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A new state record of *Eucera* (*Xenoglossa*) *kansensis* (Hymenoptera: Apidae) in South Dakota, USA

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A new state record of *Eucera* (*Xenoglossa*) *kansensis* (Hymenoptera: Apidae) in South Dakota, USA

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Abstract. *Eucera* (*Xenoglossa*) *kansensis* (Cockerell, 1905) (Hymenoptera: Apidae) is newly recorded for the state of South Dakota, USA. The bees were sampled predominantly with blue vane traps, and *E. kansensis* was associated with a wide range of habitats that did not include its primary floral resources of *Cucurbita* L. and *Ipomoea* L. Further study is warranted to determine the basis for the association of *E. kansensis* within the wide range of habitats in this study.

Key words. Faunal inventory, biodiversity, distribution records, pollinators.

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Introduction

The longhorn bee tribe Eucerini (Hymenoptera: Apidae) is a widespread and diverse group of solitary bees that includes important pollinators of both wild and agricultural plants (Dorchin et al. 2018). Based on revised phylogenetic analyses, several members of the tribe were recently reduced to subgeneric rank within the genus *Eucera* (Dorchin et al. 2018). One of the groups subsumed into *Eucera* was the large squash bees of the genus *Xenoglossa*, now treated as a subgenus, which consists of oligoleges that collect pollen from the flowers of *Cucurbita* L. and *Ipomoea* L. (Hurd et al. 1971; Fowler 2020). *Eucera* (*Xenoglossa*) is morphologically distinct from congenerics by having a small tooth on the inner basal margin of each mandible (Hurd and Linsley 1964; Ascher and Pickering 2022).

Eucera (*Xenoglossa*) consist of seven species distributed from Central America to the northern regions of the United States of America (USA) (Michener 2007). Two species, *E. strenua* (Cresson, 1878) and *E. kansensis* (Linnaeus, 1763), are distributed throughout much of the USA (Ascher and Pickering 2022). In this paper, we add a state new record for South Dakota to the known geographic distribution of *E. kansensis* (Fig. 1) within the country..

Materials and Methods

Bees were sampled mainly in Brookings County in east-central South Dakota, USA, at four locations. First, sampling occurred in 2013 and from 2019 through 2021 at the Eastern South Dakota Soil and Water Research Farm (ESDSWRF) located 1.5 mi north of the city of Brookings, South Dakota (44.352581, −96.802640, 500 m elev.). The ESDSWRF is divided into mostly small (<2 acre) plots of various annual and perennial crops and small

Figure 1. *Eucera* (*Xenoglossa*) *kansensis*, female.

non-crop areas such as groves, perennial grass plots, and restored prairie used for agronomic and insect-related studies (Pikul et al. 2008, Eberle et al. 2015).

In addition, bees were sampled in 2019–2021 at the North Central Agricultural Research Laboratory (NCARL, 44.3388°, −96.7924°), 1 mile north of Brookings at two small (≈0.1 ha), restored prairie plots and a grassy courtyard / garden area with small shrubs, fruit trees, and squash and melon plants (≈0.1 ha).

Finally, sampling was conducted at two restored prairies in 2019–2021 and one remnant prairie; all prairie sites were situated among land farmed to corn and soybean. One prairie was 63 acres and located 2 miles southwest of the town of Aurora, South Dakota. The other was 30 acres and located 1 mile south of the town of Arlington, South Dakota. The remnant prairie was approximately 20 acres and located in Deuel County at the Round-Bullhead Lakes Game Production Area, 4 miles north-northeast of the village of Goodwin.

Sampling of bees in 2019–2021 was conducted with blue vane traps (Kimoto et al. 2012). Records of bees collected in 2013 were obtained from pinned specimens but sampling method was not specified. Identifications were based on descriptions for *E. kansensis* given in Hurd and Linsley (1964) and Ascher and Pickering (2022). Diagnostic characters used for identifying *E. kansensis* included inner basal margin of mandible with a small tooth (both sexes); in females, clypeus dark in basal half and yellow in apical half; in males, clypeus yellow at base and black along the side margins and with forelegs dark brown (Fig. 2–4). All specimens were deposited at NCARL, except the lone specimen from Deuel County was deposited at the Severin-McDaniel Insect Research Collection (SMIRC), South Dakota State University, Brookings, South Dakota. We also checked for records of

Figures 2–4. *Eucera* (*Xenoglossa*) *kansensis*. **2)** Female showing inner basal margin of mandible with a small tooth and clypeus dark in basal half and yellow in apical half. **3)** Male with clypeus yellow at base and black along the side margins and with forelegs dark brown. **4)** Abdominal segment T6 of male with sparse golden-yellow hairs.

E. kansensis from South Dakota using the online database of the Symbiota Collections of Arthropods Network (SCAN 2022) and in iNaturalist (2022).

