ELEVENTH MEETING OF THE

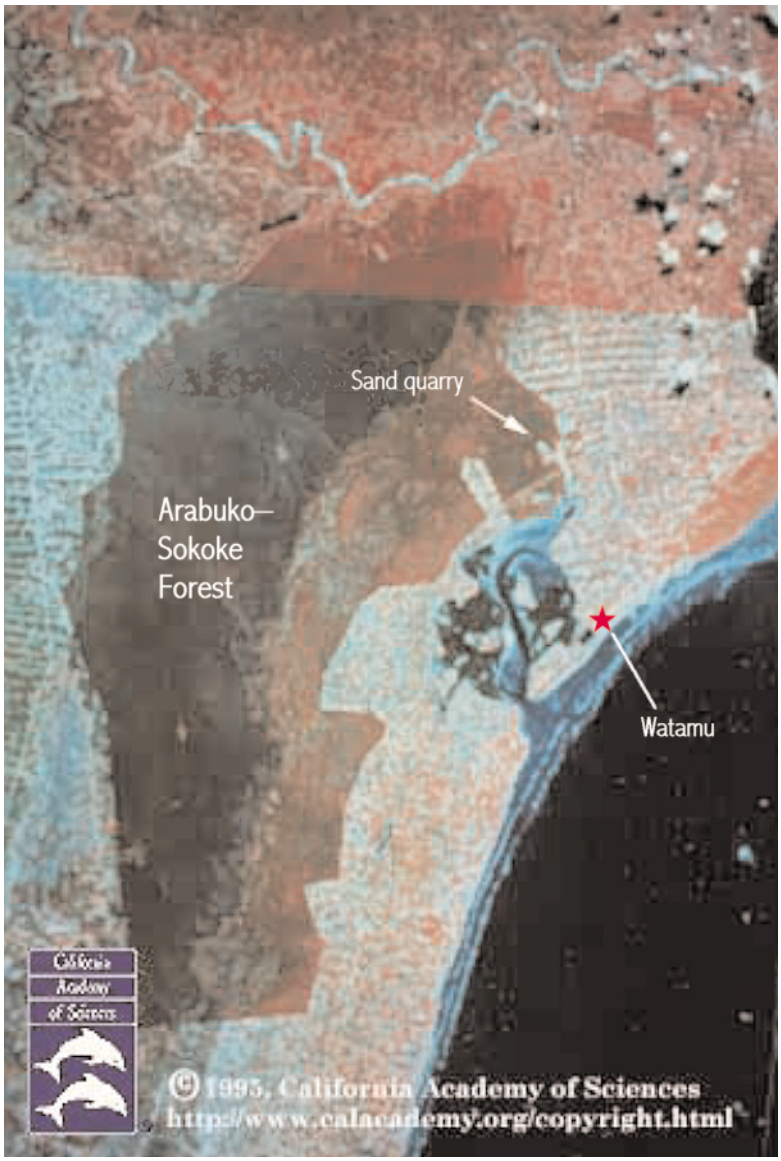
AFRICAN AMPHIBIAN WORKING GROUP

ONZIEME REUNION DU GROUP DE TRAVAIL DES AMPHIBIENS AFRICAINS

Hyperolius parkeri
Arabuko-Sokoke Forest

19-21 April 2002

Watamu, Kenya



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DELEGATES

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Rotich, D.	National Museums of Kenya	KENYA
Schiotz, A.	Denmark Aquarium	DENMARK
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Tandy, M.	Patagonia, Arizona	USA
Vonesh, J.	University of Florida	USA
Weldon, C.	Potchefstroom University	SOUTH AFRICA.

ACKNOWLEDGMENTS: For administrative assistance the AAWG thanks Chris Kibre and Jack Wong of the California Academy of Sciences.

