Catalogue of American Amphibians and Reptiles.

Pianka, E.R. 1991. *Phrynosoma platyrhinos.*

Phrynosoma platyrhinos Girard
Desert Horned Lizard

Phrynosoma platyrhinos Girard, *In* Baird and Girard, 1852 (1854):69. Type-locality, "from [the vicinity of the] Great Salt Lake, [Salt Lake County, Utah]". Syntypes, National Museum of Natural History (USNM) 189 (3 specimens, all adults, one male and two unsexed) and Museum of Comparative Zoology, Harvard (MCZ) 5948, subadult female, collected "by Capt. Stansbury's party", date of collection unknown (not examined by author).
Phrynosoma platyrhynos: Hallowell, 1853:107.
Doliosaurus platyrhinos: Girard, 1858:409.
Phrynosoma platyrhinum: Cope, 1875:49.
Phrynosoma maccallii: Yarrow and Henshaw, 1878:1647 (part).
Phrynosoma platyrhinus: Boulenger, 1885:247.
Anota platyrhina: Cope, 1900:443.
Phrynosoma plathyrhinos: Böhme, 1988:38. *Lapsus.*

• **Content.** Three subspecies are recognized: *platyrhinos*, *calidiarum*, and *goodei*. See Remarks.

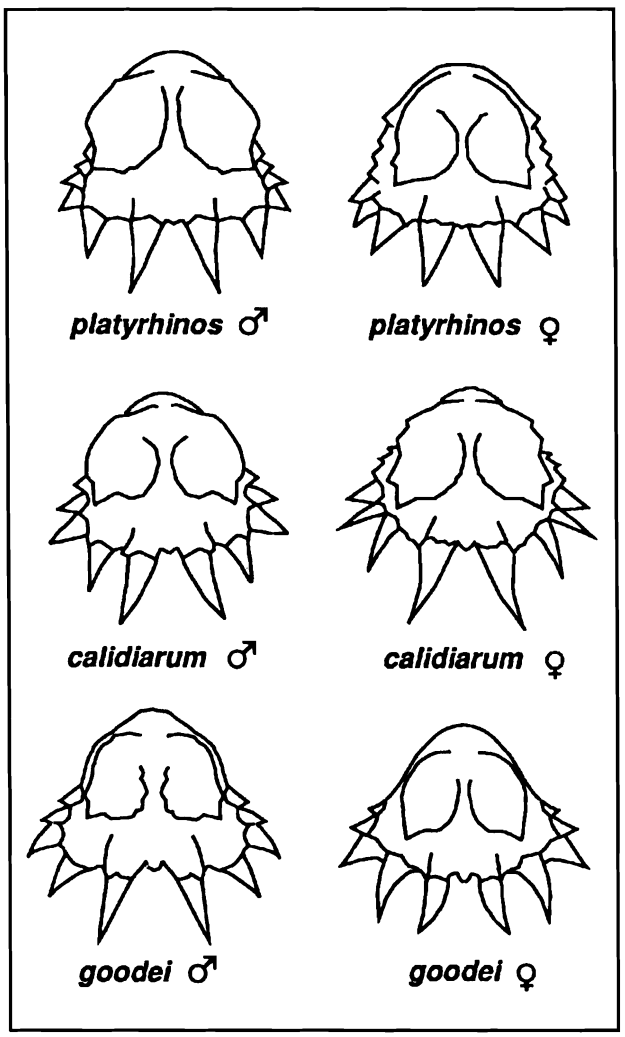
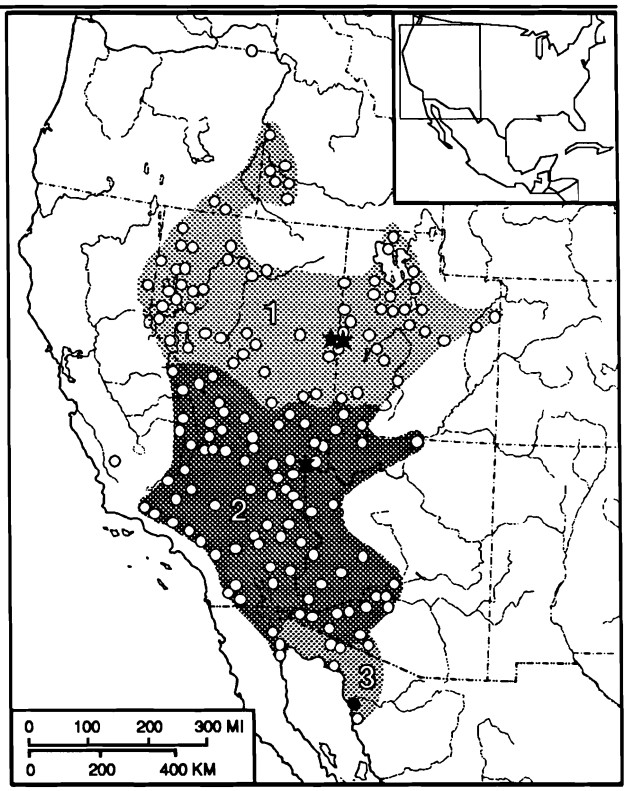


