

Catalogue of American Amphibians and Reptiles.

Korky, J.K. 1999. *Bufo punctatus*.

***Bufo punctatus* Baird and Girard**
Red-spotted Toad

Bufo punctatus Baird and Girard 1852:173. Type locality, "Rio San Pedro of the Rio Grande Del Norte (Devil's River, Val Verde County), Texas." Three cotypes (originally 4, one apparently lost), National Museum of Natural History (USNM) 2618 (3) (Cochran 1961a:37), sex undetermined, collected by J.H. Clark under Col. J.D. Graham, date of collection unknown (not examined by author).

Bufo beldingi Yarrow 1882:441. Type locality, "La Paz, California." A total of eleven syntypes, USNM 12660 (5; originally 6, one presented by The Smithsonian Institution to the British Museum bearing metal tag 12660; Boulenger's [1882] catalogue listed this specimen as female, no SVL determined), SVLs 47.3, 48.3, 66.5, 66.8, 70.7, sex undetermined; USNM 12670 (5), sex undetermined, SVLs 27.1, 32.3, 36.9, 38.6, 42.0, all collected in 1882 by L. Belding (not examined by author).

• **CONTENT.** No subspecies are recognized.

• **DEFINITION.** *Bufo punctatus* is a small toad (adult SVL 38–76 mm, \bar{x} = 69 mm) with a flattened, short, sub-triangular head and a pointed snout. Males are smaller than females and have darkened vocal pouches. Noble (1954) noted larger parotoids in males. Larval TL = 27 mm at Gosner stage 36. SVLs of cotypes (in mm) are 44.8, 47.1, and 48.6.

• **DIAGNOSIS.** This is the only North American toad with round parotoids about the same size as the eye, and with cranial crests notably weak or absent. Color above is light gray, olive, or reddish brown, with the body and the upper portion of slender limbs covered with small, red or orange tubercles. Blair (1972) and Conant and Collins (1991) reported that specimens from the limestones of the Edward's Plateau in central Texas are pale gray or virtually unmarked. Color below is white to yellowish buff, with or without spotting under the head and on the breast. Juveniles have numerous orange-tipped warts, are dark spotted below, and the undersides of feet are yellow. Larvae have a labial tooththrow formula of 2(2)/3 and labial papillae only at the sides of the mouth (Storer 1925). Larval coloration was discussed by Luepschen (1981).

• **DESCRIPTIONS.** Baird and Girard's (1852) original description briefly described only adults, as did Cope's (1889) description. Slevin (1928) provided a synonymy to that time. Adequate descriptions and life history accounts are in Dickerson (1920), Storer (1925, who commented on their tolerance of brackish and alkaline water), Smith (1934, 1950, 1956), Wright and Wright (1949), Lowe (1964), Stebbins (1951, 1954, 1966), Ferguson and Lowe (1969), Blair (1972), Collins (1974), Conant (1975), Dixon (1987), Conant and Collins (1991, 1998), and Collins et al. (1993). The eggs were described by Livezey and Wright (1947), Wright and Wright (1949), and Leviton (1991). Strecker (1926) noted that eggs were laid in strings, whereas Wright (1929) commented on the presence of single eggs not in files, and the latter character was considered unique among U.S. bufonids by Smith (1950). Larval biology was summarized by Altig and Johnston (1986). Ferguson and Lowe (1969) provided an audiospectrogram of the mating call and the following

