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THREE NEW PIKAS (*GENUS OCHOTONA*) FROM UTAH

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In his Mammals of Utah, Durrant (Univ. Kansas Publs., Mus. Nat. Hist., 6:67-73, August 10, 1952) recognized 5 subspecies of *Ochotona princeps* (Richardson) as occurring in Utah. While Durrant's manuscript was in press, Gardner (Journ. Washington Acad. Sci., 40:344, October 15, 1950) named *Ochotona princeps moorei* from the Wasatch Plateau. Durrant (*op. cit.*:70) previously studied two of the specimens upon which Gardner based the name *Ochotona princeps moorei* and although he recognized differences, owing to the paucity of specimens, he referred them to *O. p. cinnamomea.* Recent acquisitions of additional specimens from critical areas and also from areas from which these animals had not been previously recorded, indicate the existence in Utah of three heretofore undescribed subspecies of the aforementioned species. Moreover, our studies confirm that the animals from the Wasatch Plateau belong to *O. p. moorei* and not to *O. p. cinnamomea* as indicated by Durrant. Of the 5 subspecies mentioned by Durrant (*op. cit.*:67-73), only 4 are now known to occur in Utah, because no animals from Utah are now known to be referable to *O. p. saxatilis.* The addition of the three new kinds herein described and named indicate that the pikas from Utah now belong to eight subspecies.

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Ochotona princeps wasatchensis, new subspecies

Type.—Male, adult, skin and skull, number 4787, Museum of Zoology, University of Utah; 10 miles above lower powerhouse, road to Cardiff Mine, Big Cottonwood Canyon, Salt Lake County, Utah; June 24, 1946; collected by J. Berryman; original number 1.

Range.—Southern Wasatch Mountains, limits unknown.

Diagnosis.—Color: Summer pelage: Sides and upper parts near Light Ochraceous Buff (some specimens approach Warm Buff), back darker than sides owing to moderate suffusion of dark hairs; top of head between Cinnamon Buff and Clay Color; underparts Light Buff to Warm Buff; upper surface of fore and hind feet between Light Buff and Warm Buff; subauricular and postauricular regions Light Ochraceous Buff surrounded by Cinnamon-Buff; inner and outer surfaces of ears black; margins of ears whitish. *Winter pelage*: Darker than summer; sides and upper parts near Pinkish Buff moderately suffused with brown; subauricular and postauricular regions particularly less distinctive; top of head notably darker. *Skull*: Rostrum short; nasals short with straight lateral margins; orbit small; maxillary fenestrae small and subcircular; proximal ends of nasals rounded; anterior margin of palatal bridge concave; zygomata parallel; palatal bridge narrow.

Comparisons.—In color, topotypes of *O. p. wasatchensis* differs from both topotypes of *O. p. clamosa* and near topotypes of *O. p. uinta* as follows: Lighter; subauricular and postauricular regions markedly lighter, general appearance buffy as opposed to pinkish cinnamon; sides and upper parts near Light Ochraceous-Buff with comparatively little suffusion of dark hairs, as opposed to near Light Pinkish Cinnamon or approaching Pinkish Buff with a predominance of dark hairs; top of head with less suffusion of dark hairs; upper surfaces of fore and hind feet with more buff.

From topotypes of *Ochotona princeps clamosa*, topotypes of *O. p. wasatchensis* differ as follows: *Size*: Smaller; ears longer. *Skull*: Posterior ends of nasals wider; zygomata parallel as opposed to divergent posteriorly; coronal suture square as opposed to rounded; maxillary fenestrae average smaller and relatively wider (dorso-ventrally); palatal bridge wider (antero-posteriorly); posterior margin of palatal bridge evenly rounded as opposed to V-shaped; width of molariform teeth less; antero-ventral processes of zygomata projecting less laterad; tympanic bullae markedly less inflated ventrally; interptergoid space narrower; infraorbital foramen oval as opposed to elongate dorso-ventrally.

