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M J. Paulsen

University of Nebraska - Lincoln, [mjpaulsen@unl.edu](mailto:mjpaulsen@unl.edu)

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(Coleoptera: Scarabaeoidea: Ochodaeidae)

M. J. Paulsen

Florida State Collection of Arthropods  
Florida Department of Agriculture and Consumer Services  
PO BOX 147100  
Gainesville, FL 32614-7100, USA

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# Nomenclatural changes in the Nearctic Ochodaeinae and description of two new genera (Coleoptera: Scarabaeoidea: Ochodaeidae)

M. J. Paulsen

Florida State Collection of Arthropods  
Florida Department of Agriculture and Consumer Services  
PO BOX 147100  
Gainesville, FL 32614-7100, USA

**Abstract.** Generic placement of Nearctic species of Ochodaeinae has lagged behind changes in generic concepts in the group. In order to place Nearctic species into the appropriate genus-level taxa, several nomenclatural changes are made. The new generic name *Xenochodaeus* is proposed for species with an elongate, subparallel sulcus on the propygidium and a longitudinally impressed mentum. The genus contains 6 species. *Xenochodaeus americanus* (Westwood), new combination, is valid and is removed from synonymy with *X. musculus* (Say), new combination. A neotype is designated for *Odontaeus musculus*. *Ochodaeus opacus* LeConte is synonymized under *X. americanus*. Other new combinations include *Xenochodaeus luscinus* (Howden), *X. planifrons* (Schaeffer), *X. simplex* (LeConte), and *X. ulkei* (Horn). The new generic name *Cucochodaeus* is proposed for species having the propygidial sulcus absent, stridulatory peg absent, and possessing 9 antennomeres. The genus contains 1 species, *C. sparsus* (LeConte), new combination. *Ochodaeus mandibularis* Linell is placed into synonymy with *C. sparsus*. *Ochodaeus gnatho* Fall is transferred to the genus *Codocera* Eschscholtz, resulting in *C. gnatho* (Fall), new combination. Two new combinations result from Nearctic species transferred to *Neochodaeus* Nikolajev: *N. repandus* (Fall) and *N. striatus* (LeConte). Three Nearctic species are transferred to *Parochodaeus* Nikolajev, resulting in new combinations: *Parochodaeus californicus* (Horn), *P. duplex* (LeConte), and *P. peninsularis* (Horn). A lectotype is designated for *Ochodaeus kansanus* Fall, and that same specimen is designated as the neotype of *Ochodaeus duplex* (LeConte), objectively synonymizing *O. kansanus* with *O. duplex*. A checklist of Nearctic species and key to Nearctic genera are provided.

## Introduction

During my research on the scarabaeoid beetles of Nebraska, USA, it became clear that changes were necessary in the nomenclature of the Ochodaeinae from the state. Due to the lack of a modern revision of the group, identification of Nearctic ochodaeids has never been straightforward. Ratcliffe (1991) listed three species from Nebraska: *Ochodaeus kansanus* Fall, *O. mandibularis* Linell, and *O. musculus* (Say). However, based on my research all of these names are either synonymous or were misapplied. Subsequently, I have collected specimens of three additional species of Ochodaeinae in the state. This paper is an attempt to correct the nomenclature of the Nearctic fauna to aid in identification and placement within genera. Comparative morphological characters (including especially the form of the mentum and propygidium) were considered resulting in the creation of two new genera.

The Nearctic Ochodaeidae includes the subfamilies Ochodaeinae, with approximately 22 species, and Chaetocanthinae, with one species in the genus *Pseudochodaeus* Carlson and Ritcher (Smith 2003). The Nearctic Ochodaeinae has not been treated in its entirety since Fall (1909). Carlson (1975) treated some species, as did other regional works (e.g., Howden 1968, Hatch 1971, Ratcliffe 1991), but little has been published that would alleviate obvious long-standing nomenclatural issues within the fauna. Almost all North American ochodaeines were formerly placed in the genus *Ochodaeus* Dejean. Nikolajev (1995, republished in English in 1996) created two additional genera for North American species (*Neochodaeus*, *Parochodaeus*) based on the form of elytral locking mechanisms on the propygidium (Fig. 1-4), a character suite first noted by Horn (1876) and later discussed by Arrow (1904). However, Nikolajev (1995) transferred few Nearctic species into the appropriate genera. Thus, many species that should have been transferred to *Neochodaeus* or *Parochodaeus* are currently still retained in *Ochodaeus*. Carlson (2002) included a key to Nearctic genera but because many species have not been assigned to the correct genus the identification of Nearctic Ochodaeinae remains problematic.

While Nikolajev's *Parochodaeus* does seem to be a valid genus based on an arguably homologous, shared character (bituberculate propygidial margin with interlocking dentate elytral apices, Fig. 2), the same could not be said for *Neochodaeus* if all species with a longitudinal propygidial sulcus were included in it. There are two distinct character states with respect to propygidial sulci in the Nearctic fauna, first depicted by Horn (1876). In one group, the propygidium is short and narrowly transverse (length ~1/6 width), with the longitudinal sulcus short (length and width subequal) and trapezoidal (Fig. 4). This group includes *N. praesidii* (Bates), the type species of that genus. In the second group, the propygidium is long (length ~1/4 width), with the longitudinal sulcus subsequently elongate (length more than 2 times width) and subparallel (Fig. 3). Corresponding with these propygidial characters are two distinct forms of the mentum, either more or less flat, or deeply, longitudinally impressed, respectively (Fig. 5-6). For these reasons, a new genus is proposed below to accommodate species with a subparallel, longitudinal sulcus and longitudinally impressed mentum.

