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REMARKS ON THE STATUS OF THE SUBSPECIES OF
SCELOPORUS UNDULATUS, WITH DESCRIPTIONS
OF NEW SPECIES AND SUBSPECIES OF
THE *UNDULATUS* GROUP

BY HOBART M. SMITH

THE status of the various forms of the *undulatus* group is a subject concerning which there has long been much diversity of opinion. The most recent reviewer¹ of the group considers *occidentalis* and its close relatives, as well as *elongatus*, *consobrinus*, *floridanus* and *woodi*, as subspecies of *undulatus*. He recognizes nine subspecies of *undulatus*.

In my own opinion there are seven subspecies of *undulatus*; they include *undulatus*, *fasciatus*, *consobrinus*, *virgatus*, *garmani*, *tristichus*, and *elongatus*. *S. woodi* and *occidentalis* differ rather widely from *undulatus* and are not included.

It is suggested by Burt² that *undulatus undulatus* (= *undulatus fasciatus*) is possibly linked with *occidentalis* by means of a series of vicariating forms extending through Mexico. Although this suggestion may be correct, a study of most of the Mexican material available has not indicated that such is the case. It is certain that *occidentalis* is not linked with *undulatus* in the United States.

¹ Charles E. Burt, "A Key to the Lizards of the United States and Canada," *Trans. Kans. Acad. Sci.*, 38 (1935): 255-305, 71 figs.

² *Ibid.*

I am indebted to Dr. E. H. Taylor for permission to study material in his personal Mexican collection, and for notes on habitats of certain species; to Mrs. Helen T. Gaige for numerous courtesies facilitating the study, most of which is based upon the extensive collections in the University of Michigan Museum of Zoology; to Dr. E. B. Chamberlain for permission to study critical material in the Charleston Museum; to Dr. A. I. Ortenburger, for the opportunity to study material in the University of Oklahoma; to Mr. C. D. Bunker, for permission to examine material in the Dyche Natural History Museum; and to Dr. Carl L. Hubbs, for aid in determining the status of certain names. The study was completed during the tenure of a fellowship granted by the National Research Council.

Sceloporus cautus, n. sp.

HOLOTYPE.—E.H.T.³ No. 13027; collected thirty miles north of El Salado (San Luis Potosí), in Coahuila, Mexico, by E. H. Taylor and Hobart M. Smith.

PARATYPES.—E.H.T. No. 13028, topotype; E.H.T. No. 13025, from a locality thirty miles north of Matehuala, San Luis Potosí; E.H.T. Nos. 13050, 13056–61, ten miles south of Majoma, Zacatecas; U.M.M.Z. No. 77274, Charcas, San Luis Potosí.

DIAGNOSIS.—A *Sceloporus* of the *undulatus* group, of relatively large size (maximum snout-vent measurement 80 mm.); scales on posterior surface of thigh somewhat smaller than preanal scales; dorsal scales 31 to 39; femoral pores 10 to 14, the 2 series separated medially by 9 to 12 scales; supraoculars large, entire, separated from median head scales by 1 complete series of scales, from superciliaries by 1 complete and 1 incomplete series of small scales; dorsal scales strongly mucronate; 2 dark spots on either side of throat posteriorly in both sexes; dorsolateral light stripes present, but broken or dim; back barred in females; males with a series of dark spots on each

³ E.H.T. indicates the collection of E. H. Taylor; U.M.M.Z. that of the University of Michigan Museum of Zoology; K.U. that of the University of Kansas.

side of middorsal line; lateral belly marks blue, dark bordered, widely separated medially.

DESCRIPTION OF HOLOTYPE.—Interparietal pentagonal, somewhat rounded; parietal single on each side, about one-half size of interparietal; frontoparietal single on each side; frontal divided, in contact with interparietal; supraoculars 5-5, separated from median head scales by 1 complete row of small scales, from superciliaries by 1 complete and 1 incomplete row of small scales; 6-6 superciliaries; prefrontals in contact medially; frontoparietals typical; 2 pairs of elongate, internasal scales; 4 postrostrals; 2 canthals, typical; subnasal and loreal present; preocular divided; 2 rows of lorilabial scales, reduced below subocular by 1 scale in contact with both subocular and supralabials; 4 supra- and 4 infralabials to a point below middle of eye.

Mental pentagonal deeply notched laterally, with a labial border about one-half that of rostral; outer row of labiomenal scales separated from mental anteriorly by partial contact of first postmental and first infralabial; 4 pairs of postmentals, the scales of the first pair in contact medially; gular scales smooth, notched.

