

### The reptile fauna of The Gambia, West Africa

CRAIG EMMS<sup>1</sup>, MALANG DK JAMBANG<sup>1</sup>, OUSMAN BAHL<sup>1</sup>, BINTA MANKALI<sup>1</sup>, LUC PAZIAUD<sup>2</sup> and LINDA BARNETT<sup>3\*</sup>

<sup>1</sup> *Makasutu Wildlife Trust, Darwin Field Station, Abuko Nature Reserve, The Gambia*

<sup>2</sup> *Gambia Reptile Farm, Kartong, The Gambia*

<sup>3</sup> *Institute of Education, University of Warwick, Coventry, CV4 7AL, U.K.*

[\*address for correspondence: *Froglife, 9 Swan Court, Cygnet Park, Peterborough PE7 8GX, U.K.*]

BETWEEN March 1999 and July 2005 CE and LB surveyed the amphibians and reptiles of The Gambia by undertaking a survey of the marine turtles: Barnett *et al.* (2004), and by using drift fences in 2000, 2002 and 2004/5. The results of the amphibian survey have been published in Emms *et al.* (2005). In 2003 staff from Makasutu Wildlife Trust (MWT) and members of the British Army Ornithological Society (BAOS) surveyed the River Gambia during 'Exercise Night Heron' identifying and counting the aquatic reptiles (Barnett & Emms, 2005a). In addition MWT and the government Department for Parks and Wildlife Management (DPWM), Luc Paziaud of the Gambia Reptile Farm based in Kartong, and Rowland Jordan, an ex-pat based in the Bijolo/Kololi area have provided a free service to remove 'troublesome' snakes from people's compounds, releasing them into protected areas. This service provides a fairly regular source of information on the distribution of snake species within the western part of The Gambia. The Gambia Reptile Farm opened in 1999. It is an educational and research establishment licensed by DPWM, which has had some degree of success at breeding snakes and keeping a variety of reptiles in captivity.

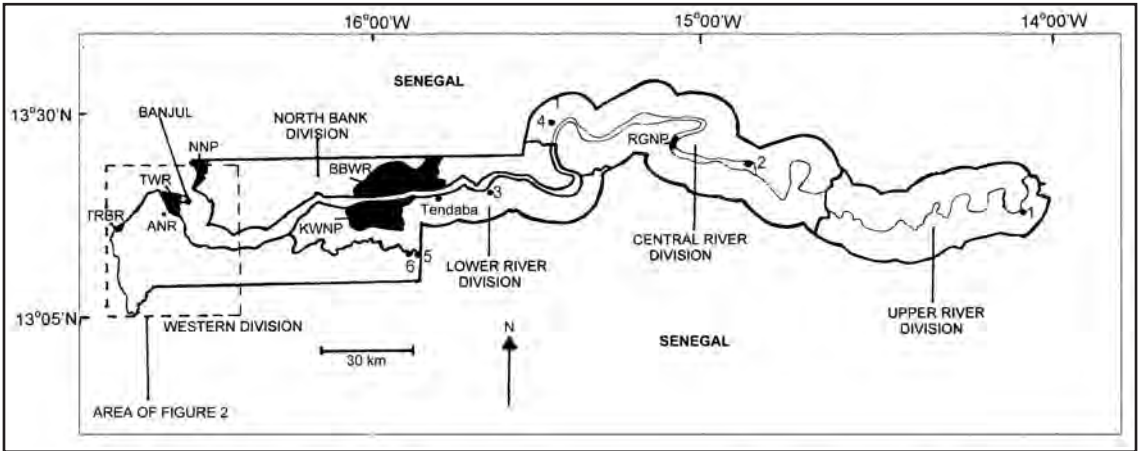
In this paper we have collated the data from the existing literature including unpublished material from our own surveys and casual records to form an up-to-date checklist for The Gambia.

#### The Gambia

The Gambia lies on the western coast of tropical Africa and has a land mass of only 11,300km<sup>2</sup>. The

much larger country of Senegal surrounds it to the north, east and south (see Figure 1). The local climate is characterized by a long dry season from mid-October to early June, followed by a short rainy season from mid-June through to early October. July and September are the hottest months of the year when average daytime temperatures climb to around 30°C. The coolest part of the year is from December to mid-February, with average daytime temperatures of 24°C. Average rainfall per year is 1020 mm, but this is not evenly spread throughout the country with the western half of the country receiving up to 1,700 mm while in the east it may be as low as 800 mm.

The main habitats of The Gambia include a coastal strip of moist scrub and forest. Mangroves are well represented, especially around the mouth of the River Gambia and extend up the river for over 200 km. The main terrestrial habitats are moist southern Guinea savannah in the Western Division and in some parts of the North Bank Division. This is a habitat of tall trees growing fairly close together, forming closed canopy woodland. This gradually changes into Sudan savannah as you travel eastwards, a drier habitat with shorter trees spaced much further apart. A few relict patches of gallery forest still exist such as Abuko Nature Reserve (ANR), Pirang Forest and the 'big forest' at Makasutu Culture Forest (MCF). Parts of the river bank and several islands are also cloaked in gallery forest along the freshwater parts of the river. Freshwater marshes cover a fairly large proportion of Central River Division and ephemeral marshes are present in the Upper River Division during the rainy season.



**Figure 1.** Map of The Gambia showing the regional divisions and protected areas. ANR = Abuko Nature Reserve; BBWR = Bao Bolon Wetland Reserve; KWNP Kiang West National Park; NNP = Niumi National Park; RGNP = River Gambia National Park; TBR = Tanji Bird Reserve; TWC = Tanbi Wetland Complex; 1= Fatoto; 2 = MacCarthy Island; 3 = Toniataba; 4 = Belel Forest Park; 5 = Sintet; 6=Kalagi.

However, many of these habitats are disappearing as more land is cleared for agriculture, including rice cultivation, and the amount of woodland cover and marshland in The Gambia is decreasing. The main reason for this fast degeneration appears to be the growing human population, numbering some one and a half million individuals in 2003, and making The Gambia the fourth most densely populated country in Africa. Many forests and woodlands are also subject to annual bushfires in the dry season, which further degrade these habitats. Over hunting, over fishing and over exploitation of other natural resources also appears to be a major problem facing Gambian biodiversity though this is largely undocumented and unquantified.

## METHODOLOGY

Casual records have been kept for all reptiles located in the country between March 1999 and July 2005. During 1999-2001, information was also collected and collated on the marine turtles: Barnett *et al.* (2004).

### Drift Fences

From June to September 2000, two drift fences were used in ANR: Barnett *et al.* (2001). During

June 2002 seven drift fences were erected in western Gambia. Between May 2004 and July 2005 two drift fences have also been monitored in ANR by the staff of MWT as part of the capacity building and research undertaken on the Darwin Initiative Project funded by DEFRA of the UK Government. Details of the 2002 and 2004/2005 methodology have been published in Emms *et al.* (2005).

### River Gambia Expedition

‘Exercise Night Heron’ was a collaborative venture between MWT and the BAOS, supported by the Gambian National Army and River Gambia Excursions. This boat-based expedition took place over eleven days in March 2003 and surveyed the River Gambia from Tendaba, a point just to the east of Kiang West National Park (KWNP), to the Gambian/Senegalese border beyond Fatoto in the Upper River Division. MWT staff (CE and LB) concentrated on surveying the river and its banks for mammals and reptiles while the BAOS members concentrated on the birds (Barnett & Emms, 2005a).