In addition, the generic placement of Nearctic species lacking propygidial modifications was examined. In species of *Codocera* Eschscholtz and *Ochodaeus* Dejean the elytral locking mechanism is apparently the reflexed apical margin of the propygidium itself, and the propygidium lacks a longitudinal furrow or apical tubercles (e.g., Fig. 1). It became clear that one Nearctic species must be transferred to *Codocera*, and the creation of a second new genus is warranted for the remaining species, *Ochodaeus sparsus* LeConte, which is discussed in detail below. No Nearctic species are retained in *Ochodaeus*.

## Materials and Methods

Approximately 3,000 specimens were examined from the following institutions and private collections (through the assistance of the individuals indicated), whose acronyms may be used in the text:

BMNH Natural History Museum, London, UK (M. Kerley)  
 CMNC Canadian Museum of Nature, Ottawa, Canada (A.B.T. Smith)  
 CMNH Carnegie Museum of Natural History, Pittsburgh (R. Davidson)  
 CSWC Charles S. Wolfe Collection, at TAMU (E.G. Riley)  
 FSCA Florida State Collection of Arthropods, Gainesville, FL (P. Skelley)  
 KSEM Kansas Snow Entomological Museum, Lawrence, KS (Z. Falin)  
 KSUC Kansas State University, Manhattan, KS (G. Zolnerowich)  
 MCZ Museum of Comparative Zoology, Harvard University (P. Perkins)  
 MJPC M.J. Paulsen Collection, Gainesville, FL  
 TAMU Texas A&M University, College Station, TX (E.G. Riley)  
 UCRC Entomology Research Museum, UCR, Riverside, CA (D.C. Hawks)  
 UNSM University of Nebraska State Museum (B.C. Ratcliffe)  
 USNM United States National Museum of Natural History, Washington, D.C. (D. Furth)

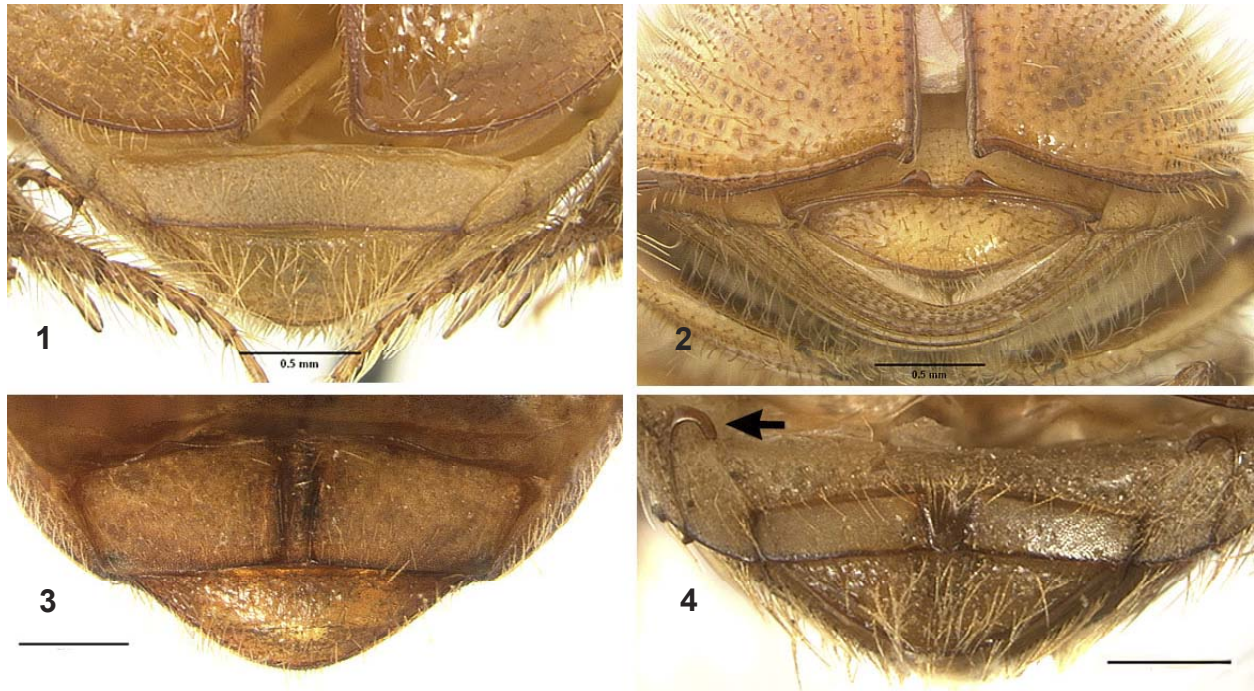
The Nearctic region is defined as in Smith (2003), and is composed of the continental United States, Canada, and northern Mexico.

## Taxonomic treatment

### Key to genera of Nearctic Ochodaeinae

1. Anterior margin of pronotum not simply concave, instead margin produced behind eyes. Antenna with 9 antennomeres ..... ***Cucochodaeus*, new genus**
- Anterior margin of pronotum simply concave, not produced behind eyes. Antenna with 10 antennomeres ..... **2**
- 2(1). Apex of elytra dentate, interlocking with 2 tubercles on propygidial margin (Fig. 2) ..... ***Parochodaeus* Nikolajev**