Mertensophryne micranotis
Arabuko-Sokoke Forest

SCHEDULE OF EVENTS

FRIDAY, APRIL 19

1800: WELCOME COCKTAIL PARTY, ANNOUNCEMENTS, AND
Slide show: *A History of AAWG*, by Alan Channing

SATURDAY, APRIL 20

MORNING SESSION (Chair: R. C. Drewes)

0815: Announcements

0830: **Marius Burger**, Alan Channing & Les G. Underhill.
The use of call analyses to identify cryptic species of dainty frogs within the *Cacosternum nanum* and *C. boettgeri* complexes in the Eastern Cape and KwaZulu-Natal.

0900: **Alan Channing** & W. T. Stanley
A strange new bufonid from the Eastern Arc Mountains, Tanzania.

0930: **Rafael de Sa** & Alan Channing
Callulina kisiwamsitu, a new microhylid frog from the West Usambara Mountains, Tanzania.

1000: **Christabel Geland** & Alan Channing
Preliminary data for an amphibian monitoring program on the mountains of the Western Cape, South Africa.

1030: Coffee/Tea break

1100: **Tim Halliday**
What can DAPTF do for African Amphibians?

1130: **Samantha Hopkins** & Alan Channing
Chytridiomycosis in amphibian populations in the Western Cape, South Africa.

1200: Lunch

AFTERNOON SESSION (Chair: Kim Howell)

1300: **Simon P. Loader**, Mark Wilkinson & David J. Gower
Reproductive biology of African caecilians (Amphibia: Gymnophiona).

1330: **Stefan Lötters**, Damaris Rotich Joachim Kosuch & Michael Vith
Initialization of a long-term amphibian anuran survey in the Kenyan Highlands.

1400: **J. Measey** & G. Lobos
Invasive populations of *Xenopus laevis* (Daudin) in Chile.

1430: Coffee/Tea break

1500: **J. Measey**, D. Gower, O. Oommen & M. Wilkinson
Are caecilians rare? Some preliminary methods for assessing population size and density of subterranean amphibians.

1530: **J. C. Poynton**
Altitudinal species turnover in southern Tanzania shown by anurans: Results of a transect.

1600: **L. R. Minter**
Monitoring frogs at a Mopane woodland site.

POST-DINNER FIELD TRIP TO BE ANNOUNCED

SUNDAY, APRIL 21

MORNING SESSION (Chair: R. C. Drewes)

0830: **Mark-Oliver Roedel** & Raffael Ernst
Leaf litter anuran assemblages of different forest habitats in West Africa – Independent populations or distinct species assemblages?

0900: **Arne Schiotz**
Denmarks Aquarium, Copenhagen, Denmark
Reflections on the *Hyperolius viridiflavus* group.

0930: **Ché Weldon** & Louis du Preez
Confirmation of chytridiomycosis in South Africa.

1000: **Stephen Spawls**
An overview of the amphibians of Ethiopia.

1030: Coffee/Tea Break

1100: **Christina Richards**
The origin of a complex breeding trait – phytotelm breeding in mantellid frogs.

1130: Concluding Remarks – Organization meeting.

AFTERNOON FIELD TRIP TO BE ANNOUNCED

ABSTRACTS OF PRESENTATIONS

The use of call analyses to identify cryptic species of dainty frogs within the *Cacosternum nanum* and *C. boettgeri* complexes in the Eastern Cape and KwaZulu-Natal.

Marius Burger[1], Alan Channing[1] & Les G. Underhill[2]

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[2]Avian Demography Unit, University of Cape Town, Rondebosch 7701, South Africa. E-mail (LGU): lgu@maths.uct.ac.za

Although six different taxa of the genus *Cacosternum* have been described from the Eastern Cape and KwaZulu-Natal provinces in South Africa, only three have been regarded as valid by most workers during the last few decades. These were *Cacosternum n. nanum*, *C. n. parvum* and *C. boettgeri*. Two other taxa, *C. boettgeri albiventer* and *C. striatum* were best considered synonyms of *C. nanum* and *C. boettgeri* respectively. Consensus as to the validity of *C. poyntoni*, known only from a single specimen, remains contentious. Members of this genus are polymorphic and identification by means of morphological characters has been notoriously difficult. The functioning of advertisement calls in species mate recognition is well accepted as a useful means for investigating taxonomic complexities. We collected and analysed call data from numerous populations in this region and found that at least six different call pattern types can be distinguished. These results enabled us to propose a new taxonomic arrangement: *C. n. parvum* elevated to specific status, confirmation of *C. striatum* as a valid species and two species are currently undescribed.

