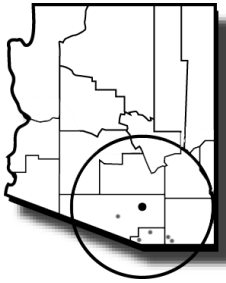


Barking Frog
(*Eleutherodactylus*
augusti) from Cochise
Co., AZ.
Photo by Erik F.
Enderson



Barking Frog

Eleutherodactylus augusti (Dugés, 1879 in Brocchi, 1882)

Caren Goldberg University of Arizona, School of Renewable Natural Resources

Barking frogs (*Eleutherodactylus augusti*) live farther north than any other member of the large neotropical family Leptodactylidae. They are distributed from the Isthmus of Tehuantepec in southern Mexico through the Sierra Madre Occidental into Arizona and the Sierra Madre Oriental into Texas and New Mexico (Zweifel, 1967). Like all other members of the genus *Eleutherodactylus*, barking frogs develop directly from eggs to small frogs, with no tadpole stage. The advertisement call of the eastern barking frog (*E. a. latrans*) sounds like the yapping of a small dog. In Arizona, however, we have the western barking frog (*E. a. cactorum*), which does not sound like a dog unless you are fairly far away and not paying much attention. Barking frogs in Arizona also differ from those in New Mexico and Texas in morphology, behavior, and mitochondrial genetic sequence, and likely represent a different species (C. Goldberg, B. Sullivan, J. Malone, C. Schwalbe, unpub. data).

Barking frogs can be distinguished from all other anurans in Arizona by the fold of skin across the back of the frog's head and the well-developed tubercles on their feet. They are terrestrial and commonly found on cliffs, caves, and rock outcrops in a variety of biotic



Barking Frog (*Eleutherodactylus augusti*) from Cochise Co., AZ.
Photo by Erik F. Enderson

communities (Smith and Buechner, 1947; Wright and Wright, 1949; Bezy et al., 1966; Reddell, 1971). In Arizona, barking frogs have been found on limestone,

rhyolite, and other rock outcrops in Madrean evergreen woodland, and are strongly associated with Naco Group limestone in the Huachuca Mountains (Bezy et al., 1966; Goldberg and Schwalbe, 2000). Barking frogs have been found in caves and abandoned mines throughout their range (Reddell, 1971; Hubbard et al., 1979; Goldberg and Schwalbe, 2000; C. Schwalbe., pers. comm.).

In Arizona, barking frogs have been documented in the Santa Rita (Slevin, 1931), Pajarito (Bezy et al., 1966), Huachuca (Schwalbe et al., 1997) and Quinlan (Enderson, 2002) Mountains at elevations of 1,280–1,890 m. There is also an unconfirmed report of a barking frog caught in the Sierra Ancha of central Arizona (Wright and Wright, 1949). Barking frogs are extremely difficult to detect unless you are in the right place at the right time, in which case their loud call identifies their presence.

Their call is ventriloquistic, so barking frogs are difficult to locate even after they are detected. In Arizona, barking frogs call for only two to four weeks on rainy nights after the start of the summer monsoons in late June or July (Goldberg and Schwalbe, 2000). The call can be heard from more than 600 m in many cases. A population of barking frogs can only be relied upon to call during the first two or three nights after the first full monsoon storm hits a

particular spot. This short window of timing is difficult to catch and many of the sky islands in southeastern Arizona likely contain undocumented barking frog populations.

In Arizona, gravid females have been found in June (Goldberg and Schwalbe, 2000; unpublished data). Females likely deposit eggs in moist or rain-filled cracks, fissures, and in caves (Wright and Wright, 1949). Eggs may also be deposited in moist earth under rocks (Jameson, 1950). Jameson (1950) hypothesized that male barking frogs guard the egg clutch and maintain moisture levels by excretion. However, our radio-tracking data from Arizona suggests that males move too frequently to guard eggs and that females may stay with the clutch (Goldberg and Schwalbe, 2000). Clutches contain from 50–76 eggs (Wright and Wright, 1949; McAlister, 1954; Degenhardt et al., 1996). One clutch contained eggs with diameters of 8–8.5 mm (Valett and Jameson, 1961). Hatching is estimated to occur after 25–35

days of development in Texas (Jameson, 1950); anecdotal evidence from Arizona suggests that one clutch may have hatched in 21 days (Goldberg and Schwalbe, 2000).

Adult size of barking frogs ranges from 47–94 mm (Wright and Wright, 1949; Zweifel, 1956; Anderson and Lidicker, 1963). Adult females in the Huachuca Mountains of Arizona were larger than males by an average of 7.1 mm (Goldberg and Schwalbe, 2000). Males in Arizona have dark tympana and adult males have dark throats during the calling season; females have pink tympana and white throats year-round (Goldberg and Schwalbe, 2000). Barking frogs can live at least six years as adults in the wild. An adult frog from Sonora, Mexico, lived in captivity for 11 years at the Arizona-Sonora Desert Museum.

In the wild, barking frogs have been known to eat camel crickets (*Ceuthophilus* sp.), field crickets (*Acheta*



Barking Frog
(*Eleutherodactylus
augusti*) from Pima
Co., AZ.
Photo by Erik F.
Enderson

assimilis), Gladston grasshoppers (*Melanoplus gladstoni*), longhorned katydids (Tettiganiidae), short-horned grasshoppers (probably Acrididae), land snails (*Bulimulus* sp. and *Succinea* sp.), silverfish (*Lepisma saccharina*), centipedes (*Scolopendra* sp.), scorpions (*Vaejovis* sp.), kissing bugs (*Triatoma* sp.), spiders, and adult ant lions (*Hesperoleon niger*; McAlister, 1954; Olson, 1959; Schwalbe et al., 1997; Radke, 1998; Goldberg and Schwalbe, 2000). In captivity, barking frogs have eaten cave crickets (*Pholeogryllus geertsii*; Olson, 1959) and cliff chirping frogs (Jameson, 1955).

