U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

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No. 26

[Actual date of publication, November 24, 1906]

REVISION OF THE SKUNKS OF THE GENUS *SPILOGALE*

BY

ARTHUR H. HOWELL

ASSISTANT BIOLOGIST, BIOLOGICAL SURVEY

Prepared under the direction of

Dr. C. HART MERRIAM

CHIEF OF BUREAU OF BIOLOGICAL SURVEY

WASHINGTON

GOVERNMENT PRINTING OFFICE

1906

PROVISIONAL MAP OF THE DISTRIBUTION OF THE GENUS *SPIOGALE*.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BIOLOGICAL SURVEY,

Washington, D. C., July 25, 1906.

SIR: I have the honor to transmit for publication as North American Fauna No. 26, a Revision of the Skunks of the genus *Spilogale*, by Arthur H. Howell, Assistant.

Respectfully,

C. HART MERRIAM,
Chief, Biological Survey.

HON. JAMES WILSON,
Secretary of Agriculture.

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REVISION OF THE SKUNKS OF THE GENUS *SPILOGALE*.

By ARTHUR H. HOWELL,
Assistant Biologist.

INTRODUCTION.

HISTORY AND MATERIAL.

The little spotted skunks were apparently known to naturalists as early as the middle of the seventeenth century, but for many years they were confused with other groups of ill-smelling animals, and not until the early part of the nineteenth century—in the time of Gray and Lichtenstein—did their characters and habitat become definitely known.

Hernandez, in 1651, referred to a variety of the Mexican "*yzquipatl*" having many white stripes, and this probably is the first mention in literature of the spotted skunks.^a

The first account of a United States species is that given by Catesby in his 'Natural History of Carolina,' published in 1743. His description of the 'pol-cat' of Carolina was very inaccurate, but as I have elsewhere shown^b was undoubtedly drawn from personal observation of a spotted skunk. This description was made the chief basis of the first scientific name applied to any member of the group—*Viverra putorius* Linnæus, 1758.

Buffon, in 1765, copied Catesby's figure, and attached to it the appellation '*le Conepate*.' Another species, which he called '*le Zorille*,'^c was described from a specimen in the cabinet of a curate in Paris; this was doubtless the first specimen of *Spilogale* to find its way into the hands of any naturalist, and the figure with the accompanying description furnishes the first accurate portrayal of any species of the genus. Buffon wrongly ascribed the animal to South America, and the error was not corrected for many years. Schreber, in 1776, copied Buffon's description and figure, and latinized the vernacular '*zorille*' into *Viverra zorilla*.

^a Thesaurus Rer. Med. Novæ Hisp., p. 332.

^b Proc. Biol. Soc. Wash., XV, pp. 2-4, 1902.

^c A modification of '*zorillo*,' the vernacular name of the skunks in Mexico.

Little advance was made in the study of the spotted skunks for the next half century. The species described by Buffon and Schreber became confused with the South African '*muishond*'—a four-striped black and white animal having the ill-smelling qualities of a skunk, but belonging to a quite different group—and it was not until Lichtenstein published his monograph of the skunks in 1838 that the mistake was corrected. In this paper only two species of spotted skunks—*Mephitis zorilla* and *M. interrupta*—were recognized, the latter having been described in 1820 by Rafinesque. Gray, in 1837, proposed *Mephitis bicolor* as a new species, but in his revision of the *Mustelidæ*, published in 1865,^a adopted *interrupta* instead, placing both *bicolor* and *zorilla* under it as synonyms. As early as 1837 he pointed out some of the characters which distinguish the spotted skunks, and placed his *M. bicolor* in a subdivision by itself; but not until 1865, when he proposed *Spilogale*, was the genus provided with a name. The practice of 'lumping' all the forms of the genus under one name was continued by most later authors, Baird in his 'Mammals of North America' using the name *bicolor*, and Coues^b in his monograph of the family reviving the Linnæan name *putorius* for the species collectively; and it was not until 1890, when Doctor Merriam published his preliminary revision of the genus,^c that an adequate attempt to define the species was made. The total number of specimens available for study at that time was only 39 skins and 38 skulls, but in spite of the meagerness of the material 10 species and subspecies were recognized, 8 of which were described as new. All of these are retained in the present paper, and in addition eight more forms described since 1890 are recognized. One species and one subspecies (*Spilogale microdon* and *S. angustifrons elata*), are herein described as new, bringing the total number of known forms up to 20.

The present revision is based on a study of about 380 skins with skulls and 75 additional skulls. The bulk of this material is in the collection of the Biological Survey, but this has been supplemented by additional specimens from the collections of the U. S. National Museum, and the American Museum of Natural History, and the private collection of Dr. C. Hart Merriam. The author acknowledges gratefully his obligation to the following gentlemen for the loan of valuable material from the collections under their charge: To Dr. J. A. Allen and Mr. Frank M. Chapman, of the American Museum of Natural History; Mr. Gerrit S. Miller, jr., of the U. S. National Museum; and Dr. D. G. Elliot, of the Field Columbian Museum. To Dr. C. Hart Merriam I am indebted also for much valuable criticism.

^aProc. Zool. Soc. London for 1865, p. 150.

^bFur-Bearing Animals, p. 239, 1877.

^cN. Am. Fauna No. 4, pp. 1-16, 1890.

DISTRIBUTION.

The genus *Spilogale* has a much more restricted distribution than the genus *Mephitis*, and its affinities are decidedly southern. The northern limits of its range may be roughly indicated as follows: Northern Virginia, southern Minnesota, central Wyoming,^a southern Idaho, southeastern Washington,^b and southern British Columbia (Howe Sound). Most of the species are confined to the Sonoran or Austral zones, but a few (*S. phenax* and its subspecies, *S. putorius* and *S. tenuis*) occur in the Transition, and two (*S. tropicalis* and *lucasana*) in the Tropical.

To the southward the genus spreads over the greater part of Mexico, including Lower California, and reaches Yucatan,^c Guatemala,^c and Costa Rica. In the latter region, according to Mr. George K. Cherrie, it is very rare.

The members of this genus are much less uniformly distributed than the large skunks (*Mephitis*), and are absent from extensive areas where they might be expected to occur. No species, so far as known, occupies the coastal plain of eastern Mexico, from Tamaulipas to Yucatan. Spotted skunks are likewise absent or very rare in the coastal region of Georgia and the Carolinas, although occurring much farther north along the Alleghenies.

HABITS.

The little spotted skunks are more agile than the large skunks of the genus *Mephitis*, and, unlike the latter, often climb bushes and small trees. Most of the species prefer rocky situations, and whenever they are available make their homes in rock piles or crevices in cliffs. On the Northwest Coast they live in hollow logs or stumps, and on the prairies of southern Texas are found under patches of cactus and mesquite. Some species live in brushy river bottoms, and these occasionally dig burrows for themselves, though more frequently they occupy deserted burrows of other animals. A den examined by the writer in South Carolina consisted of a burrow dug beneath the roots of a fallen tree. The habit of digging small holes in the ground

^a Merritt Cary, of the Biological Survey, tells me that *Spilogale* is reported by sheep herders as occurring on the Caspar plains north of Douglas, Wyoming. He also reports that several spotted skunks were killed in the Black Hills, near Elk Mountain, South Dakota, in 1902 and 1903.

^b I am informed by S. E. Piper, of the Biological Survey, that he captured two specimens of *Spilogale* at Almota, Washington, in the Snake River canyon, in 1897. These specimens can not now be found, so that their identity can not be determined, but they probably are referable to the Great Basin form, *S. gracilis saxatilis*. Although the genus reaches British Columbia on the Pacific coast, Almota is the most northerly place in the interior from which it has been recorded.

^c Recorded by Alston in *Biologia Centrali Americana*, but no specimens from these regions have been examined.

in search of insects is attested by several observers. Dr. W. L. Ralph tells me that in Florida spotted skunks are often found occupying the burrows made by burrowing owls (*Speotyto c. floridana*), and the supposition is that they had made way with the original occupants, or at least with their eggs. Both the Florida species and the Pacific Coast forms are known to frequent ocean beaches. The spotted skunks frequently take up their abode under houses or outbuildings, and have been known to come boldly into occupied dwellings. They are strictly nocturnal in habit, and therefore are rarely seen afield except on moonlight nights. Dr. C. Hart Merriam tells me that when moving about in the moonlight their markings blend with the lights and shadows in such a way as to render the animals very inconspicuous.

The fluid secreted by the anal glands and used as a means of defense possesses the same properties as that of the allied genera,^a and is of equally disagreeable odor.^b

In many parts of the West these skunks are known as 'hydrophobia cats' and are greatly dreaded on account of the prevalent notion that their bite produces rabies. While there are a few authentic cases of skunk bite having resulted fatally,^c there are also many instances in which it has produced no ill effect whatever. The recorded cases of skunk rabies are nearly all from the plains region of the West (Kansas, Texas, and Arizona) and relate more to *Mephitis* than to *Spilogale*. The most plausible explanation of these facts seems to be that at certain periods rabies may become locally epidemic among dogs and wolves, and by them be communicated to skunks.

FOOD.

The food of the spotted skunks, judged by the records of seventeen stomach examinations made by the collectors of the Biological Survey, consists in large measure of insects, chiefly beetles and grasshoppers. These are supplemented by mice and other small mammals, lizards, salamanders, small birds, and crayfish. One stomach contained persimmons and several species of fungus.

In some localities these skunks are known to destroy hens' eggs, and doubtless wild birds' eggs also are frequently eaten. Most of the reports received by the Biological Survey with reference to damage done in the poultry yard by the spotted skunks come from the Pacific Coast, where they are particularly abundant.

S. E. Piper, of the Biological Survey, examined a *Spilogale* den in the Holston Mountains, Tennessee, and found in it the remains of

^a See N. Am. Fauna No. 20, pp. 12-13, 1901.

^b I am informed by Dr. A. K. Fisher that a solution of chlorinated soda (Labarraque's fluid) is a highly effective agent in destroying the odor of the skunk's secretion.

^c See Coues, Fur-bearing Animals, pp. 223-235, 1877.

three gray squirrels (*Sciurus carolinensis*). The capture of so large a mammal as a squirrel by these skunks is, however, unusual.

The spotted skunks doubtless do much good in destroying rats. H. C. Oberholser, of the Biological Survey, reports that at Port Lavaca, Texas, they are known to capture wood rats (*Neotoma*), which they secure by following them into their runways. D. E. Lantz, also of the Biological Survey, has recorded an instance where a *Spilogale* proved to be a valuable aid in destroying house rats and mice. He says:

At one time my family occupied for two years a house with large cellar openings on the outside. * * * The cellars, and in fact the entire house, were overrun with rats and mice. A couple of months after we had first occupied the house I noticed that a little striped skunk was present in the cellar. We could often hear the fights between it and rats, and I was careful not to disturb it when I went to the cellar for coal. I often saw it in the cellar, and it did not seem to fear my presence there. In a very few weeks we could hear no more of the fights with the rats, and all the rats and mice were either killed or driven from the place.^a

C. J. Maynard, writing of the Florida species, says:

These skunks are easily domesticated, and I have frequently known of their being used in the houses for the purpose of catching mice. Sometimes the animals are captured and the scent glands removed, but they are often simply decoyed about the premises by exposing food, when they will take up their abode beneath the buildings and will soon become so tame as to enter the various apartments in search of their prey.^b

Recorded observations on the food habits of the spotted skunks seem to indicate that while in regions where they are abundant they destroy more or less poultry, the fact that their diet consists chiefly of injurious rodents and insects entitles them to be considered valuable allies of the farmer, and their presence about the farm should be encouraged.

