



Nomenclatural changes in North American *Phymatodes* Mulsant (Coleoptera: Cerambycidae)

IAN P. SWIFT¹ & ANN M. RAY²

¹California State Collection of Arthropods 3294 Meadowview Road, Sacramento, CA 95832 USA. E-mail: ian@pleocomma.com

²Department of Entomology, University of California, Riverside 3401 Watkins Avenue, Riverside, CA 92521 USA.

E-mail: annray@ucr.edu

Abstract

The following nomenclatural changes to the genus *Phymatodes* Mulsant, 1839 are proposed: *P. juglandis* Leng, 1890 = *P. decussatus* (LeConte, 1857); *P. mohavensis* Linsley and Chemsak, 1963 = *P. nitidus* LeConte, 1874; *P. lecontei* Linsley, 1938 (a replacement name) = *P. grandis* Casey, 1912; *P. oregonensis* Chemsak, 1963 = *P. nigrescens* Hardy and Preece, 1927; *P. blandus picipes* Linsley, 1934 and *P. blandus propinquus* Linsley, 1934 = *P. blandus* (LeConte, 1859); *P. hirtellus densipennis* Casey, 1912 and *P. ursae* Knull, 1940 = *P. hirtellus* (LeConte, 1873); *P. decussatus australis* Chemsak, 1963 and *P. decussatus posticus* Van Dyke, 1920 = *P. obliquus* Casey, 1891; *P. frosti* Casey, 1924, a valid name which has not previously been mentioned in the literature = *P. dimidiatus* (Kirby in Richardson, 1837); *P. concolor* Linsley, 1934 is afforded full species status; *P. lividus* (Rossi, 1794) is formally recorded as established in North America. A key and diagnoses for all native and introduced North American species are provided, which include the more recently described species, *P. tysoni* Linsley and Chemsak, 1984, and *P. shareeae* Cope, 1984, in addition to the introduced species *P. lividus*.

Key words: Nearctic, Cerambycinae, Callidiini, longhorned beetle, wood borer, taxonomy

Resumen

Se proponen los siguientes cambios de nomenclatura al género *Phymatodes* Mulsant, 1839: *P. juglandis* Leng, 1890 = *P. decussatus* (LeConte, 1857); *P. mohavensis* Linsley y Chemsak, 1963 = *P. nitidus* LeConte, 1874; *P. lecontei* Linsley, 1938 (nombre de sustitución) = *P. grandis* Casey, 1912; *P. oregonensis* Chemsak, 1963 = *P. nigrescens* Hardy and Preece, 1927; *P. blandus picipes* Linsley, 1934 y *P. blandus propinquus* Linsley, 1934 = *P. blandus* (LeConte, 1859); *P. hirtellus densipennis* Casey, 1912 y *P. ursae* Knull, 1949 = *P. hirtellus* (LeConte, 1873); *P. decussatus australis* Chemsak, 1963 y *P. decussatus posticus* Van Dyke, 1929 = *P. obliquus* Casey, 1891; *P. frosti* Casey, 1924, un nombre válido que no se ha mencionado antes en la literatura = *P. dimidiatus* (Kirby en Richardson, 1837), *P. concolor* Linsley, 1934 se reconoce como especie, *P. lividus* (Rossi, 1794) es formalmente establecido en América del Norte. Se presentan una clave y diagnósticos para todas las especies nativas e introducidas de América del Norte, que incluyen las especies más recientemente descritas, *P. tysoni* Linsley y Chemsak, 1984, y *P. shareeae* Cope, 1984, además de las especies introducidas *P. lividus*.

Palabras Claves: Neártica, Cerambycinae, Callidiini, cerambícidos, barrenador de la madera, taxonomía

Introduction

The genus *Phymatodes* Mulsant is distributed throughout the Holarctic region (North America, Europe, and Asia) (Linsley 1964). As of this study, there are 26 species recognized in North America, the majority occurring in the western states and provinces. The biology is varied among the many species and common larval host plants include species in the genera *Pinus* (Pinaceae), *Quercus* (Fagaceae), *Salix* (Salicaceae), and *Pseudotsuga* (Pinaceae) (Linsley 1964, Linsley and Chemsak 1997). Adults may be collected from flowers,

beaten from host branches, taken at ultraviolet lights at night, or reared from infested wood (Linsley 1962). Recently, adults of several species have been collected in traps baited with "generic" male-produced volatile pheromones (for information about generic pheromones see Hanks *et al.* 2007).

Members of the genus *Phymatodes* can be distinguished from other North American callidiines by their reduced metacoxae, subcylindrical body form, and generally by their smaller overall size.

The genus *Phymatodes* was most recently reviewed by E.G. Linsley in *The Cerambycidae of North America* (Linsley 1959, 1964). In the intervening years, many additional specimens have accumulated in museums and other collections. In light of the new material available for study, it seems prudent to reexamine some of the species hypotheses proposed by Linsley and other authors. Early authors often did not examine type specimens when describing new species, relying instead on written descriptions to compare taxa (see Linsley 1964). In addition, many species were described from one or very few specimens (Leng 1890, Van Dyke 1937). This has led to errors (see Linsley 1964), and after examining type material of some *Phymatodes* species, we have determined that some synonymies are clearly present.

This is the second in a series of studies reexamining the taxonomy of North American Cerambycidae (see Swift and Ray 2008). In the present study, we propose only taxonomic changes, and no new species are described. Specimens of *Phymatodes* examined for this study were based on the following collections: BMNH (British Museum of Natural History, London, England) CSCA (California State Collection of Arthropods, Sacramento, CA, USA); CASC (California Academy of Sciences Collection, San Francisco, CA, USA); CNC (Canadian National Collection, Ottawa, Ontario, Canada); EMEC (Essig Museum of Entomology Collection, University of California, Berkeley, CA, USA); ISPC (Ian Swift Private Collection, Discovery Bay, CA, USA); JCPC (Jim Cope Private Collection, San Jose, CA USA); LACM (Los Angeles County Museum of Natural History Collection, Los Angeles, CA, USA); FMNH (Field Museum of Natural History, Chicago, IL, USA); HMUG (Hunterian Museum, University of Glasgow, Scotland); MCZC (Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA); NHRS (Naturhistoriska Riksmuseet, Stockholm, Sweden); RAPC (Ron Alten Private Collection, Alta Loma, CA, USA); SDMC (San Diego Museum of Natural History, San Diego, CA, USA); SIIS (Staten Island Institute of Arts and Sciences, Staten Island, New York, USA); USNM (National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA).

Species accounts

Phymatodes aeneus LeConte

(Fig. 1)

Phymatodes aeneus LeConte, 1854:18. Type locality: Between Fort Vancouver and Yokolt Plain, Oregon Territory, USA.
MCZC

Callidium aeneum, LeConte, 1857:60

The intensely glossy blue sheen of the elytra, femora, and pronotum will immediately distinguish it among western US species. Among eastern US species, it appears most similar to *P. aereus*, but *P. aeneus* can be separated again by the glossy integument; sparsely, finely punctate elytra with longer, sparse, erect setae; as well as having antennomere II less than one-half the length of III, and IV less than the length of III.

