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# NOTES ON SPOTTED SKUNKS (GENUS *SPILOGALE*) FROM WESTERN MEXICO

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## RESUMEN

Ejemplares de zorrillo manchado procedentes del oeste de México en el Museo de Historia Natural de la Universidad de Kansas, colectados en las dos pasadas décadas, aumentan grandemente el conocimiento de las dos especies en esa región Dos ejemplares de *Spilogale pygmaea* (uno de Sinaloa y otro de Oaxaca) son registrados por primera vez. Dos subespecies de zorrillo manchado pigmeo son reconocidas. *S. pygmea pygmea* Thomas con localidad típica en Rosario, Sinaloa y *S. p. australis* Hall con localidad típica en Acapulco, Guerrero.

El zorrillo manchado grande *Spilogale putorius* presenta, en el oeste de México un clinal en el tamaño del norte, donde son más grandes, hacia el sur donde son más pequeños. Los ejemplares procedentes de Jalisco y Sinaloa representan el área de intergradación entre las dos subespecies, pero los de Jalisco están más cerca de *S. putorius angustifrons* Howell y los de Sinaloa son más bién *S. p. leucoparia* Merriam. Los ejemplares de Sinaloa representan el primer registro para el estado.

## SUMMARY

Specimens of spotted skunks acquired from western México by the Museum of Natural History at The University of Kansas in the past two decades add substantially to the konwledge of the species occurring in that region. Two specimens of the rare *Spilogale pygmaea* (one from Sinaloa and one from Oaxaca) are reported for the first time. Two subspecies of pygmy spotted skunk are recognized — *S. p. pygmaea* Thomas with type locality at Rosario, Sinaloa, and *S. p. australis* Hall with type locality at Acapulco, Guerrero.

The large spotted skunk, *Spilogale putorius*, varies clinally in size form north (larger) to south (smaller) in western México. Specimens from Jalisco and Sinaloa are from an area of intergradation between two subspecies, but those from Jalisco more closely resemble *S. p. angustifrons* Howell and individuals from Sinaloa are best assigned to *S. p. leucoparia* Merriam. Specimens from Sinaloa are the first to be reported from the state.

