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## ARTICLES

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### THE HERPETOFAUNA OF ABUKO NATURE RESERVE, THE GAMBIA

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**T**HE Gambia is situated on the North Atlantic coastline of West Africa. It is a small country of only 11,300 km<sup>2</sup>, with a population of 1,038,175 in 1993 and an annual population growth rate of nearly 5% (Baldeh et al., 1997). The Gambia is entirely surrounded by the much larger country of Senegal to the north, east and south, whilst in the west it is bounded by the Atlantic. With a typical tropical climate, The Gambia has two well-defined seasons. The rainy season extends from June through to October, while November to May forms the dry season. Although small, The Gambia is important zoogeographically as it sits astride a number of habitat transition zones and is also the northernmost outpost for lowland forest in the region. In the west of the country the main habitat is southern Guinea savannah, which develops into Sudan savannah as one travels eastward. On the north bank of the River Gambia the Sudan savannah is slowly being encroached by the Sahel. Lowland forest is represented in the country by a few patches of swamp forest and remnant gallery forest, the most famous of which is Abuko Nature Reserve.

#### **Herpetological recording in The Gambia**

There has been very little recording of amphibians and reptiles in The Gambia as a whole. Many of the existing records have been centred on

the south bank of the River Gambia, particularly in the west of the country (Håkansson, 1974 & 1981; Miles et al., 1978; Moiser & Barber, 1994; Pauwels & Meirte, 1996). Abuko is the location that has received most of the attention with Ängeby (1976), Johnson (1997) and Starin & Burghardt (1992) confining their work to within the nature reserve. Gruschwitz et al. (1991a & 1991b), Håkansson (1974 & 1981), Moiser & Barber (1994) and Pauwels & Meirte (1996) have also contributed significantly to our knowledge of the herpetofauna at Abuko. Before the present study took place, there were seven species of amphibian and 30 species of reptile recorded at Abuko. Only a few expeditions have recorded amphibians and reptiles further east in The Gambia, most notably Andersson (1937) and Gruschwitz et al. (1991a & 1991b) on MacCarthy Island and in the River Gambia National Park respectively. Almost nothing is known about the amphibian and reptile fauna on the north bank of the River Gambia, except for at the sacred crocodile pool at Berending (Håkansson, 1981; Moiser & Barber, 1997).

#### **Abuko Nature Reserve**

Located only 25 km from the capital city of Banjul, in the Western Division, Abuko is the smallest nature reserve in Africa being only 105 ha

in size. The main part of Abuko was established as a nature reserve in 1968, and extended to its present size in 1978. Previously it had been fenced and protected as a water catchment area since 1916 (Gorman & Wally, 2000). A patch of gallery forest stands along the banks of Lamin Stream within the reserve, and this gradually dries out to form Guinea savannah the further you go from the stream towards the boundaries of the reserve. The extent and quality of the gallery forest appears to be diminishing, due at least in part to the increasingly low water table in the country as a whole. Lamin Stream once flowed throughout the year but now only flows during the rainy season. The stream bed has been dammed in a few places to preserve the water levels in four pools throughout the drier part of the year. Abuko Nature Reserve is surrounded on three sides by an unfenced buffer zone of similar size to the reserve itself. The headquarters of the Department of Parks and Wildlife Management (DPWM) are located in the buffer zone adjacent to the reserve. The buffer zone has suffered badly from the effects of illegal grazing and wood harvesting.

### **Dwarf Crocodile Pools**

A Bristol University Dwarf Crocodile Project (DCP) was undertaken at Abuko from 1988 to 1990. As a part of this project the Bristol team created four small pools in the gallery forest, in the hope of attracting Dwarf Crocodiles and improving their breeding success in the reserve. In 1990 the staff of the reserve added a fifth pool. In an effort to 'rediscover' this species during the present survey, the senior authors inspected the DCP pools during the rainy season of 1999 and found that the original butyl rubber linings had rotted through. Only one pool held a significant amount of water, even immediately after heavy rainfall. However, the original irrigation system of buried pipes set up by the DCP was still functioning. Funds were sought and obtained from the conservation committee of the British Herpetological Society to reline four of the pools, this time with gravel and cement, in order to make



Renovation of the Dwarf Crocodile pools at Abuko Nature Reserve.

them more permanent features. The work on the pools was completed in June 2000, just before the onset of the rainy season. In addition a hide was constructed overlooking one of the pools to aid future research efforts.

