

ARTICLE XVIII.—*Observations on the North American Badgers, with Especial Reference to the Forms found in Arizona, with Description of a New Subspecies from Northern California.* By EDGAR A. MEARNS, Assistant Surgeon, U. S. A.

From my field observations, and an examination of the specimens in the American Museum collection, it appeared that two very different Badgers inhabit Arizona. One of these is found in the low, semi-desert region of the Territory, which is characterized by the Sonoran fauna and flora, the other in the plateau and mountain region. At Fort Verde, in the Upper Sonoran area, having an altitude of about 3300 feet, the ranges of these two overlap each other. The naturalists of the Wheeler Survey long since noted the presence of two forms of the Badger in Arizona and New Mexico. The southern Badger at large, in its range from Texas to Lower California and southward, has always been known as the *Taxidea berlandieri* of Baird, described from figures, MS. descriptions, and skulls in the Berlandier collection, from Matamoras, Mexico. Later systematic writers have reduced the form to the rank of a subspecies, making it *Taxidea americana berlandieri*. As the Arizona specimens were all clearly referable to one or the other of two forms, and, as the ranges of these two touched and even overlapped in places, the probability of their being specifically distinct from each other was suggested; and doubts were entertained as to the identity of the Badger of the Sonoran Fauna with that of the Tropical Fauna of Eastern Mexico, or typical *T. berlandieri*.

Through the courtesy of Mr. F. W. True, of the United States National Museum at Washington, I have been able to compare Arizona specimens with Professor Baird's types (skulls) of *T. berlandieri*, and to examine the fine National Museum series of Badgers. Dr. J. A. Allen has also kindly permitted me to use the specimens in the American Museum collection, so that the total material at my command is greater than that examined by preceding writers, but is, nevertheless, totally insufficient for the determination of the geographical forms of this animal; and, until better and more extensive material is available for study, the Badgers from such widely different regions, faunally and geographically, as Lower California, Sonora, Arizona, and Eastern

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Mexico, are, in my judgment, best left as they are—*Taxidea americana* standing for the northern Badger, and *Taxidea americana berlandieri* for the southern.

Though unable to arrive at definite or satisfactory conclusions, I will present the results of my investigation, in the hope that they may prove of use to future students of the American Badgers.

*Specimens examined*, 32, as follows: **Minnesota**, Grant Co., 1877, J. N. Sanford (Am. Mus., No. 1473, ♀ ad., skin and skull). **Iowa**, Quasquiton, E. C. Bedwell (Nat. Mus., No. 2078, skull). **Dakota**, Valley of White River, Upper Missouri, Dr. Hayden (Nat. Mus., No. 2148, skull); near Snatch Creek, June 8, 1864, S. M. Rothhammer (Nat. Mus., No. 6602, skull); Fort Lincoln, Nov. 20, 1889, Herman Luerssen (mounted); Ft. Randall, Jan., 1873, Dr. E. Coues (Nat. Mus., No. 12,908, skull). **Nebraska**, Republican Fork, Platte River, Sept. 28, 1856, W. S. Wood (Nat. Mus., No.  $\frac{2}{3}\frac{2}{3}\frac{2}{3}$ , ♂); Loup Fork, Platte River, F. V. Hayden (Nat. Mus., No. 3456, skull); Platte River, F. V. Hayden (Nat. Mus., No. 3457, skull); Ft. Bridger, C. S. McCarthy (Nat. Mus., No. 3656, skull). **Kansas**, Nat. Mus., No. 21,771, skull, from Army Med. Mus. **Wyoming**, Bridger's Pass, W. S. Wood (Nat. Mus., No. 3322, skull); F. V. Hayden (Nat. Mus., No. 11,565, skull). **Utah**, Salt Lake Region, Capt. Sternberg (Nat. Mus., No. 2164, skull); Bridger, F. Hirst (Nat. Mus., No. 15,693, skull). **Oregon**, Upper Des Chutes, J. G. Cooper (Nat. Mus., No. 2033, skull). **California**, Ft. Crook, John Feilner (Nat. Mus., No.  $\frac{41}{33}\frac{3}{3}$ , ♂); El Cajon Valley, C. R. Orcutt (Nat. Mus., No. 23,529, skull). **Lower California**, Cape St. Lucas, John Xantus (Nat. Mus., No. 4135, skull). **Arizona**, Springerville, Apache Co., E. W. Nelson (Nat. Mus., No. 15,044, skin); Pinal Co., Oct. 25, 1884, W. E. D. Scott (Am. Mus., No.  $\frac{18}{30}\frac{45}{0}$ , ♀); Ft. Verde, Yavapai Co., E. A. Mearns, Aug. 30, 1885 (Am. Mus., No.  $\frac{2}{10}\frac{2}{3}\frac{6}{6}$ , ♀); Oct. 12, 1885 (No. 260 Mearns Coll.; Am. Mus., No. —, ♂ ad., skin); Feb. 3, 1888 (Am. Mus., No. 1936, ♂, skin and skull). **New Mexico**, Dr. J. S. Newberry (Nat. Mus., No.  $\frac{2}{7}\frac{6}{6}\frac{6}{6}$ , skin and skull); Nat. Mus., No. 376, skull; Cantonment Burgwyn, Dr. Anderson (Nat. Mus., No.  $\frac{2}{1}\frac{2}{1}\frac{2}{1}\frac{2}{1}$ ). **Mexico**, Matamoros, Dr. L. Berlandier (Nat. Mus., Nos. 1389 and 1390, skulls). **Unknown localities**, Nat. Mus., No. 21,777, skull, from Army Med. Mus.; No. 13,889, skull, collected by Dr. E. Coues; No. 23,037, skull.