Specimens examined: 25, including the type of *P. aeneus*

Phymatodes aereus (Newman)

(Fig. 2)

Callidium aereum Newman, 1838:393. Type locality: North America. BMNH

Phymatodes aereus, LeConte, 1850:33

Callidium pallipes Haldeman, 1847:37. Type locality: Pennsylvania, USA. MCZC

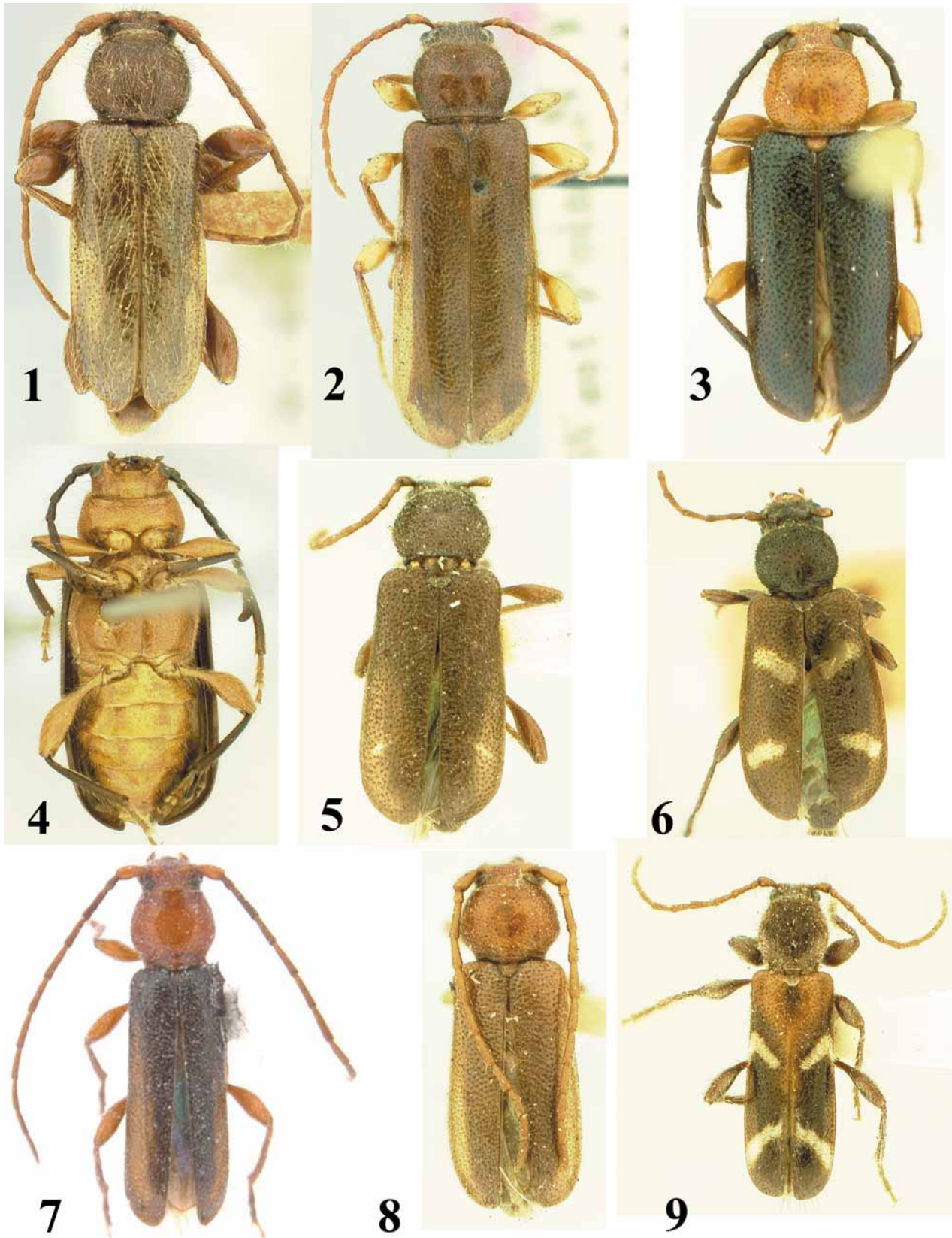


PLATE 1. 1) *Phymatodes aeneus*, male; 2) *P. aereus*, female; 3) *P. amoenus*, female; 4) *P. amoenus*, female ventral; 5) *P. ater*, female; 6) *P. ater*, female; 7) *P. blandus*, male; 8) *P. concolor*, male; 9) *P. decussatus*, male.