### **Herpetological Survey of Abuko Nature Reserve**

The senior authors have been living adjacent to Abuko since March 1999, when they took up their present posts with DPWM. They have recorded all amphibian and reptile species found in the reserve on a casual basis during this period.

From June to the end of December 2000, two drift fences were established in Abuko with the purpose of recording amphibians, reptiles, and small mammals. The first fence was erected in an area of gallery forest adjacent to a large permanent

pool. The second one was erected in Guinea savannah adjacent to an area that has been known to flood in the recent past, forming a large shallow pool. Each fence was 30 m long, with pitfalls placed every 3 m. The fences were constructed from local materials (rice bags sown together for the barriers and cooking oil containers with their tops removed as the pitfalls) in an effort to find a cheap and reliable method of gathering data on amphibians and reptiles in The Gambia. This design met both of these criteria and the system will be extended to record the herpetofauna of the other protected areas in The Gambia by DPWM staff. Miss Christina Santoni, of St Mary's College of Maryland, worked at Abuko with DPWM staff for two and a half weeks during June and July 2000. She inspected the drift fences every morning and identified (as far as was possible) the catches. Miss Lyndsay Gale, a volunteer conservation worker from England, continued to check the fences with staff during August and September for amphibians and reptiles, although her main area of interest lay in small mammals.

In addition the authors also undertook regular nocturnal searches during the summer of 2000, primarily for the Dwarf Crocodile. Other amphibians and reptiles encountered were also recorded on a casual basis. On three nights counts of the Nile Crocodiles in the reserve were also carried out.

A small number of voucher specimens of most species, including all new species for The Gambia, were sent to Greg Schneider of the Zoology Museum of Michigan University for determination. Colin McCarthy of The Natural History Museum (London) kindly identified *Lamprophis fuliginosus* from a preserved specimen and *Pelusios castaneus* from photographs.

## SPECIES ACCOUNTS

### AMPHIBIANS

#### *Silurana tropicalis*

The Forest Clawed Toad has been previously recorded in Abuko by both Gruschwitz et al.

(1991a) and Jones (1990). During the present survey it was frequently encountered in the gallery forest drift fence throughout the rainy season, though in far greater numbers during August and September. One individual was also captured in the Guinea savannah drift fence during September.

#### *Bufo maculatus*

Previously unrecorded in The Gambia, two specimens of this toad were encountered during the present survey in Abuko, one in the savannah part of the reserve and another in the gallery forest drift fence. According to Rödel (2000) this species occupies humid savannahs and gallery forest habitats in West Africa, with Guinea and Sierra Leone being the nearest countries to The Gambia where it has been previously recorded.

#### *Bufo pentoni*

Penton's Toad was recorded in Abuko for the first time during the present survey, where small numbers were caught in the savannah drift fence in June and July.

#### *Bufo regularis*

The Common African Toad was the most commonly recorded of the *Bufo* species in Abuko during the present survey but surprisingly has only been recorded previously by Håkansson (1974), who states that one was found being eaten by *Crotapholpeltis hotamboeia*. Commonly encountered during both the dry and rainy seasons in all habitats, large congregations of this toad were especially common around the lights of the DPWM headquarters (located in the buffer zone). On one occasion a specimen of *Naja melanoleuca* was observed to eat three large *B. regularis* in the space of only five minutes. *Bufo regularis* was also observed to be a prey item of *Varanus niloticus*.

#### *Bufo xeros*

The Savannah Toad was recorded in Abuko for the first time during the present survey, where small numbers were caught in both drift fences in June, August and September.

*Hemismus marmoratus*

The Shovel-nosed Frog was recorded in Abuko for the first time during the present survey. Many hundreds of these frogs were captured at the beginning of the rainy season in the gallery forest drift fence, especially following a night of rain. Smaller numbers were recorded throughout the rest of the rainy season in both drift fences and one specimen was excavated from the soil below a small tree stump (about 30 cm deep) in September 1999.

