ); same data except 4 Jul 1908, 3 ♂♂, 2 ♀♀; same loc., 4 Jul 1908, W. J. Gerhard, 3 ♂♂, 10 ♀♀ (FMNH); same loc., 4 Jul 1910, H. Ramstadt, 1 ♀ (UMMZ). *LA PORTE Co.*: La Porte, no date, 1 ♂ (CMNH). *LAWRENCE Co.*: 21 Aug 1930, 1 ♂ (PURC). *MONROE Co.*: Bloomington, 14 May, 1 ♀ (UMMZ). *PORTER Co.*: Beverly Shores, 17 Jun 1934, H. Dybas, 1 ♂ (FMNH); Ogden Dunes, 21 Jun 1932, H. Seevers, 1 ♂, 1 ♀ (FMNH). *STARKE Co.*: North Judson, 10 Aug 1915, A. Mares, 1 ♀ (INHS). *COUNTY UNKNOWN*: no date, 2 ♂♂, 2 ♀♀ (UMRM, UMSP). *IOWA. HOWARD Co.*: Elma, 2 Jul 1902, 1 ♂ (PMNH). *JOHNSON Co.*: Iowa City, 16 Jun 1898, Wickham, 1 ♂ (USNM). *KANSAS. DOUGLAS Co.*: Baldwin City, Jun 1901, J. C. Bridwell, 1 specimen (MSUC). *JOHNSON Co.*: Prairie Village, 17 Jun 1960, flower *Rhus* sp., J. R. Heitzman, 1 specimen. *RILEY Co.*: Popenoe, 13 Jun, 1 ♀ (USNM). *COUNTY UNKNOWN*: no date, T. B. A., 1 ♂, 1 ♀ (PURC). *KENTUCKY. LAUREL Co.*: London, 2 Jun 1959, 1 ♂ (PMNH); same data except 10 Jun 1959, *Quercus coccinea*, 1 ♀. *MAINE. YORK Co.*: Lebanon, 29 Jul, A. E. Brower, 1 ♀ (DENH); Wells, 9 Jun 1902, 1 ♂ 1 ♀ (FMNH); same loc., 1925, 1 ♂, 1 ♀ (RUIC); York Beach, no date, 1 ♀ (CUIC). *MARYLAND. ALLEGANY Co.*: Green Ridge State Forest, 12 Jul 1990, J. Glaser, 1 ♀ (JAGC); same data except: 15 Jul 1990, 1 ♀; 17 Jul 1990, 1 ♀ (LGBC). *FREDERICK Co.*: Fort Detrick, 15 Jun 1956, W. H. Cross, 1 ♀ (MEMU). *GARRETT Co.*: Mineral Spring, 2 Jul 1916, 1 ♀ (INHS). *PRINCE GEORGES Co.*: Beltsville, 15 Jun 1913, J. D. Hood, 1 ♀ (INHS); same loc., 1 Jul 1952, running on *Pinus virginiana* log, G. H. Nelson, 1 ♀; same data except flying, 1 ♂; same loc., 1953, H. C. Mason, 1 ♀ (FSCA); Berwyn, 14 May, G. W. Barber, 1 ♀ (RUIC); College Park, 3 Jun 1914, J. B. S. Norton, 1 ♀ (RUIC); same loc., 24 May 1950, 1 ♀ (FSCA). *COUNTY UNKNOWN*: no date, 3 ♂♂, 4 ♀♀ (UMMZ, UMSP); Ocean Beach, 13 Jun 1948, tide wash, 1 ♀ (RUIC). *MASSACHUSETTS. ESSEX Co.*: Haverhill, Jul 1954, 1 ♀ (RUIC); Lynn, 7 Jul 1920, 2 ♂♂ (RUIC); Lynnfield, 30 Jun 1916, 1 ♂ (PMNH). *HAMPDEN Co.*: Chicopee, no date, 1 ♀ (USNM); Mt Tom State Park, 16 Jun 1949, A. R. Lewis, 1 ♀ (DENH). *HAMPSHIRE Co.*: Amherst, 25 Jun 1950, T. H. Farr, 1 specimen (MSUC). *MIDDLESEX Co.*: Bedford, 20 Jun 1922, 1 ♀ (RUIC); same data except 23 Jun 1922, 1 ♂; 26 Jun 1922, 1 ♀; Burlington, 26 Jun 1923, 1 ♀ (RUIC); Lexington, 29 Jul 1920, 1 ♀ (RUIC); Malden, High Rock, no date, 1 ♀ (PMNH); Natick, 9 Jul 1926, C. A. Frost, 1 ♂ (CUIC); Sherborn, 7 Jul 1923, 1 ♀; same loc., 30 Jul 1955, C. A. Frost, 1 ♀ (FMNH). *NORFOLK Co.*: Medfield, 25 Jun 1913, H. A. Preston, 1 ♀ (PMNH); Norwood, 27 Jun 1942, C. Christiansen, 1 ♀ (CMNH). *PLYMOUTH Co.*: no date, 1 ♂ (CUIC); Marshfield, 6 Jul 1921, 1 ♀ (RUIC). *WORCESTER Co.*: Berlin, 6 Jul 1936, sweeping sprouts of *Quercus* sp., C. A. Frost, 2 specimens (MSUC, OSEC); Leominster, 12 Jun 1915, F. W. Graham, 1 ♂ (PMNH); Petersham, 21 Jul, D. DeLeon, 1 ♀ (UMSP); same loc., 6 Sep 1942, L. J. & M. J. Milne, 1 ♀ (DENH); same data except 5 Jun 1945, 1 ♀. *COUNTY UNKNOWN*: 8 Jun 1917, E. A. Chaplin, 1 ♀ (FMNH). *MICHIGAN. ALPENA Co.*: Alpena, no date, W. A. Nason, 2 ♀♀ (INHS). *ARENAC Co.*: Saginaw Bay, Charity Island, 23 Jun 1910, A. W. Andrews, 1 ♂ (UMMZ). *CHEBOYGAN Co.*: 17 Jul 1931, Irwin, 1 ♂ (UMMZ); Douglas Lake, 15 Jul 1931, E. Kaufman, 1 ♀ (UMMZ). *NEWAYGO Co.*: 15 Jul 1950, R. H. Dreisbach, 2 specimens (MSUC). *OCEANA Co.*: Pentwater, 27 Jul 1935, 2 ♀♀ (FMNH). *WAYNE Co.*: 10 Aug 1906, A. W. Andrews, 2 specimens (MSUC, UMMZ). *COUNTY UNKNOWN*: no date, 2 ♂♂, 1 ♀ (INHS, RUIC). *MINNESOTA. AITKIN Co.*: Aitkin, 8 Jul 1976, A. G. Peterson, 1 ♀ (UMSP). *ANOKA Co.*: Fridley Sand Dunes, 3 Jul 1923, C. E. Mickel, 1 ♀ (UMSP); Rice Creek, 21 Jun 1925, C. B. Philip, 1 ♀ (UMSP). *BECKER Co.*: 9.7 km SW of Detroit Lakes, 8 Jul 1992, J. R. Powers, 1 ♀ (EMEC). *BLUE EARTH Co.*: Rapidan, 25 Jun 1923, Mohr, 1 ♀ (INHS). *CASS Co.*: 1 Aug 1937, E. Wood, 1 ♀ (UMSP). *CLEARWATER Co.*: Bagley, 14 Jul 1935, D. G. Denning, 1 ♀ (UMSP). *MILLELACS Co.*: 3.2 km E & 3.2 km S of Onamia, 13 Jul 1968, P. J. Clausen, 1 ♀ (FSCA); same data except 19 Jul 1969, 2 ♀♀ (UMSP). *OLMSTED Co.*: no date, C. N. Ainslie, 1 ♂, 1 ♀ (UMSP). *POLK Co.*: Crookston, 23 Jul 1935, D. G. Denning, 1 ♀ (UMSP). *POPE Co.*: Sedan, no date, 1 ♀ (UMSP). *RAMSEY Co.*: no date, O. W. Oestlund, 1 ♀ (UMSP); 24 Jul 1923, H. H. Knight, 1 ♂ (UMSP); St Anthony Park, 24 Jun 1899, 1 ♂ (UMSP); same loc., Powder Plant, 9 Jul 1921, W. E. Hoffman, 1 ♀ (UMSP); St Paul, 29 Jun 1928, L. B. Reed, 1 ♀ (UMSP), same loc., 29 Jun 1940, light trap, 1 ♂ (UMSP). *ST LOUIS Co.*: Duluth, no date, 1 ♀ (LACM). *WASHINGTON Co.*: Stillwater, 18 Jul 1920, 1 ♀ (UMSP). *MISSOURI. BARRY Co.*: Mark Twain National Forest, 5.3 km E of hwy 112 on Sugar Camp Scenic