Comparisons of topotypes of *O. p. wasatchensis* with near topotypes of *Ochotona princeps uinta* show the former to possess the following differences: *Size*: Smaller; ear and hind foot longer. *Skull*: Smaller in most measurements; rostrum shorter, but relatively wider; nasals shorter, lateral margins straight as opposed to slightly concave; orbit markedly smaller; zygomatic breadth less; posterior ends of nasals round as opposed to wedge-shaped; posterior outline of skull in dorsal view, rounded as opposed to wedge-shaped; maxillary fenestrae markedly smaller and of different shape, being shorter but actually as well as relatively wider (dorso-ventrally); zygomata weaker; masseteric fossa of the zygoma shorter and narrower; palatine vacuities larger; anterior margin of palatal bridge markedly concave as opposed to nearly straight;

palatal bridge markedly wider (antero-posteriorly); alveolar length of upper molariform teeth shorter; basioccipital narrower and shorter; width across exoccipital processes less; tympanic bullae shorter (antero-posteriorly) but more inflated ventrally.

Characters that distinguish topotypes of *O. p. wasatchensis* from near topotypes of *Ochotona princeps moorei* are as follows: Ear and hind foot longer. *Color*: Darker; general appearance buffy as opposed to buffy gray; upper parts near Light Ochraceous-Buff as opposed to Pale Ochraceous-Buff. *Skull*: Lateral margins of nasals straight and not expanded anteriorly as opposed to concave and expanded anteriorly; posterior ends of nasals round as opposed to moderately wedge-shaped; in dorsal view, outline of lower margin of maxillary fenestrae concave as opposed to straight or slightly convex; posterior ends of nasals extend relatively further caudad; lateral margins of zygomata approximately straight as opposed to slightly convex; width of zygoma at union of zygomatic process of squamosal and jugal less; maxillary fenestrae shorter but relatively wider (dorso-ventrally); palatine vacuities larger and "teardrop" shaped as opposed to nearly oval; posterior end of palatine vacuities relatively wider; posterior margin of palatal bridge concave as opposed to straight or slightly convex; interpterygoid space narrower; tympanic bullae smaller.

For comparisons of topotypes of *O. p. wasatchensis* with animals from the Fishlake Plateau and with those from the La Sal Mountains, see accounts under the new subspecies herein described from these localities.

Topotypes of *O. p. wasatchensis* differ from near topotypes of *Ochotona princeps utahensis* as follows: *Size*: Markedly smaller; ear longer. *Color*: Lighter throughout (general appearance buffy as opposed to grayish). *Skull*: Smaller; lateral margins of nasals straight as opposed to concave; anterior ends of nasals not inflated as opposed to inflated; rostrum shorter; maxillary fenestrae markedly smaller; orbit longer; palatine vacuities larger; anterior margin of palatal bridge concave as opposed to nearly straight (some specimens have a median caudal process); interpterygoid space shorter; basioccipital shorter.

Topotypes of *O. p. wasatchensis* can be easily distinguished from those of *Ochotona princeps fuscipes* and *Ochotona princeps cinnamomea* as follows: *Size*: Larger than *O. p. cinnamomea*. *Color*: Lighter; general appearance buffy as opposed to pinkish or cinnamon; head buffy as opposed to grayish. *Skull*: Larger; nasals markedly longer; orbit longer; palatal bridge markedly wider (antero-posteriorly); alveolar length of upper molariform teeth greater; interpterygoid space narrower.

Topotypes of *O. p. wasatchensis* can be distinguished from those of *O. p. figginsi* as follows: *Size*: Larger. *Color*: Upper parts lighter; sides and upper parts buffy as opposed to cinnamon; underparts lighter. *Skull*: Occipitonasal length greater; lateral margins of nasals straight as opposed to slightly concave; orbit wider; maxillary fenestrae markedly smaller; basioccipital shorter.