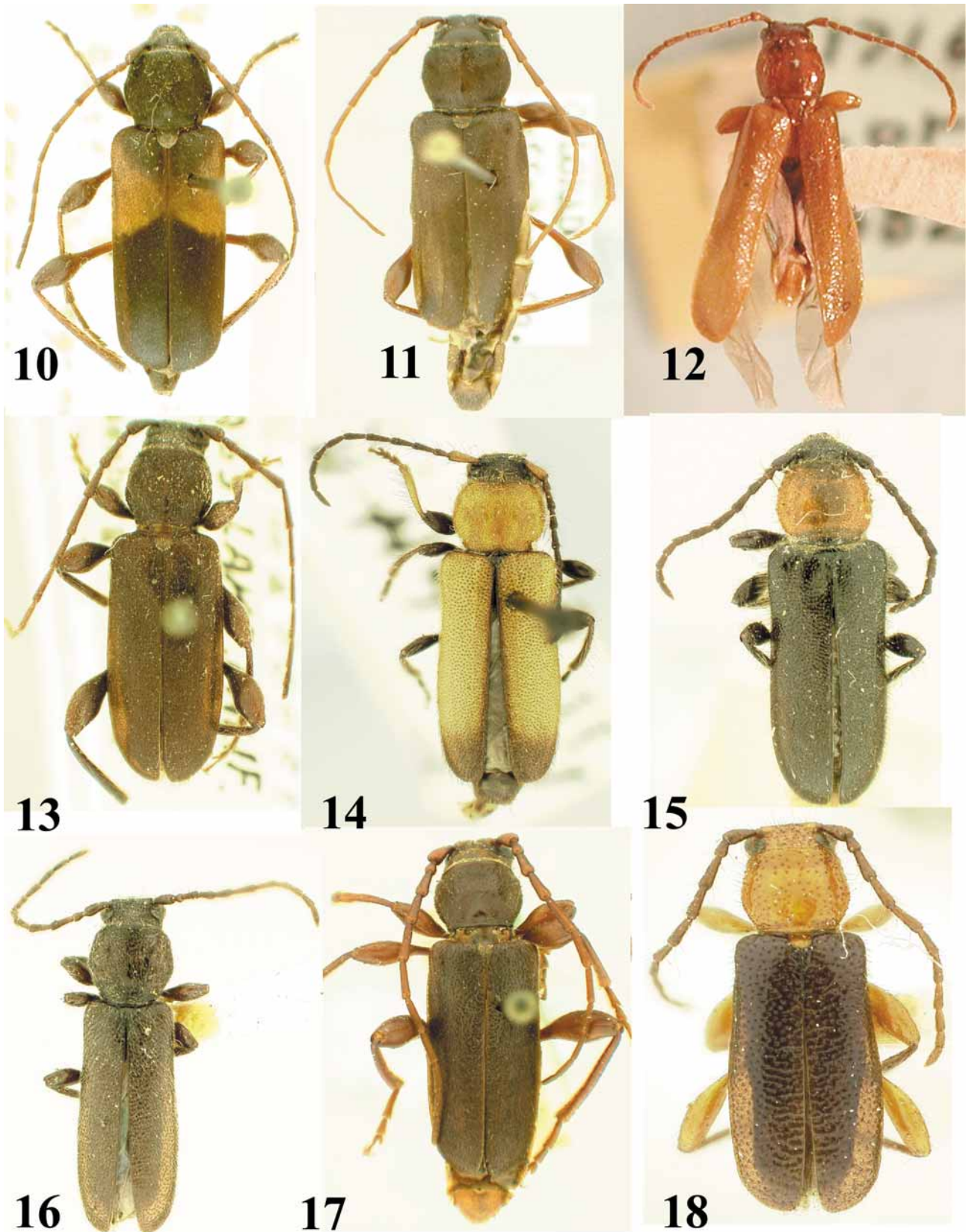


PLATE 2. 10) *Phymatodes dimidiatus*, male; 11) *P. dimidiatus*, male; 12) *P. fulgidus*, paratype female; 13) *P. grandis*, male; 14) *P. hirtellus*, male; 15) *P. hirtellus*, female; 16) *P. hirtellus*, female; 17) *P. infuscatus*, male; 18) *P. lengi*, female.

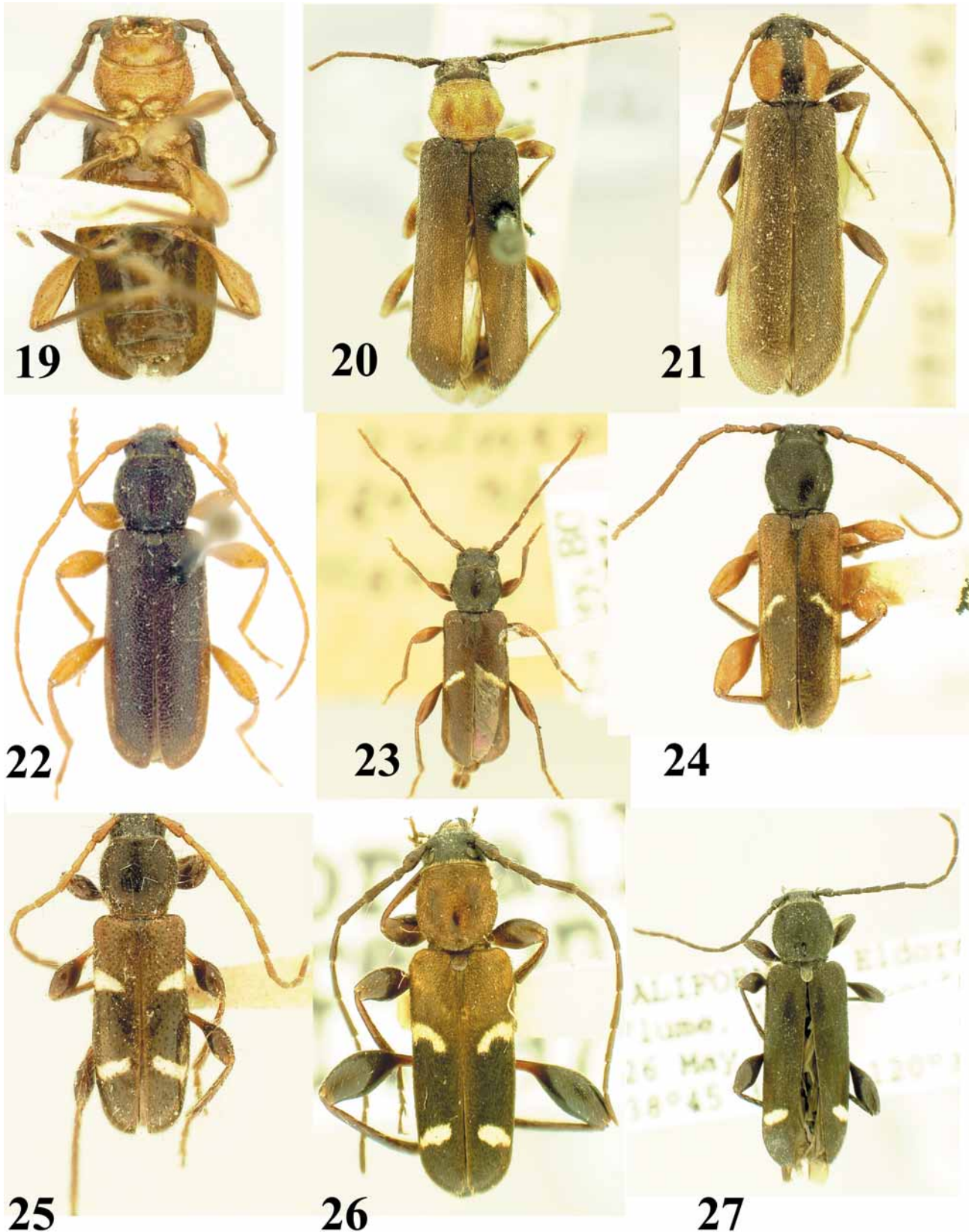


PLATE 3. 19) *Phymatodes lengi*, female ventral; 20) *P. lividus*, male; 21) *P. maculicollis*, male; 22) *P. nigerrimus*, male; 23) *P. nigrescens*, male; 24) *P. nigrescens*, male; 25) *P. nitidus*, male; 26) *P. obliquus*, male; 27) *P. obliquus*, male.