A strange new bufonid from the Eastern Arc Mountains, Tanzania.

Alan Channing[1] and W.T. Stanley[2]

[1] Zoology Department, University of the Western Cape, Private Bag X17, Bellville, 7535, South Africa

[2] Division of of Mammals, Field Museum of Natural History, 1400 South Lakeshore Drive, Chicago, IL, USA

Specimens of a large tree toad, characterised by large discs, no parotids, and a metallic colour, were collected from the Eastern Arc. A phylogenetic analysis using characters derived from osteology, myology and others (based on a previous

study by Grandison 1981), demonstrate that this species (1) can not be placed in any currently recognised genus, and (2) has affinities with a complex of genera from West Africa. We erect a new genus to accommodate this species.

Callulina kisiwamsitu, a new microhylid frog from the West Usambara Mountains, Tanzania.

Rafael De Sa[1] and Alan Channing[2]

[1] Department of Biology, University of Richmond, Richmond, Virginia 123456, USA. Email: rdesa@richmond.edu

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The monotypic genus *Callulina* was erected to accommodate a microhylid taxon, *C. kreffti*. *Callulina* resembles the genus *Probreviceps* but differs from *Probreviceps* because it has large discs on the fingers and toes (Nieden 1911). The genus *Callulina* is endemic to Tanzania, and is only known to occur in the Usambaras, Ulugurus, Ngurus, and Udzungwa mountains (Frost 1999). During an amphibian survey in Tanzania 1999–2000, we were able to record the advertisement call of *Callulina* from Mazumbai Forest Reserve, West Usambaras. Subsequent comparisons with advertisement calls from *Callulina* from the East Usambaras indicated that these two populations of *Callulina* represent two separate taxa. Herein we describe this new species as *Callulina kisiwamsitu* on the basis of morphology and a different advertisement call. The specific name derives from the Swahili kisiwa (island) and msitu (forest), and refers to the habitat of this species, which is now just a remnant forest that once covered the West Usambara mountains.

Preliminary data for an amphibian monitoring program on the mountains of the Western Cape, South Africa.

Christabel Geland and Alan Channing
Zoology Dept., University of the Western Cape, Private Bag X17, Bellville, 7535, South Africa. E-mail: (CG) cgeland@uwc.ac.za (AC) achanning@uwc.ac.za

The Landdroskop Mountain Range forms part of the Cape Fold Mountains and falls under the jurisdiction of the Hottentots Holland Nature Reserve, which is located in the Grabouw area, south western Cape, South Africa. There are hiking trails that lead through the mountain range and it is uncertain as to the extent of the potential damage that these activities might cause to the environment and more

importantly to the frogs that inhabit this area. There are 14 known frog species from this mountain range. Landdroskop is rich in anuran life, as there is a seepage area through which the rain water drains and the soils become water-logged in the rainy season. The high levels of endemicity in the area require that monitoring should be introduced as the recently described frog, *Athroleptella landdrosia*, is already listed in the Red Data book as being near endangered and *Capensibufo rosei*, is described as being vulnerable. Results from a one year study indicate that *Afrana fuscigula*, *Arthroleptella villiersi* and *Breviceps montanus* are good candidates for long-term monitoring.

What can the DAPTF do for African amphibians?

Tim Halliday (International Director, DAPTF)

Africa presents a particular challenge to the DAPTF because, unlike many other parts of the world, local networks of interested and involved people do not exist in most countries. We seek, in collaboration with other local and international organisations, to create local Working Groups who will: (1) set up long-term monitoring programmes, (2) identify any amphibian population declines that have occurred or are occurring, and (3) investigate potential causes of such declines. In this talk, I will review the activities that the DAPTF is already supporting in Africa and will discuss future projects in which we might get involved.

Chytridiomycosis in amphibian populations in the Western Cape, South Africa.

