

ruber and *Rhinella crucifer* (Souza-Júnior et al. 1991. Rev. Brasil. Biol. 51:585–588). The specimens of *G. chabaudi* (males) identified herein possess the diagnostic characters of this species, especially three pairs of genital papillae: one preanal pair, another postanal, laterally projecting and a third ventral pair located in a short, subulated and coiled tail. In this note, the distribution of *G. chabaudi* is expanded and *P. platensis* is a new host record.

We are grateful to Marissa Fabrezi (Instituto de Biología y Geociencias del NOA-Salta) for identifying the tadpoles.

GABRIEL CASTILLO, Universidad Nacional de San Juan Argentina. Diversidad y Biología de Vertebrados del Árido, Departamento de Biología, San Juan, Argentina (e-mail: nataliocastillo@gmail.com); **GERALDINE RAMALLO**, Instituto de Invertebrados, Fundación Miguel Lillo, San Miguel de Tucumán, Argentina (e-mail: gramallos@yahoo.com.ar); **CHARLES R. BURSEY**, Pennsylvania State University, Department of Biology, Shenango Campus, Sharon, Pennsylvania 16146, USA (e-mail: cxb13@psu.edu); **STEPHEN R. GOLDBERG**, Whittier College, Department of Biology, Whittier, California 90608, USA (e-mail: sgoldberg@whittier.edu); **JUAN CARLOS ACOSTA**, Universidad Nacional de San Juan Argentina. Diversidad y Biología de Vertebrados del Árido, Departamento de Biología, San Juan, Argentina (e-mail: jcastoasanjuan@gmail.com).

PSEUDOPHILAUTUS AMBOLI (Amboli Bush Frog). PREDATION BY TERRESTRIAL BEETLE LARVAE. Amphibians are important prey for numerous arthropod taxa, including ground beetles (Toledo 2005. Herpetol. Rev. 36:395–399; Bernard and Samolg 2014. Entomol. Fennica 25:157–160). Previous studies have shown that *Epomis* larvae feed exclusively on amphibians and display a unique luring behavior in order to attract their prey (Wizen and Gasith 2011. PLoS ONE 6:e25161). Moreover, the larval mandibles are characterized by two curved “hooks,” a modification for grasping onto the amphibian skin (Brandmayr et al. 2010. Zootaxa 2388:49–58). Published observations of *Epomis* beetles attacking amphibians are scarce, and the majority of our knowledge comes from reports originating in Japan (Crossland et al. 2016. Herpetol. Rev. 47:107–108) or the Middle East (Wizen and Gasith 2011, *op. cit.*). To the best of our knowledge, the only record from India of amphibian predation by *Epomis* reports of a ground-dwelling toad *Duttaphrynus scaber* carrying the beetle larva (Barve and Chaboo 2011. Herpetol. Rev. 42:83–84).

Pseudophilautus amboli is a small endemic frog distributed in the Western Ghats of India. It is known from a few localities only in Maharashtra and Karnataka (<http://research.amnh.org/vz/herpetology/amphibia/Amphibia/Anura/Rhacophoridae/Rhacophorinae/Pseudophilautus/Pseudophilautus-amboli>; 20 Feb 2017). This species is classified as Critically Endangered due to its narrow distribution range, and is threatened by habitat loss and fragmentation (<http://www.iucnredlist.org/details/58910/0>; 2 Jun 2017). Here we report predation of *P. amboli* by *Epomis* larvae in India.

At 2300 h on 22 October 2016, we performed an amphibian survey at Amboli forest, a hilly location on the Northern Western Ghats ridge in Sindhudurg District of Maharashtra, India (15.964681°N, 74.003616°E, WGS 84; 690 m elev.). During our visit we observed several juveniles of *P. amboli*, active on broad leaves in the forest, approximately 20 cm above the ground surface. Upon close inspection, we noticed that five of these specimens (SVL ca. 40 mm) had small beetle larvae attached to their bodies (Fig. 1). GW identified the larvae as *Epomis* sp. based on his work with this genus and its interactions with amphibians. All larvae observed on *P. amboli* were first-instars attached to the throat area, and some had their head embedded deep inside the amphibian's flesh (Fig. 1B). Nevertheless, the frogs were still alive