Dr, T21N R27W S13, 26 May 1996, hardwood slash, T. C. MacRae, 1 ♀. *BARTON Co.*: T32N R30W S23 (SE ¼), 5 Jun 1959, D. & J. McReynolds, 2 ♀♀ (FSCA). *BOLLINGER Co.*: Duck Creek Cons Area, NE corner of Pool 2, T28N R9E S32, 15 Jun 1996, *Quercus lyrata* slash, T. C. MacRae, 1 ♀; same data except 16 Jun 1996, *Quercus palustris* slash, 1 ♀. *BOONE Co.*: 10 Jun 1971, S. O. Swadener, 1 ♀ (UMRM); 1977, F. D. Miller, 1 ♀ (UMRM); Columbia, 20 Jun 1937, H. E. Brown, 1 ♂ (UMRM); same loc., 27 May 1941, malt trap in apple orchard, W. R. Enns, 1 ♀ (UMRM). *BUTLER Co.*: University Forest Cons Area, 2.4 mi E jct hwy W & KK, T26N R6E S13, 12 Jun 1999, fermenting bait trap, T. C. MacRae, 1 ♂; same data except *Acer rubrum* slash, 2 ♀♀. *CALLAWAY Co.*: Fulton, 15 Jun 1939, W. R. Enns, 1 ♂ (UMRM); 6.4 km E of Holts Summit, 7 Jun 1979, dead *Carya* sp., M. E. Rice, 1 ♀. *CARTER Co.*: Mark Twain National Forest, Pinewoods Lake, emerged 19 May 1987 from dead branch *Acer saccharum* collected 14 Jun 1986, T. C. MacRae, 1 ♂; same data except 26 May 1987, 2 ♂♂, 1 ♀; 11 Jun 1988, 1 ♂, 1 ♀; Peck Ranch Cons Area, Rogers Creek Natural Area, 0.4 mi W Rd B on Rd 14, T28N R2W S25 (NW¼), 5 Jun 1999, hardwood slash, T. C. MacRae, 1 ♀; 6.4 km W Ellsinore, jct hwy 60 & 21, T26N R2E S11 (NE¼), 5-VI-1999, hardwood slash, T. C. MacRae, 1 ♀. *GREENE Co.*: Willard, 4 Jul, A. E. Brower, 1 ♀ (DENH). *JEFFERSON Co.*: Pevely, 22 Jun 1909, S. W. Bock, 1 ♂ (UMRM); 4.8 km S of Plattin, 22 Jun 1989, trunk dead *Carya* sp., T. C. MacRae, 2 ♀♀; same data except trunk fire-injured *Quercus* sp., 1 ♀; Valley View Glades Natural Area, 6.8 km NE of Hillsboro, hwy B, T41N R4E S30, 26 May 1987, cut log *Carya ovata*, T. C. MacRae, 1 ♀; Victoria Glades, 3.8 km SE of Hillsboro, T40N R5E S14, 9 Jul 1984, fermenting bait trap, T. C. MacRae, 1 ♂; same data except 16 Jul 1984, 1 ♂; 16 Aug 1984, 1 ♂; 8 Jul 1985, 1 ♂; 18 Jul 1985, 1 ♂; 9 Jun 1986, 1 ♂; 17 Jul 1986, 1 ♂. *LINCOLN Co.*: Elsberry, 1 Jun 1940, H. E. Brown, 1 ♀ (UMRM). *MARIES Co.*: Spring Creek Gap State Forest, 29 May 1986, R. L. Blinn, 1 ♀ (UMRM). *MORGAN Co.*: Gravois Mills, 30 May 1965, D. Easterla, 1 specimen. *NEWTON Co.*: Neosho, 11 Jun 1974, L. P. Burgess, Jr., 1 specimen. *OREGON Co.*: Mark Twain National Forest, McCormack Lake, 6 Jun 1968, R. L. Fisher, 1 specimen (MSUC). *PULASKI Co.*: 24 Jun 1958, A. Littahorsky, 1 specimen. *ST LOUIS Co.*: 10 Jul 1940, Japanese beetle trap, 1 specimen (MODA); Ranken, 1 Jun 1930, E. P. Meiners, 1 ♀ (UMRM). *STODDARD Co.*: Duck Creek Cons Area, W side of Pool 2, T27N R9E S4, 15 Jun 1996, *Carya alba* slash, T. C. MacRae, 1 ♀; same data except *Quercus lyrata* slash, 1 ♀. *TEXAS Co.*: Cabool, 3 Jun 1991, UV light, H. M. Webber, 1 ♂ (FSCA); same data except 8 Jul 1991, 1 ♂. *WRIGHT Co.*: Mountain Grove, 3 Jun 1987, H. G. Townsend, 1 specimen (MSFE); same data except 21 Jun 1989, 1 specimen. *COUNTY UNKNOWN*: no date, 2 ♂♂ (CMNH). *NEW HAMPSHIRE. HILLSBOROUGH Co.*: Manchester, 3 Jul, 1 ♂ (INHS); Wilton, 22 Jul 1936, J. G. Conklin, 1 ♀ (DENH). *ROCKINGHAM Co.*: Hampton, 14 Jun, S. A. Shaw, 1 ♀ (USNM); same data except 17 Jul 1932, 1 ♀ (DENH). *STRAFFORD Co.*: Dover, 13 Aug 1935, B. G. Markos, *Quercus* sp., 1 ♀ (DENH); Durham, 13 Aug 1935, *Quercus* sp., W. A. Westgate, 1 ♀ (DENH). *NEW JERSEY. ATLANTIC Co.*: Atlantic City, 1 ♂, 1 ♀ (RUIC); Brigantine, 26 Jun, beach drift, 1 ♂ (RUIC); same loc., 15 Jun 1945, F. M. Schott, 1 ♀ (DENH); Da Costa, 18 Jun, 1 ♀ (RUIC); West Atlantic City, 11 Jun 1929, A. Whittaker, 1 ♂, 2 ♀♀ (MCPM). *BERGEN Co.*: Hillsdale, 22 Jun 1921, E. D. Quirsfeld, 1 ♀ (CMNH). *BURLINGTON Co.*: Masonville, 8 Jul 1923, *Quercus rubra*, C. A. Thomas, 1 ♀ (CMNH); same loc., 15 Jul 1924, R. J. & M. B. Sim, 1 ♂, 1 ♀ (USNM); Riverton, Jul, R. J. & M. B. Sim, 1 ♂, 1 ♀ (USNM); same loc., 4 Jul 1925, 1 ♀ (CDAE). *CAMDEN Co.*: Camden, 7 Jul, 1 ♀ (RUIC). *CAPE MAY Co.*: Anglesea, no date, 2 ♂♂, 3 ♀♀ (RUIC); same data except, May 1931, 1 ♀; Ocean City, 1 ♀ (AELC); same loc., 8 Jul 1933, 1 ♂ (NCSU); Sea Isle City, 24 May, 1 ♂ (RUIC); same data except 10 Jun, 2 ♂♂, 1 ♀ (& FMNH); 11 Jun, 1 ♂, 2 ♀♀; Townsend's Inlet, 24 Jun 1945, L. J. & M. J. Milne, 1 ♀ (DENH); Wildwood, 7 Jul, 1 ♂ (CMNH). *CUMBERLAND Co.*: Millville, 23 Jun 1925, F. C. Fletcher, 1 ♂, 2 ♀♀ (CUIC). *ESSEX Co.*: Newark, no date, 2 ♂♂, 1 ♀ (RUIC); South Orange, 23 Jun 1889, 1 ♂ (CUIC). *GLOUCESTER Co.*: Glassboro, 30 May 1942, W. F. Rapp, Jr., 1 ♀ (INHS); same data except 1 Jun 1942, 1 ♂; 11 Jul 1942, 1 ♂; 18 Jun 1943, 1 ♂. *GRANT Co.*: no date, 1 specimen (MSUC). *MONMOUTH Co.*: Lahaway, 5 Jul, 1 ♀ (RUIC); Manasquan, 10 Jun 1937, 1 ♂ (FMNH). *MORRIS Co.*: Hibernia, 22 Jul 1935, C. O. Easelbaugh, 1 ♀ (INHS); *OCEAN Co.*: nr Barnegat, 5 Jun 1945, beach drift, L. J. & M. J. Milne, 1 ♀ (DENH); Lakehurst, 2 Jul 1922, F. M. Schott, 1 ♂ (DENH); Lakehurst, Wrangle Brook Rd, 17 Jun 1955, D. M. Anderson, 1 ♂ (CUIC); Lavallette 5 Jun 1932, C. G. Siepmann, 1 ♂ (UMMZ); Point Pleasant, 1 Jul 1917, 1 ♂ (CMNH); Seaside Heights, no date, L. Bottimer, 1 ♂, 1 ♀ (EMEC). *SOMERSET Co.*: Basking Ridge, 25 Jun 1936, W. R. Douglas, 1 ♀ (PMNH). *COUNTY UNKNOWN*: no date, 1 ♀ (LACM); no date, F. H. B., 1 ♂, 1 ♀ (MCPM). *NEW YORK. ALBANY Co.*: Rensselaerville, 25 Aug, 1 ♂ (FSCA). *GREENE Co.*: no date, 1 ♀ (CMNH); Cairo, 20–23 Jun 1938, J. N. Belkin, 1 ♀ (FSCA).

