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*** START OF THE PROJECT GUTENBERG EBOOK THREE NEW BEAVERS FROM UTAH ***

Three New Beavers from Utah

By

STEPHEN D. DURRANT and HAROLD S. CRANE

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Three New Beavers from Utah

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By

STEPHEN D. DURRANT AND HAROLD S. CRANE

The subspecific identity of beavers from Utah seems never to have been carefully investigated. With the exception of the name *Castor canadensis repentinus* applied to animals from Zion and Parunuweap canyons by Presnall (1938:14), all other writers from 1897 until the present time, have used for animals from Utah, the name combination *Castor canadensis frondator* Mearns, the

type of which is from Sonora, Mexico. Study of specimens of beavers from Utah, accumulated in the collections of the Museum of Zoölogy, University of Utah, proves these animals to be far more variable than formerly supposed, and discloses the existence of three hitherto unnamed kinds, which are named and described below.

We recognize the need for caution in proposing new names for American beavers, because the transplanting of these animals from one watershed to another may have permitted the animals of a given area to change genetically, say, through hybridization, and may also have altered the geographic distribution of the several kinds. The officials of the Utah State Fish and Game Commission have assured us that such transplants have not occurred in the areas where these three new kinds are found, and further that nowhere in the state have transplants been made from one major drainage system to another; such transplants as have been made were only within the same major drainage system.

The capitalized color terms used in this paper are after Ridgway, Color Standards and Color Nomenclature, Washington, D. C., 1912. All measurements are in millimeters. We are indebted to the officials of the United States National Museum for the loan of comparative materials.

***Castor canadensis pallidus* new subspecies**

Type.—Female, adult, skin and skull, number 719, Museum of Zoölogy, University of Utah; Lynn Canyon, 7,500 ft., Boxelder County, Utah; September 7, 1932; collected by W. W. Newby.

Range.—Known only from the Raft River Mountains.

Diagnosis.—Size small; tail and hind foot short (see measurements). Color (type): Pale, upper parts uniformly Ochraceous-Buff; underfur Snuff Brown; underparts uniformly Light Buff, grading to Light Ochraceous-Buff at base of tail; underfur Light Drab; front and hind feet Light Ochraceous-Buff. Skull: Rostrum short; nasals broad (breadth averaging 54 per cent of length), constricted posteriorly and barely projecting posteriorly beyond premaxillae; zygomatic arches robust, but not widely spreading (zygomatic breadth 77 per cent of basilar length); mastoid breadth 73 per cent of zygomatic breadth; anterolateral margin of orbit narrow (6.2); occipital condyles visible from dorsal view; condylobasal length greater than occipitonasal length; upper incisors narrow (Orange Chrome in color); coronoid processes high and wide; cheek teeth narrow.

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Measurements.—Measurements of the type are as follows: Total length, 1040; length of tail, 380; length of hind foot, 157; length of ear, 35; occipitonasal length, 129.1; basilar length, 116.6; mastoid breadth, 65.6; interorbital breadth, 23.6; length of nasals, 43.3; zygomatic breadth, 89.7; breadth of nasals, 23.4; alveolar length of upper molariform teeth, 30.4.

Comparisons.—From topotypes and near topotypes of *Castor canadensis taylori*, *C. c. pallidus* differs as follows: Size smaller; tail and hind foot shorter. Color: Markedly lighter throughout. Skull: Nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals, as opposed to 46 per cent); nasals barely projecting posteriorly beyond premaxillae; rostrum shorter; zygomatic breadth relative to basilar length less; mastoid breadth actually as well as relatively greater; interorbital breadth greater; occipitonasal length shorter rather than longer than condylobasal length; tympanic bullae smaller; coronoid process higher and wider; cheek teeth narrower.