Comparisons of topotypes of *O. p. wasatchensis* with topotypes of *Ochotona princeps saxatilis* show the former to differ as follows: *Color*: Lighter, upper parts Light Ochraceous-Buff as opposed to Light Buff; dorsum lighter owing to less suffusion of dark hairs; under parts more buffy. *Skull*: Occipitonasal length less; lateral margins of nasals straight

as opposed to concave; posterior half of nasals markedly wider; orbit longer; maxillary fenestrae shorter but relatively wider; posterior processes of zygomata shorter and narrower; anterior margin of palatal bridge more concave; breadth of braincase less; basioccipital markedly narrower; tympanic bullae larger.

Specimens examined.—Total, 27, distributed as follows: *Salt Lake County*: Silver Lake Post Office (Brighton), 9,000 feet, 3; Silver Lake, Big Cottonwood Canyon, 8,700 feet, 1; near Lake Solitude, Silver Lake Post Office (Brighton), 9,000 feet, 1; 10 miles above lower powerhouse, road to Cardiff Mine, Big Cottonwood Canyon, 1; Big Cottonwood Canyon, 1½ miles down canyon from "The Spruces", 1; 2 miles above Alta, 6; Mountain Lake, near Alta, 10,000 feet, 1; Little Cottonwood Canyon, 6 miles above Wasatch Boulevard, 1; Big Willow Canyon, 7,000 feet, 1. *Utah County*: Mt. Timpanogos, 11 (B.Y.U.).

Ochotona princeps lasalensis, new subspecies

Type.—Male, adult, skin and skull, number 6409, Museum of Zoology, University of Utah; Warner Ranger Station, 9,750 feet, La Sal Mountains, Grand County, Utah; June 23, 1948; collected by Keith R. Kelson; original number 531.

Range.—La Sal Mountains of Eastern Utah.

Diagnosis.—Color: *Winter pelage* (worn): Sides and upperparts Pinkish Buff, dorsum darker because of greater admixture of brown hairs; underparts Pale Pinkish-Buff; general appearance of animals buffy gray as a result of exposure of under fur; upper surfaces of fore and hind feet between Pale Pinkish Buff and Pinkish Buff; subauricular region near Light Ochraceous-Buff; inner surface of ears approaching Mummy Brown, with light scattering of buffy hairs; margins of ears whitish with longer hairs on anterior margins pale buffy; top of head grayish to pale buffy, with moderate mixture of brownish hairs. *Skull:* Rostrum wide; nasals long and narrow posteriorly; antero-lateral margin of zygomatic arch angular and concave; orbit wide; posterior margin of orbital plate of maxillary containing alveoli of last two upper cheek teeth, bilobed; masseteric fossae of zygomata long, and wide posteriorly; anterior margin of palatal bridge straight; alveolar length of upper molariform teeth markedly long; width of molars markedly wide.

Comparisons.—Ochotona princeps lasalensis can be distinguished from all subspecies studied as follows: *Skull:* Antero-lateral margins of zygomata angular and slightly concave as opposed to evenly rounded and convex; posterior margin of orbital plate of maxillary containing alveoli of last two upper cheek teeth, highly elevated and bilobed as opposed to having only one distinct lobe; alveolar length of upper molariform teeth greater; posterior ends of nasals narrower.

With the exception of animals referable to *O. p. uinta* and *O. p. utahensis,* those of *O. p. lasalensis* differ from all others studied in having longer nasals. Furthermore, with the exception of specimens of *O. p. clamosa, O. p. fuscipes* and *O. p. cinnamomea,* those referable to *O. p. lasalensis* differ from all others studied in having a markedly wider posterior region of the masseteric fossa.

