

Catalogue of American Amphibians and Reptiles.

Andrew H. Price and Brian K. Sullivan. 1988. *Bufo microscaphus*.

***Bufo microscaphus* Cope
Southwestern Toad**

Bufo microscaphus Cope, "1866" (1867):301. Type-locality, "... Arizona . . . near the parallel of 35° and along the valley of the Colorado from Fort Mojave to Fort Yuma," restricted to Fort Mohave, Mohave County, Arizona by Shannon (1949). Lecto-type designated by Shannon (1949), National Museum of Natural History (USNM) 4184, an adult female, collected by H. B. Mollhausen, date of collection unknown (not seen by authors).

Bufo columbiensis: Cope, 1889:267 (part).

Bufo compactilis: Slevin, 1928:97 (part).

Bufo woodhousii: Shannon, 1949:301 (part).

• **Content.** Three subspecies are recognized: *californicus*, *mexicanus*, and *microscaphus*.

• **Diagnosis.** A species of *Bufo* distinguished from all other North American representatives of the genus by the following characteristics: cranial crests weak or absent; parotoid glands rounded (length = 1.7 x width); inner metatarsal tubercle dull and rounded; dorsal stripe weak or absent; male vocal sac pale and round when inflated; advertisement call pulse rate around 60 p/s and release call pulse rate around 70 p/s at 20° C.

• **Definition.** A small to medium-sized (males and females to 75 and 80 mm SVL, respectively) western representative of the *Bufo americanus* species group (Blair, 1959). The ground color is variable, although typically there is a pale mark on each sacral hump and another forms a bar across the head onto each eyelid. A vertebral stripe is generally absent.

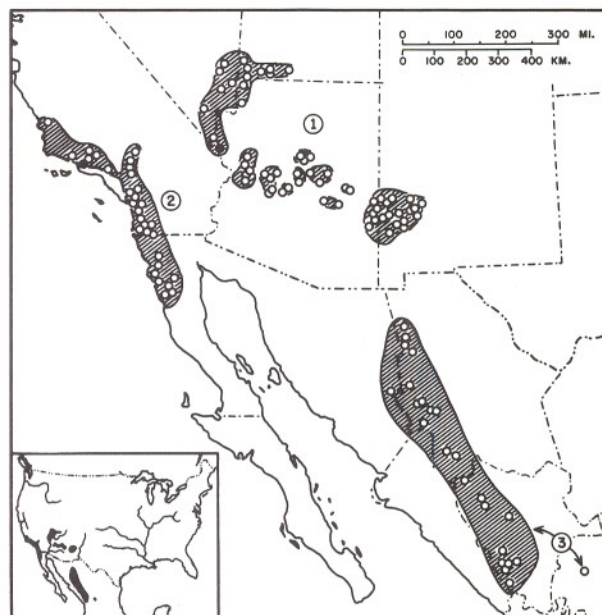
• **Descriptions.** Cope "1866" (1867) enumerated morphological features distinguishing *B. microscaphus* from *B. speciosus* and *B. woodhousii*. The adult morphology was described by Myers (1930), Shannon (1949), Stebbins (1951, 1954) and A. Blair (1955). The eggs and larvae were described by Stebbins (1951, 1954) and Altig (1970). Cole et al. (1968) and Bogart (1972) described the karyotype. Blair (1957), Brown and Littlejohn (1972) and Stebbins (1985) described vocalizations.

• **Illustrations.** Color photographs are in Wauer (1964); black and white ones are in Blair (1959) and Webb (1972). Drawings are in Stebbins (1951, 1954, 1985); a photograph of the skull is in R. Martin (1973). Sullivan (1986) has an advertisement call sonogram and W. Martin (1972) an oscillogram.

• **Distribution.** A series of isolated populations of *B. m. microscaphus* stretches from the Mogollon plateau of southwestern New Mexico westward to the Colorado and Virgin River basins of northwestern Arizona, southern Nevada, and southwestern Utah. *B. m. californicus* ranges mostly west of the deserts in southern California and northern Baja California Norte, but extends into the Mojave Desert along the Mojave River. *B. m. mexicanus* occurs at high elevations in the Sierra Madre Occidental of Chihuahua, Durango, and Sonora. An isolated population occurs along a head-water of the Río Aguanaval in northwestern Zacatecas. Preferred habitat is in the vicinity of relatively shallow permanent or intermittent flowing water over sandy or rocky substrates, from desert (ca. 90 m) to pine-fir forest (ca. 3025 m). Artificial habitats, such as irrigated cropland and reservoirs, are increasingly utilized.

