

ALONSO BOSCH, Museo de Historia Natural "Felipe Poey," Facultad de Biología, Universidad de La Habana, Calle 25 #455 e/ J e I, Vedado, Plaza de la Revolución, CP10400, La Habana, Cuba (e-mail: ralonso@fbio.uh.cu).

PHILAUTUS VERMICULATUS (Perak Bubble-nest Frog). ENDOPARASITES. *Philautus vermiculatus* is known to occur in extreme southern peninsular Thailand and Malaya (Frost 2017. Amphibian Species of the World: an Online Reference. Version 6.0 <<http://research.amnh.org/herpetology/amphibia/index.html>>; accessed 12 Jan 2017. American Museum of Natural History, New York). We know of no published records of parasites from *P. vermiculatus*. In this note we establish the initial parasite list for *P. vermiculatus*.

We examined three *P. vermiculatus* (mean SVL = 29.3 mm ± 4.2 SD, range = 26–34 mm) from Peninsular Malaysia, Perak State, Bukit Larut (4.324758°N, 102.324758°E; WGS 84) collected by LLG and deposited in the herpetology collection of La Sierra University, Riverside County, USA as LSUHC 8870 (collected March 2008) and LSUHC 10625, 10626 (collected September 2010).

The digestive tract was removed and the esophagus, stomach, small and large intestine were opened and their contents examined for parasites utilizing a dissecting microscope. Two Nematoda were found. They were each placed in a drop of lachtophenol on a glass microscope slide, cover slipped, studied under a compound microscope, and identified utilizing Anderson et al. (2009. Keys to the Nematode Parasites of Vertebrates, Archival Volume. CAB International, Wallingford, Oxfordshire. 463 pp.) and Gibbons (2010. Keys to the Nematode Parasites of Vertebrates. Supplementary Volume. CAB International, Wallingford, Oxfordshire. 416 pp.) We identified one female of *Foleyellides malayensis* from the body cavity of LSUHC 10625 and one larval Acuariidae in a cyst in the stomach wall of LSUHC 10626. *Foleyellides malayensis*, a member of the Onchocercidae, is transmitted by blood-sucking arthropods (Anderson 2000. Nematode Parasites of Vertebrates. Their Development and Transmission. CAB International, Wallingford, Oxfordshire. 650 pp.). Acuariidae are parasites of aquatic birds and utilize arthropods as intermediate hosts (Anderson 2000, *op. cit.*). Amphibians serve as paratenic (transport) hosts with development to the adult occurring when the amphibian is eaten by a carnivorous bird. Both nematodes were deposited in the Harold W. Manter Laboratory (HWML), University of Nebraska, Lincoln, USA as *F. malayensis* (HWML 99964) and Acuariidae sp. (HWML 99965). *Philautus vermiculatus* represents a new host record for *F. malayensis* and for larvae assigned to the Acuariidae.

STEPHEN R. GOLDBERG, Whittier College, Department of Biology, Whittier, California 90608, USA (e-mail: sgoldberg@whittier.edu); **CHARLES R. BURSEY**, Pennsylvania State University, Department of Biology, Shenango Campus, Sharon, Pennsylvania 16146, USA (e-mail: cxb13@psu.edu); **L. LEE GRISMER**, La Sierra University, Department of Biology, Riverside, California 92515, USA (e-mail: lgrismer@lasierra.edu).

PHRYNOBATRACHUS KREFFTII (Kreffft's Puddle Frog). ANUROPHAGY. *Phrynobatrachus krefftii* is found in small streams and pools in the forests of the East and West Usambara Mountains in northwestern Tanzania (Channing and Howell 2006. Amphibians of East Africa. Cornell University Press, Ithaca, New York. 418 pp.; Pickersgill 2007. Frog Search: Results of Expeditions to Southern and Eastern Africa. Edition Chimaira, Frankfurt am Main, Germany. 575 pp.). It is among the largest of species in this genus and is the sole representative from the Eastern Arc Mountains within a small clade found in the Albertine Rift Mountains

(e.g., *P. acutirostris*, *P. dendrobates*, *P. petropedetoides*, and *P. versicolor*) that may also include other large East African species such as *P. irangi* (Drewes and Perret 2000. Proc. California Acad. Sci. 52:55–64; Zimkus et al. 2010. Mol. Phylogenet. Evol. 55:883–900; Zimkus et al. 2012. PLoS ONE 7:e35118).