The nearest subspecies geographically and morphologically to *O. p. lasalensis* is *Ochotona princeps saxatilis.* Topotypes of *O. p. lasalensis*

can be distinguished from those of *O. p. saxatilis* as follows: Ears shorter. *Color*: Sides and upper parts Pinkish Buff as opposed to near Light Buff (one specimen Ivory Yellow); upper parts darker with greater admixture of brown; subauricular region near Light Ochraceous-Buff, as opposed to Warm Buff; inner surfaces of ears darker; region between nose and vibrissae grayish as opposed to yellowish or buffy. *Skull*: Rostrum wider; orbit markedly wider; zygomatic breadth greater; anterior margin of palatal bridge straight as opposed to slightly concave; basioccipital narrower; tympanic bullae more inflated ventrally; width of molariform teeth markedly greater; dorsal margin of foramen magnum more deeply concave.

Topotypes of *O. p. lasalensis* can be distinguished from those of *Ochotona princeps figginsi* as follows: *Color*: Lighter, sides and upper parts Pinkish Buff as opposed to between Cinnamon-Buff and Cinnamon; dorsum lighter with less admixture of dark brown; subauricular region near Light Ochraceous-Buff as opposed to near Clay Color; head grayish buffy as opposed to browish cinnamon; underparts lighter. *Skull*: Rostrum wider; premaxillae extend further caudad; posterior margin of parietals and interparietal ruonded as opposed to pointed or square; orbit wider; anterior margin of palatal bridge straight as opposed to concave; ventral tips of exoccipital processes wider; palatal bridge wider; width of cheek teeth greater.

Comparison of topotypes of *O. p. lasalensis* with specimens of *Ochotona princeps winta* show the following: *Size*: Smaller. *Color*: Lighter; sides and upper parts near Pinkish Buff as opposed to Light Pinkish Cinnamon, underparts lighter; head less brownish. *Skull:* Orbit shorter; coronal suture square as opposed to rounded; maxillary fenestrae slightly smaller; palatal bridge wider (antero-posteriorly).

Topotypes of *O. p. lasalensis* differ from those of *Ochotona princeps wasatchensis* as follows: *Color*: More uniformly buffy grayish; sides and upperparts near Pinkish Buff as opposed to Light Ochraceous-Buff; head markedly grayer. *Skull*: Zygomatic breadth greater; rostrum longer; frontal processes of premaxillae extend further caudad; maxillary fenestrae larger; zygomata heavier; anterior margin of palatal bridge straight as opposed to concave; palatal bridge markedly wider; tympanic bullae larger.

The following characters distinguish topotypes of *O. p. lasalensis* from those of *Ochotona princeps clamosa*: *Size*: Slightly smaller, ear longer. *Color*: Differs in color from *O. p. clamosa* as it does from *O. p. uinta*. *Skull*: Rostrum markedly longer; maxillary fenestrae markedly larger; anterior margin of palatal bridge straight as opposed to concave; palatal bridge markedly wider (antero-posteriorly); median ventral ridge of basioccipital less pronounced.

Topotypes of *O. p. lasalensis* can be distinguished from those of *Ochotona princeps moorei* as follows: *Color*: General appearance buffy as opposed to grayish buffy; sides and upper parts Pinkish Buff as opposed to Pale Ochraceous-Buff. *Skull*: Rostrum longer; lateral margins of nasals straight as opposed to concave; maxillary fenestrae larger; masseteric fossa of zygoma longer and shallower; anterior margin of palatal bridge straight as opposed to concave; palatine vacuities larger; sphenopalatine vacuities shorter; tympanic bullae shorter.

Comparison of topotypes of *O. p. lasalensis* with near topotypes of *Ochotona princeps utahensis* show the following: *Size*: Smaller. *Color*: Lighter, buffy as opposed to grayish. *Skull*: Masseteric fossa of zygomatic arch shallower; zygomatic arch heavier; palatal bridge wider (antero-posteriorly); sphenopalatine vacuities longer.