### Identification of specimens

Some specimens were collected for identification purposes and as voucher material and are stored at the Zoology Museum of the University of Michigan, and the Darwin Field Station, ANR (in 70% ethanol). Registration numbers are provided for specimens retained in museums from the current surveys. The specimens have been identified by Greg Schneider of the Zoological Museum of the University of Michigan, by Eli Greenbaum of the Division of Herpetology of the

University of Kansas (*Chalcides armitagei*), by Roger Bour of the Paris Museum of Natural History (photographs of *Trachemys s. scripta*, *Pelomedusa subrufa olivacea* and *Pelusios castaneas*) and by Barry Hughes (photographs of *Toxicodryas blandingii*).

## RESULTS

In the following systematic account we have included all known locations (except in a few cases where there are just too many to list), with references, for the individual species. Locations in the western half of Western Division are shown in Figure 2. Species new to The Gambia (i.e. previously unpublished) are marked with an asterix, \*.

### Order Chelonia

#### FAMILY TESTUDINAE

*Kinixys belliana nogueyi* Loveridge, 1953. Bell's hinged tortoise.

Widespread though not at all common (see Figure 3g). Most commonly encountered during the rainy season and believed to aestivate during the latter part of the dry season. Recorded in the coastal strip of Tanbi Wetland Complex (TWC); Barnett *et al.* (2000), Fajara (pers. obs.), ANR; Gruschwitz *et al.* (1991a), Sukuta; Håkansson (1981), Brikama, MCF, Sittanunka (pers.obs.) and MacCarthy Island; Andersson (1937) as subspecies *nogueyi*.

*Kinixys erosa* Gray, 1831. Serrated or Forest hinged tortoise.

Recorded by Loveridge & Williams (1957) and by Villiers (1958). The authors give no detail of the locations.

#### FAMILY DERMOCHELYIDAE

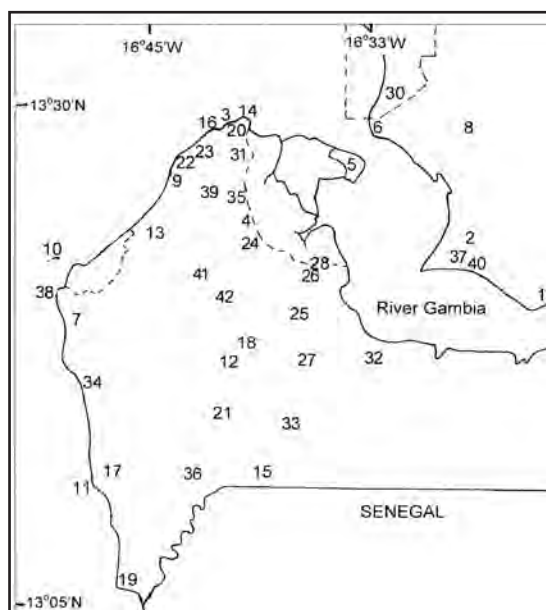
*Dermochelys coriacea* (Vandelli, 1761). Leatherback turtle.

Recorded as dead animals stranded on beaches at Solifor Point and Fajara; Barnett *et al.* (2004).

#### FAMILY CHELONIIDAE

*Chelonia mydas* (Linnaeus, 1758). Green turtle.

The commonest marine turtle and the only one nesting on Gambian beaches (June through to October), probably in low numbers; Barnett *et al.* (2004).



**Figure 2.** Map of the western half of Western Division, The Gambia showing the location of 1. Albreda; 2. Aljamdu; 3. Bakau; 4. Bakoteh; 5. Banjul; 6. Barrakunda; 7. Batakonko; 8. Berending; 9. Bijilo; 10. Bijol islands; 11. Bolon Fenyo; 12. Brikama; 13. Brufut; 14. Cape St. Mary; 15. Dimbaya; 16. Fajara; 17. Gunjur; 18. Kabafita Forest Park; 19. Kartong; 20. Katchikally; 21. Kiti; 22. Kololi; 23. Kotu stream; 24. Lamin; 25. Makasutu Culture Forest; 26. Makumbaya; 27. Mandinaba; 28. Mandinari; 29. Marakissa; 30. Niji Bolon; 31. Old Jeshwang; 32. Pirang Forest; 33. Radville Farm; 34. Sanyang Community Forest; 35. Serrekunda; 36. Sifoe; 37. Sittanunka; 38. Solifor Point; 39. Sukuta; 40. Toubakolong; 41. Towtoo; 42. Yundum.

Recorded by Gruschwitz *et al.* (1991a), being identified from confiscated carapaces held at the wildlife department. Also along the coast at Niuni National Park (NNP), Brufut, Tanji River Bird Reserve (TRBR), Bijol Islands, Solifor Point and Kartong by Barnett *et al.* (2004), Bolon Fenyo near Gunjur (pers. obs.) and Jinack Island; Barnett *et al.* (2000).

*Eretmochelys imbricata* (Linnaeus, 1766). Hawksbill turtle.

Uncommon to rare visitor to Gambian offshore waters. Identified by Gruschwitz *et al.* (1991a) from confiscated carapaces held at the wildlife department, and Barnett *et al.* (2004) from a confiscated carapace of a turtle reportedly caught by fishermen off Gunjur.

*Lepidochelys olivacea* (Eschscholtz, 1829). Olive ridley turtle.

Infrequent visitor to Gambian offshore waters. Recorded by Gruschwitz *et al.* (1991a) and identified by Pauwels & Meirte (1996) from confiscated carapaces held at the wildlife department. Barnett *et al.* (2004) made a single observation of a severed head of this species taken from a turtle reportedly captured off Gunjur.

#### FAMILY TRIONYCHIDAE

*Cyclanorbis senegalensis* (Duméril & Bibron, 1835). African flapped soft-shelled terrapin.

Three records exist: Andersson (1937) on MacCarthy Island and Jones (1990) without details of location. Eva-Maria Minuth recorded it at Marrakissa (pers. comm.).

*Trionyx triunguis* (Forskål, 1775). African or Nile soft-shell turtle.

Recorded twice; in the Gambia River by Loveridge & Williams (1957) and in Barrakunda by Reeve (1912).

#### FAMILY EMYDIDAE

*Trachemys s. scripta*\* (Schoepff, 1792). American red-eared terrapin.

One specimen recorded in Kotu Stream in 2002 (pers. obs.). Confirmed by Roger Bour from photographs (see Figure 3c). It is assumed that this individual was a pet that had been released as this species is not native to Africa.

#### FAMILY PELOMEDUSIDAE

Freshwater turtles and terrapins appear to be relatively common in the River Gambia. During Exercise Night Heron in 2003, 15 unidentified turtles were recorded in the river in Central River Division and Upper River Division.

*Mauremys leprosa* (Schweigger, 1812). Stripe-necked turtle.

Recorded by Loveridge & Williams (1957) in the Gambia River and by Villiers (1958) with no location, both times as *Clemmys leprosa*.

*Pelomedusa subrufa olivacea*\* Loveridge, 1941. Marsh or Helmeted terrapin.

Recorded in 2003 (pers. obs.) in Fajara, determined by Roger Bour from photographs (see Figure 3b).

*Pelusios adansonii* (Schweigger, 1812). Adanson's hinged terrapin.

Recorded by Jones (1990) and is mentioned as a possibility by the National Environment Agency (1997). Although there appears to be no reference to specimens taken in The Gambia, Miles *et al.* (1978) did discover this species in the Casamance (southern Senegal) and therefore its presence in The Gambia remains a distinct possibility.

*Pelusios c. castaneus* (Schweigger, 1812). West African mud turtle.

