Zootaxa 3936 (1): 042–070
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3936.1.2
http://zoobank.org/urn:lsid:zoobank.org:pub:B1F90AE0-B6C4-449B-B9B5-2E47DF321910

Type specimens in the Port Elizabeth Museum, South Africa, including the historically important Albany Museum collection. Part 1: Amphibians

WERNER CONRADIE[1,2,4], WILLIAM R. BRANCH[1,3] & GILLIAN WATSON[1]

[1] *Port Elizabeth Museum (Bayworld), P.O. Box 13147, Humewood, 6013, South Africa*
[2] *South African Institute for Aquatic Biodiversity, P/Bag 1015, Grahamstown, 6140, South Africa*
[3] *Department of Zoology, P.O. Box 77000, Nelson Mandela Metropolitan University, Port Elizabeth, 6031, South Africa*
[4] *Corresponding author. E-mail: werner@bayworld.co.za*

Abstract

The Port Elizabeth Museum houses the consolidated herpetological collections of three provincial museums of the Eastern Cape, South Africa: the Port Elizabeth Museum (Port Elizabeth), the Amatole (previously Kaffarian) Museum (King Williams Town), and the Albany Museum (Grahamstown). Under John Hewitt, Albany Museum was the main centre of herpetological research in South Africa from 1910–1940, and he described numerous new species, many based on material in the museum collection. The types and other material from the Albany Museum are now incorporated into the Port Elizabeth Museum Herpetology collection (PEM). Due to the vague typification of much of Hewitt's material, the loss of the original catalogues in a fire and the subsequent deterioration of specimen labels, the identification of this type material is often troublesome. Significant herpetological research has been undertaken at the PEM in the last 35 years, and the collection has grown to be the third largest in Africa. During this period, numerous additional types have been deposited in the PEM collection, generated by active taxonomic research in the museum. As a consequence, 43 different amphibian taxa are represented by 37 primary and 151 secondary type specimens in the collection. This catalogue provides the first documentation of these types. It provides the original name, the original publication date, journal number and pagination, reference to illustrations, current name, museum collection number, type locality, notes on the type status, and photographs of all holotypes and lectotypes. Where necessary to maintain nomenclatural stability, and where confused type series are housed in the PEM collection, lectotypes and paralectotypes are nominated.

Key words: Amphibia, Port Elizabeth Museum, Albany Museum, types

Introduction

The Port Elizabeth Museum (hereafter PEM) is situated in the Bayworld complex, Port Elizabeth, South Africa. Established in 1856, it is the third oldest museum of the old Cape Province (restructured into the Eastern Cape, Northern Cape and Western Cape provinces in 1995). Herpetological studies at the museum date back to the early part of the last century, with the appointment of Frederick William FitzSimons as Director (1906–1936), and the formation in 1919 of the first Snake Park in Africa (Pringle 1941). The snake park, which was also the world's second, has been situated within the museum complex ever since.

Frederick W. FitzSimons, born in Londonderry, Ireland, was only 35 when he was appointed Director of the Port Elizabeth Museum, a post he held until his retirement 31 years later. Although he organised amongst other things the collections and displays as well as public functions, his main interest was in snakes. The new Snake Park became a major tourist attraction. He rapidly established himself as an authority on local snakes with the publication of several books, including *The Snakes of South Africa: their Venom and the Treatment of Snake Bite* (FitzSimons 1910, 1912), of which the second, expanded edition was one of the first popular books on snakes published anywhere in English. Two subsequent books, *Pythons and their Ways* (FitzSimons 1930), and *Snakes* (FitzSimons 1932), the second also published in German, confirmed his local and international herpetological status. However, although he was a great promoter of snakes, F.W. FitzSimons did no significant herpetological

 Accepted by M. Vences: 9 Feb. 2015; published: 18 Mar. 2015

taxonomic research. This was left to his eldest son, Vivian Frederick Maynard FitzSimons, who was appointed as Curator of lower vertebrates and invertebrates at the Transvaal Museum (now the Ditsong National Museum of Natural History), Pretoria in 1921. The younger FitzSimons published numerous descriptions of new reptiles and amphibians and became the foremost southern African herpetologist due to his monographic reviews of the subcontinent's lizards (FitzSimons 1943) and snakes (FitzSimons 1962).

During the period 1910–1940, between the popularising of snakes by F.W. FitzSimons in Port Elizabeth and the subsequent education and appointment of his eldest son Vivian to a post in the Transvaal Museum, the most prolific and astute herpetologist in South Africa was Dr. John Hewitt in Grahamstown. Hewitt had earlier also worked for several years in the Transvaal Museum, but in 1910 was appointed Director of the Albany Museum in Grahamstown, retiring eventually only in 1958 (Adler 1989). Hewitt had an exceptional 'taxonomist's eye', and described numerous cryptic species, often on the basis of very few specimens. He at present remains the fourth most prolific describer of valid southern African reptiles, particularly of lizards of which he described 43 taxa, adding only a single snake species (*Bitis albanica*). He also erected a number of new reptile genera, of which two (*Narudasia* and *Scelotes*) are still valid. More importantly, he was responsible for naming the greatest number (33 in total, of which 24 are still regarded as valid) of southern African amphibians, as well as the amphibian genera *Anhydrophryne, Arthroleptella*, *Microbatrachus* (= *Microbatrachella*), *Microphryne* (Madagascan) and *Natalobatrachus*. In later life, his administrative duties as Director curtailed his herpetological career, and his popular summary of the Eastern Cape vertebrate fauna (Hewitt 1937) was one of his last contributions to southern African herpetology. During his lengthy career, Hewitt wrote 45 herpetological papers describing 153 taxa, including four varieties (roughly equivalent to races), 67 subspecies, 69 species and 13 genera. Of these, one genus and 10 other taxa were Madagascan. With changing species concepts (Frost & Hillis 1990) and taxonomic refinements, the use of varietal and subspecific categories is in decline. Currently 62 (47.7%) of Hewitt's 130 non-generic herpetological taxa are still considered valid. His massive contributions to herpetological systematics, were only recently recognised with the descriptions of *Heleophryne hewitti* Boycott, 1988 and *Phyllodactylus hewitti* (= *Goggia hewitti*, Branch *et al*., 1995), although earlier FitzSimons (1947) had named a small frog (*Arthroleptella hewitti* = *Anhydrophryne hewitti*) in his honour.

As was usual for this period, descriptions of new taxa were often based on few specimens, with little character analysis. Unfortunately, Hewitt was less than rigorous with the documentation and typification of his new taxa, particularly with respect to the number of individuals comprising the type series (e.g. Hewitt 1927). The place of deposition and catalogue numbers of his type material is also often confused (see for example *Cacosternum capense* in this publication). In some descriptions, no specific types were designated although material was discussed, whilst in others additional specimens were discussed, but it is not always clear whether these were included in the type series or included as variation in the type description. Some have subsequently been considered by curators and researchers to be part of the type series, although this could possibly not be the case. Compounding these problems, material collected subsequent to the type descriptions was sometimes mixed with type material in the Albany Museum collection. Finally, as was also common practice at the time, Hewitt regularly exchanged type material with other institutions (particularly Arthur Loveridge (Museum of Comparative Zoology, Harvard), Vivian FitzSimons (Transvaal Museum) and Gladwyn Noble (American Museum of Natural History, New York)). As 'types' were more desirable in exchanges than other material, Hewitt often exchanged topotypic material, of which some had been collected subsequent to the cotype material used in the descriptions. This, in some cases, has been mistakenly incorporated and labeled as cotype or paratype material in these collections (eg. *Cordylus tasmani* Power 1930; MCZ R-27121, -27122, -31571 and -31572), even though the specimens have no nomenclatural standing.

The size of the PEM herpetology collection increased in 1993 following the incorporation of the herpetological collections of the Kaffarian Museum (= Amatola Museum, King Willliams Town: 600 specimens), Cape Nature Conservation (= CapeNature, Jonkershoek: 2700 specimens) and the Albany Museum (Grahamstown: 6268+ specimens) into the PEM collection. The most significant of these was the herpetology collection of the Albany Museum, which included the second largest group of herpetological types (over 120) in South Africa, as well as the largest collection (over 750 specimens) of land tortoises from the subcontinent. Sadly 50 years prior to the transfer, a disastrous fire on 6 September 1941 severely damaged the Albany Museum. Fortunately the library and most of the research collections were saved, but the museum specimen catalogues and an unknown amount of preserved material were destroyed (Anon 1941; Hewitt 1941; Hewitt 1942). This has made re-accessioning of the collection very difficult, as the only data available comprises of terse localities on small, attached labels, some of which are now nearly 100 years old and made of poor material that has peeled or became detached from the specimens. Many

also listed only a museum number, causing all provenances for these specimens to be lost with the catalogues. Furthermore, some specimens were probably lost at the time of the fire, or have been subsequently misplaced (see *Bufo regularis poweri*).

Active research in herpetology at the PEM was revitalised by the appointment of a fulltime herpetologist (WRB) in 1979, whilst curation of the collection was delegated to a Collections Manager (GW) in 1997. An assistant herpetologist (WC) was appointed in late 2007, whilst WRB formally retired in 2011, retaining the honorary post of Curator Emeritus Herpetology. The PEM has an active herpetological research policy, and is one of only four museums in Africa undertaking such research. Since the election of a democratic government in South Africa (1994), field research has expanded into sub-Saharan Africa, and as a consequence the collection is actively growing, with a growth of approximately 4–5% per year in the period 2000–2013. The PEM herpetology collection is now the third largest collection (~32 000 specimens) on the African continent, after those of the Ditsong National Museum of Natural History (Pretoria, South Africa: ~86 0000 specimens) and the Natural History Museum of Zimbabwe (Bulawayo, Zimbabwe: ~52 000 specimens), respectively. The PEM collection comprises of mostly African specimens with 30 African countries represented. Whilst the amphibian collection is relatively small (~11 800 specimens), it includes a large number of type specimens (37 primary & 151 secondary types), representing 43 taxa, of which 34 (Frost 2014) are still regarded as valid (Table 1). In total, the type material of the PEM holds 28 (16%) of the 169 currently recognized amphibian species of southern Africa (Du Preez & Carruthers 2009; Channing 2012; Channing & Baptista 2013; Channing *et al.* 2013; Conradie 2014). This is currently the second largest primary amphibian type collection in any African museum (17 primary types in Natural History Museum of Zimbabwe; Broadley 2010 and 44 primary types in Ditsong National Museum of Natural History; L. Mashinini *pers. comm*.).

TABLE 1. List of the type specimens in PEM (described name, authors and the current name (according to Frost 2014).* representing missing types.

Described name	Authors	Current Name
Acanthixalus sonjae	Rödel, Kosuch, Veith and Ernst 2003	*Acanthixalus sonjae*
Anhydrophryne rattrayi	Hewitt 1919	*Anhydrophryne rattrayi*
Arthroleptella bicolor villiersi	Hewitt 1935	*Arthroleptella villiersi*
Arthroleptella landdrosia	Dawood and Channing 2000	*Arthroleptella landdrosia*
Arthroleptella drewesii	Channing, Hendricks and Dawood 1994	*Arthroleptella drewesii*
Arthroleptis bequaerti	Barbour and Loveridge 1929	*Phrynobatrachus bequaerti*
Arthroleptis gutturosus	Chabanaud 1921	*Phrynobatrachus gutturosus*
Boulengerula uluguruensis	Barbour and Loveridge 1928	*Boulengerula uluguruensis*
Breviceps acutirostris	Poynton 1963	*Breviceps acutirostris*
Breviceps fuscus	Hewitt 1925a	*Breviceps fuscus*
Breviceps montanus	Power 1926	*Breviceps montanus*
Breviceps parvus	Hewitt 1925a	*Breviceps adspersus*
Breviceps parvus caffer	Hewitt 1932	*Breviceps adspersus*
Breviceps tympanifer	Hewitt 1925a	*Breviceps verrucosus*
Bufo angusticeps amatolica	Hewitt 1925b	*Vandijkophrynus amatolicus*
Bufo fenoulheti	Hewitt and Methuen 1912	*Poyntonophrynus fenoulheti*
Bufo fenoulheti obtusum	Hewitt 1925b	*Poyntonophrynus fenoulheti*
Bufo fenoulheti rhodesianus	Hewitt 1932	*Poyntonophrynus fenoulheti*
Bufo gariepensis nubicola	Hewitt 1927	*Vandijkophrynus gariepensis nubicolus*
Bufo regularis pardalis	Hewitt 1935	*Amietophrynus pardalis*
*Bufo regularis poweri**	Hewitt 1935	*Amietophrynus poweri*

.....continued on the next page

TABLE 1. (Continued)

Described name	Authors	Current Name
Bufo regularis rangeri	Hewitt 1935	*Amietophrynus rangeri*
Bufo robinsoni	Branch and Braack 1996	*Vandijkophrynus robinsoni*
Bufo rosei	Hewitt 1926	*Capensibufo rosei*
Bufo vertebralis albiventris	Power 1927	*Poyntonophrynus fenoulheti*
Cacosternum capense	Hewitt 1925b	*Cacosternum capense*
Cacosternum karooicum	Boycott, De Villiers and Scott 2002	*Cacosternum karooicum*
Cacosternum thorini	Conradie 2014	*Cacosternum thorini*
Cardioglossa occidentalis	Blackburn, Kosuch, Schmitz, Burger, Wagner, Gonwouo, Hillers and Rödel 2008	*Cardioglossa occidentalis*
Heleophryne hewitti	Boycott 1988	*Heleophryne hewitti*
Heleophryne rosei	Hewitt 1925	*Heleophryne rosei*
Hyperolius chelaensis	Conradie, Branch, Measey and Tolley 2012	*Hyperolius chelaensis*
Hyperolius horstockii semidiscus	Hewitt 1927	*Hyperolius semidiscus*
Hyperolius raymondi	Conradie, Branch and Tolley 2013	*Hyperolius raymondi*
Kassina wealii quinque-vittata	Hewitt 1927	*Semnodactylus wealii*
Leptopelis spiritusnoctis	Rödel 2007	*Leptopelis spiritusnoctis*
Natalobatrachus bonebergi	Hewitt and Methuen 1912	*Natalobatrachus bonebergi*
Poyntonia paludicola	Channing and Boycott 1989	*Poyntonia paludicola*
Rana vertebralis	Hewitt 1927	*Amietia vertebralis*
Strongylopus kitumbeine	Channing and Davenport 2002	*Strongylopus kitumbeine*
Strongylopus springbokensis	Channing 1986	*Strongylopus springbokensis*
Tomopterna tandyi	Channing and Bogart 1996	*Tomopterna tandyi*
Xenopus gilli	Rose and Hewitt 1927	*Xenopus gilli*

The herpetological types of the PEM have previously not been catalogued, but such a synopsis is essential for a number of reasons. Firstly, it brings to the attention of the wider herpetological community the existence of an important collection of African herpetological types. Secondly, and more importantly, it attempts to clarify confusion resulting from the inadequate documentation and subsequent mistakes involving the number, location and status of much of the type material associated with Hewitt's species descriptions, and their fate following the fire at the Albany Museum and subsequent long period of relative neglect. This first instalment details the amphibian type holdings, and will be followed by similar synopses for chelonian and squamate types.

How to use this catalogue

The types are listed in alphabetical order according to the original species name, followed by author, year of publication, journal and pagination. The full reference can be found in the reference section. Current scientific names are according to the synonymy by Frost (2014).

The following template was used for type descriptions:

[Original Name] [Author(s) and date]
[Journal Pagination]; [Plate(s)/Figure(s)].

[*Type* (Amount)]: [Accession number(s)]; [Locality]; [Collector(s)], [Date].

The information provided is based on the original publications. If the original description was not available, the information is derived from museum record labels and catalogues. Specimens that possibly belong to a type series are also listed; this includes other specimens mentioned in type descriptions. The location of other types of a particular series in other institutions is given when known, but was not actively researched due to time and resource constraints. Status and taxonomical comments are noted under "Remarks", as well as specimen status (e.g. damaged or in poor condition; cleared and stained with alizarin). In a few cases additional information on types is presented, i.e. where there is a date of collection on a label that is not fully detailed in the type description. Dorsal and ventral photographs of holotypes and lectotypes present in the PEM collection are illustrated (Fig. 1–9). Lectotypes have only been allocated to syntypes where the whole type series is present in the PEM. In such cases, the best specimen was chosen based on careful examination of the type descriptions for clues supporting its inclusion (accession number, measurements, or comparison of specimens to photographs or illustrations in the type description). Where no mention is made to a specific specimen, or the identifying label is lost, the authors chose the specimen that best represents the type description.

Between 1968 and 1969 many of the vertebrate types in the Albany Museum were opportunistically X-rayed by Mr. Frank Farquharson. These included the amphibian types then available (Table 2), and contained in 'type bottles'. These original X-rays' negatives are now in the PEM. A number of types were misplaced at the time, and stored in bottles in the general collection. The availability of these X-rays is also noted. We further adapted the Chakrabarty *et al.* (2013) GenSeq Nomenclature and ranking system for genetic sequences derived from type material (see Table 3). Unless noted, all specimens are in good condition and now stored in either 70% ethanol or 50% iso-propanol.

TABLE 2. AM Amphibian type specimens X-rayed (1968–1969), now in PEM.

Type	X-rayed
Arthroleptella bicolor villiersi Hewitt 1935	Plate 1, 11 syntypes, AMA 6566; Plate 2, 9 others AMA 6899
Arthroleptis gutturosus Chabanaud 1921	Plate 1, paratype, "ex BMNH"
Breviceps acutirostris Poynton 1963	Plate 1, holotype and 2 paratypes
Breviceps parvus caffer Hewitt 1932	Plate 1, AMA 5963, syntypes 1–7; Plate 2, syntypes 8–9
Bufo angusticeps amatolica Hewitt 1925b	Plate 1, AM 4044 (2 specimens), AM 4922 (4 specimens)
Bufo fenoulheti Hewitt & Methuen 1913	Plate 1, syntype (AM 1502)
Bufo fenoulheti obtusum Hewitt 1925b	Plate 1, syntype (AM 1716)
Bufo fenoulheti rhodesianus Hewitt 1932	Plate 1, syntypes 1–9, Plate 2 ; syntypes 10–16, AMA 6067
Bufo gariepensis nubicola Hewitt 1927	Plate 1, holotype (AMA 5227), others (AMA 4927, 5228)
Bufo regularis rangeri Hewitt 1935	Plate 1, syntype Male
Bufo vertebralis albiventris Power 1927	Plate 1, syntypes (AMA 5610)
Heleophryne rosei Hewitt 1925b	Plate 1, cotypes (2, AMA 4965), 2 large tadpoles
Natalobatrachus bonebergi Hewitt & Methuen 1913	Plate 1, 3 cotypes (AM n/a)
Rana vertebralis Hewitt 1927	Plate 1, holotype and 5 subadults (AMA 5227)
Xenopus gilli Rose & Hewitt 1927	Plate 1, holotype (AMA 5112); Plate 2, 2 paratypes (AMA 5091)

Museum abbreviations (following Frost 2014)

AMG Albany Museum, Grahamstown, South Africa (also AMA and AM).
BMNH The Natural History Museum, London, United Kingdom (formerly the British Museum [Natural History]).
CAS California Academy of Sciences, Department of Herpetology, San Francisco, USA.
FMNH Field Museum, Division of Amphibians and Reptiles, Chicago, USA (formerly Chicago Natural History Museum).
KU University of Kansas, Museum of Natural History, Division of Herpetology, Kansas, USA.

MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, USA.
MMK	McGregor Museum, Kimberley, South Africa.
NMB	National Museum, Bloemfontein, South Africa.
NMP	Natal Museum, Pietermaritzburg, South Africa.
PEM	Port Elizabeth Museum, Port Elizabeth, South Africa.
SAIAB	South African Institute for Aquatic Biodiversity, Grahamstown, South Africa.
SAM	Iziko Museum of South Africa, Cape Town, South Africa (formerly South African Museum).
SMF	Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt-am-Main, Germany.
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany.
TMP	Ditsong National Museum of Natural History, Pretoria, South Africa (formerly Transvaal Museum).
UIMNH	University of Illinois, Museum of Natural History, Illinois, USA.
UMMZ	University of Michigan, Museum of Zoology, Michigan, USA.
ZMB	Universität Humboldt, Zoologisches Museum, Berlin, Germany.
ZSM	Zoologische Staatssammlung München, München, Germany.

TABLE 3. GenSeq Nomenclature data for Port Elizabeth Museum amphibian type specimens.

Species	Species Catalog #	GenBank #		GenSeq
		12S	16S	Nomenclature
Arthroleptella landdrosia	NA	AF330244		genseq-3 12S
Cacosternum thorini	PEM A10091		KJ461734	genseq-1 16S
Cacosternum thorini	PEM A10083		KJ461736	genseq-2 16S
Cacosternum thorini	PEM A10089		KJ461737	genseq-2 16S
Cacosternum thorini	PEM A10094		KJ461377	genseq-2 16S
Cardioglossa occidentalis	PEM A7398		EF641003	genseq-2 16S
Hyperolius chelaensis	PEM A9223		JQ513627	genseq-1 16S
Hyperolius chelaensis	PEM A9224		JQ513628	genseq-2 16S
Hyperolius chelaensis	PEM T350		JQ513629	genseq-2 16S
Hyperolius raymondi	PEM A10049		JQ513632	genseq-1 16S
Hyperolius raymondi	PEM A10055		JQ513633	genseq-2 16S
Hyperolius raymondi	PEM A10041		JQ513634	genseq-2 16S
Hyperolius raymondi	PEM A10048		HF570359	genseq-2 16S
Hyperolius raymondi	PEM A10050		HF570360	genseq-2 16S
Hyperolius raymondi	PEM A10066		HF570361	genseq-2 16S
Hyperolius raymondi	PEM A10057		HF570364	genseq-3 16S
Hyperolius raymondi	PEM T517.1		HF570362	genseq-3 16S
Hyperolius raymondi	PEM T517.2		HF570363	genseq-3 16S

List of Amphibian type specimens

Acanthixalus sonjae Rödel, Kosuch, Veith and Ernst 2003

Journal of Herpetology, 37: 44; Figs. 1–5, 7.

Paratype: PEM A7414; Haute Class de Haute Dodo, 45°4'03"N; 7°19'3"W, Cote d'Ivoire; W. R. Branch and M.-O. Rödel, 15 March 2002.

Remarks. Holotype (SMNS 09573) and other paratypes in SMNS and ZSM.

Anhydrophryne rattrayi Hewitt 1919

Records of the Albany Museum, 3(3): 182–189; Pl. V.

Lectotype: PEM A6334 (formerly AMG 4044); Hogsback, Amatola Range, Eastern Cape Province, South Africa; G. Rattray and J. Wood, 'January 1919'.

Paralectotype: PEM A7463 (AMG number no longer available; probably the same as the lectotype); same details as lectotype.

Remarks. The type description mentions a series (number unspecified) of zoological specimens, including the *A. rattrayi* specimens, presented to the AMG by Rattray, which he and Wood collected during the summer holidays of December 1918 to January 1919. A total of four AMG series (AMG 4044, 4365, 7003, 8917) comprising 38 specimens of *A. rattrayi*, all collected by Rattray from the Hogsback area, are currently represented in the PEM collection. The type description makes specific reference to an adult female (see p. 184, 187, 188), a sub-adult female (see p. 187), and a single metamorph. Ventral and dorsal photographs are provided of the adult female and a dorsal photograph of the sub-adult female (Pl. V), while a line drawing is provided for the metamorph (see p. 185). We have with confidence assigned PEM A6334 to the adult female listed in the type description, as it is the only adult female in the series with the same snout-vent length of 23 mm, and fits the illustration in limb position and general morphology, as well as having ventral patterning that resembles that in the accompanying photograph. Our assignment is further supported in that Hewitt described the detailed structure of the sacral diapophyses, which would have required dissection of the adult specimen. This is evident in incisions in the ventral skin and musculature of the specimen. We thus select PEM A6334 as the lectotype, and the separate metamorph (PEM A7463) is treated as a confirmed paralectotype.

Within the type bottle, and with the same AMG 4044 number, are a series of 26 other *A. rattrayi,* all now present in PEM (PEM A6333, 6335, 6336, 6640, 7441–62). Based on the photograph and information in the type description, none of these specimens appear to be the sub-adult female. This specimen is therefore either missing or now deformed, and thus indistinguishable from the other AMG 4044 specimens. All of these specimens were present in the 'type bottle' on its transfer to PEM, but the amount that should be included in the type series is now impossible to determine as no number in the series is given in the type description. We acknowledge that all 26 additional specimens with the label AMG 4044 could be potential cotypes, and that they may include the sub-adult female mentioned in the type description. However, we cannot confirm this and therefore defer to nominating them as additional paralectotypes. The other specimens in the 'type bottle', including PEM A3830, 3969, 7420–25, 6981 and 7969 (of the AMG series 4365, 7003 and 8917) are considered subsequent additional topotypic material, and we consider them to have no nomenclatural standing.

Arthroleptella bicolor villiersi Hewitt 1935

Records of the Albany Museum, 4: 294.
Current name: *Arthroleptella villiersi* Hewitt, 1935

Lectotype: PEM A1568 (formerly AMG 6562); Jonkershoek near Stellenbosch, Western Cape Province, South Africa; C. de Villiers, February 1929.

*Paralectotype*s (3): PEM A1565–1567 (all formerly AMG 6562); same details as lectotype.

Additional specimens: (a) PEM A1569–1571, 1581, 1607, 1612 and 1756 (all formerly AMG 6562); same details as lectotype. (b) PEM A2327, 2507, 2844, 2922, 3016, 3812, 3813 and 3823 (all formerly AMG 6566); Paradys, Western Cape Province, South Africa; C. de Villiers, no date listed. (c) PEM A1564 (formerly AMG 6899); same details as lectotype.

Remarks. The 'type bottle' contained a total of 11 specimens (four adult males, three adult females and four sub-adult specimens) all collected from Jonkershoek and all labeled AM 5625, one additional adult specimen from Jonkershoek (AMG 6899), and eight specimens (three females and five males) from Paradys (AMG 6566). The type description clearly states the "Types" comprise a series of adult males collected at "Jonkershoek near Stellenbosch, C.P." (p. 294). We therefore restrict the type series to the four adult males from this locality. The additional material in the 'type bottle', can at best be considered 'additional material', although the text makes no

direct reference to the four sub-adult specimens from Jonkershoek (PEM A1570, 1581, 1612, 1756) or the five males from Paradys (PEM A2327, 2507, 2844, 2922, 3813). Direct reference is made to the females from both Jonkershoek (PEM A1569, 1571, 1607) and Paradys (PEM A3016, 3812, 3523) in the text (p. 296). To stabilize the situation, given the uncertainty over specimen numbers, we designate one of the adult males from Jonkerhoek, i.e. PEM A1568 as the lectotype as this specimen best fits the type description. The additional three adult males from Jonkershoek therefore become paralectotypes, and the remaining specimens have no nomenclatural standing. Full-body X-rays exist for all of the material listed. The species was elevated to full species status by Channing, Hendricks and Dawood (1994).

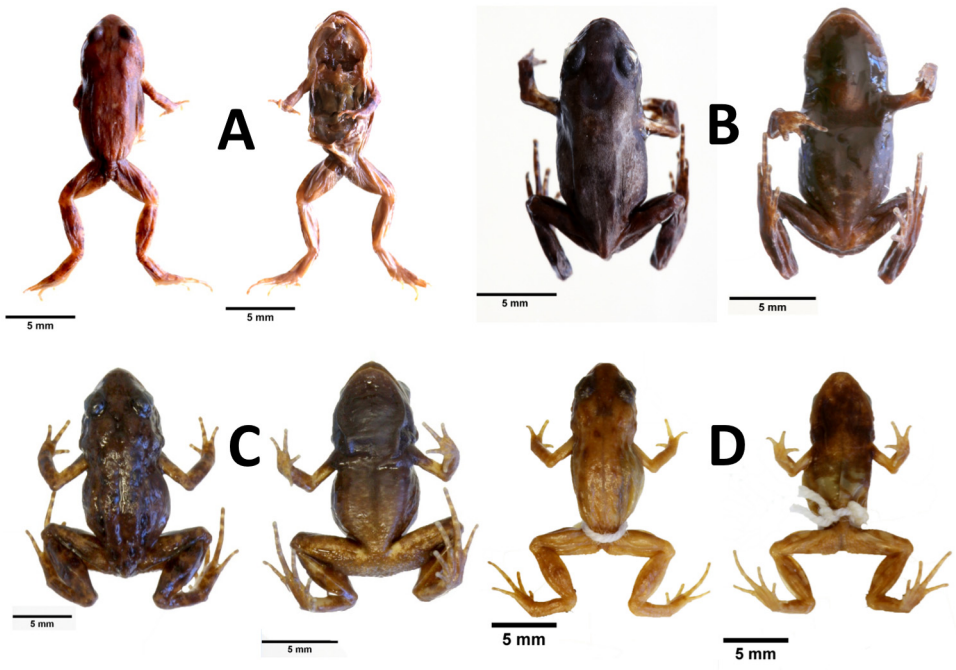

FIGURE 1. Family Pyxicephalidae I: A—Lectotype of *Anhydrophryne rattrayi* (PEM A6334), B—Lectotype of *Arthroleptella bicolor villiersi* (PEM A1568), C—Holotype of *Arthroleptella drewesii* (PEM A2319), D—Holotype of *Arthroleptella landdrosia* (PEM A7123).

Arthroleptella drewesii Channing, Hendricks and Dawood 1994

South African Journal of Zoology, 29(4): 240–243; Fig. 1 & 2.

Holotype: PEM A2319; Fernkloof Nature Reserve in Hermanus (34°23'S; 19°17'E), Western Cape Province, South Africa; R.C. Drewes and A. Channing, 26 August 1992.

Paratype: PEM A2320; same locality data as holotype, but collected 9 May 1993.

Additional specimen: PEM A2321; same details as paratype; cleared and stained with alizarin.

Remarks. An additional paratype is in CAS (193248).

Arthroleptella landdrosia Dawood and Channing 2000

Journal of Herpetology, 34: 375–379; Fig. 2.

Holotype: PEM A7123; Hottentots Holland mountain, near the Landdroskop hut (34°02'30"S; 19°01'00"E), Western Cape Province, South Africa; J. Channing and A. Channing, 9 September 1997.

Remarks. No additional types are listed. A second male specimen collected from the type locality was used for genetic analysis (see Table 2).

Arthroleptis bequaerti Barbour and Loveridge 1929a

Proceedings of the New England Zoölogical Club, 11: 25.
Current name: *Phrynobatrachus bequaerti* (Barbour and Loveridge, 1929)

Paratypes (2): PEM A8518–8519 (formerly AMG 6741); Mt. Vissoke, Belgian Congo, Democratic Republic of the Congo; J. Dencherd, 1927.

Remarks. The original type series consisted of 25 specimens: The holotype and 10 remaining paratypes remain in MCZ. Numerous paratypes have been exchanged: three to NMB, five to FMNH (Marx 1958), one each to ZMB, UMMZ, UIMNH (Smith *et al.* 1964), and BMNH. No reference is made in Barbour and Loveridge's (1946) catalogue on the exchange of two paratypes (MCZ A-14771 and A-14772) to AMG or, for that matter, to any other museum. No documentation relating to the transfer survives from AMG. Transferred from *Arthroleptis* to *Pararthroleptis* by Deckert (1938), and subsequently to *Phrynobatrachus* by De Witte (1941).

Arthroleptis gutturosus Chabanaud 1921

Bulletin du Comit d'Études Historiques et Scientifiques de l'Afrique Occidentale Française, 1921: 452.
Current name: *Phrynobatrachus gutturosus* (Chabanaud, 1921)

Cotype: PEM A1563 (no AMG number available); Sanikol, Liberia; collectors and date unknown.

Remarks. A label in the bottle with the type specimen notes that this specimen originated from the BMNH. No documentation relating to the transfer survives from AMG. Frost (2014) listed one specimen to be in AMG (now PEM). A full body X-ray exists for the specimen. Species transferred to *Phrynobatrachus* by Laurent (1941).

Boulengerula uluguruensis Barbour and Loveridge 1928

Memoirs of the Museum of Comparative Zoology, 50:183.

Paratypes (2): PEM A2947–2948 (formerly both AM 6011); Vituri, Uluguru Mountains, Tanzania; A. Loveridge, 30 October 1926.

Remarks. The type description lists a total of 40 specimens collected from the Uluguru Mountains from 20 September – 30 October 1926. It clearly states that MCZ A-12367 is designated as the holotype and the remainder as paratypes, all in the MCZ. Subsequently, paratypes were exchanged to other institutions, i.e. four to AMNH, three to FMNH (Marx 1958), one each to SMF, UIMNH (Smith *et al.* 1964), BMNH, and the Congo Museum. The MCZ online database shows that two paratypes (MCZ A-12377 and A-12378) were sent in exchange to Hewitt at the AMG, before subsequently being transferred to PEM. Both specimens have a longitudinal ventral incision.

Breviceps acutirostris Poynton 1963

Annals of the Natal Museum, 15(24): 321–322.

Holotype: PEM A1540 (formerly AMG 5507); Swellendam Mountains, Western Cape Province, South Africa; G. Hutchinson, 5 February 1927.

Paratypes (2): PEM A841–842 (formerly both AMG 5507); same details as holotype.

Remarks. The holotype is illustrated as Fig. 31 in Poynton (1964). Both adult female holotype and paratype have a mid-right ventral incision; otherwise in perfect condition.

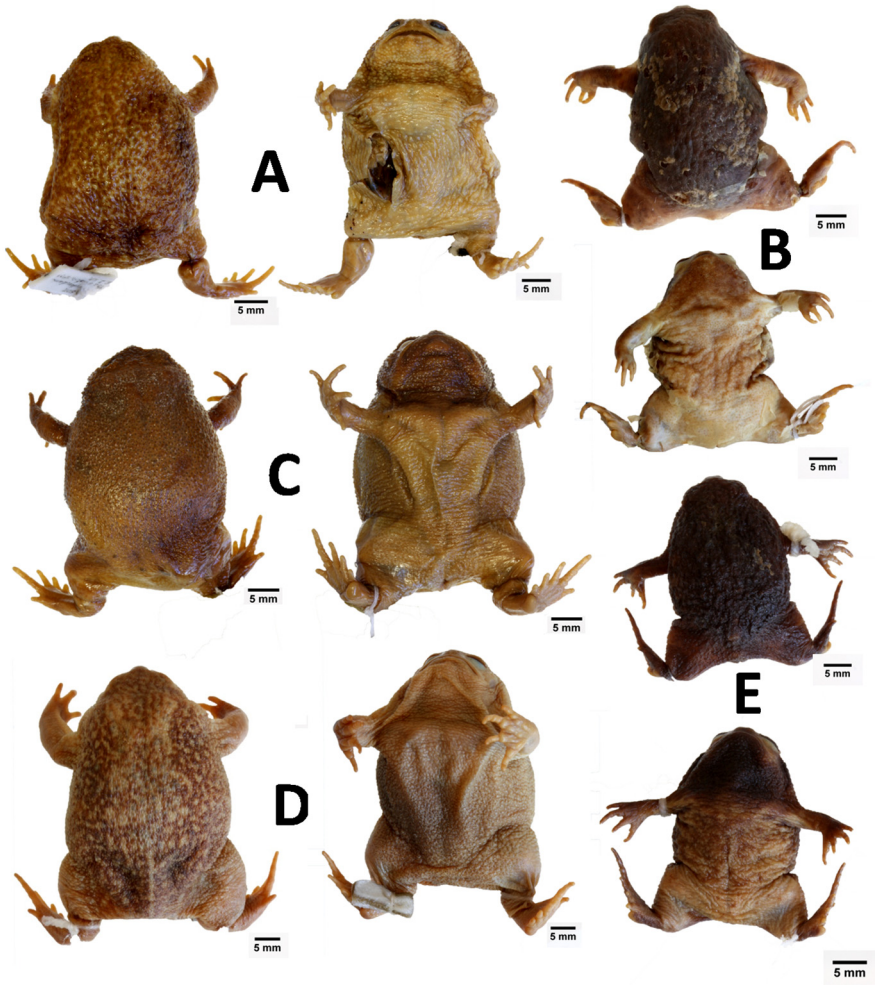

FIGURE 2. Family Breviciptidae: A—Holotype of *Breviceps acutirostris* (PEM A1540), B—Lectotype of *Breviceps fuscus* (PEM A4826), C—Lectotype of *Breviceps tympanifer* (PEM A4811), D—Lectotype of *Breviceps parvus* (PEM A1534), E—Lectotype of *Breviceps parvus caffer* (PEM A849).

Breviceps fuscus Hewitt 1925a

Annals of the Natal Museum, 5(2): 191–192; Pl. X, Fig. 5.

Lectotype: PEM A4826 (original AMG number unknown, re-accessioned as AMA 522); Knysna, Western Cape Province, South Africa; J.H. Rex, date unknown.

Paralectotype: PEM A4827 (original AMG number unknown, re-accessioned as AMA 521); same details as lectotype.

Remarks. The type description notes the types comprise of two adult specimens [=syntypes]. No specific reference is made in the text to a specific specimen, but one is illustrated in the plates. Two specimens are present in the PEM with the same details provided in the type description. One specimen has a very old label tied to the right leg that reads "Knysna H. Rex". The other specimen lacks an original label, but constriction marks indicate that an old label (now lost) was tied around the right leg. This specimen conforms best to the illustration, but due to the better condition of the previous specimen we designate it (PEM A4826) as the lectotype. It is intact and in good condition, whilst the paralectotype has mid- and transverse ventral incisions.

Breviceps montanus Power 1926

Annals of the South African Museum, 20: 466. Pl. XLIII; Figs. 3 & 4.

Syntype: PEM A4725 (original AMG number unknown, re-accessioned as AMA 82); Table Mountain, Western Cape Province, South Africa; H.W. Oakley, W.L. Sclater and F. Cruden, date unknown.

Remarks. The specimen has a ventral incision and the stomach contents and eggs have been removed and stored in separate vials. Plate XLIII, Fig. 3 & 4 in the type description illustrates two different specimens, evident from the way the arms are preserved pointing forward in the dorsal image (Fig. 3) and stretched out to the sides in the ventral image (Fig. 4). The syntype in PEM conforms to the latter. The dorsal image must refer to one of the other two syntypes in the South African Museum.

Breviceps parvus Hewitt 1925a

Annals of the Natal Museum, 5(2): 192–194; Pl. X, Fig. 6–8.
Current name: *Breviceps adspersus* Peters, 1882

Lectotype: PEM A1534; Grahamstown, Eastern Cape Province, South Africa; collector and date unknown.

Paralectotypes (4): PEM A1533, 1535–1537; Grahamstown, Eastern Cape Province, South Africa; J. Hewitt collected PEM A1536 (formerly AMG 1092) in August 1910 from within a termite nest; R. Essex collected PEM A1537 from Coldsprings, near Grahamstown.

Remarks. The type description makes no reference to the number of specimens in the type series. PEM A1533 and 1534 are both illustrated in the type description (Pl. X, Fig. 6). PEM A1534 is designated as the lectotype as it is the largest specimen and in very good condition. All are in similar conditions, apart from PEM A1536 which has a ventrolateral incision from arm to groin. According to Loveridge (1929b), one syntype was donated to the MCZ (A-10836). Placed in synonymy with *Breviceps pentheri pentheri* by Parker (1934), and later transferred to the synonymy of *Breviceps adspersus* by Poynton (1964).

Breviceps parvus caffer Hewitt 1932

Annals of the Natal Museum, 7(1): 109.
Current name: *Breviceps adspersus* Peters, 1882

Lectotype: PEM A849 (formerly AMG 5963); Gleniffer, near Kei Road, Eastern Cape Province, South Africa; G.A. Ranger, 11 January 1928.

Paralectotypes (6): PEM A843–848 (all formerly AMG 5963); same details as lectotype.

Remarks. A total of nine specimens are present in the type bottle, all from the type locality. Two of the specimens (PEM A1417 and 1418) clearly do not belong to the same AMG 5963 series, as the original labels tied to the specimens differ in paper type, size, writing and the manner in which they are tied to the specimens. We thus regard these as topotypes collected after the original type series. In the type description a specific male measuring 28 mm is mentioned, which corresponds best to PEM A849 and we thus designate it as the lectotype. No specimens are illustrated in the type description. All material has a single ventral incision, except for the two additional specimens. Full body X-rays exist for all the types, as well as the additional specimens. One extra syntype (now MCZ A-17691) was sent in an exchange to MCZ from AMG (Barbour and Loveridge 1946). Synonymised with *Breviceps adspersus* by Poynton (1964).

Breviceps tympanifer Hewitt 1925a

Annals of the Natal Museum, 5(2): 190–191; Pl. X, Fig. 1 & 2.
Current name: *Breviceps verrucosus* Rapp, 1842

Lectotype: PEM A4811 (formerly AMG 1390); Pirie, Eastern Cape Province, South Africa; R. Godfrey, date unknown.

Paralectotypes (2): (a) PEM A4809; Qacu Forest near Tois River, Eastern Cape, South Africa; T. Liefeldt, date

unknown. (b) PEM A4812; Hogsback, Amatola Range, Eastern Cape, South Africa; G. Rattray (according to original publication), date unknown.

Remarks. The designation of types in the original description is confusing: "Types – Two adult examples from Pirie, C.P., presented to the Albany Museum (no. 1390) by the Rev. Robert Godfrey. Other smaller specimens in the same collection were taken at Hogsback, Amatola Range (Dr. G. Rattray), and Qacu Forest, near Tois River (Mr. T. Liefeldt); the Durban Museum has the same species from Umbilo (L. Brevis.)". Obviously the two specimens from Pirie, of which only one (now PEM A4811) was present in the material received from AMG, must be considered syntypes. We included the other smaller specimen from Hogsback and Qacu Forest as part of the type series. The specimen from Umbilo (Durban Museum) may simply be additional material. To stabilize the situation, we designate PEM A4811 (the only remaining specimen from Pirie) as the lectotype, and regard the smaller specimens from Hogsback (PEM A4812) and Qacu Forest (PEM A4809) as paralectotypes. Synonymised with *Breviceps verrucosus* by Poynton (1964).

