

LUCANUS ELAPHUS (COLEOPTERA: LUCANIDAE) DISCOVERED IN NEBRASKA, WITH BRIEF NOTES ON ITS BIOLOGY AND IDENTIFICATION¹

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ABSTRACT: *Lucanus elaphus*, a species of stag beetle found in the eastern United States, is recorded from Nebraska for the first time. Its discovery in the southeastern part of the state is a substantial westward range extension. Brief commentary is provided on its biology and identification.

The lucanids, or stag beetles, occur worldwide and consist of just over 800 species. They have been treated in comprehensive checklists by Benesh (1960) and Maes (1992) and in illustrated catalogs by Didier and Seguy (1953) and Mizunuma and Nagai (1994). The latter book is spectacular for its colored plates of the world fauna. There are about 25 species in eight genera in the United States (Ratcliffe, in press). Five species of Lucanidae occur in Nebraska, and these were comprehensively reviewed by Ratcliffe (1991). All of the Nebraska species are near the westernmost limit of their geographic ranges. *Lucanus elaphus* Fabr. was not included in this work because it was not then known to occur in Nebraska.

Lucanids are usually found in decaying stumps and logs in deciduous and coniferous habitats. Adults of some species are attracted to lights at night, and some feed on sap flows from fluxing trees. Their eggs are usually laid in crevices in bark or logs, and the larvae feed on decaying wood. The larvae resemble those of scarab beetles, but in lucanids the anal opening is longitudinal or Y-shaped whereas in scarabs it is usually transverse or rarely Y-shaped.

A prairie state like Nebraska is not usually considered as having suitable habitat for stag beetles because they are customarily associated with eastern deciduous forests. Most of the species in Nebraska are found in the southeastern part of the state where oak/hickory forests are found, usually as gallery forests (occasionally extensive) along rivers and streams.

There is also a lack of collecting in many parts of the state, and our lack of knowledge of what species occur in Nebraska is even more pronounced for species like stag beetles that are usually encountered only at lights or in rotted stumps or logs where they live.

The elephant stag beetle, *Lucanus elaphus* Fabr., is found in the eastern United States. Females are rarely collected. Its closest occurrence to Ne-

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braska seems to be in Indiana, Arkansas, and Oklahoma (Downie and Arnett 1996; Blackwelder and Arnett 1974). We report here a NEW STATE RECORD represented by two male specimens. The locality data are:

NE: Richardson Co., 1 mi W, 1 mi N Barada, VIII-1-2000, at lights, J. Georges collector, and NE: Richardson Co., Indian Cave State Park, VIII-6-1999, found dead, G. Birch collector.

Richardson County is in the southeastern corner of the state, and it has extensive tracts of eastern deciduous forest where this species would be most likely to occur. Nevertheless, the discovery of this species in Nebraska is a surprising westward range extension.

Lucanus elaphus is the largest stag beetle in North America. It is most easily distinguished from its congeners (*L. capreolus* (L.) and *L. placidus* Say in Nebraska) by its usually larger size (31-62 mm), males with the head much wider than the pronotum and with a distinct, ridge-like crest above and behind the eyes, males with the mandibles long and widely forked at the apex (Fig. 1), and females with the mentum quadrate (especially on the anterior angles).

The 1999 specimen is deposited as a voucher specimen in the Systematics Research Collections of the University of Nebraska State Museum.

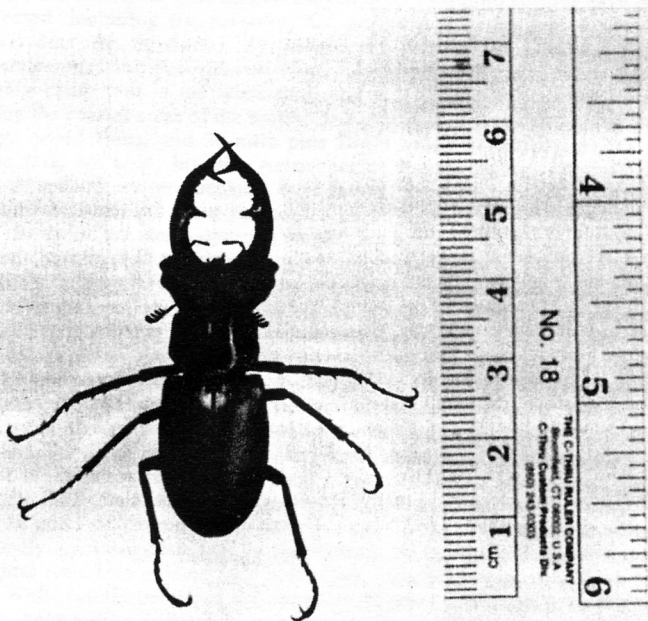


Fig. 1. *Lucanus elaphus* male collected in Richardson Co., Nebraska in August 2000.

