

# Scientific Papers

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## The Herpetofauna of Upper Niger National Park, Guinea, West Africa

By

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## INTRODUCTION

Guinea is a West African country about the size of Oregon (ca. 246,000 km<sup>2</sup>), located on the Atlantic coast and bordered by Guinea-Bissau, Senegal, Mali, Côte d'Ivoire (Ivory Coast), Liberia, and Sierra Leone. Several vegetation zones are recognized; these include coastal mangroves in the west, semi arid Sahel in the northeast, and tropical rainforest in the southeast. However, most of the country is covered in a mosaic of lowland (up to 400 m) Guineo-Congolian rainforest, savanna, and secondary grassland, but the Fouta Djallon highlands (1538 m), Simandou range (1656 m), and Mount Nimba region (ca. 1700 m) include premontane and montane vegetation (White, 1983; Fahr and Ebigo, 2003).

Despite the great diversity of flora and fauna in Guinea, relatively few biologists worked in the country during most of the 20<sup>th</sup> century because of an unstable political environment ruled by Sekou Touré after independence (Ramsay, 1999). With some exceptions (e.g., Maclaud and Mocquard, 1896; Mocquard, 1902; Klaptocz, 1913; Chabanaud, 1920, 1921; Parker, 1936; Angel, 1921, 1943, 1944; Guibé, 1952; Angel et al. 1954a, b; Guibé and Lamotte, 1958, 1963; Laurent, 1958; Schiötz, 1968), relatively little concerning the herpetofauna of Guinea was published prior to the end of Touré's rule in 1984. Although some major publications about the herpetofauna of West Africa have included data or collections from Guinea (e.g., Grandison, 1956; Schiötz, 1967, 1999; Rödel, 2000), others (e.g., Papenfuss, 1969; Joger, 1981) have not. Three papers (Böhme, 1994a, b, 2000) dealt with anurans, skinks, and snakes of Ziamá, Guinea. One recent publication (Rödel and Bangoura, 2004) discussed the amphibians of the Simandou Range in southeastern Guinea, including a new species of *Ammirana* that also occurs in Upper Niger National Park. Finally, two recent papers (Ineich, 2003; Rödel et al., 2004) discussed the herpetofauna of a region (Mt. Nimba) shared between Guinea, Liberia, and Côte d'Ivoire; and two Rapid Assessment Program expeditions were conducted in this area in 2002 and 2003 (McCullough, 2004; I. Christie, pers. comm.; M. -O. Rödel, pers. comm.). With these recent exceptions, no researchers have attempted to synthesize information about the Guinean herpetofauna as a whole, or to discuss the entire herpetofauna of any region in Guinea in a manner comparable to other West African countries (e.g., Doucet, 1963a, b; Roux-Esteve, 1969; Papenfuss, 1969; Barbault, 1975; Roman, 1980; Zug, 1987; Hughes, 1988; Joger and Lambert, 1996, 1997, 2002; Akani et al., 1999; Raxworthy and Attuquayefio, 2000; Barnett et al., 2001; Rödel and Ernst, 2003). Herein, we present a preliminary analysis of the amphibians and reptiles of the recently established Upper Niger National Park (Parc National du Haut Niger or PNHN).

## ACKNOWLEDGMENTS

Fieldwork in Guinea was funded by the National Science Foundation (Grant No. 80699) to our collaborator Frank Pezold for a University of Louisiana at Monroe (ULM) collecting expedition, and a Faculty Development grant to Carr from the Howard Hughes Medical Institute's Biological Sciences Education Program at the University of Louisiana at Monroe. Greenbaum acknowledges a grant from the Declining Amphibian Populations Task Force and Critical Ecosystem Partnership Fund; Midwest Tongs ([www.tongs.com](http://www.tongs.com)) kindly donated equipment. We thank Bakary Coulibaly of the Direction Nationale de la Recherche Scientifique et Technique for his assistance and permission to collect in Guinea, the Direction Nationale des Eaux et Forêts and Bakary Magassouba, Director of Upper Niger National Park, for permission to conduct research in the park, and Samba Diallo and Moussa Elimane Diop for field assistance. We are especially grateful to Peter DeRidder, David Brugière and Marie-Claire Fleury-Brugière for assistance in the field and provision of valuable data, specimens, and photographs. We are indebted to our American field companions Mark Antwine, Amy Matthews, and Nicole Pezold—in particular, the collection and preparation assistance of Amanda Rosenzweig and Caroline Dixon was invaluable. Brian Crother and Marcie Dixon collected at Diaragbèla in 2003 and graciously allowed us to include those specimens. Assistance with anuran, gecko, turtle, and typhlopod identifications came from Mark-Oliver Rödel, Aaron Bauer, Roger Bour, and Van Wallach, respectively; assistance with invertebrate identification came from Zack Falin, and bats were identified by Duane A. Schlitter. Final specimen deposition arrangements were facilitated by John Simmons, Omar Torres-Carvajal, Dan Berger, and Linda Trueb (KU), Christopher Raxworthy (AMNH), Frank Pezold and Stephanie McCormick (NLU), and Samba Diallo (CNSHB). We are grateful to Wolfgang Böhme for allowing us to examine specimens from ZFMK, Andreas Schmitz for loan of specimens from MHNG, Annemarie Ohler for loan of amphibian specimens from MNHN, and Roger Bour for data and photographs of MNHN turtle specimens. The manuscript was improved by comments from William E. Duellman, Barry Hughes, Rebecca Kormos, Gerhard Nikolaus, Frank Pezold, Mark -O. Rödel, and Linda Trueb.