Bufo angusticeps amatolica Hewitt 1925b

Records of the Albany Museum, 3(4): 360–362; Pl. XV, Fig. 3.
Current name: *Vandijkophrynus amatolicus* (Hewitt, 1925b)

Lectotype: PEM A833 (formerly AMG 4044); Amatola Range, near Hogsback, Eastern Cape Province, South Africa; G. Rattray, December 1918.

Paralectotypes (5): (a) PEM A828, 829, 831, 832 (formerly AMG 4922); Amatola Range, near Hogsback, Eastern Cape Province, South Africa; R. Essex, September 1924. (b) PEM A834 (formerly AMG 4044); same information as lectotype.

Remarks. The type description refers to a series of specimens, but gives no indication of the actual number. It specifically mentions a female measuring 35 mm, and illustrates a specimen (Pl. XV, fig. 3). Thirteen specimens were present in the type bottle, which Poynton (1964) considered as comprising the type series. However, this is an error as four specimens have AMG numbers (7003 and 8912) which could only have been issued after 1926, one specimen has no label, and two remaining specimens have AMG numbers (4365) that were issued between December 1918 and September 1924, and are therefore not referable to either of the two collections mentioned in the type description. We therefore restrict the type series to the six remaining specimens directly linked to the type description, including two intact specimens collected by Rattray (AMG 4044) and four specimens collected by Essex (AMG 4922, of which three have abdominal incisions). One intact AMG 4044 (PEM A833) specimen conforms to the illustration in Plate XV, and to stabilize the situation we therefore designate the illustrated specimen as the lectotype. The remaining five specimens of the AMG 4044 and AMG 4922 series become paralectotypes. Full body X-rays exist for all six type specimens. Elevated to full species (*Bufo amatolica*) by Hewitt (1926), nomenclaturally corrected to *Bufo amatolicus* by Frost (1985), and transferred to a new genus, *Vandijkophrynus* by Frost *et al.* (2006).

Bufo fenoulheti Hewitt and Methuen 1912

Transactions of the Royal Society of South Africa, 3: 108.
Current name: *Poyntonophrynus fenoulheti* (Hewitt and Methuen, 1912)

Lectotype: PEM A825 (AMG 1520); Newington, Limpopo Province, South Africa; J.P. Fenoulhet, March 1912.

Remarks. The description is based on three specimens (one in AMG and two in TMP). Poynton and Broadley (1988) reported the 'holotype' to be in the PEM, although Hewitt & Methuen (1912) did not designate a holotype or emphasize or illustrate a specific specimen. We follow Poynton and Broadley (1988) and designate PEM A825 as the lectotype on the basis that it is mentioned first in the list of syntypes. The remaining syntypes (TMP 10877–10878) therefore become paralectotypes. The lectotype is in perfect condition except for transverse and longitudinal incisions on the abdomen, and a ventral transverse incision at the base of the left leg. A full body X-ray is available. Frost *et al.* (2006) placed the species in a new genus, *Poyntonophrynus.*

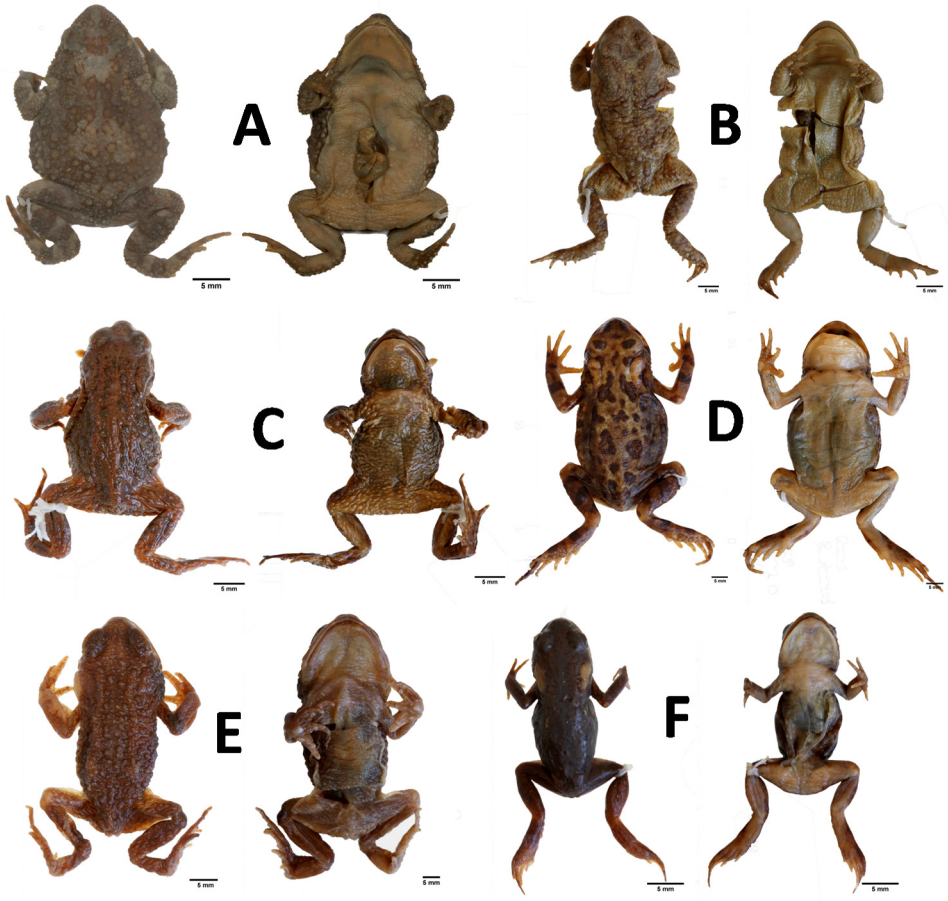

FIGURE 3. Family Bufonidae I: A— Lectotype of *Bufo fenoulheti rhodesianus* (PEM A9079), B—Lectotye of *Bufo fenoulheti* (PEM A825), C— Lectotype of *Bufo angusticeps amatolica* (PEM A828), D—Holotype of *Bufo robinsoni* (PEM A2492), E—Holotype of *Bufo gariepensis nubicola* (PEM A2513), F—Lectotype of *Bufo rosei* (PEM A5132).

Bufo fenoulheti obtusum Hewitt 1925b

Records of the Albany Museum, 3(4): 363.
Current name: *Poyntonophrynus fenoulheti* (Hewitt and Methuen, 1912)

Syntype: PEM A824 (formerly AMG 1716); Bleskop, Rustenburg district, North West Province, South Africa; G. van Dam, 5 February 1917.

Remarks. The type description does not list any AMG specimens and refers to all types being present in the TMP (11362–11370). The presence of a specimen with the same collection details as the type series in the AMG material suggests that one syntype was exchanged from the TMP (now in the PEM), thus we retain this as a syntype. An oblique dorsal incision is present resulting in loose flap of skin behind parotid gland. A full body X-ray is available. Frost *et al.* (2006) placed the species in a new genus, *Poyntonophrynus.*

Bufo fenoulheti rhodesianus Hewitt 1932

Annals of the Natal Museum, 7(1): 110; Pl. VI, Figs. 2 & 3.
Current name: *Poyntonophrynus fenoulheti* (Hewitt and Methuen, 1912)

Lectotype: PEM A9079 (formerly AMG 6067); Farm Driefontein, near Gwelo, Zimbabwe; K. Tasman, 25 April 1929.

Paralectotypes (15): PEM A9080–9094 (formerly AMG 6067); same details as lectotype.

Remarks. The type description only refers to a 'series' of specimens and no specific reference is made to any particular specimen in the type description. A male (PEM A9079) and female (PEM A9085) conform to individuals illustrated (Pl.VI, fig. 2, 3) and we designate the illustrated male as the lectotype. The type description does not indicate a collection date, but the original labels record 25 April 1929. All specimens have incisions on the lower abdomen, except for two intact juveniles. Full body X-rays are available for all 16 type specimens. Poynton (1964) rejected the distinctiveness of this species from *Bufo fenoulheti fenoulheti*. Frost *et al.* (2006) placed the species in the new genus *Poyntonophrynus.*

Bufo gariepensis nubicola Hewitt 1927

Records of the Albany Museum, 3(5): 412–413; Pl. XXIV, Fig. 5.
Current name: *Vandijkophrynus gariepensis nubicolus* (Hewitt, 1927)

Holotype: PEM A2513 (formerly AMG 5227); The summit of Mont-aux-Sources (11,500 ft.), Lesotho; R. Essex, January 1926.

Additional specimens: (a) PEM A2514 (formerly AMG 5228); Foot of Nemahadi Pass, Lesotho; R. Essex, January 1926. (b) PEM A2515 (formerly AMG 4972); Nemahadi Police Camp, Mont-aux-Sources, Lesotho; J. Cottrell, February 1925.

Remarks. Lambiris (1988) noted the holotype to be in the PEM. Branch and Braack (1995) incorrectly and redundantly designated PEM A2513 as the lectotype, considering the Nemahadi Pass (AMG 5228) and Nemahadi Police Station (AMG 4972) specimens to form part of the type series (paralectotypes). However, Hewitt (1927) specifically referred to a single specimen as the 'Type', and the two other specimens from Nemahadi Pass and Nemahadi Police Station discussed in the type description constitute only 'additional material'. The holotype is intact, but in very poor condition. The two additional specimens have mid-ventral incisions and are also in very poor condition. Full body X-rays exist for all material. FitzSimons (1948) treated this species as a full species (*Bufo nubicolus*), incorrectly amending the specific name (Frost 2014). This specific amendment was followed by Poynton (1964), but who prefered to retain it as a subspecies, i.e. *B. gariepensis nubicolus.* This notion was followed by subsequent authors (e.g. Lambiris 1988). Frost *et al.* (2006) placed many large African bufonids in a new genus *Vandijkophrynus*, and Du Preez & Carruthers (2009) used the combination *Vandijkophrynus gariepensis nubicolus. However*, Channing (2001) and Frost (2014) do not recognize subspecies within *V. gariepensis,* and the status of *nubicolus* remains unresolved.

Bufo regularis pardalis Hewitt 1935

Records of the Albany Museum, 4(2): 288.
Current name: *Amietophrynus pardalis* (Hewitt, 1935)

Lectotype: PEM A837 (formerly AMG 7248); Gleniffer, Kei Road, Eastern Cape Province, South Africa; G.A. Ranger, date unknown (potentially early August 1934).

Allolectotype: PEM A838 (formerly AMG 7248); same details as lectotype.

Remarks. *Amietophrynus pardalis* and *rangeri* are very similar in appearance and occur in microsympatry, such that both have the same type locality. It was Ranger's observations on his farm of a difference in breeding season between the two toads that led Hewitt to describe two new taxa. However, due to their very similar morphologies, Hewitt described them as sympatric subspecies, with no geographical separation, and noted (p. 283): "These two Gleniffer forms are clearly closely allied, and their status as geographical subspecies may seem somewhat arbitrary". At the time Hewitt was struggling to make sense of a bewildering diversity of toads in southern Africa, many of which were considered simply regional variants of a wide-ranging *Bufo regularis* (Boulenger 1881). The latter is now restricted to north of the equator, with the *regularis* complex in the subcontinent now split into seven species (Tandy & Keith 1972). Many of Hewitt's comments in the type description show that he was aware of the complexity of the situation, and he was prescient in predicting that the differences in vocalization between the two taxa noted by Ranger at Gleniffer would direct future taxonomic

studies (p. 284 – “it is quite probable however that the call-note character may prove to have greater systematic value than the shape of the parotoids”).

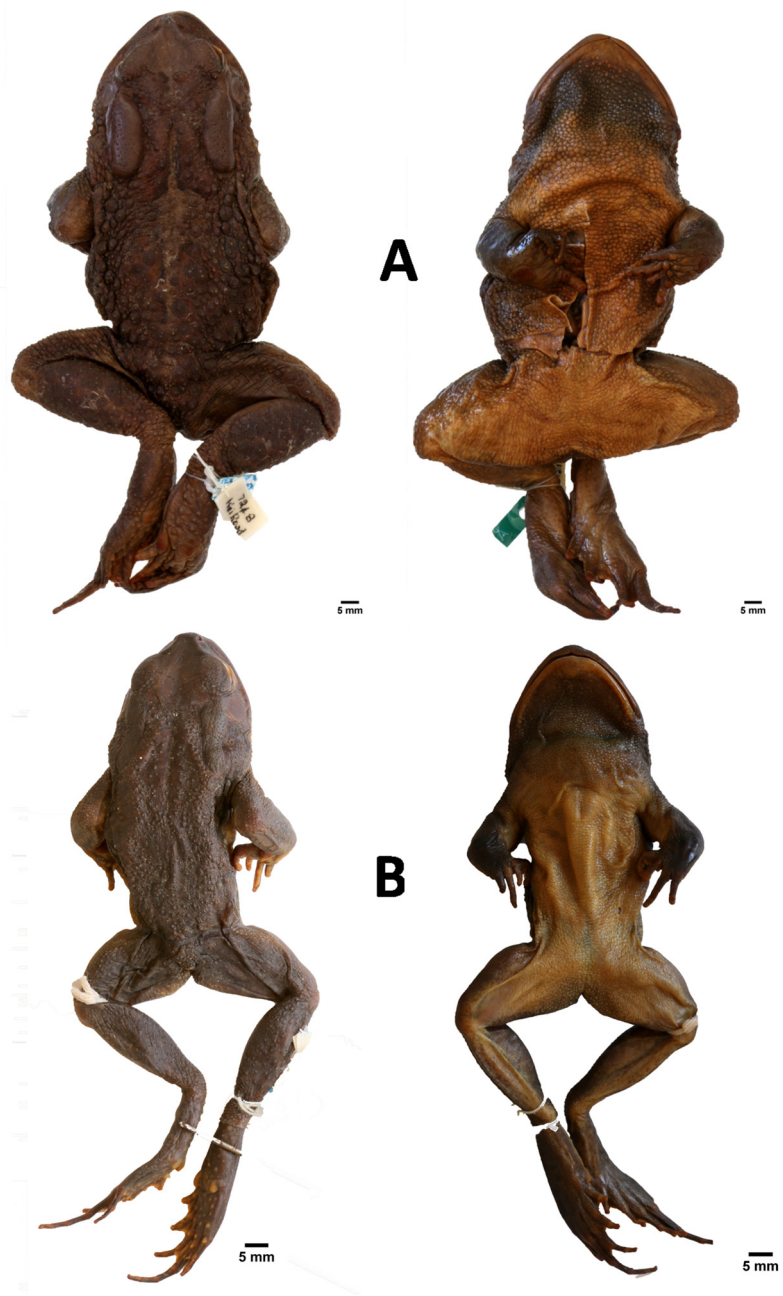

FIGURE 4. Family Bufonidae II: A—Lectotype of *Bufo regularis pardalis* (PEM A837), B—Lectotype of *Bufo regularis rangeri* (PEM A822).