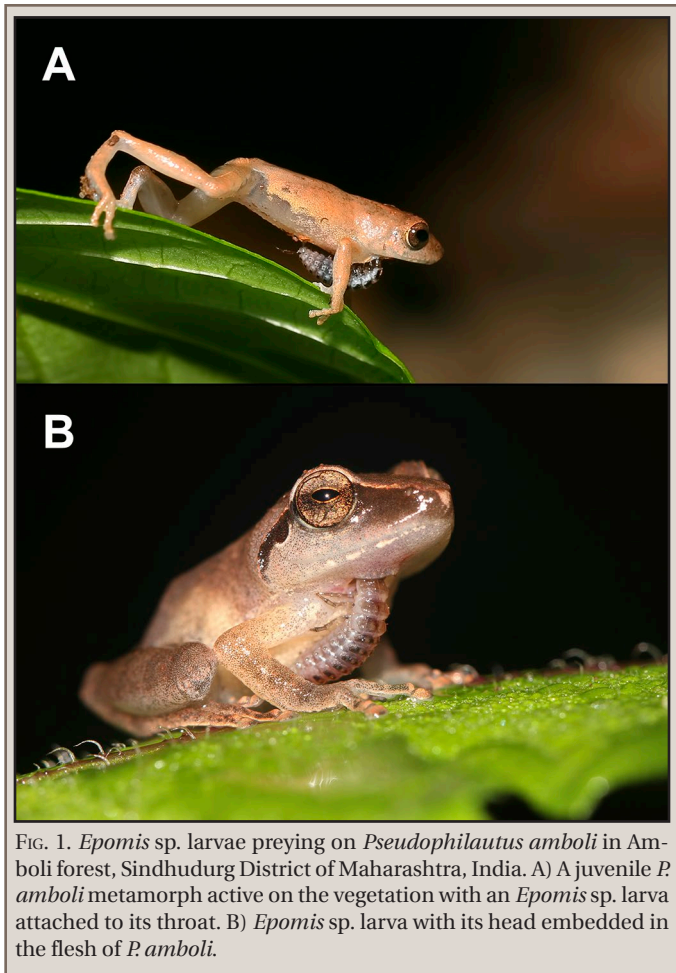


FIG. 1. *Epomis* sp. larvae preying on *Pseudophilautus amboli* in Amboli forest, Sindhudurg District of Maharashtra, India. A) A juvenile *P. amboli* metamorph active on the vegetation with an *Epomis* sp. larva attached to its throat. B) *Epomis* sp. larva with its head embedded in the flesh of *P. amboli*.

and did not show any sign of struggling. They seemed to behave normally and moved about in the vegetation without problems. The amphibians and larvae were not collected.

The infected *P. amboli* may have encountered the *Epomis* larvae on vegetation above the ground surface, similarly to what is reported for *E. nigricans* larvae attacking tree frogs in Japan (Tachikawa 1994. *In* Amazing Life of Insects, Atlas 48th Special Exhibition. Oturu Museum, Oturu. 20 pp.). The location of the larvae on the amphibians' bodies suggests that they enticed the frogs to approach by displaying their characteristic luring behavior (summary in Wizen and Gasith 2011, *op. cit.*). Moreover, because *Epomis* larvae feed exclusively on amphibians in a parasitic manner, the interaction is usually fatal to the amphibian. Our observations serve as evidence for the existence of a stable breeding population of *Epomis* beetles in the area that relies on the frogs as its main food source. This calls for further research to monitor and evaluate the impact of the beetles on the population of the Critically Endangered amphibian.

We thank Nirman Chowdhury and Gargi VR for assistance in the field.

GIL WIZEN, 602-52 Park St. E, Mississauga, Ontario L5G 1M1, Canada (e-mail: wizenrop@gmail.com); **ANISH PARDESHI** (e-mail: anish-pardehi103@gmail.com) and **KAKA BHISE**, Malabar Nature Conservation Club, 591 Amboli Bazar, Amboli, Sawantwadi Taluka, Sindhudurg District, Maharashtra, India (e-mail: msbkaka29@gmail.com).