Auricular lobules 5, elongate, narrow, the longest extending across ear, the median ones largest; temporal scales smaller than auricular lobules, keeled, mucronate, smaller than largest scales between ear and lateral nuchal pocket; latter scales very strongly mucronate, keeled, larger than scales between nuchal pocket and arm; latter scales keeled, mucronate, denticulate, the median (smaller) scales subequal in size to largest temporal scales.

Dorsal scales keeled, strongly mucronate, denticulate, in parallel rows, 35 between occiput and base of tail; lateral scales slightly smaller than dorsal scales, keeled, more strongly keeled and mucronate than dorsal scales; 38 scales around middle of body; ventral scales notched or pointed; preanal scales subequal in size to median ventral abdominal scales; 44 ventral scales from a line across shoulders to anus.

Dorsal scales of foreleg keeled, mucronate, denticulate, about

one-third size of median dorsal scales on body; median ventral scales on lower foreleg about two-thirds size of dorsal scales of same member; posteroventral scales on lower foreleg keeled, anteroventral scales smooth; ventral scales of upper foreleg about one-half size of ventral scales of lower foreleg, weakly keeled distally, smooth near axilla; lamellar formula for fingers ?-11-15-16-10 (7-?-16-15-10).

Dorsal scales of hind leg keeled, mucronate, weakly denticulate, those on shank about three-fourths size of dorsal scales on body; dorsal scales on thigh about two-thirds size of dorsals on shank; scales on anterior surface of thigh smooth, mucronate; ventral scales of thigh smooth, pointed, decreasing slightly in size toward femoral pore series; femoral pores 12-13; ventral scales on shank smooth, rounded or pointed, subequal in size to dorsal scales of same member; lamellar formula for toes 9-12-17-19-14 (8-12-17-19-14).

Dorsal scales on tail somewhat larger than dorsal body scales, strongly keeled, strongly mucronate, weakly denticulate; basal subcaudals smooth, pointed or denticulate, distal subcaudals keeled, mucronate, denticulate; postanals enlarged; no post-femoral dermal pocket.

COLOR.—Males olive-gray to olive-brown; a dim, dorsolateral light line, broken in young males by dorsal crossbars; a series of about 9 dark spots on either side of middorsal line, terminating at the dorsolateral light line in adult males, continuing through dorsolateral light line in young males; a broad, dark band extending from lower posterior border of eye to groin; lateral dark band with numerous, irregular, light spots; in some specimens an indistinct, lateral line extending from axilla to groin is visible; limbs dimly banded.

Sides of belly light blue, with a dark blue medial border; belly patches separated by about 6 scale rows, not extending on hind legs; a small, bright blue spot posteriorly on throat at either side, each bordered posteriorly with black; remainder of throat dusky, except a median, longitudinal, white area about 2 scales wide.

Females. Dorsolateral light lines almost invisible in adults,

more distinct in the young; a series of 9 or 10 crossbars on either side of back, extending through area of dorsolateral light line, and frequently on sides of body; limbs more distinctly barred than in males; dorsal coloration otherwise similar to that of males. Sides of belly with a dim tinge of blue; all except very young females have a bright blue spot on each side of throat posteriorly, each with a black posterior border; the remainder of the throat may be dusky as in males, except a narrow, median, longitudinal light line; in young females and in some adults a very narrow black line extends from the gular region on the preanal region; in large adult females this line is broken.

In both sexes, a narrow, short, black line is frequently present on the posterior surface of the thigh near the insertion of the leg; in other specimens a few irregular, dark marks occur.

VARIATION.—There is surprisingly little variation in cephalic scutellation. In the 11 specimens examined the head scales are similar to those of the type except: 5 superciliaries in 2; 2 complete and 1 incomplete rows of small scales between supraoculars and superciliaries in 1; 6 supraoculars in 1; fifth supraocular narrowly in contact with median head scales in 1; prefrontals separated by an azygous scale in 5; internasals irregular in 6; preocular entire on both sides in 9, on one side in 1; 2 complete rows of lorilabials below subocular in 6. Variation in body scale counts are given in Table I.

COMPARISONS.—If it is correct to assume that the *undulatus* group is derived from the *spinosus* group, *cautus* may be considered a "missing link" between the two groups. The species is obviously closely related to *spinosus*, but differs from it in characters which associate it with the *undulatus* group.

From *spinosus spinosus*, *cautus* differs by possessing the following characters: blue spots at posterolateral edge of throat (never in *spinosus*; in this the throat is barred); supraoculars 5 or 6 (usually 4 in *spinosus spinosus*); femoral pores 10 to 14 (rarely 11 or 12 in *s. spinosus*); dorsal scales 31 to 39 (rarely more than 30 in *s. spinosus*); dorsal bands more numerous (9 or 10 in *cautus*, 6 or 7 in *s. spinosus*).