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## INTRODUCTION

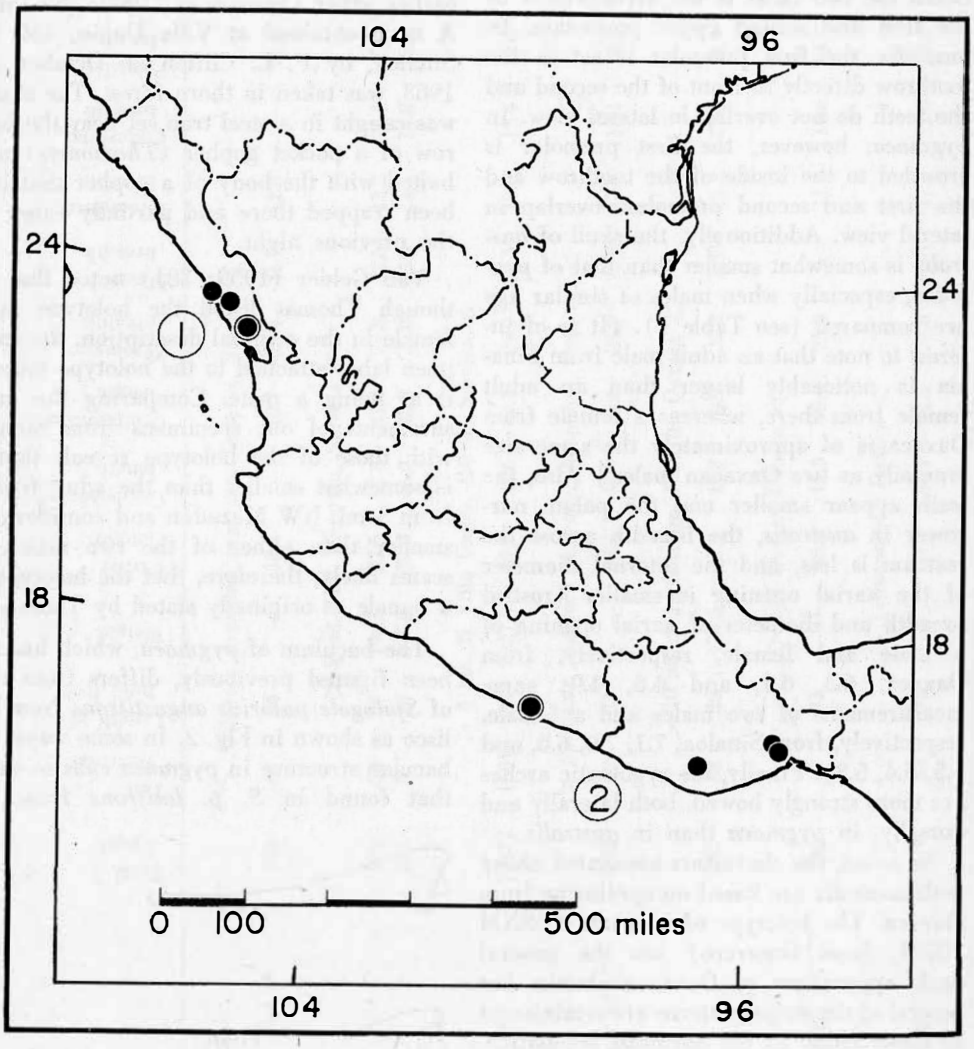
In the past two decades, the Museum of Natural History at The University of Kansas has acquired a number of specimens of spotted skunks from western México that add substantially to knowledge of distribution and variation of the two species occurring in that region. Included in the material are four of the rare pygmy spotted skunks, *Spilogale pygmaea,* the first records from the state of Sinaloa of the large spotted skunk, *Spilogale putorius,* and a large series of the latter from Jalisco. Most of our specimens were obtained in the years 1962 to 1966 through the efforts of P. L. Clifton, although M. R. Lee obtained two pygmy spotted skunks in Sinaloa in 1961, and J. R. Alcorn trapped a specimen of *Spilogale putorius* in Jalisco in 1949 and another in 1950.

All skunks listed heyond are housed in the Museum of Natural History, excepting two males of *Spilogale pygmaea,* one from Tehuantepec, Oaxaca, loaned to us from the American Museum of Natural History, and the other from Acapulco, Guerrero, which was examined at the U. S. National Museum. We wish to thank Drs. Sydney Anderson and Charles O. Handley, Jr., respectively, for making these specimens available to us for study. All measurements are given in millimeters and weights are recorded in grams. Funds to defray costs of field work were made available through the Kansas University Endowment Association. Laboratory phases of this study were supported by a contract (DA-49-193-MD-2215) from the Medical Research and Development Command, U. S. Army.

### *Spilogale pygmaea*—Pygmy Spotted Skunk

When Van Gelder (1959) revised the genus *Spilogale,* only four specimens of *S. pygmaea* were known. Three of these, two from Oaxaca and one from Guerrero, were examined by him, but he did not see the holotype of *pygmaea* from Sinaloa. Van Gelder regarded the species as monotypic, thereby relegating to synonymy under *Spilogale pygmaea* Thomas, 1898, the names *Spilogale pygmaea australis* Hall, 1938, from Guerrero and *Spilogale pygmaea albipes* Goodwin, 1956, from Oaxaca, each originally described on the basis of a single individual. Study of material recently acquired, three specimens from Sinaloa and the first female from the southern part of the range (Oaxaca), reveals, even though the samples are small, the presence of two recognizable geographic races in this species—the northern *S. p. pygmaea* (specimens from Sinaloa) and the southern *S. p. australis* (specimens from Guerrero and Oaxaca) as mapped in Fig. 1. [Greer and Greer, 1970: 629-630, recently reported a specimen from Colima, which has been examined by us and is assignahle to the subspecies *pygmaea.*]

