

## Catalogue of American Amphibians and Reptiles.

POUGH, F. HARVEY 1973. *Uma inornata*.*Uma inornata* Cope  
Coachella Valley fringe-toed lizard*Uma inornata* Cope, 1895:939. Type-locality, "Colorado Desert, San Diego County, California," in error, corrected to "Coachella Valley, Riverside County, California" by Heifetz (1941:106). Holotype, U. S. Natl. Mus. 16,500 (now lost), collected by C. R. Orcutt.*Callisaurus inornatus*: Cope, 1896:1049.*Uma notata* (part): Camp, 1916:516. See Remarks.*Callisaurus notatus* (part): Stejneger and Barbour, 1917:47.*Uma notata inornata*: Schmidt, 1953:119. First use of combination. See Comment.

- CONTENT. The species is monotypic.

- DEFINITION AND DIAGNOSIS. A medium-sized species of *Uma* (maximum snout-vent length 122 mm in males; 99 mm in females) with a dorsal pattern of ocelli that form longitudinal stripes over the shoulders. The ventrolateral blotch is absent, or present only as a minute cluster of black dots. The gular chevrons are broken or faint medially. There are usually 3 internasals, rarely 2 or 4. Femoral pores number 18 to 28, mean about 23 (Heifetz, 1941; Norris, 1958). The breeding coloration consists of a pinkish lateroventral suffusion between the axilla and groin along the lateral fold and orange washes over the anterior supralabials and infralabials and posterior festoons of the eye (Norris, 1958:289). Sexual dimorphism may be evidenced in adult females by "diffuse starring of the dorsal ocelli on the latero-posterior portion of the abdomen" (Norris, 1958:289).

- DESCRIPTIONS. The best descriptions are those of Cope (1900), Heifetz (1941), Smith (1946), and Norris (1958). Many authors between 1916 and 1941 described *U. inornata* as part of a composite "*U. notata*."

- ILLUSTRATIONS. Sources of illustrations are Mosauer (1935, photograph of head), Heifetz (1941, dorsal and ventral photographs), Cowles (1941, photograph of hind foot), Stebbins (1944, photographs and drawings of living animal, lateral and parietal eye sections), Smith (1946, photograph of living individual), and Stebbins (1954, 1966, diagrams of ventral pattern).

- DISTRIBUTION. *Uma inornata* is limited to sand dunes in the Coachella Valley and San Geronio Pass, Riverside County, California. Norris (1958) published maps showing the present distribution (fig. 6) and probable migration routes (fig. 17) of the species. He found that *U. inornata* occurs in San Geronio Pass as far west as the mouth of Snow Creek Wash, but not in apparently suitable habitat farther westward. In contrast, *Callisaurus draconoides* ranges through the pass into the San Jacinto Valley. Norris suggested that climatic factors limit the range of *U. inornata* at that point. Photographs of typical habitat are in Mosauer (1935), Stebbins (1944), Mayhew (1965), and Pough (1970).

- PERTINENT LITERATURE. *Uma inornata* has been extensively studied. Mosauer (1935), Stebbins (1944), and Pough (1970) investigated the burrowing behavior and ecology of the species. The lizards bury themselves in loose sand to escape extreme temperatures. Sand grain size affects choice of burrowing sites and distribution within an area of dunes. Norris (1958:265-266) tabulated characteristics of sand from localities inhabited by *Uma* in the United States and northwestern Mexico. *Uma inornata* rarely buries more than a few centimeters deep. If the sand becomes too hot they escape on the surface, rather than burrowing deeper to reach cooler sand. At Palm Springs, Riverside County, California, *inornata* did not bury deep enough to escape midday heat in summer. They retreated to open rodent burrows, when these were available. At night they burrowed into the windward end of small dunes where sand accumulated around shrubs. The buried twigs and leaves of the shrubs probably provided protection from predators, and perhaps reduced the pressure of overlying sand (Pough, 1970). A photograph of a resting site in sand is in Cowles and Bogert (1941: plate 29, fig. 2), and characteristic tracks in sand are illustrated in Mosauer (1935).