EXTERNAL CHARACTERS.

The members of this genus are, with one exception, smaller than any of the species of *Mephitis*.^c In form they are more slender and weasel like. The pads on both the front and hind feet are divided into four tubercles at the base of the toes. The fur is somewhat finer and closer than that of *Mephitis*, and the tail hairs are unicolored to the base. In other respects, aside from the pattern of coloration, the spotted skunks externally are essentially similar to their larger relatives.

The teats vary in number from six to ten, the usual arrangement being as follows: Pectoral, 2-2; abdominal, 1-1; inguinal, 1-1.

^a Bull. 129, Kansas State Agric. Coll., pp. 389-390, 1905.

^b Bull. Essex Inst., IV, p. 140, 1872.

^c *Spilogale lucasana* almost equals in bulk the smallest of the hooded skunks (*Mephitis m. vittata*), and exceeds it in cranial measurements; the feet of *Spilogale* are always smaller than those of *Mephitis*.

Recorded observations as to the number of young produced at a birth are very meager. Two records furnished by collectors of the Biological Survey give the number of embryos as four and five, respectively.

Spilogale exhibits less variation in markings than does *Mephitis*. Most of the species are quite constant in the pattern of coloration, and only one (*interrupta*) shows a large amount of variation. The usual color pattern may be described as follows: Body and tail black; a more or less triangular white spot on the forehead between the eyes; four parallel white stripes on the upper parts, commencing between or slightly behind the ears, and extending to about the middle of the back; the outer one on each side continued forward under and in front of the ear; another white stripe on each side commencing just behind the fore-leg and running parallel with the dorsal stripes and a short distance beyond them, where it curves up on to the back and almost or quite meets the median stripe on the corresponding side; between the ends of these two lateral stripes on the back are two narrow white patches in the same line with the median dorsal stripes. On the hinder part of the body, in front of the hips, are two transverse white bands reaching to the line of the median stripes; a small white patch on each side of the rump, sometimes continuous with a stripe on the thigh; a narrow white patch or stripe on each side of the tail at its base, usually confluent posteriorly; end of the tail usually white.

NOMENCLATURE.

GENERIC NAMES.

The synonymy of the genus *Spilogale* is not extensive, but since there has been considerable discussion with regard to the application of the generic name,^a and as it is now established on a firm basis, it will be well to consider briefly its status and history. As stated in my paper on the large skunks,^b the genus *Mephitis* of Cuvier (1800) included two species, *Viverra mephitis* and *V. putorius*, the latter being one of the spotted skunks. Lesson in 1842 made *V. mephitis* the type of the genus *Chincha*, thus restricting *Mephitis* Cuvier to the spotted skunks,^c and it was on the basis of this restriction that I proposed to adopt the name *Mephitis* in place of *Spilogale* Gray, 1865. In making this change, and until quite recently, I was unaware that the genus *Mephitis* was first proposed by E. Geoffroy and Cuvier in 1795,^d five years earlier

^aSee Allen, Bull. Am. Mus. Nat. Hist., XIV, pp. 325-334, 1901; Howell, Proc. Biol. Soc. Wash., XV, pp. 1-9, 1902; Allen, Proc. Biol. Soc. Wash., XV, pp. 59-66, 1902.

^bN. Am. Fauna No. 20, p. 14, 1901.

^cNouv. Tabl. Regne Anim., Mam., p. 67, 1842.

^dMag. Encyclop. II (6), p. 187. *Mephitis* proposed for the 'Mouffettes'; *Viverra mephitis* the only species mentioned (p. 185). The correct citation is given in Sherborne's 'Index Animalium,' and has been verified for me in the Paris Library by Mr. G. S. Miller, jr.

than its use by Cuvier in his '*Leçons d'Anatomie Comparée*,' which has always been quoted as the primary reference. As originally proposed in 1795, the genus *Mephitis* included only a single species, *Viverra mephitis* Schreber, and hence has no bearing on the spotted skunks, which remained without a name until separated by Gray in 1865 as the genus *Spilogale*.

SPECIFIC NAMES.

Very few changes in the currently accepted names have been deemed necessary, and it remains only to consider briefly those which have been found to be unavailable or which in the present paper are used in a new connection. These are as follows:

bicolor (*Mephitis*) Gray, 1837. Mag. Nat. Hist., I, p. 581.

This name was proposed for a species said to inhabit North America, but as there are no diagnostic characters in the description the name must be rejected as unidentifiable. It was used in a collective sense by Baird in 1857, and was applied to the Florida species by Allen in 1871.

mapurita (*Viverra*) Müller, 1776. Natursystems Suppl., p. 32.

The species described under this name is based on the *Zorille* of Buffon, and the name is therefore a synonym of *Viverra zorilla* Schreber.

putida (*Mustela*) G. Cuvier, 1798. Tabl. Élem. Hist. Nat. Anim., pp. 116, 117.

The description under this name is clearly that of a spotted skunk, and the references show that the name is a synonym of *Viverra putorius* Linn., for which it was evidently proposed as a substitute.

quaterlinearis (*Mephitis*) Winans, 1859 (see Coues, Fur-Bearing Animals, pp. 239-240, 1877).

This name was published by Edgar W. Winans in a newspaper, and was accompanied by an accurate description of a specimen taken in Kansas. It is a synonym of *Mephitis interrupta* Rafinesque.

ringens (*Spilogale*) Merriam, 1890. N. Am. Fauna No. 4, p. 9.

This name was given to the species occupying the southern Alleghenian region of the United States. Later investigations have shown that this should bear the name *putorius* given to it by Linnaeus in 1758. Detailed consideration of this question will be found on page 16.

striata (*Viverra*) Shaw, 1800. General Zool., I, p. 387.

The species described under this name is based on *Viverra putorius* Linn., of which name *striata* is therefore a synonym.

zorilla (*Viverra*) Schreber, 1776. Säugethiere, III, p. 445 (1777), tab. 123 (1776).

The species described under this name is clearly based on the *Zorille* of Buffon, since Schreber's plate is practically a copy of Buffon's, and

his description likewise is abridged from Daubenton, Buffon's collaborator. Buffon states that his knowledge of the *zorille* was obtained from a specimen in the collection of M. Aubrey, a curate in Paris, and his figure shows evidence of having been drawn from an actual specimen, rather than from the descriptions of travelers. Under these circumstances it would be highly desirable to make use of the name if there were any way of determining to what species it applies. But unfortunately there is nothing in either the description or the figure by which it can be identified. Buffon erroneously ascribed the animal to South America, where the genus is not known to occur, and he was followed in this, as in other details, by Schreber. The picture resembles quite strongly both the Florida species, and the several forms of *Spilogale angustifrons* inhabiting Mexico. The specimen examined by Buffon may have come from either locality—more probably, it seems to me, from Mexico. Lichtenstein was the first author to use the name in a restricted sense, and his application of it to the California species^a might be accepted were it not for the fact that at the time of the publication of Buffon's description California was not inhabited by civilized peoples; the possibility that his specimen was received from there is therefore very remote. In view of the uncertainty attaching to this name, and since all the known species are now supplied with names, it seems best to reject it altogether.

Genus *SPILOGALE* Gray.

Spilogale Gray, Proc. Zool. Soc. London, 1865, p. 150. Type, *Mephitis interrupta* Rafinesque.

Generic characters.—Skull flattened, with rostrum only slightly depressed below plane of upper surface; periotic region and audital bullæ greatly inflated; mastoid and paroccipital processes obsolete or very small; postorbital processes well developed; 'step' in lower jaw not pronounced (sometimes lacking); tube of auditory meatus directed forward; zygomata highly arched, with the highest point at the middle of the arch; antero-posterior diameter of upper molar less than transverse diameter. Dental formula: $i. \frac{3-3}{3-3}$; $c. \frac{1-1}{1-1}$; $pm. \frac{3-3}{3-3}$; $m. \frac{1-1}{2-2} = 34$.

Key to Species and Subspecies.

(Based on adult males.)

Dorsal stripes not broken into patches on hinder parts.....	<i>pygmaea</i>
Dorsal stripes broken into patches on hinder parts.....	
Upper molar with greatest convexity near middle of tooth.....	
Tail without prominent white tip (usually wholly black).....	<i>interrupta</i>
Tail with prominent white tip.....	
Size larger; mastoids greatly inflated.....	<i>putorius</i>
Size smaller; mastoids not greatly inflated.....	<i>indiana</i>

^a Abhand. Akad. Wiss. Berlin for 1836, p. 282, 1838. Specimens collected by Deppe at Monterey.

Upper molar with greatest convexity *behind middle* of tooth.

Cranium relatively narrow and high.

Rostrum narrower (interorbital breadth less than 13.5 mm.) *angustifrons*

Rostrum broader (interorbital breadth more than 13.5 mm.)

Teeth lighter.

Size large (interorbital breadth more than 15 mm.) *microdon*

Size small (interorbital breadth less than 15 mm.) *tropicalis*

Teeth heavier.

Skull long and narrow *elata*

Skull short and wide.

White patches at base of tail small (about 30 mm. in length) *ambigua*

White patches at base of tail large (about 50 mm. in length) *ambarvalis*

Cranium relatively broad and flat.

Mastoids greatly inflated *leucoparia*

Mastoids not greatly inflated.

Black markings predominating.

Rostrum broader (interorbital breadth more than 17 mm.) *latifrons*

Rostrum narrower (interorbital breadth less than 17 mm.) *olympica*

White markings predominating.

Skull larger; dentition heavy.

Size large (mastoid breadth over 35 mm.) *lucasana*

Size smaller (mastoid breadth under 35 mm.) *phenax*

Skull smaller; dentition light.

Zygomata broadly expanded and highly arched.

Rostrum narrower (interorbital breadth about 12.5 mm.) *martirensis*

Rostrum broader (interorbital breadth about 15 mm.) *arizonæ*

Zygomata not broadly expanded nor highly arched.

Skull longer (basilar length of Hensel 51-52 mm.) *tenuis*

Skull shorter (basilar length of Hensel 47-50 mm.)

Postorbital processes well developed; lateral stripe reduced. *saxatilis*

Postorbital processes not well developed; lateral stripe prominent *gracilis*

List of Species and Subspecies, with Type Localities.

<i>Spilogale ambarvalis</i> Bangs	Mico, Florida.
<i>putorius</i> (Linnaeus)	South Carolina.
<i>interrupta</i> (Rafinesque)	"Upper Missouri" River.
<i>indianola</i> Merriam	Indianola, Texas.
<i>leucoparia</i> Merriam	Mason, Texas.
<i>tenuis</i> Howell	Arkins, Colorado.
<i>gracilis</i> Merriam	Grand Canyon, Arizona.
<i>gracilis saxatilis</i> Merriam	Provo, Utah.
<i>ambigua</i> Mearns	Eagle Mountain, Chihuahua.
<i>angustifrons</i> Howell	Tlalpam, Federal District, Mexico.
<i>angustifrons tropicalis</i> Howell	San Mateo del Mar, Oaxaca.
<i>angustifrons elata</i> nobis	San Bartolomé, Chiapas.
<i>pygmæa</i> Thomas	Rosario, Sinaloa.
<i>arizonæ</i> Mearns	Fort Verde, Arizona.
<i>arizonæ martirensis</i> Elliot	San Pedro Martir Mountains, Lower California.
<i>phenax</i> Merriam	Nicasio, California.
<i>phenax latifrons</i> Merriam	Roseburg, Oregon.
<i>phenax olympica</i> Elliot	Olympic Mountains, Washington.
<i>microdon</i> nobis	Comondú, Lower California.
<i>lucasana</i> Merriam	Cape St. Lucas, Lower California.