We used high-resolution x-ray computed tomography (CT) to document the skeleton in a male specimen of *P. krefftii* (CAS 168486; SVL = 40.0 mm; Fig. 1A) that was collected near Amani in the Eastern Arc Mountains of Tanzania (5.10°S, 38.62°E; WGS 84) by R. C. Drewes, K. M. Howell, and J. V. Vindum on 9 April 1988. While reconstructing the skeleton of this specimen, we identified a frog in its gut that appears to have been swallowed headfirst, and that based on skeletal morphology (Fig. 1B,C) is a juvenile *Arthroleptis*. It is identifiable as not yet mature due to the combination of its small size (SVL = ~20 mm), poorly ossified mesopodial bones, and by having cranial bones that are not coossified (e.g., the exoccipital and otic region). Unlike the skeleton of *P. krefftii*, the skeleton of the ingested frog lacks an ossified style of the sternum and has more medially placed vomers, both of which are characteristics of *Arthroleptis* in comparison to *Phrynobatrachus* (Scott 2005. Cladistics 21:507–574). Because the size of this ingested frog is near the upper size limit for the small species of *Arthroleptis* found in these mountains (e.g., *A. xenodactyloides*, *A. xenodactylus*; Blackburn 2008. Mol. Phylogenet. Evol. 49:806–826), it is likely that this represents a juvenile of a larger species such as *A. affinis* or *A. stenodactylus* (Loader et al. 2011. Fieldiana Life Earth Sci. 4:90–102). Because this specimen has femora that are approximately as long as the tibiofibulae, it is more likely to be *A. affinis* rather than *A. stenodactylus* which typically has relatively shorter tibiofibulae.

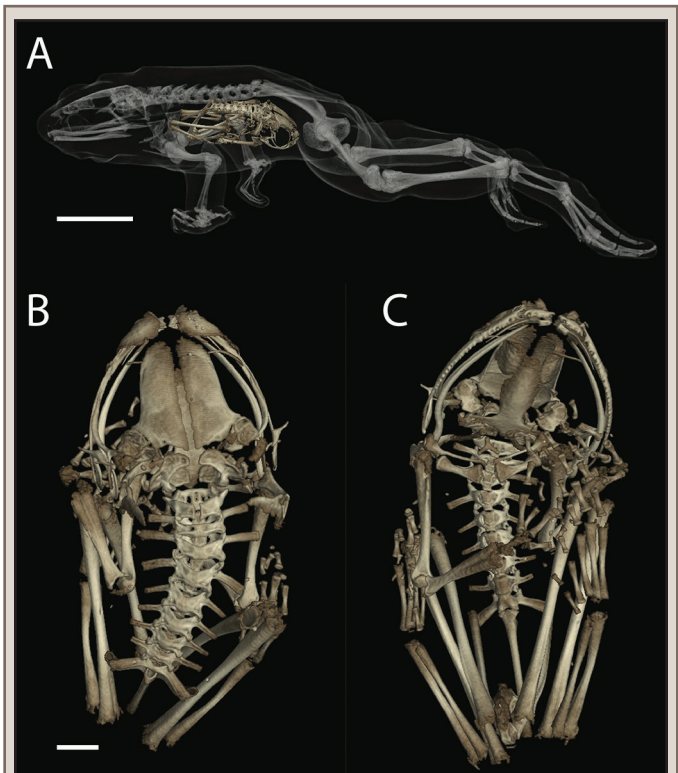


FIG. 1. A) CT-scan of *Phrynobatrachus krefftii* (CAS 168486) revealing skeleton of juvenile *Arthroleptis* in gut; scale bar, 5 mm. B, C) Dorsal and ventral views of skeleton of ingested *Arthroleptis* specimen; scale bar, 2 mm.

Previous studies of stomach contents in various species of *Phrynobatrachus* have reported an assortment of terrestrial arthropods including beetles, ants, weevils, spiders, and millipedes (Noble 1924. Bull. Am. Mus. Nat. Hist. 49:147–303; Barbour and Loveridge 1928. Mem. Mus. Comp. Zool. 50:87–261; Toft. 1982. Rev. Ecol. [Terre Vie] 36:223–232). In addition to eating arthropods, *P. krefftii* is known to eat crabs (Barbour and Loveridge 1928, *op. cit.*). While anurans eating other anurans is well documented in neobatrachian frogs, this is the first report of anurophagy in the family Phrynobatrachidae (Measey et al. 2015. PeerJ 3:e1204) and of any species of *Phrynobatrachus* consuming a vertebrate.