Samantha Hopkins[1] and Alan Channing[1]

[2]Zoology Department, University of the Western Cape, Private Bag X17, Bellville 7535, South Africa, email (SH): shopkins@uwc.ac.za (AC): achanning@uwc.ac.za

There have been many cases reported of amphibian populations declining. These are often due to anthropogenic factors. However, some declines have not had an obvious cause and many of these have been investigated and hypothesised to be due to a chytrid fungus that was first described in 1998. The chytrid fungus has since been found in frog populations throughout the world. The population declines that have been associated with chytridiomycosis have occurred in relatively undisturbed areas such as national parks. The declines tend to occur at higher altitudes or in colder climates. When declines are detected not all of the species at the site are affected. In Africa chytridiomycosis has already been seen in Kenya and South Africa. Using histological techniques the presence of chytridiomycosis

was investigated in populations of frogs from the Western Cape. Toe clippings were taken from frogs that had been collected for other surveys and tested for the fungus. Preliminary results of the survey will be presented.

Reproductive biology of African caecilians (Amphibia: Gymnophiona).

Simon P Loader, Mark Wilkinson and David J Gower
Department of Zoology, The Natural History Museum, London SW7 5BD, UK

Reproductive biology of frogs and salamanders is relatively well documented in comparison to the meagre available data on caecilians. Despite this, there is clear evidence that caecilian reproductive biology is remarkably diverse and that it has important evolutionary implications. Previously, invalid conclusions and generalities have resulted from uncritical appraisals of the limited available data. Future progress will be made by obtaining much more complete data on the basic biology of caecilian species, and interpreting this in a robust phylogenetic framework. I will briefly review current knowledge of the reproductive biology of African caecilians, which show the full range of major reproductive strategies employed by the Order. This includes oviparity with a larval stage (*Sylvacaecilia*), oviparity with direct development (*Boulengerula*), and viviparity (*Schistometopum*, *Scolecomorphus*, and *Geotrypetes*). Caecilians, including those from Africa, also show a range of parental care strategies. New data will be presented on some details of the reproductive biology of the East African *Boulengerula* and *Scolecomorphus*. Arguments will be presented for the recognition of at least two modes of viviparity in caecilians. It is hoped that this talk will generate interest in the natural history of these cryptic animals, because much is still to be discovered.

Initialisation of a long-term amphibian anuran survey in the Kenyan Highlands.

Stefan Lötters[1], Damaris Rotich[2], Joachim Kosuch[1] and Michael Veith[1]

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[2] National Museums of Kenya, Herpetology Department, Museums Hill, PO Box 40658, Nairobi, Kenya. E.mail: koskei1dam@wananchi.com

Global amphibian decline currently is a controversial issue. One aspect to judge upon this phenomenon needs (i) long?term observations of (ii) ecologically comparable species in (iii) similar habitats, carried out with (iv) standardised methods among (v) different areas of the globe. These are the goals of GADAG, the Global

Amphibian Diversity Analysis Group (www. gadag.org). At the present state, GADAG focuses on anurans in three different tropical regions with the aim to define monitoring basics and standards which later will be adopted in additional regions. One of GADAGÆs study regions comprise the Kenyan highlands, linked to the biodiversity and global change project BIOLOG–BIOTA (of the German Ministry of Education and Research, in cooperation with the National Museums of Kenya). In five areas (Kakamega, Mount Elgon, Mount Kenya, Aberdares, Runda) we are currently (i) selecting indicator species belonging to specific eco?functional types as well as populations of these species suitable for a monitoring, (ii) defining and testing monitoring standards for amphibian populations in the tropics, (iii) analysing diversity patterns of amphibian communities and compare them with other animal and plant communities that are monitored within the BIOLOG–BIOTA framework. In a subsequent phase, we (iv) will start a long?term monitoring of anuran communities as well as of the relative abundance of species and (v) will analyse diversity patterns and diversity changes of the amphibian community and of demographic and genetic population characteristics of selected species. GADAG is introduced and the development and current status of the amphibian survey in the Kenyan highlands, which has started by May 2001, is summarized.

