

# Re-evaluation of the genera *Phloeodes*, *Noserus* and *Nosoderma* (Coleoptera: Zopheridae) with description of a new species of *Nosoderma* from northern México

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**Abstract.** We revise the Nearctic species of *Nosoderma* previously associated with the genera *Noserus* LeConte 1862 and *Phloeodes* LeConte 1862 (Coleoptera: Zopheridae). These genera were characterized within the subfamily Zopherinae mainly by the presence of a marked hypomeral groove that may contain totally or almost completely the antennae while in repose. Differences between *Noserus* and *Phloeodes* were considered insufficient and the two genera have been treated as a single genus. In this work, a detailed morphological re-description of the Pacific species *Noserus plicatus* and *Phloeodes diabolicus* using SEM is compared to previous descriptions of the Atlantic *N. doyeri* and to some species of the related genus *Nosoderma*. As a result we found no consistent characters supporting the recognition of either *Noserus* or *Phloeodes* as distinct from *Nosoderma*, and we therefore placed them in the synonymy of *Nosoderma*. Further examination of type specimens of the Californian *Noserus collaris*, *N. convexulus*, *N. corrosus* and *N. torvus* allowed us to place them as junior synonyms of *N. plicatus*. The specimens from Tamaulipas and Nuevo León (México) previously included in *Noserus emarginatus* differ markedly from typical material from Texas (USA) including elytral and pronotal sculpture. We consider that these differences justify the taxonomic recognition of the Mexican taxon at the species level. A description of the new taxon *Nosoderma sylvaticum* sp. nov. is provided. The Nearctic species included in the genus *Nosoderma* are thus: *N. plicatum*, *N. diabolicum* and *N. pustulosum*, distributed along the Pacific versant of North America; *N. emarginatum*, present only in Texas; *N. doyeri*, known from Nuevo León (México); and *N. sylvaticum*, distributed in Tamaulipas and Nuevo León (México).

**Résumé.** Révision taxonomique des genres *Phloeodes*, *Noserus* et *Nosoderma* (Coleoptera : Zopheridae) et description d'une nouvelle espèce de *Nosoderma* du nord du Mexique. Nous avons révisé les espèces néarctiques de *Nosoderma* jusqu'ici associées aux genres *Noserus* LeConte 1862 et *Phloeodes* LeConte 1862 (Coleoptera : Zopheridae). Dans la sous-famille Zopheridae, ces genres étaient surtout caractérisés par la présence d'un sillon hypoméral bien marqué, pouvant contenir complètement ou presque complètement l'antenne au repos. Les différences entre *Noserus* et *Phloeodes* sont considérées comme insuffisantes et les deux genres traités comme un seul. Dans ce travail, nous faisons une redescription morphologique détaillée des espèces de la région Pacifique *Noserus plicatus* et *Phloeodes diabolicus*, que nous comparons à l'aide d'un MEB à la description antérieure de l'espèce Atlantique *N. doyeri* et des espèces du genre voisin *Nosoderma*. Nous n'avons pu trouver de caractères permettant de séparer *Noserus* et *Phloeodes* de *Nosoderma*, et en conséquence nous les plaçons en synonymie de *Nosoderma*. Des observations ultérieures sur des spécimens-types des espèces californiennes *Noserus collaris*, *N. convexulus*, *N. corrosus* et *N. torvus* nous ont permis de les placer comme synonymes junior de *N. plicatus*. Des spécimens provenant des états de Tamaulipas et du Nuevo León (Mexique), inclus jusqu'ici dans *Noserus emarginatus* se différencient clairement du matériel typique du Texas (USA), en particulier en ce qui concerne les sculptures élytrale et pronotale, et nous considérons que ces différences justifient l'élévation du taxon mexicain au rang d'espèce, *Nosoderma sylvaticus* sp. nov. dont nous donnons la description. Finalement, les espèces néarctiques incluses dans *Nosoderma* sont : *N. plicatum*, *N. diabolicum* et *N. pustulosum*, distribuées tout au long du versant pacifique de l'Amérique du Nord ; *N. emarginatum*, présent seulement au Texas ; *N. doyeri* connu du Nuevo León (Mexique) et *N. sylvaticum* sp. nov. distribué au Tamaulipas et au Nuevo León (Mexique)

**Keywords:** Systematics, Taxonomy, Coleoptera, Zopheridae, *Nosoderma*, synonyms, new species, Nearctic, North America.

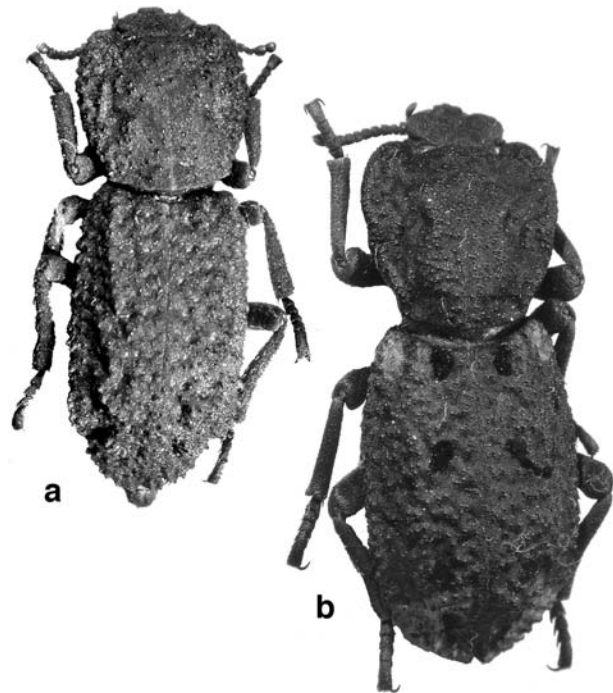
The diagnosis and content of the family Zopheridae has suffered numerous changes since its establishment by Böving & Craighead (1931). Based on the study of larval characters, these authors considered the family Zopheridae as having its own identity, and separated from the Tenebrionidae. The taxonomic discussion (Crowson 1955; Kamiya 1963; Watt 1967a, b, 1974a, b; Doyen & Lawrence 1979; Lawrence 1994; Lawrence & Newton 1995) ended in its final exclusion from Tenebrionidae and its placement near Colydiidae. If a classification was to be performed using the most recent phylogenetic hypothesis based on morphological characters (Slipinsky & Lawrence 1999), the family Zopheridae would include Zopheridae (sensu Doyen & Lawrence 1979; Lawrence 1994; Lawrence & Newton 1995), Colydiidae and Monommatidae. Slipinsky & Lawrence (1999) recognized two large subfamilies within the group, Zopherinae and Colydiinae, and within Zopherinae the tribes Latometini, Usechini, Monommatini, Phellopsini, Pycnomerini and Zopherini.

The American fauna of Zopherini includes representatives of the genera *Zopherus* Gray 1832, *Phloeodes* LeConte 1862, *Noserus* LeConte 1862, *Nosoderma* Solier 1841, *Noserinus* Casey 1907 and *Meralius* Casey 1907. In the Nearctic region, the tribe is represented by *Zopherus*, *Phloeodes* and *Noserus*, and a few representatives of the mostly Neotropical genus *Nosoderma*. After a morphological analysis of selected species of the Nearctic genera, Slipinsky & Lawrence (1999) concluded that *Noserus* was not a valid genus, and transferred it into *Phloeodes*. However, *Noserus* was not considered a morphologically homogenous entity (García-París *et al.* 2001) with some of its species, especially those from northern Mexico and southeastern USA, showing intermediate characters between *Phloeodes* and *Nosoderma*. Consequently by synonymizing *Noserus* with *Phloeodes* these authors made *Phloeodes* a taxon without independent diagnosis, since the oriental species of *Noserus* share most of their characters with *Nosoderma*.

The genus *Phloeodes* (sensu Slipinsky & Lawrence 1999, including all species of *Noserus*) is characterized by having the two terminal segments of the antennae fused with each other; the internal face of the male's femora with a large, callous looking, elliptic tubercle; the tarsal segments apparently grooved ventrally; and especially by the presence of a relatively deep and conspicuous hypomeral groove which can contain the antennae while in repose (Doyen & Lawrence 1979; Slipinsky & Lawrence 1999; García-París *et al.* 2001). *Nosoderma* also has the two apical segments of the antennae fused and present evident femoral callosities, while the short

and shallow hypomeral groove, and tarsal segments apparently grooved ventrally are only present in a few species (García-París *et al.* 2001). *Nosoderma lutosum* Champion, 1884, and the new species described below, show the last two characters are developed like in the oriental species of *Phloeodes* (eastern *Noserus*). Consequently, if we would like to maintain *Phloeodes* as an independent and "diagnosticable" entity, it is necessary to transfer the two *Noserus* species from Texas (USA) and Nuevo León (México) to the genus *Nosoderma*. By this treatment, the diagnosis of the genus *Phloeodes* becomes simply characterized by the presence of a deep hypomeral groove and tarsal grooves, a set of character states which are also shared with other zopherine genera (*Zopherus*). Alternatively, both genera *Phloeodes* and *Noserus* could be included within *Nosoderma*.

In this study, we revise the taxonomic status of *Noserus* and *Phloeodes*, basing our work on a morphological analysis, and propose the inclusion of the two taxa into the genus *Nosoderma*. We review the taxonomy of the Nearctic species of *Nosoderma* and base on our results describe a new species from northern México whose characters are intermediate



**Figure 1**  
**1a.** Habitus of *Nosoderma plicatum*. Specimen from San Luis Obispo Co. (Alta California, USA). **1b.** Habitus of *Nosoderma diabolicum*. Specimen from Contra Costa Co. (Alta California, USA).

between *Phloeodes*, *Noserus* and *Nosoderma*. Finally, several synonymies at the species level are proposed.

### Materials and Methods

The list of examined specimens is presented in Appendix 1. We also examined the type specimens of *Nosoderma interruptum* Champion 1884, *N. insigne* Champion 1884, *N. impressum* Champion 1884, *N. guatemalense* Champion 1884, *N. exsculptum* Champion 1884, *N. carinatum* Champion 1884, *N. asperatum* Champion 1884, *N. aequale* Champion 1884, *N. sparsum* Champion 1884, *N. venusta* Champion 1884, *N. zunilense* Champion 1884, *N. lutosum* Champion 1884, *Noserus emarginatus* Horn 1878, *N. doyenii* García-París, Coca-Abia et Parra-Olea 2001, *N. collaris* Casey 1907a, *N. convexulus* Casey 1907b, *N. corrosus* Casey 1907b, and *N. torvus* Casey 1907a.

Dry mounted specimens were used for descriptions and drawings. External sculpture and pubescence and dissected mouth parts were studied with an Electron Microscope (SEM). Preparations of male and female genitalia were obtained from dry or alcohol preserved specimens. Aedeagus and median lobe were removed and studied at the dissecting microscope immersed in distilled water, and with SEM. Female genitalia and genital segment were cleared with a hot 5% KOH solution, progressively dehydrated in 70%, 90%, 95% and 100% ethanol, and mounted in Euparal for examination at the dissecting microscope. Drawings of the female genitalia were performed using camera-lucida.

### Results

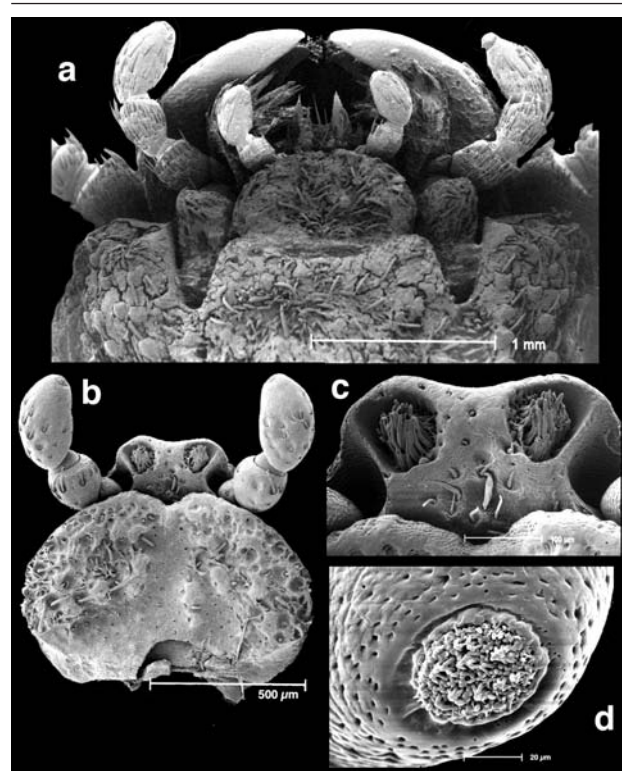
#### Morphological analysis of *Noserus*, *Phloeodes* and *Nosoderma*

Slipinsky & Lawrence's (1999) study was focused in a sample of characters which they used for phylogenetic analyses. To provide additional information, and because none of those genera have been revised for more than a century, we describe here the external morphology of two species previously included in *Noserus* (*N. plicatus*) and *Phloeodes* (*P. diabolicus*) following the description scheme of *Noserus doyenii* (García-París *et al.* 2001). These descriptions are compared to that of *Nosoderma sylvaticum* sp. nov. presented below.