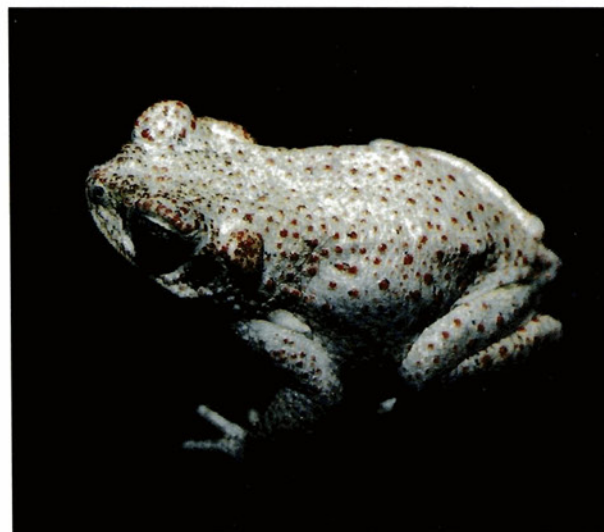


Figure 1. Adult *Bufo punctatus* from 1.5 km SSW Startzville, Comal Co., Texas (UTEP 11378)(top) and from 2 km S Galeana, Nuevo León, México (photographs by Carl S. Lieb and Robert Powell).

data summary: mean dominant frequency 2.46 ± 0.06 kc/sec; mean duration 6.08 ± 0.87 sec; mean pulse rate 51.7 ± 0.61 pulse/sec.

• **ILLUSTRATIONS.** Drawings of the egg, larval body form and mouth parts, and adult were provided by Stebbins (1966). Dickerson (1920) included adult black and white photographs, and Stebbins (1954) illustrated the anterior dorsum in a black and white sketch showing the relationship of the eyes and parotoid glands. Color drawings or photographs of adults are available in Dickerson (1920), Cochran (1961b), Obst et al. (1988), Conant and Collins (1991, 1998), Behler and King (1995), Hunziker (1999), and on the internet toad site (<http://www-astro.physics.ox.ac.uk/~erik/toad/>).

• **DISTRIBUTION.** *Bufo punctatus* occurs from southeastern California, southern Nevada, Utah, Colorado, and western Kansas (USA) south to southern Baja California, Tamaulipas, Coahuila, Nuevo Leon, Chihuahua, San Luis Potosí, Sinaloa, Sonora, and Guanajuato (México).

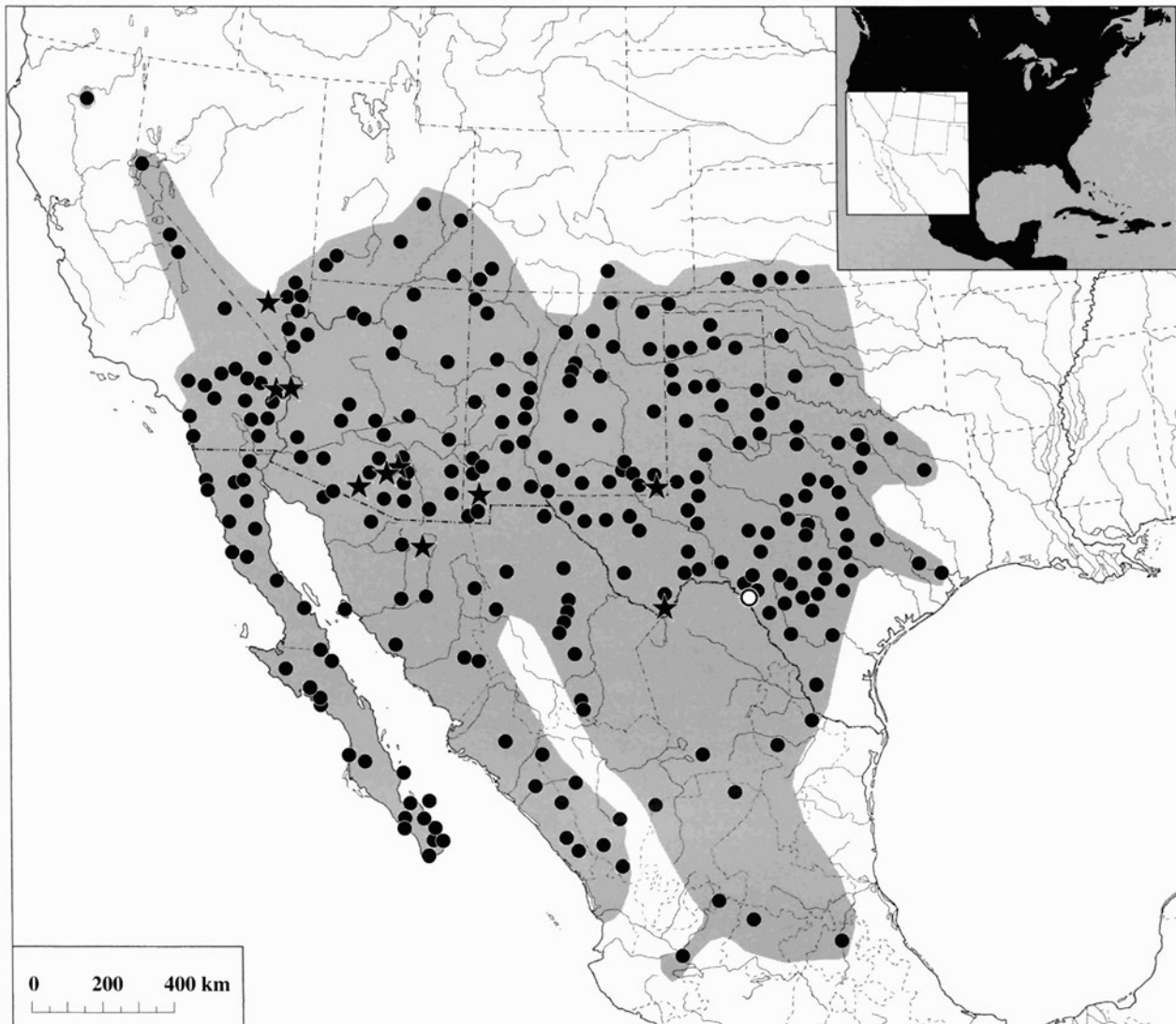
These toads are somewhat restricted to riparian and rocky habitats across grasslands and deserts in peripheral communities of woodland and subtropical thornscrub (Ferguson and Lowe 1969). Although sometimes seen on floodplains, they prefer rocky areas, which they easily traverse and in which they