TABLE I
MEASUREMENTS (IN MM.) AND SCALE COUNTS OF *SCELOPORUS CAUTUS*

MUSEUMS	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	E.H.T.	U.M.M.Z.
Number	13058	13056	13050	13060	13059	13025	13028	13027	13057	13061	77274
Snout to vent	47.3	48.0	49.3	49.5	55.0	55.0	68.0	73.0	78.5	79.0	80.0
Snout to occiput	9.6	9.2	9.0	9.8	9.5	11.0	11.5	12.5	12.8	13.8	13.8
Snout to ear	12.0	11.8	11.6	11.8	12.7	13.4	14.6	15.5	16.6	17.3	17.2
Hind leg	37.5	36.7	36.0	34.0	41.5	45.0	49.0	52.2	54.0	54.0	56.0
Tibia	10.3	10.0	10.1	11.7	12.0	15.0	14.3	15.7	16.0	16.5	16.0
Fourth toe	15.7	15.0	14.8	14.3	17.4	19.0	20.5	21.0	21.0	21.3	22.8
Fifth toe	6.8	6.5	6.4	6.4	7.9	8.0	8.3	9.0	9.0	9.0	10.0
Lamellae fourth toe	21-22	19-19	22-♀	19-19	24-24	19-20	20-21	19-19	19-19	20-21	19-20
Dorsals	35	35	35	34	38	35	39	35	33	37	31
Ventrals	44	45	49	45	47	44	50	44	46	47	45
Scales around body	38	42	39	42	39	39	42	38	41	38	39
Femoral pores	11-11	11-11	13-13	13-♀	13-14	11-12	13-13	12-13	12-12	13-13	10-11
Scales between pore series	10	10	11	12	10	11	13	9	9	12	10
Scales to head length	8.0	7.0	7.2	7.0	7.0	7.5	7.5	6.0	5.0	6.0	6.0
Sex	♂	♂	♂	♀	♀	♀	♀	♂	♀	♀	♀

Hobart M. Smith

From *u. undulatus*, which has an average dorsal scale count near that of *cautus*, the latter species differs in ventral coloration of the male, in the character of the supraocular scales, number of scales between femoral pore series, character of the auricular lobules, and in the number of dorsal crossbars.

S. occidentalis biseriatus differs in average dorsal scale count, average femoral pore count, character of supraocular scales, and in ventral coloration.

Sceloporus undulatus undulatus (Latreille)

Stellio undulatus Latreille, *Hist. nat. des rept.*, 2 (1802): 40-41 (type locality restricted to Charleston, South Carolina).

Sceloporus floridanus Baird, *Proc. Acad. Nat. Sci. Phila.*, 1858: 254 (type locality, Pensacola, Florida).

Sceloporus spinosus floridanus Stejneger, *N. Amer. Fauna*, No. 7 (1893): 181 (part); Stejneger and Barbour, *Check List N. Amer. Amph. Rept.*, 1917: 56 (part).

Sceloporus spinosus Cope, *Ann. Rept. U. S. Nat. Mus. for 1898, 1900*: 364-67, Fig. 56 (part; Fig. 55 is of *S. olivaceus*).

Sceloporus undulatus floridanus Burt, *Trans. Kans. Acad. Sci.*, 38 (1935): 281.

In 1802 Latreille described *Stellio undulatus* in his *Histoire naturelle des reptiles*. The type description was derived from a description furnished by Bosc, the French consul at Charleston, South Carolina. Bosc apparently sent no specimens with the description; a type is therefore not in existence. According to the type description, the type locality is "les grands bois de la Caroline." It is of importance, however, that the type locality be more restricted in this case. Since most of Bosc's material was collected in the vicinity of Charleston, and since he spent most of his time there, it appears very probable that the specimens he observed and sent to Latreille were collected near Charleston, to which I restrict the type locality.

Specimens examined from near the type locality prove to belong to a large-scaled, coastal form identical with the subspecies described as *floridanus* (Baird, 1858), and distinctly different from the widely distributed, northern form previously considered as typical *undulatus*.

S. undulatus undulatus occurs in the coastal areas from southeastern Louisiana to central South Carolina, including the basal half of the Florida peninsula. It differs in a number of characters from the Texas form which has, by some authors, been considered conspecific. The Texas species, as indicated by Burt (1935: 277), is related to *spinosus*; however, it is specifically distinct from the latter. (See Map 1.)

Sceloporus undulatus fasciatus (Green)

Lacerta hyacinthina Green, *Journ. Acad. Nat. Sci. Phila.*, 1 (1818): 349.

