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## FIRST RECORD OF *SOREX TENELLUS* FROM UTAH

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**ABSTRACT.**—A specimen of the Inyo shrew, *Sorex tenellus*, was collected in piñon-juniper woodland at 2017 m elevation in Granite Creek Canyon, Deep Creek Range, Juab Co., Utah. This is the easternmost record for this species and the first record for Utah.

**RESUMEN.**—Un espécimen de la musaraña Inyo, *Sorex tenellus*, fué coleccionado en el bosque de piñón y enebro a una elevación de 2017 m dentro de Granite Creek Canyon, Deep Creek Range, Juab Co., Utah. Este es el registro más oriental de esta especie y el primer registro para Utah.

The long-tailed shrews (*Sorex*) from western North America include several species that are very small and seemingly difficult to capture. Because these species have few known records of occurrence and often have restricted geographic distributions, scientists and resource managers alike often refer to them as “rare.” One such species is the Inyo shrew (*Sorex tenellus*). Prior to 2000, its known geographic distribution was limited to a region along the California-Nevada border that included the central Sierra Nevada, the Spring Mountains, and adjacent mountains and high plateaus (Hoffmann and Owen 1980, Hall 1981, Hoffmann 1999). Over subsequent years, field surveys obtained additional specimens of *Sorex tenellus*, expanding its known range northward in California (Shohfi et al. 2006) and eastward across Nevada (Rickart et al. 2004, 2011; Appendix 1).

Following the discovery of *Sorex tenellus* in the Snake Range of eastern Nevada (Rickart et al. 2004), we thought it highly likely that this species also occurred in mountain ranges further to the east in Utah. In the summer of 2014, we surveyed small mammals at localities on the eastern slope of the Deep Creek Range in western Utah. On 8 August 2014, we captured a small shrew in Granite Creek Canyon in the southern portion of the Deep Creek Range. It was caught in a Museum Special snap trap baited with peanut butter and rolled oats and set beneath a large boulder at the base of a granite cliff at 2017 m elevation

(Fig. 1). The trap site was principally exposed rock with small areas of thin soil supporting sparse vegetation dominated by single-leaf piñon (*Pinus monophylla*). Adjacent habitat further from the cliff was dominated by piñon, big sagebrush (*Artemisia tridentata*), Nevada ephedra (*Ephedra nevadensis*), and plains prickly pear (*Opuntia polyacantha*), with scattered bunchgrasses and forbs. Over a 4-day period with 240 trap nights, we did not capture any additional shrews in the immediate area. However, in riparian habitat along Granite Creek approximately 200 m east of this locality we trapped several specimens of *Sorex vagrans*, a species that is relatively common and widespread in the Deep Creek Range (Appendix 1).

The specimen from the cliff base (UMNH 37371) is a young male preserved in 70% ethanol with the skull removed and cleaned (Fig. 2). Condition of the cranial sutures and degree of tooth wear indicate it to be in Rudd’s age class 1 (Rudd 1955). External measurements taken from the fresh specimen are total length, 90 mm; tail length, 37 mm; hind foot length (including claws), 11 mm; and body mass 2.2 g. Condylbasal length of the skull is 15.0 mm. The specimen has diagnostic features (third upper unicuspid smaller than the fourth, small medial tine within the pigmented area of the first upper incisor, flattened cranium, and small size) shared by the allospecies *Sorex tenellus* and *S. nanus* (Jung and Hoffmann 1981). It is excluded from being *Sorex vagrans* because that species has a considerably larger

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Fig. 1. *Sorex tenellus* trap site in Granite Creek Canyon, Deep Creek Range, Juab Co., Utah: **A**, The specimen was captured in the space under the left side of the large (2-m-wide) boulder in the bottom center of the photograph; **B**, General habitat surrounding the trap site.

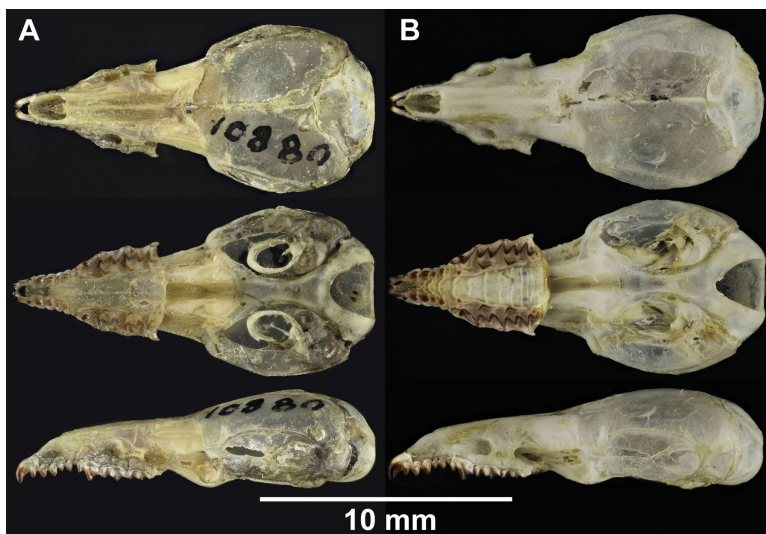


Fig. 2. Dorsal, ventral, and lateral views of *Sorex* crania: **A**, *Sorex nanus*, female (UMNH 10880) from Elk Ridge, San Juan Co., Utah (condylobasal length 14.3 mm); **B**, *Sorex tenellus*, male (UMNH 37371) from Deep Creek Range, Juab Co., Utah (condylobasal length 15.0 mm). Both are young specimens with relatively unworn teeth and prominent sutures (Rudd's age class 1). The images illustrate the larger braincase of *S. tenellus*.