Most barking frog populations in southern Arizona are probably located on U. S. Forest Service land, fairly well protected from disturbance. However, the geologic association of copper with limestone in southeastern Arizona may have led to the destruction of barking frog habitat in many of the mountains of southeastern Arizona through large-scale open-pit copper mining (Goldberg 2002).

continued on page 56

24 June 2003

Robert L. Bezy, Secretary

Directors Present: Bob Bezy, Jillian Cowles, Cristina Jones, Don Swann, Marty Tuegel.

Directors Absent: Roy Averill-Murray, Taylor Edwards, Hans Koenig, Ed Moll, Eric Stitt.

Members Present: Dennis Caldwell.

Treasurer's Report -Tuegel

Beginning Balance	\$12,022.47
Deposits	\$290.00
Expenses	\$138.00
Ending Balance	\$12,174.47

Speakers Bureau	\$1,009.19
Jarchow Award	\$150.00
FTHL Fund	\$125.00
C.H.Lowe Fund	\$3,533.00
PARC	\$250.00
General Fund	\$7,107.28
CRHSDIII (CD)	\$6,958.92

Itemized Deposits: C.H. Lowe Fund \$30.00, FTHL \$5.00, Jarcho \$30.00, Membership \$215.00, PARC \$25.00, Speakers Bureau \$10.00.

Itemized Expenses: Travel \$104.00, Raffle \$3400.

Committee Reports

Speakers Bureau – Swann for Edwards.

21 June – Caren Goldberg, Robin Llewellyn, and Don Swann gave a talk at the Greenfire Bookstore with 30 people in attendance.

Program – Swann for Roy Averill-Murray. The lineup of speakers includes:

15 July - Elissa Ostergaard

19 Aug. - Gary Nabhan.

16 Sept. - Jarchow Award.

21 Oct. - Justin Congdon.

Speakers are needed for November, and December.

Old Business

Collected Papers from Sonoran Herpetologist – Swann for Stitt.

Eric is obtaining prices for reprinting this publication.

Literature cited

Anderson, J.D. and W.Z. Lidicker, Jr. 1963. A contribution of our knowledge of the herpetofauna of the Mexican state of Aguascalientes. *Herpetologica* 19(1):40-51

Bezy, R.L., W.C. Sherbrooke and C.H. Lowe. 1966. The rediscovery of *Eleutherodactylus augusti* in Arizona. *Herpetologica* 22:221-225.

Brocchi, M.P. 1882. Étude des Batraciens de l'Amérique Centrale. Mission scientifique au Mexique et dans l'Amérique Centrale. Recherches Zoologiques, part 3, section 2:1-122.

Degenhardt, W.G., C.W. Painter and A.H. Price. 1996. Amphibians and Reptiles of New Mexico. University of New Mexico Press, Albuquerque, New Mexico.

Enderson, E. F. 2002. *Eleutherodactylus augusti cactorum*. *Herpetological Review* 33:316.

Goldberg, C.S. 2002. Habitat, spatial population structure, and methods for monitoring barking frogs (*Eleutherodactylus augusti*) in southern Arizona. M.S. Thesis, University of Arizona, Tucson, Arizona, USA.

Goldberg, C.S. and Schwalbe, C.R. 2000. Population ecology of the barking frog. Arizona Game and Fish Department Heritage Fund report, IIPAM project number 198014. Phoenix, AZ.

Hubbard, J.P., H.C. Conway, H. Campbell, G. Schmitt and M.D. Hatch. 1979. Handbook of species endangered in New Mexico. New Mexico Department of Game and Fish.

Jameson, D.L. 1950. The development of *Eleutherodactylus latrans*. *Copeia* 1950:44-46.

Jameson, D.L. 1955. The population dynamics of the cliff frog, *Syrrophus marnocki*. *American Midland Naturalist* 54:342-281.

McAlister, W. 1954. Natural history notes on the barking frog. *Herpetologica* 10:197-199.

Olson, R.E. 1959. Notes on some Texas herptiles. *Herpetologica* 15:48.

Radke, M.F. 1998. Ecology of the barking frog (*Eleutherodactylus augusti*) in Caves County, New Mexico. Report to New Mexico Department of Game and Fish, Share with Wildlife.

Reddell, J.R. 1971. A checklist of the cave fauna of Texas. Part 6: Additional records of vertebrata. *Texas Journal of Science* 22:139-158.

Schwalbe, C.R., B. Alberti and M. Gilbert. 1997. The limestone troll. *Bajada* 5(3):1.

Slevin, J.R. 1931. Range extensions of certain western species of reptiles and amphibians. *Copeia* 1931(3):140-141.

Smith, H.M. and H.K. Buechner. 1947. The influence of the Balcones Escarpment on the distribution of amphibians and reptiles in Texas. *Bulletin of the Chicago Academy of Sciences* 8:1-16.

Valett, B.B. and D.L. Jameson. 1961. The embryology of *Eleutherodactylus augusti latrans*. *Copeia* 1961(1):103-109.

Wright, A.H. and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. Comstock Publishing Associates, Ithaca, New York.

Zweifel, R.G. 1956. A survey of the frogs of the *augusti* group, genus *Eleutherodactylus*. *American Museum Novitates*: 1813.

Zweifel, R.G. 1967. *Eleutherodactylus augusti*. Catalogue of American amphibians and reptiles, 41:1-4.