Cowles (1941) reported one hibernating individual unearthed from 12 inches (30 cm) below the surface of a sand hummock on 20 February 1938. Juveniles may not hibernate as their small body size allows them to attain activity temperatures on favorable days in winter.

*Uma inornata* breathes by vertical movements of the venter in contrast to the usual lizard pattern of lateral compression of the rib cage. This respiratory mechanism prevents sand from sliding into the space created by exhalation when the lizard is buried (Pough, 1969c). A moist sand pack may form over the nostrils, preventing entry of individual sand grains and reducing water loss. Stebbins (1943, 1948) investigated the role of the nasal valves and nasal passages in excluding sand. The nasal valves exclude some particles from the nasal passages, which slope upward from the nostrils. Inhalation is slow and is followed by forceful exhalation that blows sand grains out of the nasal passages.

Pough (1969a, 1969b) found no physiological adaptations for burial in *U. inornata*. Oxygen affinity of the hemoglobin is similar to that of other lizards, and the Bohr Effect is greater than in the non-burrowing *Sceloporus occidentalis*. Buried *U. inornata* had lower heart rates than those on the surface, but this is merely a reflection of activity levels. A previous report of bradycardia in buried lizards (Norris and Kavanau, 1966) was not confirmed. Cook (1949) reported a metabolic rate of 0.1 ml O<sub>2</sub>/gm hr for *U. inornata* at about 30° C.

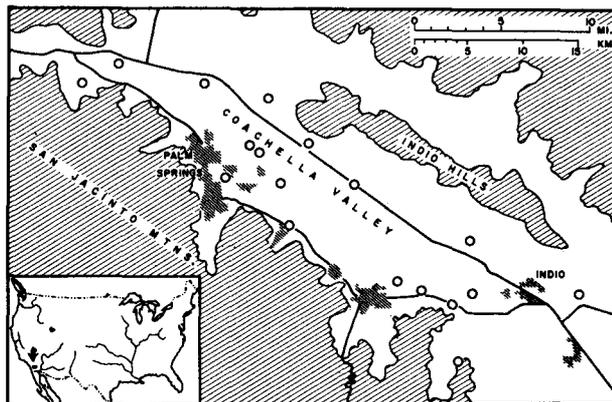
Mayhew (1964a) reported the following body temperature parameters based on field measurements from 416 lizards: maximum 44.0° C; minimum, 25.8; mean, 38.0; median, 38.0; mode, 38.0. Cowles and Bogert (1944) reported that *U. inornata* did not emerge until they reached a body temperature of 26° C.

Mayhew (1961, 1964b, 1965, 1967, 1968) and Mayhew and Wright (1970) studied reproduction in *U. inornata*. Enlargement of testes and development of eggs are dependent upon winter rainfall that promotes growth of annual plants on the sand dunes. Under favorable conditions males have motile sperm at the terminal end of the *vas deferens* from mid-April through September, and females have oviducal eggs in the same period.

The alert posture and challenge display posture in *U. inornata* are the same as those described for *U. notata*. The display action pattern of *U. inornata* also is very similar to that of *U. notata*. It consists of three push-ups, the last followed by lowering to half height and a final, higher push-up. The entire sequence takes 3.2-3.3 seconds, slightly faster than *U. notata* (Carpenter, 1963). Burt (1931) called attention to the presence of a throat fan in *U. inornata*.

Kral (1969) reported that the diploid chromosome number of male *U. inornata* is 2n = 33, consisting of 12 metacentric macrochromosomes and 21 microchromosomes. The sex chromosomes in males are X<sub>1</sub>X<sub>2</sub>Y and in females X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>. The diploid number for female *U. inornata* would thus be 2n = 34.

Campbell (1969) found that *U. inornata* was most sensitive to sounds of 3000 Hz, and that auditory sensitivity was greatest at head temperatures of 34-38° C. Stebbins and Eakin (1958) studied the effect of parietectomy on the thyroid epithelium



MAP. Hollow symbols mark known localities; the type-locality is too indefinite to be indicated. Diagonal lines indicate urban and upland areas. The species is restricted to windblown sand dunes, so the distribution is discontinuous.

of *U. inornata*. Norris (1967) presented data on color adaptation in relation to thermal ecology. Etheridge (1964) noted xiphisternal rib formula, and Gabe, Martoja, and Saint Girons (1964) described adrenal morphology.

