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A taxonomic comparison of *Uta stansburiana* of the Great Basin and the Upper Colorado River Basin in Utah, with a description of a new subspecies

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A TAXONOMIC COMPARISON OF *UTA STANSBURIANA* OF THE GREAT BASIN AND THE UPPER COLORADO RIVER BASIN IN UTAH, WITH A DESCRIPTION OF A NEW SUBSPECIES

Lloyd E. Pack, Jr. and Wilmer W. Tanner[1]

One of the most common lizards throughout the western United States and the state of Utah is the side-blotched lizard, *Uta stansburiana*. This species and the genus was first described in 1852 by Baird and Girard from the specimens obtained by the Stansbury expedition to the Great Salt Lake Valley in 1849. The type locality was designated as the Valley of Great Salt Lake, Utah. Its range was subsequently found to extend from Texas to California, and from Washington and Idaho to Mexico. Three subspecies of this lizard are of concern to us and currently recognized in the literature (Smith, 1946: Schmidt, 1953; Stebbins, 1966; and Tinkle, 1969) *Uta stansburiana stansburiana* Baird and Girard, found in eastern Washington, eastern Oregon, southern Idaho, northeastern California, most of Nevada, all of Utah except the southwestern corner, western Wyoming, western Colorado, northeastern corner of Arizona, and northwestern corner of New Mexico; *Uta stansburiana stejnegeri* Schmidt in southeastern California, southern Nevada, southwestern Utah, Arizona, New Mexico, western Texas, and northwestern Mexico; and *Uta stansburiana hesperis* Richardson restricted to southwestern California, and northwestern Baja California. Several authors (Van Denburgh, 1922; Woodbury, 1931; Smith, 1946; and Tanner and Jorgensen, 1963) have suggested problems concerning this assignment of names and ranges, and pointed out the need for additional study.

The subspecies *U. s. stansburiana*, which is the principle subject of this study, occurs in two major geographic areas: the Great Basin, and the Upper Colorado River Basin. These basins have been separated from each other by high mountains and plateaus since before the last ice age. Such isolation might result in the development of differences in the basic characteristics of these two populations, even if the habitats of both basins were essentially identical. Because there are differences in both the edaphic and biotic factors between these basins we would expect differentiating selective pressures to be operating. Given enough time, these selective pressures would produce significant differences between the two lizard populations. One factor of special importance is the presence of a significantly higher amount of ground radioactivity in the Upper Colorado River Basin (Tanner, 1965).

It has been shown that the following species of reptiles have populations in the Upper Colorado River Basin that are subspecific-

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ally distinct from adjacent populations in the Great Basin: *Crotaphytus collaris, Crotaphytus wislizeni, Sceloporus magister, Xantusia vigilis, Sauromalus obesus, Cnemidophorus tigris, Hypsiglena torquata*, and *Crotalus viridis*.

A search of the literature failed to uncover a comparative taxonomic study to determine the degree or signifiance of morphological differences that may exist between these two *Uta* populations. With the above considerations in mind a study was begun which included an examination and comparison of the external anatomical characteristics of the populations occurring primarily in the Bonneville Basin of the Great Basin and the Upper Colorado River Basin. A comparison of these with *Uta* from several adjoining as well as distant populations was also made.

The first separation of *Uta stansburiana* into subspecies was that of Ruthven (1913). His work consisted of a description of *U. s. nevadensis*, and did not include an analysis of the total population of the species. The first real attempt to understand the taxonomy of the species was undertaken by Richardson (1915) and involved the following: a recognitiion of the Great Basin population as *U. s. stansburiana;* a recognition of the southern population (SE Calif., Ariz., N. Mex., Texas and Mexico) as *U. s. elegans* (described by Yarrow in 1882 as *Uta elegans*); and the naming of a new subspecies *U. s. hesperis* from southern coastal California. The separation by Richardson was based upon four characteristics: overall size (total length, snout-vent length, tail length, and length of the hind leg). number of dorsal scales in a line between the interparietal plate and a point above the posterior surface of the thighs, relative carination of dorsal scales and the number of femoral pores. In 1946 Smith added the number of rows of postrostrals, prefrontal contact on the middorsal line, and distinct dorsolateral stripes on the females as distinguishing characteristics between those subspecies; but, in agreement with the checklists of Stejneger and Barbour (1943), he used the name *U. s. stejnegeri* for the lizards which Richardson called *U. s. elegans*. The latter subspecies is now restricted to Baja California. Tinkle (1969) extends the range of *s. elegans* into south ern and coastal California and does not recognize *s. hesperis*.

For this study we analyzed all of the above characters (with some modifications) and added several others. The first additional characters were selected for the ease with which they could be checked and the possibility that they might lead to other previously unreported characters. Photographs were made, which suggested several possible variations in scalation of the head. Finally, from field observations, variations in coloration and pattern were selected as possibly significant characters. The characteristics and the methods by which they were determined is as follows:

Dorsal scales - from interparietal to level of posterior surface of thighs (Fig. 1).

Ventral scales - first enlarged scale behind gular fold to last enlarged scale at vent (Figs. 2 and3).

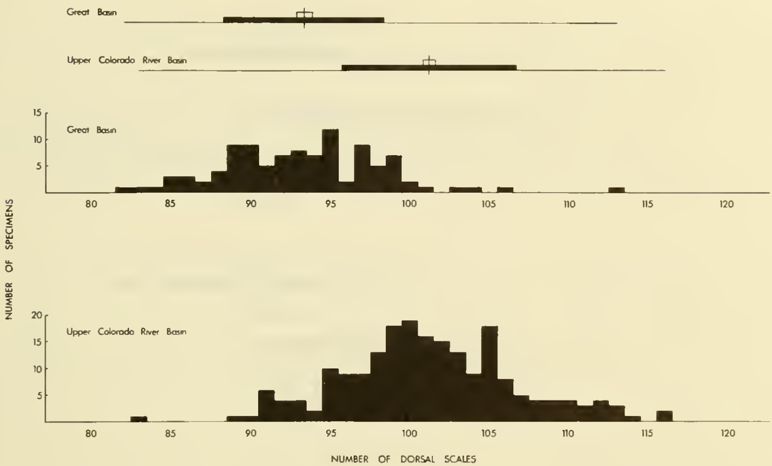

Figure 1. The number of dorsal scales in the two major Utah population of *Uta stansburiana.* The ranges, means, standard deviations, and standard errors of each are shown at the top of the figure. Horizontal black lines indicate range of variation; the dark rectanble outlines one standard deviation on either side of the mean; the vertical line is the mean.

Femoral pores - total number of pores on both hind legs (Fig. 4).

Supralabials and infralabials - counted from the rostral or mental respectively to a point directly below the center of the eye (Fig. 5).