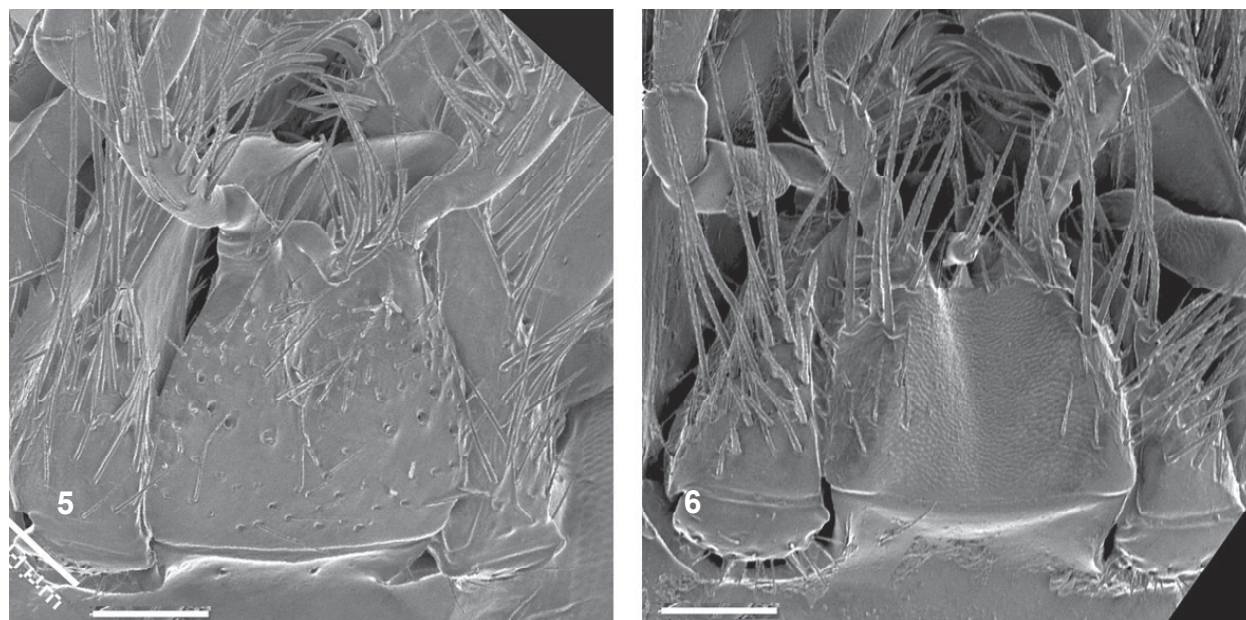
**Figure 1-4.** Propygidia of Nearctic Ochodaeinae genera. Scale bars = 0.5 mm. **1)** Unmodified propygidium of *Cucochodaeus sparsus*, with elytral apices evenly rounded. **2)** Two tubercles present on apex of propygidium in *Parochodaeus duplex*, dentate elytral apices also shown. **3)** Elongate propygidium with subparallel sulcus in *Xenochodaeus simplex*. **4)** Short propygidium with trapezoidal sulcus in *Neochodaeus praesidii*, arrow indicates stridulatory peg.

- Apex of elytra not dentate, instead evenly rounded. Propygidium lacking tubercles (sulcus may be present on surface) ..... **3**
- 3(2). Propygidium lacking sulcus. Antennal club loose, elongate. Male with mentum strongly produced ventrally into a laminar plate ..... **Codocera Eschscholtz**
- Propygidium with longitudinal sulcus (Fig. 3-4). Antennal club compact, ovoid. Mentum of male not produced ventrally into a laminar plate ..... **4**
- 4(3). Mentum distinctly longitudinally impressed from apex to base (Fig. 6). Propygidium elongate with subparallel sulcus (Fig. 3) ..... **Xenochodaeus, new genus**
- Mentum flat, only weakly emarginate apically (Fig. 5). Propygidium short, with trapezoidal sulcus (Fig. 4) ..... **Neochodaeus Nikolajev**

***Xenochodaeus* Paulsen, new genus**  
(Fig. 3, 6-14)

**Type species.** *Ochodaeus americanus* Westwood 1852: 66, here designated.

**Description.** Scarabaeoidea: Ochodaeidae: Ochodaeini. Form convex, ovate. Length 3.9-7.7 mm; width across humeri 2.5-3.7 mm. Color testaceous to dark reddish brown. *Head:* Mentum strongly, longitudinally impressed over entire length (Fig. 6); lateral margin flat or produced ventrally. Mandibles moderately large, externally rounded, visible beyond labrum in dorsal view. Antenna with 10 antennomeres; 3-antennomere club nearly round, pubescent. *Pronotum:* Surface densely punctate, punctures large, with or without a distinct tubercle anteriorly, setigerous; setae moderately long, testaceous. Margins beaded. *Elytra:* Striae (except sutural) not impressed, uniserially punctate; punctures moderate to large, moderately deep, round, lacking setae. Intervals punctate; punctures smaller, shallow, round, forming irregu-



**Figure 5-6.** Mentum (center) of *Neochodaeus* sp. and *Xenochodaeus* sp. Scale bar = 200  $\mu$ m. **5)** More or less flat mentum of *N. praesidii*. **6)** Longitudinally impressed mentum of *X. americanus*.

lar rows, each with small tubercle anteriorly, setigerous; setae dense, moderately long, testaceous. *Legs:* Metafemur usually simple, rarely toothed apically on posterior margin. Metatibia medially toothed (males only), distinctly subdentate, or dilated. *Abdomen:* Stridulatory peg present near anteriolateral angle of propygidium. Propygidium long (length  $\sim 1/4$  width), with longitudinal sulcus; sulcus elongate (length more than twice width), subparallel.

**Diagnosis.** This genus contains species with an elongate, subparallel propygidial sulcus and distinctly, longitudinally impressed mentum. Species of *Neochodaeus* possess a propygidial sulcus, but it is trapezoidal and shorter (subequal in width and length). In addition, the mentum of *Neochodaeus* species are not longitudinally impressed. In other Nearctic genera, the propygidium lacks a sulcus.