Descriptions of Species and Subspecies.

SPILOGALE AMBARVALIS Bangs. FLORIDA SPOTTED SKUNK.

Mephitis bicolor Allen, Bull. Mus. Comp. Zool., II, p. 169, 1871.

Spilogale putorius Coues, Bull. U. S. Geol. and Geog. Surv. Terr., 2d ser., No. 1, p. 12, 1875 (part); Merriam, N. Am. Fauna, No. 4, p. 7, 1890. (Not *Viverra putorius* Linn.)

Mephitis (Spilogale) putorius Coues, Fur-Bearing Animals, p. 239, 1877 (part).

Spilogale ambarvalis Bangs, Proc. Boston Soc. Nat. Hist., XXVIII, p. 222, 1898.

Type locality.—Oak Lodge, opposite Micco, Brevard County, Florida.

Geographic distribution.—Eastern portion of peninsular Florida, from New Smyrna south to Lake Worth.

General characters.—Size small; tail very short; white markings extensive; skull short and broad, with highly arched cranium.

Color.—White markings extensive, the white dorsal stripes about equaling in width the intervening black areas; median pair of dorsal stripes little, if any, narrower than outer pair; lateral stripes^a very broad; frontal spot large; white patch in front of ear large, and always continuous with outer dorsal stripe; tail with terminal third above and terminal half below, white; a large white patch, roughly U-shaped, on upper surface of tail near base. White patches sometimes occur on the thighs, and others on the upper surfaces of the hind feet, but these markings are not constant.

Cranial characters.—Skull short and broad; brain case relatively high and narrow; fronto-parietal region elevated above plane of upper surface; postorbital processes well developed; interorbital constriction slight; mastoid capsules moderately and audital bullæ greatly inflated; zygomatic spreading in an even curve and never widely expanded; upper molar and sectorial tooth small, the former with projection of inner lobe considerably behind middle of tooth.

Measurements.—Eight adult males from type locality: Total length, 356–407; tail vertebrae, 106–134; hind foot, 37–43; average, 374; 120; 40. Average of 5 adult male topotypes, as measured by Bangs, 383.8; 143.5; 41.1. Average of 5 adult females from type locality,^b 354.6; 121.2; 38.8. Skull: (See table, p. 36.)

General remarks.—This species is confined, so far as known, to the east side of the Florida peninsula, where, according to Bangs, it is locally distributed.^c Its occurrence there was first made known to science in 1871, when Dr. J. A. Allen recorded its discovery by Mr. C. J. Maynard several years previously.^d Up to that time the

^aThe term 'lateral stripes,' as used in this paper, refers to the white stripes which begin behind the foreshoulders and extend along the sides, parallel to the dorsal stripes, to a point somewhat beyond the middle of the body, where they continue transversely to the middle of the back.

^bFide Bangs.

^cProc. Boston Soc. Nat. Hist., XXVIII, p. 224, 1898.

^dBull. Mus. Comp. Zool., II, p. 170, 1871.

presence of any species of *Spilogale* east of the Mississippi Valley was unsuspected. Maynard, in 1872, gave its probable distribution as extending from New Smyrna to Jupiter Inlet,^a and later investigations have largely confirmed this range.

This species, as I am informed by Mr. Frank M. Chapman and Dr. W. L. Ralph, lives in holes in the sand, both in the scrub palmetto along the coast and in dry pine barrens farther inland.

Doctor Merriam, in his preliminary revision of the genus,^b applied the Linnaean name *putorius* to this species on the assumption that Catesby's description, on which the name was primarily based, might have been drawn from either the Florida or the Carolina animal. Bangs has since rejected this application of the name, chiefly on the ground that the character given by Linnaeus—"cauda longitudine corporis"—is not applicable to the Florida animal, which has a tail about half as long as the body.^c The present writer has examined the evidence on this point with much care, and the reasons for applying the name *putorius* to the Carolina rather than to the Florida animal will be found under the next species (p. 16).

The Florida spotted skunk is a strongly characterized form, easily recognizable by its small size and extensive white markings. In skull characters it most nearly resembles the group of species occupying the Mexican table-land. Its range, however, is entirely cut off from the range of the Mexican forms by that of *S. indianola*, which occupies the intervening region of southern Texas.

Specimens examined.—Total number, 19, from the following localities:

Florida: Oak Lodge, opposite Micco, 9; Fort Kissimmee, 3; Kissimmee Prairie, 1; Lake Worth, 3; Cape Canaveral, 1; Canaveral, 1; Palm Beach, 1.

SPILOGALE PUTORIUS (Linn.). ALLEGHENIAN SPOTTED SKUNK.

Viverra putorius Linnaeus, Syst. Nat., ed. X, p. 44, 1758. (Not *Spilogale putorius* Merriam.)

Viverra striata Shaw, Gen. Zool., I, p. 387, 1800.

Spilogale ringens Merriam, N. Am. Fauna No. 4, p. 9, 1890.

Type locality.—South Carolina.

Geographic distribution.—Mississippi, Alabama, western Georgia, western South Carolina, and northward along the Alleghenies to northern Virginia; western limits of range unknown.

General characters.—Size large; tail long; white markings of moderate extent; skull and teeth heavy.

Color.—White markings less extensive than in *S. ambarvalis*; black areas broader; median pair of dorsal stripes narrower than outer pair,

^aBull. Essex Inst., IV, p. 140, 1872.

^bN. Am. Fauna No. 4, p. 5, 1890.

^cProc. Boston Soc. Nat. Hist., XXVIII, pp. 223-224, 1898.

rarely interrupted; white patch on forehead and one in front of ear small, often not continuous with outer dorsal stripe; tail with a large white patch at tip, occupying one-fourth to one-half of upper surface.

Cranial characters.—Skull long and relatively narrow; *dentition heavy*; cranium highly arched; fronto-parietal region elevated, but much less so than in *ambarvalis*; postorbital constriction marked; postorbital processes well developed; zygomata not broadly expanded, but nearly parallel to axis of skull; mastoids and audital bullæ large; anterior border of inter-ptyergoid fossa scarcely reaching plane of the posterior border of molars; *upper molar evenly rounded on inner side, with projection near middle of tooth*.

Measurements.—Seven adult males from Greensboro, Alabama: Total length, 470–563; tail vertebræ, 193–219; hind foot, 45–51; average: 512; 204; 47.5. Six adult females from same locality: Total length, 437–544; tail vertebræ, 166–204; hind foot, 38–45; average: 482; 189; 42. Skull: (See table, p. 36.)

General remarks.—This species was characterized by Doctor Merriam in 1890, under the name *ringens*, from specimens collected at Greensboro, Alabama. The present writer has already shown in some detail that the Linnæan name *putorius*, based on the ‘pol-cat’ of Catesby, is strictly applicable to this species,^a and not to the Florida species, on which it was fixed by Doctor Merriam. It is unnecessary to repeat all of the evidence here, but since additional light on the question has recently been obtained, a statement of the reasons for applying this name to the Carolina, instead of to the Florida species, is deemed advisable.

In October, 1905, the writer visited South Carolina in order to determine what species of *Spilogale* occurs in the region where Catesby traveled. Two localities in the coastal plain of that State were visited—Hardeeville, Beaufort County, and Robertsville, Hampton County. Apparently *Spilogale* does not occur in this region, since the animal is unknown to the residents, and careful trapping with the aid of a local hunter failed to secure a specimen. Proceeding next to Cleora, in the rough hill country of Edgefield County, definite evidence of the occurrence of *Spilogale* there was obtained. Local hunters reported that the small ‘polecats,’ as they are called, were frequently chased by dogs while hunting at night, and their statement that the skunks take refuge in trees makes it certain that *Spilogale* is the animal referred to. The writer was shown a den dug beneath the roots of a fallen tree in a wooded hollow, and a *Spilogale* tail was picked up near by. None of the animals were secured at this time, but in January of the present year a specimen in the flesh was sent to the Biological Survey from Cleora, thus affording definite data for the determination of Catesby’s animal, which proves to be the same as *Spilogale ringens* of Merriam.

^a Proc. Biol. Soc. Wash., XV, pp. 2–6, 1902.

The locality where this specimen was collected is well within the limits of Catesby's journeyings, for he tells us that he remained for some time "at and about *Fort Moore*, a small Fortress on the Banks of the River *Savanna*, which runs from thence a Course of 300 Miles down to the Sea, and is about the same Distance from its Source, in the Mountains."^a

The reasons for fixing the name *putorius* upon this species may be summarized as follows:

(1) As shown above, the only species of *Spilogale* known to occur in the region traversed by Catesby is the Alleghenian species—*S. ringens* of Merriam.

(2) The evidence that Catesby ever visited peninsular Florida is based solely on the title of his work and on his statement that he remained "almost three years in *Carolina* and the adjacent parts (which the *Spaniards* call *Florida*, particularly that Province lately honour'd with the name of *Georgia*)." It seems highly probable that had he made a journey to the region south of St. Augustine, the present habitat of the Florida spotted skunk, he would have given some details of the trip in his itinerary, as he did in the case of his expedition to the Bahamas.

(3) In his description of the "pol-cat," Catesby says: "They hide themselves in hollow Trees and Rocks * * *." This is exactly in accord with the habits of the Carolina species, but could not apply to the Florida species, since there are no rocks in the region where it lives.

(4) Linnæus, in his original description of *Viverra putorius*, says of it: "*Cauda longitudine corporis*." This was doubtless a rough comparison of the length of the head and body with the length of the tail, including hairs. The Carolina *Spilogale* agrees very closely with these proportions, but the Florida species has the tail much shorter than the body.

The present form is strikingly distinct from *S. ambarvalis*, but is rather closely related to *interrupta* and *indianola*. No specimens from the Mississippi Valley are available; therefore the question whether intergradation occurs between *putorius* and *interrupta* can not now be determined. However, specimens of *interrupta* from the Wichita Mountains, Oklahoma, present certain intermediate characters, and suggest the probability that the range of *putorius* extends to the westward of the Mississippi River.

Specimens examined.—Total number, 35, from the following localities:

West Virginia: White Sulphur Springs, 1.

Virginia: Winchester, 1.

Tennessee: Holston Mountains, 1.

^a The distance from the sea is clearly erroneous, since a journey of 300 miles would have carried him far above the source of the river.

North Carolina: Roan Mountain, 1; Magnetic City (foot of Roan Mountain), 8; Valley River, Cherokee County, 1.

South Carolina: Cleora, Edgefield County, 1.

Georgia: Mimsville, 1.

Alabama: Greensboro, 18; Mobile, 1.

Mississippi: Corinth, 1.

SPILOGALE INTERRUPTA (Rafinesque). PRAIRIE SPOTTED SKUNK.

Mephitis interrupta Rafinesque, Annals of Nature, I, p. 3, 1820; Lichtenstein, Abhand. Akad. Wiss. Berlin for 1836, p. 281, Tab. II, fig. 1, 1838.

Mephitis quaterlinearis Winans, [Kansas?] newspaper, 1859 (see Coues, Fur-Bearing Animals, pp. 239-240, 1877).

Spilogale interrupta Merriam, N. Am. Fauna No. 4, p. 8, 1890.

Type locality.—"Upper Missouri" River.

Geographic distribution.—Iowa, southern Minnesota, Nebraska, Kansas, Missouri, and Oklahoma; south in eastern Texas to about the middle of the State.

General characters.—Resembling *S. putorius*, but with much more black; tail without prominent white tip.