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NEW SPECIES OF THE GENUS *TETRAOPES* SCHOENHERR (COLEOPTERA: CERAMBYCIDAE)

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Abstract.—Three new species of the genus *Tetraopes* Schoenherr are described: *T. crassus* and *T. crinitus* from Mexico and *T. skillmani* from Arizona. A key to all species is included and the new species are illustrated. *T. mankinsi* Chemsak and Linsley is transferred into *Phaea* Newman, new combination.

Key Words.—Insecta, Coleoptera, Cerambycidae, *Tetraopes*, new species, key.

Since Chemsak revised the genus *Tetraopes* Schoenherr in 1963, two new species have been described (Chemsak & Linsley 1979, Chemsak & Giesbert 1986). Three new species are described in this paper. A key to separate all the species of this genus is included.

Tetraopes crassus, NEW SPECIES

(Fig. 1)

Female.—Form broad, robust, cylindrical; integument reddish and black; pubescence moderately dense, long, dark, erect, appressed grayish pubescence dense. Head reddish, labrum and apices of mandibles black, very slightly narrower than pronotum; front convex, moderately coarsely, moderately densely punctate, each puncture giving rise to a long, dark, erect seta, underlying pubescence very fine, appressed, grayish; genae slightly longer than lower eye lobes; palpi with apical segments narrowing at apices, maxillary pair broader than labial; mandibles arcuate, deeply excavated dorsally at base; eyes small, very finely faceted, upper lobes widely separated; area between antennal tubercles shallowly impressed; antennae black, extending to second abdominal segment, segments from fourth narrowly pale annulate at bases, basal segments finely grayish pubescent beneath, scape with long, suberect, dark setae, segments from third with a sparse row of black, suberect setae beneath, becoming sparser toward apex, scape cylindrical, third segment subequal to first, fourth shorter than third, remaining segments becoming successively shorter, eleventh obtuse at apex. Pronotum reddish, broader than long, sides moderately lobed; apex broadly, shallowly impressed, base broadly, deeply impressed; umbone black, broad, very shallowly convex, slightly elevated, sides distinctly delimited; disk moderately coarsely, separately punctate, each puncture giving rise to a long, black, erect seta, each side with two black pubescent spots; basal margin narrowly black; sides finely, sparsely punctate, long erect, black setae rising from each puncture, umbone and basal margin with a underlying layer of very short, gray appressed pubescence; prosternum narrow, black, densely grayish pubescent; meso- and metasterna black, finely punctate, densely gray pubescent. Scutellum black, broad, densely pubescent. Elytra reddish, about 1.7 times longer than broad, sides parallel; punctures fine, sparse, becoming finer toward apex, each puncture giving rise to a long, black, erect seta; basal 1/3 with a black, transverse chevron which is broader near the suture and not extending to lateral margins; apical 1/3 with two transversely oval, black spots at middle,

black fasciae extending back from spots to apex; black areas clothed with grayish appressed pubescence; apices rounded. Legs short, stout; femora micropunctate, densely clothed with gray appressed pubescence; tibiae with suberect, black setae along outside margins; tarsi with claws appendiculate. Abdomen black with sternites micropunctate, densely gray pubescent except for narrowly glabrous apical margins on sternites 1–4; fifth sternite rounded at apex, impressed at middle. Length, 12 mm.

Male.—Unknown.

Type.—HOLOTYPE female from MEXICO: Jalisco, 3 mi NE Mazamitla, 12-VII-1982, A. J. Gilbert. Deposited in EMEC.

Diagnosis.—The larger, broader body, fine sparse punctures, the shape of the thoracic umbone, and the transverse, black chevron of the elytra make this species distinctive. The body size and shape of the umbone will separate it from *T. discoideus* LeConte. *T. umbonatus* LeConte differs by the prominently elevated umbone, coarser punctures and differently shaped elytral chevron.

Etymology.—Named for the broad, robust body shape.

