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Abstract. *Trox paulseni* Ratcliffe, **new species** (Coleoptera: Trogidae), is described from Nebraska and Kansas, USA. A description, diagnosis to separate it from *Trox hamatus* Robinson (its closest congener), distribution, and illustrations are provided.

Key Words. Taxonomy, scarab beetles, Scarabaeoidea.

Introduction

The Trogidae are distributed worldwide with diversity and abundance increasing in arid regions. Approximately 300 species are known (Scholtz 1982, Zidek 2013). There are 51 species of *Trox* Fabricius and *Omorgus* Erichson known in the Nearctic Region, and 19 of these species occur in Nebraska. The genus *Trox* contains 25 species in the USA with 14 of those species occurring in Nebraska (Ratcliffe and Paulsen 2008). Vaurie (1955) provided the most recent revision of the North American species, and Scholtz (1982) and Zidek (2013) produced a world catalog and checklist, respectively, for the Trogidae.

Trogids are recognized by the presence of a flat, hidden abdomen and an overall warty, brown or black to predominantly grayish brown, dirt-encrusted appearance. Their size ranges from 5.0–17.5 mm for the Nebraska species. These beetles are among the last scavengers to visit the dry remains of dead animals, where they feed on skin, bone, hair, and feathers. They also feed on the organic debris (feathers, fur, feces) found in the nests of birds and mammals. Many interesting and possibly rare species as well as valuable new data could be gathered by collecting in the burrows of small mammals and in the nests of birds where there are accumulations of fur or feathers. Many species are also attracted to lights, and a few are occasionally found in dung, especially carnivore scat that contains hair and bones as is the case with the new species described herein.

Material and Methods

I examined 46 specimens representing a new species of *Trox,* some of which were collected by M. J. Paulsen, P. Wagner, and Glenn Salsbury and others that were in the collections of the University of Nebraska State Museum (UNSM) and the Snow Entomological Museum (SEMC) at the University of Kansas. For the new species description, label data are quoted verbatim. A single slash (/) indicates a break between lines on the same label, and lower case letters (a, b, c) each indicate a different label. Collection codens are as follows:

BMNH The Natural History Museum, London, United Kingdom
CMNC The Canadian Museum of Nature, Ottawa, Ontario, Canada
FSCA Florida State Collection of Arthropods, Gainesville, Florida, USA (Paul Skelley)
GASC Glenn A. Salsbury Collection, Frontenac, Kansas, USA
MJPC M. J. Paulsen Collection, Lincoln, Nebraska, USA
SEMC Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA (Zack Falin)
UNSM University of Nebraska State Museum, Lincoln, Nebraska, USA (Brett Ratcliffe, M. J. Paulsen)

I use the phylogenetic species concept as outlined by Wheeler and Platnick (2000). This concept defines species as the smallest aggregation of (sexual) populations diagnosable by a unique combination of character states.