KINGS Co.: Brooklyn, Jun 1934, E. J. Gerberg, 5 ♂♂ (FSCA), same loc., 14 May 1935, 1 ♂ (FMNH). *NASSAU Co.*: Long Beach, no date, 1 ♂ (EMEC). *ORANGE Co.*: Fort Montgomery, 12 Jul 1914, F. M. Schott, 1 ♀ (FMNH); same data except 19 Jul 1914, 3 ♀♀ (CMNH, FMNH, GHNC); 8 Jul 1917, 1 ♀ (EMEC); Pine Island, 17 Jun 1911, C. L. Pollard, 1 specimen (FSCA); Tuxedo, 30 Jul, 1 ♀ (UMMZ). *QUEENS Co.*: Long Island, Jamaica, no date, 1 ♂ (LEMQ); Long Island, Rockaway Park, 10 Jul 1931, 1 ♂ (FMNH); same locality, 4 Aug 1939, 1 ♀ (FMNH). *ROCKLAND Co.*: Bear Mt, 25 Jun, Schott, 1 ♀ (DENH). *ST LAWRENCE Co.*: Morristown, 30 Jun 1941, H. Dietrich, 1 ♂, 1 ♀ (CUIC). *SUFFOLK Co.*: no date, 1 ♀ (PMNH); Fire Island, 1 Jul 1938, 1 ♂ (FMNH); Montauk Beach, 2 Jul 1916, F. M. Schott, 1 ♀ (CMNH); Napeague, 4 Jul 1932, 1 ♂ (PURC); Orient, 1 Jul 1932, R. Latham, 1 ♀ (CUIC); same data except 1 Jul 1945, 1 ♂; Riverhead, 27 May 1950, R. Latham, 1 ♀ (CUIC). *SULLIVAN Co.*: Callicoon, 12 Jul 1937, L. L. Pechuman, *Ceanothus americanus*, 1 ♀ (CUIC); Ten Mile River Boy Scout Camp, 15 Jul 1943, H. P. Boyd, 1 ♂ (CMNH). *TOMPKINS Co.*: Ithaca, 8 Aug 1940, J. N. Belkin, 1 ♀ (FSCA). *ULSTER Co.*: Ellenville, 6-18 Jul 1937, E. J. Gerberg, 2 ♀♀ (FSCA). *WASHINGTON Co.*: Salem, 7 Jul 1937, H. Dietrich, 1 ♀ (CUIC). *COUNTY UNKNOWN*: no date, 2 ♂♂, 2 ♀♀ (CMNH, MCPM); Jones Beach, 26 Jun 1942, Kistler, 1 ♀ (DENH); Long Island, no date, 2 ♂♂, 1 ♀ (SDSU, USNM). *NORTH CAROLINA. DURHAM Co.*: 18 Jun 1986, stump *Quercus* sp., W. B. Rudd, 1 ♂ (NCSU). *SWAIN Co.*: Great Smokies, Hazel Creek, 8 Jun 1944, J. G. Needham, 1 ♀ (CUIC). *COUNTY UNKNOWN*: no date, 1 specimen (MSUC). *OHIO. ATHENS Co.*: Nelsonville, 25 Jun 1973, J. R. Galford, 1 ♀ (PMNH). *COSHOCTON Co.*: Cavallo, 8 Jul 1940, 1 ♀ (FSCA). *GUERNSEY Co.*: Millwood, 1 Jul 1940, 1 ♀ (AELC); same loc., 19 Jul 1940, 1 ♀ (FSCA). *HOCKING Co.*: 2 Jul, D. J. & J. N. Knull, 1 ♀ (FMNH). *KNOX Co.*: 18 Jun 1941, 1 ♀ (FSCA); 23 Jun 1941, 1 ♀ (AELC). *MUSKINGUM Co.*: Salt Creek Twp, 15-25 Jul 1935, 1 ♀ (UMMZ). *VINTON Co.*: Lake Hope State Park, 7 Jul 1993, fermenting bait trap, J. A. Green, 3 ♂♂; same data except 17 Jul 1993, 5 ♂♂, 1 ♀; 19 Jul 1993, 1 ♀; Zaleski, 18 Jun 1994, fermenting bait trap, J. A. Green, 1 ♂, 6 ♀♀; same data except 30 Jul 1994, 1 ♀. *COUNTY UNKNOWN*: no date, 1 ♂, 1 ♀ (CMNH). *OKLAHOMA. LATIMER Co.*: Jul 1992, K. Stephan, 1 ♂; 8 km W of Red Oak, Jul 1981, K. Stephan, 1 ♀. *LEFLORE Co.*: Winding Stair Camp, 29 Jun 1983, H. C. Reed, J. Nelson, 1 ♀ (OSEC). *PAWNEE Co.*: Pawhuska, 10 Jun 1960, G. C. Eickwort, 1 specimen (MSUC). *PENNSYLVANIA. ADAMS Co.*: Arendtsville, 15 Jun 1927, S. W. Frost, 1 ♂ (CUIC); same data except 5 Jul 1927, 2 ♂♂, 2 ♀♀; 12 Jul 1927, 1 ♂ (MCPM); 26 Jul 1927, 1 ♀; 2 Aug 1927, 1 ♀ (EMEC); 1 Jun 1929, 1 ♂ (EMEC); 13 Jun 1936, 1 ♂, 1 ♀ (EMEC). *ALLEGHENY Co.*: 22 Jun 1921, E. A. Klages, 1 ♂ (CUIC); same data except 4 Jul 1893, 1 ♀; Pittsburg, 24 Jun, 1 ♀ (CMNH); same data except 30 Jun, 1 ♂; 1 Jul, 1 ♂; 2 Jul, 1 ♂; 6 Jul, 2 ♂♂, 1 ♀; Ross Station, 6 Jul 1918, 1 ♀ (CMNH); Walls, 16 Jun 1921, 1 ♂ (CMNH); same data except 24 Jun 1921, 1 ♂, 1 ♀. *BEAVER Co.*: Raccoon Creek State Park, 26 Jun 1953, 1 ♀ (FMNH). *BERKS Co.*: Mt Penn, no date, 1 ♀ (FMNH). *CENTRE Co.*: Patton Twp, Scotia Barrens, 23 Jul 1979, F. D. Fee, 1 ♀ (FSCA); same data except 2 Aug 1979, 1 ♀; 15 Aug 1979, 1 ♀; 14 Jul 1980, 1 ♀; State College, 20 Jul 1955, sawmill, J. A. Chemsak, 1 ♀ (EMEC); same loc., 7 Jul 1979, J. O. Pepper, 1 ♀ (MEMU); same loc., 15 Jul 1985, F. D. Fee, 1 ♀ (FSCA). *CHESTER Co.*: Downingtown, 4 Jul 1937, R. C. Casselberry, 1 ♀ (UCDC). *DAUPHIN Co.*: Harrisburg, 5 Jun 1914, J. N. Knull, 2 ♂♂, 1 ♀ (FMNH); Hummelstown, 15 Jun, J. N. Knull, 3 ♂♂ (FMNH); same data except 7 Jul, 2 ♂♂, 1 ♀ (OSEC); 11 Jul, 1 ♀ (OSEC); 3 Jul 1915, 1 ♀; 29 May 1918, 1 ♂, 1 ♀; 9 Jun 1919, 1 ♂; same loc., 9 Jul 1926, Champlain & Kirk, 1 ♂, 1 ♀ (UMMZ); same loc., 25 Jul 1930, 1 ♂, 1 ♀ (CDAE, UCDC); Inglenook, 27 Jun 1926, 1 ♂, 1 ♀ (CUIC); Rockville, 28 Jun 1918, J. N. Knull, 1 ♂ (FMNH). *DELAWARE Co.*: Castle Rock, 23 Jun, 1 ♀ (UMRM). *FAYETTE Co.*: Dunbar, no date, 1 ♀ (CMNH). *FRANKLIN Co.*: 6.4 km W of Fannetsburg, 23 Jul 1988, J. E. Wappes, 1 ♂ (FSCA); Mont Alto, 18 Aug, J. N. Knull, 1 ♂, 2 ♀♀ (FMNH); same data except Jul 1932, 1 ♂ (UCDC); same loc., 2 Jul 1932, J. G. Shanafelt, 1 ♂ (LACM); 4.8 km W of Roxbury, 10 Aug 1989, sugar bait, J. E. Wappes, 7 ♂♂ (FSCA, TAMU); same data except 20 Aug 1989, 2 ♀♀ (FSCA); St Thomas, Aug 1932, J. O. Pepper, 1 ♂, 1 ♀ (FSCA). *GREENE Co.*: Pine Bank, 6 Jul 1957, 1 ♂ (EMEC); same loc., 3 Jul 1957, R. W. Surdick, 1 ♀ (FSCA). *HUNTINGTON Co.*: 1.6-3.2 km E of Neelyton, 15 Jul 1989, sugar bait, J. E. Wappes, 2 ♀♀ (TAMU). *LANCASTER Co.*: Lancaster, Jul, 2 ♂♂ (USNM); same loc., no date, 1 ♂, 1 ♀ (LACM); Schoeneck, 4 Jul 1904, 1 ♀ (INHS). *NORTHAMPTON Co.*: Mount Hope, 20 Jun 1903, 2 ♀♀ (LACM, UMMZ). *PHILADELPHIA Co.*: Philadelphia, no date, W. H. Ashmead, 1 ♂, 1 ♀ (USNM). *PIKE Co.*: Greentown, 19 Jul 1916, E. D. Quirsfeld, 1 ♀ (CUIC); same data except 20 Jul 1916, 1 ♀ (CUIC). *WESTMORELAND Co.*: Jeanette, 2 Jul, H. G. Klages, 2 ♂♂ (CMNH); same date except 7 Jul, 1 ♂ (CMNH); St Vincent, no date, 1 ♂, 1 ♀ (CMNH). *COUNTY UNKNOWN*: no date, 4 ♂♂,

