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A STUDY OF THE VARIATION IN THE LESS COMMON SNAKES OF UTAH ⁽¹⁾

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INTRODUCTION

Among the snakes of Utah are a number of species which have been considered as being rare, and were until recent years represented in collections by only a few specimens. Of the 24 species of snakes listed for Utah, 12 species are represented by comparatively few specimens. One species, *Arizona elegans occidentalis*, for example is represented by only two specimens, which were collected in the vicinity of St. George, Utah. Some of the other less common species have, however, been greatly added too during the last few years by careful collecting.

The large numbers of snakes that have been collected by the various institutions and collectors, has made it possible to further study the distribution and morphological variations of certain species.

The materials used in this report came from the following sources: Brigham Young University, labeled B.Y.U.; Zion Canyon National Park, labeled Z.C.N.P. and the University of Utah, labeled U. of U. I am also grateful to Mr. L. M. Klauber for information concerning one specimen of Lyre snake now in the University of California at Los Angeles. I am grateful to Mr. Russell K. Grater for the specimens from Zion Canyon. Many of the notes have come from Dr. Vasco M. Tanner and Dr. D. E. Beck. For these and other courtesies I am grateful.

This study of the scale variation of the less common snakes of Utah is based upon specimens which have been collected within the past fifteen years.

(1) Contribution No. 89, Department of Zoology and Entomology, Brigham Young University.

DIADOPHIS REGALIS REGALIS (Baird & Girard)

MEASUREMENTS AND SCALE VARIATIONS

	BYU	USAC	ZCNP	ZCNP	U of U	U of U	U of U	U of U	ZCNP
Number	2701		75	69	2006	1213	639	804	23
Sex	F	F	F	F	M	M	M	M	
Scale Row	17-15	17-15	17-15	17-15	17-15	17-15	17-15	17-15	17-15
Gastrosteges	229	226	229	223	208	215	224	223	219
Urosteges	71	64	73	82	72	73	60+	81	79
Supralabials	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7
Infralabials	8-8	7-8	8-8	8-8	8-8	8-8	8-8	8-8	8-8
Preoculars	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2
Postoculars	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2
Loreals	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Temporals	1-2	1-1	1-1	1-1	1-1 1-2	1-1 1-2	1-2 1-1	1-2	1-2
Total Length	201	526	726	306	448	360	638	380	510
Tail Length	34	90	124	62	84	86	104	110	107
Ratio	.169	.171	.171	.202	.193	.239	?	.289	.210

PUBLISHED RECORDS: Zion National Park (Tanner 1927 p. 26) (A. M. Woodbury 1931 p. 69) (Presnall 1937 p. 232) (W. W. Tanner 1940 p. 141); Springdale (A. M. Woodbury 1931 p. 69); Pine Valley (Hardy 1939 p. 83); Circleville (W. W. Tanner 1940 p. 141); Deep Creek Mts. (Knowlton & Thomas 1935 p. 264) (W. W. Tanner 1940 p. 141) Utah; and Preston, Idaho (W. W. Tanner 1940 p. 141).

NEW RECORDS: Pole Canyon near Cedar Fort, Ut. Co., U. of U. No. 2006 (H. W. Setzer & D. M. Woodbury, Colls.). Birch Creek Canyon, Juab Co., U. of U. No. 1213 (S. Flowers, Coll.).

REMARKS: At the present writing I am aware of 15 specimens of this species from the Utah area, with a great percentage of them coming from Washington County. From the distribution records now available it becomes quite evident that this snake should be found throughout Utah, wherever a suitable habitat can be found. Records would indicate that this species inhabits the Oak, Juniper, Pinyon-Pine Belts of our foot hills, 5000 ft., and up to the Aspen-Fir Belt at an elevation of 7000 ft. In Southern Utah it has been taken as low as

4045 ft. Because of its secretive habits few specimens are seen or collected. Dr. D. E. Beck collected a specimen from under a pine log at the camp ground in Pine Valley, Washington County. Ross Hardy collecting in the same area found four specimens under rocks in the Oak brush. Mr. M. V. Walker collected a specimen in Oak Creek, Zion National Park during the afternoon. The snake was feeding on a small *Pituophis c. deserticola*. From the information available it appears that this species spends much of its time in secluded places. More collecting may provide an answer to the limits of distribution of this species. Dr. H. J. Pack listed a specimen for St. George, Washington County, Utah.