Widespread and common, found in both brackish and fresh water. Recorded in Banjul; Böhme (1978), Gunjur (in a well in a garden), Kartong, ANR, Albreda and Sittanunka (pers.obs.) and MacCarthy Island; Andersson (1937) (as *P. subniger*). Recorded by Jones (1990) without details of location. An unidentified *Pelusios* species, probably of this species was recorded by Gruschwitz *et al.* (1991a) in ANR.

### Order Squamata

#### FAMILY LEPTOTYPHLOPIDAE

*Leptotyphlops narirostris* Villiers, 1950. Thread snake.

Recorded in ANR, where it is commonly forced above ground by floods during the rainy season; Barnett *et al.* (2001). In addition an unidentified species of *Leptotyphlops* was recorded in Sifoe (in a rotten palm trunk); Håkansson (1974). Four specimens are stored at the Zoology Museum, University of Michigan (UMMZ 227299-302).

*Rhinoleptus koniagui* (Villiers, 1956). Thread snake. Recorded by Jones (1990) with no details of its location. There appears to be no mention of specimens taken so this record should be treated with caution until supporting voucher material is obtained.

#### FAMILY TYPHLOPIDAE

*Typhlops punctatus* (Leach, 1819). Spotted blind snake.

Widespread though difficult to say whether or not it is common. Most specimens are seen at times of heavy flooding during the rainy season, or by farmers ploughing their land. Recorded in ANR;



Gruschwitz *et al.* (1991b) and Barnett *et al.* (2001) and Fajara (pers. obs.), Sittanunka; Barnett & Emms, (2002), NNP; Barnett *et al.* (2000) and MacCarthy Island; Andersson (1937). Seven specimens are stored at the Zoology Museum, University of Michigan (UMMZ 227303, UMMZ 227304, UMMZ 229245-229249).

#### FAMILY BOIDAE

*Gongylophis muelleri*\* Boulenger, 1892. Sand boa (see Figure 3d).

Recorded in Bao Bolon Wetland Reserve (BBWR); Barnett & Emms (2002). The specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229244).

*Python regius* (Shaw, 1802). Royal python. Much less common than the rock python, though still fairly widespread. Recorded in Gunjur and Old Jeshwang (pers. obs.), ANR; Gruschwitz *et al.* (1991b), Barnett *et al.* (2001) and Håkansson, (1981), Towtoo and MCF (pers. obs.), the TWC; Barnett *et al.* (2000), Kartong, Sittanunka, Aljamdu and Toubakolong (pers. obs.) and MacCarthy Island; Andersson (1937). Jones (1990) recorded this species with no details of location.

*Python sebae* (Gmelin, 1788). Northern/Central African rock python.

Widespread and common though larger specimens are scarcer than they were a decade or so ago. Recorded by many herpetologists; e.g. Gruschwitz *et al.* (1991b), Barnett *et al.* (2001) and Håkansson (1974 and 1981). Adults and juveniles (August) have been seen on a regular basis at ANR during the 2004-5 survey.

#### FAMILY COLUBRIDAE

*Crotaphopeltis hotamboeia* (Laurenti, 1768). Herald or White-lipped snake.

Extremely widespread and common. Recorded by Gruschwitz *et al.* (1991b), Håkansson (1974), Andersson (1937) and in ANR on a regular basis during the 2004-5 survey. Prey items include *Bufo regularis* (Håkansson, 1974). Three specimens are stored at the Zoology Museum, University of Michigan (UMMZ 227438, UMMZ 229235, and UMMZ 229236).



**Figure 3a.** Armitage's skink, *Chalcides armitagei* (preserved specimen).

*Dasypeltis fasciata* Smith, 1849. Western forest egg-eating snake.

Fairly widespread and common. Recorded in Cape St Mary; Gans (1959), ANR; Barnett *et al.* (2001), Kartong, Sukuta and Sittanunka (pers. obs.). Jones (1990) recorded this species with no details of location. One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 227295).

*Dasypeltis scabra*\* (Linné, 1758). Common egg-eating snake.

Recorded in TRBR; Barnett & Emms (2002), Kartong, Sittanunka and Toubakolong (pers. obs.). One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229237).

*Dispholidus typus* (Smith, 1829). Boomslang.

Recorded in ANR (Gruschwitz *et al.*, 1991b) and Albreda (de Rochebrune, 1884).

*Grayia smithi* (Leach, 1818). Smith's water snake. Recorded in ANR (Gruschwitz *et al.* 1991b) based upon a photograph supplied by Mr Edward Brewer OBE. The only other record is by de Rochebrune, 1884 (as *Graya silurophaga*) and labelled simply as 'Gambie'. Although both of these records are unsupported by collected material this species does appear to be a likely candidate for inclusion in the Gambian checklist as it has been recorded in south-eastern Senegal and in Guinea Bissau (Chippaux, 2001). However, these records should be treated with caution until a voucher specimen has been obtained.

*Grayia tholloni* Mocquard, 1897. Thollon's water snake.

Recorded in Kotu Stream (Hughes, 1983). The specimen is stored at the Natural History Museum, London and has been positively identified by Hughes (1983), and Pauwels & Meirte (1996).

*Hapsidrophys smaragdina* (Schlegel, 1837). Emerald snake.

Recorded in the remnant patch of gallery forest in ANR; Gruschwitz *et al.* (1991b) and Håkansson (1981). Jones (1990) recorded this species with no details of location. There have been three recent sightings in ANR during June, July and November 2005 (pers. obs.).

*Lamprophis fuliginosus* (Boie, 1827). Brown house snake.

Widespread and fairly common. *Lamprophis fuliginosus* is expected to be iridescent black in life, becoming grey in preservative, but without any sign of lines (see also note under *L. lineatus*). A specimen from Fajara stored at the Natural History Museum, London (1956.1.7.76) has been identified by B. Hughes as *L. fuliginosus* (pers. comm.). Also recorded in Kartong (pers. obs.) and ANR; Gruschwitz *et al.* (1991b) and Barnett *et al.* (2001), NNP; Barnett *et al.* (2000), Sittanunka and Toubakolong (pers. obs.), and MacCarthy Island; Andersson (1937) as *Boaedon fuliginosum*. Jones (1990) recorded this species (as *Boaedon fuliginosum*) with no details of location.

*Lamprophis lineatus* (Duméril, Bibron & Duméril, 1854). House snake.

Differs from *L. fuliginosus* in that it is light brown with yellow head lines, with one or two often prolonged onto the body. Barry & Hughes (1969) treated *L. fuliginosus* and *L. lineatus* as separate species, although Roux-Estève and Guibé (1965) concluded that the lack of differences in scalation meant they were of the one species. Recorded twice in ANR; Barnett *et al.* (2001) and once in Kartong (pers. obs.). Two specimens are stored at the Zoology Museum, University of Michigan (UMMZ 229238, UMMZ 229239).

*Lamprophis virgatus* (Hallowell, 1856). Braid house snake.

Recorded in Fajara; Håkansson (1974) as *Boaedon*

*virgatus* and Håkansson (1981) as *B. virgatum*, and in Sittanunka (pers. obs.).

*Lycophidion semicinctum* (Duméril, Bibron & Duméril, 1854). Wolf snake.

Records of this species in The Gambia appear to be confused with *L. albomaculatum* which was originally classified as a distinctive subspecies of *L. semicinctum*. Condamin (1994) has subsequently treated *L. semicinctum* as a separate species from *L. albomaculatum* which has been followed by Chippaux (2001). It is thus unclear which of the previous records refer to *L. semicinctum* as a full species although a specimen taken in September 2000 at ANR by Barnett *et al.* (2001) has been positively identified as this species. This specimen is stored at the Zoology Museum, University of Michigan (UMMZ 227296).