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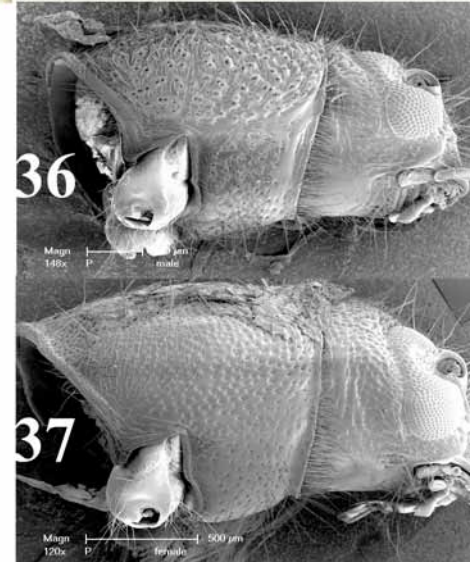
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PLATE 4. 28) *Phymatodes rainieri*, holotype female; 29) *P. shareeae*, paratype male; 30) *P. testaceus*, female; 31) *P. tysoni*, paratype female; 32) *P. varius*, male; 33) *P. varius*, female; 34) *P. vilitatis*, male; 35) *P. vulneratus*, male; 36) Scanning electron micrograph of *P. decussatus*, male prothorax and head; 37) *P. decussatus*, female prothorax and head.

This species occurs in the eastern US, where it is distinctive within its range. Among all North American species, it is most similar to *P. aeneus* which occurs along the west coast. See the discussion of *P. aeneus*.

Specimens examined: 156

***Phymatodes amoenus* (Say)**

(Figs 3, 4)

Say, 1824:413. Type locality: Arkansas River, USA. MCZC

This species closely resembles *P. lengi*, as well as *P. blandus*. Linsley (1964) lists the robust form; shorter, explanate elytra; robust tarsi; longer antennomere II; and orange abdomen as the primary differences separating it from *P. lengi*. Of these characters, however, only the abdominal coloration is distinctive. The pronotum of *P. lengi* is as wide as long, while that of *P. amoenus* is one and one-fourth times wider than long. Caution must be exercised, however, in comparing pronota among *Phymatodes* species as there is considerable sexual dimorphism in most species groups. Comparison between like sexes is necessary to adequately separate species. Other minor differences between these two species include the violet color and somewhat less punctate elytra of *P. lengi*, whereas in *P. amoenus* the elytra are blue and more rugosely punctate. Based on these minor differences, these species are regarded as valid.

Specimens examined: 189

***Phymatodes ater* LeConte**

(Figs 5, 6)

Phymatodes ater LeConte, 1884:22. Type locality: Buffalo, New York, USA. MCZC

This species is quite variable, having four, two, or even no elytral fasciae. Its unmarked forms resemble *P. ursae* Knull [= *hirtellus* (LeConte)], but can be separated by the presence of medial and lateral callosities on the pronotum, which is generally smaller, rounded, and not as wide as the width across of the elytral humeri.

Specimens examined: 14, including the type of *P. ater*

***Phymatodes blandus* (LeConte)**

(Fig.7)

Callidium blandum LeConte 1859:79. Type locality: Tejon, California, USA. MCZC

Phymatodes blandus, Leng, 1884:99.

Phymatodes blandus picipes Linsley, 1934:165. Type locality: Yosemite, California USA. CASC **NEW SYNONYMY**

Phymatodes blandus propinquus Linsley, 1934:181. Type locality: Santa Ana Canyon, Orange County, California USA.

CASC NEW SYNONYMY

The west coast cismontane *P. blandus* complex consists of several color forms that do not follow any particular biogeographic pattern. There is considerable gradation of these phenotypes in all parts of the range, thereby making distinction of the Sierra Nevada populations (*picipes*), and the southern forms (*propinquus*) difficult. *Phymatodes b. propinquus* was described from three specimens, and *P. b. picipes* from five specimens. Together with the nominate taxon, these three forms seem best treated as one variable species throughout its range from southern Oregon to southern California.

Specimens examined: 112, including the types of *P. b. blandus*, *P. b. picipes*, *P. b. concolor*, and *P. b. propinquus*

***Phymatodes concolor* Linsley, NEW STATUS**

(Fig. 8)

Phymatodes blandus concolor Linsley, 1934:181. Type locality: Big Pine, Inyo County, California USA. CASC

The transmontane populations of *P. blandus* (*P. blandus concolor*) occur along the western edge of the Great Basin and Mojave Deserts in Washington, Oregon, Nevada, and California. These populations consistently exhibit the unicolorous light brown integument, longer antennae, and the less densely punctate pronotum. These characters, in addition to a distinctive geographical distribution, provide a sufficient basis for elevating this taxon to full species status.

Specimens examined: 38, including the type of *P. b. concolor*

***Phymatodes decussatus* (LeConte)**

(Figs 9, 36, 37)

Callidium decussatum LeConte, 1857: 61. Type locality: Sacramento, California, USA. CASC

Phymatodes decussatus, Leng, 1884:100.

Phymatodes juglandis Leng, 1890:214. Type locality: Los Angeles, California USA. SIIS (type missing) **NEW**

SYNONYMY

Phymatodes fasciapilosus Van Dyke, 1920:33. Type locality: Rogue River Valley, Oregon, USA. CASC

The type of *P. decussatus* closely matches Leng's description of *P. juglandis*. Both species have setose elytral fasciae, similar coloration (red-brown elytral with two white fasciae), and similar antennal ratios. In addition, both *P. decussatus* and *P. juglandis* have been reared from *Juglans* spp. (Juglandaceae), and are the only species of *Phymatodes* known from this host (Linsley 1964). Unfortunately, the type of *P. juglandis* is either lost or was never designated, making direct comparison between these two species difficult. Nevertheless, based on Leng's description and information on life history, the above synonymy is proposed.

Linsley (1964), as well as Chemsak (1963), confused *P. juglandis* and *P. decussatus* (= *P. obliquus* Casey), possibly due to the absence of a *juglandis* type. Linsley (1964), however, did consider *P. fasciapilosus* synonymous with *P. juglandis*. Both authors considered *P. decussatus* (= *obliquus*) the taxon with non-setose, arcuate fasciae, and *P. juglandis* with setose, angulate fasciae. The two species are superficially similar in overall coloration; both having the basal half of the elytra red-brown; the apical portion dark brown to almost black; two pairs of white fasciae; and the pronotum, head, and legs, red-brown. However, they differ as indicated above. See also the discussion of *P. obliquus*.

Specimens examined: 97, including the type of *P. decussatus* and *P. fasciapilosus*

***Phymatodes dimidiatus* (Kirby)**

(Figs 10, 11)

Callidium kalmii Schoenherr, 1817:422. Type locality: Canada. NHRS

Callidium dimidiatum Kirby, 1837:137. Type locality: Canada. BMNH

Clytus palliatus Haldeman, 1847:41. Type locality: Massachusetts, USA. MCZC

Phymatodes dimidiatus, LeConte, 1850:33

Phymatodes mannerheimi LeConte, 1857:60. Type locality: Washington, USA. MCZC

Phymatodes kalmii, Aurivillius, 1912:350

Phymatodes frosti Casey, 1924:240. Type locality: Maine, USA. USNM **NEW SYNONYMY**

This species is widespread throughout boreal North America, from Alaska to the northeastern US, and south into the higher elevations of southern California and northern New Mexico. The species *P. frosti* Casey was not treated by Linsley (1964) and has not been listed in Monné *et al.* (2008), or any other catalogue. The type at the USNM is identical to *P. dimidiatus*. *Phymatodes dimidiatus* displays little regional variation, with the

exception of populations in the Rocky Mountains of Colorado, which are entirely dark brown, superficially resembling *P. lecontei* Linsley (= *P. grandis* Casey).