*External Characters.*—In comparing Arizona Badgers, a specimen from Fort Verde may be considered a typical representative of the Sonoran faunal province, while one collected by Mr. Scott in Pinal County, Arizona, represents the northern species, which extends its habitat southward along the mountains and high plateau region. A detailed description and comparison of these two specimens is a necessary preliminary to more extended comparisons:

No. 2496, Am. Mus. Coll., ♀, nearly adult,\* August 30, 1885, Fort Verde, Arizona; collected by E. A. Mearns.—Above grayish brown, with a continuous white dorsal stripe, broad in front and narrow posteriorly, extending from nose to root of tail; white stripe occupying one-third of space between eyes (measuring 25 mm. at widest point), and broadly bordered on either side with brownish black before; the two black bands united in front and extending to the edge of the upper lip, encircling the nasal pad, involving the eye on each side, fading to brownish on the occiput, and gradually grizzling to the color of the back; feet and lower part of limbs, and a large triangular patch in front of ear, black, the latter joined to the black area surrounding the eye, forming an isthmus which separates two whitish patches on the sides of head which are broadly united in the northern Badger; convexity of ears black throughout, this color extending onto the opposite surface at the posterior root, where it forms a conspicuous black spot, the rest of the inner surface being white, as is a narrow stripe in front of the ear, bordering the triangular black patch; sides of face, a triangular postorbital spot, throat and much of lower jaw, very pale clay-color; long hairs of back, clay-color or ochraceous buff, with a subterminal band of dark brown, and hoary tips; coating of hairs still longer on sides, where the grayish tips are broader, and the yellowish ground color more exposed; upper surface of tail lacking the annulations of blackish brown except near the base, but with the extreme tip of tail blackish, the hairs pointed with gray; below with a white band extending from the point of the chin to the anus, corresponding to the white dorsal stripe, the two together dividing the animal into lateral halves; this stripe broadly bordered by brownish black on the chin, and interrupted by a small black spot in the median line opposite the angles of the jaw; rest of under surface, including under side of tail and inner aspect of thighs, ochraceous buff, becoming clay-color on the throat; claws, horn-color; iris, grayish brown; nasal pad, black; under surface of feet, dusky, the folds between the pads flesh-color.

*Measurements* (taken from the fresh specimen by author): length to end of caudal vertebræ, 650; head and body (measured from nose to tuberosity of ischium), 530; tail to end of vertebræ, 120, to end of hairs, 165, girth of neck, 295, of chest, 340, of abdomen, 445; distance between eyes, 39; distance between angles of mouth, 42; from front incisor teeth to angle of mouth, 37; width of nasal pad, 22; height of ear above meatus, 55; width of ear, 47; from tip of nose to eye, 57, to centre of pupil, 63, to ear, 80, to auditory meatus, 112, to tip of ear, 153, to occiput 160, to end of outstretched hinder extremity, 705; fore limb, from olecranon to end of longest claw, 189; length of manus, 102; width, 48, claws, 28, 32, 33, 31, 28; hind limb, from patella to end of longest claw, 155; length of pes, 104, width, 42, claws, 12, 14, 16, 19, 14.5; expanse of fore limbs, across shoulders, 570; expanse of outstretched hind limbs, 517 mm.

