

Short Communication

External morphology and osteology support the placement of *Phrynobatrachus nlonakoensis* Plath, Herrmann & Böhme, 2006 within the genus *Arthroleptis*

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Abstract.—Examination of external morphology and osteology of type material of *Phrynobatrachus nlonakoensis* Plath, Herrmann, and Böhme, 2006 support a recent taxonomic change, transferring the species into the genus *Arthroleptis*, which was recently made without examination of specimens.

Key words.—Africa, Arthroleptidae, Cameroon, Phrynobatrachidae, taxonomy.

Particular morphological characters noted in the original description of *Phrynobatrachus nlonakoensis* Plath, Herrmann, & Böhme, 2006 a species of puddle frog from Mt. Nlonako, Cameroon, indicate the species may have been assigned to the wrong genus. The description reports only an inner metatarsal tubercle in *P. nlonakoensis*, whereas all other species have both inner and outer metatarsal tubercles (Deckert 1938; Zimkus & Blackburn 2008; Frétey 2008). Although drawings of the holotype do not illustrate a tarsal tubercle, the authors differentiate this species from *P. africanus* and by the presence of a tarsal tubercle. Although recent work revealed that both *P. africanus* and *P. sandersoni* actually do exhibit a tarsal tubercle (Zimkus & Blackburn 2008), the discrepancies between the illustrations and descriptions in the original description led these authors to question the validity of the placement of *P. nlonakoensis* into the genus of puddle frogs. Recent review of all species of these two genera supports reassignment of *P. nlonakoensis* to the genus *Arthroleptis* (Frétey 2008). However, Frétey used only the drawings included in the original

description to come to this conclusion, and no specimens were examined to support this change in taxonomy. Therefore, type material of *P. nlonakoensis* was examined to confirm the validity of this taxonomic change.

This work is based on morphological examination of type specimens of *Phrynobatrachus nlonakoensis*: ZFMK 80970 (holotype, male), ZFMK 80969 (paratype, male; erroneously numbered ZFMK 78969 in the original description), and ZFMK 80971 (paratype, male; erroneously numbered ZFMK 78971 in the original description). High-resolution images were obtained with a JVC 3-CCD digital camera mounted on a dissecting microscope using AutoMontage Pro 5.0 (Synoptics). Images were saved as TIFF files, cropped, and contrast-adjusted using Adobe Photoshop 7.0 for Macintosh. Osteological data were collected with a Thermo Kevex digital x-ray (Model PXS10) in combination with a PaxScan amorphous silicon sensor array (Model 4030R) and ViVa version 2.0 (Varian Medical Systems, Inc.); specimens were x-rayed using 40 kV.