Lacerta fasciata Green, *Ibid.*

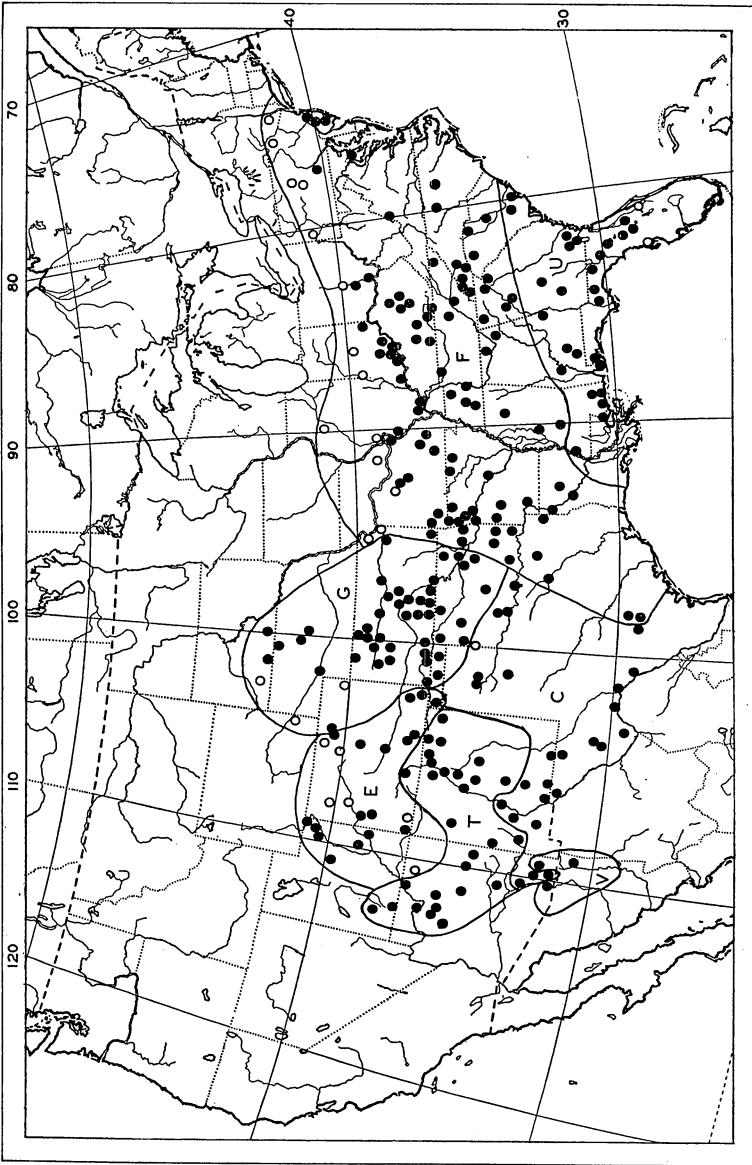
Sceloporus thayerii Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, 6 (1852): 127 (type locality, Indianola, Calhoun County, Texas).

Sceloporus undulatus Stejneger and Barbour, *Check List N. Amer. Amph. Rept.*, 1933: 65.

Sceloporus undulatus undulatus Burt, *Trans. Kans. Acad. Sci.*, 38 (1935): 280.

Since the name *undulatus* is applicable to the Gulf coast form, *fasciata* or *hyacinthina* must be resurrected for the northern subspecies. Since both of the latter names were proposed by the same author, on the same page and in the same article, either is available. I have chosen *fasciata*, the second described species, for its brevity. It is based upon a female, probably No. 8347, in the Academy of Natural Sciences of Philadelphia collection. *S. hyacinthina* was based upon males, presumably Nos. 8345-46, 8348, in the same collection. The type locality, not stated, is probably the vicinity of Princeton, New Jersey.

This subspecies is most closely related to *u. consobrinus* and *u. undulatus*. From the latter it differs in dorsal scale count. The count at which there is least overlap is 37; 4.4 per cent of *u. fasciatus* have counts of 37 or less, while 92.3 per cent of *u. undulatus* have counts of 37 or less. In *u. fasciatus*, the counts of 35 to 37 are from: vicinity of Atlanta, Georgia (35, 36, 36, 37; 11 others, all 38 or more); Transylvania County, North Carolina (35); Guilford, Guilford County, North Carolina (37, 37; others 40, 41); Cypress Hill, Virginia (37); Long Dale, Allegheny County, Virginia (37; others 39, 41); Natural



MAP 1. Distribution of the subspecies of *Sceloporus undulatus*. Dark spots indicate localities from which specimens have been examined; circles indicate published records. C, *u. consobrinus*; E, *u. elongatus*; F, *u. fasciatus*; G, *u. garmani*; T, *u. tristichus*; U, *u. undulatus*; and V, *u. virgatus*.

