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The Maluti Mystery revisited: Taxonomy of African River Frogs (Pyxicephalidae, *Amietia*) on the Drakensberg Mountains in southern Africa

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Abstract

The taxonomy of two similar frogs from the top of the Drakensberg escarpment, the Maluti River Frog and the Phofung River Frog is not settled. I examine the relevant types and type descriptions, and discover a number of errors in the literature. Some of the recent taxonomic changes were found to be unsupported. The Maluti River Frog is assigned to *Amietia vertebralis* (Hewitt, 1927), and the Phofung River Frog to *Amietia hymenopus* (Boulenger, 1920).

Key words: Drakensberg, taxonomy, *Amietia*, *Strongylopus*, types

Introduction

The Maluti-Drakensberg highlands are the home to three River Frogs: Queckett's River Frog, the Maluti River Frog and the Phofung River Frog. The latter two possess umbracula, and have been confused in collections. Tarrant *et al.* (2008) suggested the common names Maluti River Frog for the larger species, and Phofung River Frog for the smaller species.

Queckett's River frog *Amietia queckettii* (Boulenger, 1895) was recognised as a good species by Channing & Baptista (2013). The taxonomy of the other two species is not stable. The Maluti River Frog has recently been referred to *Amietia vertebralis* and later *Amietia umbraculata*, while the Phofung River Frog may be *Amietia vertebralis*, *Amietia hymenopus*, or it may be in the genus *Strongylopus* (Poynton 1964, Tarrant *et al.* 2008, Clarke & Poynton 2012). This paper addresses the taxonomic discord. Collection abbreviations: AACRG—African Amphibian Conservation Research Group, North West University, South Africa; BM—old acronym for NHMUK; NHMUK—Natural History Museum, London; NMSA—Natal Museum, Pietermaritzburg, South Africa; PEM—Port Elizabeth Museum South Africa, part of Bayworld; TM—Transvaal Museum, Pretoria, South Africa, now part of the Ditsong Museums.

The river frogs of the Maluti-Drakensberg massif

The Drakensberg massif was formed around 180 Ma (Moulin *et al.* 2011) and consists of a sandstone base capped with a layer of basalt that is over 1000 m thick in places (Haskins & Bell 1995). The eastern and southern faces form a steep escarpment, which is the result of millions of years of erosion. The Kingdom of Lesotho is situated on part of the Drakensberg and related mountain ranges and highlands, enclosed within the boundaries of South Africa. These highlands have many endemics, and are rich in plant and animal species (Mucina & Rutherford 2006, Zunkel 2003). They remain less accessible, although recent repeated visits by herpetologists have provided interesting data (Tarrant *et al.* 2008, Kruger *et al.* 2011).

Two of the common amphibian species on top of the Drakensberg are the Phofung River Frog and the Maluti River Frog. Both species are found in the streams draining the high mountains. The Maluti River Frog is fully aquatic, while the Phofung River Frog can also be found in vegetation along stream edges (Fig. 1). They can be distinguished from the other river frog that occurs there, *Amietia queckettii* (Channing & Baptista 2013) as both

Amietia vertebralis (Hewitt, 1927). Dubois 1987

Rana umbraculata Bush, 1952

Amietia umbraculata (Bush, 1952). Tarrant, Cunningham & Du Preez 2008; Kruger, Weldon & Du Preez 2011

Discussion

This study of the Maluti and Phofung river frogs has shown how important type specimens and accurate type descriptions are. Although the type of *Rana vertebralis* PEM1550 is now in poor shape, it was in the only jar of specimens not in good condition that were recently transferred to the Port Elizabeth Museum (Bayworld) (W.R. Branch, pers comm.). When Poynton examined the specimen for his dissertation and 1964 monograph, the specimen was still in good condition, and he had no hesitation in assigning *Rana umbraculata* Bush, 1952 as a junior synonym of *Rana vertebralis* (despite the fact that Bush was proud of the species, and was then Poynton's PhD supervisor).