Results

Eucera (*Xenoglossa*) *kansensis* (Cockerell, 1905) (Hymenoptera: Apidae)

We recorded a total of 88 specimens of *E. kansensis* (61 females, 27 males) from South Dakota in our survey. *Eucera kansensis* was collected in a wide variety of habitats at the ESDSWRF, NCARL, Aurora prairie, and the remnant prairie at the Round Lake Game Production Area, but not at the Arlington prairie. The earliest date for the new state record consists of two specimens both sampled by unspecified method at the ESDSWRF on 21 August 2013. Additional specimens were collected in blue vane traps from 2019-2021. No further records of *E. kansensis* from South Dakota were found in records from SCAN (2022) or iNaturalist (2022).

New state record. USA, SOUTH DAKOTA, Brookings County, ESD Soil Water Res Farm, 44°18.7″W, 96° 47.9″N, plot 121 cuphea, 21 Aug 2013, K. Nemec, ♀; USA, SOUTH DAKOTA, Brookings County, ESD Soil Water Res Farm, 44°18.7″W, 96°47.9″N, plot 105 crambe, 21 Aug 2013, K. Nemec, ♂.

Other records [all sites in same county, except one]. SOUTH DAKOTA, Brookings County, ESD Soil Water Res Farm, VII.15–29.2019, ex. plot C24 alfalfa, E. Beckendorf & J. Julius, ♀; 2 mi SW Aurora, VIII.13–27.2019, ex. prairie, E. Beckendorf & J. Julius, ♀; N Cen Ag Res Lab, 44.3388°, –96.7924°, VI.29–VII.6.2020; ex. fuel tank prairie, B. Erdmann & B. Kienlen, 2 ♂; N Cen Ag Res Lab, VI.29–VII.6.2020; ex. courtyard with fruit trees, B. Erdmann & B. Kienlen, ♂; N Cen Ag Res Lab, VII.6–13.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.6–13.2020, ex. plot C32 prairie, B. Erdmann & B. Kienlen, ♀; 2 mi SW Aurora, VII.6–13.2020, ex. prairie, B. Erdmann & B. Kienlen, ♀; 2 mi SW Aurora, VII.6–13.2020, ex. prairie, B. Erdmann & B. Kienlen, 2 ♂; N Cen Ag Res Lab, VII.6–13.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♂; ESD Soil Water Res Farm, VII.10–17.2020, ex. plot C24 alfalfa, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VII.13–20.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VII.13–20.2020, ex. courtyard with fruit trees, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VII.13–20.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, 2 ♀; ESD Soil Water Res Farm, VII.13–20.2020, ex. plot C32 smooth bromegrass, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.13–20.2020, ex. east-west trees, B. Erdmann & B. Kienlen, 3 ♀; ESD Soil Water Res Farm, VII.13–20.2020, ex. plot C32 prairie, B. Erdmann & B. Kienlen, ♂; N Cen Ag Res Lab, VII.13–20.2020, ex. C wing prairie; B. Erdmann & B. Kienlen, 2 ♂; N Cen Ag Res Lab, VII.13–20.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♀; 2 mi SW Aurora, VII.13–20.2020, ex. prairie, B. Erdmann & B. Kienlen, ♂; ESD Soil Water Res Farm, VII.15–22.2020, ex. B23 soybeans, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.17–24.2020, ex. plot B21 corn, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.17–24.2020, ex. plot B11C corn, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.17–24.2020, ex. plot C23 corn, B. Erdmann & B. Kienlen, 2 ♀; ESD Soil Water Res Farm, VII.20–27.2020, ex. plot C32 smooth

