

List of Amphibians of Sudan

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Abstract

Thirty-two amphibian species are of definite occurrence in Sudan and seven more species are of possible occurrence. Tomopterna milletihsorsini from Jabal Al Dayer Biosphere Reserve was reported as a new record to Sudan. Vertebrae of fossils of Kababisha humarensis and Kababisha sudanensis were reported as two new species to science from the Cenomanian formations of Wadi Milk, northern Sudan. In addition, fossils of legless caecilians were found in the same formations.

Keywords: Sudan; Extent; Extant; Amphibians

Introduction

Amphibians of the Sudan are poorly known, except for *Sclerophyrus* (=Bufo) *regularis* which is a dissection, parasitological and physiological model animal in laboratory classes and research. Even though, *S. regularis* is widely misclassified with other species such as *Sclerophyrus maculatus* and *Sclerophyrus xeros*. Therefore, deeper investigation into their taxonomy and diversity is required Abugabr [1], Barbour [2] found from Dr. H. C. Phillips collection from Sinnar *Ptychadena* (=Rana) *mascareniensis*, *Phrynobatrachus natalensis* and *S. regularis*. Schmidt [3] collected *S. regularis* and *Ptychadena* (*Rana*). *mascareniensis* from what is known as southern Sudan. *Hoplobatrachus* (=Dicroglossus) *occipitalis* were collected by Pike [4] from Khartoum and from Sinnar during this study. Mulleir [5] (2012) recorded *Sclerophyrus* (=Bufo) *pentoni* and *Tomopterna kachowskii* from the Red Sea Hills. Evans [6] collected fossil vertebrae and described *Kababisha humarensis* gen. et sp. Nov. and *Kababisha sudanensis* gen. et sp. Nov., Order Urodela, Suborder: Salamandroidea. They also collected but unidentified vertebrae belonging to frogs and Apoda. Rauhut [7] found in Wadi Al Milk amphibian fossils belonging to *Gymnophiona* indet., the Caudata *K. humarensis*, *K. sudanensis* and the anura indet. Thus confirming the findings of Evans [6], Rödel [8] related amphibians of the Sudan to the eastern region of Africa. The present work compiled a list of amphibians of Sudan based on field work collections as well as deskwork.

Material and Methods

Amphibians were collected by hand from the Nile, Khartoum, Geizera, Sinnar, West Kordofan States, Jebel Al Dayer Biosphere Reserve (JADBR) North Kordofan State and the Red Sea hills. Material were kept moist and either identified in the field or in the laboratory. Identification followed Rödel [8]. The authorities were accessed from Frost [9] as well as the valid scientific names.

Results and Discussion

Thirty amphibian's species were recorded as definite occurrence (Table 1). In the table these were marked as (*) and seven species marked as (#) are possibly to be found in Sudan. Barbour [2] reported *P. mascareniensis*, *P. natalensis* and *S. regularis* (Figure 1) from Sinnar. Pike [4] collected *H. occipitalis* from Khartoum. During the present work *S. regularis* and *H. occipitalis* were collected from Sinnar, El Souki and Damazin along the Blue Nile. Abugabr [1] recorded *S. xeros* and *S. maculatus* from Shendi area on the eastern bank of the Nile. Both species (Figure 2 & 3) were reported from Jebel Al Dair Biosphere Reserve (JADBR) by Abd El-Rahman. Mulleir [5] recorded the shaata gardens toad (*Sclerophyrus pentoni*) and the sand frog *Tomopterna kachowskii* (Figure 4) from Arkawait, the Red Sea hills. The present work recorded *Pyxicephalus cordofana* from Al Muglad, west Kordofan. According to Frost [10] *P. cordofana*

(Cordofan Frog) is endemic to Sudan. Recently, Abd El-Rahman [11] collected *L. bocagii* (Figure 5), *S. pentoni*, *S. xeros*, *S. regularis*, *Hemisis marmoratus* (Figure 6), *Kassina senegalensis* (Figure 7), *Tomopterna milleti* (Figure 8), *Hildebrandtia ornata* (Figure 9) and *Ptychadena schillukorum* (Figure 10) from JADBR. According to Abd El-Rahman [11] *T. milleti* is a new record to Sudan. Some fossil amphibians were recorded from Sudan. Werner [12] reported from Wadi Al Milk frogs and gymnophionen (caecilians, Apoda). According to Werner and Gayet [13] these gymnophionens were the oldest ones reported from Gondwana.

Evans [6]. collected vertebrate of frogs, Urodeala and Apoda from the Cenomanian formations (100.5 and 93.9 million years ago) of Wadi Milk. They also described two Sirenidae (salamander) *K. humarensis* and *K. sudanensis*. Werner and Gayet [13] stated that these salamanders are the earliest sirenids known outside North America. Pöllath [14] from the Holocene excavations in Wadi Howar reported a bone of an unidentified amphibian fossil. Sukova [15] found a fossil amphibian bone from Sabaloka (West Bank) during exploration of the site of Sphinx (SBK.W-60).



Figure 1: *Sclerophyrus regularis*.



Figure 2: *Sclerophyrus xeros*.



Figure 3: *Sclerophyrus pentoni*.



Figure 4: *Tomopterna kachowskii*.



Figure 5: *Leptopelis bocagii*.



Figure 6: *Hemisis marmoratus*.



Figure 7: *Kassina senegalensis*.



Figure 8: *Tomopterna milletihsorsini*.



Figure 9: *Hildebrantia ornata*



Figure 10: Ptychadena skillukorum.