Postrostrals - Number of scales separating the anterior internasals and rostral. If either or both of the anterior internasals were separated from the rostral by two scales it was recorded as two rows; if they were both separated from the rostral by a single scale it was recorded as one row. This was in contrast to Smith's (1946) definition, requiring both anterior internasals to be separated from the rostral by two postrostrals and was chosen because his work had previously shown that the separation of the rostral from both anterior internasals by two scales was an unusual condition except in the *Uta* of coastal California.

Frontoparietals - scales bounded anteriorly by the frontals, posteriorly by the interparietal, and laterally by the circumorbitals and parietals.

Scales between interparietal and supraoculars - number of scales along a line from the parietal eye to the supraoculars at an angle of 45° to the midline of the body, usually including a single frontoparietal and one to three circumorbitals. Right and left sides were added together.

Occipitals - number of occipital scales touching the posterior margin of the interparietal (Fig. 6).

Snout-vent length - tip of snout to vent measured in millimeters.

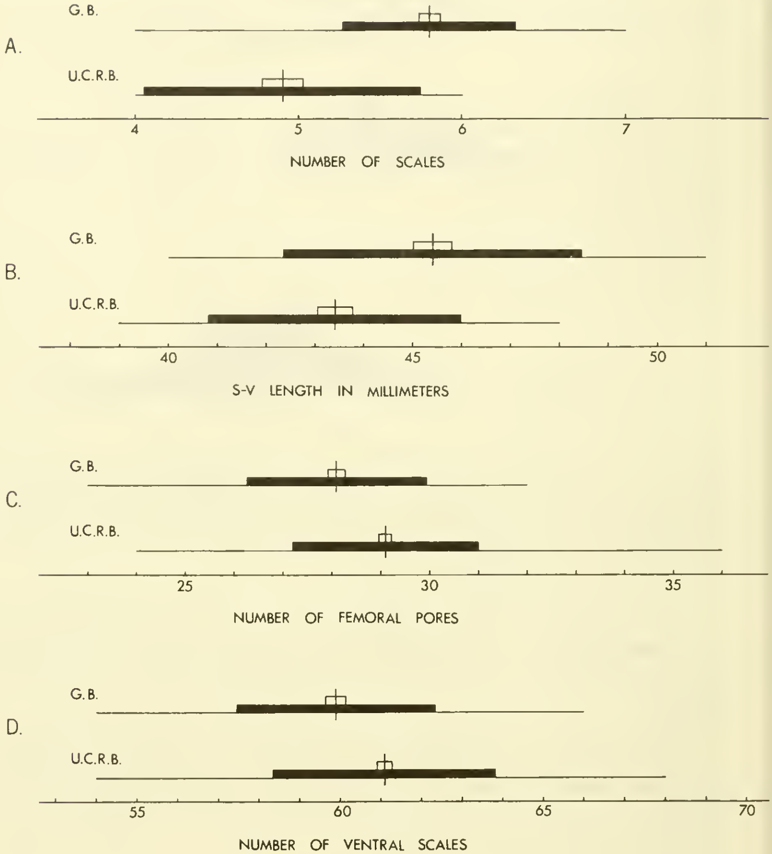

Figure 2. (A) the number of scales on a line between the interparietal and supraoculars; (B) the snout-vent length in millimeters; (C) the total number of femoral pores; and (D) the number of ventral scales in *Uta stansburiana* of the Great Basin and Upper Colorado River Basin in Utah. Symbols as in Fig. 2.

Rostral shape - height and width of rostral, and ratio of height to width.

Frontonasal length - ratio of the average length of the two lateral frontonasals to the length of the median frontonasal (Fig. 7).

Internasal contact with lateral frontonasals - if scales were in contact on one or both sides, the condition was designated as "yes." If not in contact on either side, as "no," and the distance separating them was measured (Fig. 8).

Prefrontals - four conditions were observed in the prefrontals; two prefrontal scales in contact on the midline; two prefrontals separated by the frontal and median frontonasal (which contact each

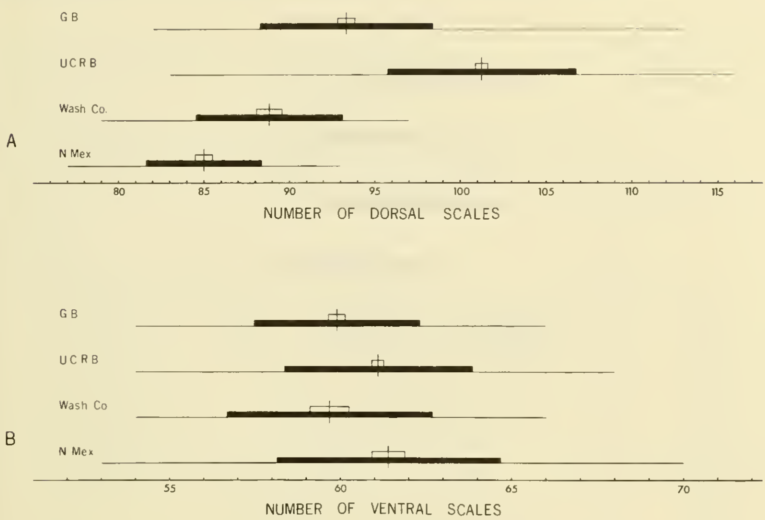

Figure 3. (A) the number of dorsal scales, and (B) the number of ventral scales in four populations of *Uta stansburiana* (Great Basin in Utah; Upper Colorado River Basin; Washington County, Utah; and Dona Ana County, New Mexico). Symbols as in Fig. 1.

other); two prefrontals separted by a small median prefrontal, also separating the frontal and median frontonasal; (or any of several abnormal arrangements or shapes of the prefrontals or adjacent scales.) Each specimen had one of these patterns (Fig. 4).

Rostral - shape of upper edge - upper edge of rostral definitely concave or approximately straight on both sides. Characters were noted as curved or straight (Fig. 8).

Internasal size - anterior internasals approximately the same size as the posterior internasals or considerably larger (Fig. 9).

Parietal size - parietals vary in size from the same size as the supratemporals and frontoparietals to several times larger. If their size (measured as longest distance across) was not more than 1½ times larger, they were considered as the same size, however, if greater than 1½ times they were listed as larger (Fig. 9).

Posterior margin of interparietal - posterior was determined to be straight, concave (often with a single scale set in the concavity), or convex.

Throat or gular color - specimens were checked as having no blue, a light or pale blue, or an intense blue color on the throat. In addition, the throat was checked for no gray, less than ½ gray, or more than ½ gray.

Back pattern - the presence or absence of a pattern of light or dark markings on the back, other than the bright blue spotting common in males of this species (Fig. 10).