bromegrass, B. Erdmann & B. Kienlen, ♂; ESD Soil Water Res Farm, VII.20–27.2020, north-south trees, B. Erdmann & B. Kienlen, ♀; 2 mi SW Aurora, VII.20–27.2020, ex. prairie, B. Erdmann & B. Kienlen, 1 ♀, 1 ♂; N Cen Ag Res Lab, VII.20–27.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♂; ESD Soil Water Res Farm, VII.27–VIII.3.2020, ex. plot C32 smooth bromegrass, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VII.27–VIII-3.2020, ex. plot C31 grass, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VIII.3–10.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, 2♀; ESD Soil Water Res Farm, VIII.3–10.2020, ex. north-south trees, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VIII.3–10.2020, ex. building site trees, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VIII.3–10.2020, C wing prairie, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VIII.3–10.2020, ex. plot C32 smooth bromegrass, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VIII.10–17.2020, ex. fuel tank prairie, B. Erdmann & B. Kienlen, ♀; ESD Soil Water Res Farm, VIII.17–24.2020, ex. plot C32 smooth bromegrass, B. Erdmann & B. Kienlen, ♀; N Cen Ag Res Lab, VI.23–30.2021, ex. fuel tank prairie, K. Long, 2 ♀; ESD Soil Water Res Farm, VI.23–30.2021, ex. plot C32 smooth bromegrass, K. Long, ♀; N Cen Ag Res Lab, VI.23–30.2021, ex. courtyard with fruit trees, K. Long, ♀; N Cen Ag Res Lab, VI.30–VII.7.2021, ex. courtyard with fruit trees, K. Long, ♀; N Cen Ag Res Lab, VI.30–VII.7.2021, ex. fuel tank prairie, K. Long, 2 ♀; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. plot C25 big bluestem, K. Long, ♀; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. north-south trees, K. Long, ♀; N Cen Ag Res Lab, VI.30–VII.7.2021, ex. C wing prairie, K. Long, 2 ♀; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. plot C32 smooth bromegrass, K. Long, ♀; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. plot C32 prairie, K. Long, ♂; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. east-west trees, K. Long, ♂; N Cen Ag Res Lab, VI.30–VII.7.2021, ex. courtyard with fruit trees, K. Long, ♂; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. building site trees, K. Long, ♂; ESD Soil Water Res Farm, VI.30–VII.7.2021, ex. plot C25 grass, K. Long, ♂; ESD Soil Water Res Farm, VII.7–14.2021, ex. plot C32 smooth bromegrass, K. Long, ♀; ESD Soil Water Res Farm, VII.7–14.2021, ex. north-south trees, K. Long, ♀; N Cen Ag Res Lab, VII.7–14.2021, C wing prairie, K. Long, ♀; N Cen Ag Res Lab, VII.7–14.2021, ex. courtyard with fruit trees, K. Long, 2 ♀; ESD Soil Water Res Farm, VII.7–14.2021, ex. plot C32 prairie, K. Long, ♀; ESD Soil Water Res Farm, VII.7–14.2021, ex. plot C32 smooth bromegrass, K. Long, ♀; ESD Soil Water Res Farm, VII.7–14.2021, ex. plot C1 alfalfa, K. Long, ♀; ESD Soil Water Res Farm, VII.7–14.2021, ex. plot B19 alfalfa, K. Long, ♀; N Cen Ag Res Lab, VII.7–14.2021, ex. courtyard with fruit trees, K. Long, ♂; ESD Soil Water Res Farm, VII.14–21.2021, ex. plot B11b corn, K. Long, ♀; ESD Soil Water Res Farm, VII.14–21.2021, ex. plot B11d soybeans, K. Long, ♀; N Cen Ag Res Lab, VII.14–21.2021, ex. fuel tank prairie, K. Long, ♀; ESD Soil Water Res Farm, VII.14–21.2021, ex. plot C32 prairie, K. Long, ♂; ESD Soil Water Res Farm, VII.14–21.2021, ex. plot B20 soybeans, 2 ♂; ESD Soil Water Res Farm, VII.14–21.2021, ex. plot C20 soybeans, K. Long, ♂; ESD Soil Water Res Farm, VII.21–28.2021, ex. plot C32 smooth bromegrass, K. Long, ♀; N Cen Ag Res Lab, VII.21–28.2021, ex. courtyard with fruit trees, K. Long, ♀; ESD Soil Water Res Farm, VII.21–28.2021, ex. north-south trees, K. Long, ♀; ESD Soil Water Res Farm, VII.21–28.2021, ex. plot C25 grass, K. Long, ♂; 2 mi SW Aurora, VII.28–VIII.4.2021, ex. prairie, K. Long, ♀; Deuel County, Round Lake, 44.933°N, 96.827°W, 19.VII.2021, ♀.

Eucera kansensis was collected as early as June 23 (2021) and between August 13 and August 27 (2019). Thus, the records indicate that *E. kansensis* is flight active generally from late June through much of August in eastern South Dakota.

Discussion

Eucera kansensis is an oligolectic species that collects pollen from the flowers of *Cucurbita* L. (Cucurbitaceae) and *Ipomoea* L. (Convolvulaceae) (Hurd et al. 1971; Fowler 2020). A small garden patch of squash and melons were grown at NCARL near a couple of our traps, but we did not observe *E. kansensis* on the flowers. In addition, plants closely related to the known hosts of *E. kansensis* were checked. Specifically, a small patch of wild cucumber, *Echinocystis lobata* (Michx.) Torr. & A. Gray (Cucurbitaceae) and a few very small patches of field bindweed, *Convolvulus arvensis* L. (Convolvulaceae), were present at the ESDSWRF, but no *E. kansensis* were observed on these plants that are closely related to the known hosts. Thus, additional sampling, especially on known cucurbit hosts and on *Ipomoea* spp., is needed to determine what plants are being utilized by *E. kansensis* in eastern South Dakota. Net sampling for *E. kansensis* may be particularly useful in understanding *E. kansensis*–plant interactions.

In addition, more widespread sampling for *E. kansensis* is needed in South Dakota, as the area sampled in this study was limited to two counties in eastern South Dakota. *Eucera kansensis* is known to occur in the neighboring states of Nebraska to the south and in Minnesota to the east and north (Ascher and Pickering 2022), so a wider distribution of *E. kansensis* is expected in South Dakota. Bees are one the most important groups of pollinators, and evaluating and monitoring the temporal, spatial, and taxonomic characteristics of pollinator communities within specific regions over time are essential for their conservation (Reyes-Novelo et al. 2008; Lebuhn et al. 2013).

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