Color.—White markings much reduced; dorsal stripes variable in width, but averaging narrower than in *putorius*, frequently interrupted (in about one-third of the specimens examined) and sometimes reduced to a few widely separated spots; median pair usually narrower than outer pair; white patch on forehead small, often a mere speck; patch in front of ear much reduced, often absent, and usually not continuous with outer dorsal stripe; *tail usually wholly black*, but occasionally with a very slender tuft of white hairs at the tip, entirely surrounded by the black hairs.

Cranial characters.—Skull closely resembling that of *S. putorius*, but averaging shorter, and relatively broader; *rostrum narrower*; mastoid capsules only slightly inflated, *but with well-developed processes*; upper molar as in *putorius*.

Measurements.—Eight adult males from Kansas, Nebraska, Iowa, and Oklahoma: Total length, 490-536; tail vertebræ, 181-223; hind foot, 44-51; average: 515; 210; 48.5. Average of two females from Cairo, Kansas: 473; 170; 42.5. Skull: (See table, p. 36.)

General remarks.—Doctor Merriam has shown the pertinence of the name *interrupta* to this species,^a and it is unnecessary to repeat the evidence here. The species may be readily recognized by its black tail. Specimens from the Wichita Mountains, Oklahoma, are intermediate in skull characters between *interrupta* and *putorius*. Externally they agree with *interrupta*. Intergradation with *indianola* probably takes place in central or southern Texas, though the material at hand is not sufficient to show this clearly.

^a N. Am. Fauna No. 4, p. 9, 1890.

The southern and western limits of the range of *interrupta* are not accurately known, and only recently it has been ascertained to reach the southern portions of Minnesota and South Dakota. Mr. Ernest Thompson Seton has kindly furnished the Biological Survey with the two most northerly records, and has sent a specimen from Sioux Falls, South Dakota, where these skunks are said to be common. He states that two were killed by a trapper in March, 1904, on the Mississippi River 40 miles southeast of Minneapolis. The animal was previously unknown to the trappers in that region, so that this is doubtless an instance of recent extension of range.

Specimens examined.—Total number, 44, from the following localities:

Kansas: Onaga, 8; Trego County, 8; Fort Leavenworth, 1; Manhattan, 2; Burlington, 1; Long Island, 3; Cairo, 3; Fort Riley, 1 (skull).

Iowa: Gladbrook, 1; Marshalltown, 2.

South Dakota: Sioux Falls, 1.

Nebraska: London, 1; Beemer, 1.

Missouri: Courtney, 1.

Oklahoma: Alva, 1; Mount Scott, Wichita Mountains, 4.

Texas: Canadian, 1; Cooke County, 1 (skull); Brazos, 3.

SPILOGALE INDIANOLA Merriam. GULF SPOTTED SKUNK.

Spilogale indianola Merriam, N. Am. Fauna No. 4, p. 10, 1890.

Type locality.—Indianola, Texas.

Geographic distribution.—Coast region of Texas and Louisiana; south to Victoria, Tamaulipas.

General characters.—Resembling *S. interrupta*, but with a pronounced white tip to the tail; skull relatively narrow.

Color.—Similar to *interrupta*; dorsal stripes frequently interrupted, the median pair usually narrower than outer pair; tail with a white patch at tip occupying about one-fourth of the upper surface.

Cranial characters.—Skull similar to that of *putorius*, but much smaller and relatively narrower across mastoids; cranium highly arched, as in the eastern species, but fronto-parietal region only very slightly elevated above plane of skull; zygomata long (in male skulls) and nearly parallel to axis of skull. Compared with *interrupta*: Skull of about the same length, but relatively narrower; inflation of mastoid capsules greater. Teeth as in *putorius* and *interrupta*.

Measurements.—Seven adult males from the coast region of Texas (Virginia Point to Corpus Christi): Total length, 440–520; tail vertebrae, 165–204; hind foot, 46–50; average, 472; 183; 48. Average of two females from San Antonio, Texas: 406; 162; 39.5. Skull: (See table, p. 36.)

General remarks.—When this species was described, only two skulls (both of females) were available. The skin characters and cranial characters of the males were unknown. Since that time a good series of

both skins and skulls has been secured by the collectors of the Biological Survey, which shows that the species is even more strongly marked than the describer supposed. Externally it closely resembles the whiter specimens of *interrupta*, but may be distinguished by the white-tipped tail. Skulls of males and females show greater differences than is usual in this genus, the former being longer, broader in the mastoid region, and flatter in the fronto-parietal region than skulls of females. Comparison with *ambarvalis* is hardly necessary, the reduction of the white markings and long skull with heavy dentition being sufficiently distinctive.

The relationships of this species are wholly with the forms occupying the regions to the northward, and not with the Mexican or western species.

Specimens examined.—Total number, 20, from the following localities:

Texas: Indianola, 2 (skulls); Virginia Point, 2; Elliott's, Matagorda County, 1; Edna, 1; Rockport, 2; Beeville, 1; Corpus Christi, 4; San Antonio, 5.
Louisiana: Iowa, Calcasieu Parish, 1.
Tamaulipas: Victoria, 1 (skull).

SPILOGALE LEUCOPARIA Merriam. RIO GRANDE SPOTTED SKUNK.

Spilogale leucoparia Merriam, N. Am. Fauna, No. 4, p. 11, 1890.

Type locality.—Mason, Texas.

Geographic distribution.—Arid region of western Texas and southern New Mexico; south over the eastern side of the Mexican table-land to Hidalgo; west to central Arizona.

General characters.—White markings extensive; skull with greatly inflated mastoid capsules.

Color.—White markings very broad, especially the lateral stripes and outer pair of dorsal stripes; frontal spot and patch in front of ear large; no white on legs; tail with terminal fourth above and terminal two-thirds below, white.

Cranial characters.—Skull of about the same length as that of *indianola*, but brain case broader and flatter; mastoid capsules greatly inflated; audital bullæ larger; upper molars similar in shape, but decidedly smaller; lower carnassial slightly smaller.

Measurements.—Average of three adult males from Rio Grande Valley (Eagle Pass, Laredo, Samuels): Total length, 402; tail vertebrae, 145; hind foot, 47.7. Average of three adult females from Texas (Eagle Pass, Langtry, Waring): 377; 147; 41. Skull: (See table, p. 36.)

General remarks.—This species, as would be expected, is more closely related to the forms occupying the arid regions of the West than to those in the Mississippi Valley. Its peculiar skull serves readily to distinguish it from the other members of the genus. Two speci-

mens from Sierra Encarnacion, Coahuila, have slightly larger skulls than the type, with the postorbital processes well developed; the white body stripes are also slightly narrower than in the typical form. A specimen from Tulancingo, Hidalgo (provisionally referred to this species), likewise has less white on the body. A specimen from Fort Clark, Texas, is apparently intermediate between *leucoparia* and *ambigua*. It resembles the former in having large bullæ and inflated mastoids, but the cranium is relatively narrow and high, as in *ambigua*.

A specimen from Flagstaff, Arizona (No. 1900, Am. Mus. Nat. Hist.), is larger than typical specimens, and the rostrum is very broad and flat; in other respects it agrees perfectly with *leucoparia*, as does also another specimen (No. 1890, Am. Mus. Nat. Hist.), from Fossil Creek, Arizona.

Specimens examined.—Total number, 22, from the following localities:

Texas: Mason, 3; Comstock, 1; Waring 1; D'Hanis, Medina County, 1; Eagle Pass, 2; Turtle Creek, Kerr County, 2; Laredo, 1; Samuels, 1.

New Mexico: Tularosa, 1.

Arizona: Flagstaff, 1; Fossil Creek, Verde River, 1.

Nuevo Leon: Monterey, 2 (skulls).

Coahuila: Sierra Encarnacion, 3; Saltillo, 1.

Hidalgo: Tulancingo, 1.

SPILOGALE TENUIS Howell. ROCKY MOUNTAIN SPOTTED SKUNK.

Spilogale tenuis Howell, Proc. Biol. Soc. Wash., XV, p. 241, 1902.

Type locality.—Arkins, Colorado.

Geographic distribution.—Eastern slopes of the Rocky Mountains in Colorado and northern New Mexico; limits of range unknown.

General characters.—Size large; white markings prominent; skull long and narrow.

Color.—Similar in markings to *S. leucoparia*, but lateral stripe narrower; frontal patch long and narrow (in type specimen, 32 by 16 mm.); terminal third of tail white.

Cranial characters.—Skull similar in general shape to that of *indianola*, but longer and relatively narrower; brain case broad and very flat; fronto-parietal region not elevated above plane of skull; rostrum and postorbital region narrow, but without pronounced constriction, the narrowness including also the anterior portion of brain case; zygomata not widely expanded, and nearly parallel to axis of skull; palate long, reaching beyond the plane of last molars; audital bullæ and mastoid capsules moderately inflated; teeth rather small; upper molars with projection of inner lobe behind middle of tooth. Compared with *leucoparia* the skull of *tenuis* is much longer and relatively narrower; brain case flatter and mastoids much less inflated.

Measurements.—Type (adult ♂): Total length, 450; tail. vertebræ, 165; hind foot, 51; young female from near Folsom, New Mexico: 400; 160; 47. Skull: (See table, p. 36.)

General remarks.—This species is most nearly related to *S. leucoparia*, which it resembles in markings but from which it differs widely in skull characters. The skull of a young female from the type locality is shorter, and broader interorbitally than that of the type, but is narrower across the mastoids—a condition due in part to immaturity. An adult female skull from Estes Park agrees with the type in narrowness, but is much smaller. An adult male skull from near Folsom, New Mexico, is broader than the type, both zygomatically and in the rostral and postorbital regions, but is slightly narrower across the mastoids.

No specimens are available from farther north than Arkins, Colorado, but it is not unlikely that the form occupying the Black Hills and eastern Wyoming (see *antea*, p. 7) may prove to be referable to this species.

Specimens examined.—Total number, 5, from the following localities:

Colorado: Arkins, 2; Estes Park, 1.

New Mexico: Oak Canyon, 5 miles north of Folsom, 2.

SPILOGALE GRACILIS Merriam. CANYON SPOTTED SKUNK.

Spilogale gracilis Merriam, N. Am. Fauna No. 3, p. 83, 1890.

Type locality.—Grand Canyon of the Colorado (north of San Francisco Mountain), Arizona.

Geographic distribution.—Northern Arizona and desert ranges of southeastern California; south in the Sierra Madre to Jalisco and Michoacan.

General characters.—Similar in size and color to *S. leucoparia*; skull with mastoid capsules less inflated.

Color.—Markings essentially as in *S. leucoparia*; white in tail proportionally less.

Cranial characters.—Skull about the size of that of *indianola*, but relatively broader; *brain case flattened*; fronto-parietal region depressed to general level of upper surface of skull; postorbital constriction pronounced; mastoid capsules moderately inflated; postorbital processes slightly developed; teeth of similar shape, but smaller. Compared with *leucoparia*: Postorbital constriction usually greater; audital bullæ and *mastoid capsules much less inflated*; teeth similar.

Measurements.—Five adult males from Grand Canyon, Arizona, and Panamint Mountains, California: Total length, 334–400; tail vertebræ, 130–160; hind foot, 41–46; average: 381; 143; 44.3. Adult female from Inyo Mountains, California: 330; 120; 37. Skull: (See table, p. 36.)