Figure. Computer-aided camera lucida drawings of the heads of representatives of the three subspecies of *P. platyrhinos*: *platyrhinos* (LACM 71654 [male] and 71650 [female], 8.3 km north of Lovelock, Pershing County, Nevada); *calidiarum* (LACM 68784 [male] and 68776 [female], 16.7 km northwest of Casa Grande, Pinal County, Arizona); *goodei* (LACM 74302 [male] and 59948 [female], 41.7 km southeast of Puerto Libertad and 6.7 km northwest of Puerto Penasco, respectively, Sonora, México).



Map. The solid circle is the restricted type-locality for *P. p. goodei*; the remaining type-localities are too imprecise to plot. Open circles represent other records; those outside the range boundary are extralimital (see text). Stars indicate fossil localities.

• **Definition.** A medium to large horned lizard (adults 72-95 mm SVL) characterized by a single row of relatively small lateral abdominal fringe scales along the side of the body. Other characteristics include: relatively short occipital horns; the longest temporal spine nearly as long as the occipital horns; small throat scales sometimes with a single row of slightly larger scales on each side of throat; enlarged chin shields; nostril inside a line connecting the supraorbital ridge with the tip of the snout; snout very blunt. The belly is usually spotted. The dorsal color is variable, and can be buff, yellowish, reddish, or grayish. Two prominent dark patches are present immediately behind the neck, grading into a series of several more down the back and onto the tail.

• **Diagnosis.** *P. platyrhinos* can be distinguished from all congeners by the following: two moderately elongated occipital horns at the back of the head usually not in contact at their base; posterior head margin between occipital horns not indented; nostril openings inside the canthus rostralis; eardrum either exposed or covered with scales; gular scales small, granular, uniform in size or with a single marginal row of slightly enlarged scales on each side of the throat; side of body between limbs with a single row of elongate, pointed fringe scales; smooth ventral scales; tail broadening gradually rather than abruptly at base.

• **Descriptions.** Girard (1852), Cope (1900), Van Denburgh (1922), Cuesta-Terron (1932), Smith (1946), Reeve (1952), Sherbrooke (1981), and Montanucci (1987) provided detailed descriptions. Böhme (1988) provided a brief description of the hemipenes. Gorman et al. (1969) described the karyotype (2N = 34).

• **Illustrations.** Behler and King (1979) and Pianka (1985) provided color photographs. Sherbrooke (1981) provided a series of color photographs, including representative habitat and a copulating pair. Switak (1979) provided a color photograph of a lizard and a black and white photograph of representative habitat. Other black and white photographs or line drawings are included in Girard (1852), Ditmars (1907), Bryant (1911), Van Denburgh (1922), Smith (1946), Stebbins (1954, 1985), Collins (1988), and Montanucci (1989b).

Montanucci (1989a) provided a black and white photograph of a mandible, and Tanner and Avery (1982) provided several line drawings illustrating buccal anatomy. Wood (1917) illustrated the vascularized ocular fundus.

• **Distribution.** *Phrynosoma platyrhinos* is a widespread lizard in western North America, occurring in lowland deserts from southeastern Oregon and southwestern Idaho through the Great Basin of Nevada and western Utah into the Mojave, Colorado, and Sonoran deserts of southeastern California, western Arizona in the United States and northeastern Baja California and northwestern Sonora in México. It can be found more frequently on sandy than rocky substrates, and has been reported to elevations of 2000 m (Smith, 1946). Stebbins (1954) suggested that several disjunct extralimital localities represented escaped pets.

• **Fossil Record.** Brattstrom (1954) reported fossil material indistinguishable from extant specimens, dated 8-10,000 ybp, from Gypsum Cave in the Frenchman Mountains near Lake Mead, Clark County, Nevada. Other Pleistocene fossils have been reported from Smith Creek Cave, White Pine County, Nevada (Brattstrom, 1976; Mead et al., 1982), and from nearby Crystal Ball Cave, Millard County, Utah (Mead et al., 1989).