Unfortunately, Hewitt’s poor documentation of type material and the presence of large numbers of additional topotypic material (some included in the type bottle) complicate resolution of the original type material in both this, and the next species. The original type description notes “Types: an adult male and female ..., collected when spawning”. However, it can be inferred that Hewitt had additional material from Gleniffer based on his comments: “A sub-adult male...” and “In old females...” (p. 290). The type bottle on transfer to PEM included four specimens consisting of two AMG series (AMG 7248 and 7270). In the type description Hewitt clearly refers to two collecting events, one in August and one in November. We thus assign the lower number (AMG 7248) to the type series. Measurements of the male and female are given (p. 283), and conform to two of the specimens in the AMG 7248 series. Thus we propose that PEM A837 (male) be designated as a lectotype and PEM A838 (female) as an allolectotype. Other specimens in the series must be treated as additional material. Both the lectotype and

allolectotype have a medial incision with posterior and anterior horizontal incisions to reveal intestines. Hewitt provides the gape width of an adult male and refers to a sub-adult male received in November, but neither could be identified among the additional material. Poynton (1964) elevated the taxon to a full species (*Bufo pardalis*), whilst Frost *et al.* (2006) placed this and other large African bufonids in the new genus *Amietophrynus.*

***Bufo regularis rangeri* Hewitt 1935**

Records of the Albany Museum, 4(2): 285.
Current name: *Amietophrynus rangeri* (Hewitt, 1935)

Lectotype: PEM A822 (formerly AMG 7248); Gleniffer, near Kei Road, Eastern Cape Province, South Africa; G.A. Ranger, November 1934.

Allolectotype: PEM A823 (formerly AMG 7248); same details as lectotype.

Remarks. The type description notes: "Types: an adult male and an adult female". However, more than 30 specimens from the two AM series noted for the species (AMG 7248 and 7270) are present in the PEM. As with the previous species we choose the lower (oldest) series as containing the types. Measurements are provided for the types (p. 285), and conform to those of an adult male and female in this series. Thus we designate PEM A822 (male) as the lectotype and PEM A823 (female) as the allolectotype. Full body X-ray exists for the lectotype. Elevated to full species by Poynton (1964), and Frost *et al.* (2006) placed this and other large African bufonids in the new genus *Amietophrynus.*

***Bufo robinsoni* Branch and Braack 1996**

Madoqua, 19(1): 15–23, Figs. 1–3, 4.
Current name: *Vandijkophrynus robinsoni* (Branch and Braack, 1996)

Holotype: PEM A2492; Paradise Gorge (28°19'45"S; 17°00'15"E, alt. 466 m a.s.l.) in the northern foothills of the Vandersterberg, Richtersveld National Park, Cape Province, South Africa. The type locality is a series of about eight small, spring-fed freshwater pools (all less than 15 m^2 in surface area) in a narrow gorge cutting through quartzite; W.R. Branch, H. Braack, R. Hall and M. Raffe, 14 September 1992.

Paratypes (6): PEM A2256–58, 2289, 2491, and 3421; same data as holotype, except PEM A2258 which was collected by H. Braack, 4 June 1992.

Additional specimens: The type description mentions additional series of adults (PEM A2489–90, 2483, 2488 and 2516) and tadpoles/metamorphs (PEM A2518).

Remarks. Other paratypes are in TMP (no. 79426) and CAS (no. 193556, 193559, 193569–70). Frost *et al.* (2006) placed this species in a new genus, *Vandijkophrynus.*

***Bufo rosei* Hewitt 1926**

Annals of the South African Museum, 20: 417–418; Pl. XXXVII.
Current name: *Capensibufo rosei* (Hewitt, 1926)

Lectotype: PEM A5132 (formerly AMG 4981); Muizenberg Mountain, Cape Peninsula, Western Cape Province, South Africa; W. Rose, 10 March 1925.

Paralectotypes (7): PEM A5133–39 (formerly AM 4981); same details as lectotype.

Remarks. The type description does not list where the types were deposited, but Frost (2014) notes that they are in the PEM where a series of eight specimens with the same collection details provided in the type description are present. One of these specimens (PEM A5132) conforms to the illustration (Pl. XXXVII), and to the snout-vent length (25 mm) provided in the text (p. 418). We therefore designate PEM A5132 as the lectotype. The remaining seven specimens bear the same AM number and the date 10 March 1925 (the type description only states a

collection date of March 1925), and can be confidently considered paralectotypes from the original series. Transferred to the new genus *Capensibufo* by Grandison (1980).

Bufo vertebralis albiventris Power 1927

Transactions of the Royal Society of South Africa, 14: 418–421; Pl. XXII, Figs. 1–4.
Current name: *Poyntonophrynus fenoulheti* (Hewitt and Methuen, 1912)

Syntypes (2): PEM A826 and 827 (formerly AMG 5610); Lobatsi, Botswana; J.H. Power, 16 July 1927.

Remarks. Both specimens in good condition with a ventral medial incision. Full body X-ray is available. The original type series consisted of eight syntypes allegedly in MMK, but not specifically stated. Subsequently one specimen was exchanged with MCZ (A-15402), according to Barbour and Loveridge (1946). The remainder of the types are unaccounted for in the MMK (Beryl Wilson *pers. comm*.). Synonymised with *Bufo fenoulheti* (Poynton 1964). Placed in a new genus, *Poyntonophrynus*, by Frost *et al.* (2006).

Cacosternum capense Hewitt 1925b

Records of the Albany Museum, 3(4): 367–368; Pl. XV, Fig. 1 & 5.

Lectotype: PEM A4963 (previously AMG 4975); Cape flats near Cape Town, Western Cape Province, South Africa; W. Rose, 9 February 1925.

Paralectotype: PEM A4962 (previously AMG 4975); same details as the lectotype.

Remarks. Poynton (1964) and later Frost (2014) recorded the types in SAM. As with *Heleophryne rosei*, described in the same publication and also based on material forwarded by Rose to AMG, no indication is given in the original description of where the type specimens were deposited. It is therefore likely that the types were always present in AMG, and that Poynton (1964) and Frost (2014) were incorrect. SAM have no records of having the types of *C. capense* (Denise Hamerton *pers. comm*.), supporting this premise. Hewitt notes "Types, two examples collected by Walter Rose on the Cape Flats near Cape Town, an adult male and a juvenile". These types were not in a labeled type bottle when forwarded to PEM, and neither were they X-rayed along with the other AMG amphibian types. However, the PEM collection contains three specimens received from the AMG with the same collection details recorded in the type description. They do not have original AMG numbers, but had been re-accessioned (AMA 4975). The ventral markings of a juvenile in the putative AMG type specimens (PEM A4963) matches that illustrated in the type description (Pl. XV, Fig. 1), and to stabilise this confusion it is here designated as the lectotype of *C. capense*. A second specimen (PEM A4962) fits the size (25 mm) noted for the adult male in the type description, and this is thus the paralectotype. The third specimen is a smaller, damaged metamorph (PEM A4964, previously AMG 4975), that is not mentioned in the type description, but bears the same collecting details. It is not considered to form part of the type series, but may be considered topotypical additional material.

Cacosternum karooicum Boycott, De Villiers and Scott 2002

Journal of Herpetology, 36(3): 333–341.

Holotype: PEM A5459; In a temporary stream in the Doringkloof Catchment (33°55'45"S; 19°54'36"E, altitude 270 m), Elandsberg Mountains, Vrolijkheid Nature Reserve, Robertson District, Western Cape Province, South Africa; C.T. Stuart, 14 July 1977.

Paratypes (15): (a) PEM A5457; same details as holotype. (b) PEM A1556–1561 and 1573–1580; Trappieskraalkloof catchment, south of Gannaberg Mountain, Robertson District, Western Cape Province, South Africa; C.T. Stuart, R.C. Boycott, and J.C. Greig, 9 and 14 July 1977.

Remarks. PEM A1560, 1573 and 1578 are cleared and stained with alizarin. All other type material is in perfect condition with all possessing medial ventral incisions.

***Cacosternum thorini* Conradie 2014**

Zootaxa, 3785: 438–452; Figs. 3, 4, 6.

Holotype: PEM A10091; From a small wetland below the forestry fire lookout tower (32°34'48"S; 26°56'34"E, 3225CA, 1530 m above sea level), Hogsback, Eastern Cape Province, South Africa; W. Conradie and C. Morrison, 7 October 2011.

Allotype: PEM A10083; same details as holotype.

Paratypes (18): PEM A10082, 10084–10090, 10093, 10094, 10096, 10098–10103 and 10105; same details as holotype.

Remarks. Right thigh incision to remove tissue for genetic analysis in holotype, allotype and some of the paratypes. Paratype male and female pair deposited in both SAIAB (191643.1–2) and NMB (A8007–8). GenSeq information listed in Table 2.

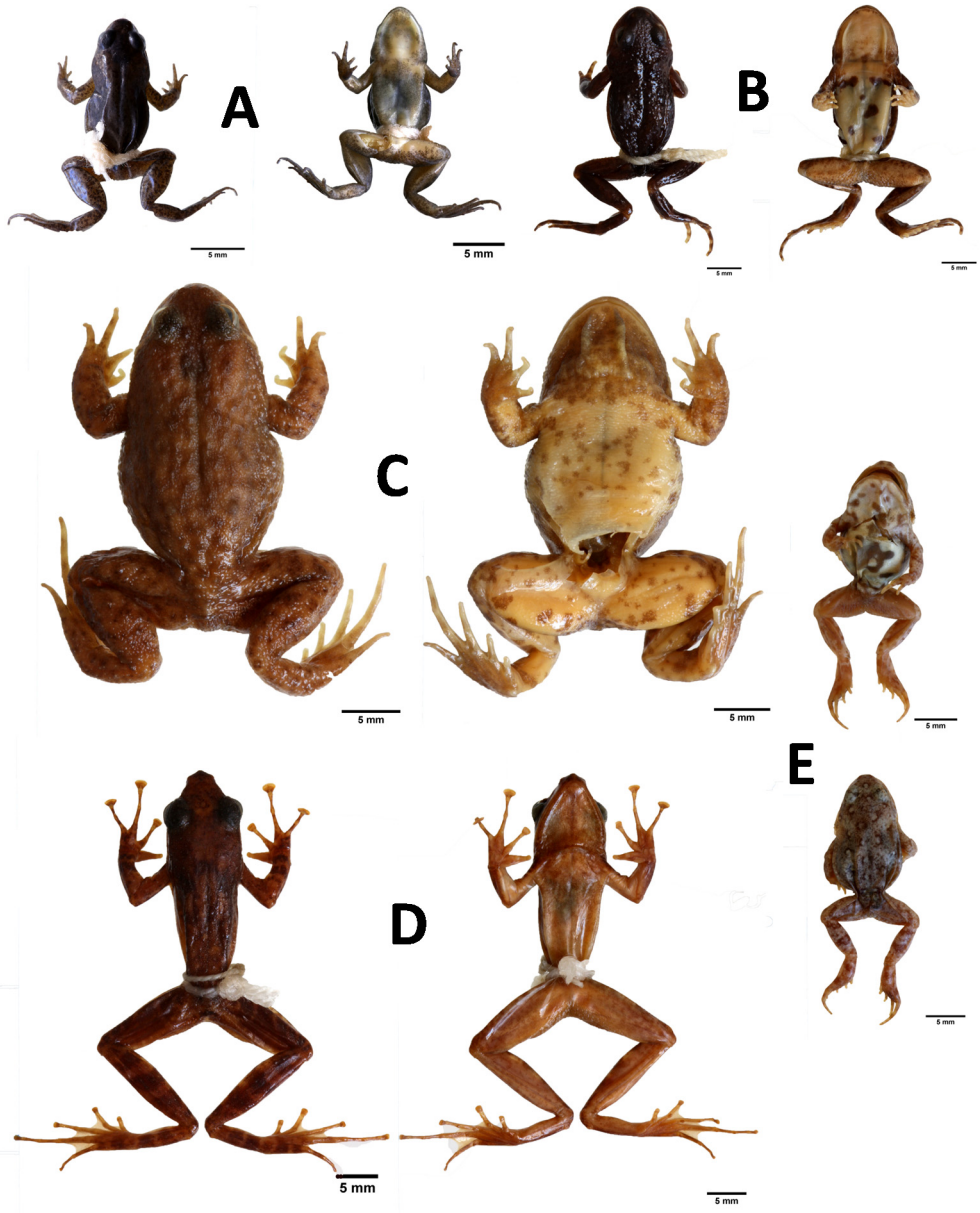

FIGURE 5. Family Pyxicephalidae II: A—Holotype of *Cacosternum thorini* (PEM A10091), B—Holotype of *Cacosternum karooicum* (PEM A5459), C—Holotype of *Poyntonia paludicola* (PEM A1600), D—Lectotype of *Natalobatrachus bonebergi* (PEM A1549), E—Lectotype of *Cacosternum capense* (PEM A4963).

***Cardioglossa occidentalis* Blackburn, Kosuch, Schmitz, Burger, Wagner, Gonwouo, Hillers and Rödel 2008**

Copeia, 3: 603–612; Figs. 1B, 1C, 2, 3A.