No. 1345, Am. Mus. Coll., ♀, nearly adult, October 25, 1884, Pinal County, Arizona; collected by W. E. D. Scott.—Above brownish gray, becoming sandy

\* Probably young of the preceding year. It has the mature dentition, and the cranial sutures closed but not obliterated, in these respects, as also in sex, agreeing with Scott's specimen, next described, which was taken about two months later in the season.

on the sides, where the subterminal annulations are obsolete; with a narrow band of white beginning about 20 mm. behind the nasal pad, extending backward in the median line and ending on the nape; black band on either side of this, not extending to the lips, but, commencing at the sides of the nose, extending backwards, sending off a triangular projection that forms a narrow black edging to the eye, and, becoming grizzled above the ears, fades to the general color of the upper surface at the occiput; lips, chin, throat, sides of head, and inner surface of ears, white; black of convexity of ears reduced to a narrow edging, which only appears as a small tuft invading the opposite surface near the posterior root; black triangular patch on side of face small in size, and separated from the orbital black by the white cheek-patch, which is broadly joined to the post-orbital white spot; tail, ochraceous buff, tinged with tawny above, with the terminal pencil broadly banded with brownish black; below white, tinged with clay-color, deepening to ochraceous buff on gular region, shoulders, inner surface of thighs and under side of tail; chest and fore part of abdomen with a pure white median band; chin markings obsolete, but with a very small median black spot opposite angles of jaw; feet and lower part of limbs, black; long hairs of upper surface of body banded sub-basally with grayish drab; claws, horn-color. The size appears to be about the same as that of the preceding specimen, from Fort Verde.

The differences in external characters between the two specimens above described, are thus antithetically expressed:

*Taxidea americana* (No. 1345).

Ears and tail short.  
Upper surface of body brownish gray.  
Longitudinal white stripes non-continuous, above and below.

Markings light.

Hairs of upper surface of body banded sub-basally with grayish drab; and with a dense growth of soft underfur.

Caudal pencil slightly banded with brownish black.

Outer surface of ears merely bordered with black, with a small tuft of black appearing on inner surface near posterior base.

Black patch on side of head, small, and cut off from other black markings by white areas which entirely surround it.

Under side of head white, with markings obsolete.

Upper lips white in front.

Under surface of body principally white.

*Taxidea a. berlandieri* (No. 2496).

Ears and tail longer.  
Upper surface of body grayish brown.  
Longitudinal white stripes, above and below, continuous from front of head to root of tail.

Markings heavy.

Hairs of upper surface of body without sub-basal bands, and without underfur.

Caudal pencil brownish black.

Outer surface of ears wholly black, a large black spot invading the inner surface at base of posterior root.

Black patch on side of head largely continuous by its upper angle with the dusky markings of the top of the head, and with the black of orbit in front, dividing the whitish cheek-patch into two triangular areas—a small postorbital, and larger suborbital one.

Under side of head clay-color, with white and black markings.

Upper lips black in front.

Under surface of body principally ochraceous buff.

Comparing the Scott example of *T. americana*, from Pinal County, Arizona, with an old female from Minnesota (Am. Mus. Coll., No. 1473, Grant Co. ; collected by J. N. Sanford), they are found to be closely similar in general coloration and in the relative size of the parts, though the Minnesota animal greatly exceeds the one from Arizona in size, the hind foot measuring 107 mm. in the former against 87 mm. in the latter ; but a part of this difference is doubtless due to the greater age of the northern specimen. The difference in coloration mainly consists in the still paler tints of the Minnesota animal, the black markings being still more restricted, there being very little black on the ears, the black spot on the side of the head smaller, the lateral stripes on the forehead scarcely encircling the eyes, and ending opposite the ears, and dark markings entirely absent from under side of head. The white dorsal stripe is narrower, interrupted at a point between the eyes, ending at the nape. The whole under parts, except the tail, white. The feet are decidedly brownish instead of glossy black. There is scarcely any indication of a dusky tip to the tail. There is considerable woolly underfur, and the hairs of the upper parts have a broad zone of drab-gray near the base. On the whole the differences are slight.