2 ♀♀ (CMNH, RUIC, UMRM); Allegheny, no date, 1 ♀ (CMNH); Indian Creek, 22 Jun 1941, 1 ♀ (INHS). RHODE ISLAND. *KENT Co.*: Warwick, 3 Aug 1914, M. Bove, 1 ♀ (PMNH); same loc., no date, E. E. Calder, 1 ♂, 2 ♀♀ (UMMZ); same data except 17 Jul 1899, 1 ♀. *PROVIDENCE Co.*: Elmwood, 21 Jun 1925, M. Bove, 1 ♀ (PMNH); Johnston, 7 Jul 1913, E. E. Calder, 1 ♀ (UMMZ); Lonsdale, 2 Jul 1922, 1 ♂ (PMNH). *WASHINGTON Co.*: Watch Hill, 28 Jun 1909, W. Robinson, 3 ♂♂, 1 ♀ (UMMZ, USNM); same data except 30 Jun 1909, 1 ♀ (UMMZ); 2 Jul 1909, 1 ♀ (MCPM); 22 Jul 1909, 1 ♂ (UMMZ). *SOUTH CAROLINA. OCONEE Co.*: Walhalla, Poor Mt, 1–10 Jun 1940, bait trap, C. L. Cartwright, 1 ♂ (FSCA). *SOUTH DAKOTA. PENNINGTON Co.*: Black Hills, Hill City, Joe Dollar Gultch, 22 Jul 1964, D. C. Ferguson, 1 ♂ (PMNH). *TENNESSEE. BLOUNT Co.*: Great Smoky Mts National Park, 21 Jun 1935, 1 ♂ (FMNH). *CUMBERLAND Co.*: Grassy Cove, 11 Jul 1922, T. H. Hubbell, 1 ♂ (UMMZ); same data except 12 Jul 1922, 1 ♀. *MORGAN Co.*: Deer Lodge, 2 Aug 1933, 1 ♀ (FMNH). *VAN BUREN Co.*: Fall Creek Falls State Park, no date, 1 ♀ (CDAE). *COUNTY UNKNOWN*: no date, 1 ♂ (MCPM). *VERMONT. CHITTENDEN Co.*: Burlington, 8 Jul 1946, 1 ♀ (DENH). *VIRGINIA. AUGUSTA Co.*: Fishersville, Jul 1946, 1 ♀ (DGMG). *FAIRFAX Co.*: 26 Jun 1920, 1 ♀ (CUIC); Springfield, 14 Jun 1987, R. D. Ward, 1 ♀ (CMNH). *STAFFORD Co.*: Fredericksburg, 1 Jun 1902, 1 ♀ (USNM). *COUNTY UNKNOWN*: no date, 2 ♀♀ (UMSP). *WEST VIRGINIA. HARDY Co.*: Lost River State Park, 3 Jul 1953, K. V. Krombein, 1 ♀ (FSCA); same loc., Jul 1974, A. S. Menke, 1 ♀ (EMEC). *KANAWHA Co.*: Guthrie, 1 Jun 1987, M. C. Thomas, 1 ♂ (JAGC). *WISCONSIN. BURNETT Co.*: Yellow River, 28–31 Jul 1909, 1 ♂, 2 ♀♀ (MCPM). *DODGE Co.*: Beaver Dam, 6 Jun 1896, W. E. Snyder, 1 ♀ (MCPM). *DUNN Co.*: Colfax, 20 Jul 1920, 1 ♂, 4 ♀♀ (MCPM). *COUNTY UNKNOWN*: no date, 3 ♂♂ (CUIC, MCPM, UMRM). *STATE UNKNOWN*. Sackitist Swamp, 8 Aug 1928, 1 ♀ (PMNH). *CANADA. ONTARIO*. no date, 2 ♀♀ (CMNH, FSCA). *QUEBEC*. St Anne's, 30 Jul 1943, 1 ♀ (LEMQ).