#### Redescription of *Noserus plicatus* (LeConte 1859)

General appearance robust, subrectangular (Fig. 1a). Length (elytra plus prothorax), 13-17 mm. Coloration variable, with dorsal color varying from light brown to chestnut-gray. Body densely covered with golden brown squamiform and hook-shaped setae. Live specimens bear a velvety, rather rugose, appearance.

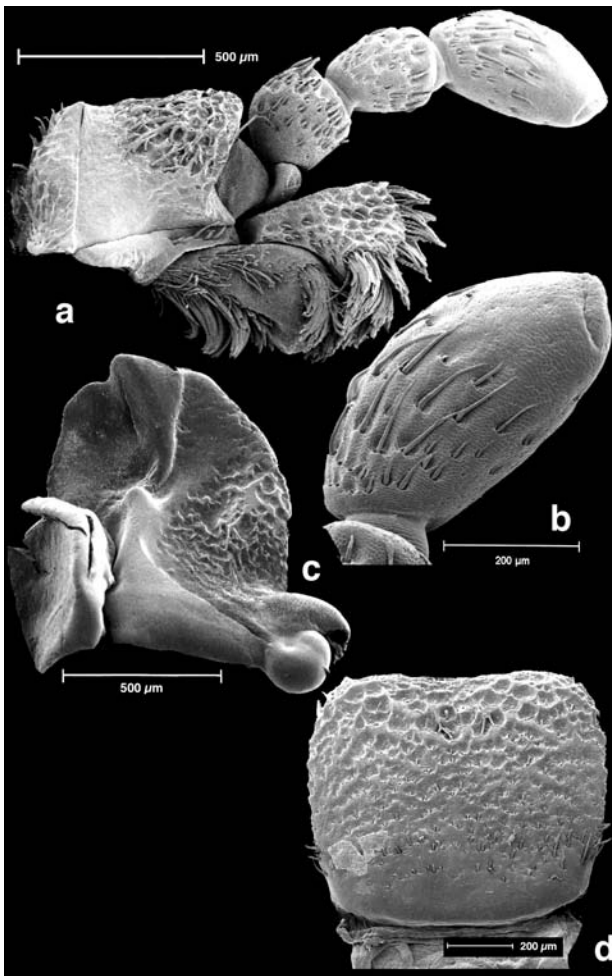
Head inserted into the prothorax as far as the antennal insertions while in repose; epistoma depressed medially and inflated laterally, densely covered with squamiform, golden setae. Gular suture arcuate; deep gular v-shaped incisions broadly opened, and accommodate maxillary basistipe (Fig. 2a). Mentum ovate, strongly emarginated at the anterior edge; prementum with two pubescent cavities (Fig. 2b,c); labial palpi robust with a broad



**Figure 2**  
Morphology of the oral region of *Nosoderma plicatum*. **2a.** Ventral view of the mouth region showing the gular v-shaped incisions which accommodate the maxillary basistipe. **2b.** Ventral view of the mentum and labial palpi. **2c.** Cavities on the ventral side of the prementum. **2d.** Sensory organs at terminal opening of the labial palpus.

terminal opening that show the sensory organs, the tegument around the opening is smooth but covered with scattered deep punctures (Fig. 2d). Maxillae with lacinia and galea densely setose (Fig. 3a); maxillary palpi with non-terminal segments short and robust, with setae on most of their ventral surface; terminal segment of palpi (Fig. 3b) elongate, fusiform, with scattered long setae and a terminal ovate fossa; basistipe well developed, with a hump. Mandibles robust and strong, with the mesal surface differentiated into a sharp tooth; edge of the incisor lobe bisinuous (Fig. 3c); proximal molar lobe flat and smooth. Labrum relatively small (Fig. 3d), strongly punctured ventrally, and lacking setae at anterior edge. Antennae with segment 2 wider than long; segment 3 longer than wide; segments 4-8 subquadrate and almost equally longer than wide, densely covered with strong acute setae; segment 9 sub-conical, wider than the other segments at its distal third (Fig. 4a), where it shows a well marked deep cavity filled with dense setae (Fig. 4b); articles 10 and 11 fused with each other and forming a subspherical terminal segment (Fig. 4a).

Prothorax subrectangular in dorsal outline, longer than wide, slightly wider at the middle, and narrower at the base, with prominent anterior lobed lateral angles that surpass genae and eyes; posterolateral angles slightly prominent (Fig. 1a); base arcuate; dorsal surface completely covered with squamiform setae, with scattered rounded granular tuberosities (warts) each

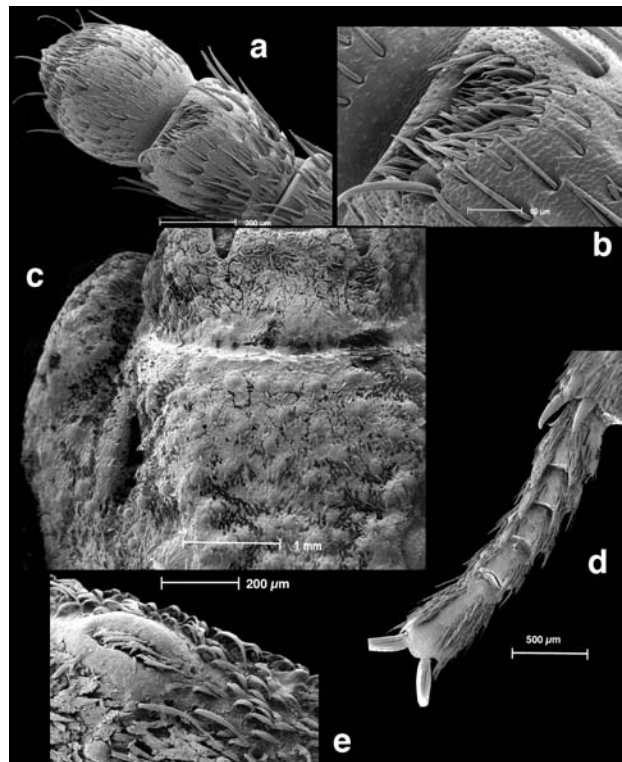


**Figure 3**  
Morphology of the buccal apparatus of *Nosoderma plicatum*. 3a. Ventral view of maxilla, showing the pubescence of lacinia and galea. 3b. Terminal segment of maxillary palpus. 3c. Mandible. Note the shape of the incisor and molar lobes. 3d. Dorsal view of labrum.

provided with a posterior sickle-shaped seta; lateral edges with more warts than in the middle; ventral surface densely covered with setae, devoid of deep fossae; two hypomerical grooves present, the first antero-external, shallow but marked, crescent-shaped, the second more internal than the first is shorter and deeper (Fig. 4c). Scutellum hidden under the elytra.

Legs completely pilose except for an internal denuded patch (femoral callosity) on the femora of males (Fig. 4e); surface of these black ovate tuberosities smooth, with a deep central elongated fissure filled with long setae (Fig. 4e); ventral surface of tarsus with two rows of divergent setae that give a marked grooved appearance to the tarsus (Fig. 4d).

Elytra 1.5 to 1.6 times longer than wide, with marked posterior tuberculation, densely covered with squamiform brown setae alternating with smooth depressions (Fig. 5a); dispersed small rounded granular tuberosities (warts) surrounded by squamiform setae including a single posterior long sickle-shaped seta (Fig. 5b); posterior elytral depressions well marked with evident tubercles; sutural region depressed with slightly



**Figure 4**  
Taxonomically informative characters of *Nosoderma plicatum*. 4a. View of antennal segments 9-11, showing the fusion of the terminal segments and the protruding area in segment 9. 4b. Detail of the protruding area, with a deep cavity filled with setae in 9th segment of antenna. 4c. Ventral view of posterior portion of head and lateral area of prothorax, showing crescent-shaped external hypomerical groove and internal groove. 4d. Ventral view of tarsus. 4e. Oval tuberosity on internal surface of male femora showing the median fissure filled with pubescence.

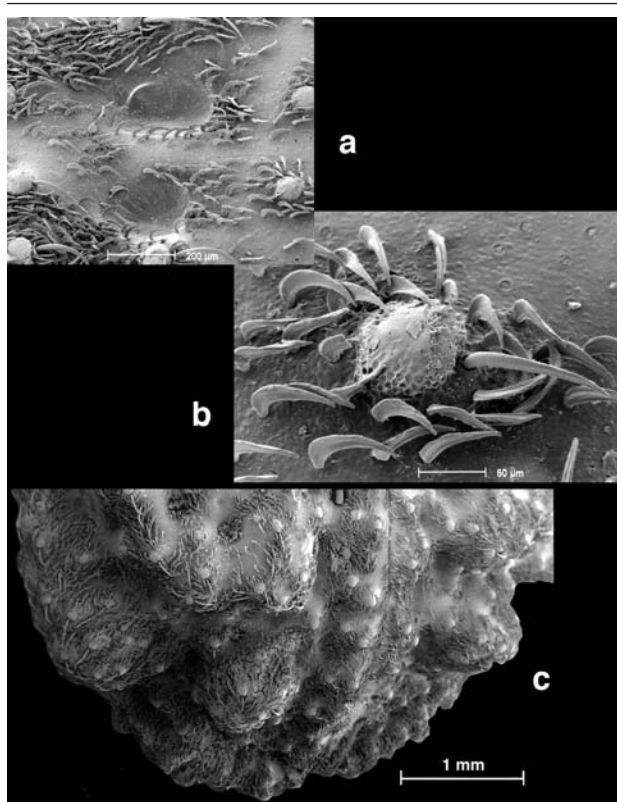
raised margins; apices fused with each other and rounded (Fig. 5c).

Aedeagus with parameres dorsally fused with each other, pubescent at their apices (Fig. 6); phallobase ventrally opened and shorter than the parameres (P/Ph ratio about 1/3). Median lobe long and thin. Female genitalia (Fig. 7) similar to those of *Noserus doyenii*. It differs in that the two distal genital palpa are placed in independent projections of the genital chamber.

### Redescription of *Phloeodes diabolicus* (LeConte 1851)

Habitus as in Fig. 1b. Length (elytra plus prothorax), 16-22 mm. Dorsal coloration variable from pale brown to dark gray. The elytra bearing brown-cream to golden patches on the apical region and shoulders, and scattered black patches, with the most of the body covered with setae (Fig. 1b).

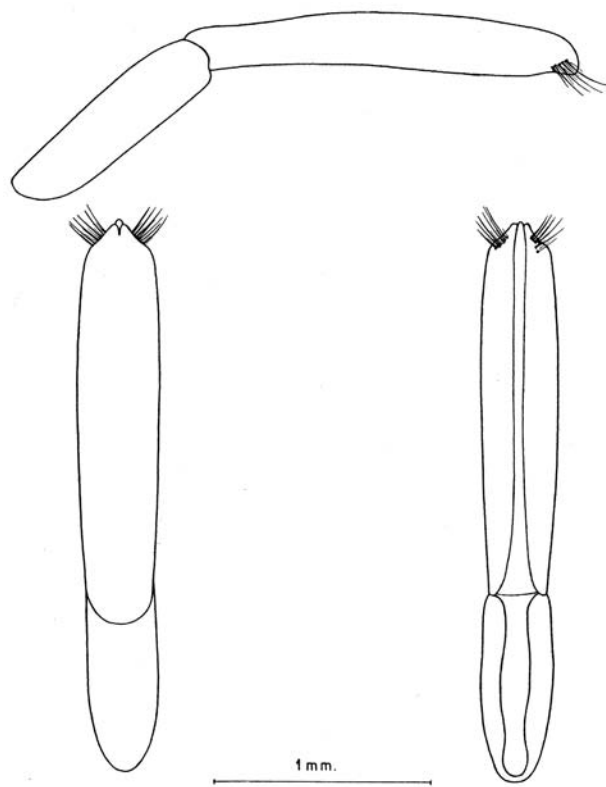
Head inserted into the prothorax as far as the supra antennal lobes while in repose; epistoma partially covered with golden setae. Gular suture arcuate; deep gular v-shaped incisions broadly opened (Fig. 8a). Mentum (Fig. 8b) ovate, with deeply emarginated anterior margin, and evenly rounded at lateral sides; frontal lobe of the prementum with two deep fossae



**Figure 5**  
External morphology of *Nosoderma plicatum*. **5a.** Dorsal view of elytral pubescence at the discal region. **5b.** Detail of elytral pubescence. Note the density of squamiform setae and the isolated long hair at the base of dorsal wart. **5c.** Dorsolateral view of elytral apical declivity.