Topotypes of *O. p. lasalensis* differ from those of *Ochotona princeps cinnamomea* and near topotypes of *O. p.* fuscipes as follows: *Size*: Larger. *Color*: Lighter; general appearance buffy as opposed to cinnamon or pinkish cinnamon; head buffy as opposed to grayish. *Skull*: Larger in nearly all measurements taken; rostrum longer; palatal bridge markedly wider (antero-posteriorly); width of basioccipital greater; tympanic bullae larger.

Comparison of *O. p. lasalensis* with animals from the Fishlake Plateau are given under the account of the new subspecies named from there. *Specimens examined.*—Total, 14, distributed as follows: *Grand County*: ½ mile, N Warner R. S., La Sal Mountains, 9,000 feet, 1; Warner R. S., 9,750 feet, La Sal Mountains, 5 (1, B.Y.U.); ½ mile S Warner R. S., La Sal Mountains, 9,700 feet, 1. *San Juan County*: Mt. Mellithin, La Sal Mountains, 12,280 feet, 2 (B.Y.U.); Geyser Pass, La Sal Mountains, 5 (B.Y.U.).

Ochotona princeps barnesi, new subspecies

Type.—Male, adult, skin and skull, number 8140, Museum of Zoology, University of Utah; Johnson's Reservoir, 8,800 feet, 15 miles north of Loa (Fishlake Plateau), Sevier County, Utah; August 23, 1952; collected by M. Raymond Lee; original number, 123.

Range.—Fishlake Plateau and environs.

Diagnosis.—*Size*: Large (see measurements). *Color*: *Summer pelage*: Dark; sides and back near Pinkish Buff with moderate suffusion of dark brown; top of head Pinkish Buff with moderate suffusion of Sepia; ears dark brown, margins whitish; subauricular patch large, center Pinkish Buff surrounded by near Cinnamon; upper surface of fore and hind feet near Pinkish Buff; underparts Pinkish Buff to Clay Color, darkest in pectoral region. *Winter pelage*: Grayer througout. *Skull*: Large; nasals markedly inflated anteriorly; rostrum deep with concave dorsal surface; upper incisors long and procumbent; palatine vacuities large and in approximately one-half of the specimens examined, asymmetrical (right-half larger than left); interpterygoid space narrow; basioccipital long and wide; braincase deep.

Comparisons.—Both cranial and external measurements show animals belonging to *Ochotona princeps barnesi* to be the largest of any of the pikas studied.

Topotypes of *O. p. barnesi* differ from near topotypes of *O. p. utahensis* as follows: *Size*: Total length greater; ears longer. *Color*: Sides and upper parts slightly lighter (some specimens indistinguishable); top of head lighter (moderately washed with Sepia as opposed to heavily washed with Sepia); underparts lighter, particularly pectoral region (between Cinnamon-Buff and Clay Color as opposed to near Sayal Brown). *Skull*: Averages larger in nearly all measurements taken; nasals markedly inflated anteriorly as opposed to slightly inflated; in dorsal outline rostrum slightly concave as opposed to convex; incisors

longer, wider and more procumbent; sphenopalatine vacuities longer; palatal bridge wider; rostrum deeper; depth of braincase over bullae greater; interpterygoid space narrower. Differences in the following features were found to be statistically significant between the two aforementioned subspecies: Total length, length of ear, basilar length, length of incisors, length of basioccipital, depth of braincase, depth of rostrum.

From specimens of *Ochotona princeps moorei* topotypes *O. p. barnesi* differs as follows: *Size:* Larger. *Color:* Darker; upper parts near Pinkish Buff as opposed to Pale Ochraceous-Buff; suffusion of brown on sides and upper parts greater. *Skull*: Markedly larger in nearly all measurements; nasals longer and markedly inflated anteriorly as opposed to shorter with anterior ends expanded laterally; rostrum longer; incisors markedly longer; maxillary fenestrae markedly larger; palatine vacuities larger; posterior border of palatal bridge concave as opposed to straight; tympanic bullae larger.