The general belief that this species is oviparous can now be confirmed. A large specimen from Zion Canyon National Park No. 75 contained 5 eggs, which averaged 19.24 mm. long and 7.2 mm. wide. The two largest eggs were located in the posterior portion of the body and measured in length 24.5 and 26.3 mm. respectively. The smallest measured 13.5 mm. and was the anterior egg. The two middle eggs were intermediate in size measuring 16 mm. each. In none of the eggs was there any indication of a developing embryo. The fact that this specimen was collected in May and contained two apparently fully developed eggs would lead us to believe that some of the eggs are deposited in late spring or early summer.

The size of the above specimen is also noteworthy, it measured 726 mm. long and has a head width of 9.8 mm. and a body circumference at the middle of 36 mm. This I believe is the largest specimen of this species reported for Utah.

SALVADORA GRAHAMIAE HEXALEPIS (Cope)

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	Z.C.N.P.
Number	214	1097	2880	24
Sex	F	F	F	F
Scale Rows	19-17-13	17-17-13	19-17-13	19-17-13
Gastrosteges	198	200	191	198
Urosteges	81	80	66	81
Supralabials	9-9	9-9	9-9	9-9
Infralabials	10-10	10-10	10-10	10-10

Preoculars	3-3	3-3	3-3	2-2
Postoculars	2-3	2-3	2-2	2-2
Loreal	2-2	2-2	2-2	2-2
Temporals	2-3	2-1-3	2-3-3	2-2-3
Total length	693	528	650	737*
Tail length	158	119	broken	169

*This specimen was reported by the writer in the Great Basin Naturalist, Vol. I, No. 3-4, p. 142, 1940, to be 705 mm. long; this was a misprint and is now corrected.

PUBLISHED RECORDS: St. George (Pack 1930 p. 6) (Tanner 1935 p. 268) Woodbury 1931 p. 82); Cottonwood Canyon (Van Denburgh 1922 p. 691); Four miles Northwest of Santa Clara (Hardy 1939 p. 83); Zion Canyon National Park (W. W. Tanner 1940 p. 142).

REMARKS: The scale formulas and measurements are well within the limits set up by C. M. Bogert, in his report, "A Study of the Genus *Salvadora*." The color pattern suggests that the Utah specimens may vary slightly, or be allied to those specimens of the Grand Canyon area. Four specimens before me all have dark brown bars, extending from the ventrals dorsally. In two specimens the bars invade the dorsal stripe. In one specimen (B.Y.U. No. 214) some of the bars become continuous across the back, others so constrict the dorsal stripe as to leave only one or a fraction of a scale light colored. While this extreme does not carry into all the Utah specimens, they are all distinctly bared.

The habits and habitats of this species are not known to the writer. Specimens have been taken while burrowing in the sand, (Pack 1930); under rocks along the creek (Hardy 1939) and on a lawn which is surrounded by sand and boulders and desert plants, (Zion Canyon, W. W. Tanner 1940). Dr. D. E. Beck collected a specimen northeast of Santa Clara on the rocky hillside. Mr. Bogert indicates that their food consists mostly of lizards, however, other forms such as small mammals, snakes, etc. may form a part of their diet.

LAMPROPELTIS PYROMELANA (Cope)

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	U. of U.	U. of U.
Number	304	322	634	825	940
Sex	M	M	F	F	M

	23-23-19	23-23-19	23-23-17	23-23-17	23-23-19
Scale Rows	222	222	226	223	225
Gastrosteges	76	50	75	71	79
Supralabials	7-7	7-7	7-7	7-7	7-7
Infralabials	9-9	9-9	8-8	9-9	9-9
Preoculars	1-1	1-1	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2	2-2	2-2
Loreal	1-1	1-1	1-1	1-2	1-1
Temporals	3-3 2-3	2-3 2-3	2-3 3-4	2-3 2-3	2-3 3-4
Total length	857	905	282	552	805
Tail length	156	121*	47	100	148
White rings body	38	38	44		
White rings tail	12	74	12		

*Tip of tail missing.

PUBLISHED RECORDS: Granger, Salt Lake Co., Beaver Canyon, Beaver Co., (Van Denburgh 1922 p. 747) (Pack 1930 p. 14) (Woodbury 1931 p. 91); New Harmony, Washington Co., (Tanner 1928 p. 49) (Woodbury 1931 p. 91); and Kolob Mountains (Woodbury 1931 p. 91).