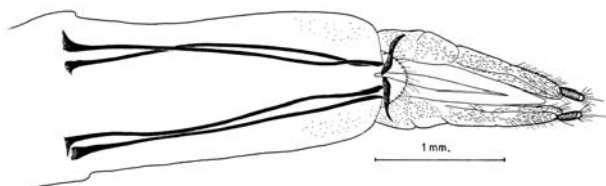
filled with dense and long pubescence; labial palpi robust with a rounded terminal opening, showing the sensory organs; the tegument around the opening smooth, but covered with scattered deep punctures (Fig. 8c). Maxillae with lacinia and galea densely setose (Fig. 8d); maxillary palpi with the basal segment short and robust, the second conical, and the terminal elongate, fusiform, with scattered setae and a terminal ovate fossa; basistipe developed, with a marked hump (Fig. 8d). Mandibles robust and strong; the incisor lobe sharp with two well developed teeth; molar lobe concave and smooth with a transverse ridge that splits it into two parts, the upper part about 0.3 times as large as the lower part (Fig. 9a). Labrum small (Fig. 9b), strongly punctured ventrally, and smooth basally provided with setae at the anterior two-thirds, more abundant at the edge. Antennae with segment 2 wider than long (Fig. 9c); segment 3 longer than wide; segments 4-8 wider than long, covered with strong acute setae; segment 9 subconical, slightly wider than the other segments at its distal portion, with a well marked deep cavity filled with dense setae (Fig. 9d); articles 10 and 11 fused with each other forming a subspherical terminal segment with dense apical pubescens (Fig. 9d).

Prothorax, longer than wide, wider at the middle, narrower at base, with prominent anterior lobed lateral angles covering genae until the supra antennal lobes; postero-lateral edges smoothly sinuous just before posterior edge, with apex evident (Fig. 1b); base arcuate; dorsal surface completely covered with

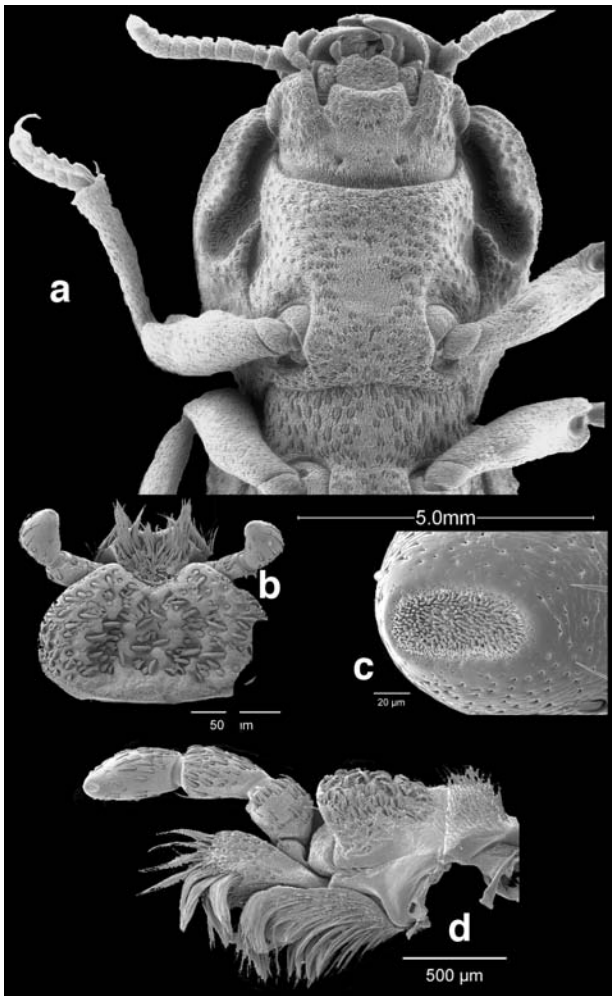


**Figure 6**  
Schematic drawing of the parameres of male genitalia of *Nosoderma plicatum*.

squamiform, golden to dark brown gray setae. Warts unevenly distributed over most of the surface; each wart bearing a long posterior setae; dorsal surface of the pronotum rugged, with a median broad elevated area, and two lateral depressions partially filled with black leaf-shape setae. Ventral surface of the prothorax densely covered by setae, without fossae; two deep hypomerical grooves lying in the anterior portion, a first antero-external, extremely deep, long and wide, and a second more internal, deep and narrow (Fig. 8a). Legs completely pilose, with marked warts, except for an internal denudated patch (femoral callosity) on the femora of males (Fig. 10a); these smooth black ovate tuberosities present a central pubescent area covered with long setae, which runs along a deep central elongated fissure through the entire length of the patch (Fig. 10b); ventral



**Figure 7**  
Female genitalia of *Nosoderma plicatum*.

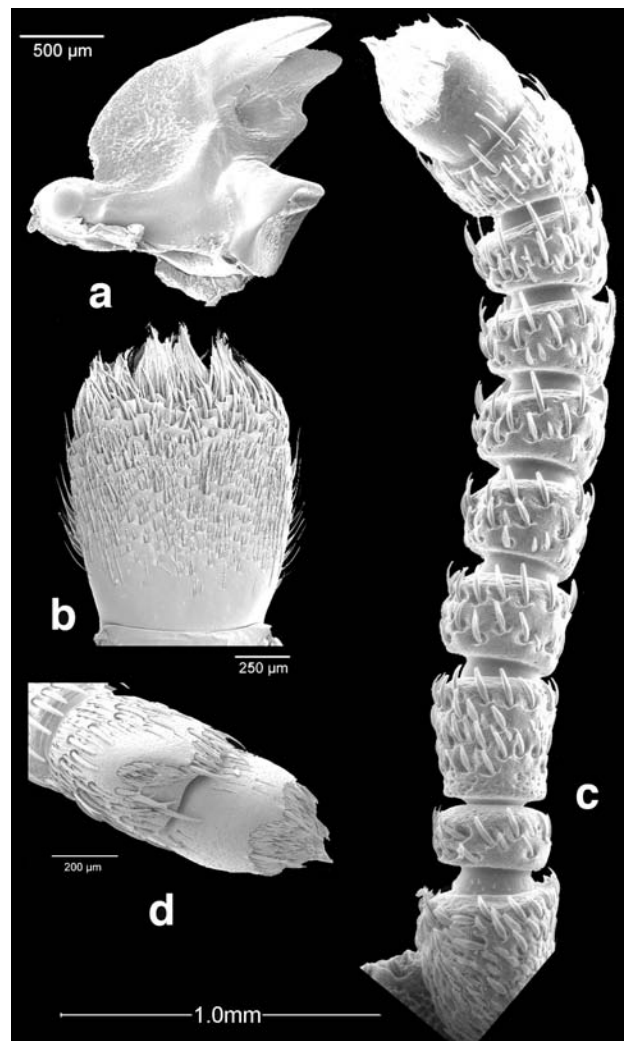


**Figure 8**  
Morphology of anterior region of *Nosoderma diabolicum*. **2a.** Ventral view of head and prothorax, showing gular v-shaped incisions, deep and broad external hypomeral groove, and short internal groove. **2b.** Ventral view of the mentum and labial palpi. **2c.** Sensory organs at terminal opening of the labial palpi. **2d.** Ventral view of the maxilla.

surface of tarsus with two rows of dense setae that give a marked grooved appearance to the tarsus (Fig. 10c). Scutellum hidden under the thorax (Fig. 10d), densely granulated and pubescent; the pubescence becoming longer and denser posteriorly.

Elytra 2.0 times longer than wide, rugose, with marked but slightly prominent tuberculation along the posterior declivity. Elytra densely covered with squamiform brown (Fig. 11b) and leaf-shaped black setae (Fig. 11c) which create a velvety texture on the surface (Fig. 11a). Small rounded smooth granular warts, provided with a single posterior long piliform seta, are dispersed on the areas covered by squamiform brown setae; paired depressions partially filled with black leaf-shape setae.

Abdominal sternites with warts and a surface texture similar to elytra; anal plate articulated to the last abdominal sternite, with a groove parallel to the posterior edge. Male genitalia with



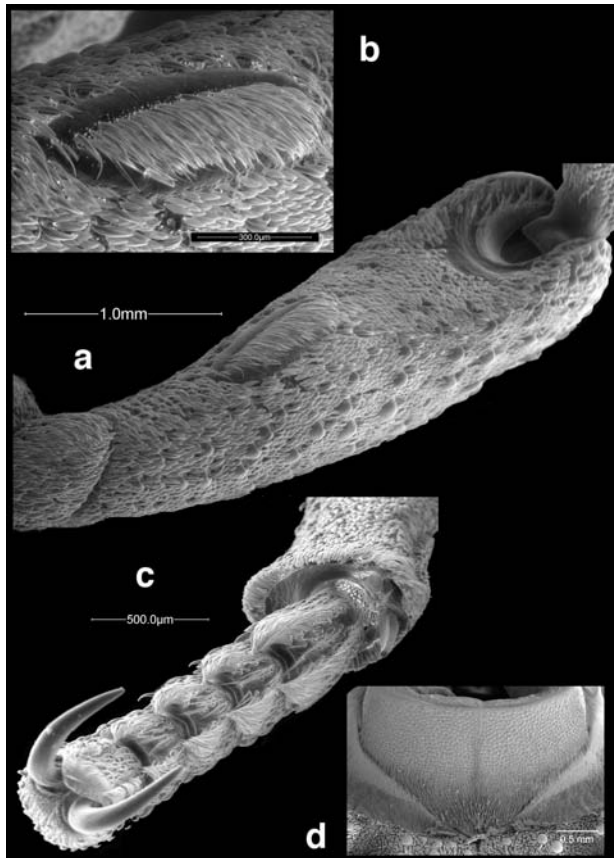
**Figure 9**  
Morphology of oral region and antennae of *Nosoderma diabolicum*. **9a.** Mandible, showing the shape of the incisor teeth. **9b.** Dorsal view of the labrum. **9c.** Antenna, showing the fusion of the terminal segments and the protruding area in segment 9. **9d.** Detail of the protruding area, with a deep cavity filled with setae in 9th segment of antenna.

parameres dorsally fused with each other, their apices pubescent (Figs. 11d, e); phallobase ventrally opened and shorter than parameres (P/Ph ratio about 1/3). Median lobe long and thin. The female genitalia is similar to those of *Noserus doyeri* and *N. plicatus*, with two genital palpi placed on independent projections of the genital chamber. Length of the projections similar to those of *N. sylvaticum sp. nov.* and shorter than those of *N. plicatus*. Projections fused with each other in *N. doyeri*.

### *Nosoderma sylvaticum* García-París, Coca-Abia & Parra-Olea *sp. nov.*

(Figs. 12-15)

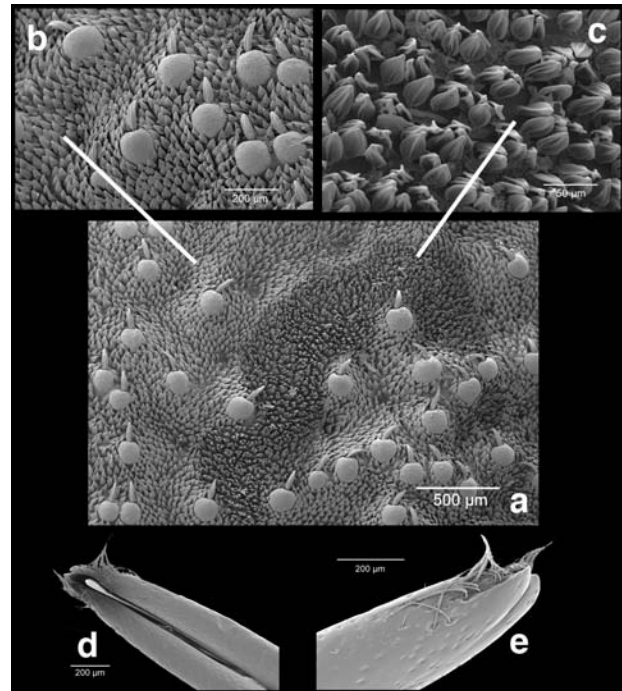
**Types.** Holotype: A female specimen from MÉXICO: TAMAULIPAS: Gómez Farías: Alta Cima (23°04.00N,



**Figure 10**  
Taxonomically informative characters of *Nosoderma diabolicum*. **10a.** Internal surface of male femur showing scattered warts and oval tuberosity. **10b.** Oval tuberosity on internal surface of femora of males showing median fissure filled with long and dense pubescence. **10c.** Ventral view of tarsus. **10d.** Detail of pubescence on scutellum.