Bridge, McCreary County, Kentucky (37; other one 41); Prince Georges County, Maryland (37; others 38, 40); Bluff City, Sullivan County, Tennessee (36); top of Sugar Loaf Mountain, Tennessee (36); 5 miles west of Jackson, Madison County, Tennessee (37); Henryville, Clark County, Indiana (37, 37; 23 others, all above 37).

From *u. consobrinus*, *u. fasciatus* differs in average femoral pore count and average number of scales between femoral pore series (see Table II); the males also differ in coloration, those of *u. fasciatus* have more extensive belly and gular patches, and indistinct dorsolateral light lines. Females of the two subspecies are difficult to distinguish, as those of *u. consobrinus* lack distinct dorsolateral light stripes.

According to the field notes of E. H. Taylor, *u. consobrinus* and *u. fasciatus* occur together in Texas at Benton, Atascosa County, San Antonio and Helotes, Bexar County. This would suggest that the two do not intergrade, although it is not impossible that the two may occur together over a narrow area and yet be considered subspecies. They are ecologically separate in the areas in which they occur together, *u. consobrinus* being terrestrial, *u. fasciatus* arboreal. I have seen no absolute evidence of intergradation, but the differences between the two subspecies do not appear to be of specific character.

S. thayerii was described on the basis of specimens presumably from the extreme southwestern edge of the range of *u. fasciatus*—in fact, from the area in which *u. consobrinus* and *u. fasciatus* are assumed to intergrade. There is some doubt that the specimens actually were collected at Indianola, for much material shipped from that point had been collected over a long period of time in areas ecologically remote from there. Regardless of this fact, the average scale counts of the *thayerii* cotypes fall within the normal range of variation of *u. fasciatus*, with which *thayerii* is here synonymized.

Sceloporus undulatus consobrinus Baird and Girard

Sceloporus consobrinus Baird and Girard, "Zoology," *Marcy's Exploration of the Red River, Rept.*, 1853: 237, Pl. 10, Figs. 5-12 (type locality, Red River, Beckham County, Oklahoma).

TABLE II
VARIATIONS IN SCALE COUNTS OF THE SUBSPECIES OF *SCOLOPORUS UNDULATUS*

DORSALS																									Total	Average				
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55					
<i>undulatus</i> ..	5	9	16	24	25	25	15	5	5	1	130	34.1		
<i>fasciatus</i>	2	4	10	28	31	54	52	55	47	38	17	13	7	4	1	363	41.5	
<i>consobrinus</i>	1	6	7	21	29	21	30	12	10	6	3	2	1	149	40.2	
<i>garmani</i>	1	1	2	3	13	24	23	13	5	5	4	1	95	40.8	
<i>virgatus</i>	2	5	5	2	3	1	2	20	38.5	
<i>tristichus</i>	1	0	5	4	15	26	30	29	28	22	21	14	195	42.1	
<i>elongatus</i>	7	5	7	5	11	28	37	34	41	32	23	9	6	3	3	251	48.1	
SCALES AROUND BODY																									Total	Average				
	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59					
<i>undulatus</i> ..	2	5	11	21	18	17	26	14	6	5	1	1	127	39.8	
<i>fasciatus</i>	2	10	18	31	38	44	41	32	18	14	5	6	292	43.9
<i>consobrinus</i>	..	1	3	8	7	19	34	24	28	15	7	5	2	2	155	40.9
<i>garmani</i> ...	1	1	0	1	3	3	3	9	7	11	6	4	1	50	42.7
<i>virgatus</i>	2	5	0	3	7	2	1	0	1	21	43.2
<i>tristichus</i>	1	0	3	4	11	16	14	18	24	25	26	15	13	8	8	5	0	1	192	44.6
<i>elongatus</i>	4	10	5	24	22	29	27	28	20	10	17	7	8	1	0	3	1	216	49.3
FEMORAL PORES																									Total	Average				
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total		Average													
<i>undulatus</i>	2	11	34	51	54	42	13	3	..	..	..	..	..	..	210	14.6								
<i>fasciatus</i>	2	20	98	196	145	80	25	4	1	..	..	..	..	..	571	14.5								
<i>consobrinus</i>	..	1	2	4	19	44	73	52	23	8	4	1	..	..	..	231	16.2										
<i>garmani</i> ...	1	11	50	55	35	10	1	..	..	..	..	..	..	..	..	163	12.9							
<i>tristichus</i>	5	23	66	83	81	52	43	12	5	1	..	..	371	16.7											
<i>elongatus</i>	1	2	4	14	43	133	118	103	36	13	6	1	..	474	17.9													
<i>virgatus</i>	1	11	13	15	2	..	..	..	..	..	..	..	..	42	14.1									
SCALES BETWEEN PORE SERIES																									Total	Average				
	2	3	4	5	6	7	8	9	10	11	Total		Average																	
<i>undulatus</i>	1	2	15	29	31	11	4	1	94	7.5																		
<i>fasciatus</i>	1	14	57	91	82	25	14	2	286	7.4																		
<i>consobrinus</i>	1	4	49	58	35	3	3	..	..	..	153	4.9															
<i>garmani</i>	14	17	13	2	1	..	..	..	47	5.1															
<i>virgatus</i>	9	9	2	1	..	..	..	..	21	4.8														
<i>tristichus</i>	1	24	41	63	41	16	3	..	..	189	5.9																
<i>elongatus</i>	5	33	86	55	36	21	1	2	..	239	6.7																		