***Tetraopes crinitus*, NEW SPECIES**

(Fig. 2)

Male.—Form moderate-sized, robust; integument reddish and black, underside black; pubescence dense, appressed, grayish, long erect, pale setae dense. Head reddish, usually infuscated on front, slightly narrower than pronotum; front strongly convex, moderately coarsely, densely, separately punctate; appressed pubescence fine, dense, grayish, erect setae long, dark, numerous; genae longer than lower eye lobes; maxillary palpi with apical segments slightly enlarged, narrowly ovoid; mandibles strongly angulate over apical 1/2; labrum dark brown, densely fringed with erect, golden hairs; eyes small, very finely faceted, upper lobes widely separated; antennae black, longer than body, segments finely gray pubescent beneath, long, erect, black hairs dense beneath on outer segments, outside with shorter hairs, scape bristling all over, third segment subequal in length to scape, fourth slightly longer than third, fifth shorter than fourth, remaining segments gradually diminishing in length toward apex, eleventh longer than tenth. Pronotum broader than long, sides shallowly rounded at middle; apical impression broad, shallow, basal impression broad, deep; umbone black, large, convex, moderately elevated, sides delimited, coarsely, contiguously punctate, very long, erect, black setae dense, each side with two black spots, apical 1/2 reddish; sides coarsely, densely punctate, long erect setae less numerous than on umbone; prosternum narrow, shallowly impressed, micropunctate, densely clothed with gray, appressed pubescence, intercoxal process very narrow; meso- and metasterna micropunctate, densely clothed with gray, appressed pubescence. Scutellum black, broadly rounded at apex. Elytra almost twice as long as broad, sides parallel; punctures over basal 1/2 large, subcontiguous, becoming smaller and more separated toward apex behind middle; appressed pubescence short, dense, grayish, erect setae long, dense; basal 1/2 with a vaguely diamond-shaped, dark chevron not extending to base or lateral margins, apical 1/3 with a transverse black chevron with oblong black spots at middle of anterior margins; apices rounded. Legs short, stout, micropunctate, densely clothed with gray appressed pubescence; tarsi with claws appendiculate. Abdomen densely micropunctate, densely clothed with fine, appressed, gray pubescence and long, pale, suberect hairs; fifth sternite with long, erect black setae over apical 1/2, rounded at apex. Length, 8.5–9 mm.