Some of the most conspicuous differences between the two subspecies are in the stripe patterns (see Van Gelder, 1959: 244, for terminology). The white stripes generally are narrower in *australis* than in *pygmaea,* especially the dorsal and shonlder stripes; moreover, the dorsal stripe in *australis* divides at about the middle of the body whereas that in *pygmaea* divides much farther posteriorly, and the shoulder stripe does not extend posteriad as far in *australis* as in *pygmaea.* Additionally, the second vertical black stripe separates the first and second vertical white stripes for a much greater distance in *australis* (usually extending anteriorly half way to the front leg), and the dorsal stripes in *australis* are separated, anteriorly, by a small but distinct band of black, whereas they are connected, or nearly so, in *pygmaea* (the white connection is continuous in the one female examined, bnt in two males the dorsal stripes are


104
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divided by a blackish area containing scattered white hairs). The total result of the color differences between the two subspecies is to reveal much more white dorsally on *pygmaea* than on *australis*.

The most striking cranial difference between the two races is the arrangement of the first and second upper premolars. In *australis*, the first premolar is set in the toothrow directly in front of the second and the teeth do not overlap in lateral view. In *pygmaea*, however, the first premolar is crowded to the inside of the toothrow and the first and second premolars overlap in lateral view. Additionally, the skull of *australis* is somewhat smaller than that of *pygmaea*, especially when males of similar age are compared (see Table 1). (It is of interest to note that an adult male from Sinaloa is noticeably larger than an adult female from there, whereas a female from Oaxaca is of approximately the same size cranially as two Oaxacan males.) Also, the teeth appear smaller and the palate narrower in *australis*, the breadth across the rostrum is less, and the internal diameter of the narial opening is smaller (rostral breadth and diameter of narial opening of a male and female, respectively, from Oaxaca, 6.3, 6.1, and 4.6, 4.9; same measurements of two males and a female, respectively, from Sinaloa, 7.1, 7.0, 6.6, and 5.5, 5.4, 5.3). Finally, the zygomatic arches are more strongly bowed, both laterally and dorsally, in *pygmaea* than in *australis*.

As noted, the characters associated above with *australis* are based on specimens from Oaxaca. The holotype of *australis* (USNM 70581, from Guerrero) has the general dark appearance of Oaxacan skunks but several of the stripe patterns are reminiscent of those found in the northern population. The dorsal white stripes meet behind the ears, for example, and these and the white shoulder stripes extend posteriorly about the same distance as in our Sinaloa material. Cranially, however, the holotype closely resemhles Oaxacan specimens (the rostral breadth is 5.9 and diameter of narial opening measures 4.8).

*Spilogale pygmaea pygmaea* Thomas.—The conditions under which a male and female from 5 mi. NW Mazatlán, Sinaloa, were captured have been discussed in an earlier paper (Jones *et al.*, 1962: 157-158). A male obtained at Villa Unión, 450 ft., Sinaloa, by P. L. Clifton on October 22, 1963, was taken in thorn forest. The skunk was caught in a steel trap set near the burrow of a pocket gopher (*Thomomys*) and baited with the body of a gopher that had been trapped there and partially eaten on the previous night.

Van Gelder (1959: 381) noted that although Thomas listed the holotype as a female in the original description, the specimen label attached to the holotype records it as being a male. Comparing the measurements of our specimens from Sinaloa with those of the holotype reveals that it is somewhat smaller than the adult female from 5 mi. NW Mazatlán and considerably smaller than either of the two males. It seems likely, therefore, that the holotype is a female as originally stated by Thomas.