Subsequent to FitzSimons (1948b) expanded "description" of *Rana vertebralis*, this became the *de facto* reference for the species, rather than the type. For example, three slightly different sets of measurements of TM 21353 show that this was regarded as representing *Rana vertebralis* (FitzSimons 1948a, 1948b; Bush 1952), while the measurements of the type were only taken from the description, despite the fact that they were incomplete.

The presence of an umbraculum in the Phofung River Frog *Amietia hymenopus* was only reported recently (Du Preez & Carruthers 2009). Previous to that, all specimens with umbracula might have been identified as Maluti River Frogs *Amietia vertebralis*. Tarrant *et al.* (2008) discovered numerous misidentified specimens in museum collections.

Although Tarrant *et al.* (2008) emphasise that they have not found any Maluti River Frogs at Mont-aux-Sources, the type locality of *Rana vertebralis*, specimens are reported from there by Bates (2002) who shows that the species is widespread in Lesotho, KwaZulu-Natal and the Eastern Cape provinces.

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References

- Bates, M.F. (2002) The distribution of *Amietia vertebralis* (Hewitt 1927) (Anura: Ranidae), with comments on its taxonomic and conservation status. *Navorsing van die Nasionale Museum Bloemfontein*, 18, 77–94.
- Boulenger, G.A. (1920) Descriptions of three new frogs in the collection of the British Museum. *The Annals and Magazine of Natural History*, 6, 106.
<http://dx.doi.org/10.1080/00222932008632416>
- Bush, S.F. (1952) On *Rana umbraculata*, a new frog from South Africa. *Annals of the Natal Museum*, 12, 153–164, plates III–VI.
- Channing, A. (1979) Ecological and systematic relationships of *Rana* and *Strongylopus* in southern Natal (Amphibia: Anura). *Annals of the Natal Museum*, 23, 797–831.
- Channing, A. & Baptista, N. (2013) *Amietia angolensis* and *A. fuscigula* (Anura: Pyxicephalidae) in southern Africa: A cold case reheated. *Zootaxa*, 3640 (4), 501–520.
<http://dx.doi.org/10.11646/zootaxa.3640.4.1>
- Clarke, B.T. & Poynton, J.C. (2012) On the generic and specific identity of the holotype of *Rana hymenopus* Boulenger 1920 (Amphibia: Anura: Pyxicephalidae). *Zootaxa*, 3195, 51–56.
- Dawood A. & Uqubay, S.M. (2004) A molecular phylogeny of the sand frog genus *Tomopterna* (Amphibia: Anura: Ranidae) based on mitochondrial 12S and 16S rRNA sequences. *African Zoology*, 39, 145–151.