99°12.00 W), 24-V-1997, M. García-París and G. Parra-Olea leg. (CNIM IB-UNAM, genitalia prepared). Paratypes, 4 specimens: No. 1: same data as holotype (MNCN, used for SEM); Nos. 2-3: TAMAULIPAS: 20 mi [32 km] N Ciudad Victoria (23°50.997N, 99°18.724 W), 17-VII-1955, 2 specimens, Derham Giuliani leg. (CAS); No. 4: SAN LUIS POTOSÍ: 6-10 mi [9.6-16 km] E Cd. [Ciudad] del Maíz (22°27.987N, 99°33.447 W), 26-VIII-69, 1 specimen, J.T. Doyen leg. (ESSIG).

**Diagnosis.** Zopherine beetle distinguished from all other species by the following combination of characters: elytra flattened dorsally, with prominent lateral ridges, covered by dense scaliform setae and with marked and prominent posterior tuberculation; posterior declivity of the elytra abrupt, with two rows of prominent tubercles; the two apical segments of the antennae fused with each other; a shallow and short hypomerical groove that does not completely contain the antennae while in repose is present on the ventro-



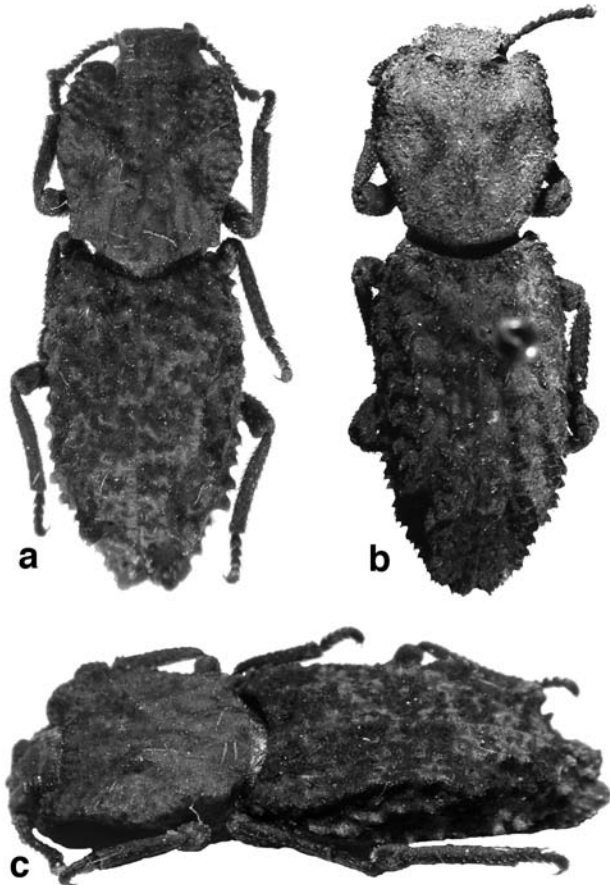
**Figure 11**  
External morphology of *N. diabolicum*. **11a.** Dorsal view of two types of elytral pubescence, illustrating a velvety black patch surrounded by squamiform setae and dorsal warts. **11b.** Detail of elytral pubescence showing squamiform golden-brown setae. Note the density of squamiform setae and isolated sickle-shaped setae at the base of isolated warts. **11c.** Detail of leaf-shaped black setae that form the black velvety dorsal patches. **11d.** View of terminal portion of the parameres of male genitalia. **11e.** Lateral view of parameres. Note the pubescence on apical regions.

lateral surface of the pronotum; posterolateral angles of the pronotum markedly angular.

The only Nearctic species with which *N. sylvaticum* shares some morphological resemblance is *N. emarginatum*, but they differ in the following traits: the elytra in *N. emarginatum* are convex with nine ridges formed by marked tubercles, whereas in *N. sylvaticum* elytra are flattened dorsally; the postero-lateral sides of the pronotum in *N. emarginatum* are curved, but markedly pointed in *N. sylvaticum*; the surface of the prothorax is more rugose with more protuberances in *N. emarginatum* than it is in *N. sylvaticum*; the scutellum in *N. sylvaticum* bears long pubescence in the posterior end, while in *N. emarginatum* the pubescence is shorter and not so evident.

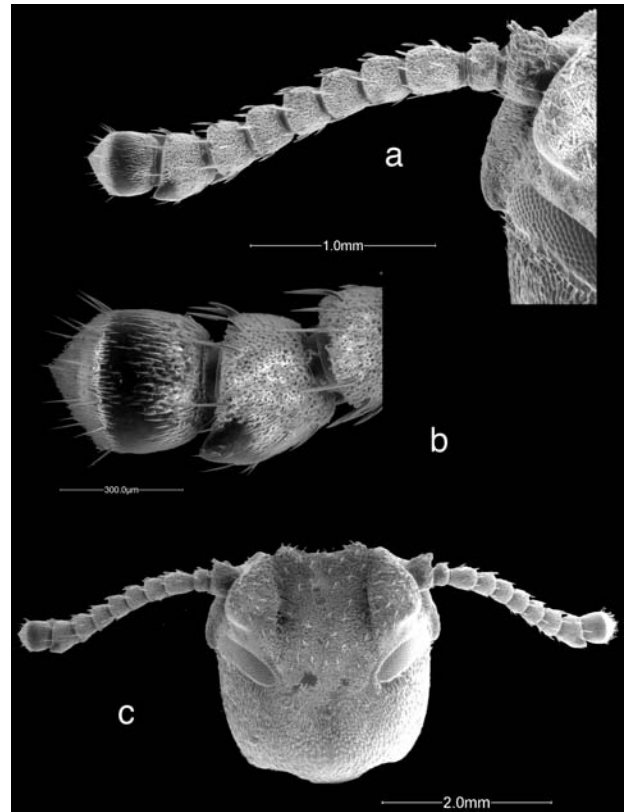
**Description.** Habitus as in Fig. 12 (a, c). Length (elytra plus prothorax), 16.0-19.0 mm. Coloration uniformly chestnut-brown, with the most of body closely covered with long, broad, golden to brown setae, with scattered hook-shaped brown setae particularly evident at margin of the prothorax, lateral ridges of elytra, and limbs. Live specimens present a velvety aspect.

Head inserted into the prothorax as far as the antennal insertions

**Figure 12**

Habitus of *Nosoderma sylvaticum* sp. nov. **1a.** Dorsal view of Holotype from Rancho del Cielo (Tamaulipas, México). **1b.** Dorsal view of a specimen from Mesa Chipinque (Nuevo León, México), tentatively ascribed to *Nosoderma sylvaticum*, that likely corresponds to a new undescribed species. **1c.** Lateral view of Holotype. Note the tubercles at posterior declivity and flattened dorsal region of elytra.

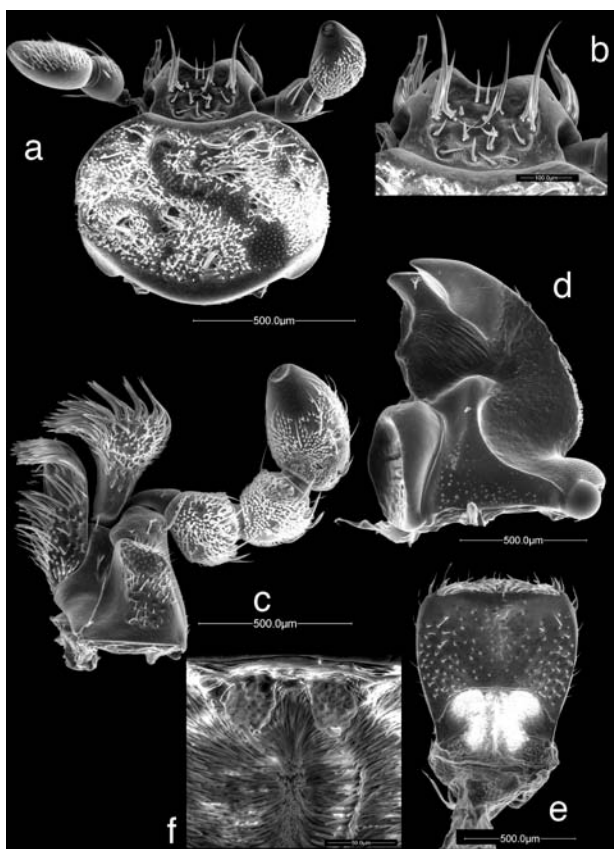
while in repose. Antennae with segment 2 short and transverse, segment 3 longer than wide, and segments 4-8 subquadrate, wider than long, covered with strong acute setae (Fig. 13a, c); segment 9 conical, wider than the other segments at its distal portion, with a well marked smooth shiny area, which includes a setose ventral patch, markedly protruding anteriorly; articles 10 and 11 fused and forming a sub-spherical terminal segment (Fig. 13a, b). Eyes narrow and elongate, placed behind lateral prominences of epistoma and supra antennal lobes (Fig. 13c). Epistoma medially flat with two deep grooves that differentiate the flat region from the bulky and prominent lateral sides, which cover base of antennae; epistoma densely covered with squamiform, golden setae. Golden hook-shaped setae cover scarcely the entire epistoma and prominent lateral sides. Gular suture arcuate; with deep gular v-shaped incisions. Prementum with arcuate posterior margin (labial suture), and a strongly emarginated anterior edge (Fig. 14a, b), without fossae but with setiferous punctures; mentum subelliptical, setose ventrally, depressed in the middle with elevated lateral and ventral sides,

**Figure 13**

Cephalic and antennal morphology of *Nosoderma sylvaticum*. **3a.** Antenna. Note the fusion of terminal segments and protruding denuded area in segment 9. **3b.** Detail of the protruding smooth area in 9th segment of antenna. **3c.** Dorsal view of the head, showing the protruding antennal lobes.

with shallow broad lateral fossae, each lateral fossae bears from one to three long curved hair (Fig. 14a); labial palpi robust with a rounded terminal opening, showing the internal sensory organs. Maxillae with lacinia and galea densely setose (Fig. 14c); maxillary palpi with short and robust segments, covered with setae on most of their dorsal surface; terminal segment of palpi elongated and fusiform, with scattered long setae and a terminal rounded fossa with internal sensory papillae; basistipe well developed, with a marked hump (Fig. 14c). Mandibles robust, each mandible triangular at base, a very sharp distal incisor lobe with two teeth and a proximal molar lobe concave and smooth, with poorly defined transversal ridges (Fig. 14d). Labrum flat, with deep anterior ventral setiferous fossae (Fig. 14e). Hypopharynx densely covered with sensoria (Fig. 14f).