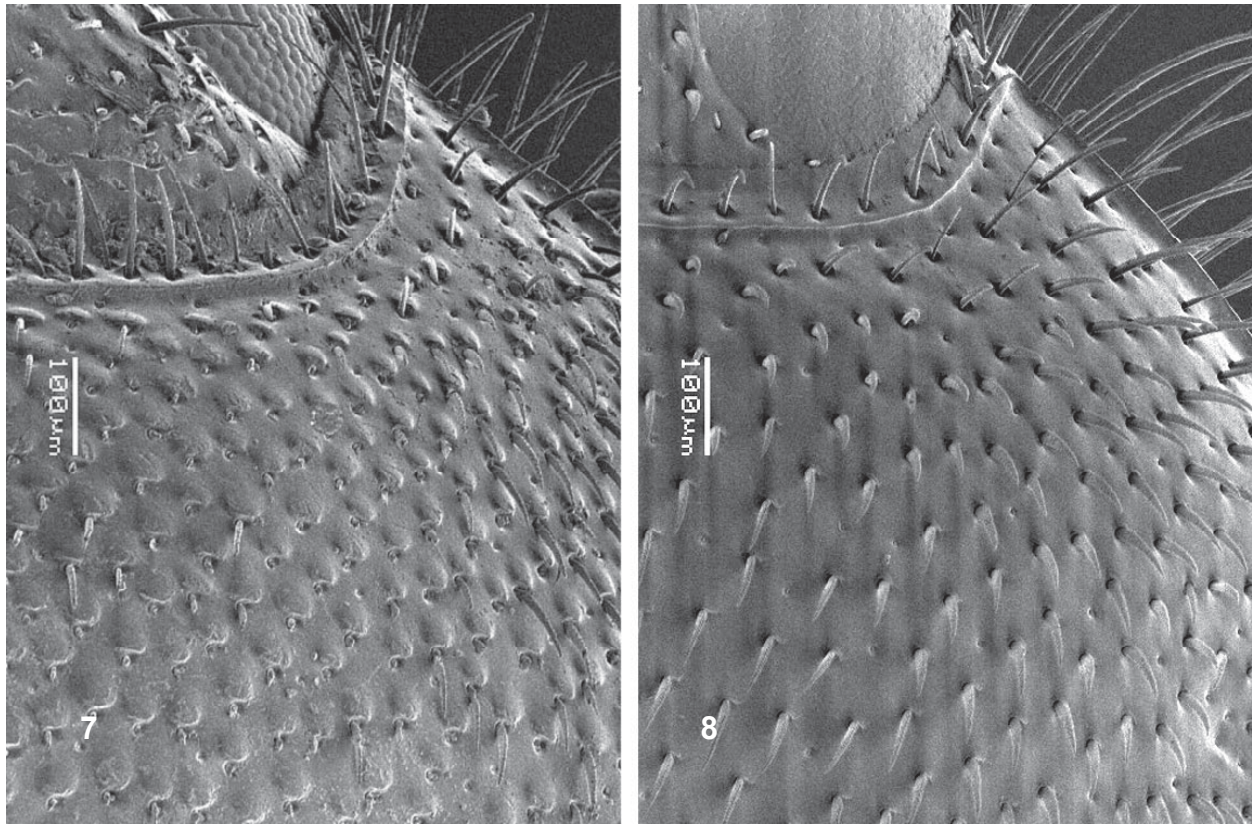
**Etymology.** *Xenochodaeus* (gender masculine; *xeno* Gr. = strange + *Ochodaeus*).

**Composition.** Six Nearctic species transferred to *Xenochodaeus* include *X. americanus*, *X. luscinus* (Howden), *X. musculus* (Say), *X. planifrons* (Schaeffer), *X. simplex* (LeConte), and *X. ulkei* (Horn) (new combinations).

**Remarks.** After study of specimens of *X. musculus* from the Great Plains (*O. musculus sensu* Dawson 1922 and Ratcliffe 1991) and from the Eastern United States (*O. musculus sensu* Woodruff 1973 and Harpootlian 2001), it became apparent that two species were being combined under one name. The identification of Great Plains specimens as *X. musculus* is erroneous. Specimens from the Great Plains differ in possessing a tuberculate pronotal surface (Fig. 7) as compared with the simply punctate pronota (Fig. 8) of *X. musculus* from the Eastern US. In addition, neither the toothed posterior margin of the metafemur nor the toothed metatibia characteristic of male *X. musculus* (Fig. 10) are present on Great Plains specimens. The metatibia of those specimens is, instead, dilated medially (Fig. 9).

The name *O. americanus* Westwood has been treated as a synonym of *O. musculus* since LeConte (1854). While at the BMNH, I located the holotype of *Ochodaeus americanus* Westwood, and determined that it is conspecific with the Great Plains specimens. The holotype has a tuberculate pronotum, not the punctate pronotum of *X. musculus* from the Eastern US. Also, the carinate frons and medially dilated metatibiae of the holotype of *O. americanus* agree with those of the Great Plains specimens. The type locality of *Ochodaeus americanus* is "America Boreali" (Westwood 1852). Interestingly, a 1962 label at-





**Figure 7-8.** SEM of pronotum behind anterior angle showing surface structure. Scale bar = 100  $\mu$ m. **7)** *Xenochodaeus americanus*, with tubercles present anterior to each setiferous puncture. **8)** *Xenochodaeus musculus*, surface with setiferous punctures only.

tached to the type specimen by Henry Howden indicates that he was also suspicious of *O. musculus*: “Believe *americanus* Westw. is good species... *musculus* Say from Midwestern U.S. seems distinct.” Specimens of *X. americanus* were examined from Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, South Dakota, and Wisconsin. All records of *X. americanus* are from prairie habitats. *Ochodaeus opacus* LeConte, described from Kansas, is a junior synonym of *X. americanus* based on the ‘granulate’ appearance of the pronotum as described by LeConte (1868) and confirmed by examination of the holotype of *O. opacus* (MCZ).

*Xenochodaeus musculus* appears to be restricted to eastern deciduous forests and is found from Oklahoma and Texas (Riley and Wolfe 2003) to South Carolina (Harpootlian 2001) and northern Florida (Peck and Thomas 1998), north to southwestern Wisconsin (N. Kriska, pers. comm.) and Ontario (Howden 1968). After identifying the differences between the two species and attributing all previously misidentified Nebraska specimens to *X. americanus*, I collected two specimens of *X. musculus* in extreme southeastern Nebraska by excavating small push-ups on forested trails and, on the same trails, collected a third specimen at blacklight. Nebraska has a diverse biota including a small portion of eastern deciduous forest in the extreme southeastern corner of the state where *X. musculus* would be expected to occur. In this area, numerous scarabaeoids reach their northwestern distributional limits (e.g., *Lucanus elaphus* Fabricius, *Phileurus valgus* (Olivier), *Valgus seticollis* Palisot de Beauvois, etc.).