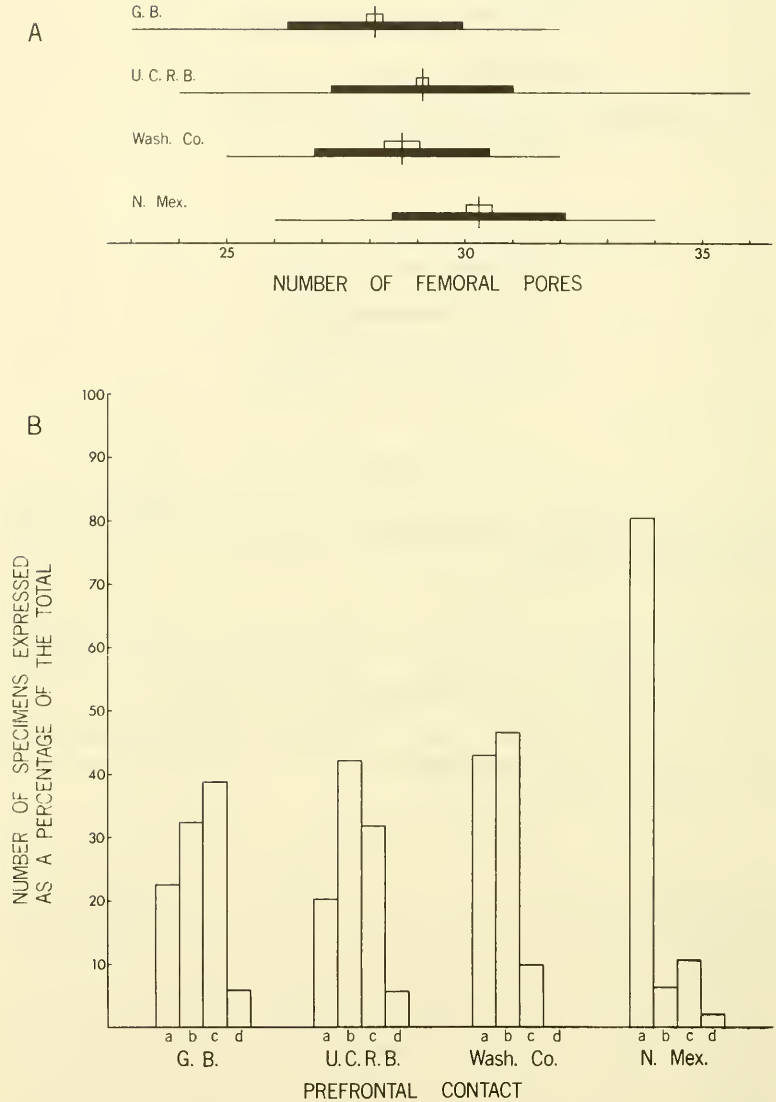

Figure 4. (A) The total number of femoral pores on both hind legs in four populations of *Uta stansburiana* (Great Basin in Utah; Upper Colorado River Basin; Washington County, Utah; and Dona Ana County, New Mexico), and (B) a comparison of the same four populations regarding the four possible conditions of the prefrontals: a) prefrontals in contact at the midline, b) two prefrontals separated by a median prefrontal, c) prefrontals separated by the median frontonasal and frontal which contact each other, and d) abnormal arrangement or shape of the prefrontals and adjacent scales. Symbols as in Fig. 1.

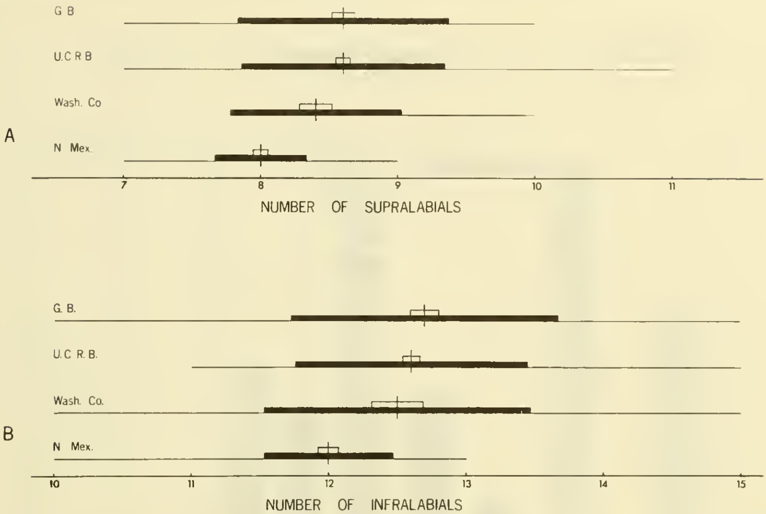

Figure 5. (A) the total number of supralabials on both sides of the head from the rostral to a point below the middle of the eye, and (B) the total number of infralabials on both sides of the head from the mental to a point below the middle of the eye in four populations of *Uta stansburiana* (Great Basin in Utah; Upper Colorado River Basin; Washington County, Utah; and Dona Ana County, New Mexico). Symbols as in Fig. 1.

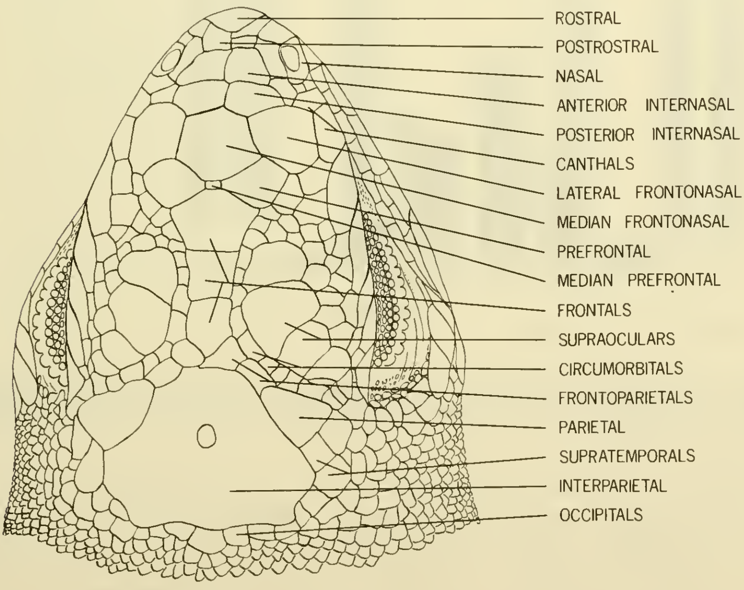

Figure 6. Illustration of the dorsal head scales of *Uta stansburiana* modified from BYU 22985. See Fig. 13.

