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A NEW JUMPING MOUSE (GENUS ZAPUS) FROM KANSAS

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In the course of study of the kinds of mammals known from Kansas, a series of nine specimens of *Zapus hudsonius* was acquired in April and May, 1948. In comparing these with topotypes of *Z. h. campestris* Preble, to which subspecies the jumping mouse of Kansas has been previously referred, it was evident that the specimens from Kansas were subspecifically distinct. Further investigation showed that these specimens from Kansas could not be allocated to any named kind. Therefore the following name and description are given for this heretofore unrecognized mammal.

Zapus hudsonius pallidus, new subspecies

Type.—Male, adult, skin, skull and body skeleton; no. 22953, Univ. Kansas Mus. Nat. Hist.; NW corner sect. 4, T12S, R20E, 5½ mi. N, 1¾ mi. E Lawrence, Douglas County, Kansas; 4 May 1948; obtained by E. Lendell Cockrum and Rollin H. Baker, original no. 916 of Cockrum.

Range.—That part of the Great Plains comprising southern South Dakota, probably southwestern Iowa, Nebraska, Kansas and northern Oklahoma; eastward to central Missouri.

Diagnosis.—Size small (see measurements); sides near Cinnamon-Buff (capitalized color terms after Ridgway, Color Standards and Color Nomenclature, Washington, D. C., 1912), sparsely mixed with black hairs except for narrow band of pure color at margins of belly; broad, middorsal stripe from nose to base of tail blackish, sparsely mixed with hairs of near Cinnamon-Buff color; lateral margins of nasals not constricted posteriorly; posterior margin of hard palate even with, or posterior to, line connecting posterior edges of third upper molars; interorbital region wide and palatal bridge long; length of molariform tooth-row and mastoid breadth small.

Comparisons.—Among named subspecies of *Zapus hudsonius, Z. h. pallidus* most closely resembles *Z. h. campestris* and *Z. h. rafinesquei* Bole and Moulthrop. From topotypes of *Z. h. campestris* from Crook County, Wyoming, *Z. h. pallidus,* differs as follows: Averaging smaller in all measurements taken except in least interorbital constriction and length of palatal bridge, which are larger, and breadth of zygomatic arch, which is same; color of sides lighter, more buff and less black; buff color richer, more orange and less yellow; middorsal stripe lighter and

less distinct; zygomatic arch heavier; lateral margins of incisive foramina broadly concave as opposed to moderately concave; dorsal process of maxillary arm of zygoma less expanded laterally; arch formed by maxillary arm of zygoma and molariform tooth-row more expanded (broader); cranium at junction with squamosal arm of zygoma more inflated; interparietal bone narrower (anteroposteriorly), and not extending laterally to junction of parietal, squamosal and supraoccipital; post parietal region of cranium more rounded, less flattened, posteriorly.

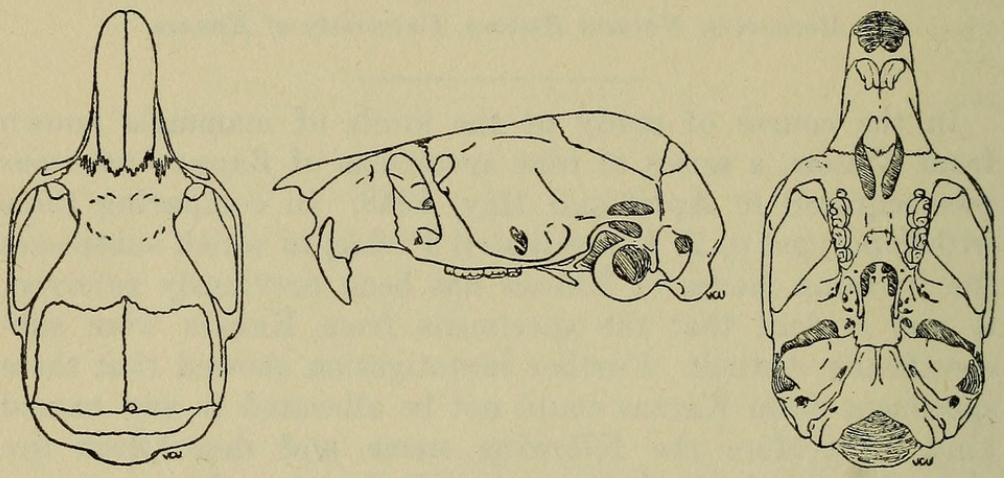

Figure I. Three views of the skull of the type specimen of *Zapus hudsonius pallidus*. UKMNH no. 22953, ♀. × 2.