Prothorax subrectangular in dorsal outline, longer than wide, slightly wider at the middle, with prominent anterior lobed lateral angles reaching genae and eyes; posterolateral angles pointed and prominent (Fig. 15a); dorsal surface of pronotum rugose with four elevated areas, two in the middle defining one central and two lateral depressions, one in the anterior and one in the posterior edges, dorsal surface covered with squamiform, curved golden-brown setae, more abundant at the lateral sides and anterior elevated areas; base of thorax arcuate; ventral



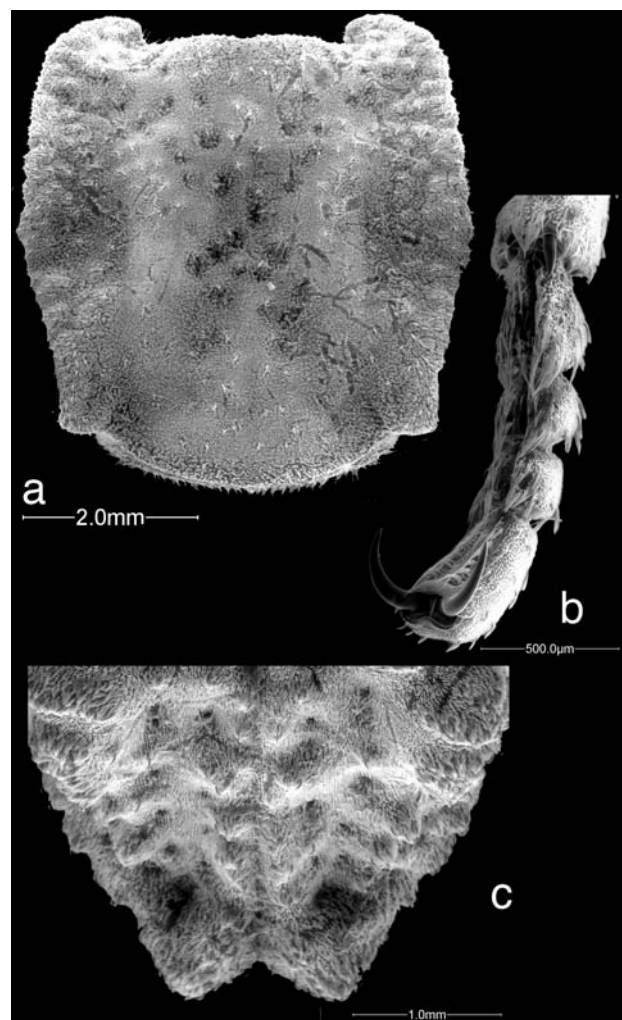
**Figure 14**  
Morphology of the oral region of *Nosoderma sylvaticum*. **14a.** Ventral view of mentum and labial palpi. **14b.** Shallow piliferous fossae on ventral side of prementum. **14c.** Ventral view of maxilla. **14d.** View of mandible. Note the shape of the incisor tooth. **14e.** Dorsal view of labrum and hypopharynx. **14f.** Detail of hypopharynx.

surface of prothorax densely covered with setae, with occasional deep fossae, and a very short but evident hypomerall groove in the anterior portion. Scutellum hidden under the pronotum, large and with smooth tubercles and postulate setae, which are denser on the posterior surface.

Legs completely pilose, with dense short pubescence, scattered with hook-shaped brown setae, with the exception of a small smooth patch (femoral callosity) on the internal surface of male femora; surface of these black ovate callosities is smooth with fine pores unevenly dispersed; ventral surface of tarsus with two rows of parallel-sided setae that give a grooved appearance to the tarsus; terminal tarsal segment with two strong claws (Fig. 15b).

Elytra 1.6 to 1.7 times longer than wide, with marked posterior tuberculation, densely covered with leaf-shaped golden setae alternating with hook-shaped brown setae, the latter being more abundant on the ridges; small setiferous fossae are dispersed and almost completely obliterated by pilosities; sutural region flat; elytral posterior declivity marked, with strong tubercles (Fig. 12b, 15c); apices acutely prominent, markedly diverging from each other (Fig. 12a, 15c).

Male genitalia similar to that of *N. doyeri* and *N. emarginatum*

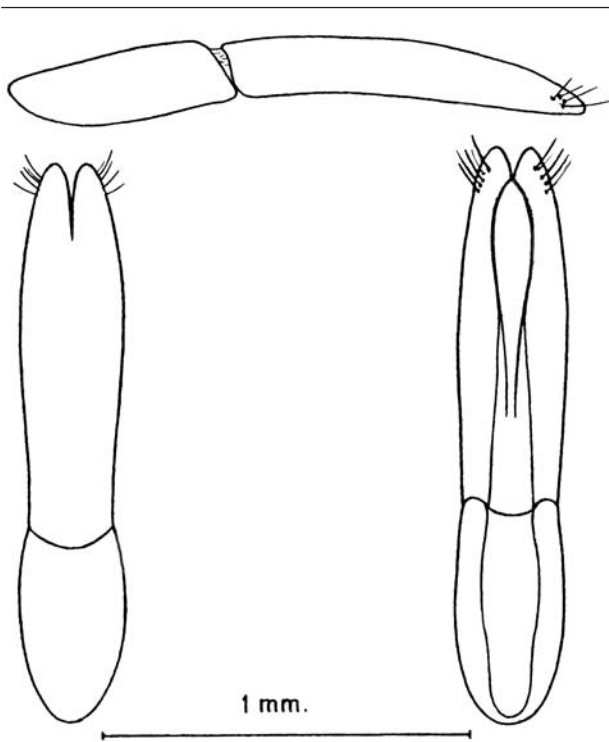


**Figure 15**  
Taxonomically informative characters of *Nosoderma sylvaticum*. **15a.** Dorsal outline of prothorax showing postero-lateral angles. **15b.** Ventral view of tarsus. **15c.** Dorsal view of apical declivity of elytra.

(Fig. 16). Female genitalia similar to those of *N. doyeri* (see García-París et al. 2001: fig. 30), but in *N. sylvaticum*, the distal terminus of the genital chamber is bilobed, instead of continuous as in *N. doyeri*; the transverse rods of the crossbow more sinuous in *N. sylvaticum*.

**Variability and referred specimens.** Paratypes 1-4 differ slightly in the extent and protrusion of dorsal tubercles.

We refer tentatively to *N. sylvaticum* two specimens from Nuevo León: Chipinque Mesa, 29-VIII-69 (J. Haddock, J.T. Doyen), which share a general elytral sculpture pattern (Fig. 12c) and female genitalia (Fig. 17), but differ by having almost rounded postero-lateral angles of pronotum; less pronounced elytral posterior declivity; subequal posterior tubercles, instead of variable in size and height; almost continuous dorsal tubercle series, without deep interruptions. These specimens might represent a different species, other than *N. sylvaticum*, but more material is needed to make a decision.



**Figure 16**  
Schematic drawing of parameres of male genitalia of *Nosoderma sylvaticum*.

**Secondary sexual characters.** Males have a large oval black tuberosity completely free of setae on the interior surface of the femora.

**Derivatio nominis.** The name “*sylvaticum*”, meaning “of the woods”, refers to the habitat of the species, dark cloud forests. It is derived from the latin noun “*sylva*” (forest, woods) and the suffix “*-aticum*” indicative of procedence or habitat.

**Geographic range.** Known from the type locality, Alta Cima (Rancho del Cielo) in Gómez Farías Municipality and from 20 mi [32.18 km] N Ciudad Victoria, both locations on small patches of Tamaulipan Cloud Forest (described in detail by Martin, 1955, 1958). The specimens from Mesa Chipinque, are tentatively assigned to this species.

**Ecological remarks.** The two specimens from Alta Cima were found active on rotten fallen logs covered by fungi at the trail side on a rainy night (21-23 h). The species inhabit the cloud forest between 700 and 1400 m of altitude. The area presents a wet subtropical climate (Martin 1955).

### Discussion

As it is evident from the descriptions above, there are a number of characters that unambiguously distinguish among the species of the group, however most of these characters are not informative to define groups above the species level, since they mostly represent autapomorphies. The few characters previously used in phylogenetic analyses were treated as constant

among species within each of the genera (Slipinsky & Lawrence 1999), but they are in fact variable among representatives of the former genus *Noserus* and also in *Nosoderma*. There is a trend from having a deep and long hypomerale groove in *Phloeodes diabolicus*, deep but short in *P. plicatus* (*Noserus sensu auct.*), shallow in *P. emarginatus*, *P. doyeri* (*Noserus sensu auct.*), *N. lutosum* and *N. sylvaticum* (*Nosoderma*), to almost absent in *N. aequale* (*Nosoderma*). A similar trend occurs with respect to the presence of a longitudinal groove along the ventral mid-line of each tarsal segment. This “groove” is a denudated space flanked by two rows of setae, rather than a deep structural modification. This character is well defined in *P. diabolicus*, but becomes less evident in *P. plicatus*, *P. doyeri* (*Noserus sensu auct.*) and *N. sylvaticum*, up to its complete obliteration in the Neotropical *Nosoderma*. On the other hand, defining polarity in the evolution of these characters is very complicated because the genus *Zopherus* (putative sister taxon of the *Nosoderma* assemblage, and potential outgroup) is derived in many morphological characters, including the presence of a deep and long hypomerale groove and the tarsus deeply grooved, whereas in *Meralius* the tarsus is not grooved and the hypomerale groove is almost absent or limited to a small anterior fossa. Two characters, the presence of a medial suture filled with setae in the male femoral tuberosity, and the presence of a fossa in the distal inflated area of the antennal segment 9, are shared among the Californian species: *N. plicatum* and *N. diabolicum* (including *N. pustulosum*). These two likely derived characters represent a synapomorphy for the western (Pacific) taxa, however, we do not believe these traits justify the recognition of a distinct genus (*Phloeodes*) for this set of species. The remaining characters examined show either a diversity that seem to correspond to species level differences (mouthparts and sculpture details), or they are homogeneous across taxa (genitalia). Consequently, with the information at hand, we consider that *Noserus* and *Phloeodes* should be synonymized with *Nosoderma*. Appendix 2 presents a check list of the species included in *Nosoderma sensu novo*.

### Taxonomic review of the Nearctic species of *Nosoderma*

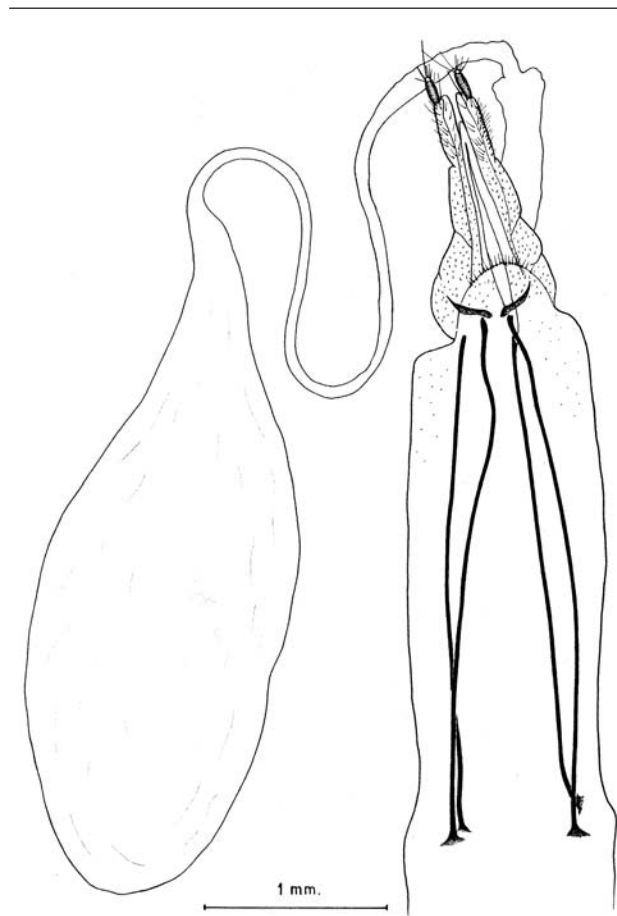
Although the separation between the Nearctic and Neotropical fauna is confusing and relatively arbitrary, there are two groups of species within *Nosoderma sensu novo* which, given their geographic isolation and affinities, can be considered typically Nearctic. One group (Pacific) occurs in the northwest of México (Baja California) and southwest USA (Alta California), and the second (Atlantic) in the mountains of northeastern

México (Nuevo León and Tamaulipas) and the extreme southeastern USA (Texas).

The Pacific group includes 13 species: *Nosoderma diabolicum* LeConte 1851, *N. pustulosum* LeConte 1859, *N. plicatum* LeConte 1859, plus 10 more species described by Casey (1907a; 1907b) (all of them previously included in the genera *Phloeodes* and *Noserus*). Most of the descriptions provided by Casey correspond mainly to descriptions of individual variations and not to species or geographic races as pointed out by Triplehorn (1972) in his review of the genus *Zopherus*. Doyen & Lawrence (1979) listed only three species of *Noserus* and *Phloeodes* from California and ignore the species described by Casey (1907a; 1907b). García-París *et al.* (2001) also questioned the taxonomic validity of four species described by Casey (1907a; 1907b), but none of these authors made a formal taxonomic change.

Casey's (1907a; 1907b) descriptions of *Noserus* (*N. collaris*, *N. convexulus*, *N. corrosus*, and *N. torvus*) were based on modifications in the elytral sculpture and body shape. *Noserus collaris* was described based on a single specimen from "California" which differed from *N. plicatum* in the shape of the prothorax, with the lateral margins more parallel-sided and rounded at the posterior edges (Casey 1907a). *Noserus torvus* was described based on more than a single specimen (perhaps two) also from "California". These specimens differed from *N. plicatum* by their smaller size, narrower body shape, longer prothorax with denser and thicker tubercles towards the sides and more dispersed and thinner tubercles in the rest of the pronotal surface (Casey 1907a). The description of *N. convexulus* was based on a single specimen, also from "California", with a more convex and robust body shape, and with a denser pubescence (Casey 1907b). Finally, *N. corrosus* was described with material from Los Angeles Co. (California), which differs from *N. plicatum* in details of the dorsal sculpture (Casey 1907b).

We had the opportunity to examine the type specimens for those taxa described by Casey. In our opinion, none of the differences considered by Casey (*op. cit.*), nor others we have observed in the type material, justify the species status for these taxa, and we therefore consider all of them to be junior synonyms of *N. plicatum* (see appendix 2). *Nosoderma plicatum* has a wide geographic distribution, more or less continuous from the central regions of Alta California (USA), from Mendocino and Napa Counties in the north, to San Diego County in the south (appendix 1). Further south, there are some reports from the Sierra San Pedro Mártir in Baja California (México) (García-París *et al.* 2000). The species is found during daylight



**Figure 17**  
Female genitalia of a specimen from Mesa Chipinque (Nuevo León, México), tentatively ascribed to *Nosoderma sylvaticum*.

under bark of fallen logs and vertical stumps, especially *Quercus*, and at night they are frequently seen walking on logs and old decaying trees.

Casey (1907a) described six more species of the genus *Phloeodes*: *P. ovipennis* described from "California", *P. elongatus* described from "California (Kern Co.)", *P. scaber* described from "California (near San Diego)", *P. latipennis* described from "California", *P. angustus* described from "California", and *P. remotus* also described from "California". Although we have not examined the type material for those taxa, a comparison of the descriptions with material of *Nosoderma diabolicum* LeConte 1851 and *Nosoderma pustulosum* LeConte 1859 we conclude that all of those species are synonyms of the species described by LeConte (1851; 1859) (appendix 2), in agreement with what Doyen & Lawrence (1979) suggested previously.

One issue that has not been resolved yet is whether *N. diabolicum* and *N. pustulosum* are different species. The characters used to distinguish them seem to be valid, but we have examined some specimens with intermediate characters from Monterey and Los Angeles Counties (Alta California, USA). There is also local variation in those characters. This problem requires a more detailed study with large samples from several populations along the distribution ranges of both species.

The *Nosoderma emarginatum* species group (Atlantic) found in the mountains of northeastern México and southeastern USA, includes two species described under the genus *Noserus*: *N. emarginatum*, *N. doyeri* (García-París et al. 2000, 2001), and the species described in this study, *N. sylvaticum*. *Nosoderma doyeri* is highly distinct in morphology and shows a geographic distribution so far restricted to Cerro Potosí (Nuevo León, México). *Nosoderma emarginatum* (Horn 1878) is another species with a unique morphology described from Texas (USA). The presence of this species in México was recorded from two localities: Mesa Chipinque (Nuevo León), and 20 mi. N Ciudad Victoria (Tamaulipas) (García-París et al. 2000). A direct comparison between these samples and type specimens of *N. emarginatum*, *N. doyeri*, and *N. lutosum* indicates that these specimens correspond tentatively to *N. sylvaticum* (see paragraph above on referred specimens).

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## Appendix 1

Material examined: The following abbreviations are used to indicate deposition of specimens: CAS (California Academy of Sciences, San Francisco, USA), EMUCB (Essig Museum of Entomology, University of California at Berkeley, USA), CNIN-IBUNAM (Colección Nacional de Insectos del Instituto de Biología, Universidad Nacional Autónoma de México, México), MCZ (Museum of Comparative Zoology, Harvard University, Cambridge, USA), and MNCN (Museo Nacional de Ciencias Naturales, CSIC, Madrid, Spain). Type material examined is not included among the specimens listed below.

### *Nosoderma doyeri* (García-París, Coca-Abia & Parra-Olea 2001)

MÉXICO: NUEVO LEÓN: Cerro Potosí, 2600-3200 m, 23-V-1996, 1 ex. (M. García-París & G. Parra-Olea leg.) (MNCN).

### *Nosoderma emarginatum* (Horn 1878)

USA: TEXAS: Sommerset, 11-VII-1958, 1 ex. (E. S. Ross) (CAS); 7 m. S.W. 24-XII-1942, 1 ex. (CAS).

### *Nosoderma sylvaticum* (García-París, Coca-Abia & Parra-Olea sp. nov.)

MÉXICO: NUEVO LEÓN: Chipinque Mesa, 29-VIII-1969, 2exs. (J. T. Doyen) (EMUCB)(possibly representing and undescribed species).

### *Nosoderma diabolicum* (LeConte 1851)

USA: CALIFORNIA: Fresno Co.: Pine Flat, Kings River, 15-XI-1994, 1 ex. (M. García-París) (MNCN). Kern Co.: 20 mi E Delano hwy 155, 11-V-1997, 3 exs. (M. García-París & C. Martín) (MNCN); South Fork of Kern Canyon, 27-III-1994, 4 exs. (M. García-París & C. Martín) (MNCN). Madera Co.: Bass Lake, 25-III-1994 (M. García-París) (MNCN). Monterey Co.: Hastings, Carmel Valley, 25-II-1993, 7 ex. (M. García-París) (MNCN), 20-I-1994, 4 exs. (M. García-París) (MNCN); 5-XI-1994, 1 ex. (M. García-París & E. Jockusch) (MNCN); Los Padres NF, Arroyo Seco Camp, 16-XI-1993, 5 exs. (M. García-París & E. Jockusch) (MNCN), 26-II-1993, 2 exs. (M. García-París) (MNCN); Ranchería Rd., 44 mi. SW Parkfield, 1-XII-1994, 1 ex. (M. García-París & E. Jockusch) (MNCN). San Diego Co.: 5-XI-1914, 1ex. (E P Van Duzee) (CAS). San Luis Obispo Co.: Pozo Rd., Los Padres NF, 1-XII-1994, 3 exs. (M. García-París & E. Jockusch) (MNCN); 16-XI-1993, 2 exs. (M. García-París) (MNCN), 8-III-1998, 7 exs. (M. García-París & Parra-Olea) (MNCN), 30-IX-1994, 2 exs. (M. García-París & E. Jockusch); vic. Cholame, 2-XII-1944, 1 ex. (M. García-París & E. Jockusch) (MNCN); Rinconada Trail Head, Santa Margarita, 1-XII-1994, 1 ex. (M. García-París & E. Jockusch) (MNCN). Tulare Co.: N of Sherman Pass, 27-III-1994, 1 ex. (M. García-París) (MNCN).

### *Nosoderma plicatum* (LeConte 1859)

MEXICO: BAJA CALIFORNIA NORTE: La Zanja, Sierra San Pedro Martir: 16-VI-53, 1 ex. (J. P. Figg-Hoblyn) (CAS). USA: ARIZONA: Yuma, 3-VII-36, 1 ex. (D. L. Tiemann collector) (EMUCB). CALIFORNIA: Cal, 1 ex. (A. Fenyes Collection) (CAS); S. Calif., 13-IX-02, 1 ex. (Bebb., R. Hopping collection) (CAS); S. F. Bay Area: 1 ex. (D. Giuliani collector) (CAS); Tamrack, 8-VII-1961, 2 exs. (R. T. Garnett Coll.) (CAS). Alameda Co.: Berkeley, 16-IV-16, 1 ex. (EMUCB), 4-III-1950, 1 ex. (C. A. Campbell) (EMUCB), 4-IV-1979, 1 ex. (D. Cox collector) (EMUCB); B.S.A. Camp Oakland, 11-VII-43, 1 ex. (R. Schuster collector) (EMUCB); Dimond, 15-V-10, 2 ex. (CAS); Jewel Lake, Tilden Pk., 24-VIII-1956, 3 ex. (G. W. Frankie collector) (EMUCB); Jewel Lk., Tilden Pk., 15-X-63, 1 ex. (J. Doyen) (EMUCB); Niles Canyon, IV-1930, 1 ex. (L. W. Saylor) (CAS); Oakland, 25-II-06, 1 ex. (Van Dyke Collection) (CAS), 18-IV-37, 1 ex. (K.S. Hagen collector, H. Chandler Collection, F.E.B. Leg. 11663) (CAS), 16-I-49, 1 ex. (D. Giuliani) (CAS); Sunol, 24-IV-21, 1 ex. (EMUCB); Tilden Park, 2 mi. E Berkeley: 3-XI-62, 6 exs. (EMUCB); Tilden Regional Park 8-III-1987, 1 ex. (Stackwell) (EMUCB); U.C. Gill Tract, Albany: 8-XI-86, 1 ex. (D. Nastel) (EMUCB). Contra Costa Co.: Danville, 12-I-1952, 1 ex. (F. X. Williams, on gill fungus) (CAS); Mitchels Canyon, 27-V-61, 4 ex. (R. M. Brown) (CAS); Mt. Diablo: 10-II-35, 2 exs. (E C Van Dyke collector, Van Dyke Collection) (CAS); Orinda, II-37, 2 exs. (E. S. Ross collection); (CAS); Russelman Park, Mt. Diablo, 12-V-62, 1 ex. (C. W. O'Brien) (EMUCB); Tilden, IV-26-49, 1 ex. (Johnston) (EMUCB); Tilden Regional Park, 1-III-1986, 1 ex. (R. Lee collector) (EMUCB); Wildcat Cyn., 26-I-1979, 4 ex. (J. K. Liebherr) (EMUCB). Fresno Co.: Jacalitos Cr., 6 mi. SSW of Coalinga, 26-II-1960, 1 ex. (D. C. Kanta) (CAS). Kern Co.: Havilah, 16-VI-05, 1 ex. (Coll. by F. Grinnell, Van Dyke Collection) (CAS); O'Neil Canyon, Lebec, 15-XII-1994, 1 ex. (M. García-París) (MNCN); Sugar Loaf, Portuguese Pass, 26-II-1994, 1 ex. (M. García-París) (MNCN); Tejon Pass, 12-V-1927, 1 ex. (F. H. Wymore collector) (CAS); Tehachapi Mt. Park: 17-XI-1968, 3 exs. (P. A. Opler) (EMUCB). Los Angeles Co.: Azusa, VI, 1 ex. (CAS); Big Dalton Dam, 1 ex. (W. C. Bentinck collector) (EMUCB); Coldbrook Guard Station, San Gabriel Mtns., 1-VI-46, 1 ex. (coll. by H.) (EMUCB); Griffith Pk., 9-VII-38, 1 ex. (E. Herald collector) (CAS); Mt. Wilson, VII-05, 1 ex. (CAS), 30-IV-16, 8 exs. (J. O. Martin collector) (CAS), 30-X, 1 ex. (CAS); Pasadena, III-97, 4 exs. (A. Fenyes Collection) (CAS), 1 ex. (A. Fenyes Collection) (CAS), 1 ex. (J. C. Huguenin Collection) (CAS); San Antonio Canyon, 18-V-32, 1 ex. (Press by Thes Craig Collector) (CAS); San Antonio Canyon, 27-V-32, 1 ex. (T. Craig collector) (CAS); Santa Anita Canyon: 11-IV-16, 1 ex. (J. O. Martin collector) (CAS), 21-XII-36, 3 exs. (D. L. Tiemann collector) (EMUCB); Santa Monica Canyon: 1 ex. (Blaisdell Collection) (CAS); Sierra Madre, V-1917, 2 exs. (J. A. Kusche Collector, Van Dyke Collection) (CAS); Tanbark Flat, 4-VI-50, 1 ex. (H. M. Graham collector) (EMUCB), 19-VI-50, 1 ex. (B. Adelson collector) (EMUCB), 19-VI-50, 1 ex. (J. W. MacSwain collector) (EMUCB), 20-VI-50, 1 ex. (H. M. Graham collector) (EMUCB), 21-VI-50, 1 ex. (T. R. Haig collector) (EMUCB), 22-VI-50, 3 exs. (R. Schuster collector) (EMUCB), 22-VI-50, 1 ex. (T. R. Haig collector) (EMUCB), 24-VI-50, 2 exs. (F. X. Williams) (CAS), 25-VI-50, 1 ex. (R. S

- chuster collector) (EMUCB), 25-VI-50, 1 ex. (W. C. Bentinck collector) (EMUCB), 25-VI-50, 2 exs. (T. R. Haig collector) (EMUCB), 27-VI-50, 2 exs. (T. R. Haig collector) (EMUCB), VII-1950, 1 ex. (B. J. Adelson) (EMUCB), 2-VII-50, 2 exs. (F. X. Williams) (CAS), 6-VII-1950, 1 ex. (H. Ruches Jr., B. J. Adelson) (EMUCB), 7-VII-50, 1 ex. (E. G. Linsley collector) (EMUCB), 14-VII-50, 6 exs. (R. Schuster collector) (EMUCB), 18-VII-50, 1 ex. (R. Schuster collector) (EMUCB), 29-V-1952, 1 ex. (J. J. Menn) (EMUCB), 5-VI-1952, 2 ex. (J. J. Menn) (EMUCB), 3-VII-52, 3 ex. (J. Linsley collector) (EMUCB), 5-VII-52, 3 ex. (J. Linsley collector) (EMUCB), 11-VII-1956, 1 ex. (J. I. Stage collector) (EMUCB), 18-VI-1956, 1 ex. (J. I. Stage collector) (CAS), 18-VI-1956, 2 exs. (J. I. Stage collector) (EMUCB); Westwood Hills, 18-III-36, 1 ex. (D. L. Tiemann collector) (EMUCB). Madera Co.: Bass Lake: 9-VI-37, 1 ex. (EMUCB). Marin Co.: Mill Valley, 16-V-49, 1 ex. (R. E. Leech collector) (CAS); Mill Valley, 8-VI-1950, 1 ex. (Mrs. Buchley) (CAS); Mt. Tamalpais, 1 ex. (F. E. Blaisdell collector, Blaisdell Collection) (CAS). Mendocino Co.: Hopland Field Sta., Riley Ridge, el. 1900', 8-V-1970, 1 ex. (R. E. Dietz) (EMUCB); Hopland Field Sta. Hdqtrs. Lk., 13-VI-73, 1 ex. (Bentzien) (EMUCB); Hopland Field Sta., 15-VI to 6-VII-1973, 2 exs. (M. M. Bentzien, pitfall) (EMUCB); 1.4 mi. SW Poor Ranch Hopland Exp. Sta., 28-IV-72, 1 ex. (E. Rogers) (EMUCB); NCCR 8 Km N Branscomb (Pitfall # 41), 15-VIII-1982, 3 exs. (coll. Don Weber) (EMUCB), 15-VII-1983, 6 exs. (coll. Don Weber.) (EMUCB). Monterey Co.: Arroyo Seco, 24-V-1955, 1 ex. (D. M. Maddox collector) (CAS); 5 mi. NE Arroyo Seco Guard Sta. 800': 4-V-75, 1 ex. (J. Powell) (EMUCB); Paloma Creek, 4 mi. air NE Arroyo Seco Guard Sta., 850', 4-V-75, 2 exs. (J. A. Chemsak) (EMUCB); Arroyo Seco Camp, Los Padres Nat. Forest, 16-XI-1993, 3 exs. (M. García-París); 1-XII-1994, 2 exs. (M. García-París & E. Jockusch) (MNCN); 26-II-1993, 1 ex. (M. García-París); Carmel, 9-VI-1908, 1 ex. (L. S. Slevin Collection) (CAS), 15-VI-1908, 1 ex. (L. S. Slevin Collection) (CAS), 1-VII-1908, 1 ex. (L. S. Slevin Collection) (CAS), 15-VI-1908, 1 ex. (EMUCB), 9-VIII-1908, 1 ex. (L. S. Slevin Collection) (CAS), 22-IX-1908, 1 ex. (L. S. Slevin Collection) (CAS), 29-IX-1908, 1 ex. (L. S. Slevin Collection) (CAS), 20-X-1908, 2 exs. (L. S. Slevin Collection) (CAS), 20-V-1909, 1 ex. (L. S. Slevin Collection) (CAS), 12-III-1911, 1 ex. (L. S. Slevin Collection) (CAS), 12-VI-1914, 1 ex. (L. S. Slevin Collection) (CAS), 24-III-1919, 1 ex. (E. P. Van Duzee Collector) (CAS), 27-V-1919, 1 ex. (L. S. Slevin Collection) (CAS); Fort Ord, 20-VI-59, 1 ex. (D. H. Bartholomew) (CAS); 3 mi. SE Hastings Reservation, 2200', 4-V-75, 1 ex. (J. A. Chemsak) (EMUCB); Hastings N. H. Reservation, 29-V-1982, 2 exs. (C. Ulrich) (EMUCB); Jamesburg, 29-IV-18, 1 ex. (Donor L.S. Slevin Coll.) (CAS); 17 air mi. WSW King City (Escondido Camp.), 19-IV-1969, 4 exs. (J. T. Doyen collector) (EMUCB); Pacific Grove, 6-IX, 1 ex. (Blaisdell Collection) (CAS), 4-VI-04, 1 ex. (A. Fenyas Collection) (CAS), 27-X-1935, 1 ex. (L. S. Slevin) (CAS); Paraiso Springs, 16-V-1912, 1 ex. (L. S. Slevin Collection) (CAS), 1-VI-1923, 1 ex. (L. S. Slevin) (CAS), 27-V-1924, 1 ex. (L. S. Slevin) (CAS), 9-V-1928, 1 ex. (L. S. Slevin) (EMUCB); Pfeiffer State Park, elev. 50 feet, 17-VI-1947, 1 ex. (under bark of decaying *Quercus agrifolia*, L. L. Jensen collector) (EMUCB); Salinas, 17-V-53, 1 ex. (Menees collector) (EMUCB); Tassajara Spgs., 17-X-1908, 1 ex. (L. S. Slevin Collection) (CAS); Tassajara, 27-V-20, 1 ex. (L. S. Slevin Collection) (CAS). Napa Co.: Calistoga, 15-VIII-45, 1 ex. (D. Giuliani) (CAS); Pope Valley, 3-II-76, 1 ex. (EMUCB). Nevada Co.: Bowman Lake, 22-VIII-52, 1 ex. (P. S. Bartholomew) (CAS). Orange Co.: Fullerton, 30-V-1951, 2 exs. (J. W. Hinerman collector) (EMUCB); Trabuco Canyon, 3 exs. (J. K. Drew colltr.) (CAS). Riverside Co.: Mill Canyon. Banning, 25-V-1960, 1 ex. (Chenault. D. C. Rentz) (CAS). San Benito Co.: East of Tres Pinos, elev. 2000 ft., 24-VI-33, 1 ex. (F. E. Blaisdell) (CAS); Pinnades Nat. Mon., 11-IV-54, 1 ex. (C. D. Holton) (EMUCB), 18-VI-1958, 3 exs. (P. S. Bartholomew) (CAS), 21-VII-1959, 2 exs. (G. W. Frankie collector) (EMUCB); Gonzalez Hwy. 25, 19-III-1994, 1 ex. (M. García-París & C. Martin) (MNCN). San Diego Co.: Anza Borrego Desert, 8-VI-68, 1 ex. (F. Hovore) (EMUCB); Julian, 4 mi N (nr Volcan Mt.), 15-XI-68, 3 exs. (P. A. Opler collector) (EMUCB); San Marcos Pass, 16-VI-58, 6 exs. (P. S. Bartholomew) (CAS); Volcan Mt.: 2 exs. (F. E. Blaisdell collector, Blaisdell Collection) (CAS). San Francisco Co.: San Francisco, 29-V-10, 1 ex. (F. E. Blaisdell collector) (Blaisdell Collection) (CAS). San Luis Obispo Co.: 31-III-1948, 1 ex. (J. W. MacSwain collector) (EMUCB); Arroyo Grande, 28-III-1937, 1 ex. (P.T. & R.M.) (CAS); Atascadero, 23-XI-39, 1 ex. (G. S. Mansfield) (CAS), 25-XII-39, 2 exs. (G. S. Mansfield) (CAS); Atascadero, 5 mi. W, 13-XI-1968, 1 ex. (J. T. Doyen collector) (EMUCB); Dune Lakes, 3 mi. S. Oceano, 26, 27-IV-73, 2 exs. (J. Powell) (EMUCB), 28-VIII-76, 1 ex. (P. Rude, J. T. Doyen) (EMUCB); Prefumo Canyon Rd., 12-XI-1994, 1 ex. (M. García-París & E. Jockusch leg.) (MNCN); San Luis Obispo, 22-IV-19, 1 ex. (E. P. Van Duzee collector) (CAS), 28-IV-19, 1 ex. (E. P. Van Duzee Collector) (CAS), 15-1940, 1 ex. (Parker Talbot) (CAS); 5 mi. NE Santa Margarita, 18-V-1965, 1 ex. (P. Welles collector) (EMUCB). San Mateo Co.: Jasper Ridge, 15-X-39, 3 exs. (G. S. Mansfield) (CAS). Santa Barbara Co.: Buellton, 9-V-34, 2 exs. (CAS); Cachuma Hwy. 54, 18 mi. SE Hwy. 101, el. 800', 4-XII-1981, 1 ex. (J. K. Liebherr) (EMUCB); 6 mi. SE Lompoc, 14-III-67, 1 ex. (J. Powell) (EMUCB); 3 mi. E. Los Prietos Rgr. Sta., 15-XI-1968, 3 exs. (J. T. Doyen collector) (EMUCB); Los Prietos, 16-VI-58, 3 exs. (P. S. Bartholomew) (CAS); 3 mi. N Refugio Beach, 21-VI-1965, 2 exs. (J. Powell) (EMUCB), 24-VI-1965, 1 ex. (J. Powell) (EMUCB); Santa Barbara, 22-XII-28, 1 ex. (Van Dyke Collection) (CAS), 22-XII-28, 2 exs. (F. E. Blaisdell collector) (CAS), 3-I-32, 1 ex. (CAS); Santa Barbara Sea Sh., 1 ex. (F. Winters) (CAS); Santa Ynez Mts, V-38, 4 exs. (J. E. Blum) (CAS); 12 mi. N Sta. Ynez (Cachuma Camp), 5-V-1969, 3 exs. (J. Doyen) (EMUCB); 47 mi. E Sta. Maria (Bates Cyn Camp, 2500'), 4-V-1969, 3 exs. (J. Doyen) (EMUCB); Santa Cruz Island: 16-V-1919, 3 exs. (Coll by J. R. Slevin, Blaisdell Collection) (CAS), 18-V-1919, 6 exs. (E. P. van Duzee collector) (CAS); Santa Cruz Is., at Field Station, 20-XII-1967, 1 ex. (T. Briggs, K. Hom, A. Jung and J. Gee collectors) (CAS); Santa Cruz Id., Prisoner's Harbor Cr., 1-V-66, 7 exs. (J. Powell collector) (EMUCB); Sta Cruz Id. Prisoner's Harbor, 14-III-69, 3 exs. (J. Powell) (EMUCB), 14-III-69, 2 exs. (J. T. Doyen) (EMUCB); 16-III-69, 1 ex. (J. Powell) (EMUCB), 16-III-69, 2 exs. (J. T. Doyen) (EMUCB); Sta Cruz Id., Central Valley, 7-V-73, 1 ex. (G. Ballmer) (EMUCB); Sta Cruz Is., UC Sts, HQ, 2-II-79, 1 ex. (J. Doyen) (EMUCB); Santa Cruz Is., Cañada Cerrada, 4-II-79, 1 ex. (J. Doyen, under bark of *Pinus muricata*) (EMUCB). Santa Clara Co.: V-1936, 1 ex. (J. E. Blum) (CAS); Alum Rock Canyon, 9-X-40, 1 ex. (K. Frick) (EMUCB); Alum Rock Park, Santa Clara: 21-V-52, 1 ex. (Peterson collector) (EMUCB); Los Gatos, 1 ex. (D. Giuliani collector) (CAS), 31-VIII-47, 1 ex. (D. Giuliani collector) (CAS), 20-VIII-56, 2 exs. (D. Giuliani collector) (CAS); San Jose, 2-IV-40, 1 ex. (G. S. Mansfield) (CAS); Saratoga: 21-V-52, 1 ex. (Don Burdick Misc. 23.) (EMUCB).