A skin from Springerville, Arizona (Nat. Mus., No. 15,044, ♀ ; collected by E. W. Nelson), apparently in winter coat, and referable to *T. americana*, is essentially like Mr. Scott's specimen, with which it agrees in size. It also closely resembles the Minnesota specimen, having a very narrow white dorsal stripe which ends at the nape, with the black stripes of the head more restricted than usual, terminating abruptly opposite the ears. The coloring of the upper surface of the body is exactly like that of the Minnesota skin ; but the under surface differs in having a creamy tint instead of being pure white. The gular band of the Scott specimen, which may have been the remains of a darker summer coat, is very faintly indicated in this one ; and the chin and throat differ from it in being buffy instead of pure white.

Two specimens of *T. americana*, obtained at Fort Verde, Arizona, agree in the main with those collected by Messrs. Scott and Nelson ; but one or two others from that locality agree with the specimen of *T. berlandieri* first described.

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A specimen of *T. berlandieri* (Nat. Mus., No. 4158), collected by Dr. Anderson, at Cantonment Burgwyn, New Mexico, is almost exactly like No. 2496, from Fort Verde, except that the vertebral stripe is interrupted, and does not reach the rump. The white vertebral stripe is a quite variable character, upon which too much stress should not be laid, it being one of those 'group marks' in which the tendency to vary is well illustrated by the genus *Mephitis*.

Badgers from the Missouri region are similar to the Minnesota specimen, but are characterized by an intense hoariness and absence of tawny shades, resulting in a sharper contrast between the dark and light areas. A specimen from Fort Lincoln, Dakota, has the white dorsal stripe as wide as in the Fort Verde specimens of *berlandieri*, but ending on the nape.

A specimen from Fort Crook, California, collected by Mr. John Feilner (Nat. Mus., No.  $\frac{4196}{3832}$ , ♂), represents a new subspecies, to be described beyond. Like many animals of that region, it is characterized by an increased intensity of ochraceous and tawny tints in its coloration.

In the above comparisons of the northern Badger with the Sonoran form of *T. a. berlandieri* found in Arizona and New Mexico, certain constant differences are noted in the latter, such as the heavier coloration, tendency to have a continuous vertebral stripe, longer tail, larger ears, absence of underfur and sub-basal banding of the gray-drab to the hairs of the upper surface, in none of which particulars is there any indication of intergradation between the two, except with regard to the white vertebral stripe, which appears to be a variable character. The Mexican Badger is smaller than northern specimens of *T. americana*; but examples of the latter from southern localities—as those from Arizona—are scarcely larger than *T. berlandieri*; but in them there is no approach to the latter in coloration. The rather scanty material at hand, and the absence of correlated constant differences in the skull and teeth, are all that prevent the *T. berlandieri* of the Sonoran faunal area from being declared a distinct species from *T. americana*. Having no skins of *T. berlandieri* from the type locality (Northeastern Mexico), it is impossible to determine the exact relationship existing between the

Badgers of that region and those of Arizona, New Mexico, and Lower California. The result of a comparison of skulls from these regions is noted below.

*Cranial and Dental Characters.*—The series of 28 skulls examined furnishes 18 that are sufficiently grown to afford useful measurements, the remaining 10 being undergrown, several of them retaining, in part, the milk dentition. As skulls of different ages are unsuited for comparison, those of which the measurements are presented in the accompanying table, are arranged in the order of their respective ages, the specimens of the several subspecies falling in next to those that are nearest them in age, thus furnishing a more accurate means of comparison, in this small series, than if simple averages of the different subspecies were given. These 18 specimens are classified in four groups (as indicated by brackets in the accompanying table), as follows :

- a. *Aged*, 8, with grinding teeth much worn, sutures obliterated, and occipital and sagittal crests strongly developed.
- b. *Adult*, 3, with no traces of sutures below, and nasal sutures closed but not entirely obliterated.
- c. *Nearly adult*, 3, with sutures closed, but nasal and basilar not obliterated.
- d. *Youngish*, 4, with sutures closed, but the nasal, fronto-maxillary, and basilar, still distinctly traceable, and the teeth nearly unworn.

