

ARTICLE XX.—*Description of supposed New Species and Subspecies of Mammals, from Arizona.* By EDGAR A. MEARNs, Assistant Surgeon, U. S. A.

***Sciurus hudsonius mogollonensis*, subsp. nov.**

(MOGOLLON CHICKAREE.)

Types, No. 2300,* ♂ ad., Quaking Asp Settlement, summit of Mogollon Mountains, Central Arizona, May 25, 1887; No. 2996, ♀ ad., from near General Springs, Mogollon Mountains, Arizona. Collected by Dr. Edgar A. Mearns.

The Chickaree of Arizona is intermediate between *Sciurus hudsonius* of the Eastern Province and var. *fremonti* of the Rocky Mountain region. Its closest affinities are naturally with the geographically nearer form, var. *fremonti*; but, in its extreme phase approaches very closely in coloration var. *hudsonius*, except in the color of the tail, which is a little redder than in var. *fremonti*. It is somewhat larger than the eastern Red Squirrel, and considerably larger than the neighboring form of the Rocky Mountains—*Sciurus hudsonius fremonti*.

Description of Types.—Color above reddish centrally from the occiput to the base of the tail, finely grizzled with gray and black, becoming more grayish on sides and outer aspect of thighs; black line of sides indicated, though not strongly pronounced; coloring of limbs externally corresponding in the main with that of the sides of the body, except the feet, which are whitish, sprinkled with black and fulvous hairs; fore part of head grayish, inclining to dusky on forehead; under surface, except the tail, a circle around eye, and end of nose except a narrow blackish line above, white; entire pelage plumbeous at base, that below appearing plumbeous on the surface, in places, by reason of the wearing away of the white tips of the hairs; tail, viewed beneath, gray centrally, bordered with black, succeeded by grayish white, and gray all round at base of tail, the black lateral stripes beginning narrowly, and gradually encroaching on the gray central

* The numbers of the type specimens are those of the American Museum Catalogue; those given in the tables, where the specimens were collected by myself, are my own original numbers.

MEASUREMENTS* OF 16 FRESH SPECIMENS OF *S. h. mogollonensis* FROM THE MOGOLLON MTS., CENT. ARIZ.

Number.	Sex and age.	DATE.	Nature of specimen.	Total length.	Head and body (measured from nose to <i>tuber nasale</i>).	TAIL.				EARS.				FROM TIP OF NOSE TO						FORE LIMB.				HIND LIMB.			
						From root to end of vertebrae.	From root to end of hairs.	Width outspread.		Height above crown.	Height above notch.	Width.	Length of ear-tufts.	Distance between eyes.	Eye.	Centre of pupil.	Tip of ear.	Occhiput.	End of outstretched hind limb.	Length, measured from coracoid process to end of claws.	From olecranon to end of claws.	Manus, from behind pisi-form bone to end long claw.	Manus, width.	Length, measured from great trochanter to end of claws.	From knee-joint to end of claws.	Pes, length.	Pes, width.
135	♂ ad.	Oct. 4, 1884	Fresh	372	197	130	175	...	20	22	23	22	...	26.5	24.0	...	44	53	312	...	...	34	...	...	...	58.0	...
136	♂ ad.	" 4, 1884	"	385	205	135	180	...	22	30	23	23	...	28.0	23.0	...	46	55	325	...	...	35	...	...	...	55.0	...
137	♂ ad.	" 5, 1884	"	378	210	127	168	...	21	30	22	...	...	29.0	22.0	...	45	55	330	...	...	35	...	...	...	53.0	...
537	♂ ad.	May 23, 1887	"	403	225	143	189	75	21	30	22	12	...	30.0	25.0	29.0	44	56	338	104	70	85	10.0	137	99	56.0	11.0
538	♂ ad.	" 23, 1887	"	390	220	141	180	75	22	30	23	11	...	27.0	23.0	29.0	43	56	340	99	72	35	10.0	130	99	52.0	11.0
543	♂ ad.	" 25, 1887	"	395	217	136	181	70	20	30	25	12	...	27.0	22.0	28.0	45	71	332	97	72	34	11.0	140	104	54.0	13.0
544	♂ ad.	" 25, 1887	"	380	210	136	182	75	18	29	23	12	...	28.0	22.7	28.0	42	70	325	94	69	35	10.0	144	100	54.5	12.0
558	♂ ad.	" 27, 1887	"	400	215	152	192	80	24	32	23	10	...	28.0	23.0	29.0	44	55	338	98	70	34	9.5	138	97	55.0	11.0
559	♂ ad.	" 27, 1887	"	422	229	156	202	80	24	32	23	6	...	28.0	23.5	28.5	43	59	353	101	70	38	9.5	144	99	55.0	13.0
560	♂ ad.	" 27, 1887	"	404	211	157	202	75	20	30	25	8	...	28.0	23.0	28.5	43	71	337	100	71	34	9.0	139	98	54.0	11.0
561	♂ ad.	" 27, 1887	"	405	214	151	195	80	24	31	26	9	...	28.0	23.0	29.0	43	72	330	102	71	34	9.3	137	99	54.5	12.5
562	♂ ad.	" 27, 1887	"	420	217	158	204	80	20	30	24	9	...	28.0	23.0	28.5	43	71	337	102	71	34	9.3	137	99	54.5	12.5
563	♂ ad.	" 28, 1887	"	385	211	142	184	70	22	29	23	6	...	30.0	22.0	27.5	43	69	335	96	70	34	9.5	134	97	53.0	11.0
579	♂ ad.	June 6, 1887	"	385	210	128	177	85	21	29	24	7	...	30.0	23.0	29.0	39	69	315	92	71	37	11.0	133	94	54.0	12.0
597	♂ ad.	" 9, 1887	"																								
598	♂ ad.	" 15, 1887	"	383	203	140	182	70	21	30	23	...		26.0	23.0	28.0	...	72	325	96	69	34	8.0	136	94	51.0	10.0
611	♂ ad.	July 21, 1887	"	400	230	145	185	70	22	31	23	3	...	28.5	23.0	30.0	44	54	338	110	72	37	10.5	141	97	53.0	11.5
667	♂ ad.	Aug. 22, 1887	"																								
Average of 16 of <i>S. h. mogollonensis</i> .				394	214	142	186	76	21	30	23	9	...	28.1	23.0	28.6	44	56	331	99	71	35	9.8	138	98	52.8	11.6
" 8 of <i>S. h. fremontii</i> .				381	199	126	168	...	18	...	...	...	...	...	23.0	...	42	51	...	...	...	30	...	...	...	48.5	...
" 5 of <i>S. h. hudsonius</i> †.				381	204	137	189	82	18	27	19	13	...	26.8	21.4	26.8	40	53	307	91	67	33	9.3	128	94	49.8	11.2

* All measurements given in this paper are in millimetres, unless otherwise stated. † Taken from Allen. ‡ All from Fort Snelling, Minnesota.

MEASUREMENTS OF SKULLS OF FIVE SUBSPECIES OF *Sciurus hudsonius*.

	Number.	Sex.	LOCALITY.	DATE.	AGE.	Total length.	Greatest width.	Basilar length.	Distance between orbits.	Nasal bones, length.	Nasal bones, width behind.	Upper incisors, from front to molars.	Upper incisors, from front to hinder margin of palate.	Upper incisors, height.	Upper incisors, width between external edges.	Upper molars, length taken together.	Upper molars, distance between.	Lower jaw, length.	Lower jaw, height.
<i>S. h. mogollonensis.</i>	559	♀	Quaking Asp, Arizona.....	May 27, 1887	Adult.	52.3	29.5	41.0	19.0	17.2	8.7	15.5	27.0	8.0	5.6	9.1	6.0	33.0	17.0
"	560	♀	" " " " " " " " " " " "	" 27, 1887	"	50.0	29.0	40.0	18.0	15.0	3.0	15.5	26.3	9.5	5.4	9.0	6.0	32.3	16.5
"	561	♀	" " " " " " " " " " " "	" 27, 1887	"	50.0	29.0	39.5	16.5	16.0	3.2	15.3	26.3	9.0	5.3	9.0	6.0	31.5	16.2
"	562	♀	" " " " " " " " " " " "	" 27, 1887	"	50.5	28.5	40.0	17.5	16.5	4.0	15.2	27.0	9.0	5.8	9.0	5.9	32.5	16.8
"	563	♀	Mormon Lake, Arizona.....	" 28, 1887	Very old.	48.4	28.0	38.0	16.5	16.0	3.4	15.4	25.6	7.2	5.3	9.0	6.1	31.0	16.0
"	667	♀	Baker's Butte, Arizona.....	Aug. 22, 1887	"	51.0	29.0	43.0	17.0	17.1	3.4	15.5	26.5	9.5	5.1	8.4	5.9	32.5	16.5
"	579	♀	San Francisco Mt., Arizona.	June 6, 1887	Adult.	49.0	28.9	39.0	17.0	15.5	3.3	15.0	25.7	8.4	5.0	8.5	6.0	31.5	16.3
"	597	♀	" " " " " " " " " " " "	" 9, 1887	"	59.7	28.0	38.5	16.5	16.0	4.0	15.0	26.0	8.7	5.0	9.0	6.1	31.5	16.3
"	598	♀	" " " " " " " " " " " "	" 15, 1887	Very old.	50.0	28.7	39.3	17.4	16.0	3.0	15.1	26.6	8.9	5.1	9.0	6.0	32.2	16.8
"	538	♀	Quaking Asp, Central Ariz...	May 23, 1887	"	51.0	29.3	40.2	17.4	17.0	4.0	15.4	27.0	8.9	5.2	9.0	6.0	33.0	16.5
"	558	♀	" " " " " " " " " " " "	" 27, 1887	"	50.0	28.4	39.3	17.2	16.5	4.0	15.0	27.0	8.9	5.0	9.1	6.0	32.0	16.0
"	611	♀	Baker's Butte, Arizona.....	July 21, 1887	"	49.5	28.3	38.5	17.0	16.0	3.4	15.0	26.0	9.8	...	8.8	6.0	32.0	16.0
<i>S. h. fremonti.</i>	.....	♀	Mill City, Colorado.....	June 20, 1877	Adult.	49.0	28.4	38.5	17.0	15.0	3.0	14.3	25.3	8.5	4.9	9.0	5.4	31.0	16.7
"	.....	♀	" " " " " " " " " " " "	July 9, 1877	"	46.5	28.4	37.0	17.0	15.0	3.4	14.3	24.0	8.5	5.0	8.6	5.2	31.0	16.6
Average of 12 skulls of <i>Sciurus hudsonius mogollonensis.</i>	.....					51.0	28.7	39.4	17.3	16.2	3.5	15.2	26.5	8.8	5.3	8.9	6.0	32.1	16.4
" 2 " <i>Sciurus hudsonius fremonti.</i>	.....					47.8	28.4	37.8	17.0	15.0	3.2	14.3	24.7	8.5	5.0	8.8	5.3	31.0	16.7
" 36 " <i>Sciurus hudsonius hudsonius</i>*	.....					45.2	26.2	.....	15.5	13.7	3.8	13.7	22.6	7.9	4.8	7.9	5.3	25.7	14.5
" 3 " <i>Sciurus hudsonius richardsoni</i>*	.....					48.3	28.7	.....	14.7	14.7	3.8	14.7	24.4	8.1	.....	.....	5.8	28.2	15.5
" 5 " <i>Sciurus hudsonius douglasii</i>*	.....					46.2	26.7	.....	16.8	13.7	4.3	14.0	23.1	8.4	.....	.....	6.1	26.2	13.7

*Taken from Dr. J. A. Allen's Monographs of North American Rodentia.

stripe until the latter becomes obliterated at the extremity, which is nearly all black; the 5-striped pattern of the tail less distinct above, and the central area reddish; the slightly developed ear-tufts dusky, and the long, full whiskers jet black.