From specimens of *Castor canadensis baileyi*, from 20 miles north northeast of Elko, Elko County, Nevada, *C. c. pallidus* differs as follows: Body smaller; tail longer; hind foot shorter; ears shorter. Color: Markedly lighter throughout. Skull: Larger; nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 41 per cent); nasals barely projecting posteriorly beyond premaxillae; rostrum broader; zygomatic breadth relative to basilar length less; mastoid breadth actually as well as relatively greater; occipitonasal length less rather than greater than condylobasal length; tympanic bullae smaller; coronoid process higher and wider; cheek teeth narrower.

From one topotype and two specimens of *Castor canadensis repentinus*, from the Colorado River at Yuma, Yuma County, Arizona, *C. c. pallidus* differs as follows: Tail and hind foot shorter. Color: Lighter throughout. Skull: Narrower; nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 47 per cent); nasals barely projecting posteriorly beyond premaxillae; rostrum shorter; zygomatic breadth relative to basilar length less; mastoid breadth actually as well as relatively greater; tympanic bullae narrower and smaller; coronoid process higher and wider; cheek teeth narrower.

From one specimen of *Castor canadensis concisor*, from Trappers Lake, Garfield County, Colorado, and from the original description of that subspecies (Warren and Hall, 1939: 358), *C. c. pallidus* differs as follows: Size smaller. Color: Markedly lighter throughout. Skull: Smaller, narrower; nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 48 per cent); rostrum shorter; zygomatic breadth relative to basilar length less; mastoid breadth relative to zygomatic breadth greater; tympanic bullae narrower and smaller; jugals narrower; distal end of meatal tube smaller; coronoid process shorter and wider; angular process shorter and rounded rather than nearly pointed; cheek teeth narrower.

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From the type and near topotypes of *Castor canadensis rostralis*, *C. c. pallidus* differs as follows: Size smaller; tail and hind foot shorter. Color: Markedly lighter throughout. Skull: Smaller and narrower; rostrum shallower and narrower; posterior end of nasals more constricted and barely

projecting posteriorly beyond premaxillae; zygomatic breadth relative to basilar length less; mastoid breadth actually as well as relatively greater; dorsal surface of lacrimal bone larger; tympanic bullae narrower; coronoid process higher and wider; angular process not projecting so far caudad; cheek teeth narrower.

From the type and near topotypes of *Castor canadensis duchesnei*, *C. c. pallidus* differs as follows: Size smaller; tail and hind foot shorter. Color: Lighter throughout. Skull: Shorter, narrower and less massive; nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 46 per cent); nasals barely projecting posteriorly beyond premaxillae; rostrum shorter and narrower; zygomatic breadth relative to basilar length less; mastoid breadth actually as well as relatively greater; tympanic bullae narrower and smaller; coronoid process higher and wider; angular process not projecting so far caudad; cheek teeth narrower.

Remarks.—The Raft River Mountains of extreme northwestern Utah, where *C. c. pallidus* occurs, are the only mountains of the state within the drainage of the Snake River. The Snake River proper lies 50 miles to the northward in Idaho and contains another kind of beaver, *C. c. taylori* (Davis, 1939: 273). Although occurring within the same drainage as *C. c. taylori*, *C. c. pallidus* is as distinct from it as from any other named kind. The relationships of *C. c. pallidus*, as indicated by the short rostrum and short, wide nasals, are rather more with *C. c. rostralis* of the Wasatch Mountains, than with *C. c. taylori*.

The pale color of the animals belonging to *C. c. pallidus* was noted at the time of capture, and is the same in the young specimen (625 mm. total length) as in the type, an adult.

Specimens examined.—Total, 2, distributed as follows: *Boxelder County*: Raft River, 5 mi. S Yost, Raft River Mountains, 6,000 ft., 1; Lynn Canyon, Raft River Mountains, 7,500 ft., 1.

***Castor canadensis rostralis* new subspecies**

Type.—Male, young adult, skin and skull, number 5199, Museum of Zoölogy, University of Utah; Red Butte Canyon, Fort Douglas, 5,000 ft., Salt Lake County, Utah; October 13, 1947; collected by Harold S. Crane and Clifton M. Greenhalgh, original number 446 of Crane.