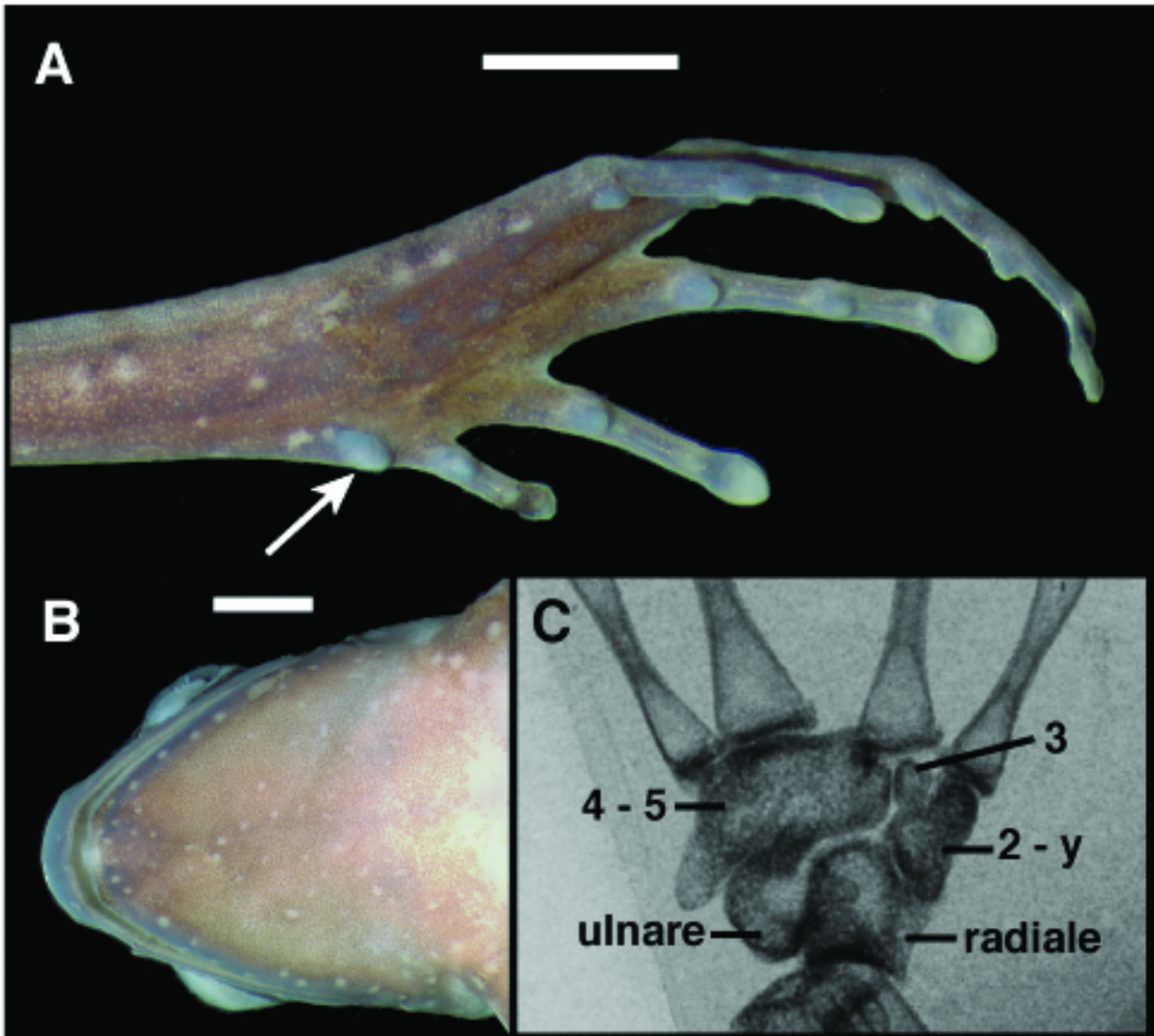


Figure 1. Photographs and radiograph of *Arthroleptis nlonakoensis* (ZFMK 80970; holotype, male). A. Right foot in ventral view, illustrating inner metatarsal tubercle (arrow) and lack of outer metatarsal tubercle, tarsal tubercle, and webbing. B. Throat, illustrating lack of vocal folds. C. X-ray image of left wrist of *A. nlonakoensis*, illustrating carpal arrangement with six elements in which distal carpals 4 and 5 are fused, and distal carpal 2 is fused to the Y element (y); proximal element of the prepollex is not visible. Scale bar 2.0 mm.

External examination of the type specimens of *P. nlonakoensis* reveal that this species exhibits only an inner metatarsal tubercle and lacks both a mid-tarsal tubercle and an outer metatarsal tubercle (Fig. 1A). Presence of inner and outer metatarsal tubercles, as well as a tarsal tubercle, is characteristic of all other *Phrynobatrachus* species (Zimkus & Blackburn 2008). The presence of rudimentary webbing on the feet of *P. nlonakoensis* was

claimed by Plath *et al.* (2006), indicating that this species may have been assigned correctly to the genus *Phrynobatrachus*. However, examination of these specimens reveals that they lack pedal webbing, which is characteristic of species of *Arthroleptis* (Schmidt & Inger 1959; Stewart 1967; Frétey 2008; Zimkus & Blackburn 2008; Fig. 1A). Although these male specimens do not exhibit secondary sexual characteristics, such as an elongate third finger,

dermal digital spines, or inguinal spines, these characters are not universally present in all *Arthroleptis* species (Noble 1931; Blackburn 2005; Zimkus & Blackburn 2008). The lateral vocal folds present in some species of *Phrynobatrachus* are not visible in these specimens (Stewart 1967; Zimkus & Blackburn 2008; Fig. 1B). In addition, the median dorsal skin raphe was not observed in the examined specimens. Nevertheless, this character is often difficult to detect and may be a result of poor preservation or dessication (Drewes & Perret 2000; Laurent 1957; Scott 2005; Zimkus & Blackburn 2008).

Phrynobatrachus nlonakoensis exhibits a carpal configuration similar to other *Arthroleptis* species with six elements in which distal carpal 2 is fused with the Y element (Laurent & Fabrezi 1985; Fig. 1C). Some *Phrynobatrachus* species exhibit carpal configurations with six elements; in this arrangement, distal carpal 3 is fused with 4 and 5 (Laurent & Fabrezi 1990). In addition, the specimens examined exhibit a cartilaginous metasternum, similar to other *Arthroleptis*, while species of *Phrynobatrachus* exhibit an ossified metasternum (Scott 2005).

These results support the claim that *Phrynobatrachus nlonakoensis* was incorrectly assigned to the genus *Phrynobatrachus* and the recent taxonomic action to reassign this species to the genus *Arthroleptis* (Frétey 2008).

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