General remarks.—Arizona specimens of this genus have proved extremely puzzling, and the material in hand is insufficient to determine with certainty the relationships and ranges of the several forms. Four species or subspecies apparently occur in the Territory—*gracilis*, *ambigua*, *arizonæ*, and *leucoparia*. *S. gracilis* occupies the northern and central portions of the Territory (intergrading at the north with the Great Basin form, *saxatilis*) and apparently extends far south along the Sierra Madre into Mexico. *S. ambigua* belongs to the high-skulled type represented throughout Mexico, the range of which extends northward to central Arizona, where it overlaps that of *gracilis*. *S. arizonæ* occurs with the preceding forms over most of central and southern Arizona. *S. leucoparia* enters the region from New Mexico, and appears to be nearly typical at Flagstaff, in central Arizona. These four forms either intergrade or hybridize in this region, with the result that many individuals can not satisfactorily be referred to one or the other. There are no appreciable color differences, and in identifying specimens dependence must be placed alone upon skull characters.

S. gracilis is a small, slender species with a moderately flattened skull. It seems to maintain its characters with little change over an extensive area. A specimen from Patzcuaro, Michoacan, a place widely separated from the type region, is remarkably close to the type in characters; its skull is a little smaller and has a slightly slenderer rostrum. A specimen from near Fort Verde, Arizona, however (No. 1906, Am. Mus. Nat. Hist.), shows some indication of intergradation with *ambigua*, its skull being somewhat higher than that of typical *gracilis*. A very old skull from Prescott, Arizona (No. 2997, Am. Mus. Nat. Hist.), has a more swollen brain case and larger post-orbital processes than is usual in skulls of *gracilis*. Three specimens from Panamint Mountains, California, have skulls even smaller and slenderer than that of the type.

Specimens examined.—Total number, 13, from the following localities:

Arizona: Grand Canyon, north of San Francisco Mountain, 2; Prescott, 1; Rio Verde, 20 miles south of Fort Verde, 1.

California: Panamint Mountains, 3; Inyo Mountains, 2.

Chihuahua: Colonia Garcia, 1.

Jalisco: Lagos, 1; San Sebastian, 1.

Michoacan: Patzcuaro, 1.

SPILOGALE GRACILIS SAXATILIS Merriam. GREAT BASIN SPOTTED SKUNK.

Spilogale saxatilis Merriam, N. Am. Fauna, No. 4, p. 13, 1890.

Type locality.—Provo, Utah.

Geographic distribution.—Utah, western Colorado, northern Nevada, southern Idaho, eastern Oregon, and northeastern California.

General characters.—Similar to *S. gracilis*, but slightly larger and with lateral stripe usually absent.

Color.—Essentially as in *gracilis*, but lateral stripe usually absent or very much reduced. In the type and three topotypes it is faintly indicated by a narrow band. A little less white in tail.

Cranial characters.—Skull similar to that of *gracilis*, but slightly larger; brain case broader; postorbital processes more strongly developed; ridge on mastoids pronounced.

Measurements.—Two males from type locality: Total length, 422–450; tail vertebræ, 163–176; hind foot, 45–49. Average of two females from type locality: 403; 152; 41.5. Adult male from Harney, Oregon: 455; 155; 50. Average of three adult females from Oregon: 360; 129; 40. Skull: (See table, p 36.)

General remarks.—This form is closely related to *S. gracilis*, from which it differs chiefly in larger size and the reduction of the white side stripes. Specimens from eastern Oregon (Harney, Shirk, and Plush) have the white markings somewhat reduced in extent, and the lateral stripe is entirely absent in several of them. The dorsal stripes, especially the median pair, are narrower than in the typical form.

The deep emargination of the nares, shown in the skull of the type proves to be an inconstant character, for the skulls of the three topotypes examined do not differ from skulls of *gracilis* in depth of emargination. In a skull of *saxatilis* from Harney, Oregon, the emargination is about half as deep as in the type skull. In the post-orbital constriction of the skull *saxatilis* does not differ appreciably from *gracilis*.

A specimen from St. George, Utah, though agreeing with *gracilis* in markings, is nearer to *saxatilis* in skull characters. Its skull is the longest one in either series and has the ridge on the mastoids pronounced, as in *saxatilis*; the postorbital processes, however, are very small.

No specimens of *Spilogale* have been examined from Idaho, but Doctor Merriam reports this form common in the canyons of Snake River, and records a skin taken by himself at Marsh Valley [in Bannock County, southeast of Pocatello].^a

Specimens examined.—Total number, 16, from the following localities:

Utah: Provo, 4; St. George, 1.

Colorado: Grand Junction, 1; Coventry, 1.

Nevada: Cottonwood Range, 1.

Oregon: Plush, Lake County, 4; Shirk, Harney County, 1; Harney, 2.

California: Susanville, 1.

SEPILOGALE AMBIGUA Mearns. CHIHUAHUA SPOTTED SKUNK.

Spilogale ambigua Mearns, Proc. U. S. Nat. Mus., XX, p. 460, 1897.

Type locality.—Eagle Mountain, Chihuahua (about 4 miles south of Monument No. 15, Mexican boundary line).

^aN. Am. Fauna No. 5, p. 84, 1891.

Geographic distribution.—From central Arizona south over the western edge of the Mexican table-land to Jalisco.

General characters.—Closely similar in markings to *S. gracilis*; skull with highly arched cranium, as in *ambarvalis* and other eastern species.

Color.—Essentially as in *gracilis*; lateral stripes very broad; a white band on the thighs.

Cranial characters.—Skull very similar to that of *S. ambarvalis*; brain case highly arched; fronto-parietal region elevated; interorbital constriction pronounced; postorbital processes well developed; zygomatica broadly expanded; mastoid capsules and audital bullæ not greatly inflated; sagittal crest slightly developed; palate short, ending on a line with posterior border of molars; upper molars of exactly similar shape and size to those of *ambarvalis*; upper carnassial averaging larger. Compared with *gracilis*: Skull shorter and relatively broader; brain case higher; rostrum more depressed; zygomatica more abruptly expanded; postorbital processes larger.

Measurements.—Type^a (adult ♂): Total length, 411; tail vertebræ, 147; hind foot, 43. Average of two adult males from Chihuahua and Jalisco: 377; 121; 45.5. Skull: (See table, p. 36.)

General remarks.—As stated by Doctor Mearns, this species has closer relationship with the forms inhabiting central Mexico than with any of the United States species. It is in fact only the most northerly ranging member of a distinct group of species occupying the Mexican table-land, from the United States boundary to Guatemala. This fact makes all the more surprising its remarkably close resemblance in cranial characters to *S. ambarvalis* of Florida, the range of which is entirely cut off from that of *ambigua*. The skull of the type of *ambigua* can be very closely matched by specimens of *ambarvalis*, the most noticeable difference being the slightly greater zygomatic breadth and the larger upper carnassial of *ambigua*. In external characters, too, the differences between *ambarvalis* and *ambigua* are slight. The latter has a white band on the thigh not possessed by the former, and the white patches at the base of the tail are much smaller. The tail is usually longer.

The range of *ambigua* meets that of *gracilis* in central Arizona and probably at many points in Mexico, the latter species apparently occupying the more mountainous regions, while *ambigua* occupies the table-land. A specimen from Fossil Creek, Arizona, is typical, as is also one from Barranca Ibarra, Jalisco.

Specimens examined.—Total number, 8, from the following localities:

Chihuahua: Eagle Mountain, 4 miles south of monument No. 15, Mexican boundary line, 1; Chihuahua, 1.

Jalisco: Barranca Ibarra, 1; Ocotlan, 1.

Arizona: Huachuca Mountains, 3; Fossil Creek, near Verde River, 1.

^a *Fide* Mearns.

SPILOGALE ANGUSTIFRONS Howell. TABLE-LAND SPOTTED SKUNK.

Spilogale angustifrons Howell, Proc. Biol. Soc. Wash., XV, p. 242, 1902.

Type locality.—Tlalpam, Federal District, Mexico.

Geographic distribution.—Southern portion of the Mexican tableland, from Guanajuato to the isthmus of Tehuantepec.

General characters.—Size small; coloration as in *S. ambigua*, but usually without white bands on thighs. Skull slender, and without prominent ridges.

Color.—Similar to that of *ambigua*, but lateral stripes averaging broader; white bands on thighs usually absent.

Cranial characters.—Skull similar to that of *ambigua*, but smaller and narrower; cranium highly arched; *rostrum* narrow; sagittal crest practically obsolete; postorbital constriction slight; postorbital processes small; audital bullæ relatively large; mastoid capsules moderately inflated; molars smaller than in *ambigua*, the upper and lower carnassials decidedly so.

Measurements.—Type (adult ♂): Total length, 345; tail vertebrae, 130; hind foot, 40. Average of three adult males from the type locality: 333; 121; 42. Adult female from type locality: 325; 105; 36. Skull: (See table, p. 36.)

General remarks.—This species belongs to the group of narrow-skulled species inhabiting the eastern United States and northern Mexico. Its nearest relative is *S. ambigua*, with which it may intergrade, though no intermediate specimens are known. Its slender skull, without ridges and with narrow rostrum, distinguishes it from any of its relatives. A specimen from Yautepec, Morelos, differs from the typical form in having thigh bands; its skull, however, is entirely typical.

Specimens examined.—Total number, 8, from the following localities in Mexico:

Mexico: Tlalpam, 5.

Morelos: Yautepec, 1.

Guanajuato: Santa Rosa, 2.

SPILOGALE ANGUSTIFRONS TROPICALIS Howell. TROPICAL SPOTTED SKUNK.

Spilogale angustifrons tropicalis Howell, Proc. Biol. Soc. Wash., XV, p. 242, 1902.

Type locality.—San Mateo del Mar, Oaxaca, Mexico.

Geographic distribution.—Coast region of southern Oaxaca.

General characters.—Similar to *S. angustifrons*, but larger; skull with smaller teeth and larger mastoid capsules.

Color.—Averaging with more white than *angustifrons*; lateral stripes large, and reaching down on to forelegs; white patches at base of tail large; white bands on thighs usually present, but variable in size.

Cranial characters.—Skull larger and more angular than that of

angustifrons; rostrum broader; mastoid capsules more inflated; audital bullæ flatter; upper molars and last lower molars relatively smaller; upper molars not evenly rounded on inner side, but with a narrow projecting lobe at the postero-internal corner; palate long, usually reaching beyond the posterior border of molars. Compared with *ambigua*, the mastoid capsules are more inflated, zygomata less widely expanded, and teeth much smaller. Skulls of females are but little smaller than those of males, and lack the sagittal crest.

Measurements.—Five adult males from type locality: Total length, 334–387; tail vertebræ, 114–145; hind foot, 40–46; average, 363; 134; 43. Average of three adult females from type locality, 339; 125; 38. Skull: (See table, p. 37.)

General remarks.—This form apparently is confined to the tropical lowlands on the west side of the isthmus of Tehuantepec. Specimens from the city of Tehuantepec, which is only a few miles from the type locality, are not typical, but show intergradation with the highland form (*elata*) in skull characters.

Although the habitat of *tropicalis* is widely removed from that of *ambigua*, the two seem to be closely related. No intermediate specimens have been examined, however.

The present form is remarkable for the great amount of variation in the size of the skull. In the type series of eight specimens this amounts in the basilar length to 17 per cent of the average.^a

Specimens examined.—Total number, 12, from the following localities:

Oaxaca: San Mateo del Mar, 8; Tehuantepec, 3; San Geronimo, 1.

SPILOGALE ANGUSTIFRONS ELATA subsp. nov. HIGHLAND SPOTTED SKUNK.

Type from San Bartolomé, Chiapas. Adult ♂, No. 133186, U. S. National Museum, Biological Survey Collection. Collected March 19, 1904, by E. A. Goldman. Original No. 16618.