Specimens examined: 156, including the type of *P. frosti* and *P. mannerheimi*

***Phymatodes fulgidus* Hopping**

(Fig. 12)

Phymatodes fulgidus Hopping, 1928:246. Type locality: Lorna, British Columbia, Canada. CNC

This species is similar to *P. concolor*, with which it shares the coarse, even elytral punctation and small overall size. The two may be separated by antennomere II, which is more than one-half the length of III in *P. fulgidus*, and only one-third the length in *P. concolor*. *Phymatodes fulgidus* also has a glabrous pronotum and elytra, while *P. concolor* is clothed in short, erect setae. *Phymatodes rainieri* also has glabrous elytra, however, the elytra and pronotum are impunctate in that species.

The type locality for this species is listed as Lorna, British Columbia, however, a town or city of that name does not appear to exist. It is presumed that the locality is around Lorna Lake or Lorna Pass in the Chilcotin Mountains near Big Creek, British Columbia, although this cannot be ascertained for certain.

Specimens examined: 2, including the type of *P. fulgidus*

***Phymatodes grandis* Casey, NEW STATUS**

(Fig. 13)

Callidium obscurum LeConte, 1859:79 (nec *Callidium obscurum* Fabricius, 1787). Type locality: Tejon, California, USA. MCZC

Phymatodes obscurus, Leng, 1884:100.

Phymatodes grandis Casey, 1912:277. Type locality: San Diego, California, USA. USNM

Phymatodes lecontei Linsley, 1938:109 (replacement name). CASC **NEW SYNONYMY**

Linsley (1938) replaced the preoccupied name *Callidium obscurum* LeConte with *P. lecontei*, however, Casey's *P. grandis* has priority over Linsley's action. Thus, Casey's name must take priority.

Two specimens in the EMEC collection from the Hualapai Mountains, Mohave County, Arizona appear to be the first record of *P. grandis* for that state (see Lewis 1979).

Specimens examined: 257, including the types of *P. grandis* and *C. obscurum*

***Phymatodes hirtellus* (LeConte)**

(Figs 14, 15, 16)

Callidium hirtellum LeConte, 1873:172. Type locality: Nevada, USA. MCZC

Phymatodes hirtellus densipennis Casey, 1912:284. Type locality: New Mexico, USA. USNM **NEW SYNONYMY**

Phymatodes ursae Knull, 1940:556. Type locality: Yellowstone National Park, USA. FMNH **NEW SYNONYMY**

This species is wide-ranging throughout western North America on *Pinus* spp. (Pinaceae). There appears to be no pattern of distribution to the color forms, which have been collected throughout the entire range of the species, and reared from the same branches (pers. obs.). Separation of any color form is not possible.

Phymatodes ursae Knull was described from one specimen collected at Yellowstone National Park. Since its original description, no additional information on this species has been published. A series of 28 specimens from Midday Valley, British Columbia, Canada reared from *Pinus ponderosa* by C. Lawson (CASC, EMEC) match the type of this species as well as display a gradient of color forms encompassing those exhibited by specimens assigned to the nominotypical *P. hirtellus* and *P. h. densipennis*. This suggests that the entirely dark phenotype of *P. ursae* is merely a color variety of *P. hirtellus* and not of specific significance. *Phymatodes*

ursae also shares many characters with *P. hirtellus*, including the large, rounded pronotum, often with callosities on the disk in females; short, somewhat bicolored antennae, with antennomere II one-half the length of III; and the even, coarse punctation and setation of the elytra. See the discussion of *P. ater* as well.

Specimens examined: 122, including the types of *P. hirtellus*, *P. ursae*, and *P. densipennis*

***Phymatodes infuscatus* (LeConte)**

(Fig. 17)

Callidium infuscatum LeConte, 1859:285. Type locality: Point Reyes, California, USA. MCZC

Linsley (1964) used the reddish brown coloration of the legs, antennae, and the elytral humeri to distinguish *P. infuscatus* from *P. lecontei* (= *P. grandis*), to which it is most similar. While this character is useful in separating some specimens, it is present in only about one-half of the material examined, and should, therefore, be used with caution. More salient diagnostic characters include the coarsely alveolate-punctate pronotum and the rugose elytra with very short, dark, appressed setae. In *P. grandis*, the pronotum is granulate-punctate and the elytra are minutely punctate with longer, erect setae among shorter, appressed setae. In addition, *P. infuscatus* is generally larger than *P. grandis*, and is the largest native North American *Phymatodes*.

Specimens examined: 59, including the type of *P. infuscatus*

***Phymatodes lengi* Joutel**

(Figs 18, 19)

Phymatodes lengi Joutel, 1911:200. Type locality: Palisades, New Jersey, USA. USNM

See discussion of *P. amoenus* Joutel.

Specimens examined: 14, including the type of *P. lengi*

***Phymatodes lividus* (Rossi)**

(Fig. 20)

Callidium lividum Rossi, 1794:98. Type locality: Etruria, Italy. BMNH
For a more complete synonymy, see Vives, 2003.

Numerous specimens of this Eurasian species have been collected in New York, Massachusetts, Pennsylvania, and Virginia indicating this species has been well established for several decades in many widespread localities and should be added to the North American faunal list as an introduced species. It is distinctive within its range, being most similar to *P. testaceus*. It differs from that species in having tarsomere I equal in length to II and III together; densely, coarsely punctate elytra; and with dark lateral markings on the pronotum.

Specimens examined: 22

***Phymatodes maculicollis* LeConte**

(Fig. 21)

Phymatodes maculicollis LeConte, 1878:614. Type locality: Isle Royale, Lake Superior, Michigan, USA. MCZC

Phymatodes hardyi Van Dyke, 1928:112. Type locality: Gordon Head, British Columbia, Canada. CASC

Phymatodes elongatus Hopping, 1937:8. Type locality: Stanley, British Columbia, Canada. CNC

Phymatodes maculicollis is similar to *P. vilitatis*, having an elongate form wherein the elytra are approximately three times as long as the basal width, and clothed in short, pale, subappressed setation. The majority of specimens have the pronotum orange-brown with a darker median macula, however, some specimens have the pronotum entirely dark brown, superficially resembling *P. vilitatis*. The two species can be further separated by the maxillary palpi. In *P. maculicollis* the maxillary palpi are two times as long as the labial palpi, and the apical maxillary palpomere is strongly dilated, while in *P. vilitatis*, the maxillary palpi are only slightly longer than the labial palpi, and the apical palpomere is not dilated. There are some minor differences in the antennae of these species as well; *P. maculicollis* has longer antennae in general, with the male antennae attaining three-quarters the length of the elytra, while those of *P. vilitatis* attain only two-thirds. The females of *P. vilitatis* have the antennae shortened, attaining one-half the length of the elytra, and the apical antennomeres (VII—XI) becoming, smaller, wider, and appear more congested or clubbed. The females of *P. maculicollis* lack this character. Additionally, both of these species lack a distinct constriction between the upper and lower eye lobes, with the upper lobe and the portion of the eye in the antennal notch being the same width.