*Ptychadena oxyrhynchus*

The Sharp-nosed Rocket Frog was not found in Abuko during the present survey but has been previously recorded by Gruschwitz et al. (1991a) during October and November 1990.

*Ptychadena trinodis*

This grass frog was recorded in Abuko for the first time during the present survey. One specimen was caught in the buffer zone during October 2000.

*Ptychadena bibroni*

The Broad-banded Grass Frog has been recorded previously by Gruschwitz et al (1991a) in Abuko, under the synonym *P. macCarthyensis* (see Rödel, 2000). During the present survey one adult of this species was located in December 2000 inside the sewerage system serving the wildlife department headquarters, in the buffer zone.

*Hoplobatrachus occipitalis*

The Groove-crowned Bullfrog has been recorded previously by Gruschwitz et al (1991a) in Abuko. This species was recorded in large numbers around the permanent pools during the rainy season, as well as in the surrounding gallery forest. A number of these frogs were trapped in the underground reservoir of the old pumping station adjacent to the pools, where they could be observed from the vertical access shafts throughout the year. Adult frogs were found after the rainy season in the Dwarf Crocodiles pools, where a few large tadpoles, presumably of this species, were also located.

*Phrynobatrachus latifrons*

This small puddle frog was recorded in Abuko for the first time during the present survey. Two specimens were caught in the gallery forest drift fence, one each in June and July.

*Phrynobatrachus francisci*

This small puddle frog has been previously recorded in Abuko by Gruschwitz et al. (1991a) in the gallery forest. During the present survey 51 specimens were caught in the gallery forest drift fence but only six in the Guinea savannah drift fence, all during the early part of the rainy season in June and July.

*Leptopelis viridis*

This tree frog was recorded in Abuko for the first time during the present survey. It was caught in low numbers in both drift fences. It was also observed on a few occasions in the gallery forest during nocturnal searches.

*Leptopelis bufonides*

This tree frog has been previously unrecorded in The Gambia. During the present survey two specimens were caught in the Guinea savannah drift fence, one each in June and July. According to Rödel (2000) this frog occurs in arid open savannahs of the Guinea and Sudan zone, and has previously been recorded in Senegal.

*Hyperolius concolor*

This tree frog has been previously unrecorded in The Gambia. During the present survey one specimen was caught in the buffer zone of Abuko, during September 1999. According to Rödel (2000) this species occurs in gallery forests and savannah ponds in the vicinity of gallery forests, and the nearest country where it has been previously recorded is Guinea.

*Hyperolius occidentalis*

This tree frog has been previously recorded in Abuko by Gruschwitz et al. (1991a) and Joger (1981). It was not recorded during the present survey.



*Kassina senegalensis*, the Senegal Running Frog.



*Leptosiaphis nimbaense*, previously unrecorded in The Gambia.

#### *Africalus fulvovittatus*

This reed frog was recorded in Abuko for the first time during the present survey. One specimen was caught in the gallery forest drift fence in June and several males were captured whilst calling from grass stems in a flooded area adjacent to the reserve in August.

#### *Kassina senegalensis*

The Senegal Running Frog was recorded in Abuko for the first time during the present survey. Large numbers were heard calling from the banks of a flooded area adjacent to the reserve and smaller numbers within the reserve itself during August and September 2000. Two voucher specimens were taken from the pool for confirmation.

#### *Kassina fusca*

The Pale Running Frog was recorded in Abuko for the first time during the present survey. A small number of this species were caught in the Guinea savannah drift fence during June. One other specimen was captured in a flooded temporary pool adjacent to the reserve during August.

## REPTILES

### Chelonians

#### *Kinixys belliana nogueyi*

Bell's Hinged Tortoise has been previously recorded in the savannah of Abuko by Mr. Eddie

Brewer (Gruschwitz et al., 1991a). This species was not recorded during the present survey.