***Trox paulseni* Ratcliffe, new species**
(Fig. 1, 3, 5–6, 8)

Type Material. Holotype male (UNSM) labeled: a) "Long Pine, Brown Co. / NEBRASKA / VI-19-1975 / B. C. Ratcliffe"; b) ex Collection of / B. C. Ratcliffe / Donated 2001"; c) my red holotype label. Allotype female (UNSM) labeled as holotype and with my red allotype label. Five paratypes, 3 males, 2 females (3 at MJPC, 2 at FSCA) labeled: "USA: NEBRASKA: Frontier / Co.: Red Willow Reservoir / SWMA: coyote scat / 40.40, -100.68, 800m / 16.V.2013; coll. MJ Paulsen". One paratype female (MJPC) labeled "NEBRASKA: ANTELOPE/ / BOONE co. line; 11 mi SW / of Elgin; 600m; 41.91533 / -98.27674; coyote scat / 24.VI.2009; MJ Paulsen". One paratype male (UNSM) labeled: a) "West Point / Neb."; b) "*Trox* / *insularis* / Chevrolat / det. Dawson"; one paratype male (UNSM) labeled: a) "Sandhills Ag Lab / McPherson Co., Nebraska / VII-8-14-1973; b) ex Collection of / B. C. Ratcliffe / Donated 2001". Two paratypes, 1 male, 1 female (UNSM), labeled: a) "USA: NEBRASKA: Rock / Co.: 11 km W of Rose / 42.222, -99.640; 770m / pitfall trap in wet meadow / 2.VI.2015; Patrick Wagner". Two paratype males (UNSM), labeled: a) "USA: NEBRASKA: Brown / Co.: nr. Clapper Lake, 32km / S of Johnstown; 42.321, / -100.069; 850m; pitfall trap / 30.VII.2015; Patrick Wagner". Eighteen paratypes, 10 males, 8 females (4 at UNSM, 10 at MJPC, 2 at CMNC, 2 at BMNH) labeled: "USA: NEBRASKA: Frontier / Co.: Red Willow Reservoir / SWMA: coyote scat / 40.40, -100.68, 800m / 9.III.2016; coll. MJ Paulsen". Five paratypes, 3 males, 2 females, (3 at MJPC, 2 at UNSM) labeled: a) "USA: NEBRASKA: Johnson / Co.: Hickory Ridge SWMA / 40º 18.966, -96º 21.341 / 425m; coyote scat in prairie / 14.III.2016, M.J. Paulsen". Seven paratypes, 6 males, 1 female (SEMC) labeled: a) "USA: KANSAS: Kiowa / Co., 10 mi NW Mullinville / 23 Feb. 1998, G. Salsbury / Coyote dung"; b) "*Trox* / *hamatus* / Robinson"; c) SEMC barcode database labels SEMC0926916–SEMC0926920, SEMC0926929. One male paratype (GASC) labeled "USA: Kansas: Clark Co / State Lake, 13-26 Mar / 2003, coyote dung / G A Salsbury". One male paratype (GASC) labeled "USA: Kansas: Crawford Co / 2W Pittsburg, 14-23 Apr / 2004, canopy trap / G A Salsbury". All paratypes with my yellow paratype labels.

Holotype. Male (Fig. 1). Length 6.0 mm; width across humeri 3.0 mm. **Head:** Frons with 4 low tubercles in transverse row (best seen in dorsal view). Clypeus triangular. Antenna reddish brown. **Pronotum:** Surface with moderately large punctures (usually obscured by tomentosity), and with 4 large, round, shallow foveae; 2 in center between median longitudinal ridges and 1 at each base either side of middle. Sides weakly arcuate, posterior angles obtusely right angled. Setae on lateral and basal margins short, thick, subcontiguous. **Elytra:** Surface tomentose with 4 elevated rows of tubercles between suture and humerus, top of each tubercle covered by cluster of short, stout, tawny setae. Sides weakly explanate, with a row of small granules. Marginal setae short, more slender than pronotal marginal setae, separated from one another by about 1 setal length. **Legs:** Protibia tridentate, apical 2 teeth subcontiguous. Metatibia broad, externally with weakly dentate, keel-like ridge (Fig. 3); internally with large, subapical tooth usually partly concealed by long setae. **Parameres:** Apices of parameres bluntly rounded (Fig. 6).

Allotype. Female. Length 5.5 mm; width across humeri 2.9 mm. The allotype does not differ from the holotype except in the following respects: Surface sculpturing more visible because of less tomentosity. **Legs:** Metatibia simple, lacking keel-like ridge on external surface and lacking subapical tooth on internal surface.

Variation (29 male and 15 female paratypes). Length 4.8–6.2 mm; width across humeri 2.7–3.4 mm. The paratypes do not differ significantly from the holotype or allotype.

Etymology. I am pleased to dedicate this species to its discoverer and my colleague, Dr. M. J. Paulsen (University of Nebraska State Museum, Lincoln, Nebraska).