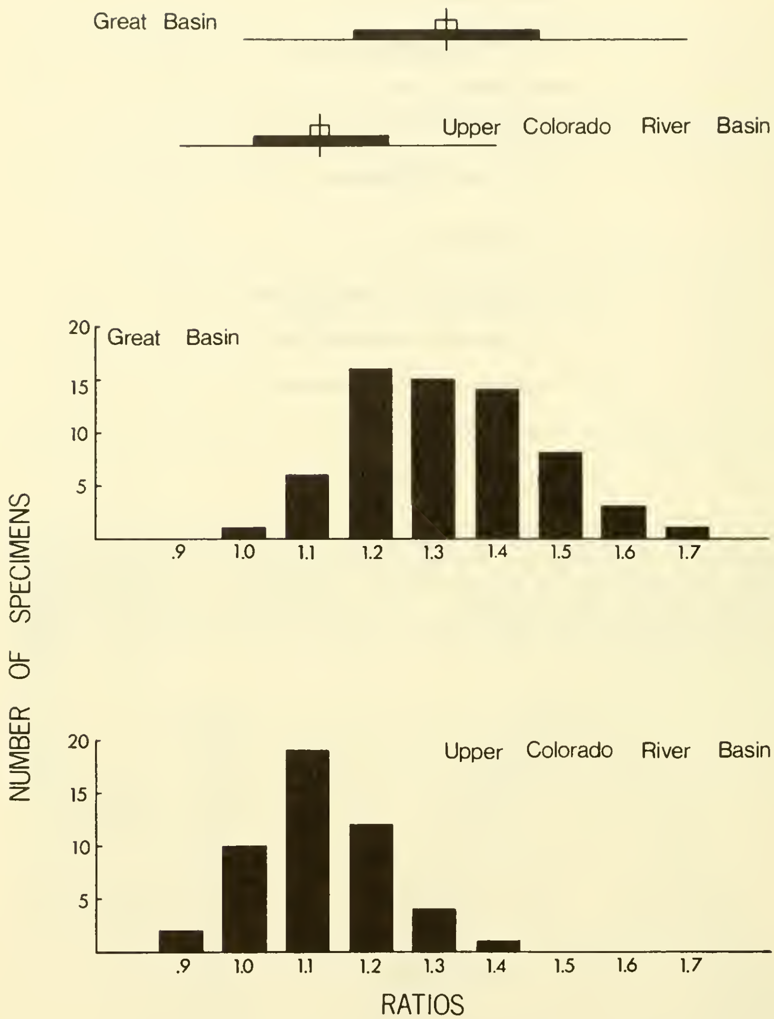

Figure 7. The ratios of the length of the average lateral frontonasal to the length of the median frononasal in the two major Utah populations of *Uta stansburiana*. Symbols as in Fig. 1.

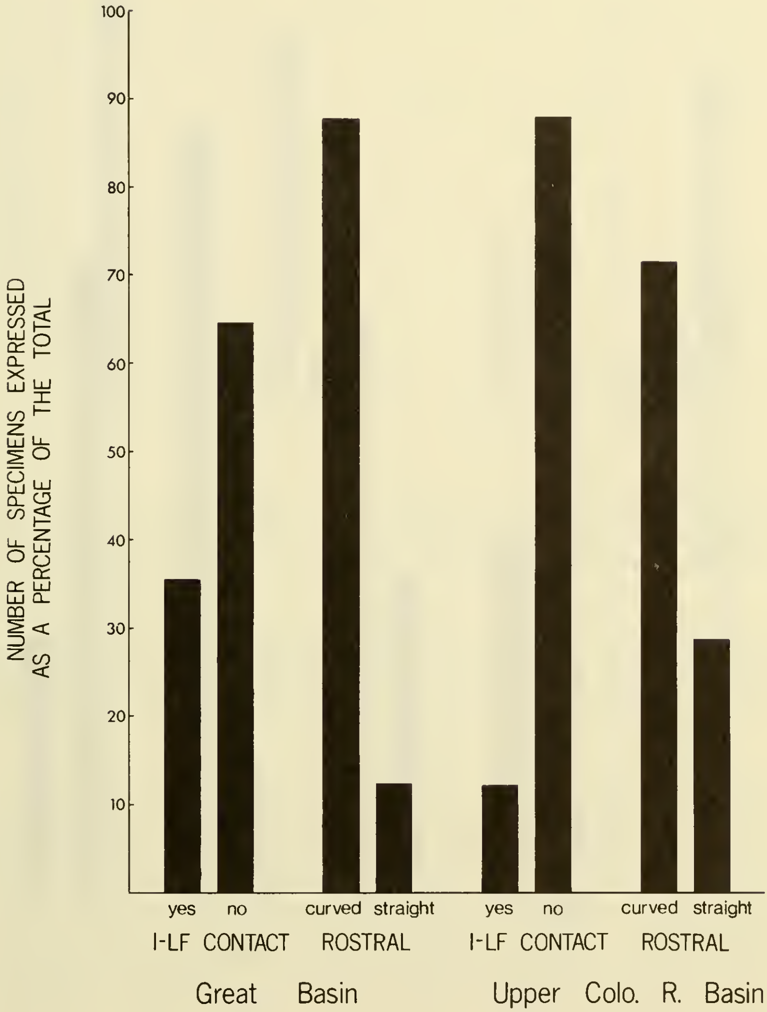

Figure 8. Internasal—lateral frontonasal contact, and shape of the upper edge of the rostral in the two major Utah populations of *Uta stansburiana*.

All measurements were made with a metric ruler or by using an ocular micrometer in a dissecting microscope. Where applicable, statistical tests of significance (as discussed by Mayr, Linsley, and Usinger, 1953) were applied to the data. They included: Chisquare test ($P = 0.05$ level of significance), comparison of means by calculating the standard error of the difference between the two means, and a