skull (mean condylobasal length 16.7 mm, 16.3 to 17.0,  $n = 8$ ) with a bulbous braincase and a small medial tine positioned within the unpigmented area of the upper incisor (Jung and Hoffmann 1981).

Based on the size and shape of the skull and comparison to museum specimens (Appendix 1),

we identify UMNH 37371 as *Sorex tenellus* rather than *S. nanus*. The 2 differ principally in the size of the skull; Hoffmann and Owen (1980) reported mean condylobasal lengths of 14.92 mm and 14.36 mm for *tenellus* and *nanus*, respectively. Specimens referred to *S. tenellus* from localities in northeastern, central, and

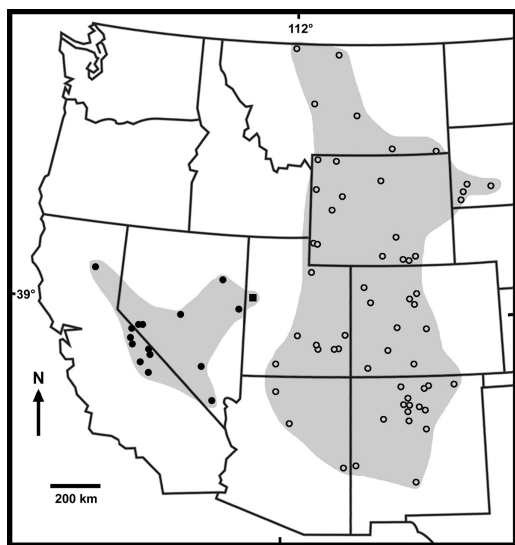


Fig. 3. Map showing the distribution records for *Sorex nanus* (open circles) and *Sorex tenellus* (solid circles). The new record for *S. tenellus* from western Utah is shown as a solid square. Records were compiled from Hoffmann and Owen (1980), Rickart et al. (2004), Shohfi et al. (2006), and unpublished museum records (Arctos database, accessed 28 August 2017).

southern Nevada (Elko, Lander, Mineral, Nye, and White Pine Counties) have a mean condylobasal length of 15.01 mm (14.7 to 15.4,  $n = 18$ ). Those from localities in northern, central, and southeastern Utah (Duchesne, Wayne, and San Juan Counties) have a mean of 14.60 mm (14.2 to 15.0,  $n = 7$ ) and are referred to *S. nanus*. The difference in the size of the skulls of these 2 taxa is due to the braincase, which is both longer and wider in *tenellus* (Fig. 2; Hoffmann and Owen 1980, fig. 1).

This specimen is the easternmost record of *Sorex tenellus* and the first record from Utah (Fig. 3). The nearest records to the Deep Creek Range are from approximately 90 km SSW in the Snake Range, White Pine County, Nevada, and approximately 160 km NW in the Ruby Mountains, Elko County, Nevada (Rickart et al. 2004, 2011). The nearest records of *Sorex nanus* are from the western Uinta Mountains, Duchesne County, Utah (UMNH 30649), Thousand Lake Mountain, Wayne County, Utah (UMNH 31132), and Bryce Canyon, Garfield County, Utah (MSB 115806), respectively, approximately 275 km ENE, 260 km SE, and 285 km SSE of the Granite

Creek locality (distribution records accessed from Arctos, 28 August 2017, <https://arctos.data.base.museum/home.cfm>). The known distributions of the 2 nominal species are separated by a gap of more than 200 km. However, surveys in areas of west central Utah would likely produce additional records.

Although *Sorex tenellus* and *S. nanus* are primarily montane shrews found most often in alpine and subalpine habitats, both have broad elevational distributions with low-elevation records to 1400 m (Hoffmann and Owen 1980). Several of the recent records from the Great Basin region, including the specimen from the Deep Creek Range, are from localities at elevations below 2400 m in xeric submontane habitat (Appendix 1). The fact that all of these specimens more closely resemble *S. tenellus* may indicate an eastward expansion from the Sierra Nevada rather than a western expansion from the Rocky Mountains (Rickart et al. 2004) and suggests that the eastern and western forms differ in their ability to disperse through the xeric lowland habitat of the Great Basin. Future investigations, including additional surveys along regional elevational gradients and genetic studies would certainly broaden our understanding of the ecology, historical biogeography, systematics, and conservation status of these interesting shrews.