*Lycophidion albomaculatum* Steindachner, 1870. Wolf snake.

Widespread and fairly common – however see notes for the previous species, as this species has often been recorded as *L. semicinctum albomaculatum*. Recorded in Bakau; Håkansson (1981), Batakonko (EvaMaria Minuth pers. comm.), Kartong and Towtoo (pers. obs.) and ANR; Gruschwitz *et al.* (1991b) and Barnett *et al.* (2001), NNP; Barnett *et al.* (2000) and Sittanunka (pers. obs.). Jones (1990) recorded this species with no details of location. Prey items include *Agama agama* (Barnett *et al.*, 2001). One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229240).

*Lycophidion irroratum* (Leach, 1819). Wolf snake. Recorded in ANR; Barnett *et al.* (2001). This specimen is stored at the Zoology Museum, University of Michigan (UMMZ 227297).

*Meizodon coronatus*\* (Schlegel, 1837). African smooth snake.

Recorded at Sittanunka and Toubakolong (pers. obs.). One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 227436).

*Philothamnus irregularis* (Leach, 1819). Common bush snake.

Very widespread and common. Recorded by Andersson (1937), Loveridge (1958), Gruschwitz *et al.* (1991b), Barnett *et al.* (2000) and Jones (1990).

*Philothamnus semivariegatus* (Smith, 1847). Spotted bush snake.

Widespread and common. Recorded in Sanyang Community Forest, ANR, near Mandinari, MCF and BBWR (pers. obs.) and MacCarthy Island; (Andersson, 1937). The record in BBWR was of a snake being eaten by a Grey heron, *Ardea cinerea*.

*Prosymna meleagris* (Reinhardt, 1843). Shovel-snouted snake.

Fairly widespread, though not common. Recorded in Fajara, Kartong and Sittanunka (pers. obs.) and MacCarthy Island; Andersson (1937) as *P. m. laurenti*. This species has been synonymised with *P. m. greigerti* by Broadley (1980) who considered the MacCarthy specimen to be intermediate between the two subspecies. Jean-François Trape regards the two subspecies to be distinct species (Jean-François Trape, pers. comm.). Further investigation needs to be carried out in order to give us a clearer picture of this species in The Gambia.

*Prosymna greigerti* Mocquard, 1906. Shovel-snouted snake.

Recorded from St. Mary's Island (Banjul) and many times from neighbouring areas of Senegal (Jean-François Trape, pers. comm.). Please refer to notes in previous section.

*Psammophis elegans* (Shaw, 1802). Slender African beauty snake.

The most widespread and common member of its genus (possibly of all the snakes) in The Gambia. Recorded by many herpetologists including Gruschwitz *et al.* (1991b), Barnett *et al.* (2001) and Håkansson (1974 and 1981). Specimens have also been collected from Toniataba, Lower River Division; USNM 162152 and Kundang, MacCarthy Island; 162145 (Barry Hughes pers. comm.)

Other *Psammophis* spp.

*P. phillipsi* (Hallowell, 1844), *P. rukwae* Broadley,

1966 and *P. sibilans* (Linne, 1758) have all been recorded in The Gambia; Gruschwitz *et al.* (1991b), Barnett *et al.* (2001), Håkansson (1974 and 1981) and Pauwels & Meirte (1996). Whilst the occurrence of *P. phillipsi* does not seem to be disputed despite the paucity of specimens to support this, the occurrence of *P. sibilans* and *P. rukwae* appears to be more of a contentious issue.

The following specimens of *P. sibilans* have been collected from The Gambia; Gambia without locality (BMNH 46.10.23.24) from Whitfield Collection via Lord Derby, dated 1846 which is probably one of the first specimens collected from The Gambia; Cape St Mary (BMNH 1923.11.30.A; 1927.2.2.68), Farafenni (ZFMK 17564); MacCarthy Island by Andersson (1937) (NRM 5484) (Barry Hughes, pers. comm.).

Chippaux (2001) shows *P. sibilans* to be absent in this part of West Africa. Using the recently published key in Chippaux (2001), two specimens from the *Psammophis* genus stored at the Zoology Museum, University of Michigan (UMMZ 227439 and UMMZ 229241) previously identified as *P. sibilans* have been recently re-examined and shown to be *P. rukwae* (the specimens have divided anal scales and two dark longitudinal lines on their ventral surfaces).

Due to the current lack of specimens and the inherent taxonomic difficulties with this group of snakes, further collection and study of specimens is needed to obtain a clearer picture of the species occurring in The Gambia.

*Rhamphiophis oxyrhynchus*\* (Reinhardt, 1843). Western beaked snake (see Figure 3f).

Restricted to the north bank of the River Gambia. Recorded in BBWR; Barnett & Emms (2002), Toubakolong and Belel Forest Park (pers. obs.). One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 227437).

*Telescopus variegatus* (Reinhardt, 1843). West African cat snake.

Widespread but not common. Recorded in ANR; Gruschwitz *et al.* (1991b), in coastal scrub around Bijilo (Rowland Jordan, pers. comm.) and in KWNP; Barnett & Emms (2002). One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229242).





**Figure 3b.** Marsh or Helmeted terrapin, *Pelomedusa subrufa olivacea*.



**Figure 3c.** American red-eared terrapin, *Trachemys s. scripta*.



**Figure 3d.** Sand boa, *Gongylophis muelleri*.



**Figure 3e.** Senegal chameleon, *Chameleo senegalensis*.



**Figure 3f.** Western beaked snake, *Rhamphiophis oxyrhynchus*.



**Figure 3g.** Bell's hinged tortoise, *Kinixys belliana nogueyi*.



**Figure 3h.** Ground cobra, *Elapsoidea semiannulata moebiusi*.



*Toxicodryas blandingii*\* (Hallowell, 1844). Blanding's tree snake.

Recorded in the rafters of the headquarters building at TRBR in 1999. Barry Hughes identified the specimen as a young snake from photographs, the haloes around the black blotches being indicative of its age. This record is not surprising as previous records of this species in northern Senegal and Guinea Bissau straddle The Gambia (Chippaux, 2001).

#### FAMILY ATRACTASPIDIDAE

*Amblyodipsas unicolor* (Reinhardt, 1843). Western purple-glossed snake.

One voucher specimen from Makumbaya is stored at the Musée Royal d'Afrique Centrale, Tervuren, Belgium; Pauwels & Meirte (1996). Another specimen from ANR is stored at the Zoology Museum, University of Michigan (UNMZ 227298).

*Atractaspis atterima* Günther, 1863. Black burrowing viper.

Recorded by Jones (1990) with no location mentioned.

*Atractaspis dahomeyensis* Bocage, 1887. Brown burrowing viper.

Recorded by Jones (1990) with no location mentioned.

*Atractaspis irregularis* (Reinhardt, 1843)

The occurrence of this species is possible, although it remains unconfirmed at the present time. Pauwels & Meirte (1996) say that it is known to be present in The Gambia, albeit without quoting a referenced source. Despite the fact that the distribution map in Chippaux (2001) shows that its nearest incidence to The Gambia is southern Guinea, this is a common rainforest species and thus may occur in the gallery forest along the River Gambia.

#### FAMILY ELAPIDAE

*Dendroaspis viridis* Hallowell, 1844. Hallowell's green mamba.

