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NATURAL HYBRID BETWEEN THE GREAT PLAINS TOAD
(*BUFO COGNATUS*) AND THE RED-SPOTTED TOAD (*BUFO PUNCTATUS*)
FROM CENTRAL ARIZONA

Brian K. Sullivan¹

Hybridization among toads of the genus *Bufo* is well known (Sullivan 1986). In the southwestern United States hybridization has been documented within both the *americanus* and *punctatus* species groups (Ferguson and Lowe 1969, Sullivan 1986). However, natural hybridization between members of more distantly related species groups is relatively rare. Natural hybrids between *Bufo punctatus* and both *B. boreas* (Feder 1978) and *B. woodhousii* (McCoy et al. 1967) have been described. Documentation of hybridization is important because it provides information about the genetic relatedness of taxa, as well as potential insights into proximate aspects of species recognition and reproductive behavior. Herein I report on a natural hybrid between *B. cognatus* (Great Plains toad) and *B. punctatus* (red-spotted toad), members of separate species groups within the "thin-skulled" lineage of North American toads.

The hybrid male was collected in a rain-formed pool on the evening of 13 August 1990 at the Cave Buttes Recreation Area along Cave Creek, 12 km southwest of Cave Creek, Maricopa County, Arizona. Approximately 50 mm of rain fell from 11 to 13 August; on each evening, a number of anurans called along a narrow (3-m wide), flowing stream and a large, shallow pool (40-m diameter) created by an earthen dike across the stream channel. Male *B. alvarius*, *B. cognatus*, and *Scaphiopus couchii* called from the pool, while male *B. punctatus* were restricted to the channel.

The hybrid was calling among the male *B. cognatus* at the large pool. I recorded a series of its advertisement calls using a Marantz PMD 430 cassette recorder and Sennheiser ME-80 microphone, and I mea-

sured its cloacal temperature with a Weber Quick Recorder thermometer. Five calls were analyzed with a DATA Precision 6000 Waveform Analyzer (see Sullivan 1989 for details), and mean values were calculated for each call variable. Data are reported as the mean \pm standard deviation.

The mean pulse rate of the advertisement call of the hybrid was 45 p/s, and the mean duration was 7.8 s, at a cloacal temperature of 24 C. The corresponding values for 13 *B. punctatus* recorded on the same night were 55 ± 2.60 p/s and 6.4 ± 1.23 s (cloacal temperatures = $25 \pm .34$ C); the values for 8 *B. cognatus* were 24 ± 1.66 p/s and 18 ± 7.58 s (cloacal temperatures = $25 \pm .82$ C). The dominant frequency of the hybrid's advertisement call was 2.109 kHz, lower than both *B. punctatus* ($2.538 \pm .111$ kHz) and *B. cognatus* ($2.700 \pm .207$ kHz). Hence, the advertisement call of the hybrid, although more similar to that of *B. punctatus*, was intermediate in pulse rate and duration and dramatically lower than either parental species in dominant frequency. However, the vocal sac was darkly pigmented and sausage-shaped when inflated (Fig. 1), the condition typical of *B. cognatus*.

The hybrid was intermediate in size (63 mm snout-vent length) relative to *B. punctatus* (54 ± 2.59 mm) and *B. cognatus* (75 ± 4.83 mm). The oval parotoid glands, enlarged cranial crests, and boss of the hybrid were also intermediate to *B. cognatus* and *B. punctatus*. Following the methodology of Ferguson and Lowe (1969), I determined four ratios (parotoid length/parotoid width, svl/parotoid width, parotoid length/eyelid length, tibia/parotoid length) for the two parental species

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Fig. 1. (a) *Bufo cognatus*, (b) hybrid, and (c) *Bufo punctatus* from Cave Buttes Recreation Area, Maricopa, County, Arizona.

and the hybrid. All of the ratios calculated for the hybrid were between the mean values and exclusive of the 95% confidence intervals for the two parental species.

Unfortunately, the hybrid escaped after these observations were completed. Documentation of a natural hybrid between members of these two distinct species groups is noteworthy. Although *B. cognatus* and *B. punctatus* typically breed in dissimilar habitats, the present observations reveal that they may interact if they breed sympatrically, and that they can produce hybrid offspring. Additional work will be required to determine the evolutionary importance, if any, of such interactions.

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