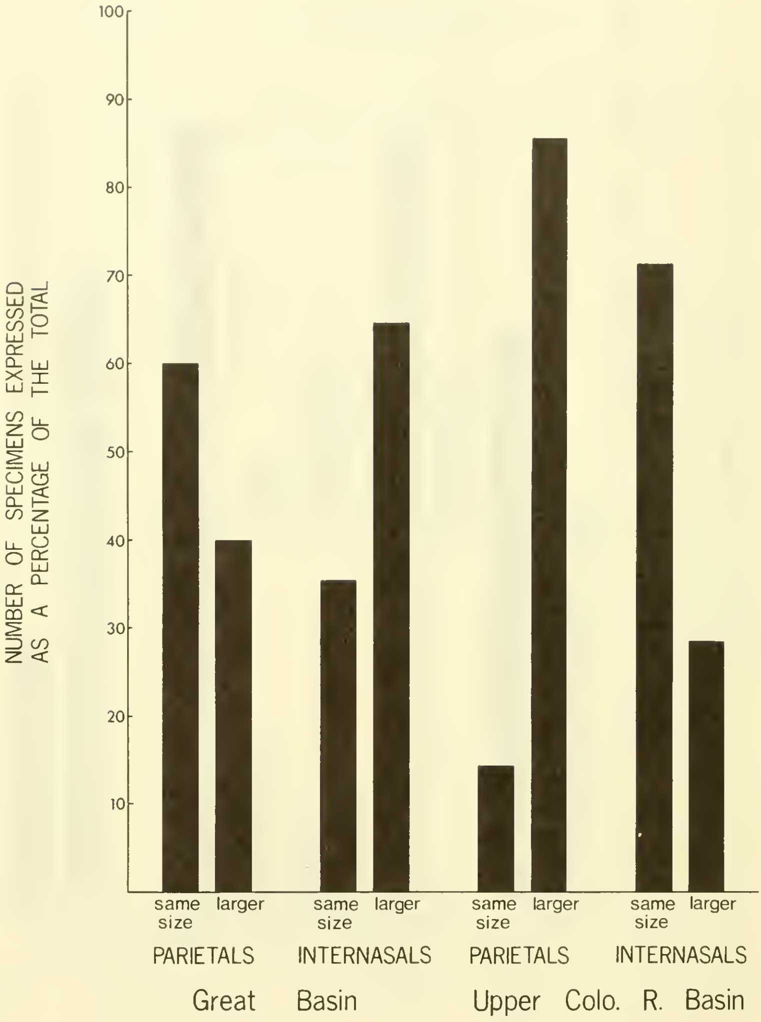

Figure 9. A camparison of parietal size with the frontoparietals and supratemporals, and anterior internasals with the posterior internasals in the two major Utah populations of *Uta stansburiana*.

determination of the percentage of overlap between populations by the calculation of the coefficient of difference.

Discussion

Analysis of variation indicates the presence of two subspecies of *Uta stansburiana* and possibly a third in Utah. The Great Basin and

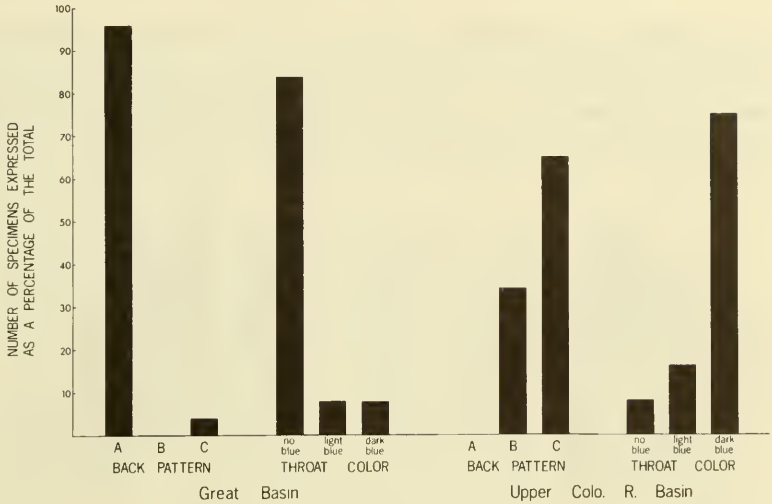

Figure 10. A comparison of the three possible conditions of back pattern and throat or gular coloration in the two major Utah populations of *Uta stansburiana*. Back patterns: (A) typical *Uta* pattern of stripes chevrons, or U-shaped marks: (B) spotted pattern, usually in rows; (C) uniform color without a pattern of light or dark markings.

Upper Colorado River Basin contain two distinct populations, and Washington Co., may contain a third or represent a zone of intergradation between these two and perhaps a population to the south.

Color Patterns

All of the Upper Colorado River Basin specimens examined were either without a back pattern or have regularly or irregularly scattered small dark brown spots; whereas 96% of the Great Basin specimens examined have some form of the typical *Uta* back pattern of stripes, chevrons, or U-shaped marks. This difference is adequate to satisfy the 75% rule of subspecific differentiation as stated by Mayr, Linsley, and Usinger (1953). Ballinger and McKinney (1967) found patternless individuals to be rare in the Texas population of *U. s. stejnegeri*. Tinkle (1969) states that *U. s. stansburiana* "is small, with little or no pattern, and with little sexual dimorphism." Obviously his statement is based on utas observed in the Upper Colorado Basin of western Colorado and eastern Utah (Fig. 11). However, such is not the case for utas from the Great Basin of western Utah and Nevada. With few exceptions utas from the Great Basin (*U. s. stansburiana*) are highly dimorphic in their color pattern (Figs. 12 & 13).

The difference observed in blue throat color (91.8% of the Upper Colorado River Basin population with blue throat, and 84% of the Great Basin population without), although not as nomenclaturally significant as the back pattern, is adequate to distinguish nearly all individuals. Figs. 11 and 12 show the typical dorsal and ventral markings of these two populations, and a New Mexico population from near the type locality of *U. s. stejnegeri*.

We suspect that there may be many types of selective pressure operating and that many environmental complexities may exist. The following are cited as examples that may be acting as selective pressures on one or both of these populations.

