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Extreme tadpoles II: the highly derived larval anatomy of *Occidozyga baluensis* (Boulenger, 1896), an obligate carnivorous tadpole

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Abstract Tadpoles of *Occidozyga* species have been reported to be carnivorous, feeding on insects and other tadpoles. We present photographic evidence for the previously undocumented larval feeding behavior in *O. baluensis*. Furthermore, we present a detailed anatomical description of the skull, cranial musculature, and gross gut morphology based on three-dimensional reconstructions from serial sections and μCT imagery. The cranial anatomy of larval *O. baluensis* is highly derived in many characters, with respect to taxa outside the genus *Occidozyga*, most notably the palatoquadrate and hyobranchial apparatus, that play a major role in tadpole feeding. A large larval stomach was present in the specimens examined, indicative of a macrophagous carnivorous mode of feeding. Because of the relatively small oral orifice, relatively large-sized food items found in the larval stomach, and the tunnel-like arrangement of structures that form the buccal cavity, we hypothesize that suction feeding utilizing strong negative pressure is employed by this species. Furthermore, we propose that force, rather than speed, is the main characteristic of their feeding. The unique features of the study species substantially expand the known morphospace for tadpoles, particularly among the Acosmanura (Pelobatoidea, Pelodytoidea, and Neobatrachia). Except for Microhylidae, acosmanurans previously described possess limited innovative larval morphologies. Larval carnivory has evolved convergently several times in distant anuran clades and shows structural, behavioral, and functional differences in the known examples.

Keywords Lissamphibia · Anura · Dicroglossidae · Carnivory · Cranium · Larval stomach

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