**Sorex preblei.** By John E. Cornely, L. N. Carraway, and B. J. Vets

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*Sorex preblei* Jackson, 1922

Preble's shrew

*Sorex preblei* Jackson, 1922:263. Type locality “Jordan Valley, altitude 4,200 feet, Malheur County, Oregon.”


**DIAGNOSIS.** *Sorex preblei* is a very small shrew with grayish pelage on the dorsum and silvery pelage on the venter (Bailey, 1936; Larrison and Johnson, 1981). The H1 has a median spine, U3 is as large as or larger than U4, condylobasal length is 14.0–14.8 mm, and maxillary breadth is ≤4.2 mm.

Preble's shrew (Fig. 1) can be distinguished from sympatric congeners as follows: from *S. merriami* by the presence of a spine on the medial edge of H1, a maxillary breadth ≤4.2 mm, a condylobasal length ≤14.8 mm, a grayish dorsum, and a silvery-colored venter (Hoffmann and Pattie, 1968; Vets and Carraway, 1984); from *S. cinerascens* by a condylobasal length ≤14.8 mm (Hoffmann and Pattie, 1968); from *S. haydeni* by the length of the mandibular toothrow <4.2 mm; and from other *Sorex* by U3 being as large as or larger than U4 and the foramen magnum set low on the occiput (Ingles, 1965; Junge and Hoffmann, 1981; Larrison and Johnson, 1981). Additionally, it can be separated from *S. monticolus* by a much shorter mandible (<6.6 mm) and *S. manus* by the dentary below m1 being much deeper than the height of m1 at the metacoonid and higher (>2.9 mm) coronid process (Mullican and Carraway, 1990).

**GENERAL CHARACTERS.** Like other members of the genus *Sorex* has a long pointed snout, small eyes, somewhat conspicuous ears, and pentadactyl plantigrade feet. The feet are buffy colored (Bailey, 1936). The tail is bicolor, olive brown above and light colored below surrounding the tip (Bailey, 1936; Jackson, 1922). The spine on the medial edge of H1 is long, acutely pointed, and set within the pigmented area (Carraway and Vets, in press). The anastomosed infraorbital and lacrimal foramina in the zygomatic plate usually positioned either even with (64.7%) or posterior to (29.0%) the mesopterygoid of M1 (van Zyl de Jong, 1991).

*Sorex preblei* is among the smallest members of the genus in North America (Fig. 1; Jackson, 1928). Ranges of external measurements (in mm) are: total length, 77–95; tail length, 28–38; length of hind foot, 7–11; and ear length, 8–11 (Armstrong, 1957; Hoffmann and Fisher, 1978; Hoffmann et al., 1969; Ingles, 1965; Jackson, 1928; Tomasi and Hoffmann, 1984; Vets, 1975). The range of recorded total weights is 2.1–4.1 g (Armstrong, 1957; Hoffmann et al., 1969; Tomasi and Hoffmann, 1984; Williams, 1984). Ranges of published cranial measurements (in mm) are: condylobasal length, 13.8–15.1; palatal breadth, 5.4–5.8; cranial breadth, 7.0–7.2; interorbital breadth, 2.9–3.1; maxillary breadth, 3.8–4.2; and length of the maxillary toothrow, 4.8–5.3 (Jackson, 1922, 1928; Hoffmann and Fisher, 1978; Ingles, 1965; Williams, 1984). Means (±SE) for a sample of 22 individuals from Oregon are: condylobasal length, 14.61 ± 0.07; length of mandible from posterior tip of lower condylar facet to tip of m1, 8.43 ± 0.04; length of mandible from posterior tip of lower condylar facet to tip of metacoonid of m1, 5.06 ± 0.05; coronoid–condylar length, 2.72 ± 0.02 (Carraway and Vets, in press). The dental formula is 3/1, 1/1, 2/2, 3/3, in 3/3, in 3/3, total 32.

**DISTRIBUTION.** The geographic distribution of *S. preblei* (Fig. 2) appears as several disjunct populations, but this likely is as much a result of unequal sampling effort as a lack of continuity of occupiable habitats. The species was reported from several localities in Montana (Hoffmann et al., 1969; Hoffmann and Fisher, 1978; Junge and Hoffmann, 1981) that include the northernmost and easternmost records. This shrew is known in Wyoming only from the northcentral and northeastern corners of the state (Hoffmann et al., 1969; Tomasi and Hoffmann, 1984). It occurs in southeastern Washington (Armstrong, 1957), central and eastern Oregon (Hansen, 1964; Jackson, 1922, 1928; Vets, 1975), west-central Idaho (Larrison and Johnson, 1981), northeastern California (Williams, 1984), and northwestern (Hoffmann and Fisher, 1978) and northeastern Nevada (Ports and George, 1990). The southernmost record

![Fig. 1. Dorsal, ventral, and lateral views of the skull and lateral view of the mandible of an adult female *Sorex preblei* (OSUFW [Oregon State University Department of Fisheries and Wildlife] 3891) from 5 mi S, 14 mi E Frenchglen, T32S, R33E, Sec. 31, 7,300 ft, Harney Co., Oregon. Occipitalnassal length of skull is 15.03 mm.](image-url)
is from the south shore of Great Salt Lake (Tomasi and Hoffmann, 1984). Known altitudinal range is from 1,280 m in Oregon (Jackson, 1922) and Montana (Hoffmann and Fisher, 1978) to 2,347 m in California (Williams, 1984).