seek crevice shelters (Dickerson 1920). Elevational distribution ranges to nearly 2,000 m (Ellis and Henderson 1913, Stebbins 1966). This species is an opportunistic breeder, from April to September, during or after rains, over most of its range. Blair (1972) reported that it breeds in the Great Basin at permanent water regardless of rain.

Stebbins (1966), Conant and Collins (1991, 1998), and Hunziker (1999) included range maps. Additional distributional data and/or maps were provided by Stejneger (1893), Ellis and Henderson (1915), Camp (1916), Engelhardt (1917), Van Denburgh (1924), Burnett (1926), Ortenburger (1926), Hill (1931), Tanner (1931), Little (1940), Glaser (1970), Reddell (1971), Knight et al. (1972), Vitt (1978), Karges (1978), Quinones Leyva (1980), Murphy and Ottley (1984), Powell et al. (1984), Dixon (1987), Carpenter and Krupa (1989), Schafer and Kasper (1989), Hammerson et al. (1991), and Degenhardt et al. (1996). Kellogg (1932) cited the species among the Mexican holdings of the U.S. National Museum. Taylor (1938), Smith and Taylor (1966), and Hardy and McDiarmid (1969) discussed and mapped the Mexican distribution. The first record on a Pacific island, off Baja California, México, was documented by Reynoso (1990).