• **Fossil Record.** None.

• **Pertinent Literature.** The most comprehensive works are those of Blair (1955) and Stebbins (1951). Evolutionary relationships were discussed by Blair (1959, 1963, 1964, 1965, 1972) and Maxson et al.



Map. Solid circles mark type-localities, open circles other records. The type-locality for *B. m. mexicanus* is too imprecise to plot.

"1981" (1982). Morphological treatises include R. Martin (1973). Vocalizations were analyzed in Brown and Littlejohn (1972) and W. Martin (1972). Cei et al. (1968), and Guttman (1972), discussed biochemistry. Cunningham (1962), Riemer (1955) and Tanner (1931) provided ecological data.

• **Remarks.** Smith (1947) placed *B. mexicanus* in the synonymy of *B. compactilis speciosus* (= *Bufo speciosus*) but mapped it within the range of *B. compactilis compactilis*. *B. microscaphus californicus* has continued to be considered a full species by some (e.g. Cunningham, 1962).

• **Etymology.** The name *microscaphus* (Greek, *micro* = "small" and *scaph* = "spade") refers to the small size of the inner metatarsal tubercle. The names *californicus* and *mexicanus* refer to the geographic origin of the respective type specimens.

• **Comment.** Although Stebbins (1951) presented cogent arguments for the specific status of *microscaphus*, Shannon (1953) continued to regard *microscaphus* as a subspecies of *B. woodhousii*. Stebbins' (1951) arrangement has been accepted by all subsequent workers. The two taxa can be confused, as Wauer's (1964) photograph of *B. microscaphus* labeled as *B. woodhousii*, shows.

1. *Bufo microscaphus microscaphus* Cope

Bufo microscaphus Cope, "1866" (1867):301. See species synonymy.

Bufo compactilis speciosus: Smith, 1947:8 (part).

Bufo woodhousii microscaphus: Shannon, 1949:301.

Bufo microscaphus microscaphus: Stebbins, 1951:274. First use of present combination.

• **Diagnosis.** Differs from *B. m. californicus* in having little or no dark spotting dorsally; from *B. m. mexicanus* in lacking ventral mottling, except for some specimens from the southern periphery (which suggests recent genetic communication between the two taxa).

2. *Bufo microscaphus californicus* (Camp)

Bufo cognatus californicus Camp, 1915:331. Type-locality, "Santa Paula, 800 feet altitude, Ventura County, California." Holotype,

Mus. Vert. Zool. 4364, adult female, collected by C. L. Camp, 22 May 1912 (examined by B. K. Sullivan).

Bufo californicus: Myers, 1930:75.

Bufo compactilis californicus: Linsdale, 1940:206.

Bufo woodhousii californicus: Shannon, 1949:301.

Bufo microscaphus californicus: Stebbins, 1951:274. First use of present combination.

• **Diagnosis.** Distinguished from *B. m. microscaphus* by its dark dorsal spotting, and from *B. m. mexicanus* by the absence of ventral mottling.

3. *Bufo microscaphus mexicanus* Brocchi

Bufo mexicanus Brocchi, 1879:23. Type-locality, "Mexique," restricted to the highlands of the Sierra Madre Occidental in Durango and Chihuahua, México by Webb (1972). Holotype lost; collector and date of collection unknown.

Bufo compactilis: Kellogg, 1932:44 (part).

Bufo compactilis speciosus: Smith, 1947:8 (part).

Bufo microscaphus mexicanus: Webb, 1972:4. First use of present combination.

• **Diagnosis.** Differs from *B. m. californicus* and *B. m. microscaphus* in having dark ventral mottling and relatively more distinct pale dorsal sacral markings.

Hybridization between *B. microscaphus* and *B. woodhousii* has been documented for some 40 years (Shannon, 1949; Stebbins, 1951; Sullivan, 1986). *B. woodhousii* generally utilizes lentic aquatic sites for breeding and avoids the lotic habitats frequented by *microscaphus*. Human alteration, however, has apparently allowed *B. woodhousii* access to habitats previously occupied solely by *microscaphus*. Consequences of these interactions are under study, and there are indications that *B. woodhousii* is replacing *B. microscaphus* in some drainages.

Literature Cited

Altig, Ronald. 1970. A key to the tadpoles of the continental United States and Canada. *Herpetologica* 26(2): 180-207.

Blair, Albert P. 1955. Distribution, variation, and hybridization in a relict toad (*Bufo microscaphus*) in southwestern Utah. *Amer. Mus. Novitates* (1722): 1-38.