## MATERIALS AND METHODS

## STUDY SITE

Upper Niger National Park includes one of the largest remaining areas of dry forest in West Africa (Brugiere and Magassouba, 2001; Ziegler et al., 2002). Previous faunal studies of the mammals (Brugiere and Magassouba, 2001; Fleury-Brugiere and Brugiere, 2001; Ziegler et al., 2002; Brugiere and Magassouba, 2003; Brugiere et al., 2005), birds (Nikolaus, 2000), and commercially important fishes (Crespi, 1998) have been consulted for background information on the park. These surveys have documented 300 species of birds and up to 98 species of mammals in the park, including rare West African endemics such as the Gambian mongoose, *Mungos gambianus*. Hippos, leopards, lions, numerous species of bats, seven species of primates, and numerous even-toed ungulates still exist in the park, but elephants have been extirpated from the area for at least 10 years (Brugiere and Magassouba, 2001; Ziegler et al., 2002; Brugiere and Magassouba, 2003).

Created by official presidential decree in 1997, the park encompasses 6000 km<sup>2</sup> in east-central Guinea in the Upper Guinea Region (Fig. 1). The park is situated in the lowland Guinea savanna belt (Ziegler et al., 2002) and has distinct dry (November–April) and rainy seasons (May–October); annual rainfall is approximately 1200–1700 mm (Fleury-Brugiere and Brugiere, 2001; Ziegler et al., 2002). Large areas of the savannas are burned annually in the dry

season. According to Fleury-Brugiere and Brugiere (2001), the highest temperatures (up to 36 °C) are in April and May, and the lowest temperatures (8 °C) occur in December and January; however, we noted midday temperatures up to 40 °C at the park in late May. Although the average elevation in the park is 400 m, the summit of Wonsonkolo Hill (near Foya) is 600 m. The Niger River, which is the largest river in Guinea and third largest river in Africa (4200 km long), flows from west to east through the center of the park. The Mafou River flows northward between the Mafou and Amana Forests to enter the Niger River at Mafou Bila. The Niantan River flows into the Niger River from the northwest region of the park near the northwest corner of the Mafou Forest (Ziegler et al., 2002).

Together with the smaller Kofing and Farakoba Rivers, the Niger and Mafou Rivers encircle the core Mafou Forest where most of our surveys took place. The Mafou, Amana, Kouya, and Tamba Forest areas form the “core areas” of the park where human disturbance is minimal. Two buffer zones surround three of these forests. In Buffer Zone 1 (Fig. 1), the population density is 1.1 persons/km<sup>2</sup>. Buffer Zone 2 has 6.8 persons/km<sup>2</sup> and agricultural activities are permitted. The government puts an annual quota on fishing, hunting, and timber harvesting in the park, with the goal of sustainable use by local communities (Ziegler et al., 2002).