The baculum of *pygmaea*, which has not been figured previously, differs from that of *Spilogale putorius angustifrons* from Jalisco as shown in Fig. 2. In some ways, the bacular structure in *pygmaea* calls to mind that found in *S. p. latifrons* from the

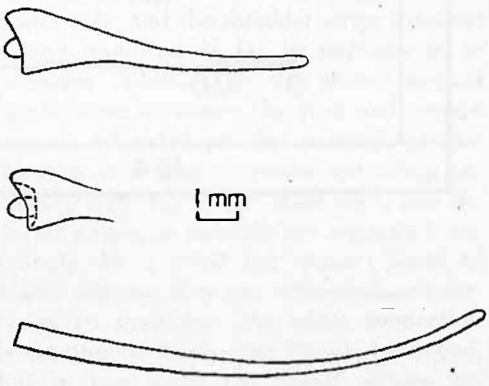

TABLE 1

EXTERNAL AND CRANIAL MEASUREMENTS OF TWO SUBSPECIES OF *SPILOGALE PYGMAEA*

| Museum catalogue number, sex, and age | Total length | Tail vertebrae | Length of hind foot | Weight | Basilar length | Condylobasal length | Occipitonasal length | Zygomatic breadth | Mastoid breadth | Interorbital breadth | Postorbital breadth | Palatilar length | Postpalatal length | Heigth of cranium | Length of max. toothrow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > *Spilogale pygmaea pygmaea*, Rosario, Sinaloa < | | | | | | | | | | | | | | | |
| British Museum, ♀ (ad.)* | 250 | 68 | 34 | — | 36.4 | — | 40.7 | 25.4 | 21.7 | 12.0 | — | 14.8 | 21.6 | 15.2 | — |
| > 5 mi. NW Mazatlán, Sinaloa < | | | | | | | | | | | | | | | |
| KU 85899, ♀ (ad.) | 270 | 58 | 35 | 190.5 | 37.5 | 42.8 | 41.4 | 27.3 | 22.5 | 13.2 | 14.1 | 15.0 | 22.3 | 15.2 | 14.9 |
| KU 85898, ♂ (ad.) | 291 | 65 | 38 | 247.0 | 39.6 | 46.0 | 45.0 | 29.0 | 23.9 | 14.3 | 14.8 | 15.8 | 23.6 | 16.6 | 15.5 |
| > 8 km. N Villa Unión, 450 ft., Sinaloa < | | | | | | | | | | | | | | | |
| KU 96185, ♂ (yg. ad.) | [267] | [60] | 38 | 227.8 | 37.8 | 43.6 | 41.9 | 27.9 | 23.5 | 13.2 | 13.4 | 15.0 | 22.8 | 16.1 | 14.8 |
| > *Spilogale pygmaea australis*, Acapulco, Guerrero < | | | | | | | | | | | | | | | |
| USNM 70581 ♂ (yg. ad.)** | 240 | 72 | 33 | — | 35.4 | 40.0 | 38.8 | 23.9 | 20.8 | 11.9 | 12.1 | 14.2 | 21.3 | 14.2 | 13.8 |
| > 10 mi. S Juchatengo, 5350 ft., Oaxaca < | | | | | | | | | | | | | | | |
| KU 98873, ♀ (ad.) | 265 | 58 | 35 | 174.5 | 37.5 | 42.8 | 40.9 | 25.2 | 22.3 | 12.2 | 12.9 | 14.9 | 22.5 | 14.6 | 14.2 |
| > Las Cuevas, Oaxaca < | | | | | | | | | | | | | | | |
| AMNH 143378, ♂ (yg. ad.)** | 248 | 69 | 33 | — | 35.9 | 41.3 | 40.4 | 25.0 | — | 11.6 | 12.6 | 14.7 | 21.2 | 15.2 | 14.1 |
| > Tehuantepec, Oaxaca < | | | | | | | | | | | | | | | |
| AMNH 175183, ♂ (ad.) | 271 | 84 | 35 | — | 37.7 | 43.1 | 41.3 | 24.6 | 22.1 | 11.7 | 12.6 | 15.0 | 22.7 | 14.4 | 14.0 |

* Measurements after Hall (1938: 512, 515).