From specimens of *Z. h. hudsonius* (Zimmerman) from Sherburne County, Minnesota, *Z. h. pallidus* differs as follows: Averaging smaller in measurements of total length, length of tail, length of hind foot and length of upper molariform tooth-row and larger in zygomatic breadth, interorbital constriction and length of nasals; color lighter (but less so than as in comparion with *Z. h. campestris*); zygomatic arch lighter; posterior margin of hard palate even with or posterior (instead of anterior) to line connecting posterior margins of third upper molars; lateral margins of nasals not markedly constricted posteriorly; lateral margins of incisive foramina broadly concave as opposed to moderately concave; arch formed by maxillary arm of zygoma and molariform tooth-row more expanded (broader).

From specimens of *Z. h. rafinesquei* from Posey County, Indiana, *Z. h. pallidus* differs as follows: Averaging larger in measurements of greatest length of skull, least interorbital constriction, length of palatal bridge, length of nasals and height of skull; color lighter, with distinct middorsal stripe which is lacking in specimens of *Z. h. rafinesquei* examined; zygomatic arch relatively lighter; posterior margin of hard palate even with or posterior (as opposed to slightly anterior) to line connecting posterior margins of third upper molars; basioccipital longer and narrower; lateral margins of nasals not markedly constricted posteriorly.

Remarks.—Zapus hudsonius pallidus, on the basis of eight specimens from the type locality, agrees most closely in size with *Z. h. rafinesquei* and in color with *Z. h. campestris;* there is less resemblance between

Z. h. pallidus and *Z. h. hudsonius*. *Z. h. pallidus* is definitely smaller both in external and cranial measurements than either *Z. h. campestris* or *Z. h. hudsonius*, and closely approximates *Z. h. rafinesquei* in these respects except as noted in the comparisons. As regards color, apparently a gradation exists from the darker *Z. h. hudsonius* through the lighter *Z. h. campestris* to the lightest *Z. h. pallidus*.

Three specimens available from Nebraska are typically *Z. h. pallidus*. One specimen from southwestern South Dakota (Bennett County) is referred to *Z. h. pallidus* but shows evidence of intergradation with *Z. h. campestris* in the shape of the nasals and the incisive foramina. Two specimens from northeastern South Dakota (Day County) show evidence of intergradation between *Z. h. campestris*, *Z. h. hudsonius* and *Z. h. pallidus* in the structure of the nasals, interparietal, posterior margin of the hard palate, in the shape of the incisive foramina and in external measurements. These specimens are here referred to *Z. h. hudsonius*. Specimens from North Dakota show no relationship to *Z. h. pallidus;* our examination indicates that these are referable to *Z. h. hudsonius* but show some characteristics of *Z. h. campestris*. In so far as South Dakota is concerned, *Z. h. campestris* apparently is restricted to the Black Hills and adjacent areas. Specimens examined from northwestern Iowa are referred to *Z. h. hudsonius* but show evidence of intergradation with *Z. h. pallidus* in the shape of the incisive foramina and the nasal bones, in the breadth of the least interorbital constriction and in the length of the upper molariform tooth-row. Two specimens examined from Cole County, in central Missouri, are referable to *Z. h. pallidus*, and show no characters of intergradation with the more eastern *Z. h. rafinesquei*. Two specimens from southern Illinois (Perry County) are referred to *Z. h. rafinesquei* but show evidence of intergradation with *Z. h. pallidus* in the color of the pelage and the breadth of the least interorbital constriction. In other respects they resemble specimens of *Z. h. rafinesquei*.