RANA BOYLII (Foothill Yellow-legged Frog). PREDATION. *Rana boyllii* lives and breeds primarily in perennial stream habitats of

the Pacific Coast region of western North America, from central Oregon to Baja California (Zweifel 1955. Univ. California Publ. Zool. 54:207–292; Hayes et al. 2016. Gen. Tech. Rpt. PSW-GTR-248). *Rana boylei* is a Species of Special Concern in California and population declines have been primarily attributed to altered flow and temperature regimes resulting from the construction of dams along many of their native streams (Kupferberg 1996. Ecol. Appl. 6:1332–1344). Chytrid fungus (*Batrachochytrium dendrobatidis*) may have played an important role in the decline of *R. boylei* in California (Padgett-Flohr and Hopkins 2009. Dis. Aquat. Org. 83:1–9), and so might the introduction of non-native species such as the American Bullfrog (*Lithobates catesbeianus*; Kupferberg 1997. Ecology 78:1736–1751). Little is known about the impact that predation might have had on *R. boylei* populations, but predation of adult *R. boylei* by *L. catesbeianus* has been reported in at least two stream systems in northern California (Crayon 1998. Herpetol. Rev. 29:232; Hothem et al. 2009. J. Herpetol. 43:275–283). Here, I report on the predation of a *R. boylei* larva by *L. catesbeianus*.

Copeland Creek is the primary drainage of the 255.8-ha Mitsui Ranch, located at the top of Sonoma Mountain in Sonoma County, California, USA (38.335834°N, 121.579652°W; WGS 84). The creek drains a landscape comprised primarily of annual grasslands with isolated stands of *Umbellularia californica* (California Bay Laurel), *Quercus lobata* (Valley Oak), and *Q. agrifolia* (Coast Live Oak). On 25 May 2015, while surveying the creek, I encountered and collected three *L. catesbeianus* in a small pool. The stomach of one small *L. catesbeianus* (SVL 70 mm; gape 27 mm) contained one snail (Physidae), one beetle (Hydrophylidae), one water strider (Gerridae), and one *R. boylei* larva at developmental stage 28 (Gosner 1960. Herpetologica 16:183–190). *Rana draytonii* and *L. catesbeianus* do not breed in this section of Copeland Creek but they use it for dispersal, foraging, and as a moist corridor to move between ponds when flows are low enough to permit these activities. Thus, I assume predation of *R. boylei* larvae by *L. catesbeianus* is opportunistic rather than a constant pressure.

I thank the Sonoma Mountain Ranch Preservation Foundation for allowing access and providing opportunity.

JEFFERY T. WILCOX, Sonoma Mountain Ranch Preservation Foundation, 3124 Sonoma Mountain Road, Petaluma, California 94594, USA; e-mail:jtwillcox@comcast.net.

SCAPHIOPUS COUCHII (Couch's Spadefoot). AGGREGATION. Tadpole aggregation behaviors have been observed in many North American anuran families, including Bufonidae, Hylidae, Leptodactylidae, Microhylidae, Ranidae, Rhinophrynidae, and Scaphiopodidae (Wells 2007. The Ecology and Behavior of Amphibians. The University of Chicago Press, Chicago, Illinois. 1148 pp.). Benefits of aggregations include increased foraging opportunities, increased resource availability, physiological benefits, and decreased predation. However, this could come at the cost of increased competition, cannibalism, and predation risk (McDiarmid and Altig 1999. Tadpoles: The Biology of Anuran Larvae. The University of Chicago Press, Chicago, Illinois. 444 pp.; Wells, *op. cit.*). Although the exact triggers influencing the occurrence of aggregation in tadpoles are not fully understood, it is likely strongly influenced by environmental and ecological parameters and a balance between the benefits and costs of this behavior.