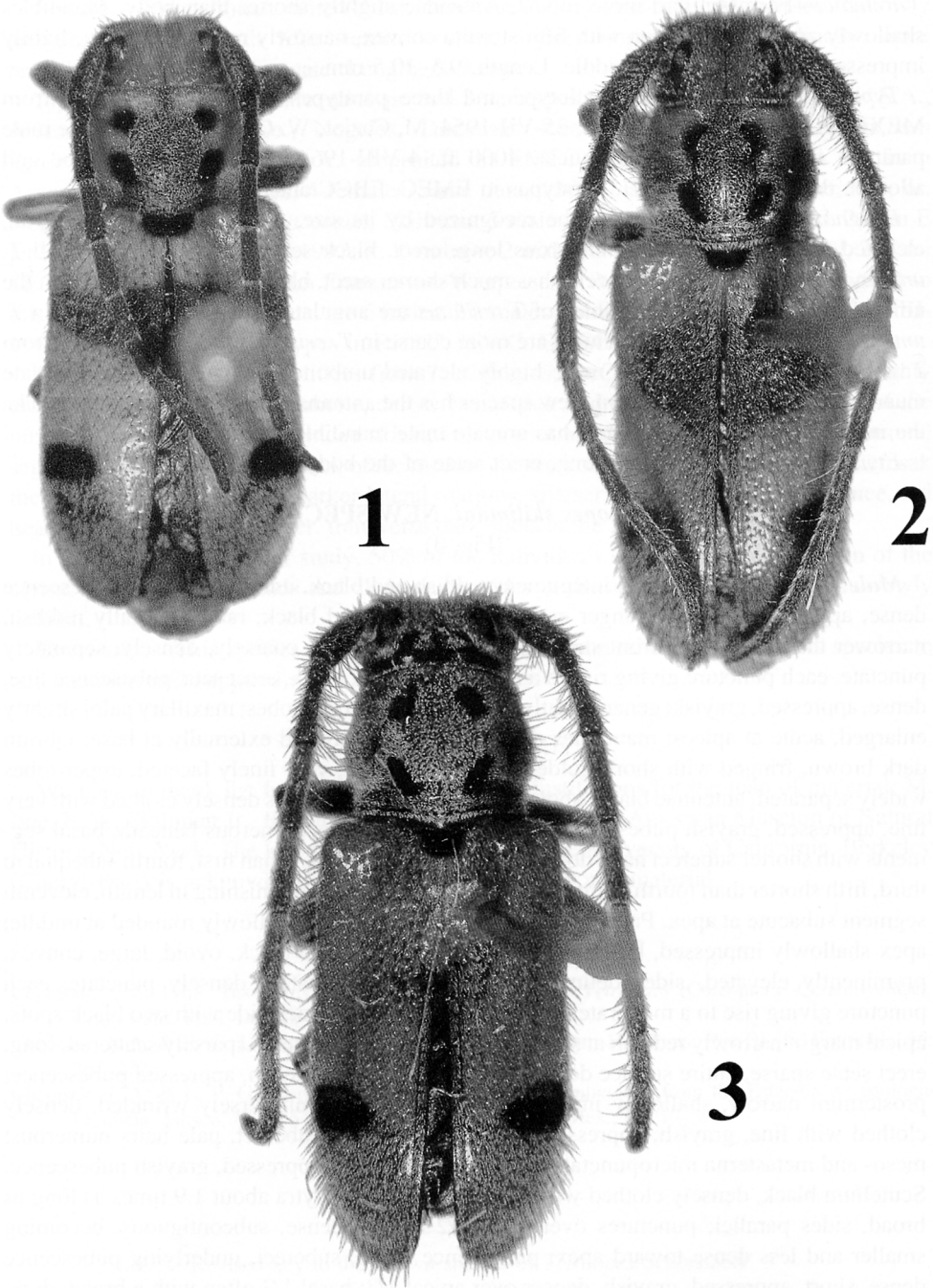


Figure 1. *Tetraopes crassus* Chemsak and Noguera, holotype female.
Figure 2. *Tetraopes crinitus* Chemsak and Noguera, holotype male.
Figure 3. *Tetraopes skillmani* Chemsak and Noguera, holotype male.

Female.—Form similar, more robust. Antennae slightly shorter than body. Mandibles shallowly arcuate. Abdomen with fifth sternite convex, narrowly rounded at apex, lightly impressed longitudinally at middle. Length, 9.5–10.5 mm.

Types.—HOLOTYPE male, allotype and three paratypes (2 males, 1 female) from MEXICO: Nayarit, 8 mi N Tepic, 25-VII-1954, M. Cazier, W. Gertsch, Bradts. One male paratype from Sinaloa: Santa Lucia, 4000 ft, 4-VIII-1964, W. Mason. Holotype and allotype deposited in AMNH. Paratypes in EMEC, EBCC and AMHN.

Diagnosis.—This species may be recognized by its size, color pattern of the elytra, elevated umbone and by the numerous long, erect, black setae. It resembles a small *T. umbonatus* LeConte but that species has much shorter erect, black setae, particularly on the umbone and elytra. The mandibles of *T. crinitus* are angulate in males and arcuate in *T. umbonatus* and the elytral punctures are more coarse in *T. crinitus*. *T. crinitus* differs from *T. discoideus* LeConte by the more highly elevated umbone, longer setae, and angulate mandibles of males. *T. skillmani*, new species has the antennae gray pubescent, often lacks the median chevron of the elytra, has arcuate male mandibles and shorter erect setae.

Etymology.—Named for the long, erect setae of the body.

Tetraopes skillmani, NEW SPECIES

(Fig. 3)