Specimens examined: 72, including the type of *P. hardyi* and *P. maculicollis*

***Phymatodes nigerrimus* Van Dyke**
(Fig. 22)

Phymatodes nigerrimus Van Dyke, 1920:35. Type locality: Carrville, Trinity County, California, USA. CASC

Phymatodes nigerrimus superficially resembles *P. grandis*. Linsley (1964) noted that “this species is distinct by reason of the very slender antennae with the second segment about one-third as long as the third; the small head, which is commonly retracted within the prothorax and the shape and sculpturing of the pronotum.” He did not say, however, what other species was used in this comparison. Most likely, he was referring to *P. grandis* (his *P. lecontei*), which differs by all these characters. The retracted head, however, is a condition sporadically present in specimens of several *Phymatodes* species, and appears to be an artifact of curation. In addition to the characters used by Linsley, *P. nigerrimus* may further be separated from *P. grandis* by the coarsely punctate pronotum; antennomere II about one-half the length of III; the coarsely, densely, rugosely punctate elytra with uniformly short, subappressed setae; and the lack of long, erect setae on the head, antennae, and legs.

Two distinct populations of *P. nigerrimus* appear to be present in California; one found in the central and northern coast ranges, the other in the Sierra Nevada. While only three Sierra Nevada specimens have been examined, they all have distinctly more rounded, elongate pronota, which lack areas of micropunctation in the center of the disk; and longer maxillary palpi, in which the apical palpomere is strongly, obliquely dilated. Without additional specimens, especially from more widely separated localities, further taxonomic action seems premature. However, with more specimens, this population may prove distinct.

Specimens examined: 39, including the type of *P. nigerrimus*

***Phymatodes nigrescens* Hardy and Preece, NEW STATUS**
(Figs 23, 24)

Phymatodes vulneratus var. *nigrescens* Hardy and Preece, 1927:190. Type locality: Sydney, British Columbia, Canada. CNC

Phymatodes oregonensis Chemsak, 1963:39. Type locality: Grave Creek, Josephine County, Oregon, USA. CASC **NEW SYNONYMY**

Chemsak (1963) diagnosed his *P. oregonensis* from the Pacific Northwest with *P. ater* from eastern North America, noting that the two species were most similar. However, among North American *Phymatodes*, *P. oregonensis* appears most similar to *P. vulneratus*. In fact, the name *P. vulneratus* var. *nigrescens* Hardy and

Preece was already available for populations in the Pacific Northwest and has priority over Chemsak's *P. oregonensis*. The type of *P. v. var. nigrescens* matches *P. oregonensis*, and the type series of this taxon extends the range of this species into Washington and British Columbia.

Linsley (1964) noted that *P. oregonensis* "resembles the dark forms of *P. vulneratus* LeConte, but the elytral punctation differs greatly in the two species", without further elaboration. *Phymatodes nigrescens* is in fact distinct from these dark forms of *P. vulneratus* as well. It can be separated from both bicolored and unicolored forms of *P. vulneratus* by the coarsely punctate apical one-half of the elytra; the overall more coarsely, sparsely punctate elytra; and the narrower, sinuate antemedial fasciae. *Phymatodes vulneratus* has impunctate, rugose elytral apices; more finely and densely punctate elytra at the basal one-half; and thinner, more linear, parallel-sided antemedial fasciae.

Under ICZN (1999) article 45.6.4, the infrasubspecific variety named by Hardy and Preece is considered subspecific, and therefore an available name.

Specimens examined: 123, including the type of *P. v. var. nigrescens*, *P. oregonensis*, and *P. vulneratus*

***Phymatodes nitidus* LeConte**

(Fig. 25)

Phymatodes nitidus LeConte, 1874:66. Type locality: California, USA. MCZC

Phymatodes crucialis Casey, 1912:282. Type locality: Santa Cruz Mountains, California, USA. USNM

Phymatodes elegans Casey, 1912:282. Type locality: California, USA. USNM

Phymatodes exilis Casey, 1912:283. Type locality: California, USA. USNM

Phymatodes collaris Casey, 1924:240. Type locality: California, USA. USNM

Phymatodes mohavensis Linsley and Chemsak, 1963:210. Type locality: Mojave, Kern County, California, USA. CASC

NEW SYNONYMY

In describing *P. mohavensis*, Linsley and Chemsak (1963) recognized what they believed to be a distinct form of *P. nitidus* utilizing the larval host *Juniperus californica* Carr. (Cupressaceae) from the Mojave Desert bioregion. However, in long series reared from the same host plant from the type locality and other adjacent desert edge locations, the color differences cited as diagnostic are not consistent, and in fact match the color variation found in *P. nitidus* from other areas which have been reared from various cupressaceous hosts as well (per. obs.). *Phymatodes nitidus* is commonly reared from *J. californica* in coastal locations along the Pacific Coast, thus, this host species is not unique to desert regions.

It appears that *P. mohavensis* is found only along the desert edge, placing it within the range of *P. nitidus*. The pronotal punctation differences also cited by Linsley and Chemsak (1963) appear to be associated with the sexual dimorphism that are present throughout the genus, and are associated with pheromone gland pores in males (Ray *et al.* 2006) (Figs. 36, 37), rather than species-level differences.

Phymatodes collaris Casey, previously listed as a synonym of *P. decussatus* in Linsley (1964) is in fact a junior synonym of *P. nitidus*, as noted in the above synonymy.

Specimens examined: 144, including the types of *P. nitidus* and *P. mohavensis*

***Phymatodes obliquus* Casey, NEW STATUS**

(Figs 26, 27)

Phymatodes obliquus Casey, 1891:26. Type locality: California, USA. USNM

Phymatodes harfordi Casey, 1912:279. Type locality: Santa Clara County, California, USA. USNM

Phymatodes decussatus var. *obliquus*, Hardy and Preece, 1926:28

Phymatodes decussatus var. *latifasciatus* Hardy and Preece, 1927:191. Type locality: Mt. Tolmie, Victoria Island, British Columbia, Canada. CNC

Phymatodes decussatus var. *posticus* Van Dyke, 1920:36; Linsley, 1964:51. Type locality: Camp Nelson, Tulare County, California, USA. CASC **NEW SYNONYMY**

Phymatodes decussatus australis Chemsak, 1963:40. Type locality: Ensanada, Baja California, Mexico. CASC **NEW SYNONYMY**

Phymatodes obliquus is the oldest name to replace the taxon in Linsley's (1964) concept of *P. decussatus* (see the discussion of *P. decussatus* as well). *Phymatodes obliquus* can be distinguished from similar species, such as *P. decussatus* (as defined herein), by its non-setose white fasciae, which are arcuate, rather than angulate; the elytral pubescence, which is long, erect, golden and white in *P. decussatus*, and short, subappressed, and dark in *P. obliquus*; and the upper eye lobe, which is contiguous with the lower lobe by at least four rows of ommatidia, while in *P. decussatus* most specimens have only a sclerotized line, lacking ommatidia.