** Measurements after Van Gelder (1959: 382), who classed USNM 70581 as a "subadult-young adult."

northwestern United States (Mead, 1967: 612). The distinctive knob on the proximal end of the baculum of *S. p. pygmaea* is set in a cuplike depression, however, whereas the bacular knob of *S. p. latifrons* evidently is not so constructed. The distal end of the baculum of *pygmaea* does not appear to bend upward as in *putorius*.

The female from 5 mi. NW Mazatlán (KU 85899) has lesions of the frontal sinuses (caused by nematodes), the first reported occurrence in this species. A young adult male taken on October 22, 1963, had testes that measured 15.

*Spilogale pygmaea australis* Hall.—An adult, lactating female of this subspecies was trapped at a place 10 mi. S. Juchatango, 5350 ft., Oaxaca, on the night of July 8, 1964, by Clifton. The skunk was caught in a commercial rat trap set under a rock in an abandoned cornfield, grown to brush and surrounded by dense cloud forest. This is evidently the first report of *S. pygmaea* from a babitat other than on the dry coastal plain of western México.

*Spilogale putorius*—Spotted Skunk

The spotted skunk evidently is one of the commonest mustelids in western México, where P. L. Clifton obtained 31 specimens in Jalisco and Sinaloa in the years 1962 to 1966. The majority of these were trapped or shot in relatively arid areas characterized by thorny vegetation, or in oak or pine-oak forest. However, at two localities (7 1/2 mi. SE Tecomate, Jalisco, and 7 mi. ENE Presa Sanalona, Sinaloa) tropical deciduous forest prevailed, and at 10 mi. NW Matanzas, Jalisco, broad areas of open grassland supported only a few widely scattered trees. Skunks were most often obtained in association with rocky outcroppings or rock fences. Clifton found that steel traps baited with tuna resulted in the greatest trapping success.

Van Gelder (1959: 304-305) showed that spotted skunk vary clinally in size from north (larger) to south (smaller) in western México. This cline is clearly evident in our material, study of which reveals the presence of two subspecies — *S. p. angustifrons* in Jalisco and *S. p. leucoparia* in Sinaloa.

Although Van Gelder (1959) placed all of the large spotted skunks in a single species, *putorius*, recent work by Mead on bacular morpholoy (1967) and reproductive physiology (1968) suggests that two species may be involved in this complex, the eastern *putorius* and the western *gracilis*. We here follow Van Gelder in use of the specific name *putorius*, but recognize that additional research may show *gracilis* to be the proper specific name for the western Mexican skunks.

*Spilogale putorius angustifrons* Howell.—Van Gelder ascribed the region of northern Michoacán, Guanajuato, Jalisco, southern Durango, and Zacatecas to the area of intergradation between *S. p. angustifrons* and *S. p. leucoparia*. He assigned all specimens from this region to the latter, however, labeling as *angustifrons* only seven specimens from southern Michoacán and the Distrito Federal. Measurements of adult males that we have examined from Jalisco (Table 2) are much smaller than measurements given by Van Gelder (1959: 305) for adult males from that state and correspond closely to those given by him for two adult males of *angustifrons* from Michoacán. Therefore, we have assigned our specimens from Jalisco to *angustifrons*, noting a slight increase in size when specimens from the western and northern parts of the state are compared with those from central Jalisco.

Two specimens examined were found to have dental abnormalities involving the first upper premolars. One has a pair of first premolars on each side, possibly resulting from a splitting of the tooth bud. Both

TABLE 2.