Locality Records (Fig. 8). Forty-six specimens examined. **KANSAS (9):** KIOWA CO. (7): 10 mi. NW of Mullinville; CLARK CO. (1): State Lake; CRAWFORD CO. (1): 2 mi. W Pittsburg. **NEBRASKA (37):** ANTELOPE/BOONE CO. (1): HWY 14 at county line; BROWN CO. (4): Clapper Lake, Long Pine; CUMING CO. (1): West Point; FRONTIER CO. (23): Red Willow Reservoir State Wildlife Management

Figures 1–7. Two species of *Trox*. **1)** *Trox paulseni* Ratcliffe, **new species,** holotype. **2)** *Trox hamatus* Robinson. **3–5)** Left metatibia, ventral view. **3)** *T. paulseni* male. **4)** *T. hamatus* male. **5)** *Trox paulseni* female. **6–7)** Parameres, dorsal view. **6)** *Trox paulseni*. **7)** *Trox hamatus*.

Area; JOHNSON CO. (5): Hickory Ridge SWMA; McPHERSON CO. (1): Sandhills Ag Lab near Tryon; ROCK CO. (2): Rose.

Additional collecting in Kansas and Nebraska will undoubtedly reveal more specimens of *T. paulseni*. In addition, specimens currently residing in museum collections identified as *T. hamatus* may actually be *T. paulseni*.

Diagnosis. *Trox paulseni* and *T. hamatus* are superficially similar but may be distinguished by the metatibial external tooth nearly obsolete and instead keel-like in *T. paulseni* (Fig. 3) (tooth large and distinct in *T. hamatus*, Fig. 4); apices of parameres bluntly rounded in *T. paulseni* (Fig. 6) (apices acute in *T. hamatus,* Fig. 7); and color of the elytral scales: tawny in *T. paulseni* and dark orange in *T. hamatus* (compare Fig. 1–2).

Supplement to the Key to Distinguish *Trox paulseni* and *Trox hamatus*
(Modified from Ratcliffe and Paulsen 2010)

8. Metatibia of male greatly expanded with large tooth on inner margin near apex (Fig. 101a). Metatibia of female wider (nearly 1/3 length), keeled narrowly on outer margin from base to external tooth (Fig. 101b) **16**
— Metatibia of male not expanded or toothed on inner margin (Fig. 102a). Metatibia of female narrow (less than 1/4 length), outer margin not keeled (Fig. 102b) **9**

16. Metatibia of male keel-like, with exterior tooth obsolete (Fig. 3, this work). Parameres bluntly rounded apically (Fig. 6, this work). Both sexes with elytral setae short, tawny or light brown (Fig. 1, this work) ..... ***T. paulseni* Ratcliffe, new species**
— Metatibia of male with exterior tooth distinct (Fig. 4, this work). Parameres acute apically (Fig. 7, this work). Both sexes with elytral setae longer, orangish (Fig. 2, this work) .... ***T. hamatus* Robinson**

Natural History. All specimens of *T. paulseni* were collected beneath coyote scat except for two specimens each from Brown and Rock counties, Nebraska, that were taken in pitfall traps baited with chimpanzee feces and one specimen from a canopy trap in Crawford County, Kansas. *Trox paulseni* is strongly associated with a prairie habitat, while *T. hamatus* is found predominantly in wooded habitats.

***Trox hamatus* Robinson: New Kansas and Nebraska Records**

Robinson (1940) described *T. hamatus* based upon specimens from New Jersey, New York, Pennsylvania, Maryland, South Carolina, and Georgia. Vaurie (1955) did not report detailed locality records in her revision of *Trox*, but noted that it is a broadly distributed species in the eastern half of the USA and Canada. Ratcliffe and Paulsen (2008) documented the distribution of *T. hamatus* in Nebraska. However, those records from Brown, Cuming, and McPherson counties are here removed from the distribution of *T. hamatus* since they are now known to be *T. paulseni.* Increased collecting efforts in both states will discover new distributional records that will certainly fill in some of the existing gaps between counties.

The distribution of *T. hamatus* (Fig. 8) follows with the new Nebraska county records since Ratcliffe and Paulsen (2008) and new Kansas records in bold: NEBRASKA: CASS CO. (3): Platte River State Park; JEFFERSON CO. (6): Rock Creek Station; **JOHNSON CO. (2): Crab Orchard;** LANCASTER CO. (8): Lincoln, Nine Mile Prairie; NEMAHA CO. (6): Indian Cave State Park; OTOE CO. (2): Nebraska City; RICHARDSON CO. (19): Indian Cave State Park; **SARPY CO. (7): Fontenelle Forest;** SEWARD CO. (1): Garland (7 mi. S). **KANSAS: BARBER CO. (1): Wolgamott Ranch; BOURBON CO. (1): Fort Scott; CHEROKEE CO. (5): Galena, Schermerhorn Park; DOUGLAS CO. (1): Woodridge Park; JEFFERSON CO. (8):** Lawrence.