Cranial and Dental Characters.—In this Chickaree we have the largest skull of any of the five races of *Sciurus hudsonius*, which is remarkable, since in *hudsonius* (verus) there is a notable increase in size to the northward, as shown by Dr. Allen's table of measurements, in the "Monographs of North American Rodentia," p. 688. The dental formula is I. $\frac{1-1}{1-1}$; Pm. $\frac{2-2}{1-1}$; M. $\frac{3-3}{3-3} = \frac{12}{10}$, a minute and functionless premolar being present in nine of the thirteen skulls examined.

Habitat.—This handsome Squirrel is an inhabitant of the fir and spruce woods of the alpine portions of Arizona, where it resides throughout the year, seldom descending into the pines, which constitute a forest zone below the firs and spruces. It is very abundant on the San Francisco peaks, and thence southward in the Mogollon Mountains, and in the eastern spur of that range known as the White Mountains. A Chickaree also inhabits the mountains of New Mexico.

Fiber zibethicus pallidus, subsp. nov.

(PALE MUSKRAT.)

Types, No. 2346, ♂ ad., September 17, 1885, and 2348, ♀ ad., August 28, 1886, both from Fort Verde, Central Arizona. Collected by Dr. Edgar A. Mearns.

Description of Types.—Size, two-thirds that of the eastern Muskrat. General color, rusty brown, paler and grayish beneath; under fur gray, tipped with rusty or yellowish brown; coarse outer hair scanty, glossy brown, reddish in places; whiskers, and scattered hairs of tail, rich liver-brown.

Cranial Characters.—The skull shows no constant differences from that of the common species, except its very much smaller size, as shown in the subjoined table of measurement.

[February,

MEASUREMENTS OF SKULLS OF *Fiber zibethicus pallidus* AND *Fiber zibethicus*.

Number.	Sex.	Locality.	Age.	Total length.	From foramen magnum to posterior margin of incisors.	Zygomatic breadth.	Breadth measured at anterior border of auditory meatus.	Height of skull.	Nasal bones, length.	Nasal bones, greatest width taken together.	Upper incisors, from front to molars.	Upper incisors, from front to posterior margin of palate.	Upper incisors, height from alveolae.	Upper incisors, width between external edges at alveolae.	Length of upper molar series.*	Distance between middle upper molars.*	Greatest width across upper molars (outside).*	From foramen magnum to hinder margin of palate.	From internasal suture to hinder extremity of interparietal suture.	Antero-posterior diameter of auditory bullae.	Length of mandible, measured from condyle to tip of incisors.	From condyle to alveolus of incisor.	Height of mandible, measured from condyle to inferior angle.	Height of mandible, meas. from tip of coronoid to inferior angle.	Length of under molar series.*
200	♂	Beaver Creek, Arizona.	Aged.	59.5	54.2	38.0	25.9	24.1	19.2	9.60	25.0	36.1	14.5	9.00	14.0	7.00	12.0	21.0	33.8	13.2	45.5	42.0	19.6	21.1	13.2
225	♂	Fort Verde, Arizona.	Adult.	62.5	54.3	37.0	25.7	25.5	20.8	9.80	25.0	37.0	14.0	9.00	14.4	7.10	12.2	20.5	34.5	12.4	46.0	42.0	20.0	21.9	14.7
232	♂	"	Adult.	55.0	48.5	34.0	23.2	22.0	17.0	8.00	22.0	32.5	13.0	8.00	14.0	6.10	11.3	18.5	30.0	11.7	40.2	37.3	18.0	20.0	14.3
241	♂	Beaver Creek, Arizona.	Aged.	59.5	53.0	37.0	25.2	23.7	19.2	9.00	23.3	34.5	13.2	8.40	14.1	7.10	12.5	21.2	33.2	12.0	44.2	40.2	19.0	21.0	14.5
451	♂	Fort Verde, Arizona.	Yg. ad.	59.0	52.0	35.6	25.1	23.2	18.5	8.00	22.8	35.0	14.0	8.70	15.0	6.20	12.0	20.0	33.0	13.0	43.0	40.0	19.0	21.0	15.8
464	♂	"	Aged.	57.5	51.5	36.3	24.9	23.0	19.0	9.40	22.7	35.0	12.0	8.80	15.0	6.10	11.4	19.5	32.5	12.0	43.0	40.0	18.5	20.5	15.0
754	♂	Fort Snelling, Minn.	Yg. ad.	64.1	58.2	39.1	28.2	26.0	20.8	9.20	26.5	38.6	15.0	9.00	16.0	6.25	13.0	22.0	36.8	14.0	49.0	43.5	22.0	23.5	16.0
755	♂	"	Adult.	65.0	59.1	40.3	29.2	27.0	20.6	9.20	27.0	39.5	14.0	8.20	15.2	6.50	13.2	21.6	34.6	15.0	49.7	44.2	21.2	25.0	16.0
757	♂	"	"	65.0	59.3	40.9	30.0	28.4	21.5	9.25	28.0	40.0	15.0	9.00	15.1	6.90	12.7	21.2	36.0	14.5	50.5	45.6	22.5	24.6	15.5
758	♂	"	"	64.6	58.0	39.5	29.2	25.2	21.1	9.20	27.0	39.5	15.2	8.00	15.1	6.25	13.0	21.5	35.0	14.6	49.5	42.5	21.8	23.2	15.3
759	♂	"	"	64.0	57.5	40.0	28.2	26.0	19.8	9.50	26.1	39.0	14.0	8.10	14.0	6.60	13.0	21.6	35.2	14.5	49.0	42.5	21.5	24.0	16.0
761	♂	"	Adult.	65.0	59.0	41.0	30.0	26.0	22.0	9.50	27.0	40.0	15.0	8.80	15.0	6.90	13.0	21.5	35.0	15.0	50.4	45.0	23.0	25.1	15.9
762	♂	"	Yg. ad.	64.5	58.0	39.0	29.0	25.1	21.0	9.70	26.2	40.0	14.0	8.60	16.0	6.30	12.6	21.0	36.4	13.9	48.0	44.0	20.5	23.2	15.1
764	♂	"	Adult.	65.0	58.5	40.0	27.9	26.5	21.5	9.90	26.5	40.0	15.0	9.00	15.6	7.00	12.8	21.8	35.0	14.0	49.0	44.2	21.0	24.0	15.9
769	♂	"	"	66.0	59.6	41.7	29.0	28.0	21.0	9.70	27.6	41.0	15.0	9.00	15.5	6.80	13.2	21.0	35.2	15.0	51.0	47.0	22.0	35.0	15.3
771	♂	"	Aged.	64.5	58.0	38.5	27.2	24.0	20.8	9.50	27.0	39.5	14.0	9.10	16.0	6.90	13.0	21.0	33.7	14.5	45.0	42.0	19.0	22.2	15.0
830	♂	Ohio	Yg. ad.	63.8	56.6	39.0	27.6	25.4	23.0	8.90	26.0	38.0	15.2	9.00	15.0	6.90	12.5	21.0	35.0	14.0	48.5	43.5	22.0	25.0	16.0
650	♂	"	Adult.	68.0	62.0	41.0	30.0	28.4	23.0	8.90	27.5	41.5	16.0	9.30	16.4	7.10	13.5	24.0	38.0	15.5	50.5	46.0	21.2	24.2	16.0
Average of 6 skulls of <i>F. zibethicus pallidus</i> .	12	"	"	58.8	52.2	36.3	25.0	23.6	19.0	8.88	23.5	35.0	13.5	8.65	14.4	6.60	11.9	20.1	32.8	12.4	48.8	40.3	19.0	20.9	14.6
"	"	"	"	65.0	58.6	40.0	28.7	26.3	21.1	9.33	26.9	39.7	14.8	8.78	15.4	6.67	12.9	21.6	35.5	14.5	49.2	44.3	21.5	24.1	15.7
Percentages of basilar length in <i>F. z. pallidus</i>	"	"	"	1.11	1.00	.695	.478	.451	.363	.170	.449	.670	.257	.166	.276	.126	.228	.385	.638	.237	.837	.773	.364	.400	.279
"	"	"	"	1.11	1.00	.682	.491	.449	.360	.159	.458	.677	.252	.150	.262	.114	.220	.368	.605	.248	.839	.754	.366	.411	.267

* Measured on alveolae.

MEASUREMENTS OF 9 SPECIMENS OF *Fiber zibethicus pallidus* FROM THE VERDE RIVER, CENT. ARIZONA.

Number.	SEX AND AGE.	DATE.	Total length.	Head and body (measured from nose to tuberosity of ischium).	Tail vertebrae.	Tail, greatest depth.	Distance between eyes.	Longest whiskers.	Girth of chest.	EARS.			FROM TIP OF NOSE TO						FORE LIMB.				HIND LIMB.					
										Height above crown.	Height above notch.	Width at base.	Eye.	Centre of pupil.	Auditory meatus.	Tip of ear.	Occiput.	End of outstretched hind limb.	From coracoid process of scapula to end of claws.	From olecranon to end of claws.	Manus, from behind pisiform bone to end of claws.	Longest claw of manus.	From great trochanter to end of claws.	From knee-joint to end of claws.	Pes, length, measured on plantar surface.	Pes, length of longest claw.		
106....	♂ ad.	June 26, 1884....	...	245	203	...	28	62	185	21.0	...	19.0	30	...	...	...	68.0	375	...	...	...	32	9.0	...	...	...	62	12.0
200....	♂ ad.	" 15, 1885....	500	280	200	...	28	60	185	17.0	...	20.0	31	34.0	57	77	70.0	372	...	78	83	9.0	...	...	...	133	69	11.0
225....	♂ ad.	July 22, 1885....	495	285	197	...	25	60	170	19.0	...	20.0	33	35.0	54	84	71.0	378	...	75	31	9.0	...	...	...	120	69	10.0
232....	♂ ad.	Aug. 19, 1885 ...	434	240	171	14	24	58	180	18.0	...	16.0	28	31.0	53	74	61.0	330	...	67	28	9.0	...	...	...	102	62	10.0
241....	♂ ad.	Sept. 17, 1885...	480	270	208	...	28	60	190	15.0	...	18.0	30	33.5	57	78	67.0	350	...	73	29	9.0	...	...	...	120	67	10.0
451....	♂ ad.	Aug. 23, 1886....	500	267	212	14	23	70	175	17.5	18.0	18.0	31	34.5	56	81	67.0	385	97	75	31	9.0	...	157	132	70	10.0	
454....	♀ ad.	Aug. 28, 1886....	493	265	210	16	26	70	185	18.0	...	20.5	32	33.5	56	80	67.0	375	97	74	31	8.5	...	148	120	68	11.0	
464 ...	♂ ad.	Sept. 20, 1886...	479	267	213	12	23	56	160	20.0	20.0	20.0	31	32.6	60	83	...	371	84	72	82	8.0	...	146	128	65	9.0	
663....	♂ ad.	May 15, 1888....	475	260	220	14	26	65	190	15.0	21.0	20.0	30	33.0	50	80	67.0	365	86	78	31	8.0	...	142	118	67	9.5	
Average measurements of nine } specimens.....			482	264	204	14	26	62	180	17.3	19	7	31	33.4	55	80	69.5	367	91	73	31	8.7	...	148	122	67	10.3	

[February,

Remarks.—This Muskrat is abundant on all the streams of Arizona that are tributary to the Colorado River; but I did not find it south of the Gila River. It is very numerous at Fort Verde, where it never builds houses for winter, but lives in burrows in the banks of streams, similar to those occupied by the Beaver, and feeds on fishes and vegetation. The naturalists of the Mexican Boundary Survey found this animal at the mouth of the Gila River. "In one nest which we accidentally opened in the bottom of the Colorado, and supposed to be the habitation of a Muskrat, we found a large store of screw-beans, on which the animal seems to feed in winter time." —(A. Schott.)