Purpuricenus linsleyi Chemsak

(Figs. 8–10)

Purpuricenus linsleyi Chemsak, 1961: 183; Linsley, 1962: 107; Chemsak & Linsley, 1982: 51; Chemsak et al., 1992: 85; Monné & Giesbert, 1994: 150; Poole & Gentili, 1996: 150.

Purpuricenus humeralis, Linsley, 1962: fig. 34 (part).

Types.—Holotype, female; data: "Tex;" deposited: U.S. National Museum of Natural History, Washington, D.C. (not examined). Paratype, female (Fig. 8); data: "Tex;" deposited: Essig Museum of Entomology, Berkeley.

Female.—Form large, robust, subcylindrical; integument black, opaque, basal one-half of elytra orange with basal margin black, posterior margin of orange markings straight, extending obliquely from basal one-third of suture nearly to apical one-third of lateral margin; pubescence dark. Head with front shining, coarsely, densely punctate, punctures becoming finer and sparser near base of antennae, moderately clothed with short, recurved hairs; vertex dull, coarsely, contiguously punctate, pubescence short, sparse, recurved, a few longer, suberect hairs scattered near eyes; antennal tubercles prominent, antennae reaching apical one-third of elytra (left antennomeres 10–11 and right antenna missing), each segment moderately clothed with short, appressed hairs, antennomeres 1–3 sparsely clothed ventrally with longer, suberect hairs, antennomere 1 robust, widest distally, 2 shortest, slightly longer than apical width, 3 1.2× longer than 1, 4–9 subequal in length and slightly shorter than 1. Pronotum 1.5× wider across lateral tubercles than long, constricted before base; prominent lateral tubercles just behind middle, angles narrowly acute, slightly recurved toward base; surface dull, finely, shallowly, densely punctate, punctures slightly more irregular in anterolateral areas; pubescence short, moderately dense, recurved toward median callus, a few longer, suberect hairs scattered throughout basal portion; disc convex, with 5 distinct calluses, median callus most prominent, glabrous apically; prosternum faintly shining, with distinct transverse impression, finely punctate anterior to depression, punctures more distinct within and posterior to impression, moderately clothed with suberect hairs; meso- and metasternum slightly shining, finely, densely punctate, clothed with moderately long, subdepressed hairs. Elytra 2.2× longer than humeral width; surface dull, basal half finely, moderately deeply, densely punctate, punctures smaller than largest of pronotal disc, separated by no more than their width, apical half subalutaceous, more finely, densely punctate; pubescence short, subdepressed, a single hair arising

from each puncture, denser toward apices; apices emarginate-truncate, sutural and outer angles obtuse, dentate. Scutellum slightly longer than wide, weakly impressed longitudinally, finely, densely clothed with short, appressed hairs, apex narrowly rounded. Legs quite elongate, robust; femora shining, moderately densely, shallowly punctate, rather densely clothed with moderately long, subdepressed hairs, metafemora extending beyond elytral apices; tibiae shining, more finely, densely punctate, densely clothed with moderately long, subdepressed hairs; metatarsomere 1 slightly longer than combined length of 2-3. Abdomen shining, very finely, densely punctate, pubescence dense, suberect, short on basal portion of each sternite, longer apically, apical edge of sternites glabrous, last sternite broadly, shallowly emarginate at apex. Length, 21.20 mm; width, 6.95 mm. Described from female paratype (Fig. 8).

Male.—Differs from female as follows: basal elytral markings reduced medially, extending only to basal one-fourth of suture; antennae surpassing elytral apices by about 4 segments, antennomere 3 1.5× longer than 1, 4-10 subequal in length and slightly shorter than 3, 11 longest, appendiculate, slightly curved apically; anterolateral areas of pronotum with punctures distinctly smaller and more widely separated than those on disc, approximately equal in size to those on prosternum; abdomen with apex of last sternite broadly subtruncate. Length 19.50 mm; width, 6.40 mm. Described from male from Texas, Eastland Co., 20 May 1921, G. O. Wiley, (TCMC) (Fig. 9a).

Diagnosis.—The large red markings covering the basal one-half of the elytra and with strongly oblique posterior margins distinguish this species from most others. It may be distinguished from similarly marked specimens of *P. paraxillaris* by its finer pronotal and elytral punctation and basal elytral hairs.

Variation.—The size of the red elytral markings is fairly uniform among females but varies greatly among males. In females, the markings cover the basal one-third to one-half of the elytra along the suture and the basal two-thirds to three-fourths along the lateral margin. In males, the markings are variably reduced along the posterior margins and elytral suture, and a few males are nearly completely black with elongate red spots at the basal one-fourth of the lateral elytral margin. The basal elytral markings of the female paratype are orange (post-mortem change?), however, they are dark-red in all other specimens examined, both male and female. Males measured 13.65-21.40 mm (18.31 ± 2.30 mm, $n = 28$) and females 13.10-21.35 mm (18.32 ± 1.97 mm, $n = 16$) in length.

Distribution.—This species has been collected from north-central to south-central Texas along the eastern and southeastern edge of the Edwards Plateau (Fig. 10).

Biology.—No larval or adult host records are available for this species, however, it probably utilizes *Quercus*. Most specimens have been collected in fermenting bait traps in the "hill country" of northern Bexar County. This locality is characterized by dry oak woodland dominated by *Q. virginiana*, *Q. fusiformis* Small, *Diospyros texana* Scheele, *Ulmus crassifolia* Nuttall and *Juniperus ashei* Buchholz. Seasonal occurrence: 11 May-26 Jun.

Material Examined.—In addition to Types, 45 specimens: TEXAS. BANDERA Co.: Redbud Reserve Ranch, 20 May-15 Jun 1989, E. Gage, 2 ♂♂ (DGMC). BEXAR Co.: NW of San Antonio, 2 Jun 1990, fermenting bait trap, D. W. Sundberg, 1 ♀ (TCMC); San Antonio, nr Sea World Park, 1-15 Jun 1993, fermenting bait trap, D. W. Sundberg, 4 ♂♂, 3 ♀♀ (DJHC, TCMC, LGBC); San Antonio, Inwood, 1-9 Jun 1994, D. W. Sundberg, 2 ♂♂, 3 ♀♀ (DJHC); jet Bitters Rd & Loop 1604, 10-20 Jun 1992, D. W. Sundberg, 2 ♂♂, 2 ♀♀ (DGMC, DJHC); vic NW of Loop 1604, Jun 1994, fermenting bait trap, D. W. Sundberg, 15 ♂♂, 6 ♀♀ (& TCMC). BROWN Co.: Brownwood, 25 May 1943, B. A. Maina, 1 ♀ (EMEC). CORYELL Co.: Fort Hood, 10 Jun 1961, S. G. Wellso, 1 ♀ (AELC). EASTLAND Co.: 11 May 1921, G. O. Wiley, 1 ♂ (UMSP); same data except 20 May 1921, 1 ♂ (TCMC). MONTAGUE Co.: 366 m (1,200 ft), 26 Jun 1940, L. H. Bridwell, 1 ♂ (USNM).