Recorded in ANR, where it is fairly common; Gruschwitz *et al.* (1991b), Barnett *et al.* (2001),

Håkansson (1974 and 1981) and Starin & Burghardt (1992), Radville Farm; Barnett *et al.* (2001) and Pirang Forest Park; Ellenberg *et al.* (1988). Jones (1990) recorded this species (as *D. viridis hallowelli*) with no details of location.

*Elapsoidea semiannulata moebiusi* Werner, 1897. Ground cobra or Garter snake.

Fairly widespread but uncommon (see Figure 3h). Recorded in Kartong (pers. obs.) and ANR; Gruschwitz *et al.* (1991b) and Barnett & Emms (2002), Sittanunka (pers. obs.), River Gambia National Park (RGNP) (pers. obs. - swimming in the river). Jones (1990) recorded this species with no details of location. An old record for Guidimaka (Loveridge, 1944, from Håkansson, 1981) may be in either The Gambia or Senegal. One specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229243).

*Naja melanoleuca* Hallowell, 1857. Forest or Black cobra.

Common but seems to be found more in wetter areas. Appears to vary in its coloration in that snakes in the Western Division have very pale or white markings on their underside whilst those found in the more eastern part of the country have much darker yellow markings. Recorded by many herpetologists including Gruschwitz *et al.* (1991b), Barnett *et al.* (2001) and Andersson, (1937). Prey items include *Bufo regularis* (Barnett *et al.* 2001).

*Naja nigricollis* Reinhardt, 1843. Black-necked spitting cobra.

Common but is usually associated with more arid areas. In The Gambia the ventral bands on this species are pink. Recorded by Gruschwitz *et al.* (1991b), Andersson (1937) and Håkansson (1974 and 1981). Prey items include *Varanus niloticus* (pers. obs.).

#### FAMILY VIPERIDAE

*Bitis arietans* (Merrem, 1820). Puff adder.

Very widespread and common and seems to account for the majority of snake bites on humans (which are sometimes fatal). Recorded by Gruschwitz *et al.* (1991b), Barnett & Emms (2002), and Håkansson (1981).

*Causus maculatus* (Hallowell, 1842). Night adder. Previously recorded in The Gambia as *Causus rhombeatus* (Lichstenstein, 1823); Andersson (1937) who mentions three specimens from MacCarthy Island. He did not distinguish *C. rhombeatus* from *C. maculatus*, and Hughes (1977) later attributed all specimens from The Gambia to *C. maculatus*. The observation by Hughes that *C. rhombeatus* is absent from this area of West Africa has been followed by Chippaux (2001). *C. maculatus* has been recorded in Kartong in the current survey (pers. obs.).

*Echis ocellatus*\* Stemmler, 1970. Carpet viper. Uncommon to rare. Recorded in BBWR; Barnett & Emms (2002). This specimen is stored at the Zoology Museum, University of Michigan (UMMZ 229250).

#### FAMILY AMPHISBAENIDAE

*Cynisca feae* (Boulenger, 1905). Worm lizard. Widespread, at least in the Western Division, but has probably been overlooked elsewhere. Recorded in Brikama; Gans (1987), and Makumbaya, Brufut, Kiti and Mandinaba; Pauwels & Meirte (1996). Jones (1990) recorded this species with no details of location.

#### FAMILY SCINCIDAE

*Chalcides armitagei* Boulenger, 1922 Armitage's skink.

The only known vertebrate that is endemic to The Gambia (Emms & Barnett, 2005). Appears to forage in the sand at the top of beaches. The locations of the four known specimens span almost the entire length of the Gambian coast on the south bank of the River Gambia. First described by Boulenger (1922), who discovered two specimens, at least one of them labelled 'Cape St Mary'. Another specimen was discovered by Gruschwitz *et al.* (1991a) on a 'beach near Serrekunda'. In addition a living specimen was captured on the beach at Kartong in 2003 and was given to Luc Paziand for his reptile farm. This specimen later died and was confirmed as *C. armitagei* by Eli Greenbaum at the University of Kansas (see Figure 3a). In the wet season of 2005, two more individuals were found in the sand dunes at Kartong. Jones (1990) recorded this species

with no details of location and without a supporting specimen. Almost nothing is known of the biology of this species. One specimen is stored at the Darwin Field Station, ANR (DFS1).

*Panaspis nimbense* Angel, 1922. Snake-eyed skink. Recorded in ANR; Barnett *et al.* (2001) and Sittanunka; Barnett & Emms (2002). Both specimens are stored at the Zoology Museum, University of Michigan (UMMZ 227305, UMMZ 229256).

*Mabuya affinis* (Gray, 1838). Brown-flanked skink. Very widespread and common. Occurs in many different habitats and is active throughout the year. Eggs have been recorded in September in The Gambia (pers. obs.). Recorded by many herpetologists including Gruschwitz *et al.* (1991a), Barnett *et al.* (2001), Barnett & Emms (2002), Pauwels & Meirte (1996) and Håkansson (1974 and 1981). Six specimens are stored at the Zoology Museum, University of Michigan (UMMZ 181152, UMMZ 227306, UMMZ 229257-60).

*Mabuya perrotetii* (Duméril and Bibron, 1839). Orange-flanked skink.

Very widespread and common. Occurs in many different habitats, though appears to be active only during the rainy season and the early part of the dry season. Recorded by many herpetologists including Gruschwitz *et al.* (1991a), Barnett *et al.* (2001), Barnett & Emms (2002), Pauwels & Meirte (1996) and Håkansson (1974 and 1981). Seven specimens are stored at the Zoology Museum, University of Michigan (UMMZ 229261-229267).

#### FAMILY VARANIDAE

*Varanus exanthematicus* (Bosc, 1792). Bosc's or Western savannah monitor.

Once regarded as common but appears to be suffering from illegal hunting pressure as its flesh is considered good to eat. Aestivates during the dry season. Recorded near Gunjur, in Tanji (pers. obs.), ANR; Gruschwitz *et al.* (1991a) and Håkansson, (1981), Mandinari; Håkansson (1981), Pirang Forest Park; Emms & Barnett (2004), Sittanunka; Barnett & Emms (2002) and NNP; Barnett *et al.* (2000).

*Varanus niloticus* (Linnaeus, 1766). Nile monitor. Found in almost all habitats where there is water. Large specimens of up to two metres in length appear to be getting less common. Prey items include *Bufo regularis* (pers. obs.). Observed to be the prey of *Naja nigricollis* (pers. obs.) and the Ratel, *Mellivora capensis* (Michael Woods pers. comm.).

The closely related Ornate monitor, *Varanus ornatus* (Daudin, 1803), which has been treated as a subspecies of *V. niloticus* until recently, has not been confirmed in The Gambia. Böhme and Ziegler (1997) state that this species has a distributional pattern restricted to the upper Guinean and western lower Guinean forest block, with some records at the eastern margin of the latter. It therefore seems unlikely to occur in The Gambia.

#### FAMILY AGAMIDAE

*Agama a. agama* (Linnaeus, 1758). Agama. The Gambia's most common, widespread and conspicuous lizard. During the rainy season males develop bright coloration with yellow or orange-yellow on the head, bright blue on the body, legs and most of the tail, and a black tip to the tail. Recorded just about everywhere in the Western and North Bank Divisions e.g.; Gruschwitz *et al.* (1991a), Miles *et al.* (1978), Barnett *et al.* (2001), Pauwels & Meirte (1996), Håkansson (1974 and 1981).

*Agama weidholzi*\* Wettstein, 1932. Weidholz's agama. Recorded near KWNP in 2001; captured by Ms EvaMaria Minuth and determined by Prof. Dr. Wolfgang Böhme of Koenig Museum, Bonn, Germany (EvaMaria Minuth, pers. comm.).

