

An annotated checklist of the frogs of Namibia

ALAN CHANNING¹ AND MIKE GRIFFIN²

¹Department of Biochemistry, University of the Western Cape, Private Bag X17, Bellville 7535, Republic of South Africa

²Ministry of Wildlife, Conservation and Tourism, Private Bag 13306, Windhoek, Namibia

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ABSTRACT

Distribution maps are provided for 43 species of frogs known to occur in Namibia. Breeding behaviour, habitat preferences and sources of advertisement call data are presented.

INTRODUCTION

Namibia is a land with contrasting frog habitats. The arid coastal strip, giving way to the hyperarid Namib desert, with its sand dunes and gravel plains with granite inselbergs, is bordered by an escarpment along most of the length of Namibia. The desert grades through a savanna into a wet tropical bushveld in the north-east. The only permanent rivers of any size form part of the boundary of the country, the Orange, Cunene, Zambezi, and Kavango Rivers, and the Kwando-Linyanti-Chobe system. Although much of the country is best described as arid, the only habitat without frogs is the inland Namib sand sea.

Our knowledge of the biology of the Namibian frog fauna has grown considerably in the past few years. Besides the herpetological interest of these animals, they play a little appreciated role in the food web. They are able to feed voraciously during times when insects are abundant, and serve as a reservoir of food for larger animals. Bullfrogs are part of the diet of some peoples. Tadpoles may be useful pollution indicators.

The study of Namibian frog distributions has progressed steadily over the last century since the publication of Boettger's (1886/87) checklist. His list included only two species, both from "Ondonga in Ovamboland", *Tomopterna cryptotis* (as *Rana Delalandei*) and *Pyxicephalus adpersus* (as *Rana adpersa*). Eight years later Fleck and Boettger (1894) had extended the list by one species, *Xenopus laevis*. The turn of the century saw many collectors travelling through South Africa, Namibia and Angola. Their collections increased the known amphibian species to six, including *Phrynomantis annectens* from the Aar River (Werner 1910). Ahl (1934) described *Bufo hoeschi* while Parker (1936) added three more frogs. Mertens' (1955) checklist recorded 24 amphibian species and subspecies (many since synonymized), which had increased to 31 by the time he revised his list (Mertens 1971). Poynton's monograph of southern Afri-

can frogs (1964) recognized 22 species collected in the country and stated that others were to be expected. Channing and Van Dijk (1976) listed 30 species, of which one, *Strongylopus grayii*, was subsequently suggested to have been based on a misidentification of tadpoles (Channing 1979).

Many recent new records have been made possible by our increased ability to identify tadpoles, and appreciation of the species-specific nature of the male advertisement call. This present checklist includes 43 known species and a further nine expected to occur within the borders of Namibia. We have compiled records made after 1964 and hence not included in Poynton's monograph (Poynton 1964). These new records are based on museum collections (Transvaal Museum, Pretoria and State Museum, Windhoek), published records, and collections of adults and tadpoles derived from our fieldwork. The new records are combined with Poynton's data to produce distribution maps for each species.

Our taxonomy is taken from the authoritative "Amphibian Species of the World" (Frost 1985) and we have attempted to list the major synonyms which have long confused the Namibian frog literature. More complete synonymies are listed in Poynton (1964) and Poynton and Broadley (1985a, b; 1987; 1988) and are not necessarily repeated here. We make no attempt at suggesting phylogenetic relationships, but we follow current familial associations (Frost 1985).

A key for the identification of Namibian frogs is provided by Channing (1991b).

FROG SPECIES RECORDED FROM NAMIBIA

Family Bufonidae

Bufo dombensis, *B. fenoulheti*, *B. gariepensis*, *B. gutturalis*, *B. hoeschi*, *B. jordani*, *B. kavangensis*, *B. maculatus*, *B. poweri*, *Schismaderma carens*.

Family Hemisotidae

Hemisus marmoratus

Family Hyperoliidae

Hyperolius angolensis, *H. nasutus*, *Kassina senegalensis*, *Leptopelis bocagii*.

Family Microhylidae

Breviceps adpersus, *B. macrops*, *Phrynomantis affinis*, *P. annectens*, *P. bifasciatus*

Family Pipidae

Xenopus laevis, (including *X. l. petersi*), *X. muelleri*

Family Ranidae

Cacosternum boettgeri, *C. namaquense*, *Hildebrandtia ornata*, *Phrynobatrachus mababiensis*, *P. natalensis*, *Ptychadena anchietae*, *P. guibei*, *P. mascareniensis*, *P. mossambica*, *P. oxyrhynchus*, *P. sp.*, *P. subpunctata*, *P. taenioscelis*, *Pyxicephalus adpersus*, *Hylarana darlingi*, *Rana fuscigula*, *Tomopterna cryptotis*, *T. krugerensis*, *T. marmorata*, *T. tuberculosa*.

Family Rhacophoridae

Chiromantis xerampelina

SPECIES PROBABLY PRESENT IN NAMIBIA

The following species have been collected outside, but near the borders of the country, and we expect that further collecting will show them to be present in the regions indicated. This list is conservative.

Arthroleptis stenodactylus, East Caprivi.*Bufo lemairii*, Kavango and Zambezi rivers.*Leptopelis cynnamomeus*, East and West Caprivi.*Ptychadena pumilio*, East Caprivi.*P. porossisima*, East Caprivi.*Rana angolensis*, Kunene and Okavango rivers, and East Caprivi.*Strongylopus grayii*, Orange and Fish river systems.*S. springbokensis*, Orange and Fish river systems.*Tomopterna delalandi*, Orange river.

The list of expected species requires some explanation. The toad *Bufo lemairii* is unusual in that it appears to lead an aquatic life, resembling a *Rana* with its long legs and webbed feet. It has been recorded from the Zambezi river and the Okavango swamps (Haacke 1982) and we expect it to occur along the rivers of the Caprivi. *Rana angolensis* is not yet recorded, but we expect it to be found in northern Namibia. Poynton and Broadley (1985b), on the other hand, do not expect this form to occur in Namibia, as they recognize a link between the Angolan and South African populations in the "uplands of the Zambezi-Zaire divide".

Strongylopus grayii is not yet confirmed from Namibia (see introduction), but we expect it to be found along the Orange river. The recently described *S. springbokensis* from Namaqualand (Channing 1986) may occur along the Orange river. The treefrog *Leptopelis cynnamomeus* is known from southern Angola (Poynton and Broadley 1987) and we expect it to occur in the Caprivi.

The little known frog fauna from the Caprivi shows affinities with Malawi, Zambia and Zimbabwe. It is very likely that many tropical frogs have found their way to Namibia via the Zambezi Valley. The Cuncne, Kwando, Kavango and Zambezi Rivers would appear to be corridors for frog dispersal from the highlands of Angola and Zambia. Other sources include the lowlands to the north via the Angolan coastal plain, the arid Botswana interior and the lowlands of Mozambique, Malawi and Zaire. The northern parts of Namibia could be expected to exhibit further representatives of frog faunas from any of these areas. The Orange River may provide a dispersal route for Karoo species into the south of Namibia. Like the Caprivi, the extreme south of the country is under-collected.

The major towns are shown on the map of Namibia (Fig. 1). The locations of rivers and major drainages is shown in Simmons *et al.* (1991).

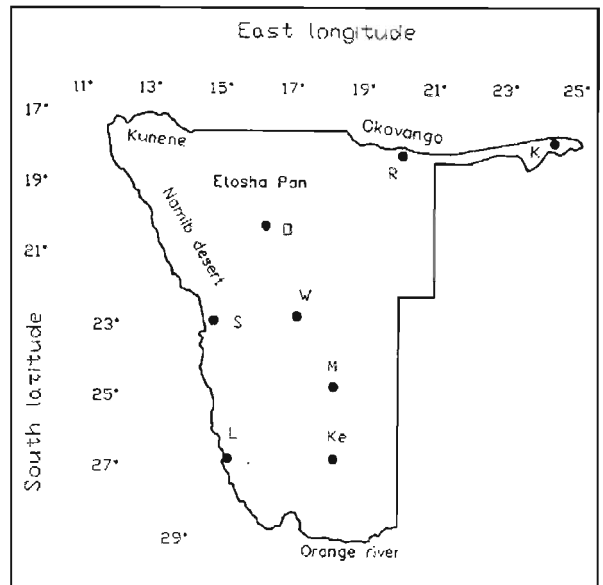


Figure 1. Map showing the principal rivers and towns in Namibia. K - Katima Mulilo, Ke - Keetmanshoop, L - Luderitz, M - Mariental, O - Otjiwarongo, R - Rundu, S - Swakopmund, W - Windhoek.

SPECIES ACCOUNTS

The following accounts are arranged alphabetically within families. Our understanding of the relationships within and between many of the genera is too fragmentary to make a phylogenetic grouping within families meaningful.

Unless otherwise stated, sonagrams of the advertisement calls of the following species are illustrated in Passmore & Carruthers (1979).

Family Bufonidae

Bufo dombensis Bocage, 1895

Bufo vertebralis dombensis Bocage, Poynton, 1964.
Bufo dombensis dombensis Mertens, 1971

The status and distribution of the dwarf toads is not yet resolved. We follow Tandy (1972), but recognize five species, including *B. jordani* and *B. kavangensis* (Poynton & Broadley, 1988). More field work, especially the recording of advertisement calls, is needed. The small morphological differences between species (see Poynton & Broadley 1988) indicate that non-morphological characters may be very helpful in understanding the relationships of these dwarf toads. Poynton & Broadley (1988) discuss various taxonomic possibilities, apparently favouring placing *dombensis*, *damaranus*, and *hoeschi* together (as one species?). Call data are required to elucidate the relationships of these taxa.

Known from the north-central areas (Fig. 2). The call is unknown, as are the habitat requirements of this species.

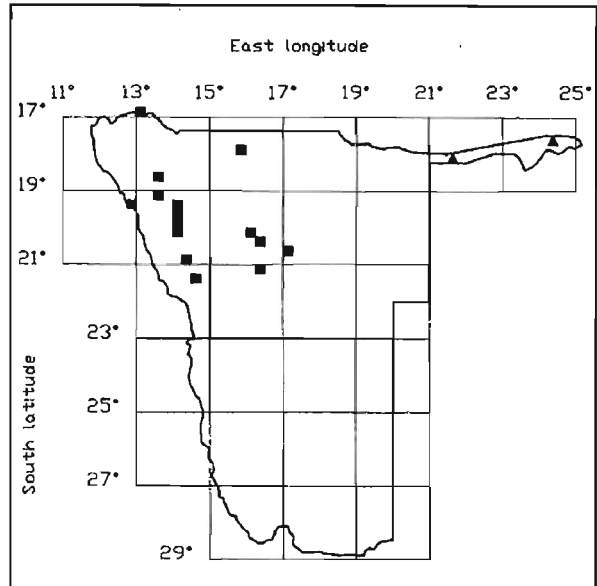


Figure 2. The distribution of *Bufo dombensis* (squares) and *Bufo fenoulheti* (triangles).

Bufo fenoulheti Hewitt and Methuen, 1913

Bufo vertebralis fenoulheti Hewitt & Methuen, 1913. Poynton 1964.
Bufo fenoulheti damaranus Mertens, 1955.
Bufo dombensis damaranus Mertens 1971
Bufo vertebralis Channing 1989

See discussion under *Bufo dombensis*. Tandy (1972) noted that *B. dombensis* may be related to *B. fenoulheti*. This species has a distinct advertisement call, illustrated by Passmore & Carruthers (1979) as *B. vertebralis fenoulheti*. Known from the central and north-eastern areas (Fig. 2). Found in sandy habitats. Males call from ground level, or while climbing in low vegetation.

Bufo gariepensis Smith, 1848

This medium sized toad has only been collected from Oranjemund and a little inland along the Orange river (Fig. 3). It is expected to extend up the Fish river.

Bufo gutturalis Power, 1927

Bufo regularis Reuss. Poynton, 1964. Stewart, 1967.
 Van Dijk, 1966. Mertens 1971. Channing & Van Dijk, 1976.

This large toad is distinguished from *B. poweri* by the light cross on the head. Breeding males have a slow snoring call. They call along rivers in the Caprivi Strip, or in smaller temporary pools. The distribution is presented in Fig. 3.

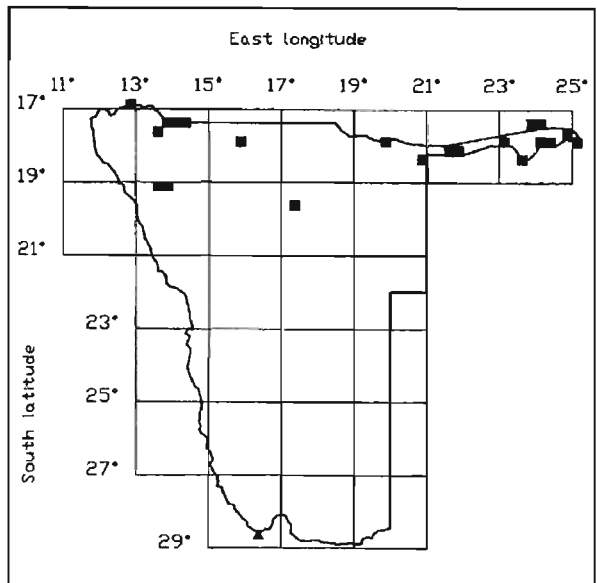


Figure 3. The distribution of *Bufo gariepensis* (triangle) and *Bufo gutturalis* (squares).

***Bufo hoeschi* Ahl, 1934**

Bufo vertebralis hoeschi Ahl. Poynton, 1964.
Channing & Van Dijk, 1976 (part).

Described from Kaiser Wilhelm mountain, Okahandja. This small toad has often been confused with other small toads. Although the ear is reduced and the tympanum often not visible, this species has an advertisement call distinct from *B. fenoulheti* and *B. vertebralis*. These toads only call for two or three nights, and then only after heavy rain. See also the discussion under *Bufo dombensis*. Known from rocky areas from the Namib to the Khomas Hochland (Fig. 4).

***Bufo jordani* Parker, 1936**

Bufo jordani Parker, 1936. Mertens, 1955, 1971.
Bufo vertebralis jordani Parker. Poynton, 1964.
Bufo vertebralis hoeschi Ahl. Channing & Van Dijk 1976 (part).

Described from the farm Satansplatz near Maltahöhe. Nothing is known about the biology of this toad, and it is not certain whether this taxon should continue to be regarded as a distinct species. More fieldwork, in particular information about its breeding biology and male advertisement call, is urgently required. Known from the south-central part of the country, from rocky habitats (Fig. 4).

***Bufo kavangensis* Poynton & Broadley, 1988.**

This species appears to be yet another cryptic dwarf toad, related to *B. hoeschi* and *B. fenoulheti*. Known from Onjoka, 32 km west of Katwitwi, and Rundu (Poynton and Broadley, 1988) (Fig. 4). Very similar to *B. fenoulheti* and *B. hoeschi*. Call unknown.

***Bufo maculatus* Hallowell, 1855**

Bufo pusillus Mertens. Poynton, 1964. Stewart, 1967.
Mertens, 1971. Channing, 1972a. Channing & Van Dijk, 1976.

In the Caprivi, restricted to waterways but elsewhere found away from running water (Fig. 5). Calls from the water's edge, well concealed under vegetation.

***Bufo poweri* Hewitt, 1935**

Bufo garmani Meek, 1897 (part) Poynton 1964,
Channing & Van Dijk 1976.
Bufo pseudogarmani Hulselmans, 1969.
Bufo garmani pseudogarmani Hulselmans. Mertens 1971.

This common toad breeds early in the rainy season in vleis and river backwaters. Males call at the water's edge, sometimes during the dry season. The call is illustrated by

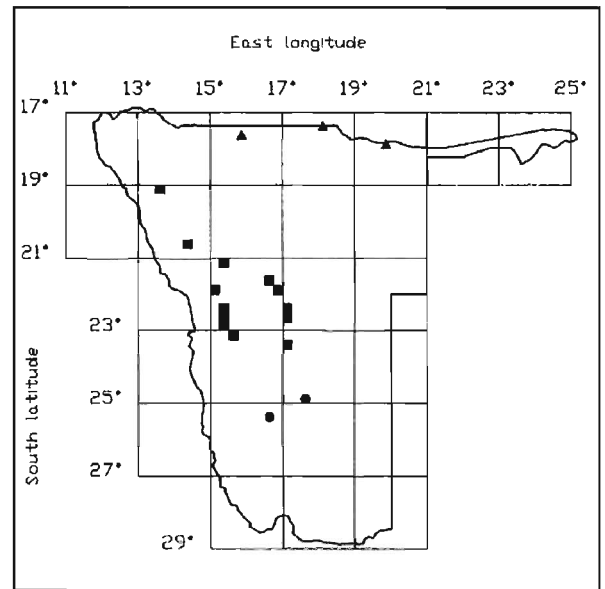


Figure 4. The distribution of *Bufo hoeschi* (squares), *Bufo kavangensis* (triangles) and *Bufo jordani* (circles).

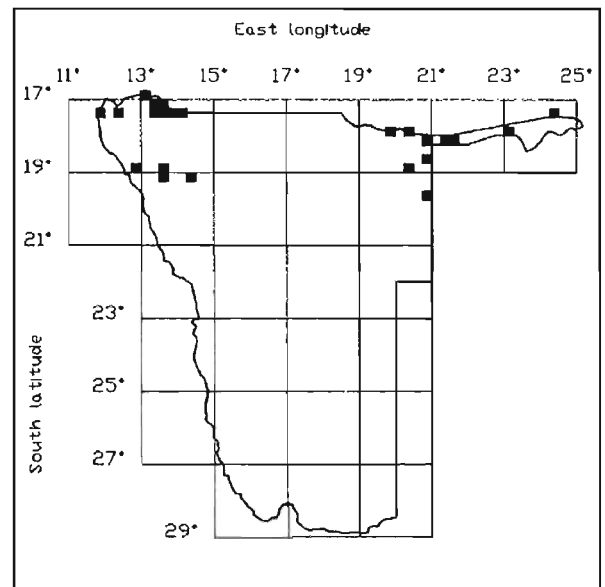


Figure 5. The distribution of *Bufo maculatus*.

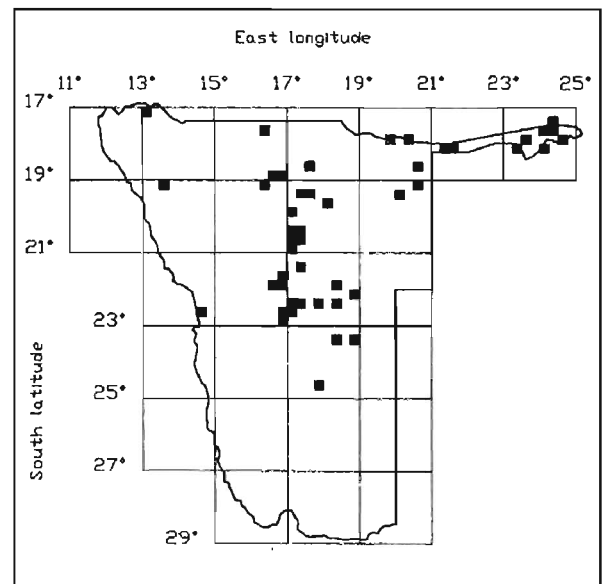


Figure 6. The distribution of *Bufo poweri*.

Van den Elzen & Van den Elzen (1977). The distribution is shown in Fig. 6. Channing (1991a) discusses the confusion between *B. poweri* and *B. garmani*; the latter now known not to occur in Namibia.

***Schismaderma carens* (Smith, 1848)**

Bufo carens Smith, 1848. Poynton, 1964. Stewart, 1967. Passmore & Carruthers, 1979.

This frog apparently breeds early in the season in the Caprivi, as no tadpoles were collected, nor calls heard, from January to March 1986. Known only from the eastern Caprivi (Fig. 7).

Family Hemisotidae

***Hemisus marmoratus* (Peters, 1854)**

Hemisus marmoratum (Peters) 1854. Poynton, 1964. Channing & Van Dijk, 1976.

Hemisus marmoratum marmoratum (Peters) 1854. Poynton & Broadley, 1985a (Caprivi records).

Hemisus guineensis microps Laurent 1972. Poynton & Broadley, 1985a (Caprivi records)

The taxonomy of this form is confounded by the variation shown in northern Namibia. A sample of over fifty specimens was collected along 10 m of road at Katima Mulilo, while newly metamorphosed animals were emerging during rain. The animals were clearly all from one population, yet the range of variation was extreme, so much so that according to the key in Poynton and Broadley (1985a) some individuals could be classified as *H. marmoratum marmoratum*, while others were clearly *H. guineensis microps*. Only one type of call was heard during three months of field work in the Caprivi, which suggests that only one species of *Hemisus* is present in the Caprivi. The records of other species and subspecies are the result of an underestimation of the variation within the taxon. Males call from the edges of pans during wet weather. The eggs are apparently laid in burrows which are flooded when the pan fills. During the day the frogs retire into mud cracks or burrows, where they may be dug out. This species is active on the surface during rain at night, when it may be easily collected. Found in the north-east of the country (Fig. 8).

Family Hyperoliidae

***Hyperolius angolensis* Steindachner, 1867**

Hyperolius parallelus Günther, 1858. Schiøtz, 1971 (part).

Hyperolius aposematicus Laurent, 1951. Poynton, 1964.

Hyperolius marmoratus aposematicus Laurent, 1951. Poynton & Broadley, 1987.

Hyperolius marmoratus angolensis Steindachner, 1867. Poynton & Broadley, 1987.

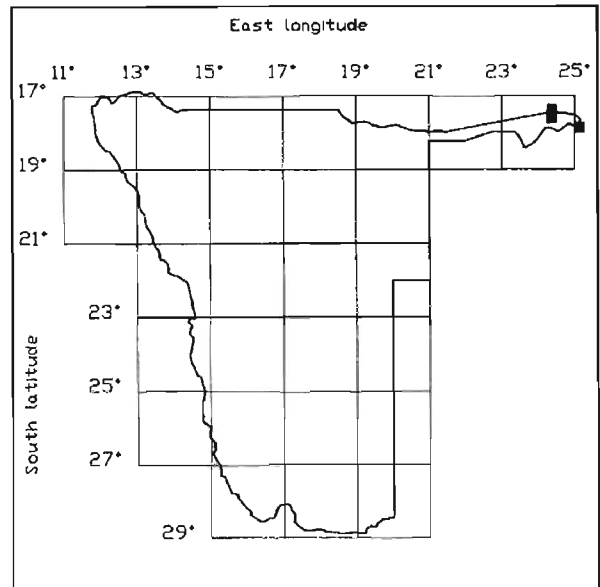


Figure 7. The distribution of *Schismaderma carens*.

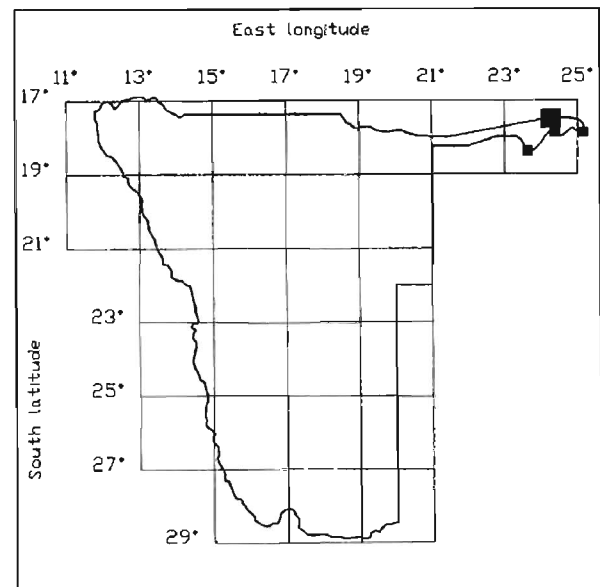


Figure 8. The distribution of *Hemisus marmoratus*.

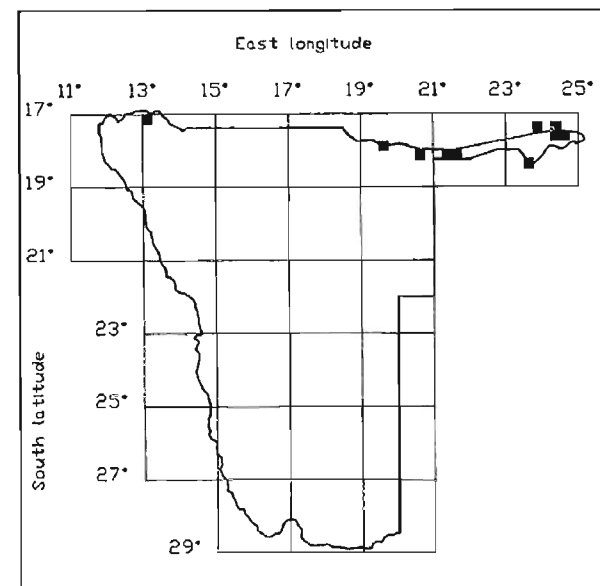


Figure 9. The distribution of *Hyperolius angolensis*.

Similar in call site and behaviour to *H. nasutus*, but call for a longer period, and apparently more common. The call is quite different from that of *Hyperolius marmoratus*, supporting the specific status of this taxon. Botswana and Caprivi material has the same call. The distribution is presented in Fig. 9.

Hyperolius nasutus Günther, 1864

Found calling from grass and reeds, up to a metre above the water, at the edges of rivers, pans and lakes in the north of the country, along the Kavango and other rivers in the Caprivi Strip (Fig. 10). During the day they remain motionless on grass or reeds at the water's edge. The call is shown in Schiøtz (1967).

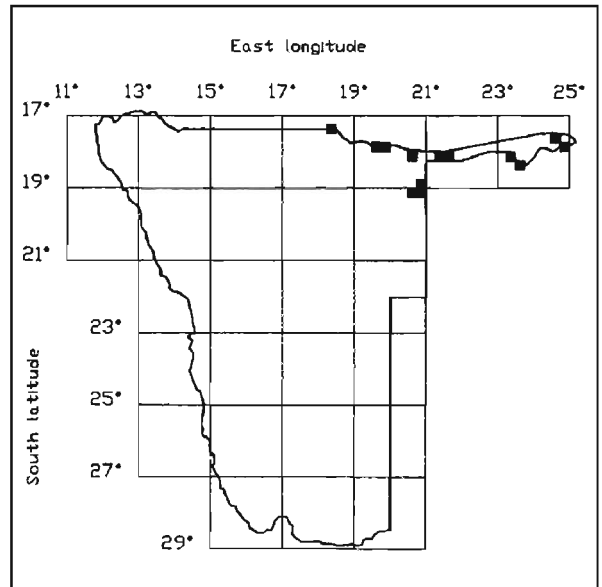


Figure 10. The distribution of *Hyperolius nasutus*.

Kassina senegalensis (Duméril and Bibron) 1841

Kassina senegalensis deserticola Ahl, 1930. Mertens 1971.

Calls during wet and dry weather, within about 50 m from the edge of vleis and pools (Fig. 11). The call is illustrated by Channing (1976) and Passmore & Carruthers (1979).

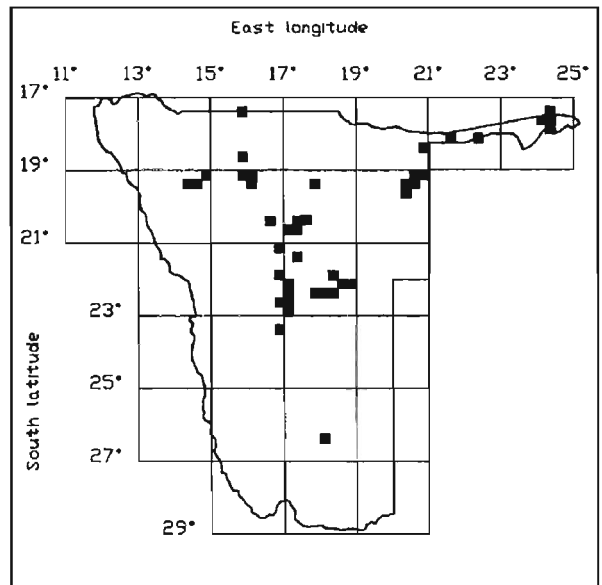


Figure 11. The distribution of *Kassina senegalensis*.

Leptopelis bocagii (Günther, 1864)

Although many species of *Leptopelis* are arboreal, *L. bocagii* is usually terrestrial. Calls from burrows, on the surface, or from more than a metre up in reeds or other vegetation. The call is illustrated by Schiøtz (1975). May be heard calling some distance from water. Breeding details unknown, although other members of this genus lay eggs in muddy nests at the edge of muddy pools, where the long tailed tadpoles may subsequently be found. Distributed in the extreme northern areas (Fig. 12).

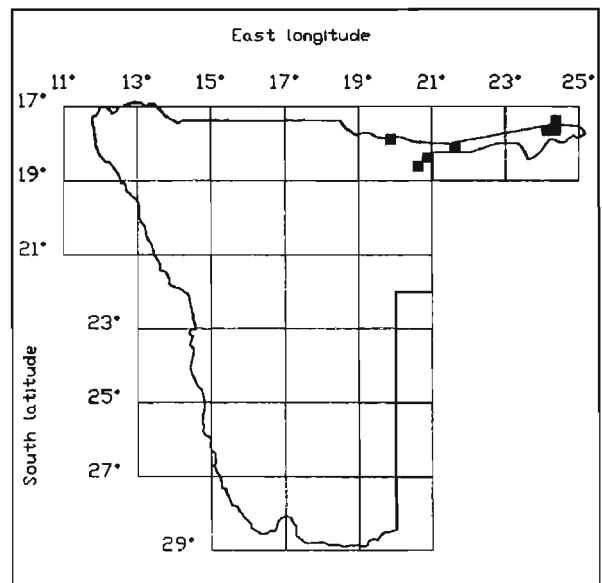


Figure 12. The distribution of *Leptopelis bocagii*.

Family Microhylidae

Breviceps adpersus Peters, 1882

Calls from concealed positions under rocks, vegetation or in burrows. May be heard calling in wet weather during the day and night. Occurs in open savanna, on Kalahari sand dunes and on mountain slopes, often far from water (Fig. 13). This species is a direct developer, (no tadpole stage is present), not requiring free water to complete the life cycle.

Breviceps macrops Boulenger, 1907

Recorded from the southern coastal dunes (Fig. 2), with an unusual record from Boegoeberg 2715dd (SMWN 25717), 22 km inland on a rocky hillside (Berger-Dell'mour 1987). Haacke (1975) recorded a specimen from the stomach of a viper (*Bitis schneideri*) from the Luderitz area.

Apparently restricted to the coastal fog belt, and favouring coastal dunes. Feeds mostly on beetles (Channing & Van Wyk 1988), and is active after dark even on cold windy evenings. Like other species of *Breviceps*, *B. macrops* is a direct developer, being able to breed in nests in damp sand. A description of the call has not yet been published. The middle of the three records from the southern coastal strip (Fig. 13) is based on a call.

Phrynomantis affinis Boulenger, 1901

Phrynomerus affinis (Boulenger 1901). Poynton 1964, Channing & Van Dijk 1976

Dubois (1988) demonstrated that the name *Phrynomantis* is the earliest available name for this genus.

The habitat and habits of this species are not well known, as it is recorded from only a few specimens. We have spent many hours searching unsuccessfully for this frog at the farm Ombujomatemba, near the Waterberg, where the first Namibian specimen was found. Call and call site unknown. Poynton and Broadley (1985a) suggest that this form may intergrade with *Phrynomantis bifasciatus*, and that more field work is required. Known from isolated records in sandy areas (Fig. 14).

Phrynomantis annectens Werner, 1910

Phrynomerus annectens (Werner 1910). Poynton 1964, Channing & Van Dijk 1976

Breeds in rock pools or in pools in river beds, especially where sheets of rock are available for shelter. Calls in the water, or near the waters edge. The type locality of this species (Aar River) was until recently uncertain. It is now known to be the farm Aar, near Aus (Jurgens 1979). Common in rocky areas in the Namib, Khomas Hochland, and in the Karas mountains (Fig. 15).

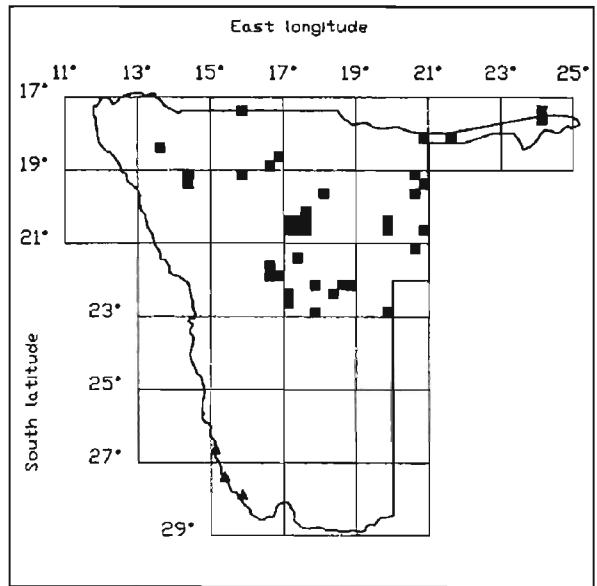


Figure 13. The distribution of *Breviceps adpersus* (squares) and *Breviceps macrops* (triangles).

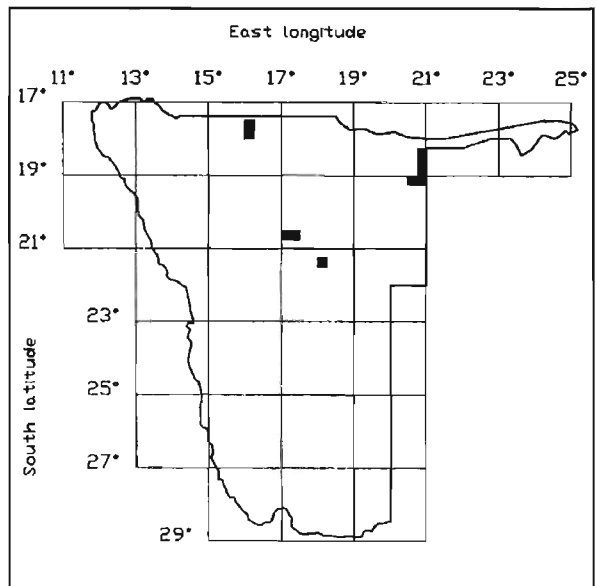


Figure 14. The distribution of *Phrynomantis affinis*.

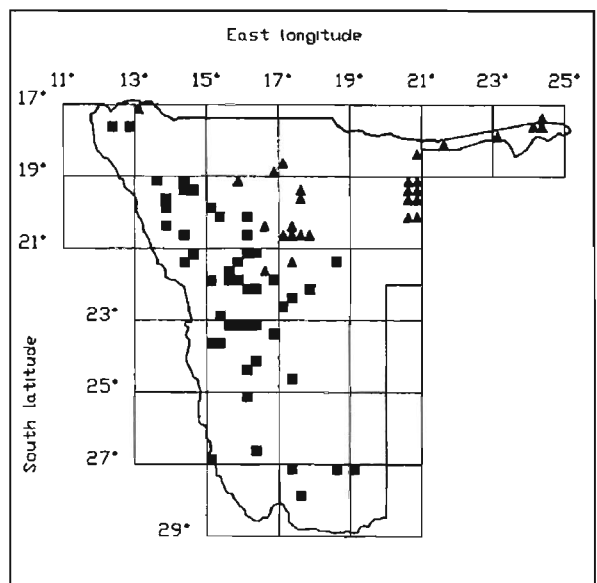


Figure 15. The distribution of *Phrynomantis annectens* (squares) and *Phrynomantis bifasciatus* (triangles).

Phrynomantis bifasciatus (Smith, 1847)

Phrynomeris bifasciatus bifasciatus (Smith) 1847.
Poynton & Broadley, 1985a
Phrynomeris bifasciatus (Smith, 1847). Poynton
1964. Channing & Van Dijk 1976.

Males call from the surface, often some distance from the water, and seem to show a preference for calling from under cover. They have been found calling in holes in tree stumps, in cracks in rocks, in rodent burrows and under fallen logs. In sandy areas they may gather around temporary pools to call. The distribution of these aposematically coloured frogs is presented in Fig. 15.

Family Pipidac

Xenopus laevis (Daudin, 1802)

This very common frog is found throughout the country (Fig. 16), being able to survive the dry season in small pools or buried in dry riverbeds. The call is uttered underwater.

Xenopus muelleri (Peters, 1844)

Very common in the Caprivi (Fig. 17), where it occupies pans and deep pools, often in the presence of large fish like barbel (*Clarius*).

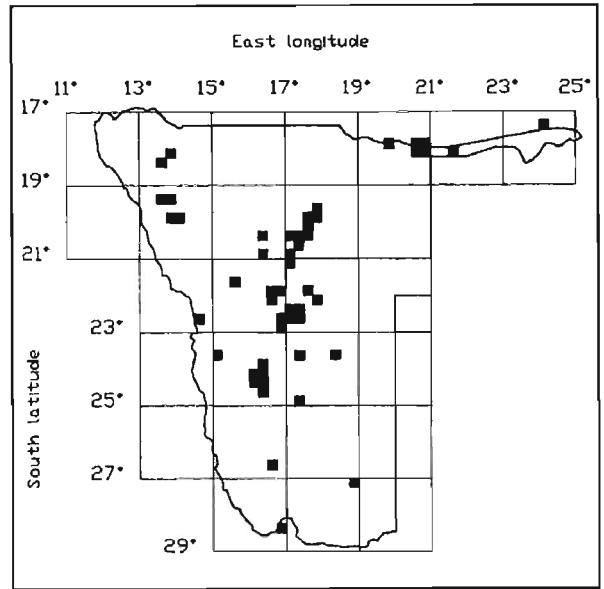
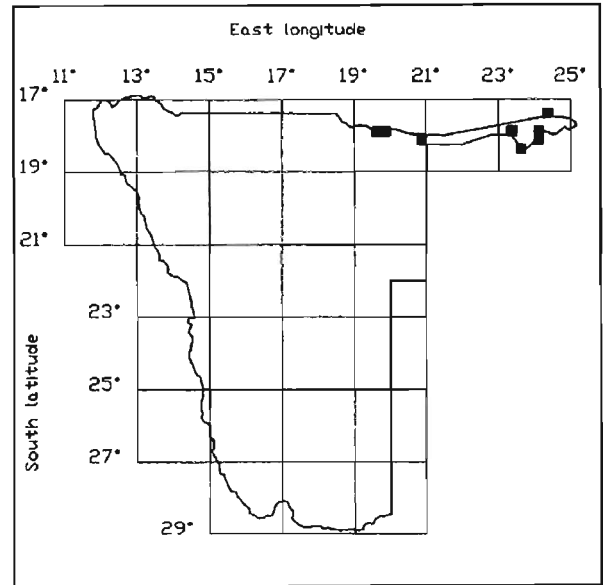
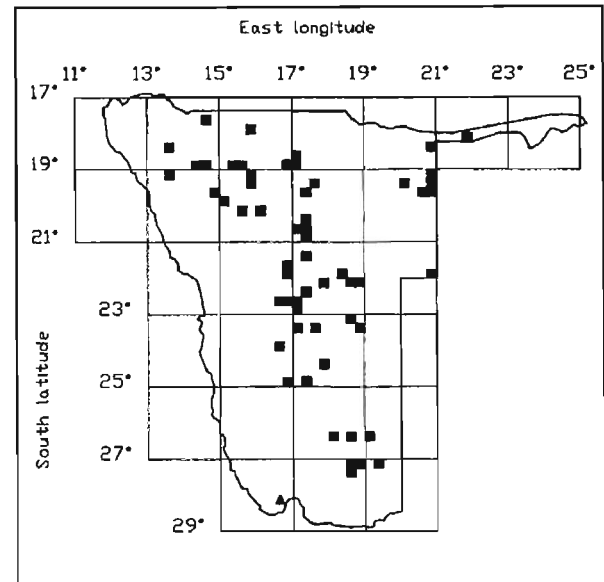
Family Ranidae

Cacosternum boettgeri (Boulenger, 1882)

Found widely in shallow pans and pools formed by rain (Fig. 18). Males may be heard calling day and night. They call close to the water, but from under vegetation or bits of debris or in cracks in mud, and are very difficult to locate.

Cacosternum namaquense Werner, 1910

Like *Breviceps macrops*, this species is apparently restricted to the extreme south western part of Namibia (Fig. 18). During the breeding season they may be found near small rock pools and other shallow temporary water bodies.

Figure 16. The distribution of *Xenopus laevis*Figure 17. The distribution of *Xenopus muelleri*.Figure 18. The distribution of *Cacosternum boettgeri* (squares) and *Cacosternum namaquense* (triangle).

Hildebrandtia ornata (Peters, 1878)

Hildebrandtia ornata ornata (Peters) 1878. Poynton & Broadley, 1985b.

Males call from the water in shallow pans and flooded areas. The restricted distribution of this distinctive frog, with its loud advertisement call, is enigmatic (Fig. 19). Males commence calling fairly late in the evening, which may account for their scarcity in collections.

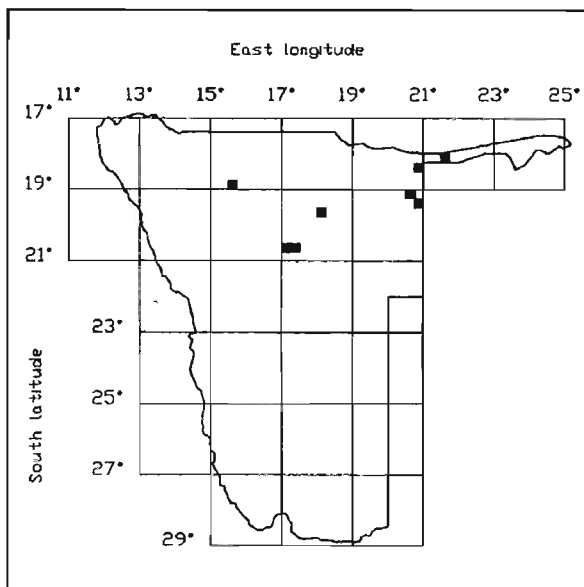


Figure 19. The distribution of *Hildebrandtia ornata*.

Phrynobatrachus mababiensis FitzSimons, 1932

Phrynobatrachus ukingensis mababiensis FitzSimons, 1932. Poynton, 1964. Stewart, 1967. Channing and Van Dijk, 1976.

Calls during the day and night during the breeding season, often in dry weather. Males call from the edge of water, concealed under small leaves or debris. Known from the Caprivi with one record from the Otjiwarongo district (Fig. 20).

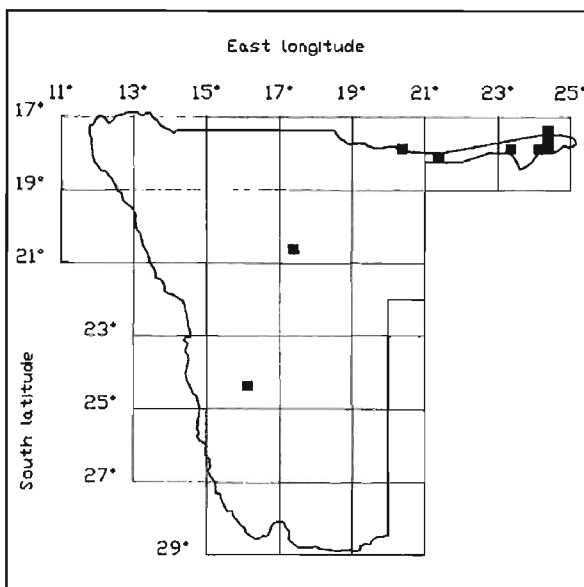


Figure 20. The distribution of *Phrynobatrachus mababiensis*.

Phrynobatrachus natalensis (Smith, 1849)

Phrynobatrachus stewartae Poynton & Broadley, 1985. Channing 1989 (Caprivi material)

We are grateful to Prof J. C. Poynton for checking the material collected from the Caprivi, and bringing to our attention the misidentification of frogs previously called *P. stewartae* (Channing 1989).

Calls from the edge of small or large pools, usually concealed under grass. The distinctive creaking call may be heard during the day and night in wet weather. Widely distributed (Fig. 21).

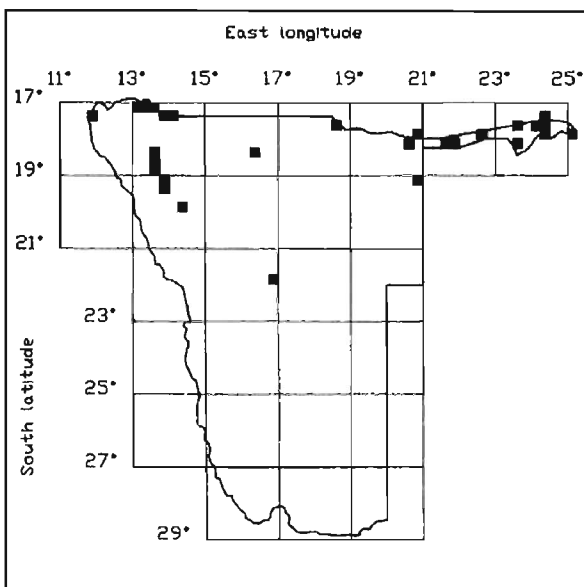


Figure 21. The distribution of *Phrynobatrachus natalensis*.

Ptychadena anchietae (Bocage, 1867)

Ptychadena superciliaris Günther, 1848. Poynton, 1971.

Found in vleis and rain filled depressions, where the males call from exposed sites along the waters edge. Known from the Caprivi (Fig. 22).

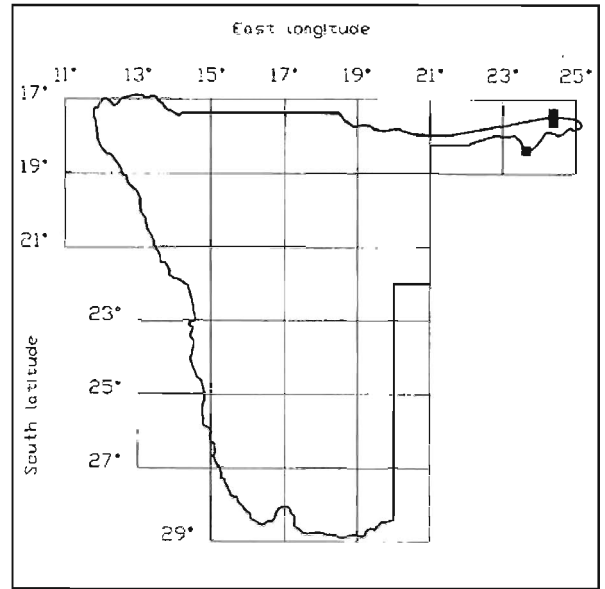


Figure 22. The distribution of *Ptychadena anchietae*.

Ptychadena sp

Ptychadena cotti (Parker, 1930). Poynton & Broadley, 1985b, Channing, 1989.

Ptychadena schillukorum. Channing 1991b.

This new species is presently being described. It is related to *Ptychadena schillukorum*. The taxonomy of *P. schillukorum* is discussed by Perret (1987). In the companion key (Channing 1991b) this species is called *Ptychadena schillukorum*.

These frogs are found in very dense vegetation at the edge of shallow pools. They often occur with *Ptychadena anchietae* and *Ptychadena mascareniensis*. The call is illustrated in Channing (1989). Known only from the Caprivi (Fig. 23).

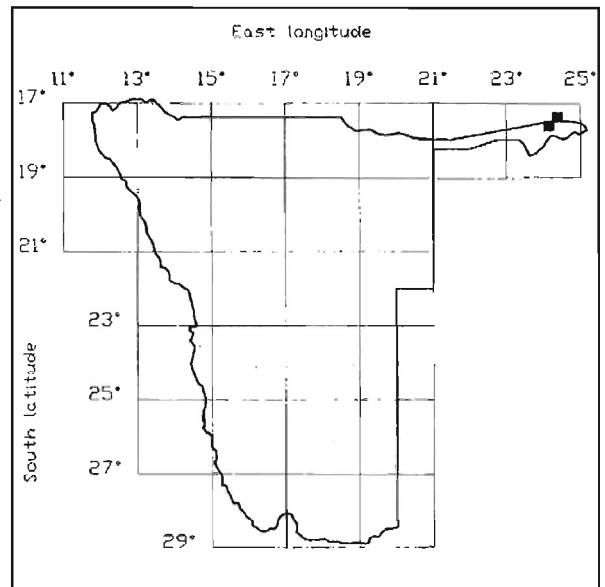


Figure 23. The distribution of *Ptychadena sp.*

Ptychadena mascareniensis (Duméril & Bibron, 1841).

Found in dense flooded grass. The males may call from the edges of water-filled depressions, or while floating clinging to vegetation. Commonly occurs with *Ptychadena anchietae*. Known from the north-eastern border areas (Fig. 24).

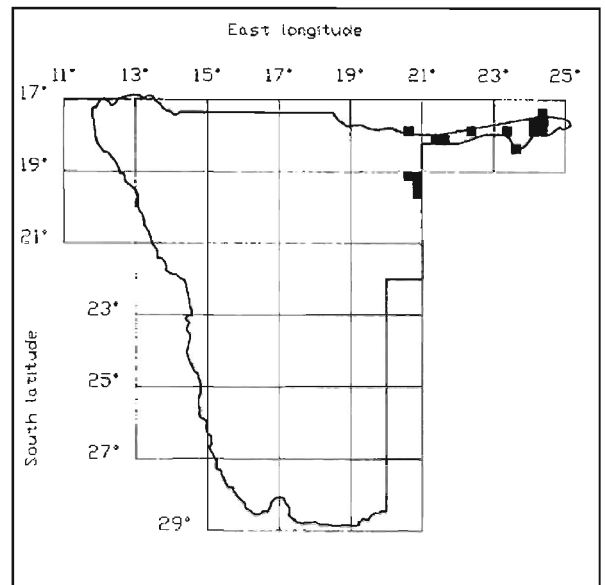


Figure 24. The distribution of *Ptychadena mascareniensis*.

Ptychadena mossambica (Peters, 1854).

One specimen was found trapped in a pit in tall grass at the edge of Lake Liambesi. A common frog in and around Katima Mulilo, and recorded eastwards from the Rundu area (Fig. 25).

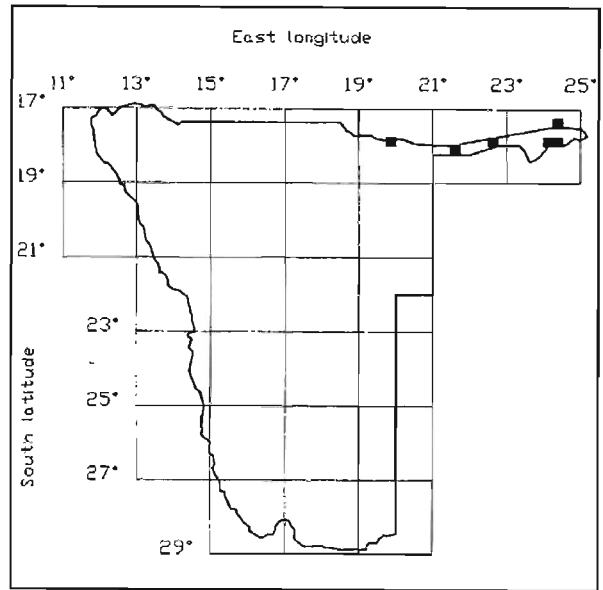


Figure 25. The distribution of *Ptychadena mossambica*.

Ptychadena oxyrhynchus (Smith, 1849).

This frog apparently breeds early in the season, as it was absent from Katima Mulilo from January to March 1986. However, breeding males were calling at Popa Falls on 21 January 1985. Known presently from Popa Falls and Katima Mulilo (Fig. 26).