- Du Preez, L. & Carruthers, V. (2009) *A Complete Guide to the Frogs of Southern Africa*. Struik Nature, Cape Town, 488 pp.
- FitzSimons, V. (1947) Descriptions of new species and subspecies of reptiles and amphibians from Natal, together with notes on some other little known species. *Annals of the Natal Museum*, 11, 111–137, plates I–III.
- FitzSimons, V. (1948a) Notes on some reptiles and amphibians from the Drakensberg, together with a description of a new *Platysaurus* from northern Natal. *Annals of the Transvaal Museum*, 21, 73–80.
- FitzSimons, V. (1948b) Descriptions of two new frogs from Natal and a gecko from Astove Island. *Robert Broom Commemorative Volume*, 1948, 235–242.
- Frost, D.R., Grant, T., Faivovich, J., Bain, R.H., Haas, A., Haddad, C.F.B., De Sa, R.O., Channing, A., Wilkinson, M., Donnellan, S.O., Raxworthy, C.J., Campbell, J.A., Blotto, B.L., Moler, P., Drewes, R.C., Nussbaum, R.A., Lynch, J.D., Green, D.M. & Wheeler, W.C. (2006) The amphibian tree of life. *Bulletin of the American Museum of Natural History*, 297, 1–370.
[http://dx.doi.org/10.1206/0003-0090\(2006\)297\[0001:TATOL\]2.0.CO;2](http://dx.doi.org/10.1206/0003-0090(2006)297[0001:TATOL]2.0.CO;2)
- Haskins, D.R. & Bell, F.G. (1995) Drakensberg basalts: their alteration, breakdown and durability. *Quarterly Journal of Engineering Geology and Hydrogeology*, 28, 287–302.
<http://dx.doi.org/10.1144/GSL.QJEGH.1995.028.P3.07>
- Hewitt, J. (1927) Further descriptions of reptiles and batrachians from South Africa. *Records of the Albany Museum*, 3, 371–415, plates XX–XXIV.
- Kruger, D.J.D., Weldon, C. & Du Preez, L.H. (2011) Resolving the confusion: *Amietia vertebralis* and *A. umbraculata* tadpole morphology. *African Zoology*, 46, 309–319.
<http://dx.doi.org/10.3377/004.046.0210>
- Mucina, L. & Rutherford, M.C. (Eds.) (2006) *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria, 807 pp.
- Moulin, M., Fluteau, F., Courtillot, V., Marsh, J., Delpech, G., Quidelleur, X., Gérard, M. & Jay, A.E. (2011) An attempt to constrain the age, duration, and eruptive history of the Karoo flood basalt: Naude's Nek section (South Africa). *Journal of Geophysical Research*, 116, B07403.
<http://dx.doi.org/10.1029/2011JB008210>
- Poynton, J.C. (1964) The Amphibia of Southern Africa: a faunal study. *Annals of the Natal Museum*, 17, 1–334.
- Tarrant, J., Cunningham, M.J. & Du Preez, L.H. (2008) Maluti Mystery: A systematic review of *Amietia vertebralis* (Hewitt, 1927) and *Strongylopus hymenopus* (Boulenger, 1920) (Anura: Pyxicephalidae). *Zootaxa*, 1962, 33–48.
- Van Dijk, D.E. (1966) Systematic and field keys to the families, genera and described species of southern African anuran tadpoles. *Annals of the Natal Museum*, 18, 231–286.
- Zimkus, B.M. & Blackburn, D.C. (2008) Distinguishing features of the sub-Saharan frog genera *Arthroleptis* and *Phrynobatrachus*: a short guide for field and museum researchers. *Breviora*, 513, 1–12.
[http://dx.doi.org/10.3099/0006-9698\(2008\)513\[1:DFOTSF\]2.0.CO;2](http://dx.doi.org/10.3099/0006-9698(2008)513[1:DFOTSF]2.0.CO;2)
- Zunkel, K. (2003) Managing and conserving southern African grasslands with high endemism. *Mountain Research and Development*, 23, 113–118.
[http://dx.doi.org/10.1659/0276-4741\(2003\)023\[0113:MACSAG\]2.0.CO;2](http://dx.doi.org/10.1659/0276-4741(2003)023[0113:MACSAG]2.0.CO;2)

APPENDIX. Material examined.

PHOFUNG RIVER FROG

Rana hymenopus Boulenger, 1920.

Holotype NHMUK 1947.2.28.65

Amietia hymenopus (Boulenger, 1920)

AACRG 0647–50, 2397, 2398 Mont-aux-Sources; NMSA 737, 740, 741, 745 (two specimens), 5597–98 Mont-aux-Sources; NMSA 5587–8 Top of Giant's Castle, Lesotho; NMSA 6351–2 Top of Organ Pipes Pass, Lesotho.

Rana draconensis FitzSimons, 1948

Holotype NMSA 734 Mont-aux-Sources

Phrynobatrachus lawrencei FitzSimons, 1947

Holotype NMSA 669 Champagne Castle, Drakensberg

MALUTI RIVER FROG

Rana vertebralis Hewitt, 1927

Holotype PEM A1550 Mont-aux-Sources

Paratypes PEM A1551, A1552, A1562 and A10562 Mont-aux-Sources

Amietia vertebralis (Hewitt 1927)

AC3037 Sani Pass top, Drakensberg; AACRG 1104–05 Upper Sani, Lesotho; AACRG 0276, 0489, 0678, 1108 Lesotho; NMSA 2608–9 Drakensberg Gardens, Drakensberg; NMSA 6297 Underberg, Yealand;

Rana umbraculata

Paratypes (male and female) NMSA 712 Drakensberg Gardens, Drakensberg