Geographic distribution.—Highlands of Chiapas and Costa Rica; Guatemala (?); limits of range unknown.

General characters.—Similar to *S. a. tropicalis*, but with narrower skull and heavier dentition.

Color.—Agrees with *tropicalis* in markings, but has a little less white at base of tail. The type specimen has a small white patch on the thigh, scarcely continuous with the white spot on flank.

Cranial characters.—Skull about the size of that of *tropicalis*,^b but much narrower across mastoids; rostrum broader, and only slightly depressed below level of upper surface; postorbital processes well

^a See table of measurements, p. 37, where the averages of the two largest and of the three smallest male skulls are given.

^b Comparison is made with the type of *tropicalis*; the others in the series from the type locality are somewhat smaller.

developed; *mastoids not inflated*, but with a pronounced ridge; upper molars larger than in *tropicalis* and more evenly rounded on inner side; lower carnassial decidedly broader; inter-ptyergoid fossa broader.

Measurements.—Type (adult ♂): Total length, 385; tail vertebrae, 123; hind foot, 45. Skull: (See table, p. 37.)

General remarks.—This form is closely related to *S. tropicalis*, from which it differs chiefly in cranial characters. It differs from *angustifrons* in having a much larger skull, but agrees with it in the form of the upper molars.

Specimens examined.—Total number, 3, from the following localities:

Chiapas: San Bartolomé, 1; Pinabete, 1.

Costa Rica (locality not known ^a), 1.

SPILOGALE PYGMÆA Thomas. PYGMY SKUNK.

Spilogale pygmæa Thomas, Proc. Zool. Soc. London for 1897, p. 898, 1898.

Type locality.—Rosario, Sinaloa.

Geographic distribution.—Known only from the type locality and from Acapulco, Guerrero.

General characters.—Size very small; *dorsal stripes not broken into patches on hinder parts*; a transverse band of white across face between the eyes.

Color.^b—Median pair of dorsal stripes *grayish* (caused by intermixture of black and white hairs), connected anteriorly, each divided at the middle of the back into two narrow stripes, the outer one of which is continued transversely until it joins the lateral stripe, while the inner one extends across the rump to the under surface of the body, where it nearly joins the corresponding stripe on the other side; a narrow transverse band on each thigh, confluent with a small patch at base of tail; lateral stripes broad, and of a distinctly yellowish hue; outer pair of dorsal stripes also yellowish, narrow, except anteriorly, where they spread out into broad patches behind the ears; frontal patch white, *broad*er than long, and united by a narrow stripe with the outer dorsal stripes; upper surface of both fore and hind feet white; tail all white, except for the basal half-inch below, and a slight admixture of black above covering the basal two-thirds.

Cranial characters.—Skull very small; cranium narrow and highly arched; fronto-parietal region scarcely elevated above plane of skull; postorbital constriction slight; postorbital processes minute; no trace of a sagittal crest; palate short, not reaching plane of posterior border of molars.

^a This specimen was sent to the World's Fair at Chicago by the Costa Rican Commission. Mr. George K. Cherrie, in response to an inquiry concerning it, states that his recollection is that the specimen came from the neighborhood of Alajuela, at about 3,000 feet altitude, on the Pacific side of the Cordillera.

^b Description drawn from a specimen in the Biological Survey Collection.

Measurements.—Adult male from Acapulco, Guerrero: Total length, 240; tail vertebræ, 72; hind foot, 33. Type (adult ♀): 182; 68; 34.^a Skull: (See table, p. 37.)

General remarks.—This remarkable species may be easily distinguished from all its relatives by its exceedingly small size and peculiar pattern of coloration. It evidently is not a common species, for up to the present time only two examples have found their way into museum collections—the type in the British Museum, and one specimen in the Biological Survey collection taken by Nelson and Goldman. The latter specimen was caught in a trap set below the surface of the ground in the burrow of a pocket gopher (*Orthogeomys*). It is an adult male and is even smaller than the type^b (a female), but agrees in every other respect with the description given by Mr. Thomas.

SPILOGALE ARIZONÆ Mearns. ARIZONA SPOTTED SKUNK.

Spilogale phenax arizonæ Mearns, Bull. Amer. Mus. Nat. Hist., III, p. 256, 1891.

Type locality.—Fort Verde, Arizona.

Geographic distribution.—Central and southern Arizona, southwestern New Mexico, and adjacent parts of Mexico.

General characters.—Similar to *S. gracilis*, but with larger and more angular skull.

Color.—Markings as in *leucoparia* and *gracilis*; lateral stripe very broad; tail with terminal fourth above, and terminal half below, white.

Cranial characters.—Skull larger than that of *gracilis*; zygomata widely and abruptly expanded, arched upward at widest point so as to be decidedly higher than in *gracilis*; brain case broad and flat; rostrum and inter-temporal region narrow; postorbital processes much larger; bullæ slightly larger; upper molars relatively small.

Measurements.—Type (adult ♂): Total length, 445; tail vertebræ, 160; hind foot, 50.^c Average of 3 adult males from Fort Huachuca, Arizona, and San Jose Mountain, Sonora: 422; 151; 45.3. Adult female from Fort Huachuca, Arizona: 380; 148; 40. Skull: (See table, p. 37.)

General remarks.—This species, although represented by only a small number of specimens in the series examined, is apparently a well-marked form. The material available at the present time shows that it is not, as the describer supposed, a subspecies of *phenax*. Compared with the latter species, *arizonæ* is very much smaller, with relatively broader brain case and larger audital bullæ. Although occupying a portion of the range of *gracilis*, no intermediates between these two forms have been discovered. Intergradation with *leucoparia* is more probable, though the material at present available is not sufficient to determine this question with certainty. Two specimens of

^a Fide Thomas.

^b See table of cranial measurements, p. 37.

^c Fide Mearns.

nearly typical *leucoparia* have been taken within the range of *arizonæ*, but on the other hand a specimen from Pinal County, Arizona (No. 610, Am. Mus. Nat. Hist.), is in some respects intermediate between the two forms.

Typical *ambigua* also occurs in the range of *arizonæ*, and at least one specimen (No. 1902, Am. Mus. Nat. Hist., from Whipple Barracks) combining the characters of these two species has been examined. By reason of the wide differences between typical specimens of the two species, and in view of the fact that they occur together in the typical forms, it seems preferable to consider the intermediate specimens as the product of hybridization rather than of intergradation.

Specimens examined.—Total number, 8, from the following localities:

Arizona: Fort Verde, 1; Fort Huachuca, 3; Pinal County, 1 (not typical); Whipple Barracks, 1 (not typical).

New Mexico: Rio Mimbres (near head), 1.

Sonora: San Jose Mountain, 1.

SPILOGALE ARIZONÆ MARTIRENSIS Elliot. PENINSULA SPOTTED SKUNK.

Spilogale arizonæ martirensis Elliot, Field Columb. Mus., Zool. Series, III, p. 170, 1903.

Type locality.—Vallecitos, San Pedro Martir Mountains, Lower California, Mexico.

Geographic distribution.—Lower California, from San Pedro Martir Mountains south to Comondú. Range probably not continuous.

General characters.—Similar to *S. arizonæ*, but smaller.

Color.—Not appreciably different from *S. arizonæ*.

Cranial characters.—Skull decidedly smaller than that of *arizonæ*, with very narrow rostrum; zygomata narrower and less abruptly expanded; molars smaller.

Measurements.—Type (adult ♂): Total length, 395; tail vertebrae 143; hind foot, 44; five adult males from San Pablo, San Ignacio, and Mulejé: Total length, 365–404; tail vertebrae, 133–155; hind foot, 42–47.5; average: 381; 148; 45.3. Average of two adult females from San Ignacio and Comondú: 375; 142; 40.2. Skull: (See table, p. 37.)

General remarks.—This subspecies was based on specimens collected at an altitude of 9,000 feet in the San Pedro Martir Mountains. The collector, Mr. Edmund Heller, considers the animals to be very scarce in that region. Nelson and Goldman collected at the type locality in 1905, but secured no skunks. Specimens of this form, however, were taken by them much farther south on the Peninsula at an altitude but little above sea level. A specimen from Mulejé agrees very closely with the type, except that the lower carnassial is somewhat smaller. The skulls of two adult males from San Ignacio are slightly broader interorbitally and narrower across the mastoids. Although the range of this form is probably cut off from that of *arizonæ* by the Colorado

Desert, the close resemblance in skull characters which it bears to *arizonæ* makes a subspecific designation desirable.

Specimens examined.—Total number, 9, from the following localities:

Lower California: San Pedro Martir Mountains, 2; San Pablo, 1; San Ignacio, 4; Mulejé, 1; Comondú, 1.

SPILOGALE PHENAX Merriam. CALIFORNIA SPOTTED SKUNK.

? *Mephitis bicolor* Gray, Mag. Nat. Hist., I, p. 581, 1837; Baird, Mamm. N. Am., p. 197, 1857 (in part—specimen from California).

Mephitis zorrilla Lichtenstein, Abh. Akad. Wiss. Berlin for 1836, p. 282, 1838. (Specimens from Monterey collected by Deppe.) ^a (Not of Schreber.)

Mephitis zorrilla Audubon & Bachman, Quad. N. Am. III, p. 276, 1854. (Not of Schreber.)

Spilogale phenax Merriam, N. Am. Fauna No. 4, p. 13, 1890.

Type locality.—Nicasio, California.

Geographic distribution.—Greater portion of California, excepting extreme northern part and southeastern desert regions.

General characters.—Similar to *S. putorius* in size and coloration, but tail shorter; skull heavy and angular.

Color.—White markings less prominent than in *S. arizonæ* or *S. leucoparia*; coloration practically the same as in *S. putorius*, but dorsal stripes extending a little farther forward, to a point between the ears; white frontal patch and patches in front of ears larger; white patch at base of tail smaller; lateral stripes broad (rarely absent); tail with terminal fourth above and terminal half below, white.

Cranial characters.—Skull large and prominently ridged; resembling that of *S. interrupta* in general shape, but brain case flatter; *postorbital processes usually well developed*; zygomata broadly and abruptly expanded; auditory bullæ and mastoid capsules not greatly inflated, the latter with pronounced ridges; sagittal and occipital crests well developed; teeth relatively rather small; upper molar with projection of inner lobe behind middle of tooth, as in most of the western species. Females have much smaller skulls than males and the sagittal crests and mastoid ridges are less developed.

Measurements.—Four adult males from San Francisco Bay region (Mount St. Helena, Point Reyes, Fairfield, and Glen Ellen): Total length, 460–485; tail vertebræ, 150–158; hind foot, 51–54; average: 470; 154.5; 52.5. Eight adult males from San Luis Obispo, Santa Barbara, and Ventura counties: Total length, 424–480; tail vertebræ, 142–195; hind foot, 47–51; average: 455; 173; 50. Average of four adult females from same localities: 408; 158; 45. Average of two adult females from Glen Ellen and Auburn: 390; 140; 45. Skull: (See table, p. 37.)

General remarks.—This species is one of the largest of the genus, being exceeded in size by *S. lucasana* only. It exhibits very little variation in markings, but the difference in size between adult males from the same locality is remarkable. This is well shown by a com-

^a The source of Deppe's specimens is given by Lichtenstein in a later paper (Abh. Akad. Wiss. Berlin for 1838, p. 422, 1839).

parison of the external measurements, and more especially those of the skull. Thus, for example, two specimens from Ventura River show a variation of 33 mm. in length of tail vertebræ, 4.8 mm. in basilar length of skull, and 5.7 mm. in occipito-nasal length. Specimens from Los Angeles and San Diego counties apparently have smaller hind feet than the typical form, but do not differ appreciably in other respects. Specimens from Three Rivers and San Emigdio have skulls averaging longer and narrower inter-temporally than those of the typical form. The skull of an adult male specimen from Alila, Tulare County (in the San Joaquin Valley), differs from typical skulls in being smaller and relatively broader zygomatically, the zygomata spreading abruptly at the posterior end and curving strongly upward. In these characters it resembles the skull of *S. arizonæ*, but it differs widely from that species in other respects.