Santa Cruz Co.: VI-34, 1 ex. (E. J. Blum) (CAS); 25-IV-32, 1 ex. (CAS); Mission Springs Conference Center, Scott's Valley, 1 ex. (K. Suzukawa) (EMUCB); Mt. Bermon, 18-I-22, 1 ex. (F. E. Blaisdell Collec.) (CAS), 20-VII-22, 2 exs. (F. E. Blaisdell Collec.) (CAS); Santa Cruz: III-17, 6 exs. (Press by E. A. Dodge) (CAS), 4-VIII-37, 1 ex. (EMUCB), 28-II-1961, 1 ex. (E. G. Jesberg) (CAS); Sta. Cruz Mts., 2 exs. (Koebele Collection) (CAS); 3 mi. N Soquel, 24-IV-1970, 1 ex. (J. A. Powell, under bark of *Umbellularia*) (EMUCB). Solano Co.: Davis, 1936, 1 ex. (J. J. Dubois collector) (EMUCB). Sonoma Co.: Cotati, 6 mi. air E, 7-IV-1968, 2 exs. (J. T. Doyen) (EMUCB); It. I. Fulton, 28-VI-55, 1 ex. (D. Rentz) (CAS). Tulare Co.: Big Fern Spr., 9 mi NE Ash Mt., HQ, 30-IV-79, 1 ex. (J. T. Doyen collector) (EMUCB); Cedar Greek, 10-VI-05, 3 exs. (R. Hopping collection) (CAS); Colony Road, 4000 ft., 1-V-1903, 2 exs. (R. Hopping) (CAS); Potwisha, 3 mi NE Ash Mt., HQ, 30-IV-79, 1 ex. (J. T. Doyen collector) (EMUCB); Sequoia Nat. Park, Potwisha, elev. 2000-5000 ft., 18-V-1924, 1 ex. (Van Dyke Collection) (CAS), 24-VI-1929, 2 exs. (Van Dyke Collection) (CAS); Sequoia Natl. Park, Paradise Valley, elev. 2000-5000 ft., 22-V-29, 1 ex. (Van Dyke Collection) (CAS); So. Fork of Kaweah New Trail, 28, 30-I-1905, 1 ex. (Hopping Collection) (CAS). Sugar Loaf, Tobias Mt., 28-VII-1994, 1 ex. (M. García-París & E. Jockusch) (MNCN). Ventura Co.: Rose Valley Falls, 3400' el., 18 mi. NE Ojai, V, IX-1980, 1 ex. (C. E. Griswold collector) (EMUCB).

### ***Nosoderma pustulosum* LeConte 1859**

USA: CALIFORNIA San Diego Co.: 1-II-1909 (Elbicksecker) (CAS, collection Blaisdell).

### ***Meralius echinatus* Guérin-Ménéville 1838**

CUBA: 1 ex. (Gundlach leg.) (MNCN).

### ***Zopherus granicollis* Horn 1885**

USA: CALIFORNIA: Kern Co.: Alta Sierra Hwy 155, 11-V-1997, 1 ex. (M. García-París & C. Martín leg.) (MNCN); 27-III-1994, 1 ex. (M. García-París leg.) (MNCN).

## Appendix 2

### **Catalogue of the species of the genus *Nosoderma***

#### ***Nosoderma* Solier 1838**

*Nosoderma* Solier 1841: 31. Lacordaire 1859: 92.

Type species: *Nosoderma morbillosum* Solier 1841 (subsequent designation by Gebien 1937: 669).

*Homaloderes* Solier 1841: 502, note (nomen nudum, Solier 1841: 31).

*Phloeodes* LeConte 1862: 216. Horn 1870: 271. Syn. nov.

Type species: *Nosoderma diabolicum* LeConte 1851 (designated by Casey 1907b: 470).

*Noserus* LeConte 1862: 216. Horn 1870: 271.

Type species: *Nosoderma plicatum* LeConte 1859 (LeConte & Horn 1883).

Synonymized with *Phloeodes* by Slipinsky & Lawrence (1999).

*Aegeonoma* Pascoe 1866: 487.

Type species: *Nosoderma diabolicum* LeConte 1851 (designated by Pascoe 1866: 487).

*Noserodes* Casey 1907b: 470.

Type species: *Noserodes squalidus* Casey 1907b (by original designation).

Synonymy by Doyen & Lawrence (1979).

*Sesaspis* Casey 1907b: 469.

Type species: *Nosoderma denticulata* Solier 1841 (by original designation).

Synonymy by Doyen & Lawrence (1979).

*Verodes* Casey 1907b: 470.

Type species: *Nosoderma aequalis* Champion 1884 (by original designation).

Synonymy by Doyen & Lawrence (1979).

*Noserosus* Doyen & Lawrence 1979: 345 (*lapsus* for *Noserus*).

### ***Nosoderma aequale* Champion 1884**

*Nosoderma aequale* Champion 1884: 44, tab. 2, fig. 14.

Loc. typ.: "MEXICO, Parada".

*Verodes aequalis* (Champion 1884): Casey 1907b.

### ***Nosoderma asperatum* Champion 1884**

*Nosoderma asperatum* Champion 1884: 45, tab 2, fig. 9.

Loc. typ.: "MEXICO".

### ***Nosoderma brevicollis* Casey 1907**

*Nosoderma brevicollis* Casey 1907b: 478.

Loc. typ.: "Mexico (Guerrero)".

### ***Nosoderma carinatum* Champion 1884**

*Nosoderma carinatum* Champion 1884: 48.

Loc. typ.: "MEXICO, Orizaba, Jacale, Las Vigas, Jalapa".

### ***Nosoderma championi* Casey 1907**

*Nosoderma championi* Casey 1907b: 476.

Loc. typ.: "Mexico (Guerrero)".

### ***Nosoderma denticulatum* Solier 1841**

*Nosoderma denticulatum* Solier 1841: 33, tab. 2, fig. 7.

Loc. typ.: "Mexique".

*Sesaspis denticulata* (Champion 1884): Casey 1907b: 469.

### ***Nosoderma diabolicum* LeConte 1851**

*Nosoderma diabolicum* LeConte 1851: 130. Lacordaire 1859: tab. 49, fig. 3.

Loc. typ.: "San Jose et San Diego" [California].

*Phloeodes ovipennis* Casey 1907a: 42. Gebien 1910: 96. Syn. nov.

Loc. typ.: "California".

*Phloeodes elongatus* Casey 1907a: 42. Gebien 1910: 96. Syn. nov.

Loc. typ.: "California (Kern Co.)".

*Phloeodes diabolicus* (LeConte 1851): LeConte 1862: 216.

### ***Nosoderma doyeri* (García-París, Coca-Abia & Parra-Olea 2001) comb. nov.**

*Noserus doyeri* García-París, Coca-Abia & Parra-Olea 2001: 145.

Loc. typ.: "MÉXICO: NUEVO LEÓN: Cerro Potosí, 2600-3200 m".

### ***Nosoderma emarginatum* (Horn 1878) comb. nov.**

*Noserus emarginatus* Horn 1878: 55.

Loc. typ.: "near San Antonio, Texas".

### ***Nosoderma exsculptum* Champion 1884**

*Nosoderma exsculptum* Champion 1884: 49.

Loc. typ.: "MEXICO, Jalapa, San Antonio de Arriba, Jacale, Durasnal".

*Nosoderma anceps* Champion, 1884: 50. Syn. nov.

Loc. typ.: "MEXICO, Jalapa, Mexico city".

Comments. Champion (1884) already suggested that *N. anceps* was possibly a variant of *N. exculptum*. We propose that *N. anceps* is a junior synonym of *N. exculptum* after the study of Champion's type specimens of both taxa, and large series of *N. exculptum* from Río Frio (México). In these series there are smooth transition between the typical *exculptum* morphology, narrower and with prominent elytral sculpture, to typical *anceps*, broader elytra with posterior rounded edges and less marked sculpture.

### ***Nosoderma guatemalense* Champion 1884**

*Nosoderma guatemalense* Champion 1884: 47, tab. 2, fig. 11.  
 Loc. typ.: "BRITISH HONDURAS, Rio Sarstoon;  
 GUATEMALA, Tonicapam, Purula, Chilasco, Calderas, Volcan de Fuego 6500 feet, San Gerónimo, Dueñas".  
*Noserodes guatemalensis* (Champion 1884): Gebien, 1910: 98.  
*Nosoderma guatemalensis* Champion 1884: Blackwelder 1945.

### ***Nosoderma impressum* Champion 1884**

*Nosoderma impressum* Champion 1884: 50.  
 Loc. typ.: "MEXICO, Jacale".

### ***Nosoderma inaequale* (Say 1835)**

*Eurychora inaequalis* Say 1835: 182.  
 Loc. typ.: "Mexico".  
*Nosoderma morbillosum* Solier 1841: 37, tab. 2, fig. 5.  
 Loc. typ.: "Mexique".  
*Nosoderma vicinum* Solier 1841: 38, tab. 2, figs. 1-4.  
 Loc. typ.: "Mexique".  
*Nosoderma inaequale* (Say 1835): Champion 1892: 490.  
*Nosoderma inaequalis* (Say 1835): Casey 1907b: 475.

### ***Nosoderma insigne* Champion 1884**

*Nosoderma insigne* Champion 1884: 48, tab. 2, fig. 13.  
 Loc. typ.: «MEXICO, Capulalpam».  
*Nosoderma insignis* Champion 1884: Blackwelder 1945.

### ***Nosoderma interruptum* Champion 1884**

*Nosoderma interruptum* Champion 1884: 47.  
 Loc. typ.: «MEXICO, Las Vigas».

### ***Nosoderma longipennis* Casey 1907**

*Nosoderma longipennis* Casey 1907b: 477.  
 Loc. typ.: "Mexico (Jalapa)".

### ***Nosoderma lutosum* Champion 1884**

*Nosoderma lutosum* Champion 1884: 46, tab. 2, fig. 8.  
 Loc. typ.: «MEXICO, Orizaba, Jalapa».  
*Noserodes lutosus* (Champion 1884): Gebien 1910: 98.

### ***Nosoderma plicatum* LeConte 1859**

*Nosoderma plicatum* LeConte 1859: 77.  
 Loc. typ.: "[Fort] Tejon", California.  
*Noserus plicatum* (LeConte 1859): LeConte & Horn 1883: 365.  
*Noserus collaris* Casey 1907a: 44. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: "California".  
*Noserus convexus* Casey 1907b: 474. Gebien, 1910: 96. Syn. nov.  
 Loc. typ.: "California".  
*Noserus corrosus* Casey 1907b: 474. Gebien 1910: 96. Syn. nov.

Loc. typ.: "California (Los Angeles Co.)".  
*Noserus torvus* Casey 1907a: 44. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: "California".  
*Phloeodes plicatum* (LeConte 1859): Slipinsky & Lawrence 1999: 19.

### ***Nosoderma pustulosum* LeConte 1859**

*Nosoderma pustulosum* LeConte 1859: 77.  
 Loc. typ.: "[Fort] Tejon", California.  
*Phloeodes scaber* Casey 1907a: 43. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: "California (near San Diego)".  
*Phloeodes latipennis* Casey 1907a: 43. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: "California".  
*Phloeodes angustus* Casey 1907a: 43. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: "California".  
*Phloeodes remotus* Casey 1907b: 472. Gebien 1910: 96. Syn. nov.  
 Loc. typ.: «California».  
*Phloeodes pustulosus* (LeConte 1859): LeConte 1862: 216.

### ***Nosoderma prominens* Casey 1907**

*Nosoderma prominens* Casey 1907b: 478.  
 Loc. typ.: «Mexico (Guerrero)».

### ***Nosoderma scabrosum* Solier 1841**

*Nosoderma scabrosum* Solier 1841: 36.  
 Loc. typ.: «Mexique».

### ***Nosoderma senex* Casey 1907**

*Nosoderma senex* Casey 1907b: 479.  
 Loc. typ.: "Mexico (Las Vigas)".

### ***Nosoderma sparsum* Champion 1884**

*Nosoderma sparsum* Champion 1884: 50, tab. 2, fig. 12.  
 Loc. typ.: "GUATEMALA, Desconsuelo, Pachoc, Tonicapam".  
*Noserodes sparsus* (Champion 1884): Gebien 1910: 98.

### ***Nosoderma squalidum* (Casey 1907) comb. nov.**

*Noserodes squalidus* Casey 1907b: 481.  
 Loc. typ.: "Costa Rica (Chiriquí)".

### ***Nosoderma subglabrum* Casey 1907**

*Nosoderma subglabra* Casey 1907b: 478.  
 Loc. typ.: "Mexico (Guerrero)".

### ***Nosoderma sylvaticum* García-París, Coca-Abia & Parra-Olea, sp. nov.**

*Nosoderma sylvaticum* García-París, Coca-Abia & Parra-Olea, sp. nov.  
 Loc. typ.: "MEXICO: TAMAULIPAS: Gómez Farías: Alta Cima".

### ***Nosoderma venustum* Champion 1884**

*Nosoderma venustum* Champion 1884: 45 tab. 2, fig. 7.  
 Loc. typ.: «GUATEMALA, Zapote, Volcan de Atitlan».  
*Noserodes venustum* (Champion 1884): Gebien 1910: 98.

### ***Nosoderma zunilense* Champion 1884**

*Nosoderma zunilense* Champion 1884: 46, tab. 2, fig. 10.  
 Loc. typ.: «GUATEMALA, El Tumbador, Cerro Zunil».  
*Noserodes zunilensis* (Champion 1884): Gebien 1910: 98.  
*Nosoderma zunilensis* (Champion 1884): Blackwelder 1945.