• **Pertinent Literature.** The most comprehensive treatment is by Reeve (1952), who examined virtually all extant material and gave localities, range maps, descriptions, and keys. Other systematic treatments are provided by Presch (1969) and Montanucci (1987). Jenkins and Tanner (1968), Presch (1969), and Montanucci (1987, 1989a) reported on osteology; the latter along with Hotton (1955) examined anatomical relationships to diet. Other anatomical aspects have been reported by Wever (1973), Miller (1981), Tanner and Avery (1982), Schwenk (1985), and Schwenk and Throckmorton (1989).

Control of color changes by temperature and light was studied by Atsatt (1939), and Lowe (1947) noted the variability in and high degree of background color matching. Dumas (1964) commented on home range, thermal requirements, and allopatry with *P. douglassi* (these two species are sympatric near Grantsville, Utah; Pianka and Parker, 1975). Thermoregulation has been studied by Cowles and Bogert (1944), Brattstrom (1965), Heath (1965), Pianka (1966), Porter (1967), and Pianka and Parker (1975). Bennett and Licht (1972) studied anaerobic metabolism during activity.

Behavior has been studied by Lynn (1965), Tollestrup (1981), and Collins (1988). Harris (1958) has suggested nocturnal habits, but both Williams (1959) and Mays and Nickerson (1968) argued against this interpretation. Homing movements were reported by Pianka and Parker (1975). Reproduction has been studied by Mayhew (1968), Howard (1974), Vitt (1977), and Vitt and Congdon (1978). Diets were examined by Knowlton and Janes (1932), Knowlton (1934), Fautin (1946), Pianka (1966), Pianka and Parker (1975), Rissing (1981), and Whitaker and Maser (1981). Pietruszka (1981) used this species in an evaluation of stomach flushing for dietary analyses.

Pianka and Parker (1975) provided a comprehensive review of the ecology of *P. platyrhinos*. Important autecological studies included Medica et al. (1973) and Tanner and Krogh (1973). Additional ecological aspects have been reported by Mosauer (1932), Duellman (1955), Gates (1957), Allred et al. (1963), Tanner and Banta (1966), Baur (1973), Busack and Bury (1974), Tomko (1975), Switak (1979), Rissing (1981), Werschkul (1982), Pietruszka (1986), Collins (1988), and González-Romero and Alvarez-Cárdenas (1989). Pianka and Pianka (1970) compared the species with its Australian ecological counterpart, the agamid *Moloch horridus*. Baur (1986) reported on longevity.

Parasites were reported by Gambino and Heyneman (1960), Babero and Kay (1967), Telford (1970), and Mankau and Widmer (1977). Guttman (1971) provided an electrophoretic datum, and Yousef et al. (1977) reported bile acid composition. Alberts (1991) employed this species in a study of lizard femoral gland secretions.

• **Nomenclatural History.** Cope (1896, 1900) erected the genus *Anota*, defined by the concealment of the tympanum by a scaly integument, to include the three subspecies of *platyrhinos*, then considered distinct species. The defining characteristic proved to be variable in two of the three taxa and they were returned to the genus *Phrynosoma* by subsequent workers. Banta (1971) argued persuasively that the original description of *P. platyrhinos* by Charles Girard appeared in a short paper in the Proceedings of the Academy of Natural Sciences in Philadelphia in 1852, prior to those contained in the complete reports to Congress of the western railroad surveys later that same year.

• **Remarks.** A cursory examination of specimens from throughout the range of *P. platyrhinos* suggests that the putative diagnostic characteristics of the subspecies are not reliable. The subspecies grade more-or-less continuously into one another. Geographic race is currently best determined by the locality of collection.

• **Etymology.** The name *platyrhinos* is a combination from the Greek "*platy*" (broad, or flat) and "*rhino*" (nose). The name *calidiarum* (L., "Roman bath house", from the words "*calid*", meaning "hot", and "*arium*", meaning "a place where something is kept") probably refers to the type-locality. The name *goodei* is a patronym honoring then Assistant Secretary of the Smithsonian Institution, Dr. George Brown Goode.