FORM AND FUNCTION. The encephalization index of S. preblei was 4% less than that of the "average" for 10 taxa of western Sorex (Carraway and Verts, 1988). Indices of bite force indicated that 12% of western Sorex examined, S. preblei has the lowest capacity for piercing hard-bodied prey (Carraway and Verts, in press). At the tip of 11 and at the metacapsal of 11, indices of bite force were 95 and 97%, respectively, of expected values based on condylar length of the 12 taxa (Carraway and Verts, in press). However, the length of the resistance moment arms (length of the mandible from posterior point of the lower condylar facet to a point of 11 and to the metacapsal of 11) were 101 and 98%, respectively, of those expected based on condylar length. Also, the length of the muscle moment arm (coronoid-condylid length) was 99% of that expected on the basis of condylar length. The reciprocal of the angle between the two moment arms was 103% of that expected on the basis of condylar length and 102% of that expected based on coronoid-condylid length. Thus, the less-than-expected bite force in S. preblei was acquired by a slight shortening of the mandible, shortening of the coronoid process, and a more acute angle than expected between them (Carraway and Verts, in press). Based on the less-than-expected bite force, the presence of long, acutely pointed teeth, and the somewhat divergent 11’s, Carraway and Verts (in press) predicted that the diet of S. preblei consists of soft-bodied prey.

ECOLOGY. Most Preble’s shrews "... have been collected from arid to semiarid shrub-grass associations or openings in montane coniferous forests dominated by sagebrush" (Tomasi and Hoffmann, 1984:708); however, they do not seem to be restricted to these habitats. "In Jordan Valley [Oregon] Preble collected the type in a trap set near a willow-fringed creek out on the big Transition Zone meadows" (Bailey, 1936:368). Also in Oregon, Preble’s shrews are known from marsh habitats (Bailey, 1936), sagebrush (Artemisia) -

dominated habitat (Verts, 1975), and dry bunchgrass (Agropyron) habitat (Hansen, 1956). In Washington, S. preblei was collected in grassland and sagebrush openings in subalpine coniferous forests (Hoffmann and Pattie, 1968; Hoffmann et al., 1969). Earlier, Armstrong (1957) collected S. preblei in communities of dense alpine fir (presumably Abies), lodgepole pine (Pinus contorta), lodgepole pine-buckeberry (Vaccinium), and white fir (Abies concolor)-spruce (Picea) in Washington. The sole specimen from Idaho was captured at a forest spring (Larrison and Johnson, 1981). In Montana, this species was collected in arid shrub-grassland habitats (Hoffmann and Fisher, 1978; Hoffmann et al., 1969). The only record from northern California (Williams, 1984) was from a site dominated by loamy sagebrush (A. cana) 40 m from a quaking aspen (Populus tremuloides) groove and 30 m from wetlands. Records from Nevada were from sagebrush-grassland characterized by big sagebrush (Artemisia tridentata), bluebunch wheatgrass (Agropyron spicatum), and Thurber needlegrass (Stipa thurberiana) — Hoffmann and Fisher, 1978; from seasonally wet, sagebrush-dominated communities characterized by big sagebrush, rabbitbrush (Chrysothamnus nauseosus), antelope bitterbrush (Purshia tridentata); and from habitats characterized by perennial streams with willows, Wood’s rose (Rosa woodii), greasewood (Sarcobatus), and Greasewood’s willdye (Elymus cinereus—Ports and George, 1990). In Utah, Preble’s shrews were collected in wet and alpine habitat in which dominant vegetation was salt grass (Distichlis), pikaweed (Salicornia), iodine bush (Allenrothia), and greasewood (Tomasi and Hoffmann, 1984).


Preble’s shrews have been collected in snap traps (Hansen, 1956); however, most have been captured in pitfall traps (Armstrong, 1957; Hansen, 1956; Hoffmann and Pattie, 1968; Ports and George, 1990; Williams, 1984).

GENETICS. A sample (n = 2) of S. preblei from Oregon had a mean heterozygosity of 0.06 and percent polymorphism of 19.23% based on 20 protein systems encoded in 28 presumptive loci (George, 1988). There is no published karyotype.

REMARKS. No published information is available on ontogeny and reproduction or behavior in Preble’s shrew. The generic name Sorex is derived from the Latin soric meaning shrew mouse (Jaeger, 1978). The specific name preblei is a patronymic honoring E. A. Preble who collected the type specimen. On the basis of skull morphology, Sorex preblei, with S. cinerex, S. lyelli, and S. fontinalis, was considered a member of the cinereus group (Findley, 1955; Jackson, 1928). Van Zyll de Jong (1991:70) remarked that “morphologically, preblei has its closest affinity to the southern short-rostrum morphotypes of S. cinereus (fontinalis and leuwruiii).” Based on Rogers’ genetic similarity and distance values, S. preblei was placed in a clade with S. cinereus, S. haydenii, S. fontinalis, and S. longirostris (George, 1988). We thank S. B. George, T. E. Tomasi, D. F. Williams, and G. L. Kirkland, Jr. for commenting on an earlier draft of the manuscript. This is Technical Paper No. 9632, Oregon Agricultural Experiment Station.

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