The subspecies occurs from southern Oklahoma through western Texas into Mexico; westward to eastern New Mexico. Specimens referable to this subspecies have been collected in southeastern Arizona between the ranges of *u. virgatus* and *u. tristichus*. There undoubtedly is an ecological separation of the normal habitats of these subspecies (especially of *u. virgatus* and *u. consobrinus*) in the region about the Huachuca and Chiricahua Mountains. I suspect that *u. consobrinus* is confined to lower altitudes in that region.

Specimens without evidence of dorsal pattern have been collected in Dark Canyon, Guadalupe Mountains, New Mexico, and at Camp Bonito, eight miles south of Oracle, Pinal County, Arizona. The phenomenon seems to be of no especial significance, as in several members of at least one other group (*scalaris*) the dorsal pattern may not be developed.

The type locality of *S. u. consobrinus* is stated by Stejneger and Barbour⁴ as "Oklahoma, Roger Mills Co., Red River." However, data given in the original description and in the journal seem to indicate otherwise. In the original description it is stated that the type was collected on June 6. According to the journal, the party camped at latitude 35° 15' 43" on the night of June 4. On June 8 the position of their encampment was 35° 24' 50". The western boundary between Beckham and Roger Mills counties is 35° 24'. The party was traveling steadily from June 4 to 8, and certainly did not reach 35° 24' north latitude on June 6 and yet progress only to 35° 24' 50" during constant travel on June 7 and 8. The route traveled was, according to the journal, directly north on or near the one-hundredth meridian.

Sceloporus undulatus virgatus, n. subsp.

HOLOTYPE.—U.M.M.Z. No. 81912; collected above Santa Maria Mine, El Tigre Mountains, Sonora, Mexico, by Berry Campbell.

PARATYPES.—U.M.M.Z. Nos. 78418–21 (12), topotypes,

⁴ Check List N. Amer. Amph. Rept. (Cambridge: Harvard University Press, 1933): 60.

U.M.M.Z. No. 78417, El Tigre Mountains; U.M.M.Z. Nos. 71146-49 (5), Chiricahua Mountains, Cochise County, Arizona.

DIAGNOSIS.—A small *Sceloporus* of the *undulatus* group, maximum snout-vent measurement about 62 mm.; dorsolateral and lateral light stripes very distinct, unbroken; dorsal dark spots small, frequently indistinct; a distinct, broad dark band below dorsolateral light line; femoral pores 12 to 16; dorsal scales 36 to 42; femoral pore series separated medially by 4 to 7 scales; both sexes immaculate white on belly, with very small blue spots on throat posteriorly, one on each side.

DESCRIPTION OF HOLOTYPE.—Head scales slightly rugose, pitted; interparietal more or less rounded; parietal single on either side, about one-third size of interparietal; frontoparietal single on either side; frontal divided, in contact with interparietal; 5 enlarged supraoculars, separated from median head scales by a row of narrow scales, from superciliaries by 1 complete and 1 nearly complete row of scales, the scales of the inner row slightly larger than those of the outer row; superciliaries 6, 5 visible from above; prefrontals separated medially by contact of frontal and median frontonasal; frontonasals typical; 2 pairs of internasals; 4 postrostrals; 2 canthals (first fused with subocular on one side); subnasal and loreal present; preocular entire; 1 complete and 1 incomplete row of lorilabials; 4 supra- and 5 infralabials to a point below middle of eye.

Mental pentagonal with a labial border about one-half that of rostral; outer row of labiomentals terminating anteriorly between first infralabial and first postmental; 4 pairs of postmentals, the scales of the first pair in contact medially; gular scales smooth, notched.

Auricular lobules 4, short, subequal in size to preceding scales; temporal scales keeled, not mucronate; scales between ear and lateral nuchal pocket greatly increasing in size posteriorly, keeled, mucronate, the largest twice as large as temporal scales; scales between nuchal pocket and arm keeled, weakly mucronate, the median scales (smallest) somewhat smaller than temporal scales.