This west coast species is similar to *P. varius* (Fabricius) from the eastern US, and few salient characters have been found to separate the two species. The most consistent differences are the extent of the white fasciae on the elytra, wherein *P. varius* possesses more expansive markings while in *P. obliquus* they are somewhat reduced. The basal pair is also more transverse in the former species, and more arcuate in the latter. Additionally, *P. varius* generally has more dense, dark setae at the elytral base, whereas in *P. obliquus* the setae are less dense and somewhat lighter. Both of these characters are difficult to interpret when examining a single specimen or even small series. Nevertheless, based on these minor differences, as well as the fact that the two populations appear to be allopatric, the two species are herein retained. However, future analyses may prove these taxa indistinct.

The subspecies previously assigned to *P. obliquus* (*P. decussatus sensu* Chemsak), are highly variable as has been noted by several authors (Hovore and Giesbert 1976, Swift 2008). In southern California, specimens exhibiting characters of both subspecies have been reared from the same logs, and long series from any region vary widely in form and coloration. Thus, it seems best to treat this species as a single highly variable taxon.

This species as well as *P. varius*, *P. dimidiatus*, and *P. vulneratus* have pronounced sexual dimorphism. The metathoracic legs are longer and more robust in males; and the pronotum is broadly rounded at the sides in males, while in the females it is feebly angulate. These four species also share similar gland pore arrays on the anterior margin and pleura of the pronotum.

Specimens examined: 326, including the types of *P. obliquus*, *P. d. posticus*, and *P. d. australis*

***Phymatodes rainieri* Van Dyke** (Fig. 28)

Phymatodes rainieri Van Dyke, 1937:113. Type locality: Rainier National Park, Washington, USA. CASC

This unique species, previously known from only the type specimen, is distinct within the genus. The pronotum and elytra are almost entirely glabrous and impunctate on the dorsal surface, with only a few scattered, long, golden setae towards the elytral apices. No other species of *Phymatodes* possesses this combination of characters. A second specimen, found in the EMEC collection, from West Spruce, 30 miles north of Westlock, Alberta, Canada, 30 June 1949, is only the second known record. It closely matches the type, but has slightly more setose elytral apices. This species appears to be restricted to the northwestern states and provinces.

Specimens examined: 2, including the type of *P. rainieri*

***Phymatodes shareeae* Cope** (Fig. 29)

Phymatodes shareeae Cope, 1984:63. Type locality: 9 miles SW of Coyote, Nacimiento Mountains, Rio Arriba County, New Mexico, USA. CASC

This species is similar to *P. vulneratus* but can be distinguished by the dark elytral setation, and the laterally expanded fasciae. Although the *P. vulneratus* complex of phenotypes are widely distributed in the western US

and are treated as a single species herein, we have chosen to maintain this species, on the basis of the clear diagnosable characters provided in the original description.

Specimens examined: 7, including the type of *P. shareeae*

***Phymatodes testaceus* (Linnaeus)**

(Fig. 30)

Cerambyx testaceus Linnaeus, 1758:396. Type locality: Europe. BMNH
For a more complete synonymy, see Vives, 2000.

This Eurasian species has been widely established in the eastern US and around the world (Linsley 1964). More recently, it has been recorded in the Pacific Northwest states and provinces (LaBonte, *et al.* 2005). Although it is variable in color, the long metatarsomere I, which is longer than the remaining tarsomeres together, is a distinguishing character among all North American *Phymatodes*.

Specimens examined: 249

***Phymatodes tysoni* Chemsak and Linsley**

(Fig. 31)

Phymatodes tysoni Chemsak and Linsley, 1984:73. Type locality: Arroyo Mocho Canyon, Alameda County, California, USA. CASC

This species is similar to *P. nitidus*, differing primarily by the apical fasciae, which are narrower, longer, and situated at a more oblique angle than *P. nitidus*. In addition, the fasciae begin at roughly the middle of the elytra at the suture, and terminate at about the three-quarters to the apices. The host plant, *Juniperus californica*, is the same as in *P. nitidus*. Based on the collections we examined, *P. tysoni* appears to be restricted to the central inner coast ranges of California.

Specimens examined: 31, including the type of *P. tysoni*.

***Phymatodes varius* (Fabricius)**

(Figs 32, 33)

Callidium varium Fabricius, 1776:232. Type locality: America borealis. HMUG
Phymatodes varius diffidens Casey, 1912:280. Type locality: Missouri, USA. USNM
Phymatodes latipennis Casey, 1912:280. Type locality: Cohasset, Massachusetts, USA. USNM
For a more complete synonymy, see Linsley, 1964.

See discussion of *P. obliquus*.

Specimens examined: 173, including the types of *P. v. diffidens* and *P. latipennis*

***Phymatodes vilitatis* Linsley**

(Fig. 34)

Callidium vile LeConte, 1873:172 (nec. Newman, 1842). Type locality: Mendocino, California, USA. MCZC
Phymatodes vilitatis Linsley 1940:253 (replacement name)

See discussion of *P. maculicollis* for further diagnoses.

A single specimen from Trabuco Canyon, Orange County, California, USA, "F-5-58", E. L. Sleeper, coll., may represent a new taxon similar to this species. It differs from *P. vilitatis* by the longer palpi and more

quadrate pronotum, with triangular-shaped gland pore arrays on the ventral surface of the prothorax. Since only a single specimen is known, formal taxonomic treatment will await additional material.

Specimens examined: 37, including the type of *P. vilitatis*

Phymatodes vulneratus LeConte

(Fig. 35)

Callidium vulneratum LeConte, 1857:60. Type locality: San Francisco, California, USA. MCZC

Phymatodes concinnus Casey 1912:278. Type locality: Santa Cruz Mountains, California, USA. USNM

This species appears to be more widespread than previously known with many populations exhibiting differing phenotypes. We found only minor differences among populations, however. These range from entirely dark brown specimens from Montana; mostly red specimens with large medial fasciae from Utah; large, bright orange-red specimens from southern California; and dark red specimens with large fasciae from over 3000 m in Nevada. Many of these populations are separable by color pattern; however, the combined differences among them encompass the variation within the species as a whole. Therefore, we have chosen to recognize *P. vulneratus* with its many color variations as a single species.