The following characters distinguish topotypes of *O. p. barnesi* from those of *O. p. cinnamomea* and *O. p. fuscipes*: *Size*: Larger. *Color*: Head brownish as opposed to grayish; sides and upper parts Pinkish Buff as opposed to Cinnamon or Pinkish Cinnamon. *Skull*: Markedly larger in nearly all measurements; nasals longer and inflated anteriorly; maxillary fenestrae markedly larger; orbit larger; palatal bridge wider; interpterygoid space relatively narrower; upper incisors longer and more procumbent; tympanic bullae larger and more inflated ventally.

Comparisons of topotypes of *O. p. barnesi* with specimens of *O. p. uinta* show the former to be much more closely related to *O. p. uinta* than to either *O. p. cinnamomea* or *O. p. fuscipes.* Characters of significance show topotypes of *O. p. barnesi* to differ from *O. p. uinta* from several localities in the Uinta Mountains as follows: *Size:* Slightly larger. *Color*: General appearance grayer; side and upper parts buffy as opposed to cinnamon buffy. *Skull*: Nasals longer and more inflated anteriorly; interorbital width greater; maxillary fenestrae slightly larger; palatal bridge markedly narrower (antero-posteriorly); palatine vacuities longer; tympanic bullae larger, being markedly longer.

Topotypes of *O. p. barnesi* differ from those of *O. p. figginsi* as follows: *Size*: Larger. *Color*: Sides and upper parts buffy moderately suffused with brown as opposed to cinnamon buffy heavily washed with dark brown. *Skull*: Slightly larger; nasals more inflated anteriorly; alveolar length of maxillary teeth greater; anterior margin of palatal bridge straight as opposed to markedly concave; occipito-sphenoidal suture straight as opposed to V-shaped.

Comparisons of topotypes of *O. p. saxatilis* with those of *O. p. barnesi* show the latter to differ as follows: *Size*: Larger. *Color*: Darker (general appearance browner); sides and upper parts Pinkish Buff moderately suffused with brown as opposed to Light Buff lightly suffused with brown. *Skull*: Larger in most measurements; posterior ends of nasals wider; maxillary fenestrae larger; posterior part of skull from lateral view slopes less sharply ventrad; anterior margin of palatal bridge square as opposed to concave; basioccipital wider; tympanic bullae larger and more inflated; rostrum deeper dorso-ventrally.

From topotypes of *O. p. lasalensis* those of *O. p. barnesi* can be distinguished as follows: *Size:* Larger. *Color:* Slightly darker; sides and

upper parts with more suffusion of brown; subauricular region more cinnamon. *Skull*: Larger in most measurements; nasals more inflated anteriorly; posterior ends of nasals wider; orbit longer; upper incisors longer; maxillary fenestrae larger; palatal bridge narrower; basioccipital markedly wider and longer.

Comparisons of topotypes of *O. p. barnesi* with topotypes of *O. p. wasatchensis* show the former to differ as follows: *Size*: Larger. *Color*: Darker (suffusion of brown greater); sides and upper parts Pinkish Buff as opposed to Light Ochraceous-Buff. *Skull*: Larger in nearly all measurements; nasals markedly more inflated anteriorly as opposed to relatively straight; frontal tongues of premaxillae longer; incisors more procumbent; maxillary fenestrae longer; upper disastema longer; anterior margin of palatal bridge straight as opposed to concave; basioccipital wider.

Topotypes of *O. p. barnesi* differ from topotypes of *O. p. clamosa* as follows: *Size*: Larger. *Color*: Differs from *O. p. clamosa* in much the same way that it does from *O. p. uinta*. *Skull*: Larger in nearly all measurements; nasals longer and markedly more inflated anteriorly; incisors longer; orbti longer; maxillary fenestrae markedly longer; tympanic bullae relatively less inflated ventrally; interpterygoid space markedly longer; palatal bridge wider (antero-posteriorly).