Male.—Form small, robust: integument reddish and black, underside black; pubescence dense, appressed, grayish, longer erect setae black. Head black, rarely partially reddish, narrower than pronotum; front strongly convex, moderately coarsely, densely, separately punctate, each puncture giving rise to a moderately long, black, erect seta, pubescence fine, dense, appressed, grayish; genae slightly longer than lower eye lobes; maxillary palpi slightly enlarged, acute at apices; mandibles arcuate, deeply excavated externally at base; labrum dark brown, fringed with short, golden hairs; eyes small, very finely faceted, upper lobes widely separated; antennae black, about as long as body, segments densely clothed with very fine, appressed, grayish pubescence, long, erect, black hairs numerous beneath, basal segments with shorter suberect hairs dorsally, third segment shorter than first, fourth subequal to third, fifth shorter than fourth, remaining segments gradually diminishing in length, eleventh segment subacute at apex. Pronotum broader than long, sides shallowly rounded at middle; apex shallowly impressed, basal impression deeper; umbone black, ovoid, large, convex, prominently elevated, sides delimited, disk finely, moderately densely punctate, each puncture giving rise to a moderately long, black, erect hair, each side with two black spots; apical margin narrowly reddish at sides; sides with small punctures sparsely scattered, long, erect setae sparse, entire surface densely clothed with fine, grayish, appressed pubescence; prosternum narrow, shallowly impressed at apex, finely, transversely wrinkled, densely clothed with fine, grayish, appressed pubescence, longer, suberect, pale hairs numerous; meso- and metasterna micropunctate, densely clothed with appressed, grayish pubescence. Scutellum black, densely clothed with black pubescence. Elytra about 1.9 times as long as broad, sides parallel; punctures over basal 1/2 coarse, dense, subcontiguous, becoming smaller and less dense toward apex; pubescence dense, suberect, underlying pubescence dense, short, appressed, grayish, denser over apical 1/3; basal 1/2 often with a broad, dark, usually diamond-shaped chevron, apical 1/3 black with a large, oblong black spot at middle of anterior margin; apices rounded. Legs short, stout, micropunctate, densely clothed with gray, appressed pubescence, long, pale hairs sparse; tarsi with claws appendiculate. Abdomen densely micropunctate, densely clothed with fine, grayish, appressed pubescence; fifth sternite with long, black, erect setae at apical 1/2 apex rounded. Length, 6–9 mm.

Female.—Form similar, more robust. Antennae shorter than body. Mandibles shallowly arcuate. Abdomen with fifth sternite convex, lightly impressed longitudinally, apex broadly rounded to subtruncate. Length, 8–9 mm.

Types.—HOLOTYPE male, allotype and 3 paratypes (2 males, 1 female) from U.S.A., Arizona, Santa Cruz Co., Nogales, Duquesne Road, 4-VIII-2001, on *Cynanchum ligulatum*, F. W. Skillman, Jr. (deposited in EMEC). Additional paratypes all from Arizona as follow: 7 males, 4 females, same data, 12-VIII-2001; 8 males, 5 females, nr. Nogales, 4-IX-1997, on *Funastrum*, Skillman; 5 males, 2 females, Duquesne Rd. 2.1 mi E jct hwy 82, 29 Aug, 1-3-IX-1997, R. Turnbow; 2 males, 3 females, Duquesne Rd, 2–3 mi SE hwy 82, 29-VIII-1997, on *Funastrum*, Wappes and Turnbow. Tentatively assigned to this species but not paratypical are 6 males, 2 females from Arizona, Yavapai Co., 26-VIII-1963, G. W. Frankie. Paratypes in RHTC, JEW, EMEC, EBCC and FWSC.

Diagnosis.—*T. skillmani* differs from *T. discoideus* LeConte by the much more highly elevated, convex thoracic umbone, denser punctation and denser black, erect setae of the umbone, less prominently rounded sides of the pronotum, densely gray pubescent antennal segments, and by the general lack of the median chevron of the elytra. In *T. linsleyi* Chemsak the umbone is reddish with darker lateral margins, sparser punctation and pubescence, red head and pronotum and larger, transverse dark spots at the apical 1/3 of the elytra.

In the series available for study, 50% of the individuals lack the median chevron of the elytra. All have black heads and all have the sides at the apex of the pronotum narrowly reddish.

Etymology.—This species is dedicated to Fred Skillman who first called this species to our attention and supplied many of the type series.

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APPENDIX

Revised key to the known species of *Tetraopes* Schoenherr*

1 Tarsal claws appendiculate	2
Tarsal claws bifid	8

* *Tetraopes mankinsi* Chemsak and Linsley, 1979 is transferred into *Phaea* Newman, new combination, because it does not fit into the definition of *Tetraopes*.

