

New frog records from the Eastern Caprivi Strip, South West Africa/Namibia

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ABSTRACT

A survey of the Eastern Caprivi Strip, SWA/Namibia, during January to March 1986 resulted in the collection of 26 species of anurans, of which four are new records for the country. *Ptychadena cotti*, *Ptychadena taenioscelis*, *Ptychadena upembae* and *Phrynobatrachus stewartae* are known from north and east of the area, and demonstrate a link with the tropical frog fauna in Malawi. An annotated list of species collected from the Eastern Caprivi Strip is presented.

INTRODUCTION

Frogs are an important link in the food web supporting some of the larger birds and carnivores. Platannas (*Xenopus* sp.) are eaten by local tribesmen in central Africa and the African bullfrog features in the diet of many African tribes. Frogs are a convenient ecological indicator, being relatively widespread, and adapted to a range of habitats. A knowledge of the frog fauna of an area is a necessary prerequisite in the planning of any conservation strategy.

The geographical location of SWA/Namibia on the southwestern coast of Africa, results in an interesting and varied frog fauna composed of tropical species in the northern savanna areas, arid-area adapted species in the Namib desert and adjacent drylands, and a few Cape species (Poynton 1964) which extend into the south of the country.

The Eastern Caprivi Strip lies on the northeastern border of the country at an altitude of about 930 m above sea level, and the eastern flood plain is usually inundated by the Zambezi River from February to June (Van der Waal & Skelton 1984). The combination of warm temperature and regular flooding produce an area with great potential for studies on anuran amphibians.

This paper lists four new SWA/Namibia records of anuran amphibians collected during an initial survey, January to March 1986 in the Eastern Caprivi Strip. An annotated list of all the frog species collected during the initial survey is also presented.

COLLECTION AND IDENTIFICATION

Collecting was carried out by repeated visits to various habitats near Katima Mulilo, and infrequent trips to Nkasa Island in the southwestern corner of the area, and elsewhere. Eggs and tadpoles were located during daytime visits, while adults were found after dark. Breeding choruses were noted, and tape recordings made of representatives of all species calling.

Identifications of the four species new to the area were

based on the descriptions and keys in Poynton and Broadley (1985b), and on the sonagrams of the advertisement calls of the male frogs in Passmore and Carruthers (1979). The identifications of all the species collected during this survey were checked using standard works for adults (Poynton 1964; Channing & Van Dijk 1976; Poynton & Broadley 1985a, b, 1987) and tadpoles (Van Dijk 1966; Channing & Van Dijk 1976). Nomenclature follows Frost (1985).

Advertisement calls were analysed on a Kay 7029A Sonagraph. The male advertisement call is a powerful taxonomic tool, as it is part of each frog species' specific mate recognition system (Passmore & Carruthers 1979), and can serve as a positive method of identification. The calls of species whose range extends into South Africa were compared to the sonagrams in Passmore and Carruthers (1979). A gazetteer of all the localities where specimens were collected is given in Table 1. All specimens of adults collected have been deposited in the State Museum, Windhoek, and the California Academy of Sciences, USA.

Table 1. Gazetteer of the localities mentioned in the text

Locality	Latitude / Longitude
Chinchimane	17 56'S/24 10'E
Chinchimane road	17 58'S/24 08'E
Chobe river	17 53'S/24 46'E
Ihaha	17 49'S/24 52'E
Kasika	17 48'S/25 06'E
Katima Mulilo	17 32'S/24 15'E
Katima Mulilo, 13 km west	17 32'S/24 15'E
Katima Mulilo, 20 km west	17 33'S/24 18'E
Katima Mulilo, 10 km south	17 37'S/24 15'E
Lake Liambezi	17 55'S/24 23'E
Lake Lisikili	17 33'S/24 39'E
Liambezi floodplain	17 52'S/24 23'E
Lusese	17 43'S/24 47'E
Maningimanzi	17 30'S/24 23'E
Mpacha	17 38'S/24 10'E
Mufalali	18 15'S/23 30'E
Mutwalwezi	17 44'S/24 50'E
Nkasa Island	18 26'S/23 39'E
Old Sangwali	18 20'S/23 43'E

NEW FROG RECORDS

Ptychadena cotti (Parker) 1930

Synonymies: See Poynton and Broadley (1985b).

New records: Katima Mulilo, Mpacha.