NEW RECORDS: Wallsburg, Wasatch Co., Brigham Young University No. 322; Pine Valley, Washington Co., University of Utah Nos. 825 and 940; and Santa Clara, Washington County, Utah. The specimen listed for Santa Clara was undoubtedly collected at a higher elevation, and brought into Santa Clara. It was later given to Dr. D. E. Beck.

REMARKS: With the exception of the Granger record it appears that this species lives in or very near the mountains. It is interesting to note its occurrence in the Wasatch Mountains, as well as the high plateaus from the Pine Valley Mountains north.

The writer is aware of no information on the habits of this snake.

LAMPROPELTIS TRIANGULUM GENTILIS (Baird & Girard)

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	
Number	2756	398	1505	333	337	336	163	2923	2929	2718	520	334	389
Sex	F	F	F	F	F	F	F	F	F	M	F	M	M
Scale Rows	23-23-19	22-25-19	22-23-19	21-21-19	21-21-17	21-21-17	21-21-17	21-21-19	21-23-19	21-21-19	21-21-18	21-21-17	22-23-19
Gastrosteges	183	183	186	188	183	183	179	182	186	186	185	188	184
Urosteges	46	40	43	42	46	48	40	?	40	47	48	51	47
Supralabials	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7	8-8
Infralabials	8-8	8-8	8-8	8-8	8-8	8-8	8-8	8-8	9-9	8-8	9-9	8-8	9-9
Oculars	1-2	1-1	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Temporals	2-3	2-3	2-3	2-3	2-3	2-3	2-2 2-3	2-3	2-3	2-3	2-3	2-2 2-3	2-3
Total length	262	258	205	497	200	202	222	555	533	587	337	534	556
Tail length	39	35	29	70	32	31	31	61?	76	88	49	86	80
Rings body	28	27	30	23	34	29	27	25	29	34	30	23	31
Rings tail	6	8	7	6	10	8	7	4?	7	10	8	8	10

*Loreals 1-1 and anal undivided in all specimens studied.

PUBLISHED RECORDS: Cedar City Canyon (Van Denburgh 1922 p. 745) (Pack 1930 p. 14); Provo (Van Denburgh 1922 p. 745) (Tanner 1928 p. 27) (Pack 1930 p. 14); Salt Lake, Tooele Valley, Moroni, Bountiful, and Vernal (A. M. Woodbury 1931 p. 93); 8 miles South of Price (Hardy 1939); Alpine, Lehi, and Mt. Pleasant (W. W. Tanner 1940 p. 143).

NEW RECORDS: Hobble Creek Canyon, 3 miles East of Thistle, Cedar Valley and Spanish Fork, Utah County; Neola, Duchesne County; Pine Valley, Washington County; Fillmore, Millard County; Helper, Carbon County, Utah.

REMARKS: A number of *Lampropeltis t. gentilis* captured in Utah County have been observed in the laboratory for several weeks at a time, but as yet feeding has not been observed. Two specimens B.Y.U. No. 2718 collected at Lehi by Harold Hutchings April 30, 1939, and No. 2924, collected in Hobble Creek Canyon by C.C.C. boys, Aug. 1940, contained adult lizards, *Sceloporus g. graciosus*.

The color pattern of this species is quite variable, ranging from a predominance of red to a predominance of black. Specimen B.Y.U. No. 520, collected in Hobble Creek Canyon 1937, has 33 complete red bands ranging from 2-6 scales in width at the dorsal. In this specimen the black bands, anterior to the tail, do not contact each other, either ventrally or dorsally. A second specimen B.Y.U. No. 2756 collected in Alpine, 1939, has only 5 complete red bands and these are only 1-2 scales wide at the dorsal. The black bands are all in contact on the ventral. The white band—and I have seen no Utah specimens with a yellow band as suggested by other writers—averaged 2 scales wide. The head is black with flecks of red or white or both on the frontal, prefrontals and internasals. In some specimens, B.Y.U. No. 2924 for example, the entire head is flecked with red and white. The labials are often white margined with black, and the first white ring usually, but not always, involves the tips of the parietals.

The distribution of this species appears to be state wide, although much collecting must be done to varify this belief.