Paratype: PEM A7398; Haute Dodo Classified Forests (4°43'–5°22'N; 6°56'–7°25'W), Cote d'Ivoire; W.R. Branch and M.-O Rödel, 17 March 2002.

Remarks. Left fourth toe removed for genetic sample. Holotype in SMNS (9632.2). GenSeq information listed in Table 2.

***Heleophryne hewitti* Boycott 1988**

Annals of the Cape Provincial Museums (Natural History), 16(11): 309–319; Fig. 1.

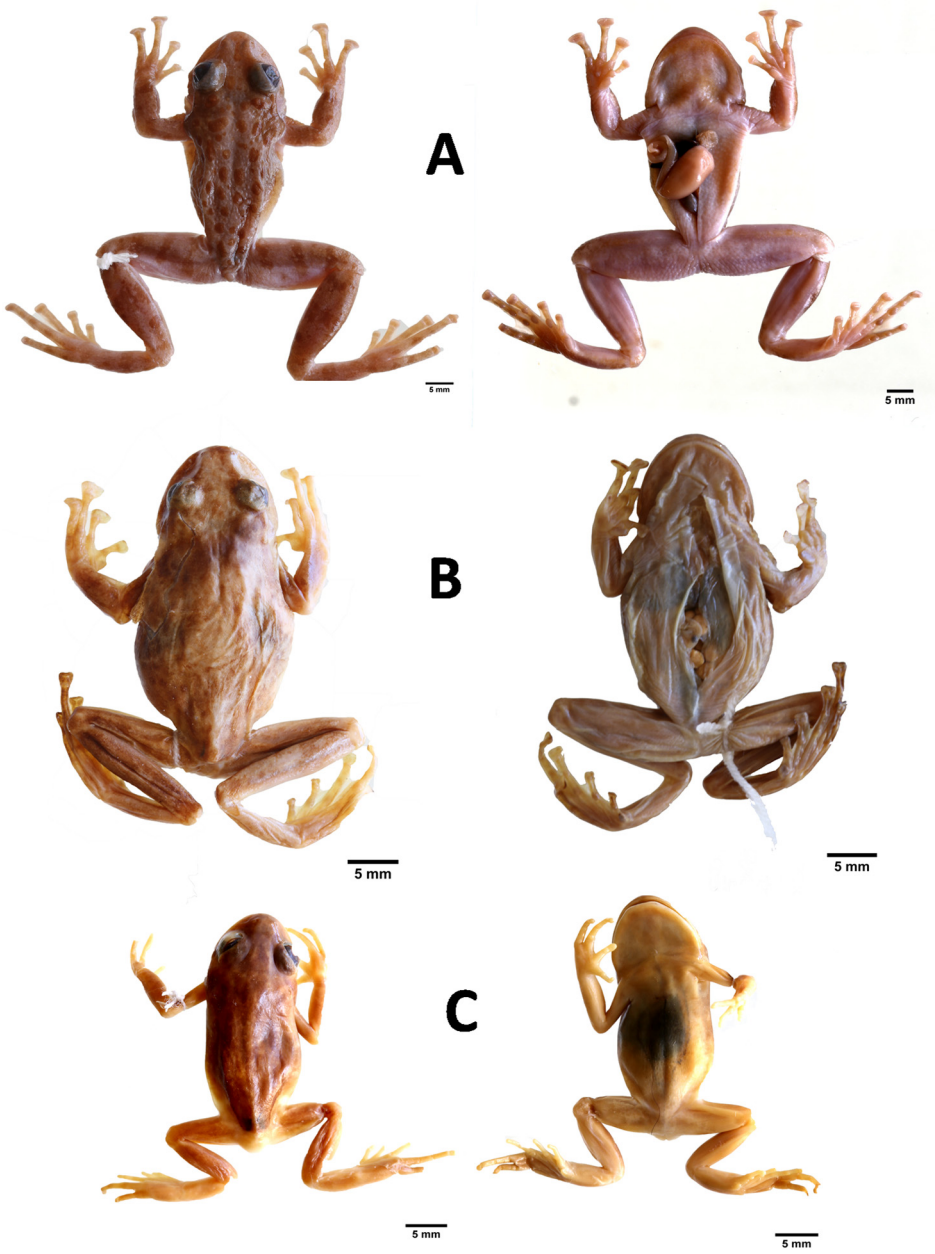

FIGURE 6. Family Heleophrynidae and Hyperoliidae: A—Holotype of *Heleophryne hewitti* (PEM A11156), B—Lectotype of *Heleophryne rosei* (PEM A1541), C—Holotype of *Kassina wealii quinque-vittata* (PEM A6289).

Holotype: PEM A11156 (formerly AMG A621); Upper reaches of the Geelhoutboom River, Loerie Forest Reserve, Elandsberg Mountains (33°47'54"S, 25°03'43"E. Alt. 420 m, 3325 CC Loerie), Eastern Cape Province, South Africa; R. Boycott, 17 October 1979.

Paratypes (12): (a) PEM A458–459, PEM A11148, 11149, 11152, 11153, 11154, (formerly AMG A697, 698, 696, 695, 613); same details as holotype. (b) PEM A460, PEM A11155 (formerly AMG A699); Martins River. (c) PEM A461, PEM A11151 (formerly AMG A622); Klein River. (d) PEM A11150 (formerly AMG A694); Diepkloof River. All paratypes collected by A. Jones, D. Smith-Belton and R. Boycott from 10 October 1979 – 30 October 1980.

Additional specimens: The following series of tadpoles mentioned in the type description are unaccounted for: a) type locality (AMG A614; PEM A463); Martin River (AMG A719; PEM A464); Klein River (AMG A628, 629; PEM A462) and Diepkloof River (AMG A630).

Remarks. All types bear a medial ventral incision. The original description mentions additional paratypes deposited in the BA, MCZ, NM, SAM and TMP.

Heleophryne rosei Hewitt 1925b

Records of the Albany Museum, 3(4): 363; Pls. XVIII & XIX.

Lectotype: PEM A1541 (formerly AMG 4965); Table Mountain, Western Cape, South Africa; W. Rose, December 1924.

Allolectotype: PEM A1542 (formerly AMG 4965); same details as lectotype.

Paralectotype: PEM A1546 (formerly AMG 4965); same details as lectotype; 10 tadpoles.

Remarks. The documentation of the material of Hewitt (1925b) is poor and ambiguous: "… founded on adult male and female examples and full grown tadpoles", thus possibly referring to more than one male and female. The type bottle received from AM only contained one adult male and female, plus 10 tadpoles. It is proposed that PEM A1541 (female) be designated as a lectotype and PEM A1542 (male) as allolectotype. The lectotype has a mid-ventral incision and an oblique incision behind the parotid. The allolectotype has an oblique dorsal incision from left eye to right lower thorax, musculature upper right fore-limb dissected, and mid ventral incision present. Type series include 10 tadpoles, accounted for but in very poor condition. The X-ray of the adult female is illustrated in PL. XVIII and is the first time Hewitt used X-rays in describing the osteology (p. 365) of a species in southern Africa. Full body X-rays are available for both adult types and the two largest tadpoles.

Hyperolius chelaensis Conradie, Branch, Measey & Tolley 2012

Zootaxa, 3269: 1–17; Figs. 5–7.

Holotype: PEM A9223; Small (< 2.5ha.) patch of Afromontane forest in a small gorge draining from Serra da Chela above the Estaçã Zootecnica (14°53'22"S; 13°16'27"E, 2045 m above sea level), near Humpata, Lubango, Angola; W. Conradie, 14 January 2009.

Paratype (1): PEM A9224; same details as holotype.

Additional specimens: PEM T350 & 351; 5 tadpoles, same details as holotype,

Remarks. Right thigh incision to remove tissue for genetic analysis in holotype and paratype. Tail tip of one tadpole taken as genetic sample. GenSeq information listed in Table 2.

Hyperolius horstockii semidiscus Hewitt 1927

Records of the Albany Museum, 3(5): 410–411; Pl. XXIV, Fig. 7.
Current name: *Hyperolius semidiscus* Hewitt, 1927

Lectotype: PEM A4579 (formerly AMG 1505); Mariannhill, KwaZulu-Natal, South Africa; P. Boneberg, date unknown.

Paralectotypes (2): PEM A4599 and 4600 (no original number on labels, re-accessioned as AMA 153); same details as lectotype, but collected 10 December and 11 December 1919, respectively, according to original labels.

Remarks. Hewitt (1927) appears to have described *H. horstockii semidiscus* almost as an after-thought during the description of *H. horstockii,* and as a consequence the number of types is not mentioned. He notes "Types from Mariannhill, Natal", but earlier notes material from various other localities (see below). The type bottle transferred to PEM contained three specimens. One of these (PEM A4579) conforms to that illustrated in the type description (Pl. XXIV, fig. 7) and its size (33.5 mm) and sex (male) are also the same as that listed, and we therefore designate this as the lectotype. Hewitt (1927) also lists additional material (p. 410), which is also now included in the PEM collection: Redhouse near Port Elizabeth (AMG 1685, now PEM A4580), Bussacks near Kariega River mouth (AMG 2627, now PEM A4582–4592), Blaaukrantz near Grahamstown (no original number on labels, re-accessioned as AMA 152, now PEM A4598), Mqanduli (AMG 2065, now PEM A4581, 4593, 4594) and Gillitts in KwaZula-Natal (AMG 2997, now PEM A4596). He also refers to a specimen from Bathurst (p. 411) but this is unaccounted for. Elevated to full species by Poynton (1964).

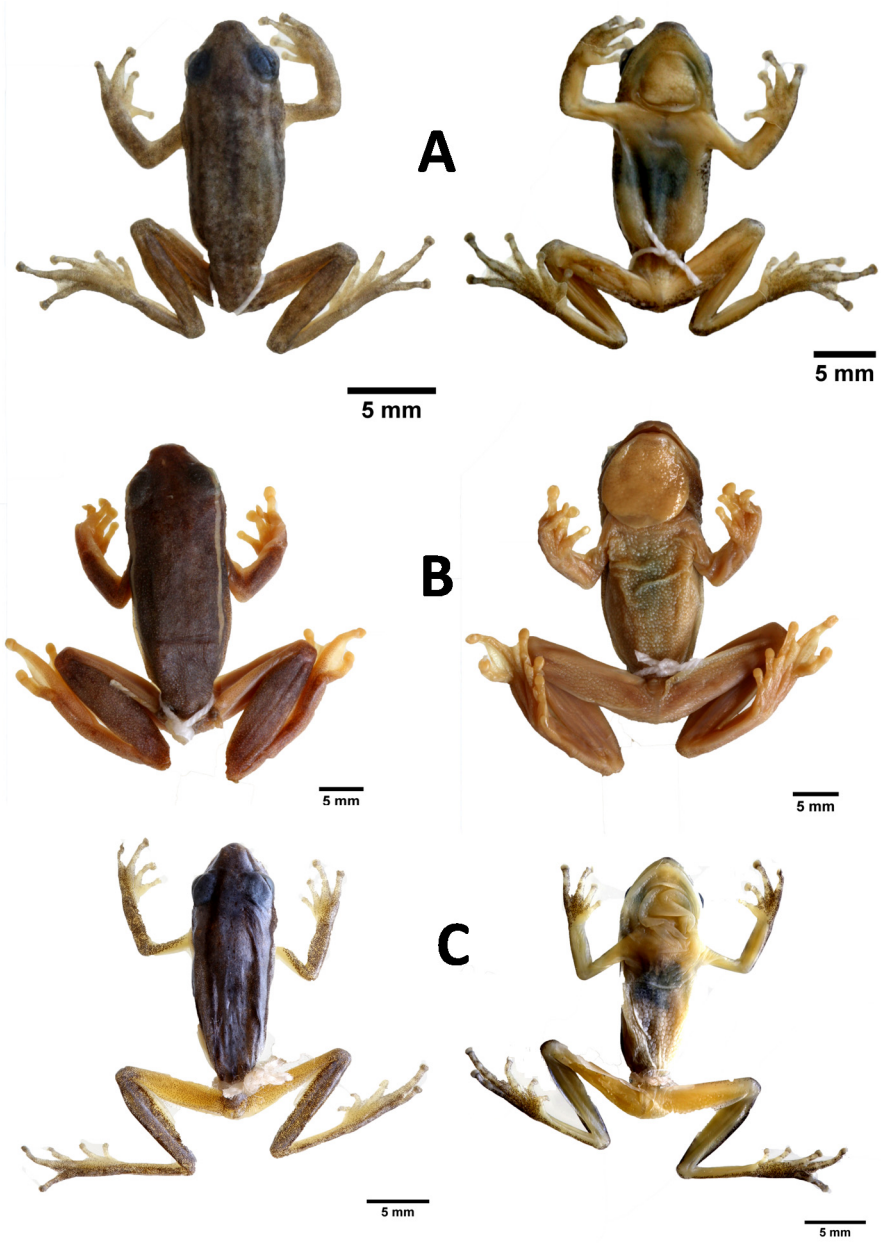

FIGURE 7. Family Hyperoliidae: A—Holotype of *Hyperolius chelaensis* (PEM A9223), B—Lectotype of *Hyperolius horstockii semidiscus* (PEM A4579), C—Holotype of *Hyperolius raymondi* (PEM A10049).

Hyperolius raymondi Conradie, Branch & Tolley 2013

Zootaxa, 3635: 201–223; Figs. 7–9.

Holotype: PEM A10049; A dambo near expedition camp (7°44'39.2"S; 19°57'16.8"E, 813 m above sea level), Lagoa Carumbo, Lunda Norte Province, Angola; W. Conradie, W.R. Branch, P. Vaz Pinto, S. Baptista and N. Baptista, 30 April 2012.

Allotype: PEM A10066; same details as holotype.

Paratypes (16): PEM A10040–10048, 10050–10056; same details as holotype.

Additional specimens: (a) PEM A10057; Headwaters of Lovua, north of village Capaia (8°20'18.5"S; 20°14'33"E, 0820AC, 154 m above sea level), Lunda Norte Province, Angola; P. Vaz Pinto, S. Baptista and N. Baptista, 5 May 2012. (b) PEM T517; 2 tadpoles, Margins Lagoa Samokaza east of Lagoa Carumbo (7°44'18.0"S; 19°59'13.0"E, 0719DB, 867 m above sea level), Lunda Norte Province, Angola; W. Conradie and W.R. Branch, 2 May 2012.