The name *Ochotona princeps barnesi* is in recognition of Claude T. Barnes, dean of Utah mammalogists whose writings first focused attention upon the mammalian fauna of Utah.

Specimens examined.—Total, 23, distributed as follows: *Sevier County*: 1 mi. NW Mt. Marvine (Seven Mile Valley), 9,200 ft., 6; Seven Mile Canyon 4 mi N Johnson's Res., 8,800 ft., 2; Johnson's Res., 8,800 ft., 15

As a result of this study, the pikas of Utah are now arranged in eight subspecies of *Ochotona princeps*. In Utah, these animals are restricted to talus slopes in high mountains. Our studies have led us to conclude that in addition to talus another important ecological requirement is moisture. We have never obtained animals from dry talus. This causes for a lack of occurrence of pikas in all talus slopes in any given mountain range. The majority of the mountains of Utah are isolated from each other by intervening valleys. These two ecological factors of talus and moisture in addition to the isolation of the mountains have caused for complete isolation of these animals.

In spite of this complete isolation of the populations of pikas, the evidence as presented by color and cranial details have enabled us to recognize complexes of relationship of the several subspecies. *Ochotona princeps saxatilis*, a Coloradan subspecies has its closet affinities with *O. p. lasalensis* from the La Sal Mountains of Utah, and not with *O. p. figginsi* of the western mountains of Colorado. *Ochotona princeps figginsi, O. p. uinta,* from the Uinta Mountains, *O. p. barnesi* from the Fishlake Mountains, and *O. p. utahensis* from the Aquarius Plateau constitute another complex of related subspecies. The Wasatch Mountains are inhabited by another complex consisting of *O. p. clamosa* from the northern area and *O. p. wasatchensis* from the southern area. The latter two subspecies are from the same ancestral stock, and are distinct from the subspecies which occur in the eastern plateaus of Utah.

This closer relationship of the pikas from the high plateaus of eastern Utah with those from the Rocky Mountains of Colorado than with those from the Wasatch Mountains is in agreement with that known to exist in other species of mammals.

The animals of *O. p. moorei* from the Wasatch Plateau in central Utah merit special consideration. While being distinct in color they do resemble *O. p. wasatchensis.* Cranially, they are distinct but do show some relationship with *O. p. barnesi* of the eastern complex. Past physiography indicates that there was opportunity for pikas from both the Wasatch Mountains and the eastern plateaus to attain the Wasatch Plateau. Animals now referable to *O. p. moorei* probably originated from an intergrading population of ancestral types of both complexes which became subsequently isolated. This is more than mere conjecture because it is known that intergradation between other kinds of mammals occurs at present on the Wasatch Plateau. Red squirrels, *Tamiascirus hudsonicus fremonti* from Colorado and eastern Utah, and those of *T. h. ventorum* of the Wasatch Mountains intergrade on the Wasatch Plateau. Likewise, golden-mantled ground squirrels (*Citellus lateralis*) show this same phenomenon. Members of these two latter genera are not so restricted ecologically as are pikas which may account for the latter evolving into a distinct subspecies on the Wasatch Plateau while the squirrels still form intergrading populations there.

Pikas of the subspecies *O. p. cinnamomea* from the Beaver Mountains and those of *O. p. fuscipes* from Iron Mountain form another complex and are related to the subspecies *O. p. tutelata* from central Nevada. Both Howell (N. Amer. Fauna, 47, p. 46, August 21, 1924) and Hall (Mammals of Nevada, p. 59, Univ. California Press, July 1, 1946) remarked upon the relationship between *O. p. cinnamomea* and animals from central Nevada now known as *O. p. tutelata.* Geographically, the range of *O.p. fuscipes* is adjacent to that of *O. p. cinnamomea,* and although they are in the same complex, the former is more unlike the latter than the latter is from animals from central Nevada. Animals of *O. p. fuscipes* show some characters of the pikas from eastern Utah. This would suggest some gene exchange in the not too distant past between animals from the eastern complex and those that came into Utah from the west.