DAVID C. BLACKBURN (e-mail: dblackburn@flmnh.ufl.edu), **DANIEL J. PALUH**, and **EDWARD L. STANLEY**, Department of Natural History, Florida Museum of Natural History, University of Florida, 1659 Museum Road, Gainesville, Florida 32611, USA.

PHYSALAEEMUS CAMACAN. PREDATION. Amphibians are prey for numerous species of invertebrates (Toledo et al. 2006. J. Zool. 271:170–177). Among the invertebrate predators, the Arachnida represent one of the four classes of arthropods that are significant vertebrate predators (McCormick and Polis 1982. Biol. Rev. Camb. Philos. Soc. 57:29–58). Several events of anuran predation by arachnids are reported from the Neotropical region and are attributed to the spider families Pisauridae, Ctenidae, Lycosidae, Sparassidae, and Theraphosidae (Menin et al. 2005. Phyllomedusa 4:39–47). Herein we report the predation of a leptodactylid frog by a spider from the family Ctenidae.

Physalaemus camacan is a small frog endemic to the Atlantic Forest of southern Bahia State, northeastern Brazil (Frost 2017. Amphibian Species of the World: an Online Reference. Version 6.0 <<http://research.amnh.org/herpetology/amphibia/index.html>>; accessed 3 May 2017. American Museum of Natural History, New York). Populations of the spider *Ctenus rectipes* are found in the Atlantic Forest of northeastern Brazil (Brescovit and Simó 2007. Arachnology 14:1–17). On 7 June 2015 at 2130 h, we observed a female adult spider *Ctenus rectipes* preying upon an adult frog *P. camacan* on the water surface of a temporary pond in a fragment of the Atlantic forest of the Reserva Ecológica Michelin (13.81666°S, 39.13333°W; SAD 69), located in the municipality of Igrapiúna, Bahia, Brazil. The predation event was



FIG. 1. Predation of *Physalaemus camacan* by *Ctenus rectipes* in northeastern Brazil.

in advanced stage and the spider had already ingested the frog's anterior region.

We thank Antonio D. Brescovit for identifying the spider, and the Center for Biodiversity Studies of the Michelin Ecological Reserve for logistical and financial support. CVMM thanks Fernanda Tonolli for her patience, affection, and eternal loving support.

CAIO VINICIUS DE MIRA-MENDES (e-mail: caio_vina@yahoo.com.br), **MIRCO SOLÉ**, Universidade Estadual de Santa Cruz, Campus Soane Nazaré de Andrade, Rodovia Jorge Amado, Km 16, Bairro Salobrinho, CEP 45662-900, Ilhéus, Bahia, Brazil; **DANILO SILVA RUAS**, Universidade Estadual do Sudoeste da Bahia, Campus Itapetinga, Praça Primavera, 40 - Bairro Primavera, CEP 45700-000, Itapetinga, Bahia, Brazil.

POLYPEDATES OCCIDENTALIS (Western Tree Frog). PREDATION. Post-metamorphic anurans are known to be most vulnerable to invertebrate predators either when they are breeding or while they are juveniles (Toledo 2005. Herpetol. Rev. 36:395–400). The only report synthesizing predation of post-metamorphic anurans is more than a decade old and reports a diverse community where ~68 species of anurans have been preyed upon in over 300 documented instances by at least 57 species of invertebrates (Toledo 2005, *op. cit.*). Despite the crucial role of predation in amphibian ecology and behavior, we know little about even the broad categories of predators, particularly among invertebrates. Here, we report an incidence of predation on a juvenile *Polypedates occidentalis* by a *Scutigera* sp.

On the night of 6 July 2015, during a survey as part of the “Bisle Frog Team,” a citizen engagement initiative, we encountered an arthropod of the genus *Scutigera* feeding on a juvenile (SVL = ca. 15 mm) *P. occidentalis* (Fig. 1). The *Scutigera* sp., commonly known as house centipedes, was found on a rock and had started to ingest the anuran by its left eye. The *Scutigera* sp. did not move in our presence and continued to feed on the anuran. We observed the predation incident for five minutes and continued on our survey. We did not observe if the *Scutigera* sp. consumed the whole anuran. The anuran did not show any signs of movement and was possibly envenomated. This predation incident occurred around a small, shallow pond in which over 50 tadpoles of *P. occidentalis* were observed. Six adult *P. occidentalis*



FIG. 1. Froglet of *Polypedates occidentalis* being eaten by a *Scutigera* sp. perched on the vertical surface of a rock.

PHOTO BY K. S. SESHADRI