Invasive populations of *Xenopus laevis* (Daudin) in Chile.

J. Measey & G. Lobos
Laboratorio de Hidronomia, Facultad de Ciencias Forestales, Universidad de Chile, Santiago, Chile

Invasive populations of *Xenopus laevis* are known from the UK, USA, and Chile, although there is poor documentation of the latter. Currently, four administrative Regions in Chile are reported as having established populations. Fieldwork during austral winter 2001 was made in order to assess the impact of *X. laevis* populations, in two localities, from population density and diet. At one site, fewer than 30 adults were captured and a population 4 times this size was estimated. At the second site, nearly 2 000 adults were trapped and a population of nearly 20 000 was estimated. This yielded density estimates of 0.37 and 0.25 clawed frogs m?2 respectively. However, significant bias in the sex ratio of animals caught at each site suggests that the populations may be even larger. Stomach contents of a sub?sample of animals revealed a diet consisting primarily of zoobenthic and zooplanktonic components. Further work is required to assess the extent to which this highly invasive anuran affects the biodiversity of indigenous aquatic invertebrate, fish and amphibian populations.

Are caecilians rare? Some preliminary methods for assessing population size and density of subterranean amphibians.

J. Measey[1], D. Gower[1], O. Oommen[2], and M. Wilkinson[1]

[1] Department of Zoology, The Natural History Museum, Cromwell Road, London. SW7 5BD

[2] Department of Zoology, University of Kerala, Kariavattom, Thiruvananthapuram, India

Caecilians (Amphibia; Gymnophiona) are regularly described as rare, enigmatic fauna of tropical soils; a statement concordant with the experience of many herpetologists. Yet, there are some publications which describe these animals as common or even abundant. Given that no quantitative estimates of caecilian density or population size exist, it is necessary to define these characteristics before establishing whether some species are either common, rare or even endangered. Toward this goal, we present some preliminary methods for estimating caecilian population size and density, concluding that some species are indeed common and found in assemblages at high densities.

Monitoring frogs at a mopane woodland site.

L. R. Minter

School of Health Sciences, University of the North, Sovenga, Republic of South Africa

Frog activity associated with a temporary impoundment in mopane woodland at Hans Merensky Nature Reserve, Limpopo Province, South Africa, has been monitored continuously from September 2000 to present. Data are collected every night, two hours after sunset, by means of an aural survey and strip transect, while weather variables, viz: rainfall, relative humidity, air temperature, barometric pressure, wind speed and direction, are measured at 30 minute intervals by means of a computerised, Davis Weather Station. Eighteen frog species have used this site for breeding during the study period, while four other species breed elsewhere on the Reserve. This paper describes seasonal and temporal patterns in the observed activity of 11 frog species at the site, between September 2001 and March 2002. Two major breeding events took place during this period. While rainfall is a strong predictor of breeding activity for all species in spring and early summer, this is not the case later in the rainy season. Some interesting observations with regard to the reproductive biology of certain species are noted. The logistics of establishing and maintaining continuous monitoring sites of this nature are discussed. Discussion is invited on the feasibility of establishing a network of frog monitoring/study sites in Africa which could provide valuable ecological and biological information which is presently lacking for the majority of African amphibians.

Altitudinal species turnover in southern Tanzania shown by anurans: Results of a transect.

J.C. Poynton
Department of Zoology, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK

A transect in southeastern Tanzania was used to investigate the pattern of altitudinal species turnover, and to compare the pattern with those shown by transects taken further south. The transect was divided into 50 m intervals. The overall trend is a fairly steady reduction in species number with increasing altitude. The frequency of species boundaries does not show general clustering, consequently no clear indication is given of a strong relationship between high species turnover and high species richness. The Tanzanian transect resembles the southern transects in suggesting a major grouping into lowland and highland sets, with opposing and overlapping subtraction margins to form a replacement-transition zone. A distributionally and taxonomically complex assemblage of species occurs in the transition zone. A comparison of similarity values taken between montane ridge and coast shows a higher species turnover (low similarity value) in Tanzania. Both lowland and highland faunas have more species than equivalent faunas to the south; the highland fauna is particularly rich in genera not known to occur further south. Yet overall, the pattern of altitudinal turnover shown in the Tanzanian transect is consonant with the pattern shown in the southern transects.