- 2(1) Thoracic umbone narrow, disk convex; sides of pronotum not lobed; median elytral chevron, if present, broad; form cylindrical 3
 Thoracic umbone broad, almost quadrate, disk flattened; sides of pronotum moderately lobed; median elytral chevron narrow, transverse, located at basal one-third; form broad. Length, 12 mm. México (Jalisco)
 *T. crassus* n. sp.
- 3(2) Thoracic umbone moderately elevated, disk moderately coarsely punctate 4
 Thoracic umbone very prominently elevated, disk finely punctate. Length 7–9 mm. Mexico (Oaxaca) *T. batesi* Chemsak
- 4(3) Elytra usually with a median dark chevron, if lacking, head black 5
 Elytra always lacking a median dark chevron, head red, umbone red. Length, 5–6 mm. USA (Texas to Arizona) *T. linsleyi* Chemsak
- 5(4) Elytra with basal punctures coarse and contiguous 6
 Elytra with basal punctures fine, separated 7
- 6(5) Elytra with median chevron oblong, never attaining scutellum or apical dark chevron; umbone densely clothed with dark erect setae. Length, 10–14 mm. Mexico (Nayarit to Veracruz) to Nicaragua *T. umbonatus* LeConte
 Elytra with median chevron, when present, usually extending to scutellum and apical dark chevron; umbone with setae elongate, moderately dense. Length, 5–10 mm. USA (Colorado, Western Arizona to Kansas and Texas) to El Salvador *T. discoideus* LeConte
- 7(5) Head black; antennae densely, uniformly clothed with short, gray, appressed pubescence; umbone strongly convex; elytra with median chevron often lacking; dark erect setae moderately long. Length, 6–9 mm. USA (Arizona) *T. skillmani* n. sp.
 Head red; antennae clothed with gray pubescence beneath, umbone moderately convex; elytra with median chevron always present, not extending to scutellum or apical dark chevron; setae very long, bristling. Length, 8.5–10.5 mm. Mexico (Nayarit to Sinaloa) *T. crinitus* n. sp.
- 8(1) Elytra with apical dark chevron bordered anteriorly by two dark, round or transverse spots; median elytral chevron present or not 9
 Elytra without apical or median dark chevron, reddish, usually with black spots; sides of pronotum usually prominently inflated, almost tuberculate
 14
- 9(8) Thoracic umbone abruptly elevated, distinctly delimited; sides of pronotum not apparently tuberculate 10
 Thoracic umbone not abruptly elevated, not distinctly delimited; elytra with median dark chevron usually heart-shaped; head and prothorax reddish. Length, 7.5–12 mm. USA (Eastern states to Michigan)
 *T. melanurus* Schoenherr
- 10(9) Elytra without anterior dark chevron, only two dark spots present; head black 11
 Elytra with distinct dark anterior chevron; head reddish. Length, 9–12 mm. Mexico (Baja California) *T. elegans* Horn
- 11(10) Median black spots of elytra distinctly larger than scutellum 12
 Median black spots of elytra subequal to or smaller than scutellum; apical dark chevron slightly directed posteriorly; elytra finely punctate. Length, 10–12 mm. (Mexico) Jalisco to Oaxaca *T. cleroides* Thomson