Purpuricenus (Sternoplistes) temminckii (Guérin-Méneville)

Sternoplistes temminckii Guérin-Méneville, 1844: 224.

Purpuricenus (Sternoplistes) temminckii, Gressitt, 1951: 319.

Discussion.—This Asian species has been intercepted by state agriculture officials in California and Minnesota. In each case, adults emerged from imported poles of *Bambusa* sp. (bamboo), a recorded host (Gressitt & Rondon 1970). There is no evidence that it has ever established in North America.

Diagnosis.—This species is distinguished from all North American *Purpuricenus* by its wholly orange elytra and orange, distinctly swollen pronotum with five black discal spots.

Material Examined.—11 specimens: CALIFORNIA. *CONTRA COSTA Co.*: Walnut Creek, emerged 30 Sep 1957 from *Bambusa* sp. from Japan, 2 ♀♀ (CDAE). *MERCED Co.*: Gustine, no date, J. Phillips, emerged from *Bambusa* sp. poles from Orient, 1 ♀ (CDAE). *SAN JOAQUIN Co.*: Manteca, emerged Jul 1957 from *Bambusa* sp., J. Joos, 1 ♀ (CDAE); Tracy, emerged 10 Oct 1957 from *Bambusa* sp. poles from India, J. L. Joos, 1 ♂ (CDAE). *SAN JOSE Co.*: emerged Jul 1957 from *Bambusa* sp. from Japan, J. L. Joos, 3 ♀♀ (CDAE, PURC). *STANISLAUS Co.*: Modesto, emerged 30 Oct 1957 from *Bambusa* sp., H. Sinclair, 1 ♂ (FMNH). MINNESOTA. *RAMSEY Co.*: St. Paul, emerged 30 Dec 1999 from *Bambusa* sp. stem from China, S. Hastings, 2 ♂♂ (MNDA).

ACKNOWLEDGMENT

My sincere thanks to D. J. Heffern, Houston, Texas, D. G. Marqua, Fort Davis, Texas and D. W. Sundberg, San Antonio, Texas for their generous assistance during this study, C. Brown, St. Louis, Missouri, for preparing the habitus photographs, E. Dean, F. Hrusa and J. M. Tucker, University of California, Davis, and Rev. J. M. Sullivan, St. Louis for kindly providing plant identifications, F. T. Hovore, Santa Clarita, California and an anonymous reviewer for helpful comments on the manuscript, the Missouri Department of Conservation, Jefferson City for allowing me to collect on department managed lands, and the individuals and institutions listed in the Material Examined sections who granted access to specimens in their care. Special thanks are extended to the Museum of Comparative Zoology, Cambridge, Massachusetts, the Field Museum of Natural History, Chicago, Illinois and the University of California, Berkeley for their gracious loans of type material.

LITERATURE CITED

- Arnett, R. H., Jr. 1963. The beetles of the United States (a manual for identification). Catholic University of America Press, Washington, D.C.
- Arnett, R. H., Jr., G. A. Samuelson & G. M. Nishida. 1993. The insect and spider collections of the world (2nd ed.). Flora and Fauna Handbook No. 11, Sandhill Crane Press, Gainesville, Florida.
- Audinet-Serville, J. G. 1833. Nouvelle classification de la famille des longicornes. *Ann. Soc. Entomol. France*, 2: 528–573.
- Aurivillius, C. 1912. *Coleoptorum Catalogus*, pars 39, Cerambycidae: Cerambycinae. W. Junk, Berlin.
- Bayer, L. J. & R. D. Shenefelt. 1969. Wisconsin Cerambycidae in the University of Wisconsin Insectarium. *Univ. Wisc., Coll. Agric. and Life Sci. Res. Div. Res. Bull.* 275.
- Bense, U. 1995. Longhorn beetles. Illustrated key to the Cerambycidae and Vesperidae of Europe. Margraf Verlag, Weikersheim.
- Beutenmuller, W. 1896. Food-habits of North American Cerambycidae. *J. N. Y. Entomol. Soc.*, 4: 73–81.
- Blackman, M. W. & H. H. Stage. 1924. On the succession of insects living in the bark and wood of dying, dead, and decaying hickory. *N. Y. St. Coll. For. Tech. Publ.* 17: 3–269.
- Bland, J. H. B. 1861. Catalogue of the longicorn Coleoptera taken in the vicinity of Philadelphia. *Proc. Entomol. Soc. Philadelphia*, 1: 93–101.
- Bland, J. H. B. 1862. Descriptions of several supposed new species of Cerambycidae in the collection of the Entomological Society of Philadelphia, with observations of some already described. *Proc. Entomol. Soc. Philadelphia*, 1: 267–276.

- Blatchley, W. S. 1910. An illustrated descriptive catalogue of the Coleoptera or beetles (exclusive of the Rhyncophora) known to occur in Indiana with bibliography and descriptions of new species. Nature Publishing Co., Indianapolis.
- Bosquet, Y. (ed.). 1991. Checklist of beetles of Canada and Alaska. Agric. Canada Res. Branch Publ. 1861/E.
- Bowditch, F. C. 1896. Coleoptera collecting notes for 1895. Entomol. News, 7: 33–35.
- Casey, T. L. 1912. Studies in the Longicornia of North America. Memoirs on the Coleoptera, 3: 215–376.
- Chagnon, G. & A. Robert. 1962. Principaux Coléoptères de la province de Québec (2nd ed.). Les Presses de L'Université de Montréal, Québec.
- Champlain, A. B. & H. B. Kirk. 1926. Bait pan insects. Entomol. News, 37: 288–291.
- Champlain, A. B., H. B. Kirk & J. N. Knull. 1925. Notes on Cerambycidae (Coleoptera). Entomol. News, 36: 139–142.
- Champlain, A. B. & J. N. Knull. 1932. Fermenting bait for trapping Elateridae and Cerambycidae (Coleop.). Entomol. News, 43: 253–257.
- Chemsak, J. A. 1961. A new species of *Purpuricenus* from Texas (Coleoptera: Cerambycidae). Pan-Pacif. Entomol., 37: 183–184.
- Chemsak, J. A. 1977. A list of types of Cerambycidae at the Field Museum of Natural History, Chicago (Coleoptera). Coleopt. Bull., 31: 173–179.
- Chemsak, J. A. & E. G. Linsley. 1974. Reclassification, synonymy, and descriptions of some North and Central American Cerambycidae (Coleoptera). Coleopt. Bull., 28: 181–184.
- Chemsak, J. A. & E. G. Linsley. 1982. Checklist of the Cerambycidae and Disteniidae of North America, Central America, and the West Indies (Coleoptera). Plexus Publishing Inc., Medford.
- Chemsak, J. A., E. G. Linsley & F. A. Noguera. 1992. Listados faunísticos de México. II. Los Cerambycidae y Disteniidae de Norteamérica, Centroamérica y las Indias Occidentales (Coleoptera). Universidad Nacional Autónoma de México, Instituto de Biología, México, D.F.
- Cherepanov, A. I. 1982. Cerambycidae of northern Asia. Cerambycinae: Clytini, Stenaspini. Nauka, Novosibirsk [in Russian].
- Cherepanov, A. I. 1988. Cerambycidae of northern Asia. Volume 2. Cerambycinae. Part II. Amerind Publishing Co., New Delhi [English translation of Cherepanov 1982].
- Craighead, F. C. 1923. North American cerambycid larvae. A classification and the biology of North American cerambycid larvae. Can. Dept. Agric. Tech. Bull. 27.
- Darlington, P. J. 1961. Letter from LeConte to Alexander Agassiz. Coleop. Bull., 15: 128.
- Dearborn, R. G. & C. P. Donahue. 1993. An annotated list of insects collected and recorded by the Maine Forest Service. Order Coleoptera. Beetles. Maine For. Serv., Insect and Disease Div. Tech. Rep. 32.
- Dejean, P. F. 1821. Catalogue de la collection de coléoptères de M. le baron Dejean. Crevot Library, Paris.
- Downie, N. M. & R. H. Arnett, Jr. 1996. The beetles of northeastern North America. Volume II: Polyphaga: series Bostrichiformia through Curculionoidea. The Sandhill Crane Press, Gainesville.
- Fabricius, J. C. 1798. Supplementum entomologiae systematicae. Hafniae.
- Fabricius, J. C. 1801. Systema eleutheratorum secundum ordines, genera, species: adiectis synonymis, locis, observationibus, descriptionibus, Volume 2. Kiliae.
- Fairmaire, L. 1864. In: Jacquelin du Val, P. N. Genera des coléoptères d'Europe comprenant leur classification en famille naturelle, Volume 4. Paris.
- Ferreira, M. C. & G. da Veiga-Ferreira. 1959. Catálogo dos cerambycídeos da Região Etiópica—II Parte—Supertribos Disteniina, Asemina, Cerambycina, Auxesina, Lepturina. Mem. Inst. Invest. Científica de Moçambique, 1: 77–398.
- Fisher, W. S. & H. B. Kirk. 1912. Cerambycidae from Harrisburg, Pennsylvania, and vicinity, with notes (Coleop.). Entomol. News, 23: 308–316.
- Fitch, A. 1845. Insects injurious to vegetation—No. 1. Amer. Quart. J. Agric. Sci., 1: 250–254, pl. 3.
- Fragaso, S. A., M. A. Monné & C. A. C. Seabra. 1987. Preliminary considerations on the higher classification of Cerambycinae (Colcoptera, Cerambycidae), with nomenclatural alterations. Rev. Bras. Biol., 47: 189–202.
- Frost, C. A. 1920. Popular and practical entomology. A day's beating. Can. Entomol., 52: 25–29.