Observations of various forms of aggregation in spadefoot (family Scaphiopodidae) tadpoles have resulted in the identification of three major types of aggregation: feeding aggregations,

premetamorphic protective aggregations, and metamorphic aggregations (Bragg 1965. Gnomes of the Night: The Spadefoot Toads. University of Pennsylvania Press, Philadelphia, Pennsylvania. 127 pp.; Black 1973. Ph.D. dissertation, University of Oklahoma, Norman, Oklahoma. 221 pp.). Within this family, the majority of studies have detailed aggregation behaviors in Plains Spadefoot (*Spea bombifrons*) tadpoles (Bragg and King 1960. Wasmann J. Biol. 18:273–289; Bragg 1964. Wasmann J. Biol. 22:299–305; Bragg 1965, *op. cit.*; Black 1968. Proc. Oklahoma Acad. Sci. 49:13–14). Similarly, several studies have documented aggregation behaviors in tadpoles of the Eastern Spadefoot (*Scaphiopus holbrookii*; Abbott 1884. Am. Nat. 18:1075–1080; Ball 1936. Trans. Connecticut Acad. Arts Sci. 32:351–379; Richmond 1947. Ecology 28:53–67), Hurter's Spadefoot (*S. hurteri*; Bragg 1956. Herpetologica 12: 201–204; Bragg 1959. Wasmann J. Biol. 17:23–42; Bragg 1968. Wasmann J. Biol. 26:11–16), and Mexican Spadefoot (*Spea multiplicata*; Dodd 2013. Frogs of the United States and Canada, Volume 2. The Johns Hopkins University Press, Baltimore, Maryland. 982 pp.). Compared to these species, considerably less is known about *Scaphiopus couchii*. Black (1973, *op. cit.*) experimentally demonstrated aggregation behaviors in *S. couchii* tadpoles under laboratory conditions, and similar to Bragg (1965, *op. cit.*), provided no account of this behavior in the field. Here, we report an observation of aggregation behavior in *S. couchii* tadpoles from the Chihuahuan Desert of west Texas.

On 3 July 2014, two large aggregations of *Scaphiopus couchii* tadpoles were found in a shallow, ephemeral pool along a dirt road on C. E. Miller Ranch, Jeff Davis County, Texas, USA (30.60548°N, 104.64239°W; WGS 84; Fig. 1). Each aggregation consisted of approximately 700 tadpoles that were visible at the surface of the water. However, turbid water and the presence of individuals at the bottom of the pool prevented a more accurate assessment of the number of tadpoles in each aggregation. Surrounding these large aggregations were smaller aggregations of 8–20 tadpoles. In sum, the total size of each of these aggregations likely exceeded 1000 tadpoles. The majority of individuals were feeding at the water surface in a vertical position, as described by Black (1973, *op. cit.*). A group of 16 individuals (15 fluid preserved and one preserved as tissue sample) were taken as vouchers to confirm identification (following Altig and McDiarmid 2015. Handbook of Larval Amphibians of the United States and Canada. Cornell University Press, Ithaca, New York. 345 pp.) and deposited at the Biodiversity Collections at the University of Texas at Austin (TNHC 91983 [TJL 2691]). Although aggregations have been observed in other *Scaphiopus* (see Bragg 1965, *op. cit.*), to the best of our knowledge, this appears to be the first detailed description of aggregation behavior in the field for *S. couchii*.

We thank the Miller family for their continued hospitality and support of our herpetological research program, and J. Farkas for reviewing earlier drafts of this manuscript. Specimens were collected under a Texas Parks and Wildlife Department Scientific Collecting Permit (SPR-1097-912) issued to TJL.

DREW R. DAVIS, Department of Biology, University of South Dakota, 414 East Clark Street, Vermillion, South Dakota 57069, USA (e-mail: drew.davis@usd.edu); **TRAVIS J. LADUC**, Texas Natural History Collections, Department of Integrative Biology, 10100 Burnet Rd, PRC 176–R4000, The University of Texas at Austin, Austin, Texas 78758-4445, USA (e-mail: travieso@Austin.utexas.edu).

SCINAX NASICUS (Lesser Snouted Treefrog). PREDATION BY TRACHYCEPHALUS TYPHONIUS (Canauaru Frog). *Trachycephalus typhonius* is a large hylid with generalist feeding habits,