The Muskrat inhabiting the plains of Montana, represented in the American Museum Collection by a specimen (No. 552, ♂) from the mouth of Rosebud River, collected by George H. Troom, agrees with the Arizona form both in its small size and pallid coloration. I have been impressed with the general similarity of these two regions, aside from the severity of the winter season in the former, especially the close resemblance of their respective flora; and it is not improbable that the range of the Pale Muskrat of the Great Basin region extends through the dry central plains to Montana.

***Arvicola mogollonensis*, sp. nov.**

(MOGOLLON MOUNTAIN VOLE.)

Type, No. 2351,* ♂, collected by Dr. Edgar A. Mearns, near Baker's Butte, Mogollon Mountains, Central Arizona, July 26, 1887.

Description of Type.—Color above yellowish brown mixed with gray; sides fulvous; belly grayish, washed with pale fulvous; feet and tail grayish; whiskers mostly white, black in front; pelage short and hispid. Forefoot 5-tuberculate; hindfoot 6-tuberculate; soles nearly naked. The dentition shows this species to be a member of the restricted genus *Arvicola*.

* Nearly adult; the skull is manifestly immature, although nearly grown.

MEASUREMENTS OF FRESH SPECIMEN.

	MM.
Total length.....	121.00
Head and body (measured from nose to tuberosity of ischium)	88.00
Tail, measured to end of vertebræ.....	31.00
“ “ “ hairs.....	35.00
Ear, height above crown.....	7.00
“ “ “ notch.....	9.00
“ width at base.....	9.00
From tip of nose to eye.....	10.50
“ “ centre of pupil.....	12.50
“ “ auditory meatus.....	19.00
“ “ tip of ear.....	31.00
“ “ occiput.....	25.00
“ “ end of outstretched hinder extremity.....	117.00
Fore limb measured from head of humerus to end of claws...	34.00
“ “ “ olecranon process to end of claws..	23.00
“ “ “ behind pisiform bone to end of claws	11.00
Hind limb measured from great trochanter to end of claws ...	44.00
“ “ “ patella to end of claws.....	31.00
“ “ “ hinder border of calcaneum to end of claws.....	18.00
Longest claw of manus.....	2.00
“ “ pes.....	2.20

MEASUREMENTS OF SKULL.

	MM.
Total length.....	23.00
Basilar length (from foramen magnum to incisors).....	19.50
Greatest zygomatic breadth.....	13.20
Greatest parietal breadth.....	11.00
Interorbital constriction.....	3.70
From front of incisor, at base, to molar series.....	7.60
Length of upper molar series (on alveolæ).....	6.00
Length of nasals.....	6.20
Greatest width of nasals.....	3.00
Length of mandible (from condyle to distal point of alveolus)..	15.00
“ “ “ (from condyle to tip of incisor).....	16.00
Height “ “ (from angle to highest point of coronoid process)	8.20
Length of lower molar series.....	6.00

Remarks.—This Vole is abundant in the Mogollon Mountains of Arizona, preferring moist openings overgrown with tall brakes and grasses, in which its numerous runways may usually be seen.

***Hesperomys leucopus sonoriensis*, Auct.**

It has been with much hesitation that I have divided the group of short-tailed Deer Mice of the west, now known collectively as *Hesperomys leucopus sonoriensis*, into five subspecies; but, in view

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of the growing inclination on the part of naturalists to acknowledge slight geographical races in zoölogical nomenclature, and of the importance of their recognition in connection with the study and definition of faunal areas, a subdivision of this group appears to be inevitable. Surveying the quite extensive series of specimens in the collection of the American Museum of Natural History, together with those in the Museum of Comparative Zoölogy, at Cambridge, it is found that no less than five very distinct types are represented from the interior region of North America, viz. : a very dark arctic race ; a pale grayish form from the treeless plains of the north ; a more reddish or cinnamon-colored race from the treeless regions of the south ; a darker and browner southern alpine form ; and a pallid race from the desert regions of California and Arizona. Three of these races have received names, all of which can be retained, although the types of the early descriptions may be far from typical examples of these races as they appear to-day, in the light of accumulated material. It becomes necessary, therefore, to redescribe them from specimens reflecting the extreme characters of each subspecies.

These several races should now stand as follows :

Hesperomys leucopus arcticus, subsp. nov. ARCTIC DEER MOUSE.

Hesperomys leucopus nebrascensis (*Baird*). BLACK-EARED DEER MOUSE.

Hesperomys leucopus texanus (*Woodhouse*). TEXAN DEER MOUSE.

Hesperomys leucopus sonoriensis (*Le Conte*). ALPINE DEER MOUSE.

Hesperomys leucopus deserticolus, subsp. nov. DESERT DEER MOUSE.

Synopsis of Subspecies.

Ears medium ; tail long ; pes, about 20 mm. ; pelage very long and dense, everywhere plumbeous at base. Color above, dark grayish brown, with considerable admixture of black in the median line, and little or no fulvous on sides ; ears densely hairy, black outside, edged and coated inside with white ; no white spot in front of the base of the ear ; tail stripe broad and black, occupying about one-half of its circumference ; feet and under parts white ; a black area around the eye.....*arcticus*.*

* Type of diagnosis, No. 5555, Mus. Comp. Zool. (= No. 4531, Smithsonian Institution), from Fort Simpson, Hudson's Bay Territory. ♂ ad., Sept. 7th. Collected by R. Kennicott. For measurements of this specimen, and many others of this subspecies, see Dr. Elliot Coues's Monographs of North American Rodentia, 1877, pp. 66 and 83.

MEASUREMENTS OF FOUR SUBSPECIES OF *Hesperomys leucopus*.

	Number.	Sex and age.	LOCALITY.	DATE.	COLLECTOR.	Nature of specimen.	Total length.	Length of head and body.	Tail to end of hairs.	Ears, height above crown.	Length of hind foot.
<i>H. leucopus nebrascensis</i>	1199	♀ ad.	Calf Creek, Montana.....	Oct. 16, 1887	...Elliot and Richardson...	Skin.	159.0	92.0	66.0	12.0	20.0
"	1200	♂ ad.	"	" 16, 1887	"	"	154.0	88.0	64.0	12.2	21.0
"	1201	♂ ad.	"	" 16, 1887	"	"	155.0	88.0	66.0	12.0	20.0
"	1202	♂ ad.	"	" 18, 1887	"	"	158.0	92.0	66.0	11.0	20.0
"	1203	♂ ad.	"	" 16, 1887	"	"	162.0	93.0	68.0	11.5	20.0
"	1204	♂ ad.	Big Porcupine Creek, Mon.	" 18, 1887	"	"	144.0	86.0	56.0	11.2	20.0
"	1205	♂ ad.	Little "	" 29, 1887	"	"	165.0	95.0	67.0	12.2	20.0
<i>H. leucopus texanus</i>	588	♂ ad.	Northwest corner of Texas.	Oct. 27, 1889	...Mr. Jenness Richardson..	Skin.	139.0	80.0	59.0	11.0	18.5
"	584	♂ ad.	North Beaver River, " Ter.	" 12, 1889	"	"	155.0	88.0	68.0	10.5	20.0
"	586	♂ ad.	"	" 18, 1889	"	"	146.0	82.0	64.0	11.0	18.5
"	587	♂ ad.	Tepee Creek, Indian Ter...	Nov. 6, 1889	"	"	165.0	89.0	77.0	10.5	19.0
"	588	♂ ad.	"	" 3, 1889	"	"	142.0	75.0	66.0	10.5	19.0
"	585	♀ ad.	Beaver River, Indian Ter.	Oct. 10, 1889	"	"	157.0	88.0	70.0	11.0	19.0
"	589	♀ ad.	"	" 9, 1889	"	"	151.0	84.0	68.0	10.5	19.0
<i>H. leucopus sonoriensis</i>	581	♂ ad.	San Francisco Mts., Ariz., ..	June 6, 1887	...Dr. Edgar A. Mearns...	Fresh	158.0	87.0	74.0	14.0	18.5
"	585	♂ ad.	"	" 9, 1887	"	"	146.0	81.0	65.0	14.0	19.0
"	610	♂ ad.	Baker's Butte, Cent. Ariz..	July 19, 1887	"	"	157.0	90.0	73.0	16.0	19.0
"	632	♂ ad.	"	Aug. 21, 1887	"	"	146.0	86.0	60.0	17.0	18.5
"	582	♀ ad.	San Francisco Mts., Ariz., ..	June 7, 1887	"	"	163.0	88.0	77.0	15.0	19.0
"	629	♀ ad.	Baker's Butte, Cent. Ariz., ..	Aug. 15, 1887	"	"	162.0	97.0	67.0	17.0	21.0
<i>H. leucopus deserticolus</i>	1175	♂ ad.	Mojave Desert, California..	June 5, 1887	Mr. F. Stephens.....	Skin.	168.0	83.8	78.7	11.2	20.8
Average of 7 specimens of <i>Hesperomys leucopus nebrascensis</i>							156.7	90.6	64.7	11.7	20.1
" 7 specimens of <i>Hesperomys leucopus texanus</i>							150.7	88.7	67.4	10.7	19.0
" 6 specimens of <i>Hesperomys leucopus sonoriensis</i>							155.3	88.2	69.3	15.5	19.2
One specimen of <i>Hesperomys leucopus deserticolus</i>							168.0	83.8	78.7	11.2	20.8

* These measurements were taken from fresh specimen by the collector.