Comment: Nearest previous record Malawi. This range extension suggests that many other species with predominantly tropical distributions may yet be recorded from SWA/Namibia. These frogs are found in very dense vegetation at the edge of shallow pools. They occur with *Ptychadena anchietae* and *Ptychadena mascareniensis*. The male advertisement call is presented in Figure 1A.

Ptychadena taenioscelis Laurent 1954

Synonymies: See Poynton and Broadley (1985b).

New records: Nkasa Island.

Comment: Males call from short flooded grass. The advertisement call of the Caprivi Strip specimens (Figure 1B) is similar to that shown in Passmore and Carruthers (1979).

Ptychadena upembae (Schmidt and Inger 1959)

Synonymies: See Poynton and Broadley (1985b).

New records: Nkasa Island.

Comment: Males call from concealed positions in thick grass or under debris within 50 cm of shallow water in pans. These frogs are very difficult to locate, which may partly explain why they have not previously been recorded from SWA/Namibia. The advertisement call is shown in Figure 1C.

Phrynobatrachus stewartae Poynton and Broadley, (1985b)

Synonymies: See Poynton and Broadley, (1985b).

New records: Nkasa Island, Katima Mulilo.

Comment: Previously known only from the type locality in Malawi, the Nkasa record is a female collected along the edge of a waterway in short vegetation.

Phrynobatrachus mababiensis was calling in the immediate vicinity. A series was collected at Katima Mulilo in wet weather. The type was described from Malawi, and although the Caprivi Strip specimens are superficially similar to *P. natalensis* (which is also present in the area), they are unambiguously identified as *P. stewartae* using the key in Poynton and Broadley (1985b). The call is unknown.

EASTERN CAPRIVI STRIP RECORDS

The following is a list of all the anuran species collected during this survey. A complete checklist to the frogs of SWA/Namibia is in preparation. Not all the species present in this area were collected. *Leptopelis bocagei*, for example, was heard calling near Katima Mulilo, but could not be located. *Schismaderma carens* had apparently bred early in the season, as only juveniles were found. A collection needs to be made at the start of the rainy season, to investigate the presence of species which breed early in the season.

Bufo gutturalis: Males call along the banks of the Zambezi River, and inland. Eggs were found 6 January 1986 in pool near river. Males called at Nkasa Island 17–19 February 1986. Adults were collected from Katima Mulilo, Lake Liambezi, Mutwalwezi and Nkasa Island.

Bufo maculatus: Males called from the edge of the Zambesi, especially strongly during a dry spell at the end of January, 1986. Adults were collected from the bank of the Zambezi River at Katima Mulilo, and at Mutwalwezi.

Bufo poweri: Juveniles common in wooded areas. Tadpoles were collected from Maningimanzi and near Katima Mulilo. Adults collected from Katima Mulilo.