• REMARKS. Although it was adequately diagnosed by Cope (1895, 1900) *Uma inornata* was long considered a synonym of *U. notata*, probably as a result of the influential works of Camp (1916) and Van Denburgh (1922). References to "*Uma notata*" published between 1916 and 1941, when *U. inornata* was resurrected (Heifetz, 1941), can be correctly attributed to species only if detailed locality data or photographs are included.

• ETYMOLOGY. *Inornata* (Latin, "unadorned") refers to the absence of ventrolateral blotches.

#### COMMENT

Schmidt (1953:119) considered *inornata* a subspecies of *Uma notata*, an arrangement that was followed by Norris (1958). Norris (1958) suggested that the magnitude of difference between these forms is comparable to that between subspecies of other lizards. Although the populations of *Uma inornata* and *U. notata* are allopatric, their ranges are separated by as little as 30 miles (W. W. Mayhew, pers. comm.). Mayhew (1964a) pointed out a number of physiological differences between *notata* and *inornata*, including activity temperature, testis volume, reproductive response to light stimulation, and length of the male reproductive season. Interspecific matings have not been observed in captive animals, although conspecific matings have been recorded. The ventrolateral blotch, the most striking external difference between the forms, is displayed in the courtship of *notata*, and apparently releases the response of the female to courtship (Mayhew, pers. comm.). In view of this additional non-morphological evidence, I follow Mayhew (1964b) in retaining *Uma inornata* as a distinct species.