The type locality of *X. musculus* is Indiana. Most of the types of Thomas Say were destroyed, and the type of *O. musculus* is not listed among those that are extant by Mawdsley (1999). A neotype is here designated to tie Say’s name to the eastern species with which it was identified by subsequent authors (LeConte 1868; Fall 1909) and alleviate the previously described confusion with *X. americanus*. Neotype of *O. musculus* Say (USNM), male. Labeled: a) “Indiana / Brown Co. S.P. / IX-1948 / at light / G.H.





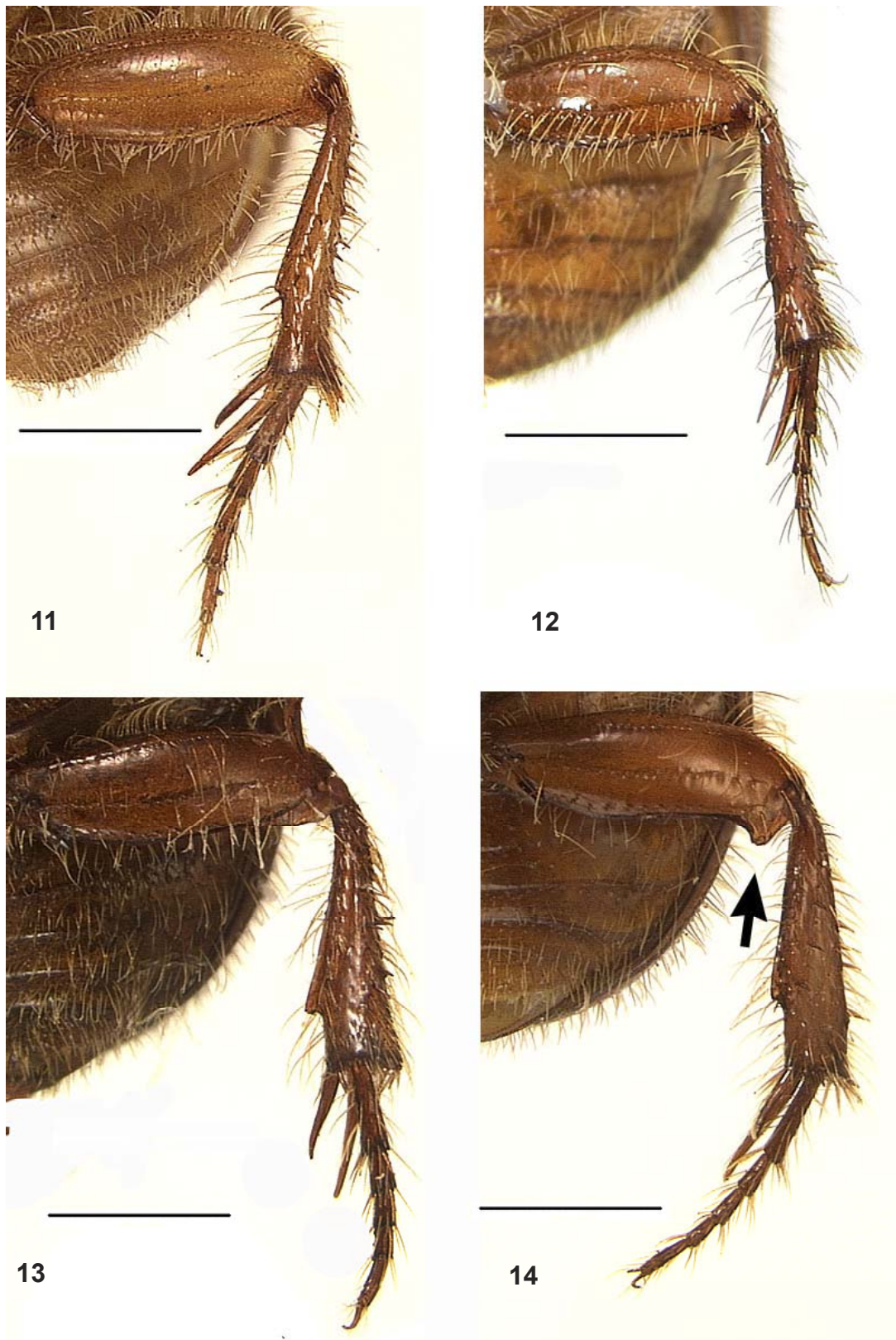
**Figure 9-10.** Dentition of male hindleg in *Xenochodaeus* spp. formerly treated as *O. musculus*. Scale bar = 0.5 mm. **9)** *Xenochodaeus americanus* with metafemur lacking tooth at apex and metatibia dilated before apex. **10)** *Xenochodaeus musculus* with metafemur with strong apical tooth, metatibia with strong tooth at middle.

Dieke”; b) “G.H. Dieke / Coll’n 1965”; c) “*Odontaeus musculus* / Say, 1835 (male symbol) / NEOTYPE / Det. M.J. Paulsen”, on red paper.

Similar confusion surrounds *X. simplex* and related species. LeConte’s (1868) and Hatch’s (1971) concepts of “*O. simplex*” do not refer to the same species. LeConte described his species from a specimen from T.H. Webb’s expedition to the Copper Mines (near Silver City, NM; see Cremony 1868). The holotype of *O. simplex* in the MCZ is a female and does not provide evidence with respect to male sexual characters. In Horn’s (1876) concept of *O. simplex*, males have dentate metatibiae (e.g., Fig. 11), but this is not true for many northern specimens currently treated as *O. simplex*, wherein the metatibiae are subdentate and excised in the posterior third (e.g., Fig. 12). This may indicate that more than one species is included under this name. However, in specimens from all regions the frons is more or less tumid but lacks carinae, and the clypeus may be slightly elevated medially.

I collected three specimens of *X. simplex* that were flying above a trail in late afternoon in Keith County, Nebraska. Diurnal activity may account for the rarity of this species in collections; most ochodaeid specimens are taken at light. Specimens were examined from Alberta, Arizona, Colorado, Montana, Nebraska, New Mexico, Texas, and Wyoming. It is also recorded from Mexico (Morón 2003).

Horn described *X. ulkei* from Nevada, and examination of the type (CMNH) indicates that this is a valid species found west of the Rocky Mountains, corresponding to the “*O. simplex*” of Hatch. The metatibiae of males are subdentate (Fig. 12). While the mentum of *X. simplex* is more or less flat, the mentum of *X.*



**Figure 11-14.** Dentition of male hindleg in *Xenochodaeus* spp. Scale bar = 1 mm. **11)** *Xenochodaeus simplex*, metatibia weakly dentate. **12)** *Xenochodaeus ulkei*, metatibia subdentate. **13)** *Xenochodaeus luscinus*, metatibia dentate. **14)** *Xenochodaeus planifrons*, metatibia dentate, arrow indicates toothed apex of metafemur.

*ulkei* is distinctly produced on each side and is almost horn-like. Specimens in the USNM are from the Pacific Northwest (British Columbia, Oregon, Washington) to Nevada and Utah.

Howden's *X. luscinus* is distinct and possesses a simple frons, simple mentum and clypeus, and toothed metatibia in males (Fig. 13). The mentum of *X. luscinus* is not produced as in *X. ulkei*, although both species have relatively small eyes compared to other members of the genus. The species was described from Canada and Utah (Howden 1968), and a specimen from Idaho is present in the USNM.

*Xenochodaeus planifrons*, distributed from Arizona to Texas (Fall 1909, Riley and Wolfe 2003) and Mexico (Morón 2003), is the only western species of *Xenochodaeus* that has the apex of the metafemur toothed (Fig. 14).

### **Codocera Eschscholtz 1821: 398**

**Remarks.** Scholtz et al. (1988) revised the genera of Ochodaeidae and removed *Codocera* Eschscholtz (not *Cadocera* as frequently misspelled; see Harpootlian 2001) from synonymy with *Ochodaeus*. López-Colón et al. (2006) listed two Palearctic species. Species of *Codocera* lack propygidial modifications as do *Ochodaeus* spp., but possess a plate-like, ventrally produced mentum in males and strongly projecting mandibles. Based on these characters, one Nearctic species (*O. gnatho* Fall) is transferred to *Codocera* resulting in *C. gnatho*, new combination. In addition to the strongly produced mentum, *C. gnatho* shares with the Palearctic *C. ferruginea* (Eschscholtz) an anterior clypeal tubercle that is present in the female but sometimes contiguous with the anterior margin in the male, and a less compact antennal club. In species of *Codocera* the antenna consists of ten antennomeres, and the stridulatory peg near the propygidium is present.

Based on the current usage of both *C. ferrugineum* and *C. ferruginea*, some confusion appears to exist about the correct gender of the name *Codocera*. Eschscholtz (1818) originally described the species as *Lethrus ferrugineus*, gender masculine. Subsequently, when creating *Codocera*, Eschscholtz (1821) clearly treated the generic name as neutral in gender by placing it in combination with '*ferrugineum*'. However, the ICZN Code (ICZN 1999) lists the suffix "-cera" (horn) as feminine, thus the correct combination for the type species is *C. ferruginea*. The name *gnatho* (jaw) is assumed to be a noun in apposition, and therefore remains unchanged regardless of the gender of the generic name with which it is combined.

*Codocera gnatho* is reported from Arizona and New Mexico (Fall 1909) and Texas (Riley and Wolfe 2003), and specimens were also examined from southern California and Durango, Mexico.

### **Ochodaeus Dejean 1821: 56**

**Remarks.** *Ochodaeus* consists of approximately 60 Old World species, with 28 species in the Palearctic region (López-Colón et al. 2006), some of which are not members of that genus based on propygidial structure. Nikolajev (2005) recently created the genus *Notochodaeus* (type species = *O. maculatus* Waterhouse) based on the presence of a propygidial sulcus and differences in the metasternum and wing venation, although this is not reflected in the Palearctic catalog (López-Colón et al. 2006). Similarly, I have not seen any New World species that should remain in *Ochodaeus*.

In North America, the only taxa (other than *Codocera gnatho*) with an unmodified propygidium are *O. sparsus* LeConte and *O. mandibularis* Linell, and these appear to be conspecific. LeConte (1868) described *O. sparsus* from Cañon Blanco, NM. Linell (1896) subsequently described *O. mandibularis* from Winslow, AZ, comparing his new species with *N. frontalis* (LeConte) without mentioning *O. sparsus*. Both *O. sparsus* and *O. mandibularis* were considered valid by Fall (1909), and the species were distinguished by a "somewhat difficult mental character" and placement of the frontal horn, both of which might differ with size. Almost all specimens in collections were previously determined as *O. mandibularis*, and the name *O. sparsus* has become more or less disused. The holotype of *O. sparsus* (MCZ) is conspecific with the species currently treated as *O. mandibularis*. Although the type of *O. mandibularis* could not be located at the USNM (D. Furth, personal communication), there appears to be only one taxon present and *O. mandibularis* Linell is therefore a junior synonym of *O. sparsus*.