Range.—Known from the western streams of the Wasatch Mountains; probably occurs in all streams draining westward into the basin of Pleistocene Lake Bonneville.

Diagnosis.—Size large; tail and hind foot long (see measurements). Color (type): Upper parts Snuff Brown, purest on head; underfur Brownish Black (2); base of tail Cinnamon Buff; hind feet Carob Brown; ears Blackish Brown (2); underparts Auburn, grading posteriorly to Cinnamon Buff; underfur Light Drab. Skull: Large, massive; nasals short and broad (breadth averaging 54 per cent of length) and moderately convex transversely; rostrum deep and broad; ventral surface of rostrum moderately concave dorsally; dorsal surface of lacrimal bone small; frontal region generally flat; zygomatic arches robust and widely spreading (zygomatic breadth averaging 82 per cent of basilar length).

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Measurements.—Measurements of the type and average and extreme cranial measurements of 6 unsexed adults from Charleston, are, respectively, as follows: Total length, 1,330; length of tail, 470; length of hind foot, 170; length of ear, 34; occipitonasal length, 128.2, 134.3 (142.1-129.5); basilar length, 112.4, 117.2 (128.2-113.2); mastoid breadth, 62.5, 64.3 (68.9-60.2); interorbital breadth, 27.9, 26.0 (26.9-26.0); zygomatic breadth, 91.3, 93.8 (105.8-90.8); length of nasals, 44.9, 43.9 (51.3-41.5); breadth of nasals, 24.5, 23.7 (25.7-22.0); alveolar length of upper molariform teeth, 28.3, 30.9 (32.5-28.7).

Comparisons.—From topotypes and near topotypes of *Castor canadensis taylori*, *C. c. rostralis* differs as follows: Color: Darker on upper parts owing to darker underfur, guard hairs actually lighter. Skull: Longer; nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 47 per cent); extension of nasals posterior to premaxillae less; rostrum shorter, broader and deeper; dorsal surface of lacrimal bone smaller; zygomatic breadth relative to basilar length greater; mastoid breadth relative to zygomatic breadth less; coronoid process shorter; coronoid and condyloid processes farther apart and space between them shallower.

From one topotype and two specimens from the Colorado River at Yuma, Yuma County, Arizona, of *Castor canadensis repentinus*, *C. c. rostralis* differs as follows: Size larger; tail longer. Color: Darker throughout. Skull: Longer; nasals shorter and wider (breadth of nasals relative to length of nasals averages 54 per cent as opposed to 47 per cent); extension of nasals posterior to premaxillae less; rostrum shorter, deeper and wider; zygomatic breadth relative to basilar length greater; mastoid breadth actually as well as relatively greater; dorsal surface of lacrimal bone smaller; coronoid and condylar processes farther apart and space between them shallower.

From specimens of *Castor canadensis baileyi*, from 20 miles north northeast of Elko, Elko County, Nevada, *C. c. rostralis* differs as follows: Size larger; tail and hind foot longer. Color: Darker throughout. Skull: Larger in all measurements taken; nasals markedly wider (breadth of nasals relative to length of nasals averages 54 per cent as opposed to 41 per cent); extension of nasals posterior to premaxillae less; dorsal surface of lacrimal bone smaller; mastoid breadth relative to zygomatic breadth less.

From one specimen of *Castor canadensis concisor*, from Trappers Lake, Garfield County,

Colorado, and from the original description of that subspecies (Warren and Hall, 1939: 358), *C. c. rostralis* differs as follows: Color: Guard hairs lighter; underfur darker (blackish as opposed to brownish). Skull: Longer and narrower; nasals broader and shorter (breadth of nasals averages 54 per cent of length of nasals as opposed to 48 per cent); dorsal surface of lacrimal bone smaller; distal end of meatal tube smaller; distal end of angular process rounded rather than pointed; coronoid process shorter; coronoid and condylar processes farther apart and space between them shallower.