#### LITERATURE CITED

- Burt, C. E. 1931. On the occurrence of a throat fan in the sand lizard *Uma notata* Baird, with notes on the adaptive specializations of the form. *Copeia* 1931(1):15-16.
- Camp, Charles L. 1916. Notes on the local distribution and habits of the amphibians and reptiles of southeastern California in the vicinity of the Turtle Mountains. *Univ. California Publ. Zool.* 12(17):503-544.
- Campbell, Howard W. 1969. The effects of temperature on the auditory sensitivity of lizards. *Physiol. Zool.* 42(2):183-210.
- Carpenter, Charles C. 1963. Patterns of behavior in three forms of the fringe-toed lizards (*Uma*, Iguanidae). *Copeia* 1963(2):406-412.
- Cook, S. F. 1949. Respiratory metabolism of certain reptiles and amphibians. *Univ. California Publ. Zool.* 53(10):367-376.
- Cope, Edward D. 1895. On the species of *Uma* and *Xantusia*. *Amer. Nat.* 29:938-939.
- 1896. On the genus *Callisaurus*. *Amer. Nat.* 30:1049-1050.
- 1900. The crocodylians, lizards and snakes of North America. *Ann. Rept. U. S. Natl. Mus.* for 1898:153-1294.
- Cowles, Raymond B. 1941. Observations on the winter activities of desert reptiles. *Ecology* 22(2):125-140.
- , and Charles M. Bogert. 1944. A preliminary study of the thermal requirements of desert reptiles. *Bull. Amer. Mus. Nat. Hist.* 83(5):261-296.
- Etheridge, Richard. 1964. The skeletal morphology and systematic relationships of sceloporine lizards. *Copeia* 1964(4):610-631.
- Gabe, M., M. Martoja, and H. Saint Girons. 1964. Etat actuel des connaissances sur la glande surrenale des reptiles. *Annee Biol.* 3:303-376.
- Heifetz, William. 1941. A review of the lizards of the genus *Uma*. *Copeia* 1941(2):99-111.
- Kral, B. 1969. A karyotype study of the fringe-toed lizard *Uma inornata* Cope, 1895. *Zool. Listy* 18(2):185-194.
- Mayhew, Wilbur W. 1961. Photoperiodic response of female fringe-toed lizards. *Science* 134:2104-2105.
- 1964a. Photoperiodic responses in three species of the lizard genus *Uma*. *Herpetologica* 20(2):95-113.
- 1964b. Taxonomic status of California populations of the lizard genus *Uma*. *Herpetologica* 20(3):170-183.
- 1965. Reproduction in the sand-dwelling lizard *Uma inornata*. *Herpetologica* 21(1):39-55.
- 1967. Comparative reproduction in three species of the genus *Uma*, pp. 45-61. In Milstead, W. W., ed., *Lizard ecology: A symposium*. Univ. Missouri Press, Columbia. xii + 300 p.
- 1968. The biology of desert amphibians and reptiles, pp. 195-356. In Brown, G. W., Jr., ed., *Desert Biology*. Vol. 1. Academic Press, New York. xvii + 635 p.
- , and S. J. Wright. 1970. Seasonal changes in testicular histology of three species of the lizard genus *Uma*. *J. Morph.* 130(2):163-186.
- Mosauer, Walter. 1935. The reptiles of a sand dune area and its surroundings in the Colorado Desert, California: A study in habitat preference. *Ecology* 16(1):13-27.
- Norris, Kenneth S. 1958. The evolution and systematics of the iguanid genus *Uma* and its relation to the evolution of other North American desert reptiles. *Bull. Amer. Mus. Nat. Hist.* 114(3):247-326.
- 1967. Color adaptation in desert reptiles and its thermal relationships. pp. 162-229. In Milstead, W. W., ed., *Lizard ecology: A symposium*. Univ. Missouri Press, Columbia. xii + 300 p.
- , and J. L. Kavanau. 1966. The burrowing of the western shovel-nosed snake, *Chionactis occipitalis* Hallowell, and the undersand environment. *Copeia* 1966(4):650-664.
- Pough, F. Harvey. 1969a. Physiological aspects of the burrowing of sand lizards (*Uma*, Iguanidae) and other lizards. *Comp. Biochem. Physiol.* 31(6):869-884.
- 1969b. Environmental adaptations in the blood of lizards. *Comp. Biochem. Physiol.* 31(6):885-901.
- 1969c. The morphology of undersand respiration in reptiles. *Herpetologica* 25(3):216-223.
- 1970. The burrowing ecology of the sand lizard, *Uma notata*. *Copeia* 1970(1):145-157.
- Schmidt, Karl P. 1953. A check list of North American amphibians and reptiles. Sixth edition. *Publ. Amer. Soc. Ichthyol. Herpetol.*, Chicago. viii + 280 p.
- Smith, Hobart M. 1946. *Handbook of lizards: Lizards of the United States and of Canada*. Comstock Publ. Co., Ithaca, New York. xxii + 557 p.
- Stebbins, Robert C. 1943. Adaptations in the nasal passages for sand burrowing in the saurian genus *Uma*. *Amer. Nat.* 77(768):38-52.
- 1944. Some aspects of the ecology of the iguanid genus *Uma*. *Ecol. Monogr.* 14:311-332.
- 1948. Nasal structure in lizards with reference to olfaction and conditioning of the inspired air. *Amer. J. Anat.* 83(2):183-222.
- 1954. *Amphibians and reptiles of western North America*. McGraw-Hill Co., New York. xxiv + 528 p.
- 1966. *A field guide to western reptiles and amphibians*. Houghton Mifflin Co., Boston. xiv + 279 p.
- , and R. M. Eakin. 1958. The role of the "third eye" in reptilian behavior. *Amer. Mus. Novitates* (1870):1-40.
- Stejneger, Leonhard, and Thomas Barbour. 1917. *A check list of North American amphibians and reptiles*. Harvard Univ. Press, Cambridge, Mass. iv + 125 p.
- Van Denburgh, John. 1922. *The reptiles of western North America*. Vol. 1. *Occas. Papers California Acad. Sci.* 10:1-611.

F. H. POUGH, CORNELL UNIVERSITY, ITHACA, NEW YORK 14850.

Primary editor for this account, Clarence J. McCoy.

Published 30 August 1973 by the SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES.