

# Fossil Anura of Southern Africa

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## ABSTRACT

The literature relevant to fossil Anura of Southern Africa is reviewed and the location of sites mapped; reference is made to a data-base used and computer access thereto.

## INTRODUCTION

Fossil Anura have been documented in Southern Africa for nearly seventy years, but publications in 1926 (Ahl in Stromer; Stromer) and 1931 (Haughton; Stromer) on pipid (*Xenopine*) fossils were followed by a period of nearly forty years without further reports. During the latter part of this period fossils discovered in South America showed a greater affinity to Pipidae of Africa, extant and extinct, than to extant South American pipids, while fossil Pipidae were also found in Israel (Nevo 1968; Estes *et al.* 1978). Most of the publications on South American fossil Pipidae mentioned Ahl (1926) and Haughton (1931). Particularly important reviews were contained in Estes (1977), Estes *et al.* (1978), and Baez

(1983). From 1970 there have been a number of publications which referred to archaeological sites (Avery 1984, Cruz-Uribe & Klein 1983); to deposits of Plio-/Pleistocene or (like Ahl's *Xenopus stromeri*) of Miocene age respectively (Hendey 1970-1978); or to fossils from the farm Stompoor of comparable age to *Eoxenopoides* Haughton, and the South American fossil pipids, namely Late Cretaceous to Neogene (van Dijk 1985; Smith 1986). Of the fossil anuran finds since 1970 it is only those from Stompoor which have been illustrated (in both publications), with some descriptive text in the former publication. There are known to be fossil Anura, undocumented, in at least some of the Transvaal limestone caves (Berger, L.R. pers.comm.; Watson 1993; and own casual observations).

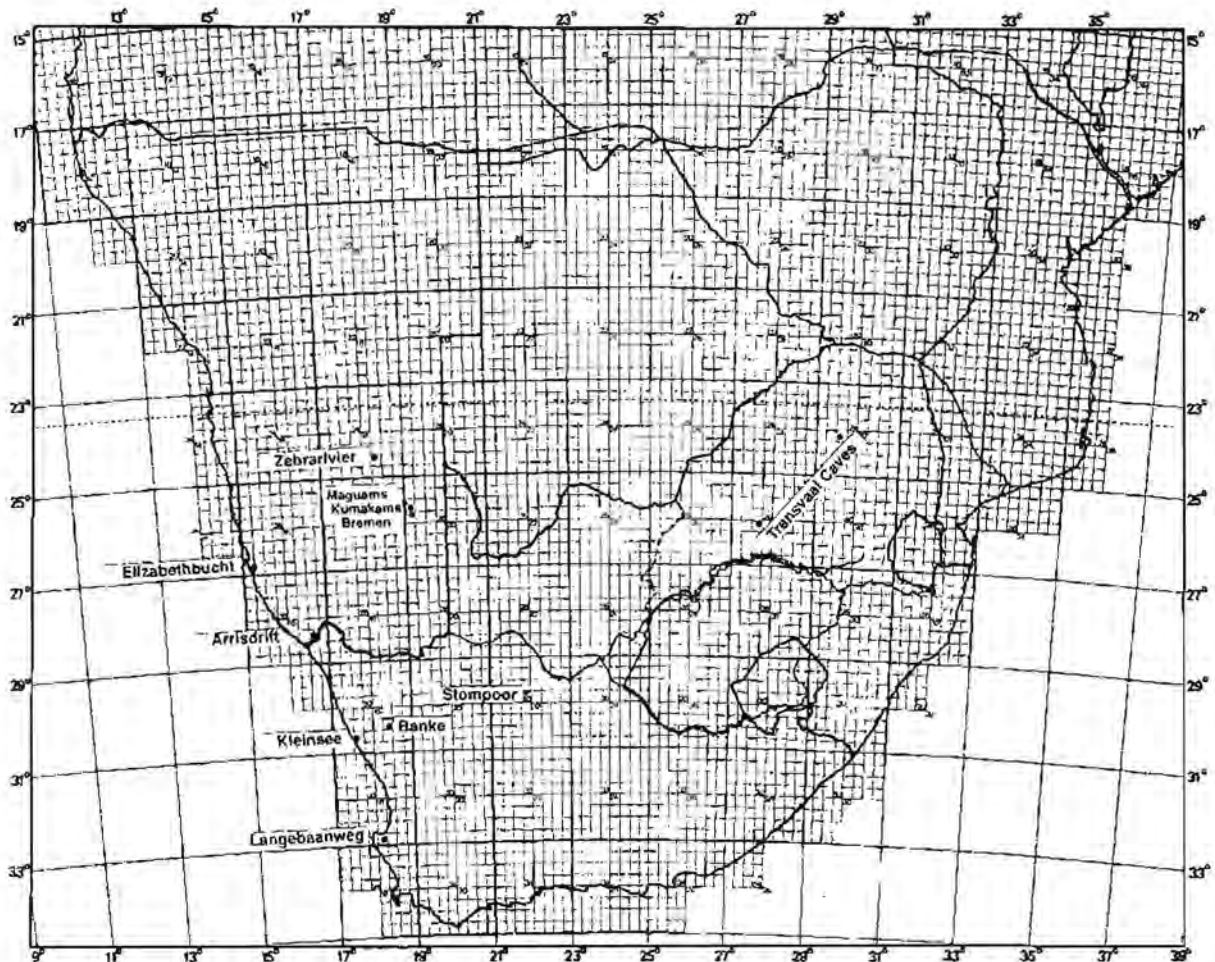


FIGURE 1: Map of Southern Africa showing Fossil Anura Sites

## SITES WITH FOSSIL ANURA IN SOUTHERN AFRICA

The distribution in Southern Africa of sites at which fossil Anurans have been found is shown on Map 1. Some details of the sites are given in Table 1.

### COMMENTS ON ANURAN FOSSILS

The information in Table 1 can conveniently be amplified by comments made on the fossils in the order in which they appear in the Table.

Of the archaeological sites examined by Cruz-Urbe & Klein (1983), 17 have faunas sufficiently extensive to warrant tabular analysis, 16 of which analyses appear in their paper and one in the paper by Avery (1984). Of the 16 sites, bullfrogs, *Pyxicephalus* (sic) sp., are listed at 5 - Bremen 1; Kumakams 1 & 2; Maguams "Andalusia"

notes: "Remains of frogs are fairly abundant at certain levels of 'E' Quarry."

Anuran fossils in the cave breccia of Transvaal caves have not been studied. \*(See Watson, 1993).

The fossils of Stromer (1931) from Kleinsee consist of a number of mostly fragmentary limb-bones. Stromer notes unspecified differences from *Xenopus laevis* and *X. stromeri*.

Stromer was unsure of the age of the material, which he put at Miocene, Pliocene or Pleistocene. Hendey (1970, p.104) quotes later opinions which exclude Miocene.

The fossils described by Hendey (1978) from the Miocene of Arrisdrift include under Class Amphibia: "A single postcranial bone ...belongs to a frog or toad." Work in progress at Arrisdrift at present (Pickford & Senut 1994)

TABLE 1: Fossil Anura in Southern Africa

GEOLOGICAL AGE	FOSSILS	GEOLOGY	LOCALITY	REFERENCE/S
<b>C A E N O Z O I C</b> <b>HOLOCENE</b>				
Middle & Late Stone Age	<i>Pyxicephalus</i>	archaeological site	Zebraarivier, Maguams Kumakams, Bremen, Namibia	Cruz-Urbe & Klein 1983
Middle & Late Stone Age	?	archaeological site	Zebraarivier, Namibia	Avery 1984
<b>PLIOCENE/</b> <b>PLEISTOCENE</b>				
	cf <i>Xenopus</i> Anura	deltaic, estuarine, lagoonal calcareous cave breccia	Langebaan: South Africa Transvaal Caves: South Africa	Hendey 1970 Berger (pers. comm); Watson 1993
?Pliocene ?Pleistocene	?cf <i>Xenopus</i>	terrace, volcanic terrain	Kleinsee, Namaqualand; South Africa	Stromer 1931
<b>MIOCENE</b>				
	amphibia <i>Xenopus stromeri</i>	terrace deposits terrace, ?volcanic terrain	Arrisdrift; Namibia borehole near Elizabethbucht; Namibia	Hendey 1978 Stromer 1926; Ahl 1926
<b>M E S O Z O I C</b> <b>CRETACEOUS</b>				
Upper	<i>Eoxenopoides reuningi</i>	crater lake	Banke, Namaqualand; South Africa	Haughton 1931; Estes 1977
Upper	pipid* <i>Eoxenopoides reuningi</i> **	crater lake	Stompoor, Maryvale; Namaqualand, South Africa	van Dijk 1985*; Smiith 1986**