Although *O. sparsus* lacks a propygidial sulcus or tubercles, it has little else in common with Palearctic *Ochodaeus*, the type species of which is *O. chrysomeloides* (Schrank). *Ochodaeus sparsus* is the only species of Nearctic ochodaeid examined in which the head is declivous behind the eyes, and the anterior marginal bead of the pronotum is correspondingly thickened and produced to contact the head; in the other Nearctic ochodaeids examined and *O. chrysomeloides* the anterior margin of the pronotum is simply convex. The stridulatory peg of the abdomen (see Fig. 4) is lacking in *O. sparsus*, and the antennal club has only nine antennomeres, not ten as in the type species of *Ochodaeus*. Due to these differences together with a complete lack of shared, derived characters that would unite it with Old World taxa, it is inappropriate to leave this species in the genus *Ochodaeus*, and a new genus is created for it.

***Cucochodaeus* Paulsen, new genus  
(Fig. 1)**

**Type species.** *Ochodaeus sparsus* LeConte 1868: 51, here designated.

**Description.** Scarabaeoidea: Ochodaeidae: Ochodaeini. Form convex, ovate. Length 4.5-7.5 mm; width across humeri 2.6-3.8 mm. Color testaceous. *Head:* Surface sharply declivous laterally behind eyes. Frons with conical horn, reduced to tubercle in small individuals. Mentum wider than long, flat, indistinctly longitudinally impressed. Mandibles moderately large, externally angulate, visible beyond labrum in dorsal view. Antenna with 9 antennomeres; 3-antennomere club nearly round, pubescent. *Pronotum:* Anterior margin not simply convex, instead marginal bead produced angulately behind eyes. Anterior third declivous. Surface densely tuberculopunctate, punctures large, setigerous; setae moderately long, testaceous. Margins with bead. *Elytra:* Striae indistinctly impressed, consisting of a single row of nearly confluent, shallow punctures; punctures lacking setae. Intervals with irregular rows of moderately dense, shallow, setigerous punctures; setae moderately dense, long, testaceous. Apex rounded (not dentate). *Legs:* Metafemur not toothed on posterior margin. Metatibia not toothed medially. *Abdomen:* Stridulatory peg absent. Propygidium moderately short (length approximately 1/5 width), simple (lacking longitudinal furrow or apical tubercles).

**Diagnosis.** This genus differs from other New World ochodaeids in having nine antennomeres, an unmodified propygidium, stridulatory peg absent, head declivous behind the eyes, and the anterior margin of the pronotum correspondingly produced behind the eyes (not simply concave).

**Etymology.** *Cucochodaeus* (*cuc-*, shortened from *cucullus* Latin = hood + *Ochodaeus*). The generic name, gender masculine, denotes the hoodlike pronotum that reaches the eyes and also projects more strongly above the head than in other Nearctic genera.

**Composition.** At present, only *C. sparsus* can be attributed to the genus, although it is possible that a review of Central American material could uncover additional species.

**Remarks.** *Cucochodaeus sparsus* is known from Mexico (Morón 2003), southern California (Linell 1896) through the southwest to Texas (Riley and Wolfe 2003), and north to Colorado and western Nebraska (Fall 1909, Ratcliffe 1991). Specimens were also examined from Utah.

***Neochodaeus* Nikolajev 1995: 77  
(Fig. 4-5)**

**Remarks.** The genus *Neochodaeus* was created by Nikolajev (1995) for two North American species, *N. praesidii* (LeConte) [type species] and *N. frontalis* (LeConte), based on the presence of a longitudinal sulcus on the propygidium. Several Nearctic species also possess a longitudinal sulcus and would appear to belong to the genus. However, as described above, there are two distinct propygidial forms, each corresponding with a distinct form of the mentum. *Neochodaeus* is here limited to species with a short propygidium and short, trapezoidal sulcus, with a more or less flat mentum that is not longitudinally impressed (Fig. 5).

Two additional Nearctic species are transferred to *Neochodaeus* forming new combinations: *N. repandus* (Fall) and *N. striatus* (LeConte). The synonymy of *O. complex* with *N. frontalis* is doubtful, and a revision of the genus is necessary to determine the status of *O. complex* with respect to *N. frontalis* and *N. repandus*. I retain *O. complex* as a synonym of *N. frontalis* pending such a revision. In addition, more Central American species remain to be transferred to the genus.

***Parochodaeus* Nikolajev 1995: 77  
(Fig. 2)**

**Remarks.** Species of *Parochodaeus* are immediately recognizable due to the dentate elytral apices and bituberculate posterior margin of the propygidium (Fig. 2). The antenna consists of 10 antennomeres, and the stridulatory peg is present. In the Nearctic fauna, additional species transferred to *Parochodaeus* include *P. californicus* (Horn) and *P. peninsularis* (Horn) (new combinations). All specimens of Ochodaeidae examined from South America thus far are members of *Parochodaeus*, and the genus is in need of revision.