In *Zapus*, wear on the upper molariform tooth-row begins on the third molar and proceeds forward with the first molar receiving wear last. Specimens were judged to be adults when the third molar showed definite wear, that is, when the cusps were mostly or totally worn down. This degree of tooth wear was found to be correlated with adult pelage. In our specimens at least, wear on the third molar was correlated also with sexual maturity in females of *Z. h. campestris;* those in late pregnancy show wear on the third molars, and some of these pregnant females show wear on no other teeth. All of these females, however, had adult pelage and all were obtained in Crook County, Wyoming, in July, 1947.

Prior to 1948, fewer than ten specimens of *Zapus hudsonius* were known from Kansas, although considerable collecting had been done in the state in the past 70 years by personnel of the University of Kansas Museum of Natural History as well as by personnel of the Bureau of Biological Survey (U. S. Fish and Wildlife Service) and other institutions. Although of apparent widespread distribution within the state, *Zapus hudsonius* may be one of the rarest of small mammals in Kansas and, certainly, is one of the least known. Probably it is found principally in relatively undisturbed marginal situations between grasslands and woodlands, especially in the more humid parts of eastern Kansas. Blair (Amer. Midl. Nat., 22, no. 1, 1939, p. 127) suggests that the

distribution of this species in northeastern Oklahoma follows the stream systems. Swenk (Nebr. Acad. Sci., 8, no. 3, 1907, p. 111) reports that the animal occurs in wooded areas in Nebraska. Eight specimens taken in April and May, 1948, in Douglas County, Kansas, from which the type of *Z. h. pallidus* has been selected, were obtained on a grassy slope along the side of a brushy drainage course. The grassy area, approximately 2½ acres in size, was covered with a thick stand of undisturbed blue stem grass and was surrounded on three sides by grazed woodlands. Now included in the University of Kansas Natural History Reservation, this area will be preserved as a natural area for ecologic study.

Measurements.—Average and extreme measurements of four adult males and four adult females of *Z. h. pallidus* from the type locality are, respectively, as follows: Total length, 199.2 (193-204), 189.5 (178-197); length of tail, 114.5 (107-121), 113.2 (106-119); length of hind foot, 28 (28-28), 27.2 (26-29); length of ear, 12.5 (11-14), 13.8 (13-15); weight, 17.0 (15.2-20.0), 14.4 (11.7-16.2); greatest length of skull, 22.4 (22.1-22.7), 21.6 (21.0-22.6); zygomatic breadth, 11.5 (10.9-11.8), 10.9 (10.5-11.1); mastoid breadth, 9.7 (9.5-10.0), 9.5 (9.1-9.7); least interorbital constriction, 4.3 (4.1-4.6), 4.4 (3.9-4.8); length of palatal bridge, 3.4 (3.3-3.5), 3.3 (3.2-3.4); alveolar length of upper molariform tooth-row, 3.4 (3.2-3.5), 3.2 (3.0-3.6); greatest height of skull, 9.2 (9.0-9.8), 8.6 (8.4-8.7); length of nasals, 8.5 (8.2-8.7), 8.2 (7.9-8.4). All of the measurements listed above are available for each of the eight specimens included except that the weight for one male and one female was not taken.

Specimens examined.—Total, 20 distributed by localities of capture as follows and unless otherwise stated in the University of Kansas Museum of Natural History:

South Dakota:—*Bennett County:* Batesland, 1 (Chicago Natural History Museum).

Nebraska:—[*Buffalo County*]: Platte Meadows, Kearney, 1 (Hastings Museum, Hastings, Neb.); *Thomas-Blaine* Counties line: Dismal River, 1 (Nebraska Game, Forestation and Parks Commission); *Richardson County*: 5 mi. SE Rulo, 1 (Nebraska Game, Forestation and Parks Commission).

Kansas:—*Brown County*: Horton, 1; *Douglas County*: NW corner sect. 4, T12S, R20E, 5½ mi. N, 1¾ mi. E Lawrence, 8; sect. 8, T12S, R20E, 4 mi. N, 1¾ mi. E Lawrence, 1; Lakeview, 2; 7½ mi. SW Lawrence, 2.

Missouri:—*Cole County*: Jefferson City, 2 (Univ. of Missouri Museum of Zoology).

Other records of occurrence (probably representative of *Z. h. pallidus*): —**Oklahoma:**—*Tulsa County:* Mohawk Park, 2 (Blair, Amer. Midl. Nat., 22, no. 1, 1939, p. 127).

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