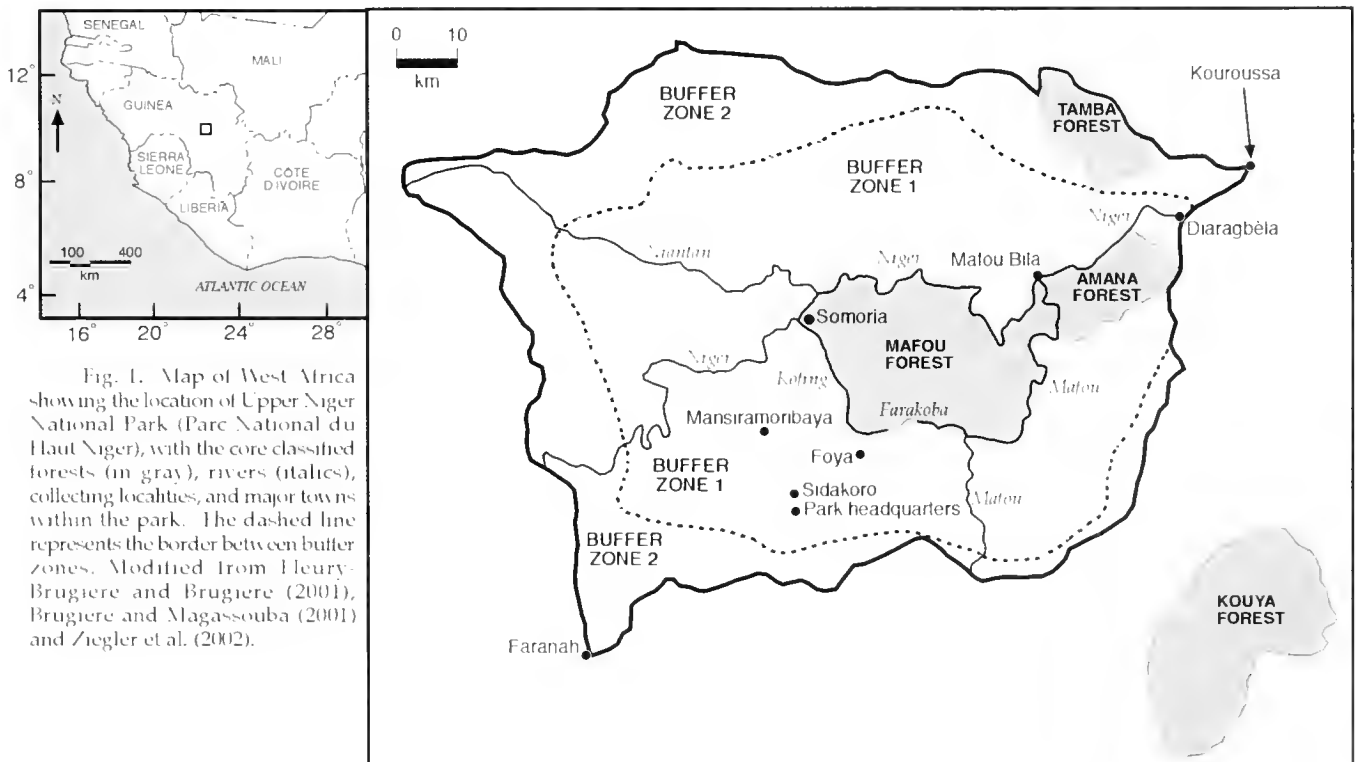


Fig. 1. Map of West Africa showing the location of Upper Niger National Park (Parc National du Haut Niger), with the core classified forests (in gray), rivers (italics), collecting localities, and major towns within the park. The dashed line represents the border between buffer zones. Modified from Fleury-Brugiere and Brugiere (2001), Brugiere and Magassouba (2001) and Ziegler et al. (2002).

The vegetation of the park is a complex mosaic of forest and savanna. We used the classification of vegetation formations of Fleury-Brugiere and Brugiere (2001) in describing terrestrial habitats. They recognized four types each of forest and savanna: (1) closed dry forest; (2) open forest; (3) bamboo forest; (4) gallery forest; (5) woodland savanna; (6) wooded savanna; (7) shrub savanna; and (8) herbaceous savanna. The forests are dominated by trees, may be multi-layered, and have little or no grass making up the ground layer or understory. Savannas differ by having a nearly continuous ground layer of grasses and varying types, sizes, and densities of woody plants. Our efforts in 2002 were concentrated in the gallery forest around stream courses and in the dry forests (closed and open).

Aquatic habitats were sampled along the Niger River. At Somoria, there is a substantial rocky outcrop that runs perpendicularly across the river bed. During the low flow period at the end of the dry season when we visited, the Niger River consists of more or less distinct pools separated by relatively short, narrow runs. One of these runs connects the major pools above and below Somoria, and the rest of the width of the river bed consists of exposed bedrock, boulders, and isolated, rain-filled pools among the rocks (Fig. 2). The predominant substrate in the river bed was sand. We also sampled along the Kofing River, which was completely dry during our visit at the end of the dry season in 2002 (the rains were late that year). We concentrated our efforts in the surrounding gallery forest, but we also searched the dry river bed, which had a clay substrate (Fig. 3).