Dorsal scales keeled, mucronate, denticulate, in parallel rows, 37 from occiput to base of tail; lateral scales (median) about three-fourths size of dorsal scales, not so strongly keeled and mucronate; scales around body 43; ventral scales smooth, notched; preanal scales subequal in size to median ventral abdominal scales; 47 ventral scales from a line between shoulders to anus.

Dorsal scales of foreleg keeled, mucronate, about two-thirds size of dorsal body scales; median ventral scales of lower foreleg about two-thirds size of dorsal scales of same member; anteroventral scales of lower foreleg smooth, posteroventral scales keeled, mucronate; ventral scales of upper foreleg weakly keeled, about one-half size of ventral scales of lower foreleg; lamellar formula for fingers 8-12-16-16-10 (8-12-16-16-10).

Dorsal scales of hind leg keeled, weakly mucronate, slightly smaller than dorsal body scales; ventral scales of thigh smooth, rounded, decreasing in size toward femoral pore series; femoral pores 13-14, the 2 series separated medially by 4 scales; ventral shank scales smooth, rounded, subequal in size to dorsal scales of same member; lamellar formula for toes 7-12-18-19-14 (8-12-18-20-14).

Dorsal scales at base of tail larger than dorsal body scales, strongly keeled, mucronate, weakly denticulate; subcaudals smooth and weakly notched at base of tail, keeled and mucronate distally; postanals enlarged; no postfemoral dermal pocket.

COLOR.—Dorsal ground color russet brown; a distinct, uninterrupted, dorsolateral light line extending from temporal region on base of tail; a distinct, lateral light line extending from upper labial region through ear, above arm to groin and a short distance on anterior surface of thigh; a distinct, dark brown stripe below lateral light line, extending from lateral nuchal pocket to groin and on anterior surface of thigh; a distinct, brown band on each side between the dorsolateral and lateral light lines, extending from posterior margin of eye on base of tail; a short, dark band extending from anterior surface of upper foreleg to lower edge of lateral nuchal pocket.

In females, 9 or 10 crescent-shaped, dark marks in a series on each side of middorsal line; each dark spot, in some specimens, has a small light spot on its medial posterior edge. In males these dorsal dark spots are practically obsolete; the light spots, in turn, are enlarged and are bordered anteriorly by a narrow dark line.

The males do not differ from the females in ventral coloration, lacking all evidence of typical belly marks. In both sexes a small, pale blue spot is present on each side of the throat posteriorly; it is not dark bordered. In some specimens a few dark flecks are present on the chest; the ventral surfaces are otherwise immaculate white.

COMPARISONS.—This subspecies differs from all others of the *undulatus* group in lacking the typical lateral belly marks in the male. It differs also in having a distinct dark band below the lateral light band. The average femoral pore count is slightly lower than that of *u. consobrinus*, its closest relative.

In addition, a young specimen from Montezuma Canyon, Huachuca Mountains, Arizona (U.M.M.Z. No. 69911) has been seen. A specimen in the Kansas University Museum, from Romero Canyon, Huachuca Mountains, Arizona (No. 15208) does not belong to this subspecies. It is a male, and possesses the characters of *u. consobrinus*.

Sceloporus undulatus garmani Boulenger

Sceloporus garmani Boulenger, *Proc. Zool. Soc. London*, 1882: 761, Pl. 56 (type locality, Pine Ridge, South Dakota).

The subspecies is most closely related to *undulatus consobrinus*, from which it differs in coloration in both sexes and in femoral pore count. In *u. garmani*, 6.7 per cent of the pore counts are 15 or more; in *u. consobrinus*, 88.7 per cent are 15 or more. In *u. garmani*, the males lack gular markings, and the females have distinct dorsolateral light stripes.

Specimens of both *u. garmani* and *u. elongatus* are available from Milton Reservation, Weld County, Colorado. The specimen of *u. elongatus* (K.U. No. 18401) has 49 dorsal scales and 17–18 femoral pores, with typical coloration. The specimen

of *u. garmani* has 44 dorsal scales and 14–14 femoral pores, with distinct dorsolateral light stripes and small dorsal spots. The latter tends toward *u. elongatus* in dorsal scale count, but not in femoral pore count nor in coloration. Sufficient material is not available to determine whether or not intergradation between the two subspecies occurs, at least in this locality. Whether they intergrade or not, they are certainly connected through *u. consobrinus* and *u. tristichus*, which do intergrade with each other; the latter intergrades also with *u. elongatus*, and the former with *u. garmani*.