- Frost, S. W. & H. Dietrich. 1929. Coleoptera taken from bait traps. *Ann. Entomol. Soc. Amer.*, 22: 427-437.
- Gahan, C. J. 1906. Coleoptera (Cerambycidae). *In: The fauna of British India including Ceylon and Burma*. C. T. Binham, London.
- Garnett, R. T. 1918. An annotated list of the Cerambycidae of California. (Col.). *Can. Entomol.*, 50: 205-213.
- Germar, E. F. 1824. *Insectorum species novae aut minus cognitae, descriptionibus illustratae*, Volume 1. Halae.
- Gosling, D. C. L. 1974. An annotated checklist of the Cerambycidae of Michigan (Coleoptera). Part I, introduction and the subfamilies Parandrinae, Prioninae, Spondyliinae, Aseminae, and Cerambycinae. *Great Lakes Entomol.*, 6 (1973): 65-84.
- Gressitt, J. L. 1951. Longicorn beetles of China. *Longicornia*, 2: 1-677.
- Gressitt, J. L. 1959. Longicorn beetles from New Guinea, I (Cerambycidae). *Pac. Insects*, 1: 59-171.
- Gressitt, J. L. & J. A. Rondon. 1970. Cerambycids of Laos (Disteniidae, Prioninae, Philinae, Aseminae, Lepturinae, Cerambycinae), pp. 1-314. *In: Gressitt, J. L., J. A. Rondon & S. von Breuning [eds.], Cerambycid-beetles of Laos (Longicornes du Laos)*. Pacific Insects. Monogr. 24: 1-651.
- Guérin-Méneville, E. F. 1844. *Iconographie du règne animal de G. Cuvier, ou représentations d'après nature d'une des espèces les plus remarquables et souvent non encore figurées de chaque genre d'animaux*. Insectes. J. B. Baillière, Paris.
- Haldeman, S. S. 1847. Materials towards a history of the Coleoptera Longicornia of the United States. *Trans. Amer. Philos. Soc.*, 10: 27-66.
- Hamilton, J. 1890. Notes on Coleoptera - No. 6. *Can. Entomol.*, 22: 237-242.
- Hamilton, J. 1895. Catalogue of the Coleoptera of southwestern Pennsylvania, with notes and descriptions. *Trans. Amer. Entomol. Soc.*, 22: 317-381.
- Hatch, M. H. 1971. The beetles of the Pacific Northwest. Part V: Rhipicerioidea, Sternoxi, Phytophaga, Rhyncophora, and Lamellicornia. *Univ. Wash. Publ. Biol.* 16.
- Headstrom, R. 1977. *The beetles of America*. A. S. Barnes and Co., Inc., Cranbury, New Jersey.
- Henshaw, S. 1885. List of the Coleoptera of America, north of Mexico. American Entomological Society, Philadelphia.
- Hovore, F. T. & E. F. Giesbert. 1976. Notes on the ecology and distribution of western Cerambycidae (Coleoptera). *Coleopt. Bull.*, 30: 349-360.
- Hua, L., H. Nara & C. Yu. 1993. Longicorn beetles of Hainan & Guangdong. *Muh-Sheng Mus. Entomol.*, Natou Hsien.
- Kartesz, J. T. 1994. A synonymized checklist of the vascular flora of the United States, Canada, and Greenland (2nd ed.), Volume 1 - checklist, Volume 2 - thesaurus. Timber Press, Portland, Oregon.
- Kirk, H. B. & J. N. Knull. 1926. Annotated list of the Cerambycidae of Pennsylvania (Coleoptera). *Can. Entomol.*, 58: 39-46.
- Klausnitzer, B. & F. Sander. 1978. Die bockkäfer Mitteleuropas. Cerambycidae. *Neue Brehm Büch* No. 499.
- Knull, J. N. 1932. Notes on Coleoptera, No. 3. *Entomol. News*, 43: 62-67.
- Knull, J. N. 1934. Notes on Coleoptera, No. 4. *Entomol. News*, 45: 207-212.
- Knull, J. N. 1937. New southwestern Buprestidae and Cerambycidae with notes. *Ohio J. Sci.*, 37: 301-309.
- Knull, J. N. 1946. The long-horned beetles of Ohio (Coleoptera: Cerambycidae). *Ohio Biol. Surv. Bull.*, 39: 133-354.
- Knull, J. N. 1954. A new *Euryptera* and notes on other Cerambycidae (Coleoptera). *Ohio J. Sci.*, 54: 129-130.
- Lacordaire, J. T. 1869. *Histoire Naturelle des Insectes. Genera des Coléoptères, ou exposé méthodique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes*. Librairie Encyclopédique de Roret, 8: 1-552; 9: 1-409.
- Laporte, F. L. 1840. *Histoire naturelle de animaux articulés*, 2 vols. Paris.
- Latreille, P. A. 1829. Les crustacés, les arachnides et les insectes. *In: Cuvier, Le règne animal* (2nd ed.), Volume 5.
- LeConte, J. L. 1850. An attempt to classify the longicorn Coleoptera of America North of Mexico. *J. Acad. Nat. Sci. Philadelphia* (ser. 2), 2: 5-38.