Blair, W. Frank. 1957. Structure of the call and relationships of *Bufo microscaphus* Cope. *Copeia* 1957(3): 208-212.

—. 1959. Genetic compatibility and species groups in U. S. toads (*Bufo*). *Texas J. Sci.* 11(4): 427-453.

—. 1963. Evolutionary relationships of North American toads of the genus *Bufo*: a progress report. *Evolution* 17(1): 1-16.

—. 1964. Isolating mechanisms and interspecies interactions in anuran amphibians. *Quart. Rev. Biol.* 39: 334-344.

—. 1965. Amphibian speciation, p. 543-556. In H. E. Wright, Jr. and David G. Frey (eds.), *The Quarternary of the United States*. Princeton Univ. Press, Princeton, New Jersey. x + 922 p.

—. 1972. Evidence from hybridization, Ch. 11, p. 196-232. In W. F. Blair (ed.), *Evolution in the genus Bufo*. Univ. Texas Press, Austin. viii + 459 p.

Bogart, James P. 1972. Karyotypes, Ch. 10, p. 171-195. In W. F. Blair (ed.), *Evolution in the genus Bufo*. Univ. Texas Press, Austin. viii + 459 p.

Brocchi, Paul. 1879. Sur divers batraciens anoures de l'Amerique Centrale. *Bull. Soc. Philom. Paris*, Ser. 7, 3(1): 19-24.

Brown, Lauren E. and Murray J. Littlejohn. 1972. Male release call in the *Bufo americanus* group. Ch. 16, p. 310-323. In W. F. Blair (Ed.), *Evolution in the genus Bufo*. Univ. Texas Press, Austin. viii + 459 p.

Camp, Charles L. 1915. *Batrachoseps major* and *Bufo cognatus californicus*, new Amphibia from southern California. *Univ. California Publ. Zool.* 12(12): 327-334.

Cei, J. M., V. Erspamer and M. Roseghini. 1968. Taxonomic and evolutionary significance of biogenic amines and polypeptides in amphibian skin. II. Toads of the genera *Bufo* and *Melanophryniscus*. *Syst. Zool.* 17(3): 232-245.

Cole, Charles J., Charles H. Lowe, and John W. Wright. 1968. Karyotypes of eight species of toads (genus *Bufo*) in North America. *Copeia* 1968(1): 96-100.

Cope, Edward D. "1866"(1867). On the Reptilia and Batrachia of the Sonoran province of the Nearctic region. *Proc. Acad. Natur. Sci. Philadelphia* 18: 300-314.

—. 1889. The Batrachia of North America. *U. S. Nat. Mus. Bull.* (34): 3-525.

Cunningham, John D. 1962. Observations on the natural history of the California Toad, *Bufo californicus* Camp. *Herpetologica* 17(4): 255-260.

Guttman, Sheldon I. 1972. Blood proteins, ch. 14, p. 265-278. In W. F. Blair (ed.), *Evolution in the genus Bufo*. Univ. Texas Press, Austin. viii + 459 p.

Kellogg, Remington. 1932. Mexican tailless amphibians in the United States National Museum. *U. S. Nat. Mus. Bull.* (160): iv + 224.

Linsdale, Jean M. 1940. Amphibians and reptiles in Nevada. *Proc. Amer. Acad. Arts Sci.* 73(8): 197-257.