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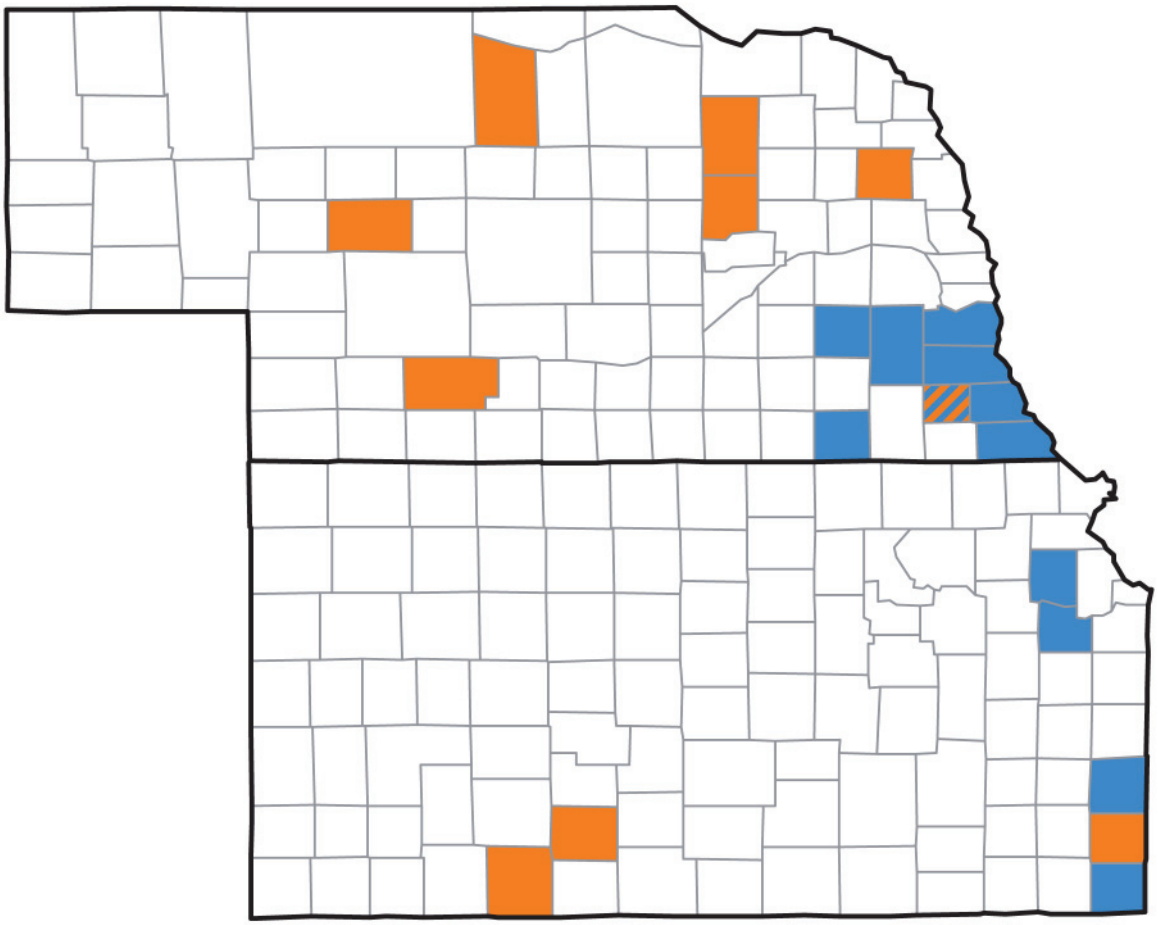

Figure 8. Nebraska and Kansas distributions of *Trox paulseni* (orange) and *Trox hamatus* (blue).