Sceloporus undulatus tristichus Cope

Sceloporus tristichus Cope, in Yarrow, *Surv. W. 100th Merid.*, 5 (1875): 571 (type locality, Taos, New Mexico).

This subspecies is the most dubious of the species. So far as I can determine, its most consistent difference from *u. consobrinus*, its closest relative, is the presence of distinct lateral belly marks in females, similar to those in the males. The females also have the belly rather dusky, usually with numerous black flecks. The females and sometimes the males lack distinct dorsolateral light stripes. The character which Cope used to separate the subspecies (reduction of outer row of scales between supraoculars and superciliaries) appears to be useless.

Sceloporus undulatus elongatus Stejneger

Sceloporus elongatus Stejneger, *N. Amer. Fauna*, No. 3, 1890: 111 (type locality, Moa Ave, Painted Desert, Arizona).

This subspecies differs from *u. tristichus* in average dorsal scale count and in the absence of dorsolateral light lines. The two subspecies definitely intergrade in southern central Colorado and northern Arizona. Specimens from central Colorado differ from most Utah specimens in having the belly more speckled. Utah specimens frequently have the belly as maculate as that of the Colorado specimens.

Unfortunately, the two characters differing in the two subspecies do not intergrade at the same point, the color pattern

of *u. elongatus* (no or indistinct dorsolateral light lines; distinct, complete dorsal crossbars) intergrading with that of *u. tristichus* farther south than the area in which the dorsal scale counts intergrade. As it is difficult to define color differences in areas of intergradation, I have assumed that average dorsal scale count is the most important character separating the two subspecies. In *u. tristichus*, 17.9 per cent of the dorsal scale counts are 45 or more; in *u. elongatus*, 90.5 per cent of the counts are over 45.

Northern specimens of *u. tristichus* which approach *u. elongatus* in dorsal scale counts are from Paragonah (20 counts; range, 40 to 45; average, 43) and Kanab (46 counts; range, 40 to 46; average, 42.8), Utah; San Luis Valley, near Monte Vista, Rio Grande County, Colorado (14 counts; range, 40 to 46; average, 42.6); and from various localities in northern Arizona near the Grand Canyon.

Three specimens of *u. elongatus* from Skull Canyon, Baca County, Colorado, have dorsal scale counts of 43, 45, 48; the femoral pore counts are 17-17, 16-17, ?-?. Eight specimens from Comanche County, Oklahoma, have the following dorsal scale count: 42(1), 45(1), 46(4), 48(1), 53(1); femoral pores: 15(1), 16(2), 17(5), 18(5), 19(1), 20(1), 21(1). The coloration is typical. The specimens from Baca County, Colorado, are from the most eastern locality in the known range of the subspecies.

It has been stated by Cope⁵ and Burt⁶ that *occidentalis* and *undulatus* intergrade and are subspecies. Intergradation between the two subspecies, if it occurred, would be between *occidentalis biseriatus* and *undulatus tristichus*, as these two are the most closely approximated geographically of their respective species. It appears obvious that these two do not intergrade, as indicated by differences in the number of scales separating medially the femoral pore series, and in the coloration, as well as in average counts of dorsal scales and femoral pores.

⁵ "Crocodylians, Lizards, and Snakes of North America," *Ann. Rept. U. S. Nat. Mus. for 1898, 1900*: 155-1294.

⁶ *Op. cit.*

KEY TO THE SUBSPECIES OF *SCELOPORUS UNDULATUS*

1. Dorsal scales 37 or less 2
 Dorsal scales 38 or more 3
2. Males lacking lateral belly patches *u. virgatus*
 Males with broad, lateral belly patches *u. undulatus*
3. Dorsal scales 45 or more *u. elongatus*
 Dorsal scales 44 or less 4
4. Males lacking lateral belly patches; dorsolateral and lateral light
 stripes very distinct *u. virgatus*
 Males with lateral belly patches 5
5. Males without gular patches; femoral pores 14 or less; dorsolateral
 light stripes distinct in both sexes *u. garmani*
 Males with gular patches 6
6. Females with lateral belly patches; femoral pores 16 or more (74.7
 per cent) *u. tristichus*
 Females without lateral belly patches 7
7. Dorsolateral light stripes distinct in males; dorsal crossbars reduced
 in males, confined to areas between dorsolateral light stripes; gular
 region with 2 dark patches posteriorly, not extending over entire
 throat; femoral pores 16 or more (69.7 per cent) *u. consobrinus*
 Dorsolateral light stripes indistinct in males; dorsal crossbars extend-
 ing completely across back when visible; gular region almost en-
 tirely black in adult males; femoral pores 15 or less (80.7 per
 cent) *u. fasciatus*