- LeConte, J. L. 1873. Classification of the Coleoptera of North America. Part II. Smithsonian Misc. Coll., 11: 279-348.
- LeConte, J. L. 1875. Descriptions of new Coleoptera of the United States with notes on geographical distribution. Trans. Amer. Entomol. Soc., 5: 169-176.
- LeConte, J. L. 1884. Short studies of North American Coleoptera. (No 2). Trans. Amer. Entomol. Soc., 12: 1-32.
- LeConte, J. L. & G. H. Horn. 1883. Classification of the Coleoptera of North America (2nd ed.). Smithsonian Misc. Coll., 26: 1-567.
- Lee, S.-M. 1987. The longicorn beetles of Korean Peninsula. Natl. Sci. Mus., Seoul.
- Leng, C. W. 1886a. Synopses of Cerambycidae. Entomol. Amer., 2: 60-63.
- Leng, C. W. 1886b. Synopses of Cerambycidae. Entomol. Amer., 2: 81-83.
- Leng, C. W. 1920. Catalogue of the Coleoptera of America, north of Mexico. John D. Sherman, Jr., Mount Vernon.
- Leonard, M. D. 1928. A list of the insects of New York with a list of the spiders and certain other allied groups. Cornell Univ., Agric. Exp. Sta. Mem. 101.
- Lepesme, P. 1948. Les Stenaspini africains (Col. Cerambycidae). Rev. Franç. Entomol., 14: 310-317.
- Linnaeus, C. 1758. Systema naturae per regna tria naturae secundum classes, ordines, genera, species. cum characteribus, differentilis, synonymis, locis (10th ed.). Holmiae. Laur. Salvius., Volume 1.
- Linsley, E. G. 1962. The Cerambycidae of North America, Part III. Taxonomy and classification of the subfamily Cerambycinae, tribes Opsimini through Megaderini. Univ. Calif. Publ. Entomol. 20.
- Linsley, E. G. & J. A. Chemsak. 1997. The Cerambycidae of North America, Part VIII: bibliography, index, and host plant index. Univ. Calif. Publ. Entomol. 117.
- Lugger, O. 1884. Food-plants of beetles bred in Maryland. Psyche, 4: 203-204.
- MacRae, T. C. 1994. Annotated checklist of the longhorned beetles (Coleoptera: Cerambycidae and Disteniidae) occurring in Missouri. Insecta Mundi, 7 (1993): 223-252.
- Monné, M. A. & E. F. Giesbert. 1994. Checklist of the Cerambycidae and Disteniidae of the Western Hemisphere. Wolfsgarden Books, Burbank (1993).
- Mulsant, E. 1839. Histoire naturelle des Coléoptères de France, Longicornes. Paris, Maison.
- Mulsant, E. 1862. Tribu des Longicornes. Ann. Sci. Phys. Nat. Agric. Indust. (ser. 3), 6: 374.
- Mulsant, E. 1862-1863. Histoire naturelle des coléoptères de France. Longicornes (2nd ed.). Annis Soc. Imp. Agric. Hist. Nat. Indust., Lyon.
- Nakamura, S., Y. Akiyama & K. Terada. 1981. Morphological and taxonomic studies of the cerambycid pupae of Japan (Coleoptera: Cerambycidae). Hiwa Mus. Nat. Hist. Misc. Rep. 20.
- Papp, C. S. 1984. Introduction to North American beetles. Entomography Publications, Sacramento.
- Pascoe, F. P. 1866. Catalogue of the Longicorn Coleoptera, collected in the Island of Penang by James Lamb, Esq. Proc. Zool. Soc.: 222-267, 504-536.
- Penrose, R. L. & R. L. Westcott. 1974. Notes on the distribution, hosts and bionomics of some Pacific Northwest Cerambycidae (Coleoptera). Coleopt. Bull., 28: 233-236.
- Picard, F. 1929. Coléoptères Cerambycidae. Faune de France, 20: 1-167.
- Planet, L. M. 1924. Les longicornes de France. Encyclopédie Entomologique, ser. A., Volume 2: 1-386.
- Plavilstshikov, N. N. 1940. Fauna SSSR, 22(2).
- Plaza Lama, J. 1988. Los Cerambycidae Latreille de Madrid (Col.) (2.a. nota. Subfamilia: Cerambycinae Latreille). Bol. Grupo Entomol. Madrid, 3: 85-114.
- Poole, R. W. & P. Gentili (eds.). 1996. Nomina Insecta Nearctica. A check list of the insects of North America. Volume 1: Coleoptera, Strepsiptera. Entomological Information Services, Rockville.
- Rice, M. E. 1982. Notes on Cerambycidae from Missouri. Coleopt. Bull., 35 (1981): 459-462.
- Rice, M. E., R. H. Turnbow, Jr. & F. T. Hovore. 1985. Biological and distributional observations on Cerambycidae from the southwestern United States (Coleoptera). Coleopt. Bull., 39: 18-24.
- Schaufuss, L. W. 1916. Calwer's Käferbuch (6th ed.), 2 vols.
- Schiefer, T. L. 1998. A preliminary list of the Cerambycidae and Disteniidae (Coleoptera) of Mississippi. Trans. Amer. Entomol. Soc., 124: 113-131.
- Sherman, F. 1946. Notes on Cerambycidae of South Carolina (Coleoptera). Entomol. News, 57: 125-127.
- Skiles, D. D., F. T. Hovore & E. F. Giesbert. 1978. Biology of *Leptura pacifica* (Linsley) (Coleoptera: Cerambycidae). Coleopt. Bull., 32: 107-112.

- Skillman, F. W., Jr. 1994. New records of Georgia Cerambycidae (Coleoptera). *Insecta Mundi*, 7 (1993): 210.
- Smith, J. B. 1900. Insects of New Jersey. A list of the species occurring in New Jersey, with notes on those of economic importance. 27th Ann. Rep. St. Bd. Agric. Suppl. (1899), Trenton.
- Solomon, J. D. 1995. Guide to insect borers of North American broadleaf trees and shrubs. U.S. Dept. Agric., For. Serv. Agric. Handbook 706.
- Stein, J. D. & A. D. Tagstead. 1976. The long-horned wood-boring beetles of North Dakota (Coleoptera: Cerambycidae). U.S. Dept. Agric., For. Serv. Res. Paper RM-171.
- Svacha, P. & M. L. Danilevsky. 1987. Cerambycoid larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea). Part 2. *Acta Univ. Carol. Biol.*, 31: 121-284.
- Thomson, J. 1860. Essai d'une classification de la famille des cérambycides et matériaux pour servir à une monographie de cette famille. Paris.
- Thomson, J. 1864. Systema cerambycidarum où exposé de tous les genres compris dans la famille des cérambycides et familles limitrophes. *Mém. Soc. Roy. Sci. Liège*, 19: 1-540.
- Turnbow, R. H., Jr. & R. T. Franklin. 1980. An annotated checklist of the Cerambycidae of Georgia (Coleoptera). *J. Georgia Entomol. Soc.*, 15: 337-349.
- Villiers, A. 1946. Coléoptères cérambycides de l'Afrique du Nord. *Faune Emp. Franç.*, 5: 1-152.
- Villiers, A. 1978. Faune des coléoptères de France 1. Cerambycidae. *Encyclopédie Entomol. (ser. A)*, 52: 1-552.
- White, A. 1846. Descriptions of Australian insects. *Stoke's Voyage*, 1: 505-512.
- Wickham, H. F. 1897. The Coleoptera of Canada. XXIV. The Cerambycidae of Ontario and Quebec. *Can. Entomol.*, 29: 148-153.
- Wolcott, A. B. 1900. Coleoptera of central Illinois - No. III. *Entomol. News*, 11: 468-470.
- Yanega, D. 1996. Field guide to northeastern longhorned beetles (Coleoptera: Cerambycidae). *Illinois Nat. Hist. Surv. Manual* 6.
- Zimsen, E. 1964. The type material of J. C. Fabricius. *Munksgaard, Copenhagen*.

Received 18 Aug 1999; Accepted 7 Feb 2000.