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APPENDIX 1. List of specimens examined in this study housed at the Natural History Museum of Utah, University of Utah (UMNH), and the Monte L. Bean Life Science Museum, Brigham Young University (BYU).

*Sorex nanus* ( $n = 9$ ) UTAH: **Duchesne County**, Uinta Mountains, Moosehorn Lake, 40.69667° N, 110.89167° W (NAD 1927), 3175 m (UMNH 30649). **San Juan County**, Elk Ridge, Gooseberry Ranger Station, 2609 m (UMNH 10880); Abajo Mountains, North Canyon, 0.6 km N, 0.6 km E North Creek Pass, 37.85360° N, 109.46385° W (NAD 1927), 3002 m (UMNH 30296); La Sal Mountains, head of Dark Canyon, north base of Mt. Peale, 38.45056° N, 109.22089° W (NAD 1927), 3200 m (UMNH 29808, 29810), 38.44520° N, 109.23550° W (WGS 1984), 3533 m (UMNH 40457, 40458). **Wayne County**, Thousand Lake Mountain, 0.05 km S, 0.35 km W Snow Lake, 38.42326° N, 111.46216° W (NAD 1927), 3218 m (UMNH 31132). WYOMING: **Teton County**, South Cascade Canyon, Grand Teton National Park, 3060 m (UMNH 10898).

*Sorex tenellus* ( $n = 30$ ) NEVADA: **Elko County**, Ruby Mountains, Lamoille Canyon, 40.65342° N, 115.41550° W (NAD 1927), 2285 m (UMNH 31717). **Lander County**, Toiyabe Range, Kingston Canyon, 0.10 km N, 0.025 km E confluence of Burnt Creek and Kingston Creek, 39.21982° N, 117.13358° W (NAD 1927), 2122 m (UMNH 32706). **Mineral County**, Wassuk Range, summit of Mt. Grant, 38.56615° N, 118.79414° W (WGS 1984), 3351 m (UMNH 39158, 39159, 39161); 38.56512° N, 118.79358° W (WGS 1984), 3357 m (UMNH 39160, 39162); 38.56562° N, 118.79343° W (WGS 1984), 3373 m (UMNH 39164, 39165); 38.56643° N, 118.79117° W (WGS 1984), 3383 m (UMNH 39163). **Nye County**, Ranier Mesa, Nevada Test Site (BYU 4216, 4217, 4225, 4709, 4710, 4711). **White Pine County**, Snake Range, Lehman Creek, 1.8 km E boundary of Great Basin National Park, 39.01083° N, 114.18681° W (NAD 1927), 1900 m (UMNH 33798); Snake Range, vicinity Lehman Creek, 0.58 km E boundary of Great Basin National Park, 39.01032° N, 114.20092° W (WGS 1984), 1966 m (UMNH 40549, 40550); Snake Range, Great Basin National Park, south fork Lehman Creek, 0.6 km N, 0.5 km E Teresa Lake, 39.00861° N, 114.30417° W (NAD 1927), 3017 m (UMNH 30288); 0.40 km S outlet of Stella Lake, 39.00217° N, 114.31868° W (WGS 1984), 3211 m (UMNH 39815, 39816, 39924, 39925, 39926); 0.25 km S, 0.40 km W outlet of Stella Lake, 39.00383° N, 114.32315° W (WGS 1984), 3334 m (UMNH 39491); 0.45 km S summit of Bald Mountain, 39.01598° N, 114.32269° W (WGS 1984), 3397 m (UMNH 39817, 39818, 39927). UTAH: **Juab County**, Deep Creek Range, Granite Creek Canyon, 4.5 km S, 3.6 km E summit of Ibapah Peak, 39.78768° N, 113.87769° W (NAD 1927), 2017 m (UMNH 37371).

*Sorex vagrans* ( $n = 15$ ) UTAH: **Juab County**, Deep Creek Range, Granite Creek Canyon, 5.6 km S, 4.85 km E summit of Ibapah Peak, 39.77800° N, 113.86300° W (NAD 1927), 1855 m (UMNH 37372); Granite Creek Canyon, 5.3 km S, 4.3 km E summit of Ibapah Peak, 39.78064° N, 113.86815° W (NAD 1927), 1896 m (UMNH 37246); Granite Creek Canyon, 4.55 km S, 3.75 km E summit of Ibapah Peak, 39.78730° N, 113.87650° W (NAD 27), 2000 m (UMNH 37373, 37374, 37375, 37376); Granite Creek Canyon, 3.5 km S, 3.6 km E summit of Ibapah Peak, 39°47'44.90" N, 113°52'53.55" W (WGS 84), 2010 m (BYU 36737, 36738); Granite Creek Canyon, 3.5 km S, 3.15 km E summit of Ibapah Peak, 39.79640° N, 113.88315° W (NAD 27), 2115 m (UMNH 37377, 37378, 37379), Queen of Sheba Canyon, 2438 m (UMNH 3732, 3733, 3764, 3765).