One species was recorded from Nebraska by Ratcliffe (1991), as *O. kansanus*. The species was later transferred to *Parochodaeus* by Nikolajev (1995). However, *P. kansanus* most closely approximates the description of *O. duplex* LeConte, which was described from Texas (LeConte 1868) but has been overlooked since that time. The description of *O. duplex* agrees with males of *P. kansanus*, and no other known species from Texas, in the dual carinae of the clypeus and frons. Fall (1909) expressed concerns about the possible synonymy of *O. kansanus* with *O. duplex*. Although LeConte's name has remained unused for nearly a century, it is unlikely that Fall's name has been used in 25 publications in the last 50 years, thus *O. duplex* cannot be suppressed. Neither Horn (1895), nor Fall (1909) could locate the type of *O. duplex* in the MCZ. Fall (1909) indicated that the type might be present in Ulke's collection in the CMNH, but I have examined that collection as well and it is not present. To alleviate confusion surrounding the identity of this species, the lectotype of *O. kansanus* in the MCZ from Hamilton, KS (here designated) is also designated as the neotype of *O. duplex*, resulting in an objective synonymy. With the lectotype designation above, the remaining syntypes of *O. kansanus* are paralectotypes. Male (MCZ) labeled: a) "Hamilton Co. / Ks. 3350 ft. / F.H. Snow."; b) "TYPE / kansanus"; c) "M.C.Z. / Type / 24778" on red paper; d) male symbol; e) "H.C. FALL / COLLECTION"; f) "*Ochodaeus / kansanus / Fall*" on red-bordered paper; g) "*Ochodaeus kansanus / Fall, 1909 (male symbol) / LECTOTYPE / Det. M.J. Paulsen*" on red paper; h) "*Ochodaeus duplex / LeConte, 1868 (male symbol) / NEOTYPE / Det. M.J. Paulsen*" on red paper; i) "*Parochodaeus duplex / (LeConte, 1868) / det. M.J. Paulsen 2007*". Lectotype of *Ochodaeus kansanus* Fall, 1909 here designated. Neotype of *Ochodaeus duplex* LeConte, 1868 here designated. One male, three female paralectotypes labeled a) as *a* of lectotype; b) male or female symbol, or label not present; c) as *e* of lectotype; d) "*Ochodaeus kansanus / Fall, 1909 (male or female symbol) / PARALECTOTYPE / Det. M.J. Paulsen*" on yellow paper; e) as *i* of lectotype. Two male paralectotypes labeled: a) "Hamilton / Co. Ks."; b) male symbol; c) as *e* of lectotype; d) as *i* of lectotype. One male, one female paralectotype labeled: a) "McPherson / Ks. 8/29"; b-e) as paralectotypes above. One female paralectotype labeled: a) "McPhers / Ks. 7/31"; b-e) as paralectotypes above. One male paralectotype labeled: a) "McPherson / Ks. VIII-29 / (Knaus)"; b-e) as paralectotypes above. Two male paralectotypes labeled: a) "Las Vegas / N. Mex. / ? A. Fenyes"; b-e) as paralectotypes above.

*Parochodaeus pectoralis* (LeConte) is known from Arizona, Colorado, Kansas, New Mexico, Oklahoma, Texas, and Utah (Carlson 1975). In 2004, I collected it in Dundly County in extreme southwestern Nebraska. This species is easily separated from *P. duplex* by its larger size and enlarged, strongly curved first tarsomere of the metatarsus. Carlson (1975) treated the *P. pectoralis* complex, creating two new species. Revisionary work is needed on these and other taxa, especially *P. biarmatus* (LeConte), before a useful key to Nearctic species of *Parochodaeus* can be created.

**Checklist of the Nearctic Ochodaeidae**

OCHODAEIDAE Mulsant and Rey, 1871: 236.

OCHODAEINAE Mulsant and Rey, 1871: 236.

OCHODAEINI Mulsant and Rey, 1871: 236.

**Codocera Eschscholtz**, 1821: 398

*Stomphax* Fischer von Waldheim 1823: 158, synonym.

*Codocera gnatho* (Fall in Fall and Cockerell, 1907: 247) (*Ochodaeus*), **new combination**.

*Ochodaeus nimius* Fall, 1907: 248, synonym.

**Cucochodaeus Paulsen, new genus**

*Cucochodaeus sparsus* (LeConte, 1868: 51).

*Ochodaeus mandibularis* Linell, 1896: 723, **new synonymy**.

**Neochodaeus Nikolajev, 1995: 77**

*Neochodaeus frontalis* (LeConte, 1863: 76) (*Ochodaeus*).

*Ochodaeus complex* LeConte, 1868: 51, synonym.

*Neochodaeus praesidii* (Bates, 1887: 106) (*Ochodaeus*).

*Neochodaeus repandus* (Fall, 1909: 36) (*Ochodaeus*), **new combination**.

*Neochodaeus striatus* (LeConte, 1854: 222) (*Ochodaeus*), **new combination**.

**Parochodaeus Nikolajev, 1995: 77**

*Parochodaeus biarmatus* (LeConte, 1868: 51) (*Ochodaeus*).

*Parochodaeus californicus* (Horn, 1895: 224) (*Ochodaeus*), **new combination**.

*Parochodaeus howdeni* (Carlson, 1975: 60) (*Ochodaeus*).

*Parochodaeus inarmatus* (Schaeffer, 1906: 270) (*Ochodaeus*).

*Parochodaeus duplex* (LeConte, 1868: 51) (*Ochodaeus*), **new combination**.

*Ochodaeus kansanus* Fall, 1909: 34, **new synonymy**.

*Parochodaeus pectoralis* (LeConte, 1868: 51) (*Ochodaeus*).

*Parochodaeus peninsularis* (Horn, 1895: 224) (*Ochodaeus*), **new combination**.

*Parochodaeus ritcheri* (Carlson, 1975: 62) (*Ochodaeus*).

**Xenochodaeus Paulsen, new genus**

*Xenochodaeus americanus* (Westwood, 1852: 66) (*Ochodaeus*), **new combination**

*Ochodaeus opacus* LeConte, 1868: 51, **new synonymy**.

*Xenochodaeus luscinius* (Howden, 1968: 1118) (*Ochodaeus*), **new combination**.

*Xenochodaeus musculus* (Say, 1835: 178) (*Odontaeus*), **new combination**.

*Xenochodaeus planifrons* (Schaeffer, 1906: 269) (*Ochodaeus*), **new combination**.

*Xenochodaeus simplex* (LeConte, 1854: 222) (*Ochodaeus*), **new combination**.

*Xenochodaeus ulkei* (Horn, 1876: 182) (*Ochodaeus*), **new combination**.

CHAETOCANTHINAE Scholtz, 1988: 231

PSEUDOCHODAEINI Scholtz, 1988: 235

**Pseudochodaeus Carlson and Ritcher, 1974: 99**

*Pseudochodaeus estriatus* (Schaeffer, 1906: 271) (*Ochodaeus*).



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