The origin of a complex reproductive trait - phytotelm breeding in Mantellid frogs.

Christina Richards
Department of Biological Sciences, Wayne State University, Detroit, Michigan.

Many lineages of tropical anurans have evolved novelties for breeding in plant-held water bodies (phytotelmata). It is often assumed that this is a relatively derived trait and the ancestral condition was pond-breeding.However, this has never been explicitly tested and it is possible that phytotelm breeding evolved from other ancestral conditions (e.g., stream breeders) or is not a derived breeding strategy at all. To examine the origin of this trait, we adopted a phylogenetic approach using frogs from the mantellid genera *Mantidactylus* and *Mantella* to test the hypothesis that phytotelm breeders evolved from pond-breeders. Five species in *Mantidactylus* and one in *Mantella* are obligate phytotelm breeders. The remaining species in this diverse lineage (> 100 species) includes pond and stream breeders, and direct developers. We sequenced 12S, 16S and tRNA mitochondrial

genes from twenty species of *Mantidactylus* and nine *Mantella* including all phytotelm-breeders and nearly all putative species groups.These data indicate that all phytotelmic *Mantidactylus* are monophyletic and are sister to the members of the subgenus *Guibemantis* (pond breeders).Phytotelmic *Mantella* (*M. laevigata*) are also apparently derived from pond breeding ancestors. We conclude that phytotelm breeding has evolved independently in *Mantella* and *Mantidactylus* from separate pond-breeding ancestors.

Leaf litter anuran assemblages of different forest habitats in West Africa – Independent populations or distinct species assemblages?

Mark-Oliver Roedel and Raffael Ernst
University of Wuerzburg, Department of Animal Ecology and Tropical Biology (Zoology III), Biocenter, Am Hubland, D-97074 Wuerzburg, Germany

Interspecific interactions are usually complex in natural communities, but abiotic factors and phylogenetic history are just as important in structuring communities and etermining the distribution and abundance of species. There is an ongoing debate about the way in which communities are organized. Communities are either seen as integrated, repeatable, tightly structured species assemblages that evolved as units, or they are viewed as the result of species-specific responses to the particular set of physiological constraints imposed by particular features of the environment. Our analyses of the leaf litter anuran assemblages of Tai National Park, Côte d'Ivoire by means of niche overlap analysis, non-metric-multidimensional-scaling, and Mantel-test comparison revealed that the observed multivariate structure is only weakly influenced by biotic interactions and therefore most likely not the sole result of past or present species interactions. Results indicate that different life histories are likely to explain the observed pattern. In primary forest, distinct species assemblages existed but could be explained by geographic proximity and therefore the existence of common local species pools. Assemblages in secondary forest were predictable based on environmental parameters. This is due to physiologically more restrictive conditions allowing only highly adapted or tolerant species to survive.

Reflections on the *Hyperolius viridiflavus* Group.

Arne Schiøtz
Zoological Museum, Copenhagen, Denmark

The *Hyperolius viridiflavus* group or superspecies is a characteristic group within

the genus, sharing a common morphology and biology, but showing a greater variation in colour-pattern than probably any other species in the animal kingdom. The group consist of a few forms from clearings ("farmbush") in the central-west African forest belt, and a bewildering array of widely different forms throughout the tropical savanna. The different forms are conventionally termed subspecies, a terminology that can be criticised but serves as a convenient, short-hand way of labelling. The species structure in the group has been much disputed, and the group has been regarded as consisting of as few as two species (*H. viridiflavus* in the savanna, *tuberculatus* in forest) and as many as more than 25. The justification for this is discussed, and especially the author's belief that there are two basic groups in the savanna, characterized by essentially different patterns of variation, such as in the one group the re-appearence of the same pattern in widely separated localities; also a number of cases of sympatry, consistently between a member of each of the two groups. The status of the South African "*marmoratus*-forms" is ambiguous. Recent studies of mtDNA have given valuable further insight into the systematic structure, beyond the (irrelevant?) dorsal pattern. A recent study of about half the recognized "subspecies" concludes by proposing a splitting up of these into no fewer than ten full species. The necessity and practicability of such a splitting is discussed.