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Among known kinds of *Castor canadensis*, *C. c. rostralis* is most like *Castor canadensis duchesnei*, from which the former subspecies differs as follows: Tail and hind foot longer. Color: Darker throughout. Skull: Nasals shorter and wider (breadth of nasals averages 54 per cent of length of nasals as opposed to 46 per cent); nasals less arched transversely; rostrum shorter, deeper and broader; ventral surface of rostrum less concave dorsally; dorsal surface of lacrimal bone smaller.

For comparison with *Castor canadensis pallidus*, see account of that subspecies.

Remarks.—Animals from Kamas, in the drainage of the Weber River, are intergrades between *C. c. rostralis* and *C. c. duchesnei*, but their short, wide nasals and wide rostra make them referable to *C. c. rostralis*.

The available specimens of *C. c. rostralis* are all from streams which ultimately empty into Great Salt Lake, which is in the northern part of the basin of Pleistocene Lake Bonneville. Some streams drain into the Lake Bonneville Basin without emptying into Great Salt Lake proper. Beavers from these streams, we suspect, when they become known, will be found to be related to *C. c. rostralis*.

Specimens examined.—Total, 16 (2 skins and skulls, 14 skulls only), distributed as follows: Summit County: Kamas, 5,500 ft., 6. *Salt Lake County*: Red Butte Canyon, Fort Douglas, 5,000 ft., 1; Millcreek Canyon, 6 mi. above mouth, 7,000 ft., 1. *Wasatch County*: Charleston, Heber Valley, 5,500 ft., 8.

***Castor canadensis duchesnei* new subspecies**

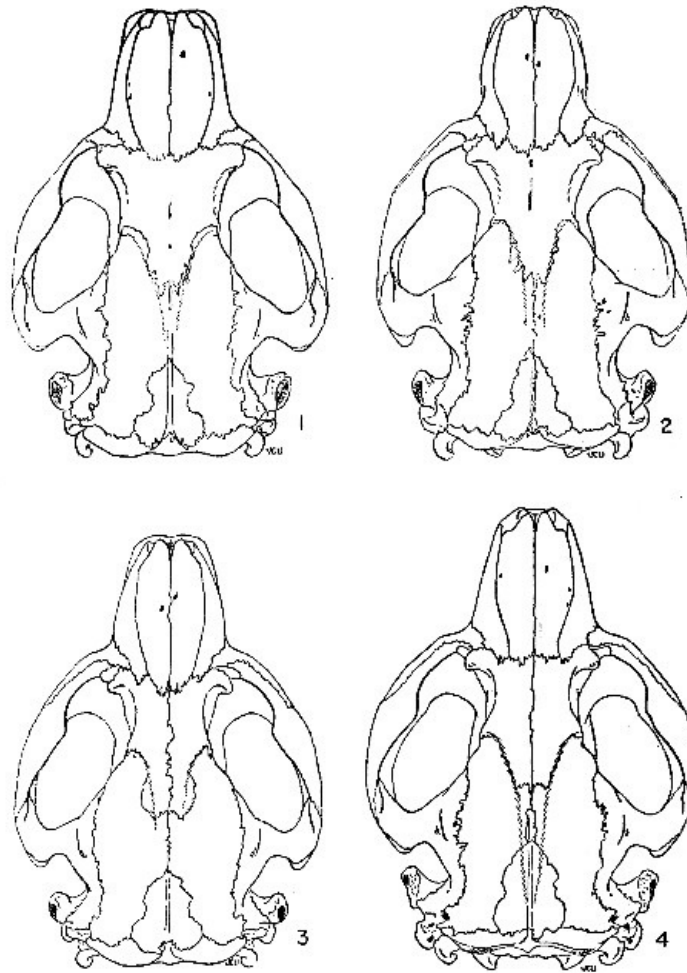
Type.—Male, young adult, skin and skull, number 4625, Museum of Zoölogy, University of Utah; Duchesne River, 10 miles northwest of Duchesne, 5,600 ft., Duchesne County, Utah; September 23, 1946; collected by Dave Thomas, original number 160 of K. R. Kelson.