Several specimens of this snake have been collected during its hibernation and it seems noteworthy to report them at this time. One specimen collected in Cedar Valley Dec. 10, 1940, was taken while digging holes for power line poles. The snake was found in sandy soil 4 feet from the surface. A second specimen was taken from a gravel pit near Helper, Utah, December 15, 1940, by Lester Winters, who gave the specimen to Mr. Horace Richards of Price Junior

College. Mr. Richards deposited the specimen in the Brigham Young University Collection. This specimen was 6 feet under ground. Another specimen was taken from a gravel pit near Mt. Pleasant, Utah.

RHINOCHEILUS LECONTEI Baird & Girard

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	U. of U.	B.Y.U.	Average
Number	1322	2863	213	2931	2036	1162	
Sex	M	M	F	F	F	F	
Scale Rows	23-23-19	23-23-19	23-23-19	23-23-19	23-23-19	23-23-19	
Gastrosteges	202	205	207	199	197	197	201.6
Urosteges	53	53	50	46	43	46	47
Supralabials	8-9	8-8	8-8	8-8	9-9	8-8	
Infralabials	9-9	8-8	9-9	8-8	9-9	8-8	
Preoculars	1-1	1-1	1-1	1-1	1-1	1-1	
Postoculars	2-2	2-2	2-2	2-2	2-2	2-2	
Loreal	1-1	1-1	1-1	1-1	1-1	1-1	
Temporals	2-4 2-3	2-3	1-3	2-3	2-3	2-3	
Total length	161	347	328	234	648	278	
Tail length	94	50	45	32	79	36	
Spots body	30	25	32	32	23	31	27.8
Spots tail	11	10	11	10	11	8	10.2

PUBLISHED RECORDS: St. George (Van Denburgh 1922 p. 776) (Tanner 1927 p. 57) (Pack 1930 p. 7) (Woodbury 1931 p. 94) (Tanner 1936 p. 269); Veyo (Hardy 1939), Washington County; White Valley, Millard County, (W. W. Tanner 1940 p. 143).

NEW RECORD: Fillmore, Millard County, Utah. Summer 1940.

REMARKS: Before the distribution of this species can be determined considerable more collecting must be done in western Utah and eastern Nevada. The published records suggest that its distribution extends from southern Utah to southern Idaho.

Almost nothing is known regarding the habits of these snakes. Specimens have been taken in the evening as they were moving from

one desert shrub to another. One specimen at St. George was taken in a cemetery by the sexton while digging a grave.

The numbers of undivided caudal plates varies greatly in the Utah specimens, six specimens range from 14 to 47 undivided plates. Two California specimens varied from 14 to 51.

THAMNOPHIS EQUUS (Reuss)

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.
Number	211	1093	1095	259	1176	1094	212
Sex	F	F	F	F	F	M	M
Scale Rows	19-19-17	19-19-17	19-19-17	19-19-17	19-19-17	19-19-17	19-19-17
Gastrosteges	170	171	167	172	171	174	171
Urosteges	75	75	70	78	74	86	81
Supralabials	8-8	8-8	8-8	7-8	8-8	8-8	8-8
Infralabials	10-10	10-10	10-10	10-10	10-10	10-10	10-10
Preoculars	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Postoculars	3-3	3-3	3-3	3-3	3-3	3-4	3-4
Loreal	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Temporals	1-2 1-3	1-2	1-2	1-2	1-2	1-2	1-2 1-3
Total length	719	504	555	764	525	470	429
Tail length	165	111	123	174	116	113	104

PUBLISHED RECORDS: Moab, Grand Co., and Bluff, San Juan Co., Utah (Tanner 1928 p. 270) (Woodbury 1931 p. 100).

REMARKS: Apparently the only observations on the habitats of these snakes have been made by Dr. A. G. Ruthven and Dr. V. M. Tanner. Both suggest their habitats to be in the immediate vicinity of streams. Dr. Ruthven indicates that their food consists of "frogs and tadpoles which abound in this habitat."

The range of this species in Utah is rather indefinite. It has been taken from only two localities in the Colorado River area of southern Utah.