#### *Pelusios c. castaneus*

The West African Mud Turtle was recorded in Abuko for the first time during the present survey, although Gruschwitz et al. (1991a) recorded an unknown species of *Pelusios* in 1990 and 1991. One large specimen was caught in the gallery forest drift fence in August.

## Snakes

#### *Typhlops punctatus*

The Spotted Blind Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b) in 1990. During the present survey one specimen of this species was caught in the gallery forest drift fence in July and one in the Guinea savannah drift fence in August.

#### *Leptotyphlops narirostris*

Previously unrecorded in The Gambia, six specimens of this thread snake were caught in the Guinea savannah drift fence in June and July. One specimen of a *Leptotyphlops* species was previously recorded by Håkansson (1974) from Sifoe, in The Gambia (25 km from Abuko). *Leptotyphlops narirostris* is widespread in West Africa (Colin McCarthy, pers. comm.).



African Rock Python with DPWM staff and the authors at Abuko Nature Reserve. The specimen was caught after it had eaten a vulture, and was later released back into the reserve.

#### *Python regius*

The Royal Python has been previously recorded in Abuko by Gruschwitz et al. (1991b) and Håkansson (1981). The principle authors also found a 1.3 m python in a public toilet during a previous visit to Abuko in April 1998. During the present survey one 1.3 m specimen was found in a storeroom at the DPWM headquarters (located in the buffer zone) during July 1999. This was later released near the education centre.

#### *Python s. sebae*

The African Rock Python is a well-recorded member of the herpetofauna in Abuko (e.g. Brewer, 1985; Gruschwitz et al., 1991b; Håkansson, 1974 & 1981 and Starin & Burghardt, 1992). During the present survey a 3.3 m python was observed twice (late in the evening on both occasions) during the summer of 1999 in the same patch of Guinea savannah. In 1999 a 4.6 m python was retrieved from the hyena cage in the animal orphanage (after eating a Hooded Vulture, *Necrosyrtes monachus*) and in 2000 a 4 m python was retrieved from another cage in the animal orphanage after eating a captive Black-crowned Crane, *Balearica pavonina*. Both snakes were

released near the education centre in the reserve. Various anecdotal accounts gathered from tourists visiting the reserve include one account of a large python observed eating a Bushbuck, *Tragelaphus scriptus*, in the savannah. Starin & Burghardt (1992) reported that several pythons had been killed

and eaten by Nile Crocodiles, *Crocodylus niloticus*, in the permanent pools in Abuko.

#### *Grayia smithi / G. tholloni*

Smith's Water Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b), based upon a photograph published in Brewer (1985). However, Pauwels & Meirte (1996) appear to cast some doubt on this record as it is not verified by collected material. They also mention the presence of *G. tholloni* in The Gambia, presumably inferring that this latter species might be the one photographed in Abuko. This species was not recorded during the present survey.

#### *Lamprophis fuliginosus*

The Common House Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b), and Håkansson (1981) as *Boadon fuliginosum*. During the present survey one small (30 cm) specimen of this species was found by reserve staff under a stone at the DPWM headquarters, located in the buffer zone.

#### *Lycophidion semicinctum albomaculatum*

The Wolf Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b) during 1990. One specimen of this species was found dead on a road adjacent to the reserve during September 2000. This specimen had recently caught and eaten a female Agama, *A. agama*.

*Lycophidium irroratum*

Previously unrecorded in The Gambia, one small specimen of this wolf snake was caught in the gallery forest drift fence in June. The nearest country to The Gambia where this species has been previously recorded, is Sierra Leone (Colin McCarthy, pers. comm.).

*Prosymna meleagris*

The Shovel-snouted Snake was recorded in Abuko for the first time during the present survey. One specimen was caught in the Guinea savannah drift fence in September.

*Gastropyxis (Hapsidrophys) smaragdina*

Håkansson (1981) has previously recorded the Emerald Snake in Abuko during 1975 and 1976. This species was not recorded during the present survey.

*Psammophis elegans*

The Slender African Beauty Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b) and Håkansson (1981). During the present survey this species proved to be the most commonly seen in the reserve.

*Psammophis sibilans*

The African Beauty Snake was recorded in Abuko for the first time during the present survey. Several specimens were encountered in both gallery forest and Guinea savannah.

*Psammophis phillipsi*

The Olive Sand Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b) and Håkansson (1981). This species was not recorded during the present survey.

*Philothamnus irregularis*

The Common Bush Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b). This species was not recorded during the present survey.

*Dasypeltis fasciata*

The Savannah Egg-eating Snake was recorded in

Abuko for the first time during the present survey. A single specimen was encountered in the gallery forest in July 2000 being mortally wounded by a party of Brown Babblers, *Turdoides plebejus*, that were possibly protecting their nest site.

*Crotaphopeltis hotamboeia*

Håkansson (1974 & 1981) has previously recorded the Herald Snake in Abuko. He records one specimen found in the evening eating a toad (*Bufo regularis*). This species was not recorded during the present survey.

*Telescopus variegatus*

The West African Cat Snake has been previously recorded in Abuko by Gruschwitz et al. (1991b). This species was not recorded during the present survey.

*Dispholidus typus*

The Boomslang has been previously recorded in Abuko by Gruschwitz et al. (1991b). This species was not recorded during the present survey.

*Elapsoidea semianulata moebiusi*

The Ground Cobra has been previously recorded in Abuko by Gruschwitz et al. (1991b). This species was not recorded during the present survey.

*Naja melanoleuca*

The Forest Cobra has been previously recorded in Abuko by Gruschwitz et al. (1991b), Håkansson (1981) and Starin & Burghardt (1992). This species was recorded several times during the present survey in both main habitats as well as around the wildlife department headquarters in the buffer zone. One shed skin found in December 2000 was 2.34 m long, with a girth of 10 cm at mid-body.

*Naja nigricollis*

The Spitting Cobra has been previously recorded in Abuko by Gruschwitz et al. (1991b). This species was not recorded during the present survey.

*Dendroaspis viridis hallowelli*

The Green Mamba has been previously recorded in Abuko by Gruschwitz et al. (1991b), Håkansson (1974 & 1981) and Starin & Burghardt (1992). During the present survey a large specimen over 2 m in length was encountered several times around the headquarters of the wildlife department in the buffer zone of the reserve.

*Bitis a. arietans*

The Puff Adder has been previously recorded in Abuko by Gruschwitz et al. (1991b), Håkansson (1981) and Starin & Burghardt (1992). This species was not recorded during the present survey.

**Lizards**

*Mabuya affinis*

The Brown-flanked Skink has been previously recorded in Abuko by Gruschwitz et al. (1991a) and Håkansson (1981). During the present survey this species was common in both main habitats throughout the year and three were caught in the gallery forest drift fence in June. In September 1999 a batch of four eggs of this species were found half-buried in sand and were hatched successfully in captivity. Juveniles have also been recorded on several occasions during the rainy season.

*Mabuya perrotetii*

The Orange-flanked Skink has been previously recorded in Abuko by Gruschwitz et al. (1991a), Håkansson (1981) and Pauwels & Meirte (1996). During the present survey this species was recorded only during the rainy season.

*Leptosiaphis nimbaense*

Previously unrecorded in The Gambia, one specimen of this Snake-eyed Skink was caught in the Guinea savannah drift fence in June. This species commonly appears in the literature as *Panaspis nimbaensis* or *P. nimbensis*. It has been previously recorded from Guinea and Ivory Coast (Colin McCarthy, pers. comm.).

*Varanus n. niloticus*

The Nile Monitor is a well-known species in Abuko, where it has been recorded several times (e.g. Brewer, 1985; Gruschwitz et al, 1991a; Håkansson, 1981; Moiser & Barber, 1994 and Starin & Burghardt, 1992). During the present survey, Nile Monitors were frequently encountered in every habitat throughout the year. Most adult specimens recorded were between 1-2 m in length. Juveniles were recorded during the early part of the rainy seasons.

*Varanus e. exanthematicus*

Brewer (1985), Gruschwitz et al. (1991a) and Håkansson (1981) have previously recorded Bosc's Monitor in Abuko. This species was not recorded during the present survey.