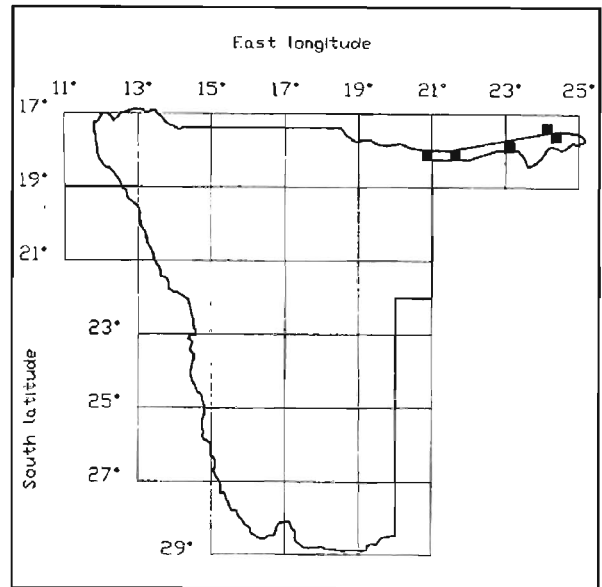


Figure 26. The distribution of *Ptychadena oxyrhynchus*.

Ptychadena subpunctata (Bocage, 1866).

This large frog prefers more permanent water bodies than many of the smaller *Ptychadena* species. They occur along the grassy edges of rivers and deep pools, and in behaviour and call resemble *Rana angolensis*. Known from the Caprivi Strip and along the Okavango River (Fig. 27).

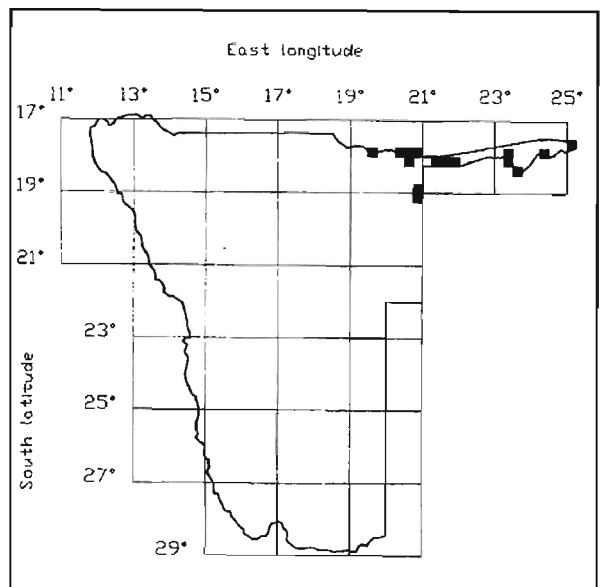


Figure 27. The distribution of *Ptychadena subpunctata*.

Ptychadena taenioscelis Laurent, 1954.

Males call from short flooded grass. The call is illustrated by Passmore & Carruthers (1979) and Channing (1989). Only known in the Caprivi (Fig. 28).

Ptychadena guibei Laurent, 1954

Ptychadena upembae (Schmidt & Inger, 1959).
Channing 1989, 1991b.

Ptychadena chrysogaster guibei Laurent, 1954.
Poynton 1964.

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 Namibia. The call is illustrated by Channing (1989), and the distribution (Nkasa Island) shown in Fig. 29. In the companion key (Channing 1991b) this species is called *Ptychadena upembae*.

Pyxicephalus adspersus Tschudi, 1838.

Although Poynton and Broadley (1985b) follow Parry (1982) in recognising three subspecies, (the Namibian form being *P.a. edulis*), we recognize only the nominate form in Namibia until further work has confirmed that the populations are genetically distinct. The relative head width, a major distinguishing character of the subspecies (Parry 1982), varies with size. Age classes are distinct, with colour changes associated with age, for example the white mark on the tympanum becomes less distinct as the animals get bigger. This is one of the characters which are supposed to distinguish the two subspecies. Large adults from Namibia may have a distinct white mark on the tympanum. A small series from Katima Mulilo contained individuals which could be identified as *P. a. edulis* and others which could be identified as *P. a. angusticeps* (following Parry). Fieldwork in progress suggests that *Pyxicephalus edulis* is restricted to the east coast of Africa.

This very common frog (Fig. 30) is poorly represented in collections due to its large size. Reports in the literature suggest that males stay near the tadpoles to protect them by chasing intruders (Balinsky & Balinsky 1954, Poynton 1964, Poynton & Broadley, 1985b). The adults tend to stay near the pans where they breed, and breeding takes place a few times each season after heavy rain. Breeding involves male-male interactions and may take place during the day. The tadpoles are gregarious. Loveridge (1950) reported that adult bullfrogs may feed on conspecific tadpoles. We have observed more than twenty batches of tadpoles in different pans, at various stages, but not while adult bullfrogs were present. However, under conditions of rapid desiccation, attendant males have been shown to dig channels permitting tadpoles isolated in peripheral pools to swim to the main body of water (Kok *et al.* 1989). They are dried and eaten by indigenous people in some northern areas.

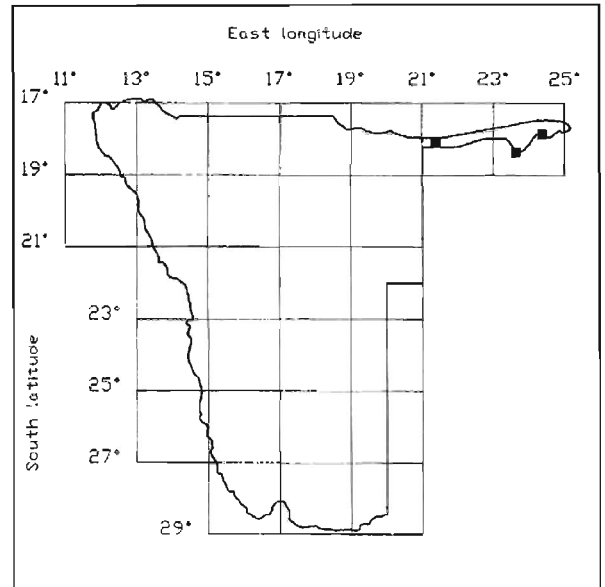


Figure 28. The distribution of *Ptychadena taenioscelis*.

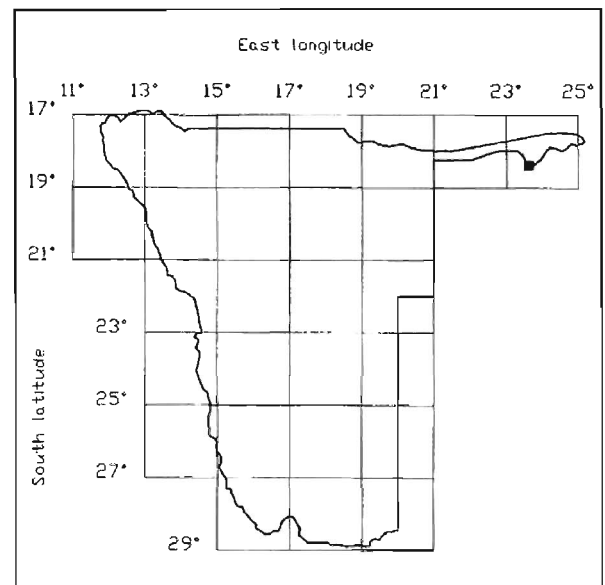


Figure 29. The distribution of *Ptychadena guibei*.

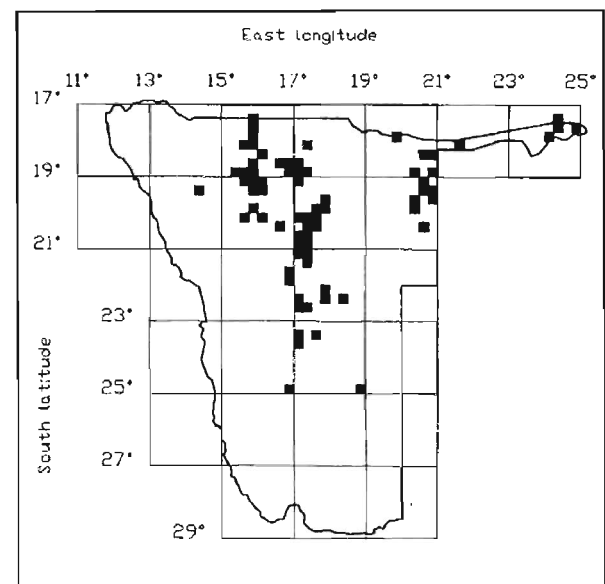


Figure 30. The distribution of *Pyxicephalus adspersus*.

Hylarana darlingi Boulenger, 1902.*Rana darlingi* Channing 1991b.

Known only from two specimens, one (SMR 2533), collected along the edge of the Kwando River during the day. More specimens are expected with more collecting. Known from Angola and Zambia. Distribution shown in Fig. 31. In the companion key (Channing 1991b) this species was called *Rana darlingi*.

Rana fuscigula Duméril and Bibron, 1841.