and Maguams "Elefant". At Kumakams 2 bullfrogs are listed in 12 of 15 samples, only equalled by "small hare". Avery (1984) lists Reptilia/Amphibia in 22 of 23 samples; presumably the Amphibia are *Pyxicephalus*. Cruz-Urbe & Klein comment on the possibility that bullfrogs may be an indicator of water close to the sites, in contrast to other sites where bullfrogs are absent. Living African Bullfrogs have not been recorded in the vicinity of any of the 6 fossil sites, the fossils representing a South and South-West extension of the range recorded by Channing & Griffin (1993).

At Langebaanweg Hendey (1970) reports at least one anuran species, which he compares to *Xenopus laevis* (sic), of which two skeletons of fairly large adults were used for comparison. Although smaller than the comparative material, "no significant morphological differences...were noted". Of the fossil material Hendey

holds promise of numerous anuran specimens.

*Xenopus stromeri* Ahl 1926 from a borehole near Elizabethbucht, was based on numerous fragments, including a nearly complete neurocranium, which Ahl illustrated (text and Plate). The forward position of the parietal foramen, inter alia, distinguished *X. stromeri* from modern *Xenopus*. *X. stromeri* has been confirmed by subsequent work as Miocene and a good species.

*Eoxenopoides reuningi* Haughton 1931 from a diamond-prospecting borehole at Banke in Namaqualand, was based on numerous specimens of a rather small pipid (head and body 22 - 30 mm). The specimens came from 5 levels in a crater lake which had formed over a kimberlite pipe (the Arnot pipe). Haughton used 21 of at least 44 numbered specimens in compiling his description of the taxon, and used 43 specimens to group variations in the

sacral region, indicating that at least this number had this region preserved. Haughton placed the taxon as Late Cretaceous to Early Tertiary. Estes (1977) revised Haughton's description, added tadpoles, and, on the basis of botanical evidence suggested a younger age. Scholtz (1985) suggested an age similar to that proposed by Haughton, quoting radiometric dates from associated kimberlite pipes of 60 to 70 million years, which bridges the Cretaceous-Tertiary transition.

Specimens from another crater lake, on the farm Stompoor in the northern Cape, were identified as pipids when first documented (van Dijk 1985) and referred to *Eoxenopoides reuningi* by Smith (1986), who obtained two further specimens from new boreholes. The material first obtained represented twelve adult animals, two being represented only by moulds, and one tadpole. The bones were mostly in place but fragmented. The best specimen was one in the possession of a prospector and available only for photography, colour photographs of part and counterpart having been made. The apparent absence of marked expansion forward of the lateral edges of the sacral diapophyses in most of the specimens, besides other features, suggested that inclusion in *Eoxenopoides reuningi* was provisionally not warranted. The illustration in Smith is of a specimen with slight expansion of the sacral diapophyses visible posteriorly, but not markedly anteriorly.

## DISCUSSION

Of the fossil Anura from sites in Southern Africa, only *Eoxenopoides reuningi* has been adequately studied. This is in part due to the paucity or poor quality of material from the other sites, but also apparently through lack of interest in Anura where mammals, including humans, are the primary interest. A difficulty peculiar to fossils, is that literature relevant because it gives information on the age or palaeoenvironment of sites, might not mention the group of interest, in this case Anura, and so might not be noticed. Articles on fossils of other regions might also be of interest, for instance South American pipid fossils (van Dijk 1994), with the problem that a significant article primarily about South American fossils may be overlooked, e.g. Baez (1983); also Baez & Gasparini (1977), Estes (1975a and b), Estes & Reig (1973), and others. A collection of literature on African Anura has been made (circa 9000 items) which is accessible through computer-searches, has been used in the present compilation, and has the potential for use in other fields. To illustrate its use in palaeontology: a search for estimates of the age of the Kleinsee site would indicate Hendey (1970) on Langebaanweg, even had there been no reference to Anura in that work. Similarly forward-looking is the inclusion in the data-base of abstracts, and even papers presented in title only, if there is known to be work going on which has yielded, or might yield, anuran fossils or dates (e.g. Pickford & Senut 1994; Senut *et al.* 1994). Compilation of the data-base and the computer search facility is ongoing.

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- \* Added in proof.  
Anuran specimens listed but not identified taxonomically.