#### FAMILY CHAMAELEONIDAE

*Chamaeleo gracilis* Hallowell, 1842. Graceful chameleon. Widespread and common and is often found in the same habitats as the Senegal chameleon. Recorded in Sifoe; Håkansson (1974), Gunjur (pers. obs.), ANR; Gruschwitz *et al.* (1991a), Barnett *et al.* (2001) and Håkansson (1981), Mandinari; Håkansson (1981), MCF (pers. obs.), NNP;

Barnett *et al.* (2000) and MacCarthy Island; Andersson (1937). Jones (1990) recorded this species with no details of location. Two specimens are stored at the Zoology Museum, University of Michigan (UMMZ 227434-5).

*Chamaeleo senegalensis* (Daudin, 1802). Senegal chameleon. Figure 3e.

Widespread and common. Recorded in Sifoe; Håkansson (1974), Kartong (pers. obs.), ANR; Gruschwitz *et al.* (1991a), Barnett *et al.* (2001) and Håkansson (1981), Mandinari; Håkansson, (1981), Pirang Forest Park; Ellenberg *et al.* (1988), NNP; Barnett *et al.* (2000) and MacCarthy Island; Andersson (1937). Jones (1990) recorded this species with no details of location.

#### FAMILY GEKKONIDAE

*Hemidactylus brooki angulatus* Hallowell, 1852. Brook's house gecko.

Widespread and common, especially around human habitation. Recorded in TWC; Barnett *et al.* (2000), Fajara; Håkansson (1974), Kotu (pers. obs.), Lamin; Gruschwitz *et al.* (1991a), ANR; Gruschwitz *et al.* (1991a), Håkansson (1974) and (pers. obs.), near Bakoteh; Pauwels & Meirte (1996), in Sintet & Kalagi; Miles *et al.* (1978), RGNP; Gruschwitz *et al.* (1991a), NNP; Barnett *et al.* (2000) and BBWR; Barnett & Emms (2002). Jones (1990) recorded this species with no details of location. Two specimens are stored at the Zoology Museum, University of Michigan (UMMZ 229252-3).

*Hemidactylus f. fasciatus* (Gray, 1831/1842). Banded gecko.

Recorded by Jones (1990) with no details of location. Branch & Rodel (2003) state that it is a forest dweller that might range into the savannah region by making use of gallery forests, so it could possibly be found in The Gambia.

*Hemitheconyx caudicinctus* (Duméril, 1851). Fat-tailed gecko.

Recorded at two locations. The first record reported in Gruschwitz *et al.* (1991a) was by Mr Edward Brewer OBE in Kabafita Forest Park in 1973. The second record in 2001 was in forest around Sittanunka (pers. obs.). Jones (1990) recorded this species with no details of location.



*Lygodactylus gutturalis* (Bocage, 1873). Painted or Forest dwarf gecko.

Widespread and common. Recorded in Bakau, Fajara, Kololi (pers. obs.), Sifoe; Håkansson, (1981), ANR and MCF (pers. obs.) and Tendaba; White (1984). One individual gecko was recorded living on a large wooden pirogue (a local type of boat) based at Lamin Lodge, which regularly plies the River Gambia to and from MacCarthy Island (pers. obs.). Jones (1990) recorded this species with no details of location.

White (1984) observed breeding in this species by captured specimens. They laid eggs from the end of January through to the end of July with an incubation period of 10–12 weeks. White also observed that this species includes ants and tree sap in its diet.

*Tarentola* spp.

Two species of gecko belonging to the genus *Tarentola* have been recorded in The Gambia. The Fig tree gecko, *Tarentola ehippiata* O'Shaughnesy, 1875 is most frequently encountered and probably widespread and common, especially around human habitation but also on fig trees. Recorded in Bakau; Gruschwitz *et al.* (1991a), Gunjur; Håkansson (1981), Sifoe; Håkansson (1974, 1981), Dimbaya (pers. obs.), TWC; Barnett *et al.* (2000), Yundum & Lamin; Gruschwitz *et al.* (1991a), ANR; Gruschwitz *et al.* (1991a), Barnett *et al.* (2001) and Håkansson (1974, 1981), near Bakoteh; Pauwels & Meirte (1996), in Kalagi; Miles *et al.* (1978), NNP and BBWR; Barnett *et al.* (2000). Jones (1990) recorded this species with no details of location. One specimen of this species is stored at the Zoology Museum, University of Michigan (UMMZ 229254).

The second species, *Tarentola annularis*\* (Geoffroy, 1798) has been recorded once from KWNP; Barnett & Emms (2002). The specimen which is stored at the Zoology Museum, University of Michigan (UMMZ 229255) is a juvenile and in poor condition. Interestingly Miles *et al.* (1978) caught a number of geckos in Sintet & Kalagi that they were unable to definitely assign to either of these species as they showed a mixture of *annularis* and *ehippiata* characters, as well as characters intermediate between the two taxa. In

addition, Joger (1984) identified specimens from Senegal adjacent to The Gambia as *T. ehippiata senegambiae*. In order to examine the variation of *Tarentola* individuals in The Gambia, it would thus be beneficial to collect further specimens in order to determine how many species are present.

## Order Crocodylia

### FAMILY CROCODYLIDAE

*Crocodylus cataphractus* Cuvier, 1825. African Slender-snouted crocodile.

Recorded on MacCarthy Island; Andersson (1937), RGNP in 1987 and Fatoto in 1970; Gruschwitz *et al.* (1991a). There was also a possible sighting in the RGNP by a member of the BAOS in March 2003 when a 'smallish crocodile with a long thin snout' surfaced very briefly next to a boat during Exercise Night Heron; Barnett & Emms (2005a). It may be possible that this species is surviving in low numbers in suitable parts of the River Gambia.

*Crocodylus niloticus* (Laurenti, 1768). Nile crocodile.

Fairly widespread and common, in both fresh and saltwater habitats. The sacred crocodile pools of Katchikalli (in Bakau), Kartong Folonko and Berending, along with ANR appear to form protected breeding populations from which crocodiles often disperse into the surrounding countryside. Recorded in Bakau; Moiser and Barber (1994) and Håkansson (1981), ANR; Gruschwitz *et al.* (1991a) and Barnett *et al.* (2001), Sintet; Miles *et al.* (1978), Kartong Follonko and sand mines; Moiser and Barber (1994) and Barnett & Emms (2000), MCF (pers. obs.), TWC; Barnett *et al.* (2000), Niji Bolon (pers. obs.), Berending; Moiser and Barber (1997) and Håkansson (1981), BBWR ; Barnett *et al.* (2000), MacCarthy Island; Andersson (1937), RGNP; Gruschwitz *et al.* (1991a) and the stretch of the River Gambia in between (pers. obs.).

*Osteolaemus t. tetraspis* Cope, 1861. African dwarf crocodile.