Found in permanent springs and streams in the Naukluft Mountains, and along the Fish River. The construction of the Hardap Dam on the Fish River appears to have had a negative influence on the habitat downstream, as the river is considerably drier than before the dam was built. Further fieldwork is needed to determine if the frogs that once lived along the Fish river are still able to do so. The call is shown in Channing (1979) and Passmore & Carruthers (1979), and the distribution illustrated in Fig. 31.

Tomopterna cryptotis (Boulenger, 1907)*Pyxicephalus delalandei cryptotis* (Boulenger), 1907. Poynton, 1964. Stewart, 1967.*Tomopterna delalandei cryptotis* (Boulenger), 1907. Channing & Van Dijk, 1976. Jurgens, 1979.

As Poynton and Broadley (1985b) point out, reliable identification of this species depends upon the advertisement call, as *Tomopterna marmorata* and *Tomopterna krugerensis* are not always separable from this species morphologically. The distribution map (Fig. 32) includes literature records. We have not checked the identification of those specimens. Although many of the earlier records may include *Tomopterna krugerensis*, we have found that these two species are always sympatric where *Tomopterna krugerensis* occurs. The details of the distribution of *Tomopterna cryptotis* will probably be slightly modified when fieldwork based on advertisement calls is reported. The call is shown in Passmore and Carruthers (1979).

Tomopterna krugerensis Passmore & Carruthers, 1975*Pyxicephalus delalandei cryptotis* (Boulenger), 1907 (part). Poynton, 1964. Stewart, 1967.*Tomopterna delalandei cryptotis* (Boulenger), 1907 (part). Channing & Van Dijk, 1976. Jurgens, 1979.

See comment under *Tomopterna cryptotis*, which may have been confused with this species in older records. The call is illustrated by Passmore and Carruthers (1979). A poorer quality sonagram is shown in Van den Elzen (1978). Known from the centre of the country (Fig. 33), but until more fieldwork is done to determine the presence of this species by the unique male call, the present distribution map is far from representative.

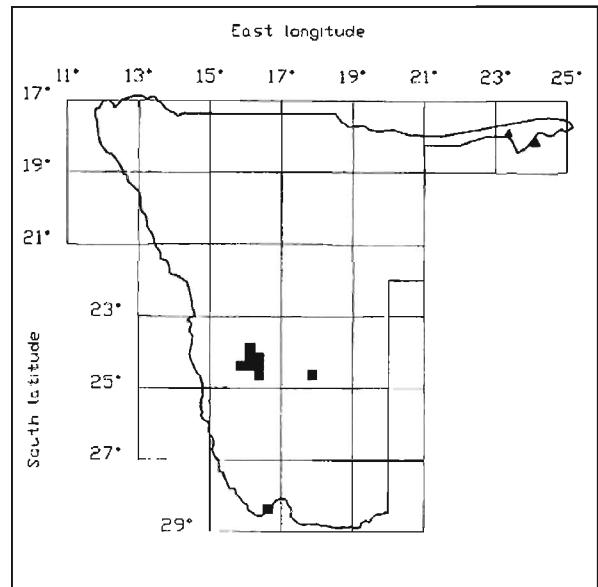


Figure 31. The distribution of *Rana fuscigula* (squares) and *Hylarana darlingi* (triangles).

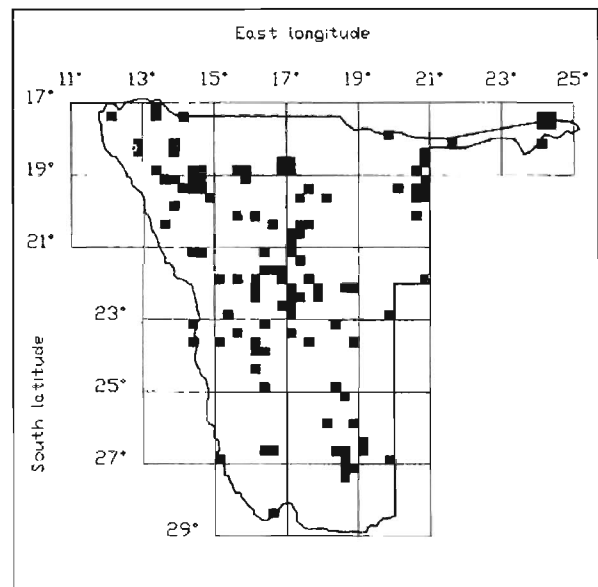


Figure 32. The distribution of *Tomopterna cryptotis*.

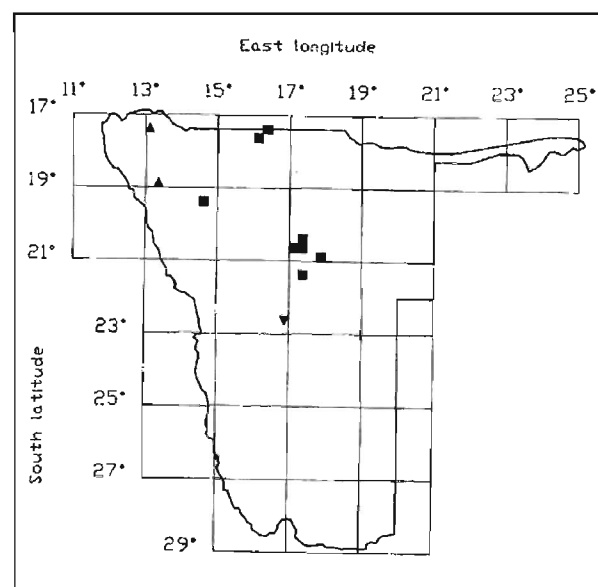


Figure 33. The distribution of *Tomopterna krugerensis* (squares), *Tomopterna tuberculosa* (triangles), and *Tomopterna marmorata* (inverted triangles).

Tomopterna tuberculosa (Boulenger, 1882)

See comment under *T. cryptotis*. This species may have been confused with *T. cryptotis* in older records. Only one record from the Koakoveld (Fig. 33). Call unknown.

Tomopterna marmorata (Peters) 1854

As Poynton & Broadley (1985b) remark, the identification of museum specimens is difficult. Field data on advertisement calls is required to substantiate the distribution records. See further comment under *T. cryptotis*. Sonagrams of the calls are presented by Passmore & Carruthers (1975, 1979) and Van den Elzen and Van den Elzen (1977). Not well collected (Fig. 33), two of the records being based on Van den Elzen & Van den Elzen's (1977) sonagrams.

Family Rhacophoridae

Chiromantis xerampelina Peters, 1854

Calls during dry and wet weather from grass around the edges of vleis. May make foam nests in trees or man made structures overhanging water, but frequently place the nests in grass over the edge of water, where they are hidden. Widely distributed in the northern areas (Fig. 34), where adults may be found far from open water, gathering at even small pools after rain to breed. This species has an unusual breeding system, where up to seven males may assist one female to make her foam nest, each apparently also fertilizing some eggs.

DISCUSSION

This annotated checklist provides an updated overview of anuran studies in Namibia. The maps indicate where specimens have been collected, and this should help future researchers desiring to obtain further field information. Apart from the obvious zoogeographical value of these maps, they provide clear indications of where future work in conservation and basic research is required. The southern part of Namibia appears to be under-represented in our maps, and more field work is required there.

Frogs are best identified by their unique calls. A companion paper to this one (Channing 1991b), provides an illustrated key to enable non-specialists to identify adult frogs. Frogs collected at night from breeding choruses serve as an audio reference point, especially if the calls can be recorded. A word of caution: ensure that the frog that is recorded is the same individual that is later collected for identification. Many species may be present around a pond, even if only one species is calling.

Many of the records reported in this paper are based on tadpoles. The identification of tadpoles is based on the works of Van Dijk (1966; 1971). Many species may be identified by their eggs, although no literature is available

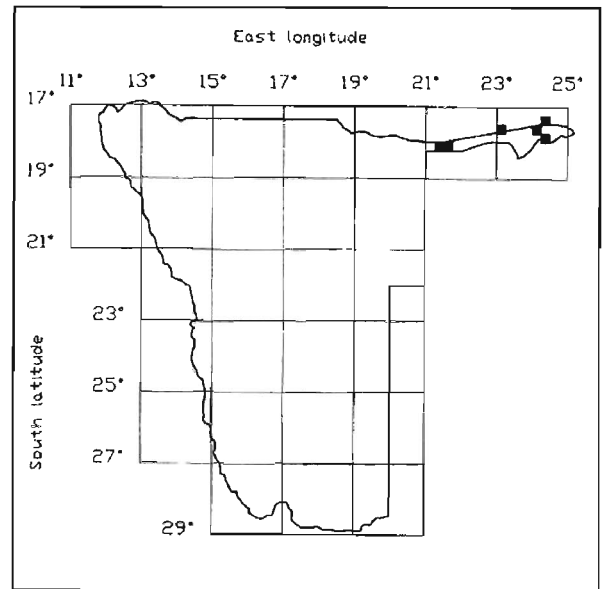


Figure 34. The distribution of *Chiromantis xerampelina*.

to enable identification of the majority of southern African frog eggs.

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