Geologists mostly agree that the mountains of Utah, where these subspecies of pikas occur are relatively young. The great uplifts that formed the major mountains and plateaus of Utah are no older than late Pliocene. Moreover, many of the uplifts are considered to have originated during the Pleistocene, and some even in the Late Pleistocene. In view of the youth of these mountains, the degree and amount of morphological differentiation between animals of the several subspecies of pikas indicate that subspeciation has been relatively rapid in this animal. These rapid uplifts would cause an increase in talus and followed by the aridity of the Late Pleistocene would effectively form isolated populations of pikas on the several mountains. Sufficient time has elapsed for them to have become subspecifically distinct.

Contribution from Department of Zoology, University of Utah, Salt Lake City, Utah.

TABLE I

MEASUREMENTS OF OCHOTONA

	Total length	Length of hind foot	Length of ear	Occipi-tonasal length	Basilar length	Zygomatic breadth	Length of nasals	Length of orbit	Length of basioc-cipital	Width of palatal bridge	Length of maxillary fenestrae	Alveolar length maxillary tooth-row
					O. p. wasatchensis 4 ♂♂ type, 3 near topotypes							
Average	188.8	32.0	23.3	42.9	34.1	20.9	14.7	10.0	8.4	2.0	4.8	8.6
Minimum	181	31	23	42.2	33.5	20.3	13.9	9.6	8.4	1.9	4.4	8.4
Maximum	197	33	25	43.7	34.6	21.5	15.1	10.5	8.4	2.0	5.1	8.8
					O. p. lasalensis 3 ♂♂ type, 2 topotypes							
Average	178.7	31.0	23.0	44.4	35.0	22.6	15.3	10.0	8.5	2.5	5.6	9.1
Minimum	178	30	22	43.5	------	22.5	15.1	9.7	8.5	2.2	5.3	8.9
Maximum	180	32	24	45.4	------	22.7	15.5	10.2	8.5	2.8	5.8	9.4
					O. p. barnesi 3 ♂♂ type, 2 topotypes							
Average	210.7	32.5	25	46.9	37.5	22.7	15.8	10.7	9.5	2.2	6.1	9.0
Minimum	210	32	24	46.6	37.0	22.0	15.5	10.2	9.3	2.2	6.0	8.5
Maximum	212	33	25	47.5	38.1	23.2	16.1	11.1	9.8	2.2	6.1	9.4
					O. p. wasatchensis 8 ♀♀ near topotypes							
Average	187.6	31.5	25.1	43.9	34.3	21.0	14.9	10.2	8.5	2.1	4.8	8.6
Minimum	180	30	23	42.0	32.8	20.3	14.1	9.7	8.1	1.7	4.2	8.4
Maximum	198	34	26	45.5	36.6	21.6	15.9	10.5	9.1	2.5	5.1	8.9
					O. p. lasalensis 3 ♀♀ topotypes							
Average	190.3	30	23	43.2	34.1	21.9	15.0	9.9	8.4	2.5	5.2	9.0
Minimum	182	30	22	-----	33.4	21.5	14.6	9.6	8.0	2.2	5.0	9.0
Maximum	200	30	24	------	34.8	22.2	15.3	10.1	8.8	2.9	5.6	9.1
					O. p. barnesi 6 ♀♀ topotypes							
Average	202.5	30.0	22.5	44.3	35.0	21.6	14.7	10.1	8.8	2.2	5.9	8.7
Minimum	200	28	20	43.6	33.6	20.9	14.1	9.7	8.3	2.0	5.5	8.5
Maximum	205	32	24	45.1	36.3	22.1	15.3	10.3	9.1	2.3	6.2	9.1