See also the discussion of *P. shareeae*.

Specimens examined: 185, including the type of *P. vulneratus*, *P. oregonensis*, *P. vulneratus* var. *nigrescens*, and *P. concinnus*

Key to the *Phymatodes* of North America

In the following key, *P. ater* appears in three different couplets, and *P. obliquus* appears in two (as indicated by the superscript integer following these species). Although this makes the key longer, it will help the user identify these species more accurately due to the wide morphological variation they exhibit. Users should bear in mind that many species of *Phymatodes* are quite variable, and some phenotypes may not key well. Although we have taken every effort to avoid this while keeping the key to its current length, we recommend that to the extent possible, a series of specimens from any population be examined when using this key.

- 1 Elytra with white fasciae or maculae 2
- Elytra lacking fasciae or maculae 12
- 2 (1) Elytra with a single pair of white fasciae or maculae 3
- Elytra with two pairs of white fasciae or maculae 7
- 3 (2) Elytral fasciae generally medial or antemedial, more or less linear from suture to lateral margin 4
- Elytral fasciae generally apical, oblique or maculate, generally not attaining the suture or lateral margin 6
- 4 (3) Basal one-half of elytra red-orange *P. vulneratus* (LeConte)
- Basal one-half of elytra dark brown to black 5
- 5 (4) Elytral setation long and golden, fasciae more or less sinuate *P. nigrescens* Hardy and Preece
- Elytral setation short and dark, fasciae expanded at lateral margin *P. shareeae* Cope
- 6 (3) Elytral punctuation coarse, moderately sparse, generally even throughout *P. ater* LeConte
- Elytral punctuation fine, dense, becoming more rugose over apical half *P. obliquus* Casey
- 7 (2) Basal elytral fasciae not attaining lateral margin, elytra, pronotum, and legs black, unicolorous . *P. ater*² LeConte
- Basal elytral fasciae attaining lateral margin, elytra generally bicolored, with basal half red-brown and apical half black; legs and pronotum generally red-brown 8
- 8 (7) Elytral punctuation fine, dense, and becoming more rugose over apical half 9
- Elytral punctuation coarse, generally sparse, evenly distributed throughout 10
- 9 (8) Basal fasciae arcuate, apical pair smaller *P. obliquus*² Casey
- Basal fasciae transverse, apical pair larger *P. varius* (Fabricius)
- 10 (8) Elytral fasciae lacking dense setation, without area of dense, long, erect setae along suture below scutellum 11
- Elytral fasciae densely setose, with area of dense, long, erect brown setae along suture below scutellum *P. decussatus* LeConte

11 (10) Fasciae long and narrow, apical pair at a 45 degree angle from suture at the middle of the elytra; pronotal punctation finer than base of elytra	<i>P. tysoni</i> Chemsak & Linsley	
- Fasciae short and wide, apical pair only slightly angled toward suture, restricted to apical one-third of elytra; pronotal punctation equal to that of elytral base.....	<i>P. nitidus</i> LeConte	
12 (1) Metatarsomere I longer than II-V combined	<i>P. testaceus</i> (Linnaeus)	
- Metatarsomere I shorter than II-V combined		13
13 (12) Pronotum with darkly-marked area(s) either medial, lateral (two), or along anterior and/or posterior margin ...		14
- Pronotum unicolorous, lacking darkly-marked areas		16
14(13) Pronotum generally with two dark, lateral, arcuate maculae (sometimes indistinct), antennae of male exceeding elytral apices.....	<i>P. lividus</i> (Rossi)	
- Pronotum with darkly-marked area(s) either at middle (as a macula) or along anterior and/or posterior margin; antennae of male not exceeding elytral apices		15
15 (14) Pronotum subquadrate, setation short, dense, subappressed; elytra elongate, length three times basal width	<i>P. maculicollis</i> LeConte	
- Pronotum rounded, setation long, sparse, erect; elytra stout, length less than three times basal width	<i>P. hirtellus</i> (LeConte)	
16 (13) Pronotum and elytra of differing colors (i.e. orange and black).....		17
- Pronotum and elytra generally of the same color		20
17 (16) Punctuation of elytra minute, elytra generally bicolored; head, pronotum, and legs dark brown	<i>P. dimidiatus</i> (Kirby)	
- Punctuation of elytra coarse, elytra unicolored; head, pronotum, and legs orange to orange-brown		18
18(17) Head, scape, and pronotum with short, appressed setation (sometimes with a few long erect setae), generally lacking many long erect setae	<i>P. blandus</i> (LeConte)	
- Head, scape, and pronotum lacking short, appressed setation, clothed entirely with long, erect setae		19
19 (18) Ventrites similar in orange-brown coloration to pro-, meso-, and metasternum	<i>P. amoenus</i> (Say)	
- Ventrites differing in dark brown coloration from orange-brown pro-, meso-, and metasternum	<i>P. lengi</i> Joutel	
20 (16) Elytra elongate, length three times width at base or longer; pronotum quadrate; <5 mm	<i>P. vilitatis</i> Linsley	
- Elytra stout, length less than three times width at base; pronotum rounded; generally >5 mm		21
21 (20) Elytra setose throughout		22
- Elytra glabrous throughout, with only a few scattered setae at apex.....		27
22 (21) Apical one-fourth of elytra becoming sparsely punctate and weakly rugose, elytral integument with distinctly shiny luster in oblique light.....	<i>P. aeneus</i> LeConte	
- Elytra punctate throughout, lacking shiny luster		23
23 (22) Femora yellow to yellow-brown, contrasting with brown color of elytra and pronotum		28
- Femora not yellowish, generally not contrasting with color of elytra and pronotum.....		24
24 (23) Pronotum with distinct granulate-punctate surface; elytra minutely punctate, setation of two types: long and erect, and short and appressed	<i>P. grandis</i> Casey	
- Pronotum generally coarsely or otherwise punctate; elytral setation of one type		25
25 (24) Elytral punctuation becoming rugose towards apex; larger species >11 mm	<i>P. infuscatus</i> (LeConte)	
- Elytral punctuation generally similar throughout; smaller species <8 mm		26
26 (25) Legs feebly clavate; length of antennomere II less than one-half III; overall coloration tan ...	<i>P. concolor</i> Linsley	
- Legs moderately clavate; length of antennomere II one-half III; overall coloration black	<i>P. ater</i> ³ LeConte	
27 (21) Elytral punctuation dense, almost rugose	<i>P. fulgidus</i> Hopping	
- Elytra almost entirely glabrous, impunctate	<i>P. rainieri</i> Van Dyke	
28 (23) Legs pedunculate-clavate; length of antennomere II one-half III; color of head and elytra light brown	<i>P. aereus</i> (Newman)	
- Legs moderately clavate; length of antennomere II less than one-half III; color of head and elytra dark brown	<i>P. nigerrimus</i> Van Dyke	

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