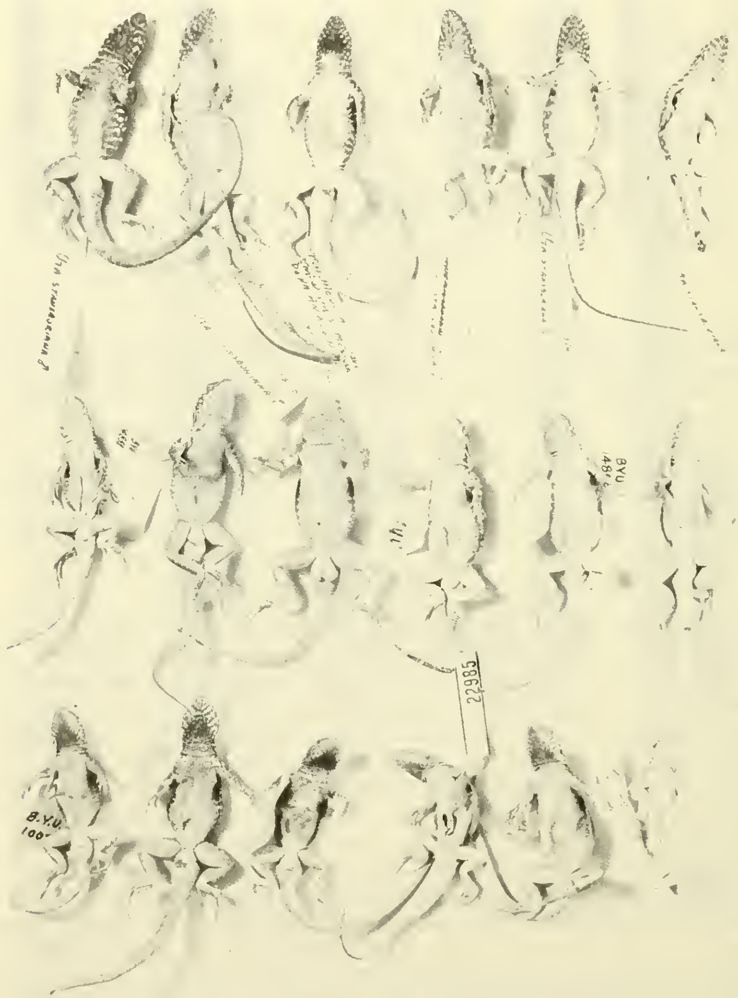

Figure 11. Dorsal views of three male (left side of figure) and three female (right side of figure) *Uta stansburiana* from three different populations: top row) Dona Ana County, New Mexico; middle row) Great Basin in Utah; and bottom row) Upper Colorado River Basin.

A lizard whose occurrence is not as general but nevertheless rivals *Uta stansburiana* in abundance at scattered locations throughout the Upper Colorado River Basin (as well as to the south) is *Urosaurus ornatus*. Although these species usually occupy distinctly different niches in the environment we have found them basking on the same rocks. Because of their similarities (in overall size, color, shape, courting, defense behavior, and the overlapping of habitat preference in

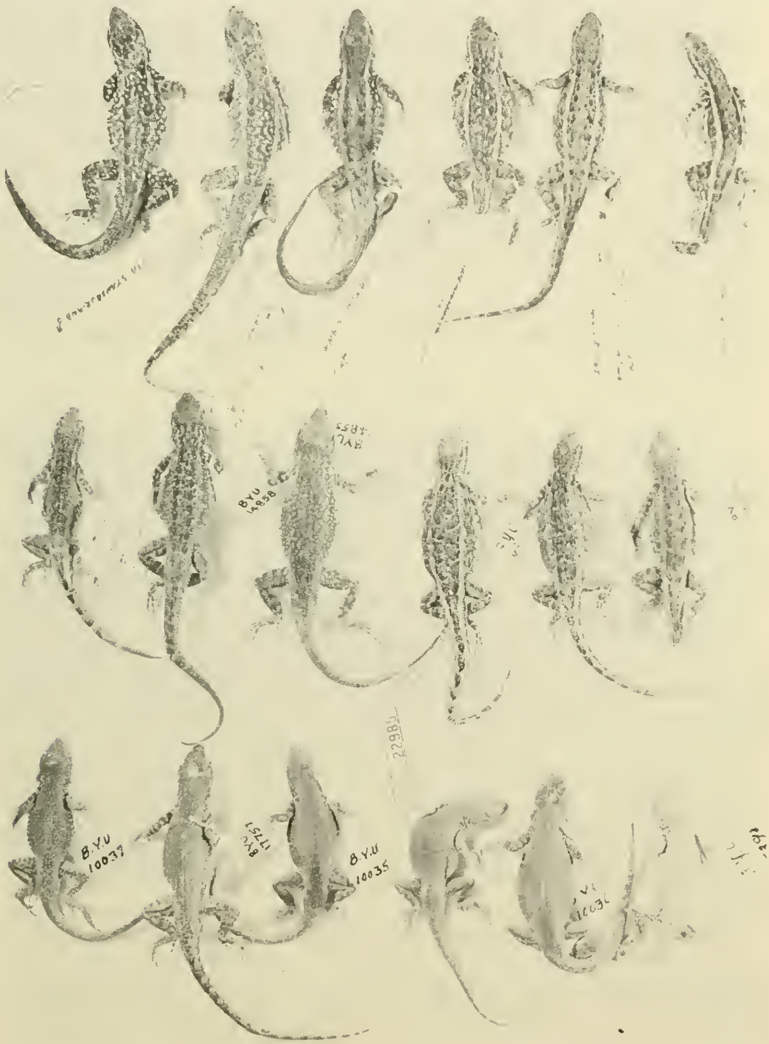

Figure 12. Ventral views of three male (left side of figure) and three female (right side of figure) *Uta stansburiana* from three different populations: top row) Dona Ana County, New Mexico; middle row) Great Basin in Utah; and bottom row) Upper Colorado River Basin.

the Upper Colorado River Basin) there may have been exerted selective pressure favoring the development of differences between them, especially differences that would aid in the selection of mates of the same species during the breeding season. Examination of live specimens of these two species readily reveals that *Urosaurus* has a distinctly marked back, whereas *Uta* does not; and also a reddish-brown throat with greenish-blue patches on the sides of the belly whereas *Uta* has a blue throat and reddish-orange to orange color on the sides of the belly. These colors may be easily seen, especially in Urosaurus, by observing the lizards during their bobbing display.

Different types of habitat are found in the Great Basin and the Upper Colorado River Basin. The habitat in the Great Basin consists of a more dense plant cover growing in soil containing rocks, sand, and covered with plant debris. In the Upper Colorado River Basin there are more open areas between the sparse vegetation and the rocks and soil are mainly derived from the reddish sandstone formations. It seems probable that an irregularly patterned and colored lizard would be less likely to be seen by predators in the Great Basin; and a uniformly patterned reddish-brown lizard would be less likely to be seen in the Upper Colorado River Basin.

Scale Patterns

The differences in the ratio of lateral frontonasal length to median frontonasal length, the number of dorsal scales, parietal size, and internazal size, although not adequate to satisfy the 75% rule, are sufficiently great to allow the separation of most Great Basin and Upper Colorado River Basin specimens. The distinction is even greater if these characters are used in combination with each other or with the back pattern and throat color characteristics.

The additional characters which show significant differences do not, by themselves, justify the separation of the Great Basin and Upper Colorado River Basin populations; but when included with more significant characters provide clues to evolutionary trends within these populations, and therefore support their separation.

The presences of larger anterior internasals and larger lateral frontonasals in Great Basin specimens probably accounts for their being more frequently in contact in this population. If this is the case, this characteristic (anterior internasal - lateral frontonasal contact) should probably not be included as a separate character, but considered instead as a result of the same gene modifications which produced the larger sized anterior internasals and lateral frontonasals.