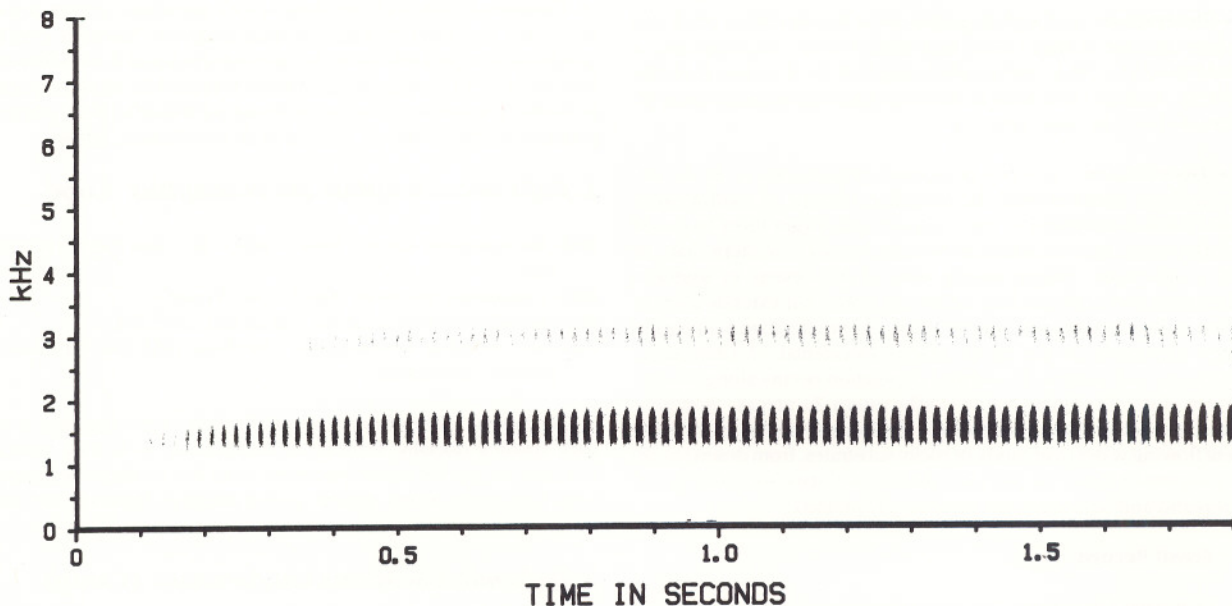


Fig. Audiospectrogram of initial part of a 5.3 sec advertisement call of *Bufo microscaphus*; 2 km N Wickenburg, Maricopa County, Arizona, 23 March 1986, body temp. 15.5°C; 45 Hz filter; specimen Brian K. Sullivan field no. 1986.3.

- Martin, Robert F. 1973. Osteology of North American *Bufo*: the *americanus*, *cognatus*, and *boreas* species groups. *Herpetologica* 29(4): 375-387.
- Martin, William F. 1972. Evolution of vocalization in the genus *Bufo*, ch. 15, p. 279-309. In W. F. Blair (ed.), *Evolution in the genus Bufo*. Univ. Texas Press, Austin. viii + 459 p.
- Maxson, Linda R., Al-ran Song, and Randee Lopata. "1981" (1982). Phylogenetic relationships among North American toads, genus *Bufo*. *Biochem. Syst. Ecol.* 9(4): 347-350.
- Myers, George S. 1930. The status of the southern California toad, *Bufo californicus* (Camp). *Proc. Biol. Soc. Washington* 43: 73-78.
- Riemer, William J. 1955. Comments on the distribution of certain Mexican toads. *Herpetologica* 11(1): 17-23.
- Shannon, Frederick A. 1949. A western subspecies of *Bufo woodhousii* hitherto erroneously associated with *Bufo compactilis*. *Bull. Chicago Acad. Sci.* 8: 301-312.
- . 1953. Notes on the lectotype of *Bufo woodhousii microscaphus* with notes on the specific relationships of the toads. *Herpetologica* 9(4): 182-183.
- Slevin, Joseph R. 1928. The amphibians of western North America. *Occas. Pap. California Acad. Sci.* (16): 1-152.
- Smith, Hobart M. 1947. Subspecies of the Sonoran toad (*Bufo compactilis* Wiegmann). *Herpetologica* 4(1): 7-13.
- Stebbins, Robert C. 1951. *Amphibians of western North America*. Univ. California Press, Berkeley. ix + 539 p.
- . 1954. *Amphibians and reptiles of western North America*. McGraw-Hill Book Co., New York. xxii + 528 p.
- . 1985. *A field guide to western reptiles and amphibians*. Second edition. Houghton Mifflin Co., Boston. xiv + 336 p.
- Sullivan, Brian K. 1986. Hybridization between the toads *Bufo microscaphus* and *Bufo woodhousii* in Arizona: morphological variation. *J. Herpetol.* 20(1): 11-21.
- Tanner, Vasco M. 1931. A synoptical study of Utah Amphibia. *Proc. Utah Acad. Sci.* 8: 159-198.
- Wauer, Roland H. 1964. Reptiles and amphibians of Zion National Park. *Zion Natur. Hist. Assoc.*: 1-55.
- Webb, Robert G. 1972. Resurrection of *Bufo mexicanus* Brocchi for a highland toad in western Mexico. *Herpetologica* 28(1): 1-6.

Andrew H. Price, Texas Natural Heritage Program, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744, and **Brian K. Sullivan**, Department of Zoology, University of Maine, Orono, Maine 04469.

Primary editor for this account, Richard G. Zweifel.

Published 15 June 1988 and Copyright ©1988 by the Society for the Study of Amphibians and Reptiles.