Remarks. Right thigh incision to remove tissue for genetic analysis in holotype, allotype and some of the paratypes. Conradie *et al*. (2013) also provide a re-description of the poorly known *Hyperolius cinereus* Monrad, 1937. GenSeq information listed in Table 2.

Kassina wealii quinque-vittata Hewitt 1927

Records of the Albany Museum, 3: 409; Pl. XXIV, Fig. 4.
Current name: *Semnodactylus wealii* (Boulenger, 1882)

Holotype: PEM A6289 (formerly AMG 1320); Cape Town, Western Cape Province, South Africa. W. Rose. Date not stated in original publication; original label reads 9 October 1925.

Additional specimens: PEM A6288 (formerly AMG 1320); same details as holotype.

Remarks. Hewitt (1927) incorrectly used the spelling *Kassina wealii quinquevittata* in the Plate legends (p. 415). In the type description an adult male with snout vent length 30 mm is referred to as the type [=holotype], we thus treat PEM A6289 as the holotype. No additional type specimens are mentioned in the type description, but a smaller male is also illustrated with outstretched legs (Pl. XXIV, Fig. 4). This illustration fits PEM A6288 (AMG 1320, same details as holotype), but this can only be considered additional material mentioned in the type description. The type description states that the type is "in the South African Museum", but Hewitt appears to have changed his mind after the article was published and accessioned it into the AM. Lambiris (1988) questioned the type to be in PEM and not SAM, followed by Frost (2014). Lambiris (1988) further discussed the taxonomic history of the taxa and re-instated the name *Semnodactylus* Hoffman (1939) which is a senior synonym of *Notokassina* Drewes (1985).

Leptopelis spiritusnoctis Rödel 2007

Mitteilungen aus dem Museum für in Berlin, Supplement, 83 (Supplement): 91– 00; Fig. 1, 2A–E.

Paratype: PEM A7917; Haute Dodo Forest Reserve (04°59'14" N, 07°19'30" W), Cote d'Ivoire; W.R. Branch and M.-O. Rödel, 15 June 2002.

Remarks. Left fourth and fifth toe removed as genetic sample. Holotype in ZMB (699511).

Natalobatrachus bonebergi Hewitt and Methuen 1912

Transactions of the Royal Society of South Africa, 3: 107–108; Pl. VII, Figs. 1–4.

Lectotype: PEM A1547; Mariannhill, Natal, KwaZulu-Natal, South Africa; P. Boneberg, March 1912.

Paralectotypes (2): PEM A1548–1549; same details as lectotype.

Remarks. Four type specimens exist, three in PEM and one in Mariannhill Monastery Museum. Lambiris (1988) reported the holotype to be in PEM, although no specific specimen was designated as a 'type' in the original description. We follow Lambiris (1988) and propose that PEM A1547 be designated as a lectotype, based on it fitting the illustration in the original description, and being in best overall condition. The lectotype and one paralectotype (PEM A1549) are intact and in good condition. One paralectotype (PEM A1548) with ventral and transverse incision on lower abdomen and ventral thoracic surface opened from the left. Full body X-rays are available for all three specimens.

Poyntonia paludicola Channing and Boycott 1989

Copeia, 1989(2):467–471; Figs. 2–5.

Holotype: PEM A1600; Southern slopes of the Steenbras Mountains in the Kogelberg Forest Reserve (34°14'S, 18°52'E), Western Cape Province, South Africa; W. Zuchini and A. Channing, 22 August 1987.

Paratypes (3): PEM A1601–1603; same details as holotype, but collected by W. Sirgel, D.E. van Dijk, and A. Channing, 21 August 1987.

Additional specimens: The following PEM specimens were also examined in the type description: PEM A1587–1599, and 1602. Type description also mentions tadpoles (PEM A1604), which are not accounted for.

Remarks. Holotype and two paratypes (PEM A1601, 1602) with anterior ventral incision. Paratype (PEM A1603) and additional specimen (PEM A1595) cleared and stained with alizarin. Additional specimen (PEM A1589), dried skeleton. Two other paratypes are in CAS (no. 165936) and KU (no. 207857).

Rana vertebralis Hewitt 1927

Records of the Albany Museum, 3(5): 404–407; Pl. XXIV, Fig. 2.
Current name: *Amietia vertebralis* (Hewitt, 1927)

Holotype: PEM A1550 (formerly AMG 5227); From a stream near the summit of Mont-aux-Sources, at the source of the Tugela River, Lesotho; R. Essex, January 1926.

Additional specimens (5): PEM A1551, 1552, 1555, 1562 and 10652 (formerly AM 5227); same details as holotype.

Remarks. Bates (2002) and Tarrant *et al.* (2008) referred to PEM A1550 as the holotype, this is correct as Hewitt (1927) referred to a single immature adult as the 'type'. He also mentions another five smaller specimens (PEM A1551, 1552, 1555, 1562 and 10652 - formerly all AMG 5227) from the type locality, and a larger female (PEM A6202 - formerly AMG 5236) collected by J. A. Cottrell from Rebaneng Pass (p.405), which is not stated to form part of a type series and thus forms additional material only. The type description also refers to tadpoles (PEM T051 - formerly AMG 5234) collected by J. A. Cottrell at Thaba Putsua, and tadpoles (PEM T294 - formerly AMG 5227) collected by R. Essex in a pool near the summit of Mont-aux-Sources. Tadpole lateral head, dorsal head and labial teeth line drawings are illustrated in Fig. 2 in the type descriptions. The holotype and additional material discussed in the type description of *Rana vertebralis* have been badly damaged and must once have once completely desiccated. Full body X-rays (taken in 1968-1969) are available for all the material and desiccation must have therefore occurred after this date. Transferred to *Amietia* (Dubois, 1987).

Strongylopus kitumbeine Channing and Davenport 2002

African Journal of Herpetology, 51(2): 135–142.

Paratype: PEM A7499; Kitumbeine Forest, Tanzania; M. Baker and T.R.B. Davenport, 3–5 April 2000.

Remarks. The holotype and other paratypes are in CAS.

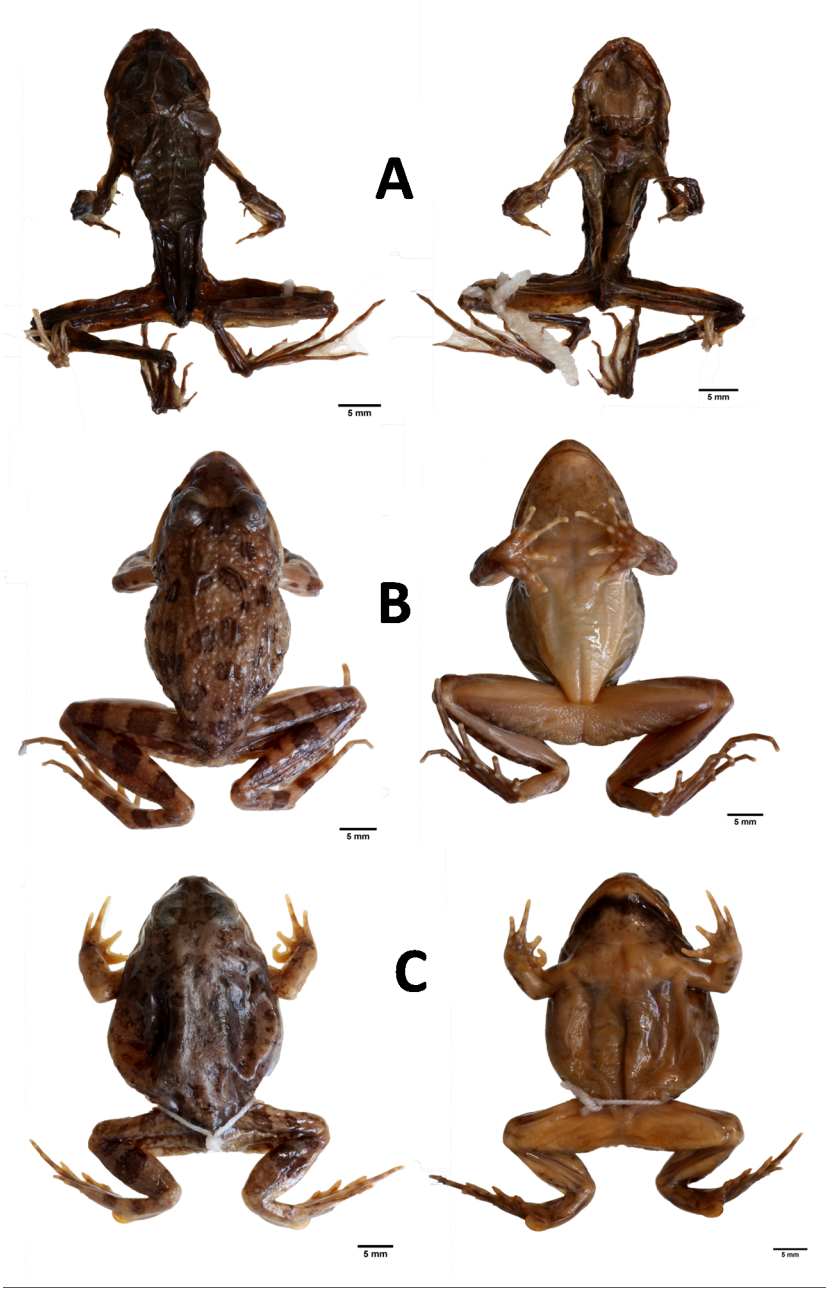

FIGURE 8. Family Pyxicephalidae III: A—Lectotype of *Rana vertebralis* (PEM A1550), B—Holotype of *Strongylopus springbokensis* (PEM A963), C—Holotype of *Tomopterna tandyi* (PEM A2283).

Strongylopus springbokensis **Channing 1986**

Annals of the Cape Provincial Museums (Natural History), 16(5): 128–135; Figs. 1, 3, 5–7.

Holotype: PEM A963; Springbok in Namaqualand, Northern Cape Province, South Africa; R.C. Drewes and A. Channing, 10 July 1984.

Paratypes (5): PEM A964–968; same details as lectotype.

Additional specimens: Two specimens, 11 km south of Kammieskroon (PEM A1274 and 1275).

Remarks. Four other paratypes are hosted in CAS (no. 157517 – 15720).

Tomopterna tandyi Channing and Bogart 1996

South African Journal of Zoology, 31: 80; Figs. 1, 2, 3.

Holotype: PEM A2283; Bedford in the Eastern Cape, South Africa (32°42'S, 26°04'E); M. Snyman, 27 January 1993.

Paratypes (9): PEM A2278–2282, 2284, 2285, 2288 and 2537; same details as the holotype.

Additional specimens: Other PEM specimens examined in type description include one adult male from Steynsburg (PEM A2536), and two adult males and two adult females from KwaNcunaca River (PEM A3063, 3066, 3073 and 3077).

Remarks. None.

Xenopus gilli Rose and Hewitt 1927

Transactions of the Royal Society of South Africa, 14: 343; Pl. XVI, Figs. 1–4.

Holotype: PEM A1523 (formerly AMG 5112); Near Cape Town, Western Cape, South Africa; W. Rose, 14 July 1926.

Additional specimens (3): PEM A1531, 1532 and 1524; same details as holotype.

Remarks. With respect to the number of types Rose and Hewitt's description states (p. 344): "Description based on four specimens collected near Cape Town by Mr. Walter Rose. The type, an adult male, is in the Albany Museum, Grahamstown". Poynton (1964) and Frost (2014) have interpreted this conservatively as comprising a single type (holotype), with the other specimens constituting additional material. We follow this interpretation. However, the type bottle received from AMG contained five specimens (an adult male, three adult females and one immature male). The only adult male conforms to the illustration (Pl. XVI, fig. 4) in the type description and is thus clearly the holotype, whilst two of the three adult females also match the illustrations (Pl. XVI, fig. 1, 3) and are thus from the additional material discussed in the type description. The other adult female is assumed to be the remaining specimen mentioned in the type description. The immature male, which is not specifically discussed in the description, remains problematic. Both the holotype and one female (PEM A1531) are intact with no incisions. The two other adult females (PEM A1524 & 1532) have their ventral surface incised to expose sternal anatomy. The immature male (PEM A1525) has a small median abdominal incision, left side of jaw cut to expose articulation, and lower jaw folded back exposing buccal features. Full body X-rays exist for all the types except the immature male. Additional X-rays photos of the torsos exist for the holotype, and two of the adult females (done by D.E. van Dijk, Sept 2001).

Missing types

Bufo regularis poweri Hewitt, 1935

Records of the Albany Museum, 4(2): 293–294.
Current name: *Amietophrynus poweri* (Hewitt, 1935)

Syntypes (5): Unknown AMG number; Kimberley, Northern Cape Province, South Africa; J.H. Power, date unknown.

Remarks. During the devastating fire at the Albany Museum the catalogue was destroyed and led to poor documentation of the remaining specimens. The type description notes that the types were deposited in the AMG, but does not provide any registration numbers to aid in the search of these specimens. A search through the PEM collection revealed a bottle with four specimens of this species from Kimberley. However, the labels were simply tied around a hind leg, unlike the unique labeling of all John Power's specimens where the labels are surgically pierced through the lower leg. For this reason they are unlikely to be the missing types, which may have been destroyed in the fire or were misplaced during the move to PEM.

FIGURE 9. Family Pipidae: Holotype of *Xenopus gilli* (PEM A1523).

Acknowledgments

Denise Hamerton and Erika Mias (Iziko Museums of South Africa), Lemmy Mashinini (Ditsong National Museum of Natural History), Beryl Wilson (McGregor Museum) and Jose Rosado (Museum of Vertebrate Zoology) provided information regarding type specimens in their collections. Frank Farquharson kindly forwarded details of the vertebrate AMG types that he X-rayed in 1968–1969. Christa Morrison provided proofreading and technical care. The two reviewers (Alan Channing and one anonymous) and editor (Miguel Vences) provided valuable comments on improving the quality of the manuscript.