In 1965, Tanner noted variation in six local populations of *Uta* in the uranium areas of the central Upper Colorado River Basin. Tanner's data suggested smaller dorsal scales than in this study with an average mean of 103.44 for 1,261 specimens. Part of this discrepancy can be explained from the fact that over 1,000 of these were from areas west of the Colorado and Green Rivers where dorsal counts average 105 to 106.

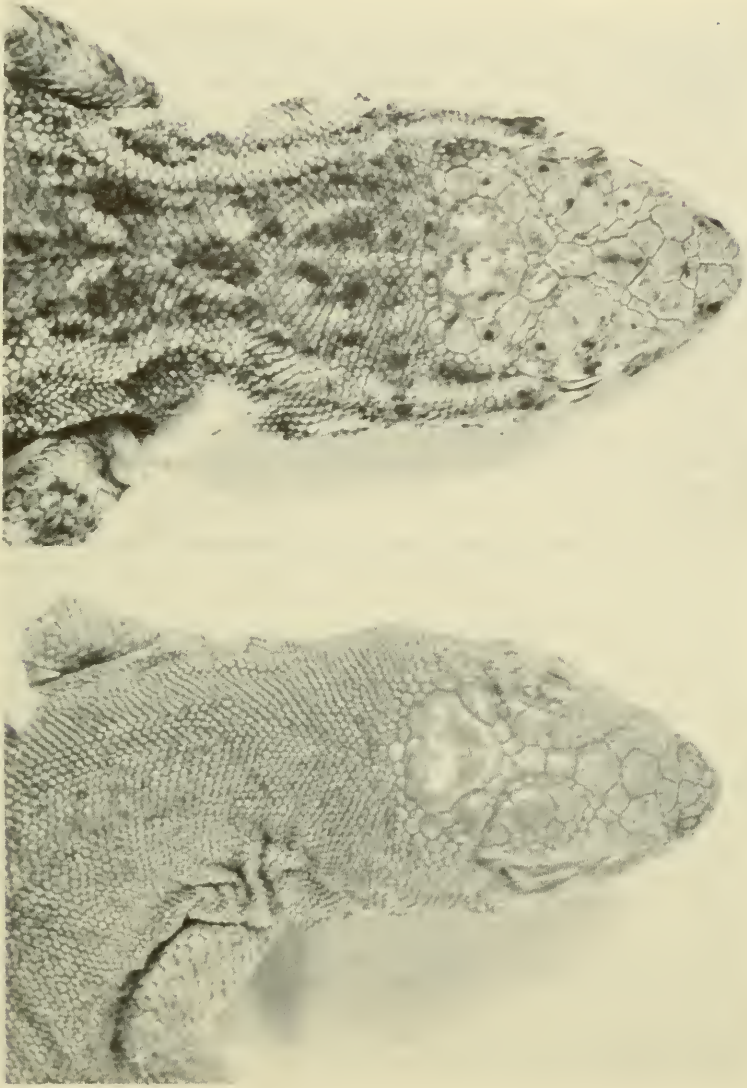

Figure 13. Dorsal view of the head of *Uta stansburiana* (top) BYU 9063, female and *Uta stansburiana uniformis* (bottom) BYU 22985 female.

A series of 270 specimens from Grand County east of Green River City and north of the Colorado River have lower counts, with a mean of 99. Specimens from western Colorado average 102 to 103. These variations may result from river barriers or deep canyons which impede or stop movement and thus increase isolation of segments of a widespread population.

The current separation of *U. s. stansburiana* from *U. s. stejnegeri* is based, in part, on the number of dorsal scales (94 or more in *stansburiana*, 93 or fewer in *stejnegeri*). The presence of a distinct population within the range of what has been called *U. s. stansburiana* with a significantly larger number of dorsal scales than specimens from near the type locality of *stansburiana* presents the problem of redefining the difference, in this character at least, between these two subspecies. Ruthven's (1913) *U. s. nevadensis* from northern Nevada was described as having dorsal scales one-fourth or one-fifth smaller than *U. s. stansburiana* (which should result in a larger number of scales, the lizards being about the same size). In 1915, Richardson found an average of 103.4 dorsal scales in a series of *Uta* collected primarily from northern Nevada. A comparison of their data with our data on the number of dorsal scales in specimens from western Utah indicates that there might be two distinctly different populations in the major basins of the Great Basin as Ruthven proposed. It definitely indicates the need for a more thorough study of all Great Basin utas.

The Great Basin and Upper Colorado River Basin populations were found in contact at two locations, in western Wayne and Garfield Counties. In both areas individuals with intermediate characters were found. In Washington and Kane Counties, Utah a broad area of contact between populations occurs in the Virgin River Valley.

The Sevier River (which drains into the Great Basin) extends into western Garfield Co., and closely approaches western Wayne Co., we have seen distinctly patterned *Uta* in Bryce Canyon National Park at an elevation of more than 7,600 feet. These *Uta*, plus the previously mentioned Upper Colorado River Basin specimens which show distinct back patterns, suggest that the Great Basin population extends to near the head of the Sevier River drainage and may extend into the western tributaries in this part of the Upper Colorado River Basin. Apparently as a result of the altitude and competition with the presumably better adapted *Sceloporus graciosus*, which is much more abundant in this area, few *Uta* are found. The reduced numbers of individuals would lead to fewer and infrequent contact, and thus minimal interbreeding between these populations.

A more extensive series of specimens from Washington Co. includes specimens intermediate between the Great Basin and Upper Colorado River Basin populations. These also appear to be intermediate between both populations and a population to the south. If this is the case, a zone of three-way intergradation occurs and thus probably an area of greater complexity than almost any area within the range of *Uta stansburiana*. Additional series of specimens from the south (Arizona), west (western Nevada and eastern California), and east from St. George would be necessary to determine accurately the relationships of these lizards to the other *Uta* populations. The relative abundance of specimens from western Kane County with the spotted back pattern may also indicate intergradation between the Great Basin and Upper Colorado River Basin populations.

Because the type locality of *Uta stansburiana stansburiana* is in the eastern Great Basin, and no other name has been based upon the Upper Colorado River Basin population, a new name for the latter must be proposed. In recognition of the almost completely patternless condition of the back, we propose:

Uta stansburiana uniformis subsp. nov.

HOLOTYPE.—Adult Male, BYU 10035, from Split Mountain. Uintah County, Utah, obtained by Wilmer W. Tanner, 21 May 1950.

PARATYPES.—UTAH: Uintah Co., topotypes BYU 10036-7; Duchesne Co., Roosevelt, BYU 13030-2; Carbon Co., Price, 22985-7; Emery Co., Lower Temple Mountain Mesa, BYU 21231-2, 21235, 21240-1, 21245; Grand Co., Yellow Cat Mining District, BYU 20179; Wayne Co., Hanksville, BYU 8398, COLORADO: Moffat Co., UCM 5524-5, 5527, 5529; Delta Co., UCM 32655-7; Montezuma Co., UCM 4880-3, New Mexico—San Juan Co., 13 miles W of Farmington, BYU 32328-31.