#### INVENTORY TECHNIQUES

Our inventory of the park herpetofauna is based on examination of 283 preserved specimens (214 collected

by ULM expeditions), dozens of photographs, and a review of the literature. We collected amphibians and reptiles in the park from 19 to 29 May 2002 as a part of the ULM expedition. During a second ULM expedition, colleagues made a short trip to Diaragbèla in the buffer zone of the park on 16 and 17 May 2003. In addition, we gathered data from several other sources in order to enhance our taxonomic coverage. The presence of several species was documented photographically based on live material captured and released, either during our visit or at other times in 2002. We also obtained several specimens from the ichthyological team surveying in other parts of the Mafou Forest in 2002. We examined 12 reptile specimens held in the ecomuseum collection at the park headquarters (referred to as PNHN ecomuseum). This is an uncatalogued collection of specimens that are known to have come from Mansiramoribaya, areas near the park headquarters, or other unspecified localities within the park (D. Brugière and N. Gerhard, pers. comm.). Photographs of specimens representing species not otherwise represented by catalogued vouchers have been deposited in the catalogued collection of color transparencies in the Division of Herpetology of the Natural History Museum, The University of Kansas (KU CT). Literature records of several species from localities at the margin of the park, i.e., Faranah and Kouroussa, are referred to in the species accounts. Several species are recorded from the park only on the basis of literature records. Moequard (1902) reported a collection (Muséum nationale d'Histoire naturelle, MNHN) of 16 species of amphibians and reptiles from the region of Kouroussa, including six snakes not recorded by us. Several anurans (24 specimens) from Kouroussa were examined, as were photos of two turtle specimens (R. Bour, pers. comm.).

Table 1. List of specific localities and the dates sampled for amphibians and reptiles in Upper Niger National Park in 2002 and 2003. The dominant habitat type(s) at each site is indicated using the system of terrestrial habitat classification for the park by Fleury-Brugiere and Brugiere (2001). Elevation for all localities is approximately 400 m.

Locality	Coordinates	Date(s)	Habitat(s)
Park headquarters, ca. 4 km S of Sidakoro	10°14'40"N, 10°27'41"W	19, 20, 28 May 2002	Closed dry forest
Somoria	10°28'49"N, 10°26'36"W	20–28 May 2002	Gallery forest and perennial river (bed and bank)
Kofing River	10°28'02"N, 10°26'32"W	22–27 May 2002	Gallery forest and dry streambed (seasonal river)
Drift fence #1	10°27'34"N, 10°26'12"W	22–29 May 2002	Gallery forest of Kofing River
Drift fence #2	10°28'54"N, 10°26'12"W	23–28 May 2002	Open forest near Somoria
Sulukudjamba, ca. 10 km downstream from Somoria	10°32'36"N, 10°23'56"W	23 May 2002	Gallery forest and perennial river (bed and bank)
Mafou Bila	10°31'04"N, 10°08'37"W	27 May 2002	Gallery forest and perennial river (bed and bank)
Diaragbèla	10°21'42"N, 09°34'21"W	16–17 May 2003	Gallery forest and perennial river (bed and bank)

These specimens from MNHN include material in addition to that serving as the basis of Mocquard's (1902) report. Because the snakes were not available for examination, we did not include a questionable record from Mocquard's (1902) paper for *Psammodphis sibilans*, which might refer to *P. elegans* already known from the park. A small collection of four anurans from Faranah from the Muséum d'histoire naturelle-Geneva (MHNG) was examined. Finally, we examined 27 specimens (14 species) from Zoologisches Forschungsinstitut und Museum Alexander Koenig (ZFMK) that were collected in the park during an ornithological survey between November 1996 and February 1997 (G. Nikolaus, pers. comm.). Three juvenile *Bufo* (NLU 70544, ZFMK 64484–85; 12.2, 17.8 and 20.2 mm SVL, respectively) could not be identified to species and were not included in the species accounts.