References

Adler, K. (Eds.) (1989) *Contributions to the History of Herpetology*. Society for the Study of Amphibians and Reptiles, Ithaca, NY, 202 pp.

Anon (1941) Destruction of the museum at Grahamstown. *South African Museums Association Bulletin*, 2, 252–253.

Barbour, T. & Loveridge, A. (1928) A comparative study of the herpetological faunae of the Uluguru and Usambara Mountains, Tanganyika Territory with descriptions of new species. *Memoirs of the Museum of Comparative Zoology, Cambridge, Massachusetts*, 50, 87–265.

Barbour, T. & Loveridge, A. (1929a) A new frog of the genus *Arthroleptis* from the Belgian Congo. *Proceedings of the New England Zoölogical Club, Cambridge, Massachusetts,* 11, 25–26.

Barbour, T. & Loveridge, A. (1929b) Typical reptiles and amphibians. *Bulletin of the Museum of Comparative Zoology, Cambridge, Massachusetts,* 69, 203–360.

Barbour, T. & Loveridge, A. (1946) First supplement to typical reptiles and amphibians. *Bulletin of the Museum of Comparative Zoology, Cambridge, Massachusetts,* 96, 59–214.

Bates, M.F. (2002) The distribution of *Amietia vertebralis* (Hewitt, 1927) (Anura: Ranidae), with comments on its taxonomic and conservation status. *Annals of the National Museum of Bloemfontein*, 18, 78–94.

Blackburn, D.C., Kosuch, J., Schmitz, A., Burger, M., Wagner, P., Gonwouo, L.N., Hillers, A. & Rödel, M.-O. (2008) A new species of *Cardioglossa* (Anura: Arthroleptidae) from the Upper Guinean Forests of West Africa. *Copeia*, 3, 603–612. http://dx.doi.org/10.1643/CH-06-233

Boulenger, G.A. (1881 "1880") On the Palaearctic and Aethiopian species of *Bufo*. *Proceedings of the Zoological Society of London*, 1880, 545–574.

Boycott, R.C. (1988) Description of a new species of *Heleophryne* Sclater, 1899 from the Cape Province, South Africa (Anura: Heleophrynidae). *Annals of the Cape Provincial Museums (Natural History)*, 16, 309–319.

Boycott, R.C., de Villiers, A. & Scott, E. (2002) A new species of *Cacosternum* Boulenger 1887 (Anura: Ranidae) from the Karoo Region of South Africa. *Journal of Herpetology,* 36, 333–341. http://dx.doi.org/10.1670/0022-1511(2002)036[0333:ANSOCB]2.0.CO;2

Branch, W.R. & Braack, H. (1995) A new toad from Paradise. *Madoqua*, 19, 15–23.

Broadley, D.G. (2010) Catalogue of types specimens of reptiles and amphibians in the Natural History Museum of Zimbabwe. *Arnoldia*, 10, 275–307.

Chabanaud, P. (1921) Contributions a l'etude de la faune herpetologique de l'Afrique occidentale. II. Deuxième note. *Bulletin du Comit d'Études Historiques et Scientifiques de l'Afrique Occidentale Française,* 1921, 445–472.

Chakrabarty, P., Warren, M., Page, L.M. & Baldwin, C.C. (2013) GenSeq: An updated nomenclature and ranking for genetic sequences from type and non-type sources. *ZooKeys*, 346, 29–41. http://dx.doi.org/10.3897/zookeys.346.5753

Channing, A. & Bogart, J.P. (1996) Description of a tetraploid *Tomopterna* (Anura: Ranidae) from South Africa. *South African Journal of Zoology,* 31, 80–85.

Channing, A. & Boycott, R.C. (1989) A new frog genus and species from the Mountains of the Southwestern Cape, South Africa (Anura: Ranidae). *Copeia*, 1989, 467–471. http://dx.doi.org/10.2307/1445445

Channing, A. & Davenport, T.R.B. (2002) A new frog from Tanzania (Anura: Ranidae: *Strongylopus*). *African Journal of Herpetology*, 51, 135–142. http://dx.doi.org/10.1080/21564574.2002.9635469

Channing, A. (1986) A new species of the genus *Strongylopus* Tschundi from Namaqualand, Cape Province, South Africa (Anura: Ranidae). *Annals of the Cape Provincial Museum (Natural History)*, 16, 128–135.

Channing, A., Hendricks, D. & Dawood, A. (1994) Description of a new moss frog from the south-western Cape (Anura: Ranidae: *Arthroleptella*). *South African Journal of Zoology*, 29, 2240–243.

Channing, A. (2012) A new species of Rain Frog from Namaqualand, South Africa (Anura: Breviciptidae: *Breviceps*). *Zootaxa*, 3381, 62–68.

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

Channing, A., Schmitz, A., Burger, M. & Kielgast, J. (2013) A molecular phylogeny of African Dainty Frogs, with the description of four new species (Anura: Pyxicephalidae: *Cacosternum*). *Zootaxa*, 3701 (5), 518–550. http://dx.doi.org/10.11646/zootaxa.3701.5.2

Conradie, W. (2014) The King of the Dwarves: a new cryptic species of Dainty Frog (Anura: Pyxicephalidae: *Cacosternum*) from the eastern Great Escarpment of South Africa. *Zootaxa,* 3785 (3), 438–452. http://dx.doi.org/10.11646/zootaxa.3785.3.6

Conradie, W., Branch, W.R. & Tolley, K.A. (2013) Fifty Shades of Grey: giving colour to the poorly known Angolan Ash reed frog (Hyperoliidae: *Hyperolius cinereus*), with the description on a new species. *Zootaxa*, 3635 (3), 201–223. http://dx.doi.org/10.11646/zootaxa.3635.3.1

Conradie, W., Branch, W.R., Measey, J.G. & Tolley, K.A. (2012) A new species of *Hyperolius* Rapp, 1842 (Anura:

Hyperoliidae) from the Serra da Chela mountains, south-western Angola. *Zootaxa*, 3269, 1–17.
Dawood, A. & Channing, A. (2000) A molecular phylogeny of Moss Frogs from the Western Cape, South Africa, with a description of a new species. *Journal of Herpetology,* 34, 375–379. http://dx.doi.org/10.2307/1565359
De Witte, G.F. (1941) *Batraciens et reptiles. Exploration du Parc National Albert. Fascicule 33*. Mission G.F. de Witte (1933–1935), Bruxelles , v + 261 pp.
Deckert, K. (1938) Beiträge zur Osteologie und Systematik ranider Froschlurche. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin*, 1938, 127–184.
Drewes, R.C. (1985) A case of paraphyly in the genus *Kassina* Girard, 1853. *South African Journal of Science*, 81, 186–191.
Du Preez, L.H. & Carruthers, V.C. (2009) *A Complete Guide to the Frogs of Southern Africa*. Struik Nature, Cape Town, 488 pp.
Dubois, A. (1987) Miscellanea taxinomica batrachologica (I). *Alytes*, 5, 7–95.
FitzSimons, F.W. (1910) *The Snakes of South Africa: Their Venom and the Treatment of Snakebite.* E.H. Walton & Co., Port Elizabeth, 160 pp.
FitzSimons, F.W. (1912) *The Snakes of South Africa: Their Venom and the Treatment of Snakebite,* T. Maskew Miller, Cape Town, xvi + 547 pp.
FitzSimons, F.W. (1930) *Pythons and their ways*. G. G. Harrap & Co., London, iii + 155p.
FitzSimons, F.W. (1932) *Snakes*. Hutchinson, London, xiv + 286 pp.
FitzSimons, V.F.M. (1943) The lizards of South Africa. *Memoir of the Transvaal Museum*, 1, 1–528.
FitzSimons, V.F.M. (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.
FitzSimons, V.F.M. (1948) 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.F.M. (1962) *Snakes of southern Africa*, Purnell & Sons, Cape Town, 423 pp.
Frost, D.R. (2014) Amphibian Species of the World: an Online Reference. Version 6.0 (24 April 2014). American Museum of Natural History, New York, USA. Electronic Database. Available from: http://research.amnh.org/vz/herpetology/amphibia/ (accessed 1 September 2014)
Frost, D.R. (Ed.) (1985) *Amphibian Species of the World. A Taxonomic and Geographical Reference*. Allen Press Inc. and the Association of Systematics Collections, Lawrence, Kansas, V +732 pp.
Frost, D.R., Grant, T., Faivovich, J., Bain, R.H., Haas, A., Haddad, C.F.B., de Sá, R.O., Channing, A., Wilkinson, M., Donnellan, S.C., Raxworthy, C.J., Campbell, J.A., Blotto, B.L., Moler, P.E., 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
Frost, D.R. & Hillis, D.M. (1990) Species in concept and practice: Herpetological applications. *Herpetologica*, 46, 87–104.
Grandison, A.G.C. (1980) A new genus of toad (Anura: Bufonidae) from the Republic of South Africa with remarks on its relationships. *Bulletin of the British Museum (Natural History) Zoology,* 39, 293–298.
Hewitt, J. & Methuen, B.A. (1912) Descriptions on some new Batrachia and Lacertilia from South Africa. *Transactions of the Royal Society of South Africa*, 3, 107–111. http://dx.doi.org/10.1080/00359191309519682
Hewitt, J. (1919) *Anhydrophryne rattrayi*, a remarkable new frog from the Cape Colony. *Records of the Albany Museum*, 3, 182–189.
Hewitt, J. (1925a) Descriptions of three toads belonging to the genus *Breviceps* Merren. *Annals of the Natal Museum*, 5, 189–194.
Hewitt, J. (1925b) On some new species of reptiles and amphibians from South Africa. *Records of the Albany Museum*, 3, 343–368.
Hewitt, J. (1926) Descriptions of new and little-known lizards and batrachians from South Africa. *Annals of the South African Museum*, 20, 413–431.
Hewitt, J. (1927) Further descriptions of reptiles and batrachians from South Africa. *Records of the Albany Museum*, 3, 371–415.
Hewitt, J. (1932) Some new species and subspecies of South Africa batrachians and lizards. *Annals of the Natal Museum*, 7, 105–128.
Hewitt, J. (1935) Some new forms of batrachians and reptiles from South Africa. *Records of the Albany Museum*, 4, 283–357.
Hewitt, J. (1937) *A guide to the vertebrate fauna of the Eastern Cape Province, South Africa Part II. Reptiles, Amphibians and Freshwater Fishes*. Albany Museum, Grahamstown, (x) + 141 + (A–H) pp., 34 pls.
Hewitt, J. (1941) Albany Museum: *South African Museums Association Bulletin*, 2 (11), 284–285.
Hewitt, J. (1942) The museum fire: Dr. Hewitt's report. No direct evidence of cause. *Grocott's Daily Mail*, 30 March 1942, 3–4.
Hoffman, A.C. (1939) A new frog from Thaba 'Nchu. *Soölogiese Navorsing van die Nasionale Museum, Bloemfontein,* 1, 89–95.
Lambiris, A.J.L. (1988) A review of the Amphibians of Natal. *Lammergeyer*, 39, 1–210.
Laurent, R.F. (1941) Contribution l'ostéologie et la systematique des ranides africains. Deuxième note. *Revue de Zoologie et de*

Botanique Africaines, Tervuren, 34, 192–234.
Marx, H. (1958) Catalogue of the type specimens of reptiles and amphibians in the Chicago Natural History Museum. *Fieldiana, Zoology,* 36 (4), 409–496.
Parker, H.W. (1934) *A Monograph of the Frogs of the Family Microhylidae*. Trustees of the British Museum (Natural History), London, 208 pp.
Peters, W.C.H. (1882) *Naturwissenschaftlich Reise nach Mossambique auf befehl Seiner Mäjestat des Königs Friedrich Wilhelm IV in den Jahren 1842 bis 1848 ausgeführt. Zoologie 3 (Amphibien)*. G. Reimer, Berlin. [total page number unkown]
Power, J.H. (1926) A monographic revision of the genus *Breviceps*, with distribution records and descriptions of new species. *Annals of the South African Museums*, 20, 451–471.
Power, J.H. (1927) On the herpetological fauna of the Lobatsi-Linokana area. *Transactions of the Royal Society of South Africa*, 14, 418–421.
Poynton, J.C. & Broadley, D.G. (1988) Amphibia Zambesica 4. Bufonidae. *Annals of the Natal Museum*, 29, 447–490.
Poynton, J.C. (1963) Descriptions of Southern Africa Amphibians. *Annals of the Natal Museum*, 15, 319–332.
Poynton, J.C. (1964) Amphibia of southern Africa: a faunal study. *Annals of the Natal Museum*, 17, 1–334.
Pringle, J.A. (1941) Short history of Port Elizabeth Museum. *South African Museums Association Bulletin*, 2, 346–379.
Rapp, W. v. (1842) Neue Batrachier. *Archiv für Naturgeschichte,* 8, 289–291. [Berlin]
Rödel, M.-O. (2007) The identity of *Hylambates hyloides* Boulenger, 1906 and description of a new small species of *Leptopelis* from West Africa. *Mitteilungen aus dem Museum für Naturkunde in Berlin*, Zoologische Reihe, 83 (Supplement), 90–100. http://dx.doi.org/10.1002/mmnz.200600031
Rödel, M.-O., Kosuch, J., Veith, M. & Ernst, R. (2003) First Record of the Genus *Acanthixalus* Laurent, 1944 from the Upper Guinean Rain Forest, West Africa, with the Description of a New Species. *Journal of Herpetology,* 37, 43–52. http://dx.doi.org/10.1670/0022-1511(2003)037[0043:FROTGA]2.0.CO;2
Rose, W. & Hewitt, J. (1927) Description of a new species of *Xenopus* from the Cape Peninsula. *Transactions of the Royal Society of South Africa*, 14, 343–346. http://dx.doi.org/10.1080/00359192609519642
Smith, H.M., Langebartel, D.A. & Williams, K.L. (1964) Herpetological type-specimens in the University of Illinois Museum of Natural History. *Illinois biological monographs*, 32, 1–80.
Tandy, M. & Keith, R. (1972) *Bufo* of Africa. *In*: *Evolution in the Genus Bufo*. University of Texas Press, Austin, pp. 119–170.
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.