EXTERNAL AND CRANIAL MEASUREMENTS OF *SPILOGALE PUTORIUS* FROM WESTERN MEXICO

| Specimens averaged or catalogue number, and sex | Total length | Tail vertebrae | Length of hind foot | Basilar length | Condylobasal length | Occipitonasal length | Zygomatic breadth | Mastoid breadth | Interorbital breadth | Postorbital breadth | Palatilar length | Postpalatal length | Height of cranium | Length of max. toothrow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > *Spilogale putorius leucoparia*, Sinaloa < | | | | | | | | | | | | | | |
| Adult males(4) | 391.0 | 140.3 | 46.0 | 46.2 | 52.6 | 49.3[3] | 33.4[3] | 29.2 | 14.4 | 14.5[2] | 18.8 | 27.6 | 17.1[3] | 17.1 |
| Minimum | 360 | 130 | 43 | 45.7 | 51.7 | 48.6 | 33.1 | 28.8 | 13.6 | 14.4 | 18.4 | 27.0 | 16.4 | 16.5 |
| Maximum | 417 | 153 | 49 | 46.8 | 53.7 | 49.7 | 33.9 | 29.7 | 14.9 | 14.9 | 19.3 | 27.8 | 18.1 | 17.8 |
| Adult females(5) | 356.2 | 131.8 | 41.2 | 42.7 | 48.6 | 45.0[4] | 30.4 | 28.0[4] | 13.4 | 14.1[1] | 17.6 | 25.2 | 16.5[4] | 16.5 |
| Minimum | 332 | 115 | 39 | 41.3 | 46.7 | 42.7 | 29.6 | 27.7 | 12.8 | — | 16.8 | 24.2 | 15.2 | 16.4 |
| Maximum | 385 | 144 | 43.5 | 44.1 | 49.9 | 46.7 | 31.3 | 28.3 | 14.6 | — | 18.2 | 26.1 | 17.6 | 17.4 |
| > *Spilogale putorius angustifrons*, northern and western Jalisco < | | | | | | | | | | | | | | |
| Adult males(8) | 367.6 | 123.0 | 42.3 | 44.6 | 50.8 | 48.1 | 32.5 | 29.2 | 14.0 | 13.8[3] | 18.3 | 26.4 | 17.4 | 16.8 |
| Minimum | 335 | 104 | 37 | 40.9 | 46.7 | 44.2 | 30.5 | 27.1 | 12.8 | 13.4 | 17.0 | 23.7 | 16.9 | 15.3 |
| Maximum | 394 | 141 | 46 | 46.2 | 53.0 | 50.7 | 33.9 | 30.4 | 15.9 | 14.0 | 19.2 | 27.9 | 18.1 | 17.7 |
| KU 109455, ♀ | 332 | 104 | 40 | 39.9 | 46.2 | 44.5 | 29.2 | 25.3 | 12.8 | 13.2 | 16.7 | 23.2 | 15.9 | 15.4 |
| KU 97303, ♀ | 370 | 130 | 38.5 | 41.8 | 47.7 | 45.9 | 30.1 | 26.8 | 13.8 | 14.0 | 16.6 | 25.4 | 16.0 | 15.9 |
| > Central Jalisco < | | | | | | | | | | | | | | |
| Adult males (6) | 349.0[5] | 117.6[5] | 40.1[5] | 43.0 | 49.1 | 46.4[5] | 30.3 | 27.4[5] | 13.6 | 13.6[2] | 17.3 | 26.0 | 16.9[5] | 16.6 |
| Minimum | 334 | 105 | 37.5 | 41.5 | 47.3 | 44.6 | 28.8 | 26.9 | 12.9 | 13.4 | 16.6 | 24.7 | 15.8 | 16.1 |
| Maximum | 370 | 132 | 43 | 44.5 | 51.0 | 48.7 | 33.1 | 28.5 | 14.5 | 13.8 | 18.1 | 27.7 | 17.7 | 17.6 |
| Adult females (4) | 335.6[3] | 105.7[3] | 37.8 | 42.0 | 47.9 | 44.8 | 29.0 | 25.9 | 12.9 | — | 17.4 | 24.9 | 15.4 | 16.4 |
| Minimum | 334 | 101 | 37 | 41.2 | 46.8 | 43.6 | 28.1 | 24.5 | 11.9 | — | 17.0 | 24.3 | 15.0 | 16.1 |
| Maximum | 337 | 110 | 39 | 43.7 | 49.9 | 47.4 | 29.7 | 26.8 | 13.3 | — | 18.3 | 25.8 | 15.8 | 17.1 |