Range.—Drainage of the Duchesne and White rivers in Utah and Colorado.

Diagnosis.—Size large; tail long (see measurements). Color (type): Upper parts Sayal Brown, purest on head, grading to Cinnamon Buff at base of tail; underfur Fuscous; hind feet Burnt Umber; ears Fuscous Black; underparts Tawny Olive; underfur Smoke Gray. Skull: Large, massive; nasals long, slender (breadth averaging 46 per cent of length) and markedly convex transversely; rostrum long and attenuate; zygomatic arches heavy and widely spreading (zygomatic breadth averaging 81.5 per cent of basilar length); ventral surface of rostrum markedly concave dorsally, especially immediately behind upper incisors; nasals extend posterior to premaxillae.

Measurements.—Measurements of the type and average and extreme cranial measurements of 9 unsexed adults, from Currant Creek, are, respectively, as follows: Total length, 1,176; length of tail, 458; length of hind foot, 165; length of ear, 33; occipitonasal length, 123.6, 132.1 (138.5-122.3); basilar length, 98.6, 114.4 (125.8-99.2); mastoid breadth, 60.4, 65.1 (67.2-64.1); interorbital breadth, 23.0, 25.1 (26.1-23.7); zygomatic breadth, 88.3, 94.2 (99.7-89.5); length of nasals, 46.1, 48.4 (51.5-46.2); breadth of nasals, 20.5, 22.5 (24.5-18.8); alveolar length of upper molariform teeth, 28.9, 29.9 (32.2-26.5).

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**Figs. 1-4 Dorsal views of skulls of *Castor canadensis*.
× 1/2**

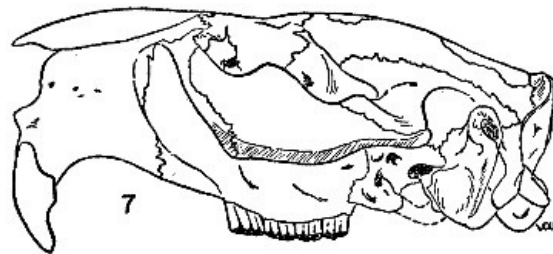
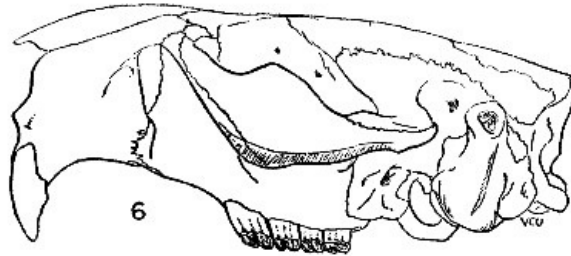
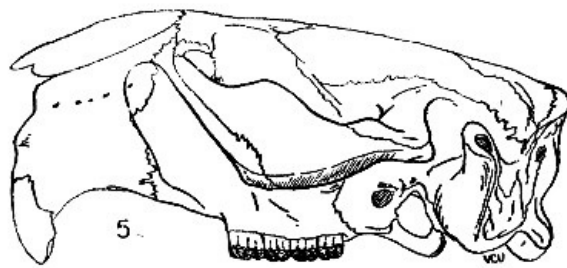
FIG. 1. *Castor canadensis rostralis*, male, young adult, no. 5199 (holotype), Mus. Zoöl., Univ. Utah.

FIG. 2. *Castor canadensis pallidus*, female, adult, no. 719 (holotype), Mus. Zoöl., Univ. Utah.

FIG. 3. *Castor canadensis duchesnei*, male, young adult, no. 4625 (holotype), Mus. Zoöl., Univ. Utah.

FIG. 4. *Castor canadensis concisor*, male, adult, no. 2090, Mus. Nat. Hist., Univ. Kansas, from Trappers Lake, Garfield County, Colorado, obtained by L. L. Dyche, October 22, 1891.