• **FOSSIL RECORD.** Numerous late Pleistocene and Holocene

fossil records have been referred to *B. punctatus*. Tihen (1962a, b) reviewed the general osteological features of New World *Bufo* placing *B. punctatus* in his Caribbean section. He considered the fossil of the species up to that point as consisting of the find by Brattstrom (1958) in a late Pleistocene gypsum cave of Nevada, of a toad that, "still has dried skin on its back ... with small red brick tubercles" Further records reported are: Dry and Howell's Ridge caves, New Mexico (Holman 1970, Van Devender and Worthington 1977); Wolcott Peak packrat midden, Deadman Cave, and Ajo Mountains packrat midden, Arizona (Van Devender and Mead 1978, Mead et al. 1984, Van Devender et al. 1991); two Whipple Mountain packrat middens, California (Van Devender and Mead 1978). Humeri from Rancho la Brisca, Sonora, México were referred to *B. punctatus* or *B. retiformis* by Van Devender et al. (1985). Van Devender and Bradley (1994) referred a scapula to *Bufo* cf. *punctatus* based on classification criteria of *B. punctatus* scapulae from Maravillas Canyon Cave, Texas (Van Devender et al. 1985). Additionally, Van Devender and Bradley (1994) reported a scapula from the same Texas site as late Wisconsin, and assigned it to *Bufo* sp., as the bone was from a very young individual that could not be positively identified. Axtell (1959) found *Bufo punctatus*, *B. speciosus*, and *B. debilis* at Black Gap, Maravillas Canyon, Texas.



MAP. Distribution of *Bufo punctatus*. The circle marks the type locality, dots mark other records, and stars indicate fossil localities.

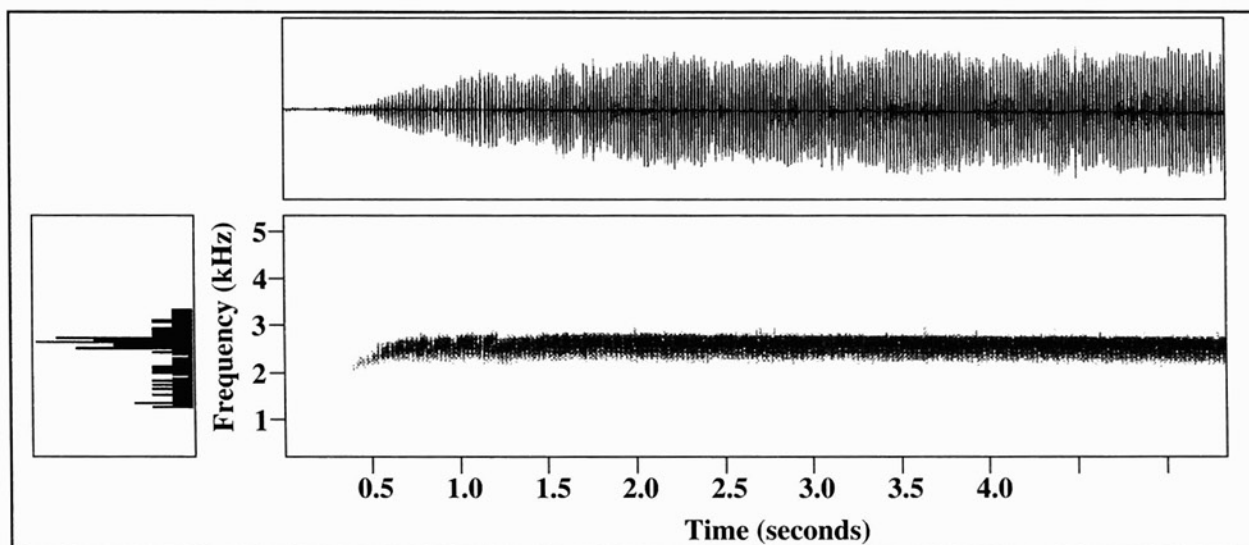


Figure 2. Vocalization of *Bufo punctatus* from a recording made at the “toads dome” internet website (www-astro.physics.ox.ac.uk/~erik/toad), 512-point FFT transformation size, with effective bandwidth of 223 Hz; audiospectrogram (above), power spectrum (left).

• **PERTINENT LITERATURE.** Ferguson and Lowe (1969) considered *Bufo punctatus* a member of the *Bufo punctatus* group, which also includes *B. kelloggi*, *B. debilis*, and *B. retiformis*. They provided comparative call data for the four species, and declared *B. punctatus* to be ancestral to the others (listed above in derived order). They reported few (9) hybrids in sympatric areas, and noted that *B. punctatus* is reproductively isolated from the others by habitat selection. Blair (1972) considered *B. punctatus* a species distinct from the other three, referred to as the *Bufo debilis* group, and discussed their osteology. Harding (1983) listed *B. punctatus* separately in his catalogue.