Specimens examined.—Total number, 95, from the following localities:

California: Baird, Shasta County, 1; Stillwater, Shasta County, 1; Dyer-ville, 1; Rio Dell, Humboldt County, 5; Auburn, 1; Mount St. Helena, 1; Glen Ellen, 2; Nicasio, 3; Point Reyes, 5; Berkeley, 1; Fairfield, 1; Sausalito, 1; Carbondale, 1; Tracy, 1; Santa Clara, 2; Boulder Creek, 1; Morro, 1; Pozo, 1; San Luis Obispo, 5; Santa Ynez Mission, 2; Ventura River, 2; Santa Paula, 2; Wawona, 1 (skull); Three Rivers, 6; Kaweah, Tulare County, 1; Milo, 3; Kern River Lakes, 2; Alila, 5; Delano, 1; Portersville, 1; San Emigdio, 5; Box Spring, Riverside County, 2; San Bernardino, 4; San Bernardino Peak, 1; Alhambra, 4; Los Angeles, 1; San Jacinto Mountains, 1; Twin Oaks, 1; Santa Ysabel, 3; Witch Creek, 1; Dulzura, 6; La Puerta, San Diego County, 1; San Diego, 2; Valley Center, San Diego County, 1; Santa Cruz Island, 1.

SPILOGALE PHENAX LATIFRONS Merriam. OREGON SPOTTED SKUNK.

Spilogale phenax latifrons Merriam, N. Am. Fauna No. 4, p. 15, 1890.

Type locality.—Roseburg, Oregon.

Geographic distribution.—Coast region of Oregon and northern California.

General characters.—Smaller than *S. phenax*; black markings more prominent; rostrum broader.

Color.—*Black markings prominent*; outer pair of dorsal stripes averaging narrower than in *phenax*; median pair usually very narrow, though sometimes of same width as outer pair; lateral stripe frequently absent or much reduced; white patches and transverse bands on hinder part of body small.

Cranial characters.—Skull shorter and relatively broader than that of *S. phenax*; rostrum actually as well as relatively much broader.

Measurements.—Six adult males from Oregon (Gardiner, Goldbeach, Beaverton, and Marshfield): Total length, 382–435; tail vertebræ, 117–146; hind foot, 45–50; average: 408; 127; 47.7. Eleven adult females from Oregon: Total length, 335–403; tail vertebræ, 105–140; hind foot, 39–46; average: 373; 122; 42.8. Skull: (See table, p. 37.)

General remarks.—This subspecies, originally described from a single female specimen, proves to be a well-marked form. It has somewhat more black than *S. phenax* and a shorter tail. The broad rostrum proves to be a constant and distinctive character. Intergradation with *phenax* apparently takes place in Shasta County, California, but strangely enough a specimen from Point Reyes, California, where typical *phenax* occurs, is clearly referable to *latifrons*.

Specimens examined.—Total number, 39, from the following localities:

Oregon: Roseburg, 2; Eugene, 2; Yaquina, 2; Beaverton, 3; Gardiner, 5; Goldbeach, 3; Hermann, Lane County, 10 (skulls); Marshfield, 4; Marmot, Clackamas County, 2 (skulls); Mount Hood, 1.

California: Hornbrook, 3; Point Reyes, 1; Siskiyou Mountains, 1.

SPILOGALE PHENAX OLYMPICA Elliot. PUGET SOUND SPOTTED SKUNK.

Spilogale olympica Elliot, Field Columbian Museum, Zool. Ser., I, p. 270, 1899.

Type locality.—Lake Sutherland, Olympic Mountains, Washington.

Geographic distribution.—The Olympic Peninsula and shores of Puget Sound; north (probably) to Howe Sound, British Columbia.

General characters.—Similar to *S. p. latifrons*; tail slightly shorter; rostrum narrower.

Color.—Markings as in *S. p. latifrons*, but white spot on forehead apparently averaging longer, and narrower anteriorly.

Cranial characters.—Skull slightly smaller than that of *S. p. latifrons*, with narrower rostrum. Compared with *S. phenax*, it is decidedly smaller, and brain case relatively narrow and high; upper molar more nearly square.

Measurements.—Type (immature ♂): Total length, 320; tail vertebrae, 104; hind foot, 41^a. Average of 8 adult males from eastern side of Puget Sound (Mount Vernon, Washington; Sumas, Port Moody, and Hastings, British Columbia): 411; 112; 47.5. Average of 7 adult females from same localities: 381; 101; 43.7. Skull: (See table, p. 37.)

General remarks.—This form is apparently a slightly differentiated subspecies, differing from *S. p. latifrons* chiefly in cranial characters. Compared with *latifrons* the skull of *olympica* has a decidedly narrower rostrum, the narrowing being chiefly toward the anterior portion. The average width of the rostrum in three male specimens of *latifrons*, measured across the alveoli of the canines, is 14.2 mm.; the average of five male specimens of *olympica* measured in the same way is 12.8 mm.

Specimens from the eastern side of Puget Sound (Mount Vernon, Washington, and Port Moody, British Columbia) average a little smaller than the series from the Olympics, and the narrowing of the rostrum is more pronounced. On the other hand, some of the individuals in the series from Tenino, at the southern end of the Sound,

^a Fide Elliot.

approach very closely to *latifrons* in skull characters, showing that intergradation takes place in that region.

The upper molar in this subspecies is more nearly square than in *S. phenax*, and the projection of the inner lobe is less pronounced. In some specimens the inner lobe is evenly rounded, almost as in *S. interrupta*, but the point of greatest convexity is farther back than in the latter species.

Specimens examined.—Total number, 90, from the following localities:

Washington: Lake Sutherland, Olympic Mountains, 1; Port Angeles, 2; Lake Cushman, Olympic Mountains, 9 (skulls); Tenino, 8; Steilacoom, 1; Quinalt Lake, 1; Keechelus Lake, 1; Hamilton, 3 (skulls); Mount Vernon, 19 (6 skins with skulls, 13 odd skulls).

British Columbia: Sumas, 3; Hastings, 3; Port Moody, 39 (9 skins with skulls, 30 odd skulls.)

SPILOGALE MICRODON sp. nov. SMALL-TOOTHED SPOTTED SKUNK.

Type from Comondú, Lower California. Adult ♂, No. 145887, U. S. National Museum, Biological Survey Collection. Collected November 8, 1905, by Nelson and Goldman. Original No. 18501.

Geographic distribution.—Known only from the type locality.

General characters.—Slightly smaller than *S. phenax*, but tail relatively longer and hind foot shorter; teeth very small.

Color.—Practically identical with *S. phenax*; outer pair of dorsal stripes but little wider than median pair; frontal patch large; tail rather scantily haired, the terminal third white.

Cranial characters.—Skull about the size of small skulls of *S. phenax*; brain case relatively narrow and high; rostrum somewhat broader interorbitally; zygomata less widely and abruptly expanded; mastoid capsules greatly inflated; teeth very small, particularly the molars and sectorial teeth. Compared with *S. a. martirensis*, skull much larger and teeth relatively smaller.

Measurements.—Type (adult ♂): Total length, 410; tail vertebrae, 158; hind foot, 45. Skull: (See table, p. 37.)

General remarks.—This species is apparently most nearly related to *S. phenax*, but whether or not their ranges meet can not now be determined with certainty. No specimens of *phenax* are known from farther south than Dulzura, California, and the intervening region is occupied by another species (*S. arizonæ martirensis*). The skull of an adult male topotype differs from that of the type in being somewhat narrower interorbitally and in having a flatter brain case.

Specimens examined.—Two, from the type locality.

SPILOGALE LUCASANA Merriam. CAPE ST. LUCAS SPOTTED SKUNK.

Spilogale lucasana Merriam, N. Am. Fauna, No. 4, p. 11, 1890.

Type locality.—Cape St. Lucas, Lower California, Mexico.

Geographic distribution.—Cape region of Lower California.

General characters.—Size very large; resembling *S. phenax* in markings, but median pair of dorsal stripes broader; skull broad and flat.

Color.—Markings similar to those of *S. phenax*, but median pair of dorsal stripes broader (nearly equaling outer pair in breadth); lateral stripes continuous with median dorsal stripes; throat with two narrow white streaks or patches on each side of the median line. Tail nearly all black above, the white confined to a small patch at tip and outer edges of the terminal half; below, the white occupies more than half of the terminal portion.

Cranial characters.—Skull much larger than that of any other species; brain case flat and very broad; zygomata nearly parallel to axis of skull; postorbital constriction slight; occipital and sagittal crests highly developed; mastoids not inflated, but with pronounced ridge continuous with occipital crest; audital bullæ broad and flattened; paroccipital processes well developed, as in *Mephitis*; lower jaw strongly convex below, and with a suggestion of the 'step' found in *Mephitis*; molars as in *S. phenax*. Skull of female of about the size of female skulls of *phenax*, but molars larger.

Measurements.—Average of 3 adult males from vicinity of type locality: Total length, 531; tail vertebrae, 198; hind foot, 56. Average of 2 adult females from type locality: 434; 166; 46.5. Skull: (See table, p. 37.)

General remarks.—This species is so much larger than any of its congeners that detailed comparison is unnecessary. Its large size is especially remarkable, since in this genus the southern species are generally smaller than the northern ones. In this case, however, *S. lucasana* is much larger than either its nearest neighbors on the north (*S. arizonæ martirensis* and *S. microdon*), or the forms occupying the mainland of Mexico. Females, however, are much smaller than males, and but little larger than females of *S. phenax*.

In some of its characters, notably the development of the paroccipital processes and the 'step' in the lower jaw, this species shows an approach to the genus *Mephitis*. In some specimens the paroccipital processes are as strongly developed as is ordinarily the case in *Mephitis*; in others these processes are much reduced. Externally this species is characterized by broad white stripes, and there is little variation in the extent of the markings; a white thigh band is present in most of the specimens examined. A specimen from Santa Anita shows an unusual amount of white on the underparts, the large transverse stripe on the hips curving forward on the ventral surface and connecting with the lateral stripe near the middle of the belly.

So far as known, the range of this species is confined to the immediate vicinity of Cape St. Lucas.

Specimens examined.—Total number, 9, from the following localities:

Lower California: Cape St. Lucas, 7; Santa Anita, 2.

Average Cranial Measurements of Spilogale.