Ears rather large; tail short; pes, about 20 mm.; pelage long and dense. Color above, pale grayish fulvous, very finely lined with black; ears densely hairy, black outside, edged and coated inside with white; a small but conspicuous white patch in front of each ear; tail stripe narrow and black; with less black around the eye.....*nebrascensis*.*

Ears small; tail short; pes, 19 mm.; pelage dense, but shorter. Color above, cinnamon-fulvous, inclining to reddish, slightly darker in the median line; ears not densely pilose, brownish, with hoary edging extending but little inside; white patches in front of ears inconspicuous; tail stripe brownish black; without black around the eye.....*texanus*.†

Ears very large; tail short; pes, about 19.2 mm.; pelage dense, but rather short. Color above, brownish fulvous, mixed with black; ears dusky, with hoary edging; tail stripe narrow and dusky.....*sonoriensis*.‡

Ears medium; tail long; pes, nearly 21 mm.; pelage short and hispid. Color above, pale cinereous drab, slightly darkened in the median line, becoming light fulvous on sides and rump; ears nearly naked, hoary edged; tail very narrowly striped with dark brown above; whiskers reaching to shoulders.....*deserticolus*.§

The skulls of these four races afford no tangible differential characters.

I am fortunate in being able to present the foregoing measurements of a series of adult specimens of *nebrascensis* and *texanus*, from skins prepared by the same person. The measurements of *sonoriensis* were all taken by me, from fresh specimens, in the field.

***Sigmodon hispidus arizonæ*, subsp. nov.**

(ARIZONA COTTON RAT.)

Type, No. 2370, ♂ ad., Fort Verde, Arizona, September 13, 1885. Collected by Dr. Edgar A. Mearns.

Description of Type.—Larger than *Sigmodon hispidus* Say & Ord, with more hairy and relatively larger ears, and longer tail. Colors much paler, both as to the coarse outer coat and the under fur. Pelage coarser, and more hispid. Skull and dentition heavier. Above light yellowish brown, mixed with ashy, lined sparingly with black; below white; pelage everywhere plumbeous at base; tail dusky above, whitish below. Ears large, orbicular, clothed with yellowish brown hairs on both surfaces, more sparingly outside.

A Young Male of the Year (No. 2372, ♂ juv., Fort Verde, Arizona, October 2, 1885. Dr. Edgar A. Mearns) differs from adults

* Type of diagnosis, No. 1200, American Museum Collection.

† Type of diagnosis, No. 2508, American Museum Collection.

‡ Type of diagnosis, No. 2357, American Museum Collection.

§ Type of diagnosis, No. 1175, American Museum Collection.

COMPARATIVE MEASUREMENTS OF SKULLS OF *Sigmodon hispidus* AND ITS SUBSPECIES.

Number.	Sex.	LOCALITY.	COLLECTED BY.	AGE.	Total length.	Height.	Greatest zygo. breadth.	Basilar length of hensel.	From front of incisors to hinder margin of palate.	From front of incisor to molars.	From foramen magnum to poster border of palate.	Distance between last upper molars.	Length of mandible.	From coronoid to tip of incisor.	From condyle to tip of incisor.	Interorbital constriction.	Length of nasal bones.	Upper incisors from alveolus.	Lower incisors from alveolus.	Length of upper molar series.	Length of lower molar series.	Length of interparietal suture.	Length of interfrontal suture.	Type of <i>Sigmodon hispidus arizonæ</i>	Average of 9 skulls of <i>Sigmodon hispidus hispidus</i>	" 8 skulls of <i>Sigmodon hispidus littoralis</i>	" 5 skulls of <i>Sigmodon "berlandieri,"</i> from Mex. *	" 7210, Orizaba, Mexico, "toltecus"; young fish, **	Average of 2 adult <i>Sigmodons</i> from Mojave Valley, Cal. *
242	♂	Ft. Verde, Ariz.	Mearns. ..	Old.	40.3	16.0	23.0	32.0	21.0	13.5	14.0	3.90	22.2	20.6	26.4	5.70	15.9	7.10	10.0	7.00	7.90	7.50	14.1						
455	♂	"	"	Yg. ad.	....	....	20.9	....	19.5	11.6	....	3.50	19.6	20.0	23.7	5.30	15.0	5.90	8.5	6.50	7.20	7.00	13.8						
1010	♂	Raleigh, N. C.	Brimley. ..	Adult.	35.9	13.6	21.0	28.8	19.2	11.8	11.7	3.60	20.5	20.7	24.0	6.10	14.3	7.00	8.8	6.90	7.00	6.00	12.4						
933	♂	"	"	Very old.	37.5	15.2	20.8	30.1	19.3	12.6	13.3	4.50	20.8	20.4	24.8	5.20	15.9	7.40	10.0	6.80	7.10	5.90	12.8						
935	♂	"	"	Yg. ad.	34.5	13.5	20.9	28.3	18.5	11.5	12.0	3.40	19.9	19.0	23.2	5.10	13.8	6.90	9.4	6.40	7.00	5.30	11.9						
961	♂	"	"	Adult.	33.6	13.4	20.0	26.3	16.6	10.6	11.7	3.30	19.0	18.0	21.5	5.50	14.0	6.80	7.7	6.30	6.70	6.00	11.2						
1095	♂	Gainesville, Fla.	Chapman...	"	34.6	13.2	19.5	28.0	18.5	11.5	12.0	3.60	19.6	17.5	22.0	4.80	13.8	6.60	8.0	6.50	6.50	5.20	12.0						
1096	♂	"	"	"	35.5	13.3	19.9	28.9	18.7	11.5	12.7	3.70	20.1	19.2	23.0	5.00	13.8	6.00	7.5	6.60	6.90	5.60	12.3						
1097	♂	"	"	Very old.	36.2	13.8	20.0	29.2	19.0	12.0	13.0	3.80	21.1	19.5	23.8	5.00	14.0	6.90	8.8	6.80	6.80	6.50	12.9						
1168	♂	"	"	"	37.8	15.0	21.0	....	20.5	13.2	....	4.10	22.0	21.0	25.0	5.30	15.0	8.00	10.0	6.60	7.00	6.00	13.4						
1170	♂	"	"	Old.	35.6	13.4	20.0	29.3	19.0	12.0	12.8	3.70	21.0	19.9	24.0	5.90	14.0	6.80	10.0	6.60	6.50	6.90	13.0						
1099	♀	E. P. Micco, Fla.	Chapman...	Adult.	34.0	13.0	19.9	27.4	18.0	11.0	11.2	3.10	19.0	17.4	21.7	5.00	12.8	5.80	7.8	6.50	6.80	5.40	13.0						
1100	♀	"	"	"		12.8	20.3	29.0	18.6	11.0	12.5	3.50	20.0	....	....	5.70	....	6.00	....	6.80	6.90	6.30	10.4						
1106	♀	"	"	"	37.0	13.5	21.0	30.1	19.9	12.5	13.3	4.00	21.4	20.5	24.0	5.40	13.5	6.20	9.3	6.80	7.10	5.70	13.5						
1110	♀	"	"	Old.	36.5	13.5	20.3	29.5	19.1	11.7	12.7	3.40	21.0	20.0	23.0	5.80	13.9	6.00	8.8	6.70	7.00	6.30	13.0						
1111	♀	"	"	"	34.4	14.0	19.9	27.6	18.0	11.0	12.0	3.50	20.0	18.6	22.1	5.70	13.1	5.70	7.0	6.60	6.50	6.10	11.9						
1112	♀	"	"	Yg. ad.	35.0	13.2	20.0	28.0	18.8	11.3	11.8	3.50	20.1	19.0	23.2	5.30	13.0	6.30	8.5	7.00	7.00	6.50	13.7						
1113	♀	"	"	Old.	35.0	13.5	20.6	27.6	19.0	11.1	11.6	3.70	20.0	19.2	22.0	6.00	12.2	6.10	7.9	7.10	7.00	6.40	12.2						
1102	♀	"	"	Adult.	36.7	13.9	....	30.3	18.9	11.6	13.0	3.60	20.8	18.8	24.2	5.30	14.0	6.60	9.3	7.00	7.00	6.50	14.0						
Type of <i>Sigmodon hispidus arizonæ</i>																													
Average of 9 skulls of <i>Sigmodon hispidus hispidus</i>																													
" 8 skulls of <i>Sigmodon hispidus littoralis</i>																													
" 5 skulls of <i>Sigmodon "berlandieri,"</i> from Mex. *																													
" 7210, Orizaba, Mexico, "toltecus"; young fish, **																													
Average of 2 adult <i>Sigmodons</i> from Mojave Valley, Cal. *																													

* Taken from Coues, N. A. Rodentia, p. 33.

in being less yellowish brown, especially about the nose and flanks ; it is more ashy.

Remarks.—The material at hand for comparison comprises a large series of skins and skulls of *Sigmodon hispidus* (verus) from Florida and the Atlantic coast, and of *S. hispidus littoralis* from the East Peninsula, opposite Micco, Brevard County, Florida, together with *S. hispidus berlandieri* from Corpus Christi, Texas, and the type of the very distinct *S. fulviventer* of Dr. Allen. In the survey of this material, the discrepancy in the sizes of Arizona and eastern or southern specimens is very apparent ; but, in the absence of detailed measurements of fresh specimens, it is impossible to make exact comparisons. However, the following measurements, taken from fresh specimens by competent collectors, will prove useful. Only adults, having prominently beaded skulls, with the sutures reasonably closed, are included :

	Total length.	Tail.
Average of 10 specimens of <i>Sigmodon hispidus</i> *...	262.74	100.87
Average of 8 specimens of <i>S. hispidus littoralis</i> †..	275.75	104.63
Type of Baird's <i>Sigmodon berlandieri</i> ‡.....	250.86	116.84
Specimen of De Saussure's " <i>Hesperomys toltecus</i> "‡	218.44	91.44
Type of <i>Sigmodon hispidus arizonæ</i>	320.00	121.00

*Six males and four females. Six are from Gainesville, Florida, and measured by Mr. Frank M. Chapman, and four from Raleigh, N. C., measured by Mr. Brimley.

†Measured by Mr. Frank M. Chapman.

‡Taken from Dr. Coues's table, the total length being the sum of the measurements of head and body, and tail, there given separately.

The excellent series of skulls in the collection of the American Museum of Natural History, N. Y., affords better material for size comparisons. In the accompanying table of measurements only well-grown skulls, in which the supraorbital bead is well displayed, have been selected.

From a study of this material, it is apparent that there are four recognizable races of the single representative of this genus found within our borders. Of these *S. hispidus berlandieri* is the smallest, and, perhaps, the least deserving of subspecific rank. The specimens of this race from Corpus Christi, Texas, above alluded to, are in the collection of Mr. Geo. B. Sennett.

In size they correspond with Prof. Baird's type, adult skulls affording similar measurements to those of Dr. Coues, from Mexico.

***Dipodomys merriami*,* sp. nov.**

Type, No. 2394, ♂ ad., New River, Arizona, May 16, 1885. Collected by Dr. Edgar A. Mearns.

Description of Type.—Toes 5-4. Form slender and delicate; tail elongate; ears large, scantily haired. Pelage above mouse gray at base, overlaid with pinkish buff; sides sandy; sides of nose and face nearly back to the eyes, spot at posterior base of ears, band across thighs and encircling base of tail, and all below, pure white, except a dusky stripe on plantar surface of foot; a dusky spot at root of tail above, at base of whiskers, and at the end of the nose; whiskers mixed white and blackish; tail with a white band on each side becoming obsolete near the extremity, drab-gray on upper and under sides and terminal one-fourth.

Remarks.—The tail and limbs are much more slender than in *D. ordi* or *D. chapmani*. The skull, likewise, is much lighter, and considerably smaller than in *D. ordi*, which is a stouter, heavier animal.

The principal agreement between this species and Gray's description of *D. phillipsi* consists in the character "toes 5-4," given in the description of the genus, of which his "*D. Phillipii*," taken by John Phillips, Esq., near Real del Monte, Mexico, is the type. His description reads as follows: "*Dipodomys Phillipii*, Gray. Grey-brown, with longer black hairs; sides sandy; sides of the nose, spot near the base of the ears, band across the thighs and beneath, pure white; nose, spot at the base of the long black whiskers, and at the base of the tail, black; tail black-brown, with the band on each of its sides and tip white. Length: body and head, 5. inches; tail, 6½ inches; hind feet, 1½ inch."

* Named in honor of Dr. C. Hart Merriam, Chief of the Division of Economic Mammalogy and Ornithology, U. S. Department of Agriculture.

MEASUREMENTS.

	MM.
Total length.....	281.00
Head and body (measured from nose to tuberosity of ischium)	110.00
Tail, from root to end of vertebræ	149.00
“ “ “ hairs.....	170.00
Ears, height above crown	10.00
“ “ meatus	13.00
Girth of chest	72.00
From tip of nose to eye.....	23.00
“ “ ear.....	36.00
“ “ auditory meatus.....	37.00
“ “ tip of ear.....	49.00
“ “ occiput	40.00
From olecranon to end of claws.....	31.00
Manus (measured from behind pisiform bone to end of claws.	12.00
From patella to end of claws.....	73.00
Pes (measured from calcaneum to end of claws).....	36.00

Dipodomys chapmani,* sp. nov.

Types, No. 2400, ♂ ad., January 26, 1887, and No. 2398, ♀ ad., October 1, 1885, both from Fort Verde, Arizona. Collected by Dr. Edgar A. Mearns.

Description of Types.—Toes 5-5. Above the predominant color is mouse gray, mixed with black and buff, becoming sandy buff on sides; sides of nose, spot behind the whiskers, above the eye, and at the base of the ear, band across thighs and encircling base of tail and all below, pure white, except a broad blackish stripe on plantar surface of foot; a black spot at the root of the whiskers; a dusky circle around eye, and a dusky spot on nose, at base of tail, and above heel; whiskers blackish mixed with white; tail banded with white on sides nearly to end of vertebræ, residue drab-gray. Ears clothed with very short hairs on both surfaces. Sexes alike.

A young specimen (No. 131, ♀ juv., Fort Verde, Arizona, September 20, 1884. Collected by Dr. E. A. Mearns) is darker than adults, having the pelage considerably mixed with black, the sides having the coloring of *Perognathus*—buff, lined with black; whiskers with more white than black; caudal pencil jet black.

Two suckling young (Nos. 2396, ♂ juv., and 2395 ♀ juv., April 27, 1886, Fort Verde, Arizona. Collected by Dr. Mearns), taken

*Named in honor of Mr. Frank M. Chapman, of the American Museum of Natural History.
1890.]

MEASUREMENTS OF SEVEN SPECIMENS OF *Dipodomys chapmani*, FROM FORT VERDE, ARIZONA.

Number.	Sex and age.	DATE.	Nature of specimen.	Total length.	Head and body.	Tail vertebrae.	Tail, measured to end of hairs.	Distance between eyes.	Chest, girth.	Ears, height above crown.	Ears, height above notch.	Ears, width at base.	FROM TIP OF NOSE TO						FORE LIMB.				HIND LIMB.					
													Eye.	Centre of pupil.	Auditory meatus.	Tip of ear.	Occiput.	End of outstretched hind limb.	From head of humerus to end of claws.	From olecranon to end of claws.	Manus, length.	Manus, width.	Manus, length of longest claw.	From great trochanter to end of claws.	From patella to end of claws.	Pes, length.	Pes, width.	Pes, length of longest claw.
250 ♀ ad.	Oct. 1, 1885	Oct. 1, 1885	Fresh	280	107	148	175	18.0	80	11.0	13.0	12.0	24.0	26.0	35.0	50	42	180	40	29	11.5		6.2	...	68	38	...	4.0
403 ♀ ad.	April 27, 1886	April 27, 1886	"	260	102	140	160	17.0	90	10.0	13.0	13.0	24.0	27.0	35.0	48	41	178	40	31	13.0	4.5	5.5	88	68	...	5.0	
442 ♂ juv	Aug. 3, 1886	Aug. 3, 1886	"	230	100	132	138	18.0	70	12.0	12.0	12.0	22.0	25.0	33.0	47	38	168	37	30	12.0	....	....	85	67	...	....	
483 ♂ ad.	Jan. 26, 1887	Jan. 26, 1887	"	256	106	137	158	18.0	68	11.0	13.0	10.5	22.5	24.5	33.0	48	38	175	40	30	12.5	4.9	4.4	88	70	7.0	4.0	
484 ♀ ad.	"	"	"	245	102	125	144	18.3	65	11.0	13.0	10.5	22.0	24.5	33.0	46	38	172	40	29	12.0	4.8	4.2	91	72	7.3	4.5	
485 ♂ ad.	"	"	"	252	100	138	161	18.4	66	10.5	13.0	11.0	22.0	25.0	33.5	47	38	170	38	29	13.0	4.7	5.0	88	72	7.0	4.0	
486 ♂ ad.	"	"	"	268	110	142	166	18.0	70	11.5	14.0	12.0	22.0	25.0	33.0	47	38	180	41	31	12.5	4.6	4.5	94	70	7.0	4.0	
Average*				260	104	138	161	18.0	73	10.8	13.2	11.5	22.8	25.3	33.7	48	39	176	40	30	12.4	4.7	5.0	90	70	7.0	4.2	

* No. 442 is excluded from the average, it being immature.

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MEASUREMENTS OF FIVE SKULLS OF *Dipodomys chapmani*.

Number.	SEX AND AGE.	LOCALITY.	DATE.	Total length.	From foramen magnum to posterior border of incisors.	Zygomatic breadth.	Greatest width of skull (measured across tympanic bullae).	From base of incisors, in front, to molar series.	From foramen magnum to base of palatal spine.	Interorbital width at point of greatest constriction.	Length of nasal bones.	Upper incisors, length.	Lower incisors, length.	Length of upper molar series.	Length of lower molar series.	Length of mandible, measured from condyle to tip of incisors.
250...	♀ ad.	Fort Verde, Arizona.....	October 1, 1885	37.2	23.5	17.0	23.0	10.1	11.1	13.0	13.5	5.8	6.0	5.0	4.6	18.3
483...	♂ ad.	"	January 26, 1887.....	37.3	23.0	....	23.7	10.1	10.9	13.0	13.1	6.0	5.7	4.2	4.4	17.7
484...	♀ ad.	"	"	35.5	21.2	....	23.5	10.1	10.0	12.5	12.6	6.0	5.1	4.8	4.6	17.3
485...	♂ ad.	"	"	36.2	22.0	....	23.4	10.0	10.4	12.0	13.2	5.9	5.7	4.9	4.6	18.0
486...	♂ ad.	"	"	36.2	21.3	16.3	23.0	10.1	10.0	12.4	13.0	6.0	5.4	4.4	4.2	17.0
Average of five skulls.....				36.5	22.2	16.7	23.3	10.1	10.5	12.6	13.1	5.9	5.6	4.7	4.5	17.7

with their mother, are extremely interesting. The color pattern is very sharply defined. They differ from adults in having the fore part of the back and sides broccóli brown, sparingly lined with black, while the back part of the dorsal surface—a diamond-shaped area—is very dark gray-brown, producing a striking contrast with the front part of the dorsal region, which is not apparent in adults.

Remarks.—This species differs from specimens of *D. ordi*, from near the typical locality, in being much more slender, with relatively longer tail, and much darker colors. The skull is very much lighter, and smaller, as shown by the accompanying table of measurements.

***Lepus alleni*,* sp. nov.**

(ALLEN'S HARE.)

Type, No. 2412, ♂ ad., from Rillito Station, on the Southern Pacific Railroad, Arizona, May 8, 1885. Collected by Dr. E. A. Mearns.

Description of Type.—Size large, much exceeding *Lepus callosus* or *Lepus texianus*; ears very large, nearly naked, except on edges. Color above yellowish brown, strongly mixed with black, this color extending from the nape to the rump, but not reaching the tail; hairs of nape plumbeous, tipped with fulvous; base of ears white; sides, including outer side of limbs, hips and rump, white, with fine black points to some of the hairs, which gives a general light gray to these parts; chin, throat and under surface in the median line, pure white, as are the inner sides of the fore legs above, the inner sides of the hind limbs throughout, and the upper surface of the feet; sides of neck whitish above; breast bright fulvous, this color extending backward upon the lower part of the neck and blending with that of the back; entire head with a whitish cast, more or less mixed with black and suffused with fulvous; orbital ring white; lashes black; whiskers chiefly black, instead of white as in *Lepus callosus* (?) and *Lepus texianus*. The ears, except the long fringes on their edges and tips, which are white, are nearly naked, being sparsely covered with short, whitish or pale fulvous down, with a few blackish

*Named in honor of Dr. Joel Asaph Allen, Curator of the department of Mammals and Birds, American Museum of Natural History.

hairs near the tip. Tail lined above with plumbeous-black, which color extends forward upon the rump; residue gray. The dense coating upon the under side of the feet is brown, strongly contrasting with their white upper surface.

Salient features in the general aspect of this Hare are its whitish sides, fulvous gular patch, and enormous, whitish ears.

A specimen taken earlier in the season (No. 175, ♀ ad., Mearns Collection, from Picacho Station, on the Southern Pacific Railroad, Arizona, April 2, 1885) still retains the winter pelage above, which is much longer than the summer coat, and more variegated with black and fulvous. There remain a few long hairs of the winter coat upon the sides, whose broad fulvous tips indicate that the fulvous extends farther down in winter.

Cranial Characters.—The skull and dentition of this species are remarkably heavy, as compared with *Lepus texianus*, as is well shown in the accompanying table of measurements. The supra-orbital process of the frontal bone is less arched, probably never forming the highest point of the skull, as is frequently the case in *Lepus texianus*, in which, however, the highest point is often at the middle line of the frontal bone opposite to the posterior supraorbital foramen. The nasal bones, premaxillaries, malars, and in fact the entire skull, has a heavy, massive appearance, contrasting in this respect with the more fragile skull of *L. texianus*.

Remarks.—This large and remarkably handsome Hare is a characteristic species of the extensive desert lying between Phoenix and Benson, Arizona, in which remarkable region it is very abundant. It was associated with the *Lepus texianus*, both species having been often seen at once, their different gaits, when running, at once distinguishing them. They were found together over a large area, each manifesting its specific characters typically, and neither showing any approach whatever to the other.

Allen's Hare appears to be a very distinct species. Two other Jackass Hares are known to inhabit Arizona. *Lepus californicus* ranges eastward through California to the Colorado River, and has been ascertained to inhabit sparingly the western border of Arizona, where I have myself seen what I supposed to be that species, on the Colorado River, near Fort Mojave. It requires no comparison with *Lepus alleni*.

1890.]

The common Jackass Hare of Arizona, abundant almost throughout the Territory, is the *Lepus texianus* of Waterhouse. In this species *the nape and base of the ear are never black*, as these parts are in the Mexican Hare (*Lepus callotis* Wagler). It differs considerably from the Jackass Hares of northwestern Texas, Indian Territory and Kansas,* and is widely different from the descriptions of Wagler's *L. callotis*, of Wagner's three "varieties" of *callotis*, and in fact from all of the forms described from Mexico, lately synonymized with *L. callotis* Wagler.

There is no conclusive evidence that the Mexican Hare (*Lepus callotis* Wagler) has ever been found in California or Arizona. There is an old specimen of Verreaux's in the American Museum, labeled "*Lepus calotis*, Waterh., Californie," which agrees in every detail with the early descriptions of *Lepus callotis*. Waterhouse had before him the type specimen of Bennett's *L. nigricaudatus*, said to have come "from that part of California which adjoins to Mexico," and he states that *L. callotis* "inhabits Mexico and the adjoining part of California;" but, as remarked by Dr. Allen, these specimens "doubtless came from Western Mexico."† Comparing *Lepus alleni* with this specimen, assumed to be from Western Mexico, the two appear to be wholly distinct. Verreaux's specimen (No. 5562, Verreaux Collection, No. 798 American Museum Collection) has the ear measuring but 115 mm. in length from the notch by 75 mm. in width, and the hind foot only 123 mm. in length, while *L. alleni* has an ear measuring 156 mm. in length from the notch and 95 mm in width, and a hind foot 138 mm. in length. The coloration is likewise very different, when due allowance has been made for the fading of the Verreaux specimen. In this comparison, *Lepus texianus*, also, appears as a very distinct species from *L. callotis*, from Mexico, whatever may be its relationship to the Hares of the United States east of the Rocky Mountains.

Lepus callotis exhibits considerable variation in color, even in specimens from south of the United States. The Tehuantepec

*The Jackass Hare of this region is usually termed *Lepus texianus* or *Lepus callotis texianus*, and, while it is the *L. texianus* of Audubon and Bachman, it is not the *L. texianus* of Waterhouse, as will be shown later.

†Baird says (Mam. N. Amer., 1857, p. 591) "not a single one of the species assigned by him [Bennett] to 'California, adjoining Mexico,' has been found in that State. The probabilities are that they came from the Southern part of Sonora, west of the Sierra Madre."

specimens described by Dr. Allen, and Wagner's "var. *flavigularis*," approach *L. alleni* most closely, but present important points of difference, particularly the black color of the nape and base of ears, and are very much smaller, as shown by the measurements, more especially those of the skulls.

***Lepus melanotis*, sp. nov.**

(EASTERN JACKASS HARE.)

In identifying the Arizona Hare (*Lepus texianus* Waterhouse) I compared it with the form of *Lepus callotis* found east of the Rocky Mountains, which Dr. Allen has designated as a northern race, under the name of *Lepus callotis texianus*, not having in his hands the material necessary to show the true status of the Great Basin form—*texianus*. Finding that the two animals were at least subspecifically distinct, I turned to the original description of *Lepus texianus*, where the Arizona Hare is unmistakably described, Waterhouse's excellent description being based on a single specimen "in the collection of the Zoological Society, of which the history is not known," and consequently from an unknown locality. He states that Mr. J. W. Audubon recognized it as a species with which he was well acquainted, and informed him that it inhabited Texas, and would shortly be published in the great work on the North American Quadrupeds, having been named *Lepus texianus*. Accordingly, Waterhouse adopted the MS. name of Audubon and Bachman; but those authors subsequently described a different Hare, from Texas, under the name of *Lepus texianus*. This leaves the northern animal, inhabiting the region east of the Rocky Mountains without a name, Audubon and Bachman's *L. texianus* being preoccupied, and also unfortunately gives to the Arizona and Great Basin form a name geographically inappropriate. It has been treated by the various writers on mammalogy under but two names (*Lepus callotis*, and *L. texianus* or *L. callotis texianus*), both of which were preoccupied. Professor Baird (Mammals of North America, 1857, p. 590; United States and Mexican Boundary Survey, II, ii, 1859, p. 45) united all the Hares of the *callotis* type under *Lepus callotis*; while Dr. Allen discriminated between the northern and southern forms, naming the former *Lepus callotis texianus*, unfortunately applying Water-
1890.]

house's name, which pertains exclusively to the form west of the Rocky Mountains, which his scanty material did not then warrant him in separating from the eastern form. All other synonyms for the Hares of the *callotis* group are based on specimens from Mexico.

Description.—Type, No. 2422, ♂ ad., from Independence, Kansas,* January 27, 1890. Collected by Dr. Edgar A. Mearns.

Color above brownish fulvous, much mixed with black, the fulvous extending down upon shoulders and outer side of fore legs; breast much brighter, more ochraceous fulvous; haunches and outer side of hind limbs abruptly white, pointed with black; inner side of limbs white; a tuft of long, fulvous hair on sides of abdomen, in front of thighs; below pure white; ears having the very long fringe on their anterior edge ochraceous, the shorter fringe on posterior edge white, their concave surface with a long, dusky patch adjoining the white fringe of the posterior edge, in which the hairs are black, tipped with fulvous; anterior half of convex surface of ear ochraceous, varied with black, its posterior half being white, except the apical portion, where it is jet black for the distance of 30 mm.; nape and base of ears white, with a mesial stripe of fulvous; upper surface of tail black, that color extending forward on the rump to opposite the acetabulum.

On comparing the type, above described, with other specimens in the American Museum Collection, from Kansas, western Texas and Indian Territory, I can find no appreciable difference, save in the very slightly paler colors of the western examples.

This Hare differs from *Lepus texianus* in just about the same particulars that the two forms of *Lepus sylvaticus*, from corresponding localities, differ from each other. That is to say, in the Arizona animals the ears are much larger, the colors paler and more ashy; while, conversely, those from east of the Rocky Mountains have a richer coloring, and small ears. In *L. melanotis* the gular patch is bright fulvous, while in *texianus* this part is pale brownish

*This is a market specimen, invoiced with several hundred pairs from the above locality, most of which I examined, and which I am informed were doubtless killed on the northern border of Indian Territory. They command a ready sale, in the New York markets, at \$1.50 per pair.

yellow, the same color staining the haunches, inner side of limbs, and sometimes the abdomen, which parts are white in *melanotis*. The ears are more ochraceous in *melanotis* than in *texianus*. The accompanying table of comparative measurements shows the relative dimensions of these two, and of *L. alleni*, the measurements of their skulls being presented in another table.

Remarks.—In naming the eastern Jackass Hare, a perplexing question arises as to its relationship with *Lepus callotis* and *L. texianus*. Dr. Allen has shown that at least two of these Hares probably intergrade, but it is quite improbable that the aggregate material hitherto accumulated in our museums is sufficient to show the true relationship of the three forms in question ; and, as I have no intergrades, all of my specimens being typical of one or the other forms, I am unable to surmise in which direction its closest affinity lies, and therefore accord it, for the present, specific rank.

We have, excluding the California species, four Jackass Hares in the region lying between the Mississippi River and California, belonging to what we may designate as the *callotis* type—species which do not change to white in winter, and have the upper surface of the tail black. There is a northern and a southern form east of the Rocky Mountains, and a northern and a southern species west of that range. The northern species west of the Rocky Mountains, and the northern form east of them, resemble each other most closely in general appearance ; while the two southern species, likewise, have many features in common. The two northern forms, and also the southern, are separated from each other by a lofty range of mountains, which is quite an effectual barrier to these inhabitants of the plains, and which is recognized as one of the sharpest lines of division between faunal provinces of which we have any knowledge. Therefore, notwithstanding the close resemblance between *Lepus texianus* and *L. melanotis*, I must hesitate to unite them as races of a single species until the narrow gulf which separates them is bridged by intermediate specimens. It sometimes occurs that the line of division is most inflexible between very closely-allied species, as, to cite an ornithological instance, in the case of the species of the 1890.]

genus *Empidonax*; and so it may be with these two Hares, whose points of difference are mainly anatomical, they belonging to a very homogenous genus, in which there is a tendency to special group marks, such as the pronounced gular patch, found in *Lepus timidus* and various old world Hares, as well as those of the present group; indeed, I can well imagine that an example of *L. campestris*, deprived of its white tail, and in summer coat, could be mistaken for one of this group, if color were made the basis of comparison, and anatomical peculiarities not brought into requisition. Moreover, if this Hare does intergrade with *L. texianus* the transition must take place over a very limited area, as the American Museum contains specimens of either, from points as near together as Deming, in south-central New Mexico, and the north-western corner of Texas, where three States and Territories meet.

In view of the evidence adduced by Dr. Allen, it would seem quite natural to unite this with *Lepus callotis*, assuming that it merged into that species near the Mexican border; but I am enjoined to caution in this direction, by the proof of the positive distinctness of the two corresponding species, on the opposite side of the Rocky Mountains.

Although it is highly probable that two or more of the forms under discussion will be united as races of a common species, I should not be greatly surprised to see all of them holding the rank of specific distinctness in the classification of the future. It seems to be a case where judgment may be properly suspended to await the evidence of new material and new facts.

Synopsis of Four Species of Jackass Hares.

Largest. Color above, brownish fulvous back to the sacrum; whole of sides, sides of rump, and outer surface of limbs, white, lined with black; inner side of hind limbs, posterior edge of fore limbs, and median line below, pure white; back of neck, in summer, pale plumbeous; base of ears white; under surface of feet and gular patch, bright fulvous; general color of head, pale yellowish gray; ears enormous, nearly bare, whitish, with white fringes; whiskers black. Total length, 643; caudal vertebræ, 69; ear from crown, 195; ear from notch, 156; hind foot, 138. Skull, 113 x 50; mandible, 83. *Lepus alleni*.

Smallest. Color above, pale yellowish gray, varied with black and fulvous; lower half of the sides of the body, limbs, and rump, white, lined with black; below white, or tinged with fulvous; back of neck, and base of ear

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externally, black in summer ; little or no black at apex of ears, which are yellowish or whitish ; whiskers usually black. Ear from crown,* 138 ; ear from notch,† 115 ; hind foot,† 123. Skull, 99 x 46 ; mandible, 70.

Lepus callotis.

Size large. Color above, pale grayish fulvous, much mixed with black ; breast and shoulders pale yellowish brown ; throat, edge of abdomen, sides of rump, thighs, inner side of limbs, and often the abdomen, washed with fulvous ; long fringe on anterior edge of ear, nearly white ; general color of head, grayish ; whiskers white. Total length, 640 ; caudal vertebræ, 106 ; ear from crown, 171 ; ear from notch, 141 ; hind foot, 145. Skull, 94 x 43 ; mandible, 71 *Lepus texianus*.

Size medium. Color above, bright fulvous, not grayish or ashy, much mixed with black ; breast and shoulders, deep fulvous ; below, and on inner surface of limbs, clearer white ; sides of rump and thighs white, lined with black, but without fulvous staining ; long fringe on anterior edge of ear, bright fulvous ; general color of head, brownish yellow ; whiskers white. Total length, 590 ; caudal vertebræ, 77 ; ear from crown, 142 ; ear from notch, 111 ; hind foot, 130. Skull, 97 x 45 ; mandible, 74.

Lepus melanotis.

*Average of four nominal species from Mexico ; taken from Waterhouse's Nat. Hist. Mam. II, 1848, p. 140.

†Taken from the Verreaux specimen, above noticed.

COMPARATIVE MEASUREMENTS OF SKULLS OF *Lepus*.

	<i>Lepus callotis</i> , from Tehuantepec, Mexico.	<i>Lepus alleni</i> , from Arizona.	<i>Lepus melanotis</i> , from Kansas.	<i>Lepus texianus</i> , from Arizona.
Number of specimens.....	..2..	..2..	..2..	..16..
Basilar length (from posterior incisors to foramen magnum)...	.....	86.0	74.0	72.8
Total length.....	99.3	112.5	97.0	93.9
Greatest breadth.....	46.0	49.8	45.0	43.2
Distance between orbits.....	23.4	36.0	27.0	26.6
Nasal bones, length.....	43.9	47.7	42.5	39.5
Nasal bones, width behind.....	21.8	24.5	20.0	19.2
Nasal bones, width before.....	20.8	17.5	14.0	14.4
Upper incisors, from front to molars.....	80.5	35.0	81.0	28.9
Upper incisors, from front to hinder margin of palate...	42.7	44.5	40.8	37.6
Upper incisors, height.....	9.9	12.9	11.5	10.2
Upper incisors, width between external edges.....	8.8	9.3	9.0	8.8
Upper molars, length taken together.....	17.0	19.2	16.9	16.4
Upper molars, distance between.....	13.7	14.4	12.2	12.2
Lower jaw, length.....	70.4	83.2	73.5	70.7
Lower jaw, height.....	48.0	50.8	45.2	42.9

COMPARATIVE MEASUREMENTS OF *Lepus alleni*, *Lepus texianus*, AND *Lepus melanotis*.

Number.	Sex and age.	LOCALITY.	DATE.	Total length.	Head and body, measured from nose to tuberosity of ischium.	TAIL.		EARS.		FROM TIP OF NOSE TO						FORE LIMB.				HIND LIMB.				
						From root to end of vertebrae.	From root to end of hairs.	Height above crown.	Height above notch.	Width.	Distance between eyes.	Eye.	Centre of pupil.	Ear.	Tip of ear.	Occhiput.	End of outstretched hind limb.	Length, measured from coracoid process of scapula to end of claws.	From olecranon to end of claws.	Manus, length to end of claws.	Longest claw of manus.	Length, measured from great trochanter to end of claws.	From knee-joint to end of claws.	Pes, length to end of claws.
175	♀ ad.	Picacho Sta., Ariz.	April 2, 1885	640	552	55	88	200	158	100	52	65	...	98	315	128	...	...	215	73	13.0	...	265	140
191	♂ ad.	Rillito Sta., "	May 8, 1885	630	525	77	105	195	155	95	52	66	...	105	315	125	...	...	230	80	13.0	...	290	140
192	♀ ad.	Red Rock, "	" 8, 1885	660	560	75	100	190	156	90	52	68	...	105	310	127	...	...	220	75	13.0	...	270	133
168	♀ ad.	Fort Verde, Ariz.	Jan. 8, 1885	640	497	95	143	169	144	80	44	60	67	92	280	118	810	266	196	71	13.0	340	250	148
188	♀ ad.	Deming, N. M.	April 20, 1885	580	470	70	110	168	125	80	42	55	66	88	265	104	790	...	180	68	9.0	...	258	130
331	♀ ad.	Fort Verde, Ariz.	Feb. 25, 1886	660	560	100	140	183	145	90	47	60	69	95	270	115	850	290	210	79	...	370	277	145
332	♂ ad.	" "	" "	666	555	105	145	175	140	90	45	55	64	90	270	106	855	270	203	75	...	355	280	145
333	♂ ad.	" "	" 25, 1886	630	530	105	135	165	138	90	45	56	66	90	275	110	820	265	195	72	...	345	270	142
369	♀ ad.	" "	April 3, 1886	595	510	95	130	155	130	90	45	56	65	91	263	110	790	260	200	75	8.6	355	270	145
512	♂ ad.	" "	Feb. 9, 1887	660	545	118	153	172	145	95	44	62	71	100	278	118	855	280	207	76	14.0	387	282	142
513	♀ ad.	" "	" 9, 1887	650	546	124	167	170	150	95	43	60	69	97	275	115	845	282	210	80	12.0	395	295	148
521	♀ ad.	" "	" 21, 1887	650	530	123	160	169	145	90	40	62	68	96	278	113	815	270	200	73	11.0	367	280	148
532	♂ ad.	Mogollon Mts. "	May 23, 1887	...	500	...	...	178	150	100	43	63	72	99	285	120	...	280	205	80	8.5	378	290	153
653	♀ ad.	Fort Verde, "	April 15, 1888	670	553	120	160	177	143	95	48	62	70	106	290	112	865	275	192	75	8.5	380	270	150
...	♂ ad.	Independence, K's Jan. 10, 1890	10, 1890	580	515	73	108	140	110	75	45	54	64	92	245	105	770	260	182	64	10.0	385	240	125
...	♂ ad.	" "	" 10, 1890	600	535	80	115	145	118	75	45	58	68	95	245	108	820	280	195	66	11.5	365	253	135

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AVERAGE AND EXTREME MEASUREMENTS OF *Lepus alleni*, *Lepus texianus*, AND *Lepus melanotis*.

	TAIL.	EARS.		FROM TIP OF NOSE TO						FORE LIMB.			HIND LIMB.								
				Distance between eyes.	Eye.	Centre of pupil.	Ear.	Tip of ear.	Occhiput.	End of outstretched hind limb.	Length, measured from coracoid process of scapula to end of claws.	From olecranon to end of claws.	Manus, length to end of claws.	Longest claw of manus.	Length, measured from great trochanter to end of claws.	From knee-joint to end of claws.	Pes, length to end of claws.				
Average of 3 specimens of <i>Lepus alleni</i> " 11 " " 2 "	Total length.	Head and body, measured from nose to tuberosity of ischium.	From root to end of vertebrae.	From root to end of hairs.	Height above crown.	Height above notch.	Width.	52	66	68	103	318	127	880	274	222	76	13.0	275	138	
		69	98	195	156	95	52	66	68	103	318	127	880	274	222	76	13.0	275	138		
		106	144	171	141	90	44	59	68	95	275	113	880	274	199	75	10.8	367	145		
Maximum of 3 specimens of <i>Lepus alleni</i> " 11 " " 2 "	Total length.	69	112	142	111	75	45	56	66	93	245	106	795	270	189	65	10.7	350	130		
		77	105	200	158	100	52	68	105	315	128	865	290	210	80	13.0	290	140			
		124	167	183	150	100	48	63	72	106	290	120	865	290	210	80	14.0	395	153		
Minimum of 3 specimens of <i>Lepus alleni</i> " 11 " " 2 "	Total length.	80	115	145	113	75	45	58	68	95	245	108	820	280	195	66	11.5	365	135		
		55	88	190	155	90	52	65	98	310	125	790	260	180	68	8.5	340	130			
		70	110	155	125	80	40	55	64	88	263	104	790	260	180	68	8.5	340	130		
Average of <i>Lepus alleni</i> in inches and hundredths " <i>Lepus texianus</i> " " <i>Lepus melanotis</i> "	Total length.	73	108	140	110	75	45	54	64	92	245	105	770	260	182	64	10.0	335	125		
		25.3	21.5	2.72	3.86	7.68	6.14	3.74	2.05	2.60	4.06	12.3	5.00	8.74	2.99	0.51	10.8	5.43			
		25.2	20.8	4.17	5.67	6.73	5.55	3.54	1.73	2.32	2.68	3.74	10.8	4.45	32.7	10.8	7.86	2.95	0.43	14.4	10.8
Ratio of dimensions to total length in <i>L. alleni</i> " <i>L. texianus</i> " " <i>L. melanotis</i> "	Total length.	23.2	20.7	3.03	4.41	5.59	4.37	2.95	1.77	2.30	2.60	3.66	9.6	4.17	31.8	10.6	7.44	2.56	0.42	13.8	9.7
		1.00	.849	.107	.152	.303	.243	.148	.081	.103	.160	.487	.199	.345	.118	.020	.438	.215			
		.823	.166	.225	.267	.220	.141	.089	.092	.106	.148	.430	.177	.130	.428	.311	.117	.573	.430	.227	

MEASUREMENTS OF TWO SKULLS OF *Lepus alleni* AND SIXTEEN SKULLS OF *Lepus texianus*.

LOCALITY.		Total length.	Greatest breadth.	Height of skull.	Distance between orbits.*	Nasal bones, length.	Nasal bones, width behind.	Nasal bones, width before.	Up. incisors from front to molars.	Upper incisors, to pos. mar. of palate.	Upper incisors, height.	bet. incisors, width bet. exter. edges.†	Length of upper molar series.†	Distance between upper molars.†	Width across upper per molars (out.†)	Length of palate.	Foramen magnum to h. m. of palate.	Posterior incisors to foramen magn.	Greatest breadth across squamosals.	Lth of mandible.	Ht. of mandible, at inferior angle.	Length of inferior frontal suture.	Length of inferior parietal suture.	With bet. squam. parietal sutures.	
Number.	Sex.																								
<i>Lepus alleni</i> .																									
191	♂	Billito Station, Arizona....	113.0	49.5	47.5	38.0	47.5	24.0	17.5	36.0	44.5	12.2	9.4	19.8	14.8	28.0	9.8	48.5	86.0	35.0	82.4	50.0	46.5	19.0	32.0
192	♀	Red Rock (S.P.R.R.), Ariz.	112.0	50.0	45.0	34.0	47.8	25.0	17.5	34.0	44.5	13.6	9.2	19.0	14.0	27.8	12.5	46.3	86.0	36.0	84.0	51.5	47.0	20.4	32.0
<i>Lepus texianus</i> .																									
332	♂	Fort Verde, Arizona....	94.7	42.3	38.0	27.0	39.0	20.9	15.0	28.0	36.0	10.7	9.0	17.0	12.7	25.6	8.5	41.0	72.5	30.5	71.3	48.8	85.0	22.0	27.5
333	♂	"	95.0	43.0	38.6	26.0	40.0	17.5	14.0	30.0	37.0	8.7	8.0	15.8	12.8	24.2	9.0	42.5	74.0	31.0	69.0	42.1	83.5	23.0	27.0
351	♂	Phoenix	91.5	42.0	37.0	26.0	36.0	18.3	14.0	27.0	36.5	9.8	8.5	16.0	11.2	23.3	9.0	39.0	72.0	30.0	68.4	42.5	85.0	21.0	27.3
352	♂	Cibicu Creek,	93.8	42.0	37.8	22.0	39.5	19.5	13.7	30.0	37.0	8.5	8.2	15.2	12.0	23.3	10.0	40.5	72.5	30.5	70.0	42.0	84.0	23.0	28.5
353	♂	Pine Springs,	97.0	44.2	40.0	29.0	41.3	20.0	14.6	31.0	39.0	11.0	10.0	16.8	13.0	25.0	10.3	42.0	76.5	31.0	73.0	45.0	87.0	24.0	28.0
369	♂	Fort Verde,	94.0	42.0	39.0	25.0	39.0	19.5	14.5	28.0	36.5	10.0	8.8	17.0	12.0	24.7	9.0	40.5	72.0	30.0	71.0	43.0	85.0	23.0	27.0
445	♂	"	93.0	42.5	38.0	25.5	39.0	19.0	14.4	27.7	37.0	10.2	9.5	16.3	11.5	24.0	9.0	39.0	71.5	30.5	71.0	42.1	87.0	21.5	27.0
163	♂	"	98.0	46.0	42.0	29.5	41.4	22.0	16.0	29.0	38.0	11.0	9.5	16.4	12.5	24.2	8.3	42.7	74.6	32.2	73.0	42.0	89.0	23.7	29.0
188	♀	Deming, New Mexico.....	91.0	43.0	35.5	26.5	37.0	19.0	14.0	28.3	37.0	12.0	7.5	15.5	10.0	21.0	9.0	38.0	71.0	30.0	70.0	44.5	84.0	20.0	25.0
331	♀	Fort Verde, Arizona....	99.0	45.2	41.0	30.0	42.8	20.0	15.2	30.5	40.0	10.9	9.5	18.0	13.0	25.0	10.0	43.0	78.0	31.0	81.4	45.3	97.0	21.0	28.5
334	♀	"	92.0	41.0	38.5	26.0	42.0	18.0	13.0	29.5	40.0	10.0	8.0	16.6	11.8	24.0	9.8	37.3	70.3	31.0	70.0	43.8	87.0	20.3	27.6
350	♀	Phoenix,	95.0	43.0	38.0	26.0	40.0	19.0	14.4	29.0	37.0	10.2	9.2	17.0	12.8	24.0	7.6	41.0	74.0	29.0	71.5	42.8	88.0	23.0	26.3
354	♀	Fort Verde,	90.5	43.5	38.0	26.0	37.0	18.0	13.8	27.5	35.5	9.0	8.5	15.2	12.5	24.0	8.5	38.0	69.5	31.0	67.5	39.5	86.0	20.5	25.5
361	♀	Sulp. Sp Valley	95.5	42.4	41.0	28.0	38.0	18.8	15.5	29.6	39.5	11.0	9.0	17.0	12.0	24.0	11.5	40.0	74.0	30.0	72.0	43.4	87.0	23.5	27.0
446	♀	Fort Verde,	91.0	45.5	39.0	26.2	40.5	18.4	14.0	28.0	37.0	11.0	10.0	16.8	13.2	24.7	11.0	39.5	71.5	34.0	70.0	43.2	85.7	18.0	28.7
447	♀	"	92.0	43.5	38.8	26.5	39.5	20.0	14.0	29.0	38.2	9.0	8.0	15.9	12.0	24.0	10.2	39.0	71.0	32.0	69.5	41.5	85.0	22.0	27.0
Average of 2 skulls of <i>Lepus alleni</i>																									
" " " <i>Lepus texianus</i>																									
Maximum of 2 skulls of <i>Lepus alleni</i> ...																									
" " " <i>Lepus texianus</i>																									
Minimum of 2 skulls of <i>Lepus alleni</i>																									
" " " <i>Lepus texianus</i>																									
Ave of <i>L. alleni</i> , inches and hundredths																									
" " " <i>L. texianus</i> " " "																									
Percentages of total length in <i>L. alleni</i>																									
" " " <i>L. texianus</i> " " "																									

* Measurement taken between outer borders of supraorbital processes of frontal bone, measured midway between anteorbital notch and postorbital foramen, at the most expanded portion.
† Measured on alveolae.

***Cynomys arizonensis*, sp. nov.**

Types, No. 2509, ♀ ad., April 9, 1885, from Point of Mountain, near Wilcox, Southern Arizona; No. 2185, ♂ ad., May 3, 1885, from Dragoon Summit, Southern Arizona. Collected by Dr. Edgar A. Mearns.

Description of Types.—No. 2509, taken on the 9th of April, is still in winter pelage. Color above, nearly uniform sandy buff, with a few scattered black hairs which are only apparent on close scrutiny; this color extends to the limbs, tail, and inguinal region, being palest on the sides and inner surface of the limbs. The hairs have whitish points, which, however, do not give it the much grizzled appearance of *Cynomys ludovicianus* or *C. columbianus*. At a little distance, it appears to be uniformly yellowish. The color below is nearly pure white, a few yellow hairs extending forward from the inguinal region to the abdomen. The chin, throat and upper lips are white. Tail with a narrow sub-terminal band of snuff-brown. Whiskers and claws, black, the latter tipped with horn-color.

No. 2185, taken May 3d, is in fresh summer coat, except posteriorly, where the winter hair is still retained, and is more ochraceous than in the preceding example. The new hair is light cinnamon color nearly to the base, there being little or no under fur. The summer coat is mixed with black hairs, and has the others barely pointed with whitish. In other respects it agrees with the first specimen, except that the latter, which is in winter coat, has an under fur of buffy white, plumbeous-black at base.

Cranial and Dental Characters.—The skull is longer and narrower than in the other species of the genus, and is remarkable for its heavy ossification, the large size of the grinding teeth, and the greater divergence of the upper rows, compared with other species of *Cynomys*, as shown in the accompanying table of comparative measurements.

Remarks.—This "Prairie Dog" is abundant, living in large colonies on the edges of the southern deserts of Arizona, extending its range up to the foot-hills of the lower mesas, being replaced at higher levels by another species. It appears to be somewhat

1890.]

larger than *Cynomys ludovicianus*, and much larger than *C. columbianus*. Its tail is a trifle longer than in the eastern species, and nearly twice the length of that of Colorado specimens of *C. columbianus*.*

Synopsis of the Species of CYNOMYS.

Size medium. *In summer*, reddish clay color above, mixed with black hairs, and much grizzled; forehead sometimes a little dusky; below vinaceous-buff; tail broadly tipped with black. *In winter*, pale vinaceous-buff, grizzled, and mixed with black hairs; below varying from pale buff to ochraceous; forehead often thickly sprinkled with black hairs. *Dimensions*†: head and body, 197–336 (average, 285); tail to end of vertebræ, 51–102 (average, 76); fore foot, 37–54 (average, 43); hind foot, 50–62 (average, 56).....*Cynomys ludovicianus*.

Size largest. *In summer*, vinaceous-cinnamon above, with but few black hairs, and grizzling obsolete; below whitish; tail with a narrow subterminal bar of broccoli brown. *In winter*, pale sandy buff, with few black hairs, and no black on forehead; below white, in places tinged with buff. *Dimensions*‡: head and body, 276–310 (average, 292); tail to end of vertebræ, 76–92 (average, 84); fore foot, 44–49 (average, 46); hind foot, 58–64 (average, 61).....*Cynomys arizonensis*.

Size smallest. *In summer*, tawney fulvous above, grizzled, much mixed with black hairs; forehead blackish, especially above the eyes; tail without terminal black, but often with many blackish hairs above and a narrow subterminal bar. *In winter*, pale buff above, mixed with black hairs, which aggregate to form blackish patches over the eyes; below varying from pale yellow to fulvous. It appears less grizzled than *C. ludovicianus*, because it lacks the strong vinaceous tint. *Dimensions*§: head and body, 270–295 (average, 291); tail to end of vertebræ, 63–80 (average, 69); fore foot, 38–46 (average, 43); hind foot, 55–62 (average, 60)..*Cynomys columbianus*.

* It is worthy of remark, in this connection, that the form of *Cynomys* inhabiting the higher portions of Arizona differs notably from *Cynomys columbianus* further north. Its general size is much greater in Arizona specimens, the coloration darker in summer, and the tail relatively much longer, and often blackish above for its entire length. The subterminal bar results from broad black annulation of the hairs, the dark rings increasing in extent from the base of the tail to its extremity. The average length of head and body, in eighteen specimens from the mountain parks of Colorado, measured in the flesh by Dr. J. A. Allen, is 253 mm., whereas eleven fresh specimens from the Mogollon and San Francisco Mountains of Arizona, measured by myself, average 291 mm. The tail to end of vertebræ averages but 48.5 mm. in Dr. Allen's series, in mine 69 mm.; hind foot, 55 mm. in his, against 60 mm. in mine. The adult skulls in my collection from Arizona are also considerably larger than those measured by Dr. Allen. This animal is abundant in the mesas and open parks of Arizona, often living in the pine forests, and sometimes in cliffs, climbing over the rocks like the large Spermophile of this region.

† Average of thirty-one specimens; measurements all taken by collectors in the field from fresh specimens. From Dr. Allen's Monographs of North American Rodentia, 1877, p. 898.

‡ Average of seven specimens; measurements all taken by myself in the field from specimens in the flesh.

§ Average of eleven specimens; measurements all taken by myself in the field from specimens in the flesh.

COMPARATIVE MEASUREMENTS OF SKULLS OF *Cynomys*.

	<i>Cynomys ludovicianus</i> *.	<i>Cynomys columbianus</i> †.	<i>Cynomys arizonensis</i> .
Number of specimens.....	19	15	2
Basilar length.....	49.0	54.3	
Total length.....	63.0	58.8	66.0
Greatest width.....	45.8	42.3	45.5
Distance between orbits.....	15.0	13.6	14.0
Distance between tips of postorbital processes.....	28.0	28.0	26.7
Nasal bones, length.....	22.9	21.5	25.0
" width behind.....	6.3	5.6	5.8
" width before.....	12.7	10.2	10.2
Upper incisors, from front to premolars.....	17.5	16.5	17.9
" from front to hinder margin of palate.....	35.6	32.5	36.5
" width between external edges.....	6.8	6.0	7.1
Length of upper molariform series.....	16.8	14.7	16.3
Distance between first upper premolars.....	10.5	11.1	
" last upper molars.....	5.0	4.8	
Greatest width across upper molars (outside, on crowns).....	18.0	22.0	
Distance between squamoso-parietal sutures.....	15.6	16.0	
Antero-posterior diameter of audital bullæ.....	18.4	13.7	
Greatest width of zygoma.....	4.1	5.0	
Lower jaw, length.....	41.1	38.2	44.0
" height.....	22.9	21.6	25.0

* Taken from Dr. J. A. Allen's Monographs of North American Rodentia, 1877, p. 399.

† Taken, in part, from Allen, five specimens from Arizona having been included in the average.



Mearns, Edgar Alexander. 1889. "Description of supposed new species and subspecies of mammals, from Arizona." *Bulletin of the American Museum of Natural History* 2(20), 277–307.

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