Types are in the collection of the Brigham Young University Museum of Natural History (BYU) and the University of Colorado Museum (UCM).

DIAGNOSIS.—This subspecies is most closely related to *U. s. stansburiana* from which it may be distinguished by the almost complete absence of a back pattern (or, if present, a pattern consisting of rows or irregularly scattered small [1-4 scales] dark brown spots); distinct blue color on the throat or gular region; a larger number of dorsal scales, average 101.6 as opposed to an average of 93.3 in *stansburiana;* parietals usually more than 1½ times the size of either the supratemporals or frontoparietals (85.7% in *uniformis*, 40.0% in *stansburiana*); and the anterior and posterior *internasals* usually of about the same size (71.4% in *uniformis*, 35.4% *in stansburiana*).

Description of the type: total length 111 mm; snout-vent length 43mm; 102 dorsal scales; 63 ventral scales; rostral width 2.4 times greater than height, upper edge concave on both sides; two postrostrals between right anterior internasal and rostral, one postrostral between anterior internasal and rostral; anterior and posterior internasals approximately same size; ratio of average lateral frontonasal length to median frontonasal length is 1.25, lateral frontonasals separted from anterior internasals by 0.2 mm; two normal-sized prefrontals separated by smaller median prefrontal; frontal divided transversely into two scales, anterior about 1½ times longer and wider than posterior; five frontoparietals; parietals conspicuously larger than frontoparietals and supratemporals; five supratemporals, the left posterior supratemporal divided longitudinally; interparietal with single scale set in concavity on posterior edge; eight occipitals contacting posterior edge of interparietal; four supraoculars on each side, separated from parietals by two rows of circumorbitals, and from frontoparietals and frontals by one row of circumorbitals; supralabials to point below middle of eye 5-5; infralabials to point below middle of eye 7-6; femoral pores 14-14.

Back uniformly gray in alcohol, without pattern, except for irregularly scattered blue scales (common in males of this species), and occasional small dark brown spots not conforming in shape or size to shape or size of scales. Light spots on sides diminishing in size towards back; ventral surface with scattered patches of dark pigment blending into darker color of sides and back; black spots on sides behind forelegs large, 20 scales long by 15 wide. Throat or gular region heaily pigmented with dark blue. Tail uniformly colored without pattern except for small blue spots on anterior dorsal portion (Figs. 11, 12, and 13).

Range.—Upper Colorado River Basin (Colorado, Green, and San Juan River Drainages) upstream from Glen Canyon Dam, including SE Utah, W Colorado, NW New Mexico, and NE Arizona, and intergrading with subspecies to the west through SW Utah and NW Arizona.

Specimens Examined

Most of the specimens came from Brigham Young University (BYU) collection, and included the following numbers: *Great Basin*—492,616, 621, 623, 1018, 1690, 1691, 2078, 2785, 3314. 3315, 4185, 4193, 4194, 5323, 8197-8200, 8325, 8790, 8793-94, 8938-40, 9063-66, 9307-13, 9817-20, 10054-56, 10178, 10188-91, 10275, 10377, 11505-07, 11525-27, 11529-31, 12456, 12933, 13074-76, 14855-67, 14869-75, 15080-87, 16599, 16600, 21036, 21922, 21928-33, 23573, 32342-44; *Upper Colorado River Basin*—191, 589, 596, 624, 1002, 1706, 1827-30, 1885, 1901-03, 1918, 2155, 2249, 2743, 2983, 3400, 3432, 4178-82, 4191, 8398, 9044, 10035-37, 11265, 11266, 11852, 11873, 11874, 11901, 12442-44, 12448-53, 12455, 12492, 12695-98, 12967, 13029-33, 14189, 14664-65, 14924-25, 14930-32, 14934, 16796, 17752-58, 17892, 18960-61, 18995-96, 20172-82, 20198-12, 20303-09, 20977, 21230-45, 21410-12, 21545-52, 21567-68, 21597-08, 21863, 21936, 22102, 22103, 22985-87, 23566, 23567, 32322-25, 32327-37, 32349-51; *Washington County, Utah*—571, 673, 708, 1213, 2251-52, 3277, 3287-88, 3347-48, 3352-53, 3654, 4195, 8947, 8947, 9722, 9821-23, 9830-37, 12965, 16578-79, 32355-64.

Upper Colorado River Basin specimens examined from the University of Colorado are as follows: 2303, 2301, 4096, 4849, 4851, 4859, 4863, 4878-4883, 4890-91, 4893, 4899, 4901, 5524-25, 5527, 5529-30, 17491, 17479, 17503, 32627, 32630-31, 32633, 32635-37, 32641-43, 32650-52, 32654--57, 32659-60, 32664, 32668-69, 32671, 32674.

The Dona Ana County specimens were of two unnumbered series (19 specimens in one, and 27 in the other) from the University of Texas at El Paso. A series from the same area was received from Mr. Philip A. Medica.

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Table 1

Numerical results for 11 characters, based on a summarization of data to include: variation, mean and one standard deviation. *Uta* populations are as follows: (1) Great Basin, (2) Upper Colorado River Basin, (3) Southern New Mexico, (4) Washington County, Utah.

	Populations considered			
Characters	1 (N=103)	2 (N=208)	3 (N=46)	4 (N=30)
Dorsal Scales	82-113(93.3)5.05	91-116(101.2)5.49	77-93(85.0)3.39	79-97(88.8)4.27
Ventral Scales	54-66(59.9)2.43	54-68(61.1)2.73	53-70(61.4)3.26	54-66(59.7)3.0
Femoral Pores	23-32(28.1)1.83	24-36(29.1)1.91	26-34(30.3)1.83	25-32(28.7)1.85
Supra labials	7-10(8.6)0.77	7-11(8.6)0.74	7-9(8.0)0.33	8-10(8.4)0.62
Infra labials	10-15(12.7)0.97	11-15(12.6)0.84	10-13(12.0)0.47	10-15(12.5)0.97
Front parietals	2-8(3.2)1.21	2-6(3.3)1.17		
No. scales between Interparietal and Supraocular	4-7(5.8)0.53	4-6(4.9)0.85		
No. occipitals in contact with Interparietal	5-10(7.1)1.23	5-10(7.6)1.10		
Snout-vent length	40-51(45.4)3.05	39-48(43.4)2.59		
Rostral shape	.39-.59(.494).045	.40-.60(.50).045		
Frontonasal length	1.0-1.7(1.32).146	.9-1.4(1.12).105		

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