May now be extinct in The Gambia, though there are persistent rumours that it may still be extant in a few remote and unsurveyed forests in the country. The

Month	No. of days sampled	Habitat	Typhlopidae	Colubridae	Scincidae	Varanidae	Agamidae	Gekkonidae	Totals
July	11	GF			5	2			7
2004	11	GS			1				1
August	15	GF	1	1	2	1			5
2004	15	GS							0
September	15	GF			3				3
2004	15	GS		1	2				3
October	13	GF		3	2				5
2004	13	GS			1		2		3
November	7	GF	1	2	3			1	7
2004	7	GS	1						1
December	15	GF	2	3	2				7
2004	15	GS			1		1		2
January	14	GF			8				8
2005	14	GS							0
February	15	GF			9			1	10
2005	15	GS			1			2	3
March	9	GF			3				3
2005	9	GS							0
April	9	GF			3				3
2005	9	GS							0
May	11	GF			2				2
2005	11	GS			1			2	3
June	18	GF		1	4				5
2005	18	GS		1				1	2

only definite records have come from ANR; Jones (1990), Gruschwitz *et al.* (1991a), Starin & Burghardt (1992) and the area around ANR; Håkansson (1974) and (1981). Although the Dwarf Crocodile Project (Jones, 1990) attempted to reintroduce this species into ANR at the beginning of the 1990s, they have not been recorded there since.

### Drift Fence Catches in ANR

Monthly catches recorded in the drift fences located in the gallery forest and Guinea savannah habitats of ANR during the 2004–2005 survey are summarised in Table 1. Nine species of reptile were caught belonging to seven families. The greatest number of individuals were caught in the gallery forest drift fence (65 individuals of five species), and the greatest number of species in the Guinea savannah drift fence (18 individuals of eight species). Whereas *Typhlops punctatus*, *Crotaphopeltis hotamboeia*, *Mabuya affinis* and *Hemidactylus brooki angulatus* were caught in both fences, *Varanus niloticus* juveniles were only captured in the gallery forest fence and *Psammophis* sp., *Mabuya perrotetii*, *Agama agama* and *Tarentola* sp. in the Guinea savannah fence.

**Table 1.** Reptile drift fence catches in Abuko Nature Reserve. GF = Gallery Forest; GS = Guinea savannah.

The most regular and abundant species caught was *Mabuya affinis* (72% of the total catch in gallery forest and 39% in Guinea savannah) with numbers peaking in January and February. Geckos were the only other reptiles caught during the dry season, in single numbers. Other reptile species tended to be recorded during the wet season and for up to three months following the end of the wet season.

The results from the drift fence survey offer an insight into the relative abundancies of reptiles in the two habitats studied and provide guidance for obtaining the maximum number of species and individuals in future studies in The Gambia (drift fences should be sited in or near to forest habitat and surveys should be carried out during and just after the wet season).

### DISCUSSION

The information presented in this paper was collected through reviewing past records and papers and carrying out fieldwork, including gathering casual records, surveying the entire

coastline for marine turtles, surveying almost the entire length of the River Gambia, establishing and monitoring drift fences at various times and translocating 'troublesome' snakes, during the period 1999–2005. During this period ten new species have been added to the Gambian checklist; *Trachemys s. scripta*, *Pelomedusa subrufa*, *Gongylophis muelleri*, *Dasypletis scabra*, *Meizodon coronatus*, *Rhamphiophis oxyrhynchus*, *Toxicodryas blandingii*, *Echis ocellatus*, *Agama weidholzi*, and *Tarentola annularis*. The study has also extended the known range of several species within the country and brings the number of reptile species recorded in The Gambia to 74 species. Through reviewing and collating the available data from published records it has become apparent that some of the species records for The Gambia are not corroborated with specimens (or even good quality photographic evidence). Such a situation makes it difficult to be absolutely certain about the validity of some of the species listed here. In the species descriptions we have therefore endeavoured to highlight areas where more specimen collection would help to clarify the situation (e.g. the *Prosymna*, *Psammophis*, *Tarentola*, *Lamprophis* and *Atractaspis* species), especially when it may be necessary to revisit specimens for re-determination. In addition, the recent work of Chippaux (2001) provides us with distribution maps of some snake species that have been recorded in both northern and southern Senegal, but not in The Gambia. Further herpetological research in The Gambia is therefore likely to reveal as yet unrecorded reptile species for the country (e.g. *Dromophis praeornatus* (Schlegel, 1837), *D. lineatus* (Duméril, Bibron & Duméril, 1854), *Naja haje* (Linné, 1758), *N. katiensis* Angel, 1922, *Dendroaspis polylepis* Günther, 1864). In addition, the sand and grass snakes may include *Psammophis sudansensis* Werner 1919 which has recently been acknowledged to occur in Senegal (Hughes, pers. comm.).

As with most of the biodiversity in The Gambia, almost nothing is known of the reptile fauna of the country east of BBWR and KUNP and much more work needs to be done to survey this area. Potential good areas for reptiles include the border

areas between north Senegal and The Gambia and the Casamance (south Senegal) and The Gambia especially in the moister areas up to 50 km from the coast; the gallery forests fringing the banks and the islands of the freshwater part of the River Gambia; the extensive freshwater marshes in Central River Division and the dry savannah and laterite hills and ridges of Upper River Division. This task is made a little easier with the presence of field workers who have been trained to erect and monitor drift fences during the various surveys and the presence of a country field guide on the common species of reptiles; Barnett & Emms (2005b) produced during the Darwin Initiative project by MWT.

### ACKNOWLEDGEMENTS

The authors wish to acknowledge the funding of the British Herpetological Society, the British High Commission to The Gambia Small Grants Fund, the Irish Agency for Personal Service Overseas and DEFRA, UK through the Darwin Initiative Project all of which helped support the fieldwork and field guide described in this paper. We also wish to thank DPWM for supporting this research, Greg Schneider of the Zoology Museum at Michigan University, Eli Greenbaum of the Division of Herpetology of the University of Kansas and Roger Bour of the Paris Museum of Natural History for identifying specimens, Barry Hughes for reviewing, commenting and providing very useful information on the manuscript and, as always, Colin McCarthy of the Natural History Museum, London for his introductions to other herpetologists and sound advice. We also wish to thank Jean-François Trape, Rowland Jordan, EvaMaria Minuth and Michael Woods for sharing some of their records with us, the BAOS members who worked so hard during Exercise Night Heron, and finally all the fieldworkers who diligently visited their drift fences every morning and helped in the capture and translocation of snakes.

### REFERENCES

- Andersson, L.G. (1937). Reptiles and Batrachians Collected in The Gambia by Gustav Svensson and Birger Rudebeck. *Ark. Zool.* **29A**, 1–28.
- Barnett, L.K., Drammeh, F., Manjang, A., Kinteh,