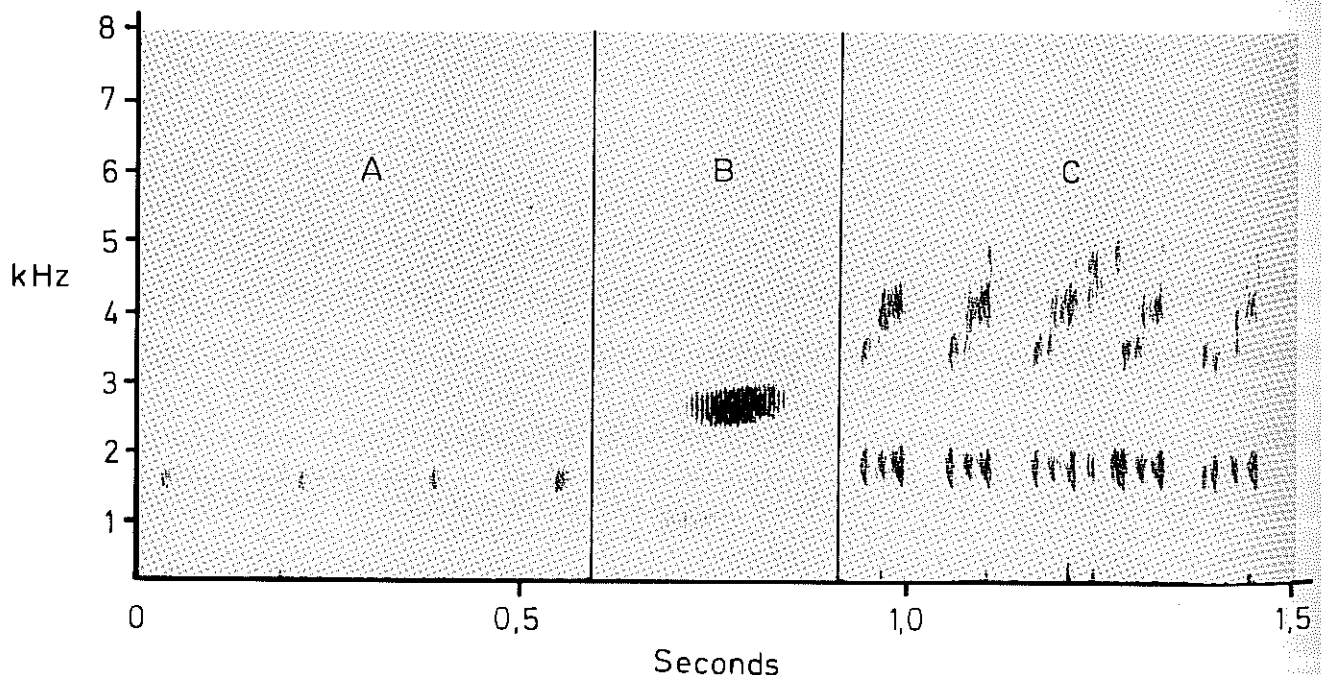


Figure 1. Sonograms of the male advertisement calls of *Ptychadena cotti* (A), *Ptychadena taenioscelis* (B), and *Ptychadena upembae* (C). There is a band of insect noise at 4.5 kHz. The calls of two individuals are visible from the 1.2 s mark onwards.

Bufo vertebralis: Calling at old golf course, Katima Mulilo, 11 January. Males call while clinging to grass over shallow water. Call identical to that in Passmore and Carruthers (1979). Adults collected from Katima Mulilo.

Chiromantis xerampelina: The characteristic foam nests made by this species are very conspicuous. Adults were frequently found during the day near nests. The tadpoles remain in the nest about four days: A fresh nest was collected 16 January and placed over a dish of water. The dish was full of external gill-stage tadpoles on the morning of 20 January. Many larvae at early stages were in the dish, suggesting that the contents of the nest are released simultaneously. One pair of frogs made three nests on three successive nights in captivity. Adult frogs were collected from Katima Mulilo and Lake Liambezi. Tadpoles were collected from Katima Mulilo.

Hemisus marmoratum: Adults could be collected by digging them out of muddy depressions near water during the day. Many newly metamorphosed froglets were collected on roads and in pools during rain 24 January and 9 February 1986. Adults were collected from Katima Mulilo, while tadpoles were collected from 20 km west Katima Mulilo, Katima Mulilo, and Chinchimane road.

Hyperolius aposematicus: Synonymies include *H. angolensis* (Poynton 1964) and *H. marmoratus angolensis* (Poynton & Broadley 1987). These brightly coloured frogs were collected from vegetation away from water during the day. Males were calling from vegetation over deep water at Lake Lisikili 9 February 1986. One pair laid eggs in captivity 10 February. Tadpoles were collected from the banks of the Zambezi River (17°31'E, 24°20'E), while adults were collected from Katima Mulilo, Lake Lisikili, Nkasa Island and Mutwalwezi.

Hyperolius nasutus: This species is found associated with permanent water. Male advertisement calls were recorded from Lake Lisikili and Nkasa Island. The call site is similar to that of *H. aposematicus*, and the two species were always sympatric. Adults were collected from Chobe river, Ihaha, Lake Lisikili, Mufalali, Mutwalwezi and Nkasa Island.

Kassina senegalensis: This ubiquitous African frog is also very common everywhere in the Eastern Caprivi Strip. Males are very difficult to locate, as they call from cracks in mud and other well concealed sites. Tadpoles were collected from 20 km west of Katima Mulilo, Katima Mulilo, and the Liambezi floodplain, while adults were collected from Katima Mulilo.

Phrynobatrachus mababiensis: Males call near water in grass. Emerging froglets were collected 16 January and 3 February 1986. Tadpoles were collected near Katima Mulilo, and adults were collected at Katima Mulilo and Nkasa Island.

Phrynobatrachus natalensis: A batch of tadpoles was metamorphosing and emerging at the old golf course,

Katima Mulilo, on 16 January. Males call during wet and dry weather. Eggs found 17 January, which hatched three days later. Tadpoles were collected from Katima Mulilo, and adults were found at Katima Mulilo and Lusese.

Phrynobatrachus stewartae: This species is similar to *P. natalensis*, but easily distinguished on the amount of webbing (Poynton & Broadley 1985). Adults were collected from Katima Mulilo and Nkasa Island.

Phrynoimerus bifasciatus: Males call from concealed positions in or under logs or stumps, or under vegetation. Calling tends to tail off between one rain and the next. Tadpoles were found in nearly every body of water, from large permanent water holes, to temporary pools formed in elephant footprints. Tadpoles were collected from various pools around Katima Mulilo, also 13 km west and 10 km south of the town.

Ptychadena anchietae: Males collected from the bank of the Zambezi River at Katima Mulilo, 17 January 1986. Found in association with *Ptychadena mascareniensis*. Tadpoles collected from Katima Mulilo, in shallow muddy pools

Ptychadena cotti: Adults collected from Katima Mulilo, and 5,7 km south of Katima Mulilo. Eggs and tadpoles unknown.

Ptychadena mascareniensis: Collected from the edge of the Zambezi, and inland. The males call from the bank, under vegetation or exposed. One was found calling in thick grass in a pool, at water level. The advertisement call is identical to that in Passmore and Carruthers (1979). Adults are extremely secretive and difficult to find. A heavy rain 24 January 1986 (38 mm) caused many large choruses to form around Katima Mulilo. Eggs were found 25 January. Adults and tadpoles were collected from Katima Mulilo (old golf course), while adults were collected from Nkasa Island where they were calling 17–19 February 1986 after a heavy rain, and Lake Liambezi.

Ptychadena mossambica: Collected an adult from a water pit at Lake Liambezi. Also very common around Katima Mulilo, many collected from lawns in the town.

Ptychadena oxyrhynchus: In this survey known only from a small collection of tadpoles from 20 km west of Katima Mulilo.

Ptychadena subpunctata: Found mainly in the southern parts, in more open grassland. Adults collected from Kasika in long grass, and others collected at Nkasa Island and Mutwalwezi. Calls recorded 17–19 February at Nkasa.

Ptychadena taenioscelis: Males call from short flooded grass. Collected adults at Nkasa Island after heavy rain.

Ptychadena upembae: Collected from Nkasa Island 17–19 February. Males call from concealed sites near the edge of flooded area in grass.

Pyxicephalus adspersus: Many newly metamorphosed froglets were found hopping near all the water bodies around Katima Mulilo 11 January 1986. By 23 February there were many individuals over 60 mm snout-vent length. Remarkably, no calls were heard at Katima Mulilo from January to March 1986, although they were breeding in the Western Caprivi Strip in February. Only collected from Katima Mulilo (tadpoles and adults).

Schismaderma carens: Uncommon, only four subadult individuals being collected in three months from Katima Mulilo.

Tomopterna cryptotis: Many calling near Katima Mulilo. The tadpoles were usually associated with tadpoles of *Hemisis marmoratum*. Tadpoles and adults collected from Katima Mulilo.

Xenopus muelleri: Tadpoles were collected from 20 km west of Katima Mulilo, Katima Mulilo and Chinchimane. Adults were collected from fish nets at Katima Mulilo, Chinchimane and Old Sangwali.

Xenopus laevis: Only one specimen was collected, after it had hopped into a house in Katima Mulilo during a heavy rain 24 March 1986.

DISCUSSION

Haacke (1970) updated the list of known anuran species in South West Africa/Namibia by the addition of four taxa. The most recent checklist of the frogs of SWA/Namibia listed 30 species (Channing & Van Dijk 1976), one of which (*Strongylopus grayii*) was based on a misidentification of tadpoles (Channing 1979). Jurgens (1979) reviewed the distributions and taxonomy of the frogs of the Etosha National Park. Poynton and Broadley (1985a, b, 1987) have reviewed museum records for the Caprivi Strip.

The new records reported here are all species whose closest known ranges are in Malawi. *Ptychadena upembae* is also known north and east of the Caprivi. The anuran faunas in central Africa are poorly known, and many tropical species will probably still be discovered in the northern part of SWA/Namibia. The importance of perennial rivers as distribution routes into Namibia for species relying on permanent water has been noted by Haacke (1970). The valleys of the Shire and Zambezi Rivers may serve as dispersal routes

for terrestrial species from eastern Africa, while the rich fauna of the Angolan highlands is linked to SWA/Namibia by the river valleys of the Cunene, Cubango, Cuito and Kwando Rivers.

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