Table 1: Amphibians of Sudan.

Family	Scientific name	English Name
Arthrolepyidae Mivart, 1869	Leptopelis bocagii, Gunther, 1865*	Bocage's tree frog
Bufonidae Gray, 1825	Sclerophyrus dodsoni Boulenger, 1895*	Dodson's toad
	Sclerophyrus pentoni Anderson, 1893*	Shaata Gardens Toad
	Sclerophyrus xeros Tandy, Tandy, Keith and Duff-MacKay, 1976*	Desert toad
	Sclerophyrus maculatus Hallowell, 1855*	Hallowell's toad
	Sclerophyrus regularis Reuss, 1833*	African common toad
	Sclerophyrus steindachneri Pfeffer, 1893*	Steindachner's Toad
Dicroglossidae Anderson, 1871	Hoplobatrachus occipitalis (Günther, 1858)*	Crowned bullfrog
Hemisotidae Cope, 1867	Hemisus marmoratus Peters, 1854*	Marbled snout-burrower
	Hylarana galamensis Dumeril & Bibron, 1841#	Marble legged Frog
Hyperoliidae Laurent, 1943	Hyperolius viridiflavus Dumeril & Bibron, 1841*	The common reed frog
	Hyperolius cinnamomeoventris Bocage, 1866#	BragancaReed Frog
	Afrixalus weidholzi Mertens, 1938#	Weidholz's banana frog
	Afrixalus quadrivittatus Pickersgill, 2007*	Khor Attar Banana Frog
	Kassina senegalensis Dumeril & Bibron, 1841*	the Senegal running frog
Microhylidae Gunther, 1858.	Phrynomantis microps Peters, 1875#	West African rubber frog
Phrynobatrachidae Laurent, 1941	Phrynobatrachus natalensis Smith, 1849*	Natal dwarf puddle frog
	Phrynobatrachus perpalmatus Boulenger, 1898*	Lake Mweru River Frog
	Phrynobatrachus mababiensis FitzSimons, 1932#	Mababe puddle frog
Pipidae Gray, 1825	Xenopus laevis Daudin, 1802*	African clawed frog
	Xenopus clivii Peracca, 1898*	Eritrea clawed frog
	Xenopus muelleri Peters, 1844*	Müller's platanna
	Xenopus poweri Hewitt, 1927*	Powers Clawed Frog
	Xenopus fischbergi Evans, Carter, Greenbaum, Gvozdk, Kelly, McLaughlin, Pauwels. Portik, Stanley, Tinsley, Tobias and Blackburn, 2015*	Fischberg's Clawed Frog
	Silurana epitropicalis Gray, 1864#	Cameroon clawed frog

Ptychadenidae Dubois, 1987	Ptychadena anchietae Bocage, 1868*	Plain grass frog
	Ptychadena schillukorum Werner, 1908*	Schilluk ridged frog
	Ptychadena mascareniensis Dumeril & Bibron, 1841*	Mascarene grass frog
	Ptychadena nilotica Seetzen, 1855*	Nile grass frog
	Ptychadena tellinii Peracca, 1904*	Central Grassland Frog
	Ptychadena pumilio Boulenger, 1920*	Medine Grassland Frog
	Hildebrandtia ornate Peters, 1878*	Hildebrandt's burrowing frogs
Pyxicephalidae Bonaparte, 1850	Tomopterna cryptoti Boulenger, 1907*	Common sand frog
	Tomopterna kachowskii Nikolski, 1900*	Kachowski Sand Frog
	Tomopterna milletihsorsini Angel 1922*	Mali screeching frog,
	Tomopterna tandyi Channing and Bogart, 1996	Tandy's sand frog
Ranidae Rafinesque, 1814 or Batsch, 179	Pyxicephalus (=Rana) cordofana Steindachner, 1867*	Cordofan Frog
	Amnirana galamensis Dumeril and Bibron, 1841*	Marble-legged Frog
Rhacophoridae Hoffman, 1932	Chiromantis kelleri Boulenger, 1882#	Kekker's Foam-nest frog
Order Urodela		
Sirenidae Gray, 1825.	Kababisha humarensis gen. et sp. nov.	Fossil remains of a salamander
	Kababisha sudanensis gen. et sp. nov.	Fossil remains of a salamander
Order Apoda		
	Unidentified vertebrae of legless caecilians	

The study showed the presence of 11 families, 17 genera and 30 species of definite occurrence. The family Rhacophoridae is possibly represented by the Kekker's foam-nest frog (*Chiromantis kelleri*). Diversity wise, Table 1 showed that Hyperoliidae has three genera and five species; Ptychadenidae has two genera and seven species followed by Bufonidae which is represented by one genus and six species. Each of the following families Arthrolepyidae and Dicroglossidae, and the possible occurrence of Microhylidae and Rhacophoridae, are represented by one species. Microhylidae with its 584 species, 61 genera and 11 subfamilies is the largest frog family in the world (AmphibiaWeb-Microhylidae, 2019). One of its members (*Phrynomantis microps*) is likely to occur in Sudan. Abugabr [1] managed to differentiate between *S. regularis*, *S. xeros* and *S. maculatus* using their proteinaceous and alkaloid/steroid components. This in line with Maciel [16] and Sciani [17] who found that secretions proved to be a useful tool in taxonomical and species identification. The study suggested execution of extensive field work to collect anurans, capture their photos using high resolution digital and camera traps, drone camera and automated sound recording. Classical and molecular approaches are to be used in classification of anurans.

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