- F., Camara, A. & Jadama, J. (2001). Ecological Report for Radville Ecological Gardens. A Private Report Commissioned by Radville Farm. Federal Republic of The Gambia: Research and Development Unit, Department of Parks and Wildlife Management, Abuko Nature Reserve.
- Barnett, L. K. & Emms, C. (2002). Report on Herpetological Survey in The Gambia. Unpublished Report. The Gambia: Makasutu Wildlife Trust.
- Barnett, L. K. & Emms, C. (2005a). Exercise Night Heron. River Gambia Expedition by the British Army Ornithological Society and Makasutu Wildlife Trust to Survey Birds, Mammals and Reptiles. Unpublished Report. Makasutu Wildlife Trust. The Gambia: Darwin Field Station, Abuko Nature Reserve.
- Barnett, L. K. & Emms, C. (2005b). *The Common Reptiles of The Gambia*. The Gambia: Makasutu Wildlife Trust. 24 pp.
- Barnett, L. K., Emms, C., Jallow, A., Cham, A. M. & Mortimer, J. A. (2004). The Distribution and Conservation Status of Marine Turtles in The Gambia, West Africa: A first Assessment. *Oryx* **38**, 203–208.
- Barnett, L. K., Emms, C. & Santoni, C. (2001). The Herpetofauna of Abuko Nature Reserve, The Gambia. *Herpetol. Bull.* **77**, 5–14.
- Barnett, L. K., Sock, D. & Kuyateh, T. (2000). Ramsar Wetland Study, The Gambia, 2000: Management Plans for NNP, TRBR and Tanbi Wetland Complex. A Private Report Commissioned by the Department of State for Fisheries, Natural Resources and The Environment, Federal Republic of The Gambia and the Ramsar Bureau. Research and Development Unit, Department of Parks and Wildlife Management, Abuko, Federal Republic of The Gambia.
- Barry, D. H. & Hughes, B. (1969). The Snakes of Ghana: a Checklist and Key. *Bull. I.F.A.N. (sér.A)* **31**, 1004–1041.
- Böhme, W. (1978). Zur Herpetofaunistik des Senegal. *Bonner Zoologische Beiträge* **29**, 360–417.
- Böhme, W. & Ziegler, T. (1997). A Taxonomic Review of the *Varanus (Polydaedalus) niloticus* (Linnaeus, 1766) Species complex. *Herpetol. J.* **7**, 155–162.
- Boulenger, E. G. (1922). Description of a new Lizard of the Genus *Chalcides*, from The Gambia, Living in the Society's Gardens. *Proc. Zool. Soc. London* **1**, 899.
- Branch, W. R. & Rödel, M. O. (2003). Herpetological Survey of The Haute Dodo and cavally Forests, Western Ivory Coast. Part II: Trapping Results and Reptiles. *Salamandra* **39**, 21–38.
- Broadley, D. G. (1980). A Revision of the African Snake Genus *Prosymna* Gray (Colubridae). *Occas. Pap. Natl. Mus. Rhod. B. Nat. Sci.* **6**, 481–556.
- Chippaux, J.-P. (2001) Les Serpents d'Afrique Occidentale et Centrale. IRD Editions. Paris, France.
- Condamine, M. (1994). *Lycophidion semicinctum albomaculatum* (Serpents, Colubridae) élève au rang d'espèce. *Bull. Soc. Herpetol. Fr.* **69-70**, 51–56.
- de Rochebrune, A.-T. (1884). Fauna de la Sénégalie. Ed. Octave Doin, Paris. 1–48.
- Ellenberg, H., Galatluong, A., Maydell, H. J., Mühlenberg, M., Panzer, K. F., Schmidtlorenz, R., Sumser, M. & Szolnoki, T. W. (1988). Pirang Ecological Investigations in a Forest Island in The Gambia. Hamburg, Germany: Stiftung Walderhaltung in Afrika.
- Emms, C., Jambang, M. DK., Bah, O., Mankali, B., Rödel, M.-O. & Barnett, L. K. (2005). The Amphibian Fauna of The Gambia, West Africa. *Herpetol. Bull.* **94**, 6–16.
- Emms, C. & Barnett, L. K. (2004). Report on Ecological Survey of Pirang Forest Park with Infrastructural Plan for Ecotourism Development. Consultancy Commissioned by the Department of Forestry and Gambian German Forestry Project. Makasutu Wildlife Trust. 25 pp.
- Emms, C. & Barnett, L. K. (2005). A Provisional Checklist of all Species Recorded within The Gambia, West Africa. The Gambia: Makasutu Wildlife Trust, Abuko Nature Reserve.
- Gans, C. (1959). A Taxonomic Revision of the

- African Snakes Genus *Dasypeltis* (Reptilian; Serpentes). *Ann. Mus. Roy. Congo Belge (Zool.)* **74**, 1-237.
- Gans, C. (1987). Studies on Amphisbaenians (Reptilia). 7. The Small Round-headed Species (*Cynisca*) from Western Africa. *Amer. Mus. Novit.* **2896**, 1-84.
- Gruschwitz, M., Lenz, S. & Böhme, W. (1991a). Zur Kenntnis der Herpetofauna von Gambia (Westafrika). Teil 1: Einführung, Froschlurche (Amphibia, Anura), Schildkröten (Reptilia, Chelonia), Krokodile (Crocodylia) und Echsen (Sauria). *Herpetofauna* **13**, 13-22.
- Gruschwitz, M., Lenz, S. & Böhme, W. (1991b). Zur Kenntnis der Herpetofauna von Gambia (Westafrika). Teil 2: Schlangen (Reptilia, Serpentes), Herpetofaunistische Bewertung. *Herpetofauna* **13**, 27-34.
- Håkansson, N. T. (1974). Impressions of the Herpetofauna in The Gambia. Unpublished Report.
- Håkansson, N.T. (1981). An Annotated Checklist of Reptiles Known to Occur in The Gambia. *J. Herpetol.* **15**, 155-161.
- Hughes, B. (1977). Latitudinal Clines and Ecogeography of the West African Night Adder, *Causus maculatus* (Hallowell, 1842), Serpentes, Viperidae. *Bull. I.F.A.N. 39 Ser A.* **2**, 358-384.
- Hughes, B. (1983). African Snake Faunas. *Bonn. Zool. Beitr.* **34**, 311-356.
- Joger, U. (1984). Taxonomische Revision der Gattung *Tarentola* (Reptilia:Gekkonidae). *Bonn. Zool. Beitr.* **35**, 129-174.
- Jones, (1990). The Gambian Dwarf Crocodile Project: Preliminary Report 1990. Unpublished Report. U.K.: Bristol University.
- Loveridge, A. (1958). Revision of Five African Snake Genera. *Bull. Mus. Comp. Zool.* **119**, 1-198.
- Loveridge, A. & Williams, E. E. (1957). Revision of the African Tortoises and Turtles of the Suborder Cryptodira. *Bull. Mus. Comp. Zool.* **115**, 163-557.
- Miles, M. A., Thomson, A. G. & Walters, G. W. (1978). Amphibians and Reptiles from the vicinity of Boughari, Casamance (Senegal), and The Gambia. *Bull. Inst. Fond. Afr. Noire, Sér. A.* **40**, 437-456.
- Moiser, C. M. & Barber, D. (1994). The Crocodile Pools of the Western Division, The Gambia. *Br. Herpetol. Soc. Bull.* **47**, 16-22.
- Moiser, C. M. & Barber, D. (1997). The Crocodile Pools of the North Bank Division, The Gambia, West Africa. *Br. Herpetol. Soc. Bull.* **58**, 7-10.
- National Environment Agency (1997). Editor Wana Grey-Johnson. State of the Environment Report – The Gambia. Government of The Gambia. 125pp.
- Pauwels, O. & Meirte, D. (1996). Contribution to the Knowledge of The Gambian Herpetofauna. *Br. Herpetol. Soc. Bull.* **56**, 27-34.
- Reeve, H. F. (1912). The Gambia: Its history, ancient, mediaeval and modern. Together with its geographical, geological and ethnographical conditions and a description of its birds, beasts and fishes found therein. London: John Murray. xv + 288 pp.
- Roux-Estève, R. & Guibe, J. (1965). Étude comparée de *Boaedon fuliginosus* (Boié) et *B. lineatus* D. et B. (Ophidiens). *Bull. I.F.A.N. sér. A.* **27**, 397-409.
- Starin, E. D & Burghardt, G. N. (1992). African Rock Pythons (*Python sebae*) in The Gambia: Observations on Natural History and Interactions with Primates. *The Snake* **24**, 50-62.
- Villiers, A. (1958). *Tortues et Crocodiles de L'Afrique Noire Francaise*. Initiations Etud Afr. **15**. 354 pp.
- White, A. (1984). A Gecko from The Gambia. The Vipera. *Bull. South West. Herpetol. Soc.* **1**, 22-28.