Superscript numbers indicate fewer specimens averaged than shown in left-hand column.

teeth on each side are about the same size as a "normal" first premolar and are located in the space usually occupied by the single tooth, resulting in one of the pair heing displaced to the outside of toothrow and the other being displaced lingually and anteriorly. Additionally, the second premolar has been crowded posteriorly so that it overlaps the third premolar lingually. The other specimen lacks the first upper premolar on both sides and there is no evidence that alveoli ever were present. Specimens of *Spilogale* with missing teeth have been reported previously (Hall, 1940: 112), but no case of supernumerary teeth seems to have been recorded. Of the 23 specimens examined, 16 have lesions of the frontal sinuses caused by nematodes.

*Specimens examined* (23). Northern JALISCO: Mesa María de León, 7 400 ft., 1; 4 mi. W Villa Guerrero, 5 500 ft., 1; 3 mi. E Totatiche, 5 600 ft., 1; 6 mi. ENE Bolaños, 5 350 ft., 1; 10 mi. NW Matanzas, 8 000 ft., 1, 4 1/2 mi. NE Comanja de Corona, 8 000 ft., 3; 14 mi. SE Lagos de Moreno, 6 700 ft., 1. Western JALISCO: 13 mi. WSW Ameca, 5 100 ft., 1; Tolimán, 2 200 ft., 2; 7 1/2 mi. SE Tecomate, 1 500 ft., 1. Central JALISCO: 6 mi. WSW Yahualica, 1; 2 mi. ESE Plan de Barrancas, 5; 9 mi. NNE Guadalajara, 1; 4 mi. N Guadalajara, 5 200 ft., 1; 3 mi. ENE Santa Cruz de las Flores, 1; 21 mi. SW Guadalajara, 5 100 ft., 1.

*Spilogale putorius leucoparia* Merriam.—Ten specimens of *S. putorius* from five localities in Sinaloa provide the first records of this species from that state. *S. putorius* and *S. pygmaea* have never been taken in the same place in Sinaloa. In our material, a specimen of *putorius* from 6 km. E. Cosalá is from approximately 80 miles to the north of the nearest known record of *S. pygmaea* (5 mi. NW Mazatlán), whereas a specimen from 7 mi. ENE Presa Sanalona was taken at an altitude of 600 feet, well within the altitudinal range of *pygmaea*. It seems logical to assume that the two species may well occur sympatrically in southern Sinaloa and adjacent areas.

Cranial measurements (Table 2) of four adult males from Sinaloa agree with measurements of specimens listed by Van Gelder as intergrades between *leucoparia* and *angustifrons* and assigned by him to the former. External measurements of our Sinaloan specimens approach those of typical *leucoparia* from the southwestern United States and northern México. We, therefore, regard the specimens from Sinaloa as intergrades, but clearly assignable to *leucoparia*.

A male obtained on January 4 had testes that measured 11 as did a male taken on January 12; a male obtained on May 17 had testes that measured 14, probably indicating an autumn breeding season as described for the *gracilis* group of subspecies by Mead (1968: 374). A female obtained on May 18, 1962, at a place 16 km. NNE Choix contained three embryos that measured 35 in crown-rump length, again suggesting that Sinaloan spotted skunks have reproductive cycles similar to those of skunks from the western United States.

Six of the 10 specimens examined have lesions of the frontal sinuses caused by nematodes.

*Specimens examined* (10). SINALOA: 18 km. NNE Choix, 2; 16 km. NNE Choix, 1 700 ft., 5; 1 1/2 mi. N Badiraguato, 750 ft., 1; 7 mi. ENE Presa Sanalona, 600 ft., 1; 6 km. E Cosalá, 1 500 ft., 1.

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