- 12(11) Apical dark chevron of elytra with anterior margin transverse or directed back at suture, anterior dark spots narrow, transverse 13
- Apical dark chevron of elytra with anterior margin directed up at suture, anterior dark spots rounded, located near outer margins. Length, 7.5–13 mm. Mexico (Chiapas, Colima, Jalisco)
. *T. ineditus* Chemsak & Giesbert
- 13(12) Pronotum densely clothed with long, erect, dark hairs; apical chevron of elytra with anterior margin transverse to slightly oblique. Length, 10–12 mm. Guatemala *T. paracomis* Chemsak
- Pronotum sparsely clothed with long, erect hairs; apical chevron of elytra with anterior margin directed back at suture. Length 12–15 mm. Mexico (Puebla) to Costa Rica *T. comes* Bates
- 14(8) Thoracic umbone very abruptly, definitely elevated, lateral margins distinctly delimited; umbone definitely longer than wide 21
- Thoracic umbone not abruptly, highly elevated, rather flattened, lateral margins delimited or not; umbone not definitely oblong in shape 15
- 15(14) Body densely clothed with short, appressed pubescence obscuring surface at least partly; long, erect hairs absent from elytra 16
- Pubescence moderate, body not distinctly, densely clothed with short, appressed pubescence; long, erect hairs present on elytra 17
- 16(15) Pubescence yellowish, very dense, thick and appressed, surface completely obscured, short suberect hairs absent from elytra. Larger species. Length, 11–17mm. USA (Kansas, Nebraska, Colorado to Texas) *T. pilosus* Chemsak
- Pubescence grayish, dense but not thick, not completely obscuring surface, short, suberect hairs often present on elytra; umbone usually shining; elytra usually tipped with black. Smaller species. Length, 8–16 mm. Canada to USA (Alberta to Texas, Utah, and Arizona) *T. annulatus* LeConte
- 17(15) Antennae distinctly annulate with cinereous pubescence, at least narrowly; if not annulate, umbone convex, not subhexagonal 18
- Antennae black, not annulate, faint traces of annulations present at most; umbone usually subhexagonal in shape; elytra almost always with large posthumeral spot; appendages black. Length, 8–15 mm. Canada to USA (Eastern North America to Rocky Mountains) *T. tetrophthalmus* (Forster)
- 18(17) Thoracic umbone not distinctly delimited at sides, convex and broad, rising rather gradually from pronotum; pronotum without a transverse ridge at sides of umbone; lateral tubercles not prominent 19
- Thoracic umbone delimited from remainder of pronotum by somewhat abrupt rise; a transverse ridge extending from each side of umbone to dorsum of lateral tubercles present on pronotum; lateral tubercles prominent; sutural spot of elytra often greatly expanded. Length, 11.5–20 mm. Mexico (Michoacan to Veracruz) *T. varicornis* Castelnau
- 19(18) Last antennal segment gradually tapering apically, antennal segments without fringes of very long hairs at apices 20
- Last antennal segment abruptly tapering at middle, then very narrowly extending apically; antennal segments with fringe of very long hairs at apices. Length, 11–16.5 mm. USA (Oklahoma to Texas) *T. texanus* Horn
- 20(19) Mandibles of male with very large, prominent dorsal tubercles extending for about half their lengths; elytra with sutural and occasionally a posthumeral

spot. Length, 12–15 mm. USA (Northern Texas to western Oklahoma)
 *T. mandibularis* Chemsak
 Mandibles of male with dorsal tubercle moderate, not extending for half
 length of mandibles; elytra with black spots at humeri and apical third only.
 Length, 9–12 mm. Canada to USA (Ontario, Midwestern states to Texas)
 *T. quinquemaculatus* Haldeman

- 21(14) Punctures of elytra at base distinct, coarse to moderately coarse, fairly
 abundant 22
 Punctures of elytra at base very fine and sparse; lateral pronotal tubercles
 prominent, extending to edges of umbone to form a transverse ridge; apical
 segment of maxillary palpi rather slender, not swollen; scape, femora and
 some tibiae reddish. Robust species. Length, 11.5–18 mm. USA (Southern
 California) *T. sublaevis* Casey
- 22(21) Antennae black, not annulated, or occasionally, at most with very small
 cinereous bands 23
 Antennae annulated with distinct bands of cinereous pubescence 25
- 23(22) Antennal scape red or black, if black, at least femora reddish; umbone narrow,
 distinctly longer than broad 24
 Antennal scape always black, femora black; pronotum very prominently
 tuberculate laterally, tubercles forming a transverse ridge dorsally; umbone
 not distinctly longer than broad. Length, 11–16 mm. Mexico (Guerrero to
 Oaxaca) *T. thoreyi* Bates
- 24(23) Antennal scape reddish, pronotum not prominently tuberculate laterally;
 umbone narrow, prominently elevated, lateral margins very distinct,
 infuscated; short, pale pubescence sparse on elytra and pronotum. Length,
 8.5–16 mm. Mexico (Nayarit to Oaxaca) *T. subfasciatus* Bates
 Antennal scape black; pronotum rather prominently tuberculate laterally;
 umbone not highly elevated; short, pale pubescence dense on elytra and
 pronotum. Length 8–14 mm. USA (Southeastern Texas) to El Salvador
 *T. thermophilus* Chevrolat
- 25(22) Thoracic umbone always distinctly delimited laterally, usually distinctly
 longer than wide; apical segment of maxillary palpi inflated, not elongate.
 Length, 8–19 mm. USA (Great Basin, Great Plains to Ohio, Arizona to Texas)
 to central Mexico *T. femoratus* LeConte
 Thoracic umbone often vaguely defined and not distinctly delimited at sides,
 usually but little longer than wide; apical segment of maxillary palpi slender,
 not swollen, only slightly broader than apical segment of labial palpi. Length,
 8–17 mm. USA (Southwest Oregon to southern California)
 *T. basalis* LeConte