An Overview of the Amphibians of Ethiopia.

Stephen S. Spawls
Sandford English School, P. O. Box 30056, Addis Ababa, Ethiopia

Although a recent comprehensive review of the snake fauna has been published (Largen & Rasmussen 1993), the overall complex herpetofauna of Ethiopia remains only partially understood. Largen has produced a checklist of the amphibian fauna of Eritrea (1997) and numerous revisions of various Ethiopian amphibian taxa over the last 3 decades. A slide-illustrated overview of Ethiopian amphibian species is presented.

Confirmation of Chytridiomycosis in South Africa.

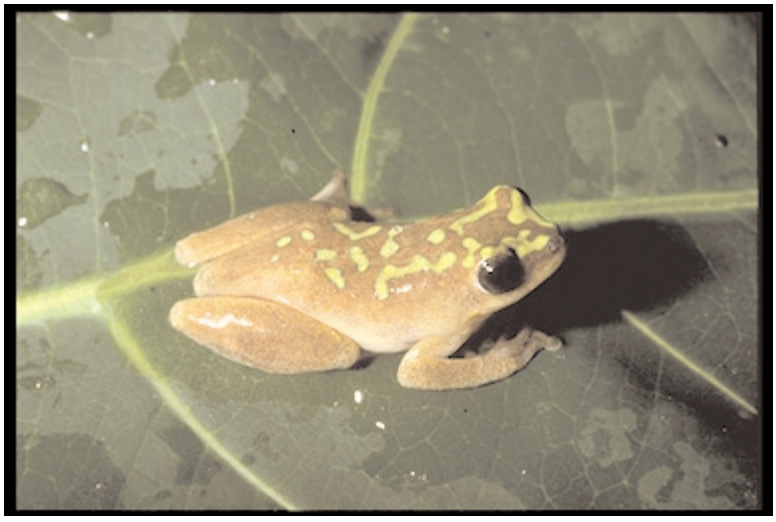
Ché Weldon and Louis du Preez
School of Environmental Sciences and Development, Potchefstroom University, South Africa

Surveillance of the infectious disease chytridiomycosis has effectively been carried out in Australia and the USA. This study documents the first surveillance of the amphibian disease in South Africa. After the first record of *Batrachochytrium*

dendrobatidis in South Africa was found in 2000 our understanding of its epidemiology and distribution was limited to it occurring somewhere in the Western Cape and in the host *Xenopus laevis*. This study aims to combine the correlations in historical information with new information on the distribution of the chytrid to better understand the disease.

Xenopus laevis were collected from various farm dams in the Western Cape during September 2001 and February 2002. Screening for the chytrid was performed by removing a piece of webbing and subjecting it to histology and standard H&E staining. Fixed specimens were obtained from South African Museums and screened in a similar way. These include four species of the genus *Xenopus* from Southern Africa.

Preliminary results of achieved specimens revealed that the chytrid was present in central South Africa since the early 70s. No pattern of dissemination is so far discernable from positive records. The chytrid is present throughout most of the area that has been covered by the initial survey in the Western Cape, indicating a dense distribution. Prevalence of the chytrid within sub samples of populations range between 30 and 50%, which is consistent with findings in Australia. The evidence indicates that the chytrid is present in frogs intended for export for the scientific trade. Investigation of the conduct of vendors in the field shows that no precautions are taken when collecting frogs from the wild to prevent the dissemination of anuran diseases between collection sites. Work on this project is ongoing and we aim to generate answers on the eluding subject of the origin of the chytrid.



Hyperolius rubripes(?) *mariae*(?)
Arabuko-Sokoke Forest

Chiromantis xerampelina nests
Arabuko-Sokoke Forest

Phrynomerus bifasciatus
Arabuko-Sokoke Forest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