Mating behavior, call variation, and hybridization were discussed by McCoy et al. (1967), Feder (1977, 1979), Sullivan (1984, 1985), Bowker and Sullivan (1991), and Malmos et al. (1995). Water regulation was studied by McClanahan and Baldwin (1969), Fair (1970), Baldwin (1974), Hillyard et al. (1987), Shoemaker (1988), Hoff and Hillyard (1990), Brekke et al. (1991), and Von Seckendorff-Hoff and Hillyard (1991, 1993a). Cutaneous sensitivity to sodium was investigated by Von Seckendorff-Hoff and Hillyard (1993b). Whitford (1969) reported changes in heart rate and body fluids in aestivating *B. punctatus*. Jaeger and Hailman (1973) included this species in a comparative study of adult anuran prototactic responses relative to intensity.

Parker (1973) reported ecological observations on an isolated population of *B. punctatus* in Arizona. Morrison et al. (1995) studied distribution, relative abundance, and habitat utilization of *B. punctatus*, and sympatric amphibians and reptiles in Arizona. Cei (1968) analyzed proteinaceous compounds in the skin of bufonids, including *B. punctatus*, for their taxonomic and evolutionary significance. Daly and Witkop (1971) included this species in an examination of the chemistry and pharmacology of bufonid skin secretions.

Moore and Moore (1980) described the relationship of body temperature to activity. Zweifel (1968) detailed embryonic temperature tolerance in an Arizonan population. Brattstrom (1968) related thermal acclimation to latitude and altitude in a large group of anurans, including *B. punctatus*. Birge et al. (1983) used *B. punctatus* embryos, and those of other amphibians and fish, as a model system for evaluating teratogenicity of trace heavy metals.

Martin (1972) compared the structure of the pectoral girdle

with those of other anurans. Winokur and Hillyard (1988) described the integumentary muscle attachments to the pelvic skin in *B. punctatus* and other anurans.

Bachmann (1972) reported on the relationship of diploid nuclear DNA amounts and developmental rate in *B. punctatus*, *B. cognatus*, and *B. debilis* populations from Portal, Arizona, and compared them to sympatric species of *Scaphiopus* and *Rana*. Schmid (1978) proposed various methods of chromosomal evolution in 22 species of bufonids, including *B. punctatus*, as well as hylids. Kasinsky et al. (1985) analyzed cytochemical and amino acid diversity in sperm histones of *B. punctatus* and *B. marinus*, as well as *Xenopus laevis*, and *Rana catesbeiana*, *R. pipiens*, and *R. ridibunda*.

Duszynski and Jones (1973) reported the occurrence of intradermal mites in New Mexico populations of *B. punctatus*. Grover et al. (1975) investigated the histochemistry of the tissue capsule about intradermal mites, also in New Mexican populations. Welbourn and Loomis (1975) explored the intradermal mite-anuran host relationship of California *B. punctatus* populations. Goldberg and Bursey (1991) examined 21 *B. punctatus* specimens' gastrointestinal tracts and lungs, and reported new host records for various cestodes and nematodes.

Hunziker (1999) provided a general account and discussed husbandry.

• **ETYMOLOGY.** The specific name *punctatus* is derived from the Latin noun *punctum*, meaning point, and is a descriptive term alluding to the spotting on the dorsum.

• **COMMENT.** Frost (1985) erred in reporting “syntypes: USNM 2618 (3 specimens); apparently lost,” for *B. punctatus*, as three of four original cotypes are presently in the USNM collection as noted above. The Red-spotted Toad also has been referred to by various authors as the Spotted Toad, Desert Toad, Rock Toad, Canyon Toad, and Belding’s Toad. Data provided by Smith (1934) and Ferguson and Lowe (1969) are highly noteworthy for their thoroughness and insightfulness.

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