Species.	Localities.	Sex.	Basilar length, a	Occipito-nasal length.	Greatest zygomatic breadth.	Greatest breadth.	Least interorbital breadth.	Palathial length, a	Post-palatal length.	Foremen maxillary to plane of last molars.	Height of cranium, b	Number of specimens averaged.	Remarks.
<i>Spilogale ambarvalis</i>	Mico, Florida.....	♂	46.6	47	32.1	27.8	14.8	17.7	28	27.8	17	7	
	Mico and Fort Kissimmee, Florida.....	♀	42.3	44	29.9	26.9	13.8	17	25.3	26	16	2	
<i>S. putorius</i>	Roan Mountain, North Carolina.....	♂	51.6	53.9	35.6	32.3	16.5	20.4	31.2	31.7	17.7	5	
	Greensboro, Alabama.....	♂	52.9	53.7	36	32.1	15.8	21.2	31.7	32.4	18	4	
	Greensboro, Alabama, and Roan Mountain, North Carolina.....	♀	48.3	50.2	33.6	29.4	15.2	19.3	28.9	29.2	17.1	5	
<i>S. interrupta</i>	Kansas.....	♂	50.9	51.4	35.1	31.2	14.9	20.4	30.6	31.2	17.6	6	
	Do.....	♀	48.1	43.2	32.5	28.9	14.6	19.3	28.7	29.2	16.9	8	
	Texas (coast region).....	♂	50.1	49.5	34.4	29.7	14.8	19.9	30.2	30.3	17.2	5	
<i>S. indianola</i>	Virginia Point, Texas, and Calcasieu Parish, Louisiana.....	♀	45.9	45.8	31.5	27.6	14.5	18.8	27.1	27.3	16.2	2	
<i>S. leucoparia</i>	Mason and D'Hanis, Texas.....	♂	46.5	49.1	33.8	31.1	14.8	18.9	27	28.8	16.4	4	
	Fossil Creek and Flagstaff, Arizona.....	♂	48.7	51.2	34.7	32.5	15	20.2	28.5	29.5	15.7	2	
	Waring and Eagle Pass, Texas.....	♀	43.5	44.9	31.9	29.6	14.5	17.5	26	26.3	15.2	2	
<i>S. tenuis</i>	Arkins, Colorado.....	♂	52	52.3	34.7	32.5	14.3	20.5	31.5	32	15.5	1	Type.
	Folsom, New Mexico.....	♀	51.4	52.1	37.3	31.6	15.7	21	30.4	31.2	16	1	
	Arkins and Estes Park, Colorado.....	♀	45.2	46.2	32.5	28.2	14.3	18.5	26.7	27.8	15.7	2	
<i>S. gracilis</i>	Grand Canyon, Arizona, and Panamint Mountains, California.....	♂	47	49.4	32.8	28.8	14.2	19.1	27.9	28.4	15.2	3	
	Michoacan and Jalisco, Mexico.....	♂	45.8	47.9	32.3	29	14.2	18.7	27.2	27.8	15	3	
	Inyo Mountains, California.....	♀	42	45	29.6	25.3	12.1	16.3	25.7	25.6	13.8	1	
<i>S. g. saxatilis</i>	Provo, Utah, and Harney, Oregon.....	♀	48.4	49	35.4	30.7	14.6	20.2	27.9	29.6	16	2	
	Do.....	♀	42.7	43.8	30.8	27.1	13	17.5	25.2	25.6	14.5	2	
<i>S. ambigua</i>	Eagle Mountain, Chihuahua, and Barranca Ibarra, Jalisco.....	♂	45.5	48.1	34.8	29.7	15.1	18.5	27	27	16.6	2	
	Fossil Creek and Huachuca Mountains, Arizona.....	♂	45.7	46.9	35	29.5	14	19.2	26.5	27.5	15.8	2	
<i>S. angustifrons</i>	Tlalpam, Federal District, Mexico.....	♂	42.7	45.4	30.3	26.9	13	17.7	25	25.4	16.2	3	
	Do.....	♀	40.8	43.7	29.5	25	12.8	16.4	24.4	24.5	15.8	1	

<i>S. a. tropicalis</i>	♂	45.8	47.3	32.8	28.8	14.5	18	28.9	16.2	3
Do.....	♂	41.3	42.4	29.2	25.5	13.3	16.5	24.9	16.1	2
Do.....	♀	42.8	45.5	30.7	28	14.2	17.5	25.3	28.5	1
<i>S. a. elata</i>	♂	45.5	49.5	33.7	28.5	14.8	18	27.5	28.2	1
<i>S. pygmaea</i>	♂	35.7	38	24	20.8	11.6	14	21.7	20.8	1
Do.....	♀	36.6	41.5	25.8	23.8	12	15	20.8	14	1
<i>S. arizonæ</i>	♂	49.2	51.8	36.6	32.5	14.9	20	29.2	30.3	4
Do.....	♀	43.5	46.6	30.8	28.4	13.5	17.5	26	28.5	1
<i>S. a. mardronensis</i>	♂	46	48	33.5	30.5	12.5	19	27	27.5	1
Do.....	♀	46.4	48.2	32.2	30.2	14.1	18.8	27.6	28.5	4
<i>S. phenax</i>	♂	44.8	47	31.3	28.3	13.7	18	26.8	27.2	1
Do.....	♀	52.6	58.9	38.1	32.7	16.5	21.7	30.9	32	6
Do.....	♂	52.3	54	38.5	33	16.2	21.6	30.7	32.2	9
<i>S. p. latifrons</i>	♀	48.3	49.4	34.2	30.4	15.2	20.1	28.3	28.7	3
Do.....	♂	52	53.1	37.7	32.5	17.3	21.1	31	31.6	8
Do.....	♀	46.5	48.1	33.4	29.1	15	19.1	27.5	27.9	7
<i>S. p. olympica</i>	♂	49.7	52.8	37.8	33.9	16.5	20.8	28.8	30.2	7
Do.....	♀	49	49.8	34	30.5	13.5	20	29	29	1
<i>S. microdon</i>	♂	50	53	35.4	33.7	16.8	19.8	30.2	30.5	1
<i>S. lucasana</i>	♂	56.2	58.9	41.4	37.5	17.6	23.1	33.1	34	5
Do.....	♀	49.2	51.6	36.2	32.1	14.3	20.1	29.1	29.5	2

a As defined by Thomas, Proc. Biol. Soc. Wash., XVIII, pp. 191-194, 1905.

b From basi-sphenoid to parietal, at plane of auditory meatus (exclusive of sagittal crest).

PLATE II.

(Greatly reduced, and relative sizes not accurately shown, owing to differences in preparation of skins.)

- FIG. 1. *Spilogale putorius* (Linn.). Roan Mountain, North Carolina (No. 66304, U.S. Nat. Mus.).
2. *Spilogale interrupta* (Rafin.). Onaga, Kansas (No. 25270, U. S. Nat. Mus.).
3. *Spilogale leucoparia* Merr. Type; Mason, Texas (No. 1701, Merriam Collection).

SKINS OF SPILOGALE.

1, *Spilogale putorius*; 2, *Spilogale interrupta*; 3, *Spilogale leucoparia*.

PLATE III.

(Greatly reduced, and relative sizes not accurately shown, owing to differences in preparation of skins.)

- FIG. 1. *Spilogale phenax* Merr. San Emigdio, California (No. 31249, U. S. Nat. Mus.).
2. *Spilogale phenax* Merr. Side view of same specimen shown in fig. 1.
3. *Spilogale phenax olympica* Elliot. Quinault Lake, Washington (No. 89551 U. S. Nat. Mus.).

SKINS OF *SPILOGALE*.

1, 2, *Spiogale phenax*; 3, *Spiogale phenax olympica*.

PLATE IV.

(Greatly reduced, and relative sizes not accurately shown, owing to differences in preparation of skins.)

- FIG. 1. *Spilogale ambarvalis* Bangs. Micco, Florida (No. 101988, U. S. Nat. Mus.).
2. *Spilogale angustifrons* Howell. Tlalpam, Federal District, Mexico (No. 50823, U. S. Nat. Mus.).
3. *Spilogale pygmaea* Thomas. Acapulco, Guerrero, Mexico (No. 70581, U. S. Nat. Mus.).
4. *Spilogale pygmaea* Thomas. Side view of same specimen shown in fig. 3.

SKINS OF SPILOGALE.

1, *Spilogale ambarvalis*; 2, *Spilogale angustifrons*; 3, 4, *Spilogale pygmaea*.

PLATE V.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale ambarvalis* Bangs. ♂, Micco, Florida (No. 70304, U. S. Nat. Mus.).
- 4, 5, 6. *Spilogale putorius* (Linn.). ♂, Greensboro, Alabama (No. 33846, U. S. Nat. Mus.).
- 7, 8, 9. *Spilogale indianola* Merr. ♂, Elliot's, Matagorda County, Texas (No. 44244, U. S. Nat. Mus.).

SKULLS OF SPILOGALE.

1, 2, 3, *Spilogale ambarvalis*; 4, 5, 6, *Spilogale putorius*; 7, 8, 9, *Spilogale indianola*.

PLATE VI.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale leucoparia* Merr. ♂, type; Mason, Texas (No. 2270, Merriam collection).
4, 5, 6. *Spilogale tenuis* Howell. ♂, type; Arkins, Colorado (No. 99365, U. S. Nat. Mus.).
7, 8, 9. *Spilogale gracilis* Merr. ♂, type; Grand Canyon, Arizona (No. 24897, U. S. Nat. Mus.).

SKULLS OF SPILOGALE.

1, 2, 3, *Spilogale leucoparia*; 4, 5, 6, *Spilogale tenuis*; 7, 8, 9, *Spilogale gracilis*.

PLATE VII.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale phenax* Merr. ♂, Fairfield, California (No. 44381, U. S. Nat. Mus.).
4, 5, 6. *Spilogale phenax* Merr. ♀, Glen Ellen, California (No. 44151, U. S. Nat. Mus.).
7, 8, 9. *Spilogale phenax latifrons* Merr. ♂, Hermann, Lane County, Oregon (No. 146291, U. S. Nat. Mus.).

SKULLS OF SPILOGALE.

1-6, *Spilogale phenax*; 7, 8, 9, *Spilogale phenax latifrons*.

PLATE VIII.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale ambigua* Mearns. ♂, type; Eagle Mountain, Chihuahua (No. 35606, U. S. Nat. Mus.).
4, 5, 6. *Spilogale arizonæ* Mearns. ♂; Fort Huachuca, Arizona (No. 46325, U. S. Nat. Mus.).
7, 8, 9. *Spilogale arizonæ martirensis* Elliot. ♂, type; San Pedro Martir Mountains, Lower California (No. 10752, Field Museum Nat. Hist.).

SKULLS OF SPILOGALE.

1, 2, 3, *Spilogale ambigua*; 4, 5, 6, *Spilogale arizonæ*; 7, 8, 9, *Spilogale a. martirensis*.

PLATE IX.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale angustifrons* Howell. ♂, type; Talpam, Federal District, Mexico (No. 50825, U. S. Nat. Mus.).
- 4, 5, 6. *Spilogale angustifrons tropicalis* Howell. ♂, type; San Mateo del Mar, Oaxaca (No. 73523, U. S. Nat. Mus.).
- 7, 8, 9. *Spilogale angustifrons elata* Howell. ♂, type; San Bartolomé, Chiapas (No. 133186, U. S. Nat. Mus.).

SKULLS OF SPIOGALE.

1, 2, 3, *Spiogale angustifrons*; 4, 5, 6, *Spiogale a. tropicalis*; 7, 8, 9, *Spiogale a. elata*.

PLATE X.

(Natural size.)

- FIGS. 1, 2, 3. *Spilogale lucasana* Merr. ♂, type; Cape St. Lucas, Lower California (No. 4219, U. S. Nat. Mus.).
4, 5, 6. *Spilogale microdon* Howell. ♂, type; Comondú, Lower California (No. 14588^f, U. S. Nat. Mus.).
7, 8, 9. *Spilogale pygmaea* Thomas. ♂; Acapulco, Guerrero (No. 70581, U. S. Nat. Mus.).

SKULLS OF SPILOGALE.

1, 2, 3, *Spilogale lucasana*; 4, 5, 6, *Spilogale microdon*; 7, 8, 9, *Spilogale pygmaea*.

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