*Agama agama*

Only Brewer (1985) has previously recorded the Agama, or Rainbow Lizard, in Abuko. During the present survey this lizard was the commonest species seen, possibly because of its large size and confiding habits. It was recorded in gallery forest and Guinea savannah, as well as around buildings. Juveniles were also commonly recorded.

*Chamaeleo gracilis*

The Graceful Chamaeleon has been previously recorded in Abuko by Gruschwitz et al. (1991a). During the present survey several specimens were recorded during 1999 and 2000 in the gallery forest and Guinea savannah, but only during the rainy season.

*Chamaeleo senegalensis*

The Senegal Chamaeleon has been previously recorded in Abuko by Gruschwitz et al. (1991a) and Håkansson (1981). During the present survey several specimens were recorded during 1999 and 2000 in the gallery forest, but only during the rainy season.

*Tarentola ephippiata*

The Fig Tree Gecko has previously been recorded at Abuko by Gruschwitz et al. (1991a) and Håkansson (1974 & 1981). During the present



survey this species was found to be common around the offices of the DPWM headquarters (situated in the buffer zone) as well as inside several of the man-made structures such as hides and toilets in the gallery forest and Guinea savannah areas.

#### *Hemidactylus brooki angulatus*

Brook's House Gecko has been previously recorded in Abuko by Gruschwitz et al. (1991a) and Håkansson (1974). This species was not recorded during the present survey.

### **Crocodiles**

#### *Crocodylus niloticus*

The Nile Crocodile is a well-known species in Abuko, where it has been recorded several times (e.g. Brewer, 1985; Gruschwitz et al., 1991a; Håkansson, 1974 & 1981; Moiser & Barber, 1994 and Starin & Burghardt, 1992). Johnson (1997) counted a maximum number of ten individual animals on two occasions in June 1997 and stated that two nest sites were known to be used in that year. The Nile Crocodile was present throughout the present survey and three nocturnal counts were carried out between May 1999 and June 2000. The number of animals present varied between 18 and 20, including all age classes. At least one nest site was used during 1999 and four hatchlings were observed just a few hours after hatching in July. One adult crocodile of 3-4 m in length has been observed on several occasions.

#### *Osteolaemus tetraspis*

The Dwarf Crocodile was shown to have bred in Abuko during 1989 by the DCP. The last known breeding prior to this appeared to be in 1981/82 (Jones, 1990). Starin & Burghardt (1992) reported six dwarf crocodiles (ranging in size from 0.2-1.2 m) in one puddle, some time between 1978 and 1983. The DCP drew to a close in 1990 and it is unknown whether Abuko's Dwarf Crocodiles have bred again since then, or indeed, even if the small population of crocodiles is still extant within the reserve. During the summer months of 2000

regular nocturnal searches for Dwarf Crocodiles were conducted around the pools and in other areas of the flooded forest and adjacent *Raphia* Palm swamps. Unfortunately this species was not recorded during the present survey. Abuko and its surroundings are thought to be the only location in The Gambia where Dwarf Crocodiles have ever occurred (Gruschwitz et al., 1991a; Håkansson, 1974 & 1981).

### **CONCLUSIONS**

During a survey of the herpetofauna of Abuko Nature Reserve during 1999 and 2000, 17 species of amphibian and 23 species of reptile were recorded. Of the amphibians, three species had not been previously recorded in The Gambia and 12 had not been recorded in Abuko before. Of the amphibian species that have been recorded in the past in Abuko only two were not located during the present survey. Of the 23 species of reptiles recorded in the present survey three had not been previously recorded in The Gambia and seven had not been recorded before in Abuko. 14 species of reptile that have been recorded previously in Abuko were not located during the present survey. The total number of species now recorded at Abuko Nature Reserve is 19 amphibians and 37 reptiles.

Abuko Nature Reserve remains the most comprehensively studied and recorded area in The Gambia for amphibians and reptiles. The variety of new species seen during the current survey reflects the lack of recording that has taken place in the past and the new methodologies employed (i.e. drift fences) in the recent survey. It is also an indication of what may be discovered in the rest of The Gambia, which remains largely unsurveyed for its herpetofauna.

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