TRIMORPHODON LYROPHANES (Cope)

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	U.C.L.A.	Average
Number	653	502	501	1798	26	
Sex	F	F	F	M	F	
Scale Rows	21-23-16	20-21-15	22-22-15	23-23-15	23	
Gastrosteges	236	227	229	218	229	
Urosteges	65	78	69	77	63	
Supralabials	8-8	9-9	9-10	9-9	10-9	
Infrailabials	12-13	12-12	12-12	11-12	12-11	
Preoculars	3-3	2-2	3-2	3-3	3-3	
Postoculars	3-3	3-3	3-4	3-3	3-3	
Loreals	2-1	2-2	2-2	2-2	3-3	
Temporals	3-4	3-4	3-5	3-4	3-4	
Total length	657	359	611	296	756	
Tail length	101	59	102	50	116	
Spots on body	31	30	28	32	31	30.14
Spots on tail	12	15	14	16	13	14

PUBLISHED RECORDS: Springdale, (Zion Canyon) (Woodbury 1931 p. 106) Zion Canyon National Park, (Klauber 1940) (W. W. Tanner 1940 p. 145) St. George, Washington County, Utah (V. M. Tanner 1935 p. 269) (W. W. Tanner 1940 p. 145).

REMARKS: Collecting in Utah has produced to date five specimens of the Lyre Snake, all coming from the Lower Sonoran life zone, or areas very closely associated with an connected to it. Just why this species is rarely collected is not known. We surmise that it is on the northern fringe of its range or that its habits are so secretive as to make its capture extremely difficult. Two specimens were collected by Dr. D. E. Beck at the base of the Sugar Loaf hill, St. George, Utah. One specimen had crowded between two flakes of a large rock and the other was found in the soil underneath the same rock. A third specimen collected by Dr. V. M. Tanner was found under a rock on the Sugar Loaf. The fourth specimen was found on the road by Dr. Beck.

The habits of this snake are not well known. They are known, however, to feed on lizards (Woodbury 1931). Dr. Van Denburgh reported a specimen which contained 16 eggs. No information can be added from the specimens which I have studied.

An examination of the four specimens at my disposal, provides the following additional scale variations: The frontal is not in contact with the preoculars in either of the specimens. The scales between the nearest ventral and infralabial, range from 6 to 7 scales. It is interesting to note that the two extremes in the caudals for females exist in Utah specimens, 63 to 78 scales. Equally interesting is the low ventral count of 218 in the single Utah male specimen. The body scales are smooth and imbricate, and the anal is divided in all Utah specimens.

The color pattern while variable, is in the main gray with medium brown blotches.

TANTILLA UTANENSIS Blanchard

MEASUREMENTS AND SCALE VARIATIONS

	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.	B.Y.U.
Number	310	1240	1571	1518	1553	180	2878	2332
Sex	M	F	F	M	M	M	F	F
Scale Rows	15	15	15	15	15	15	15	15
Gastrosteges	154	174	170	157	158	157	167	169
Urosteges	26	62	63	66	68	*	60	60
Supralabials	7-7	7-7	7-7	7-7	7-7	7-7	7-7	7-7
Infralabials	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6
Preoculars	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2
Temporals	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Total length	214	167	215	270	242		137	141
Tail length	*	37	50	72	61	*	28	27

PUBLISHED RECORDS: St. George (Van Denburgh 1922 p. 880) (V. M. Tanner 1927 p. 57) (Pack 1930 p. 10) (Woodbury 1931 p. 108) (V. M. Tanner 1935 p. 269) (Blanchard 1938 p. 372); Virgin Mountain (M. Woodbury 1931 p. 108); and Schwitz Indian Reservation, Washington Co., Utah (W. W. Tanner 1940 p. 145).

REMARKS: In 1938 a post humous paper by Dr. Frank N. Blanchard was published in which he described the Utah *Tantilla*, and gave to it the name of *Tantilla utahensis*, and St. George, Washington Co., Utah was designated as the type locality. In previous reports the Utah *Tantilla* had been referred to as *T. nigriceps* or *T. nigriceps eiseni*.

During Dr. Blanchard's visit at Brigham Young University in December 1935, many specimens were studied by him, five of which were loaned to him at that time. These five specimens are referred to as the "Beck Collection," and are designated as paratypes. These specimens are still at the University of Michigan.

Specimen No. 310 (2274) is the only paratype specimen in the Brigham Young University Collection although we have 5 specimens, Nos. 1240, 1571, 1553, 1518, and 1800 that are topotypes.

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