• **Comment.** Various features of the anatomy, behavior, diet, temporal patterns of activity, thermoregulation, and reproductive tactics of *Phrynosoma platyrhinos* can be profitably interrelated and interpreted to provide an integrated view of its ecology (Pianka, 1966; Pianka and Parker, 1975). These horned lizards are ant specialists and usually eat nothing else. Ants are small and contain much undigestable chitin, so that large numbers of them must be consumed. Thus these lizards possess a proportionately larger stomach (about 13 percent of body mass) than do all other sympatric desert lizard species, including the herbivorous Desert Iguana, *Dipsosaurus dorsalis* (herbivores typically have lower digestive assimilation rates and larger stomachs than do carnivores). Possession of such a large gut necessitates a tanklike body form, reducing speed and decreasing a lizard's ability to escape from predators by flight. Natural selection has favored the evolution of a spiny architecture and cryptic behavior rather than a streamlined body and rapid movement to cover as defense mechanisms. Increased risks of predation are likely during long periods of exposure while foraging for ants in the open. A reluctance to move, even when threatened by a predator, could be advantageous; movement might actuate a predatory attack and negate the advantages of crypsis. Such behavior doubtless contributes to the observed high variance in body temperatures of individual *Phrynosoma platyrhinos*, which is significantly greater than that of all other species of sympatric lizards (Pianka and Pianka, 1970; Pianka and Parker, 1975). *P. platyrhinos* is also active over a longer time interval than any sympatric lizard species. Wide fluctuations in body temperatures presumably reflect both this temporal activity and also perhaps reduced movements between sun and shade (the vast majority of these lizards are in full sun when first sighted). More time is thus available for feeding. Food specialization on ants is economically feasible only because these insects are usually clumped spatially and hence constitute a concentrated food supply. The high reproductive investment of adult horned lizards is also probably a consequence of their robust body form; lizards that rely upon speed to escape enemies cannot afford to weight themselves down with eggs to the same extent as horned lizards (Pianka, 1966; Pianka and Parker, 1975; Vitt and Congdon, 1978). *P. platyrhinos* has sucessfully exploited this adaptive suite to become one of the more widespread and abundant members of this most interesting and novel group of lizards.

1. *Phrynosoma platyrhinos platyrhinos* Girard

Phrynosoma platyrhinos Girard, in Baird and Girard, 1852 (1854):69. See species synonymy.
Phrynosoma maccallii: Yarrow and Henshaw, 1878:1647 (part).
Phrynosoma platyrhinos platyrhinos: Klauber, 1935:179 (part). First use of trinomial.

• **Diagnosis.** Occipital horns are moderately long (usually less than 45% of head length); tail round; 5 or 6 temporal horns, each slightly longer than the next one anteriorly; interoccipital space approximately equal to basal diameter of occipital spine.

2. *Phrynosoma platyrhinos calidiarum* (Cope)

Anota calidiarum Cope, 1896:833. Type-locality, "Death Valley, [Inyo County], California". Holotype, National Museum of Natural History (USNM) 8444 (erroneously given as 18444 by Cochran, 1961), adult female, collector and date of collection unknown (date given as 1891, op. cit.) (not examined by author).

Phrynosoma calidiarum: Ditmars, 1907:157.
Phrynosoma platyrhinus: Stephens, 1921:62.
Phrynosoma platishinus: Cuesta-Terron, 1932:116.
Phrynosoma platyrhinos platyrhinos: Klauber, 1935:179 (part).
Phrynosoma platyrhinos calidiarum: Reeve, 1952:856. First use of combination.

• **Diagnosis.** Occipital horns are heavy and long (45% or more of head length); interoccipital space one-half the basal diameter of occipital spine; 5 or 6 temporal horns, each longer than the one anterior; tail often somewhat flattened posteriorly.

3. *Phrynosoma platyrhinos goodei* Stejneger

Phrynosoma hernandezi: Streets, 1877:36 (part).
Phrynosoma goodei Stejneger, 1893:191. Type-locality, "coast deserts of the state of Sonora, Mexico", restricted to Puerto Libertad by Smith and Taylor (1950a, b). Holotype, National Museum of Natural History (USNM) 8567a, age and sex unknown, collected by T. H. Streets, M.D., date of collection unknown (not examined by author).
Anota goodei: Cope, 1900:442.
Phrynosoma platyrhinos goodei: Klauber, 1935:179. First use of trinomial.
Phrynosoma platyrhinos goodi: Stebbins, 1954:314.

• **Diagnosis.** Three temporal horns are enlarged, the one posterior equal in size to occipital horns; the 3 posterior chin shields are greatly enlarged and pointed.

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Primary editor for this account, Andrew H. Price.

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