There is little in the skull or dentition of the American Badgers upon which to base specific distinctions ; and the differences in the several subspecies noted beyond, are merely average differences, subject to exceptions and variations. The size of the skull is the most variable character, the largest coming from Wyoming, and the smallest from California and Mexico. The skull of a young Badger from Wyoming (Nat. Mus., No. 3322, ♀, July 29, 1857), which had not finished shedding its milk teeth, is as large as those of nursing females from Arizona. I find nothing diagnostic in the dentition of the Badgers of any particular region, either in the size, shape, or processes of the teeth. There is a wide range of variation, which, however, appears to be individual rather than geographical. The measurements of the teeth do not show anything of importance ; and aberrant specimens from any locality are as likely as not to find their closest analogues in those from the most distant part of the animal's habitat.

MEASUREMENTS OF SKULLS OF AMERICAN BADGERS, WITH RATIOS TO BASILAR LENGTH OF HENSEL.

Number.	Sex.	LOCALITY.	Greatest length of skull (occipital condyle to front of premax.)	Basilar length of Hensel.	Occipito-nasal length (occipital crest to front of nasals).	Interzygomatic breadth.	Intermastoid breadth.	Breadth across postorbital processes.	Least interorbital breadth.	Least postorbital breadth.	Alveolar rim of incisors to post-palatal notch.	Height of cranium at plane of post-palatal notch to foramen magnum.	Height of cranium from palate to point betw. postorb. processes.	Greatest breadth across molars (on alveoli).	Length of lateral series of teeth (on alveoli).	Greatest breadth across canines (on alveoli).	L'th pterygoid fossa (base of ham. proc. to deepest pt. postpal. notch).	Length of audital bullae.	Width of audital bullae.	Greatest length of mandible.	Height of coronoid process above angle.	Height of condyle from angle.	Length of lateral series of teeth of lower jaw.	
1279	♂	Quasquion, Iowa.....	129	110	78.0	40.0	82.0	27.5	64.0	51.0	44.0	88.5	43.0	42.0	87.0	16.5	30.5	20.5	90.0	42.5	17.5	58.0		
11865	♂	Wyoming Territory.....	135	121	112.90	65.0	40.0	30.5	29.0	66.0	55.0	42.0	86.0	46.0	43.0	86.5	15.0	30.0	24.0	91.0	40.5	17.0	51.5	
1324	♂	Republican Fork, Platte River.....	138	116	111.88	60.0	38.0	29.5	26.5	64.0	53.0	44.0	84.5	43.0	41.0	85.0	17.0	28.5	20.0	86.0	41.0	17.0	46.0	
21771	♂	Kansas.....	130	109	104.81	57.5	38.5	28.0	26.0	62.0	47.0	41.0	84.0	43.0	40.0	83.5	15.0	26.0	20.5	86.0	40.0	16.0	48.0	
1390	♂	Matamoras, Mexico.....	121	111	104.74	57.0	38.5	28.0	25.0	61.0	49.5	38.0	82.5	42.0	41.0	80.0	17.0	26.0	19.0	82.5	40.0	16.0	48.0	
4185	♂	Cape St. Lucas, L. Cal. . . . .	117	105	99.75	57.4	35.0	27.5	28.5	56.5	48.5	39.5	83.0	42.0	41.0	80.0	16.5	23.0	20.0	81.5	37.0	14.0	47.0	
1889	♂	Matamoras, Mexico.....	117	105	73.0	40.0	84.0	27.0	28.5	57.0	47.5	40.0	83.5	42.0	40.0	82.0	15.7	27.0	20.0	81.0	38.0	17.0	46.0	
12908	♂	Fort Randall, Dakota.....	126	110	107.83	57.0	40.5	30.0	29.5	61.5	50.0	41.0	86.0	43.0	42.0	84.0	15.0	31.0	22.5	87.5	42.0	19.0	52.0	
2456	♂	Loup Fork, Platte River.....	122	110	105.76	57.0	38.0	27.0	23.0	61.0	49.0	40.0	82.0	41.5	42.0	82.0	15.5	.....	.....	86.0	40.0	16.5	50.0	
21777	♂	Upper Des Chutes, Oregon.....	122	110	105.83	57.0	38.0	28.0	23.0	63.0	46.5	41.0	82.5	42.0	42.0	82.5	15.5	.....	.....	88.0	40.0	16.5	50.5	
2083	♂	Valley of White River, Up. Missouri.	110	108.78	57.0	34.0	28.5	29.0	27.0	58.0	43.0	34.0	84.0	43.0	42.0	83.0	19.0	28.0	20.5	89.0	38.0	16.5	50.0	
15693	♂	Bridger, Wyoming.....	129	115	78.0	40.0	36.5	30.0	27.0	49.0	44.0	35.5	83.0	43.0	41.5	.....	14.0	31.0	21.0	90.0	39.0	17.0	51.5	
6602	♂	Near Snatch Creek, Dakato.....	116	104	102.71	57.0	31.0	25.0	23.0	58.0	46.0	39.0	81.0	40.5	38.0	80.5	15.0	26.5	20.0	81.0	37.0	16.5	47.5	
590	♀	Pinal County, Arizona.....	119	108	70.0	40.0	68.5	35.0	27.0	31.0	58.5	43.5	42.0	31.0	40.7	39.0	80.7	15.5	31.0	21.5	81.5	37.0	16.5	48.0
1986	♀	Near Fort Verde, Arizona.....	116	105	78.0	40.0	36.5	30.0	28.0	58.0	48.5	33.0	40.0	39.0	80.0	14.0	27.0	21.0	82.0	37.0	16.5	47.0		
1985	♀	Near Fort Verde, Arizona.....	104	103	78.0	40.0	36.5	30.0	28.0	58.0	48.5	33.0	40.0	39.0	80.0	14.0	27.0	21.0	82.0	37.0	16.5	47.0		
1433	♀	Fort Crook, California.....	106	101.75	71.0	31.0	23.0	27.5	27.5	59.0	46.0	40.0	82.0	42.0	39.0	82.5	13.0	26.5	18.0	82.0	37.0	19.0	47.5	
111	♂	Combined ratios of spec. <i>T. americana</i> .....	1,111	1,000	968	708	686	327	258	257	554	449	376	307	351	368	300	141	260	189	784	357	155	453
111	♂	Two of <i>T. a. neglecta</i> (Nos. 2033, 4106).....	1,111	1,000	950	684	670	301	251	258	559	488	361	288	375	365	285	128	273	198	776	368	162	448
111	♂	Types of <i>T. berlandieri</i> (Nos. 1399, 1386).....	1,110	1,000	937	681	649	320	246	246	547	449	361	301	339	337	287	151	245	180	757	349	153	445
111	♂	Two of <i>T. a. berlandieri</i> (?) from Arizona.....	1,110	1,000	928	683	660	326	247	247	546	447	316	286	363	387	334	256	187	785	354	170	450	
111	♂	<i>T. a. berlandieri</i> (?) from Cape St. Lucas.....	1,111	1,000	948	714	709	333	262	267	538	462	376	314	376	371	266	157	305	190	776	352	183	448