Comparisons.—From topotypes and near topotypes of *Castor canadensis taylori*, *C. c. duchesnei* [Pg 415] differs as follows: Color: Guard hairs lighter, underfur darker. Skull: Nasals narrower; rostrum narrower; mastoid breadth relative to zygomatic breadth less; zygomatic breadth relative to basilar length greater; tympanic bullae narrower and smaller; cheek teeth narrower.



Figs. 5-7 Lateral views of left side of skulls of *Castor canadensis*. × 1/2

Fig. 5. *Castor canadensis rostralis*, male, young adult, no. 5199 (holotype), Mus. Zoöl., Univ. Utah.

Fig. 6. *Castor canadensis pallidus*, female, adult, no. 719 (holotype), Mus. Zoöl., Univ. Utah.

Fig. 7. *Castor canadensis duchesnei*, male, young adult, no. 4625 (holotype), Mus. Zoöl., Univ. Utah.

From specimens of *Castor canadensis baileyi*, from 20 miles north northeast of Elko, Elko County, Nevada, *C. c. duchesnei* differs as follows: Size larger; tail and hind foot longer. Color: Guard hairs lighter, underfur darker. Skull: Larger in all measurements taken; nasals broader and longer (breadth of nasals averages 46 per cent of length of nasals as opposed to 41 per cent); rostrum broader and longer; mastoid breadth relative to zygomatic breadth less; tympanic bullae larger.

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From one specimen of *Castor canadensis concisor*, from Trappers Lake, Garfield County, Colorado, and from the original description of that subspecies (Warren and Hall, 1939: 358), *C. c. duchesnei* differs as follows: Color: Lighter throughout. Skull: Nasals more convex transversely; rostrum narrower; ventral border of rostrum more concave dorsally, especially immediately behind upper incisors; distal end of meatal tube smaller; angular process shorter and rounded rather than pointed; cheek teeth smaller.

Among known subspecies of *Castor canadensis*, *C. c. duchesnei* is most like *Castor canadensis repentinus*, but differs from the latter as follows: Size larger; hind foot shorter. Color: Darker throughout. Skull: Basilar length less; mastoid breadth greater; nasals shorter and narrower; extension of nasals posterior to premaxillae less; nasals more convex transversely; cheek teeth smaller.

For comparisons with *Castor canadensis pallidus* and *Castor canadensis rostralis*, see accounts of those subspecies.

Remarks.—The extent of the range of *C. c. duchesnei* within the drainage of the White River is not definitely known. Three animals from 9-1/2 miles southwest of Pagoda Peak, Rio Blanco County, Colorado, from the drainage of the White River, are intergrades between *C. c. concisor* and *C. c. duchesnei*. They are like the latter subspecies in shape and length of the nasals, less expanded distal end of the meatal tube and the rounded angular process, and it appears best, pending the acquisition of more material, to refer them to *C. c. duchesnei*. Another specimen, number 2090, Museum of Natural History, University of Kansas, from Trappers Lake, Garfield County, Colorado, at the headwaters of the White River, and only 16 miles distant from the three

aforementioned animals, is, however, nearly typical of *C. c. concisor*. Relying upon the original description (Warren and Hall, 1939: 358), this animal is like *C. c. concisor* in size and shape of the jugals, in size of the distal end of the meatal tube and in the pointed end of the angular process. Warren and Hall (*loc. cit.*) noted that animals assignable to *C. c. concisor* occurred throughout the mountainous parts of Colorado, and recorded them from the headwaters of nearly all the major rivers of that state. Apparently *C. c. concisor* also occurs in the headwaters of the White River, while the main part of the river is inhabited by animals referable to *C. c. duchesnei*.

Specimens examined.—Total, 15 (4 skins and skulls, 11 skulls only), distributed as follows: Utah: *Wasatch County*: Currant Creek, Strawberry Valley, 6,000 ft., 11. *Duchesne County*: Duchesne River, 10 mi. NW Duchesne, 5,600 ft., 1. Colorado: *Rio Blanco County*: 9-1/2 mi. SW Pagoda Peak, 7,700 ft., 3 (Museum of Natural History, University of Kansas).

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