The young individual of the Berlandier collection (No. 1391), figured by Baird, on plate xxxix of Mammals of North America, has newly acquired its second dentition. It is remarkable for the large size of the grinding teeth. The sectorial tooth of the upper jaw is sub-quadrate, with the inner cusps extraordinarily developed. A line drawn through these two cusps would be parallel with the cranial axis, whereas, in any other specimen of the genus that I have examined, it would form a rather obtuse angle. Furthermore, the upper true molar has three lines of tubercles that are approximately parallel to each other. As remarked by Professor Baird, the dentition of this specimen is quite different from that of the adult skulls from Matamoros upon which he based his account of *T. berlandieri*. These two skulls are before me. The differences between them and a series of skulls from the Mississippi and Missouri valleys are not great. The skull, in these types of *berlandieri*, averages considerably smaller, with the mastoids more inflated. The width of the skull, as compared with basilar length of Hensel, is less; but the length of the lateral series of teeth and the breadth across the molars, are relatively greater, this being correlated with its heavier dentition. The pterygoid fossa is longer. The skulls being mature, the molar teeth are considerably worn, but not so much as to entirely obscure the tuberculation, which never could have been as shown in Baird's figure of the young skull, in which the upper molar has three complete rows of tubercles which are nearly parallel to each other; but there is a tendency toward greater parallelism between the rows of tubercles than in northern skulls. No. 1935, from Fort Verde, affords the nearest approach, in this respect, to Baird's figure; there being, in fact, three rows of tubercles, but the posterior row is incomplete. As a rule, there are two rows of tubercles, with one or two additional irregular ones. The front row has three tubercles, of which the middle one is smallest, connected by a ridge which also joins them to the outer cusp of the tooth, forming a double curve; behind them is a second row of, usually, three tubercles that are in line with the inner cusp, and behind these are one or two additional ones, near the posterolateral border. In the Missouri Badger the upper molar is relatively smaller, with the tubercles crowded and often irregular;

while in the Mexican animal, in which the surface is larger, they are usually disposed more nearly in parallel lines, as exemplified in the Fort Verde specimen, and of which the figured specimen in Baird's work furnishes an extreme instance. In the upper sectorial tooth, these old skulls do not show any marked departure from the usual form, such as the young one exhibits. The contiguous edges of the upper carnassial and molar teeth are in close apposition to each other by reason of their oblique insertion, their inner angles being rotated towards each other; but this does not afford a means of distinguishing them from Missouri skulls, as two of the latter exhibit this same peculiarity. Certain differences in the shape of the lower jaw were noted by Professor Baird, but these seem to have been individual rather than characteristic.

In Arizona skulls of *T. a. berlandieri* the shape and relative position of the teeth are about the same as in those from Matamoras, Mexico. The specimens at hand are not strictly comparable, however, those from Arizona having the teeth almost unworn, being considerably younger; but the dentition seems to be lighter, in this respect resembling Arizona skulls of *T. americana*. A New Mexican skull of *berlandieri* (Nat. Mus., No.  $\frac{22935}{4158}$ ), has the dentition in every way heavier than it is in Baird's types, though still quite young, with tubercles and cusps but little worn.

In an adult skull from Cape St. Lucas, collected by Mr. John Xantus (Nat. Mus., No. 4135\*), remarkable for the development of enormous mastoid and tympanic bullæ, the teeth are about as in typical *T. americana*.

The skull of No. 4196, from Fort Crook, California, is peculiar in having each of the three sides of the upper true molar strongly concave, or notched, so as to give it a trilobate shape. Another skull (Nat. Mus., No. 2033), from the Upper Des Chutes River, Oregon, referable to the same form, has lost the upper molars, so that it is impossible to say whether or not this is characteristic of this subspecies. Otherwise than as above, there is nothing pecu-

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\* This specimen (*i. e.* "No. 4135") has formerly been attributed to "Texas." See Dr. Allen's table, Bull. U. S. Geol. and Geogr. Survey, Vol. II, No. 4, p. 330. Its measurements are exactly as given by Allen; and, though there may be a doubt as to the locality whence it came, it is doubtless referable to the southern type of Badgers.

liar in the dentition of these two skulls, which more closely resemble those of *T. americana* than *berlandieri*.

The milk dentition of our Badgers is correctly expressed in the following formula: d. i.  $\frac{3}{3}-\frac{3}{3}$ , d. c.  $\frac{1}{1}-\frac{1}{1}$ , d. m.  $\frac{3}{3}-\frac{3}{3}=28$ . The youngest skull at hand (No. 13,889, U. S. Nat. Mus.) has commenced shedding, all of the deciduous incisors having been displaced by their successors except the outer one on each side of the upper jaw, which still lies in front of the permanent tooth. An opening in the alveolar surface in front of the canine, and another small one behind the last deciduous molar, are the only indications of the permanent upper teeth of the lateral series. In the under jaw there is a good-sized opening, covered by periosteum, for the carnassial tooth. This skull measures only 80 mm. in basilar length by 61 mm. in inter-zygomatic breadth. In an older specimen (No. 25,529, U. S. Nat. Mus.), measuring 93 x 65 mm., the permanent premaxillary teeth are all present, the permanent canines are well above the alveolar rim in the upper jaw, and those of the under jaw are near displacing the deciduous canines. The foramen for the upper permanent molar is larger, the tooth appearing at the bottom of it, and the highest cusps of the sectorial premolar are just breaking through at the inner border of the alveolus, between the second and third deciduous molars. In the mandible the outer cusp of the sectorial tooth is even with the alveolus, and a small foramen marks the appearance of the last lower molar. A still older specimen (No. 3322, U. S. Nat. Mus., ♀, Bridger's Pass, July 29, 1857; W. S. Wood), measuring 106 x 72 mm., has shed all the deciduous teeth of the upper jaw except the middle molar, which is about to be displaced by the second (middle) premolar of the permanent set, which has risen into view between its anterior and internal roots. The permanent molar and sectorial teeth have grown well above their alveoli, and the canines of both jaws have nearly reached their full size. The anterior molar of the lower jaw has been shed on the left side, but is still holding fast by its posterior root on the right. A foramen for the middle premolar has appeared at the inner side of the second deciduous molar, between its two roots; but there are no signs of the appearance of the third premolar. The permanent molars are well grown. A nearly grown skull

from the Platte River (No. 3457, U. S. Nat. Mus., without sex or date) has shed all of the deciduous teeth above ; but the middle deciduous molar of the under jaw is still holding fast by a posterior fang, while the last deciduous molar is soon to be displaced by the third premolar, which has come into view, as usual, at the inner edge of the temporary tooth.

The dental formula of the adult is always : i.  $\frac{3}{3}-\frac{3}{3}$ , c.  $\frac{1}{1}-\frac{1}{1}$ , pm.  $\frac{3}{3}-\frac{3}{3}$ , m.  $\frac{1}{2}-\frac{1}{2}=\frac{1}{1}\frac{6}{8}=34$ . At no period, subsequent to birth, is there any indication of the presence of an additional premolar, as mentioned by Baird, and sometimes cited by other authors. It is not improbable that the appearance of the point of an emerging premolar in front of the first deciduous molar may have been mistaken for an additional tooth, as the anterior root of the deciduous tooth is usually absorbed, allowing of considerable separation of the crowns of the two teeth at the time of eruption.

As usual, the milk molars epitomize the more complicated series of grinding teeth of the adult animal. The crown of the anterior upper molar forms a simple blade or cusp, without heel, though concave in its posterior profile ; it lies to the inner side of the general line of the lateral series of teeth, and is placed obliquely, with its posterior root internal. The second molar is 3-rooted and resembles the carnassial tooth, but is less expanded internally, and lacks the posterior tubercle on that side. The third tooth is molariform, of triangular shape, with the apex internal, its crown roughened by prominent tubercles. In the under jaw the first and second deciduous molars resemble premolars, and the third represents the carnassial tooth of the second dentition.

In the preceding pages, the comparative characters of the two recognized American Badgers (*T. americana* and *T. a. berlandieri*) have been given with as much fullness as the limited material would permit, and it remains to characterize a third and very distinct subspecies, as follows :

### ***Taxidea americana neglecta*, subsp. nov.**

Type, No.  $\frac{4188}{3333}\frac{6}{5}$ , U. S. Nat. Mus. Coll., ♂, Fort Crook, Northern California ; collected by John Feilner (orig. No. 313).

*Description.*—Smaller than *Taxidea americana*, with longer tail ; pattern of coloration similar, but the colors much deeper and richer, in this respect contrasting more strongly with the common Badger than does the Mexican Badger ; dark markings of head more brownish ; light areas yellowish instead of whitish ; feet and lower part of legs dark brown instead of glossy black ; hairs of upper surface, ochraceous buff, banded subbasally with grayish drab, subapically with black, and broadly tipped with yellowish gray ; tail, tawny ochraceous, the hairs pointed with grayish above, except at the tip, which is dark brown ; end of chin, light brown ; under side of head and neck, yellowish clay-color ; chest and sides of abdomen, tawny ochraceous, creamy white in the middle of the abdomen ; claws, horn-color.

The skull appears to be much smaller than that of *T. americana*. As far as can be judged from the two specimens before me it is relatively narrower and lower, more constricted in the inter-orbital region, with the bony palate slightly longer, and the audital bullæ considerably larger. The brain-case is smaller, and the height of the lower jaw, at coronoid and condyloid processes, greater. The dentition is lighter, and the upper molar constricted on each of its three sides, giving the crown of this tooth a 3-lobed appearance.