Amphibians and reptiles were collected during the 2002 and 2003 expeditions by means of visual encounter surveys by day and night. Specific localities, dates, and major habitat types sampled are indicated in Table 1. Several snakes were obtained in gill nets of fishermen or the ichthyological team set in the Niger River. Baited turtle traps set in two different pools of the Niger River near Somoria failed to capture specimens. Forested areas near Somoria were sampled with drift fences. Two drift fences made of 60-cm wide black silt fencing were installed within walking distance of the village of Somoria from 22 to 29 May 2002. One fence was installed in the gallery forest of the Kofing River and consisted of three arms of approximately 10 m length each (drift fence #1, Fig. 3). At

the end of each arm was an approximately 10-liter plastic bucket. Along the length of each arm we placed a pair of funnel traps made of sewn nylon screen wire reinforced with steel wire mesh in the ends. The second fence was placed in open dry forest as a single long fence (~ 30 m) with a bend in the middle. One end contained a plastic bucket and the other was simply a pitfall hole in the substrate. Three pairs of funnel traps were placed along the length of the fence.

All animals were fixed in buffered 10% formalin and later transferred to 70% ethanol for storage. Photographs and tissue samples were taken from selected individuals representing each species. Alcoholic specimens were deposited in the fluid collections of Centre National des Sciences Halieutiques de Boussoura (CNSHB) in Conakry, Guinea, the University of Louisiana at Monroe (NLU), American Museum of Natural History (AMNH), and the Natural History Museum at the University of Kansas (KU). Because of an unavoidable cataloging backlog, AMNH specimens are referred to by their original field numbers (AHR, EBG, and JLC). Conservation status of species were obtained from websites for the Convention on International Trade of Endangered Species (CITES, 2003), World Conservation Union (IUCN, 2003), and Global Amphibian Assessment (IUCN et al., 2004). Comparisons with the herpetofaunas of other relatively well-surveyed sites in West Africa (that include both amphibians and reptiles) were made with the Coefficient of Biogeographic Resemblance (CBR) of Duellman (1990).

#### SPECIES ACCOUNTS

Species are listed in alphabetical order by family, genus, and species. Snout-vent length (SVL) and tail length (TL) measurements are presented as means  $\pm$  standard error with the range in parentheses. Carapace length (CL) is the standard measure used for turtles. Information about color pattern in life is based on field notes, color photographs, or color digital photos of live animals. Gender of specimens was determined from secondary sexual characteristics (e.g., vocal slits in bufonids, gular sacs in hyperoliids), presence of eggs in the abdominal cavity, or direct examination of gonads. Where possible, stomach contents from one specimen of each species were examined.

#### ANURA

##### ARTHROLEPTIDAE

##### *Schoutedenella poecilnotata* (Peters, 1863)

MATERIAL: NLU 70538, park headquarters.

An adult male (24.1 mm SVL) was hopping through leaf litter in dry forest during the day. This specimen has an elongated third finger typical of males of this species (Rödel, 2000). Stomach contents included several unidentifiable insects.

Rödel (2000) noted that available descriptions are not adequate to identify with certainty species of this highly variable group of frogs. Laurent (1954) placed this and other small species (< 25.0 mm SVL) of the genus *Arthroleptis* in *Schoutedenella*. This taxonomic change has been accepted by some herpetologists (e.g., Channing, 2001; Frost, 2004), but reversed or ignored by others (e.g., Duellman, 1993; Rödel, 2000). Poynton (2003:51) discussed discrepancies in Laurent's concept of the genus *Schoutedenella*, but remarked that a "wide-ranging synthesis of data...is still lacking." A phylogenetic analysis of this group may very well result in a nomenclatural change for *S. poecilnotata*, but at present, no strong case can be made to counter Laurent's (1954) taxonomic change. This species was recorded previously from Guinea by Rödel (2000).

#### BUFONIDAE

##### *Bufo maculatus* Hallowell, 1854 (Fig. 4)

MATERIAL: NLU 70535, park headquarters; AHR 216, EBG 868, CNSHB 97, 114, 120, 128, 133–142, KU 291870, NLU 70546, 70553, 70559–60, 70572, 70576–77, Niger River at Somoria, NLU 70587, Matou Bila; NLU 70615, Diaragbela, MHNG 1011.87, Faranah.



Fig. 2. Major pool in the Niger River looking downstream from the lower end of the run at Somoria. Photo: J. L. Carr.



Fig. 3. Drift fence #1 placed in gallery forest of the Kofing River. Photo: J. L. Carr.



Fig. 4. *Bufo maculatus* (NLU 70572), adult male, collected as it was calling on the banks of the Niger River. Photo: E. Greenbaum.



Fig. 5. *Hemisus marmoratus* (NLU 70622), adult female, collected on a dirt road at Diaragbèla. Photo: M. Dixson.



Fig. 6. *Hyperolius mtidulus* (KU 291900), subadult male, collected from damp leaf litter near park headquarters. Photo: E. Greenbaum.

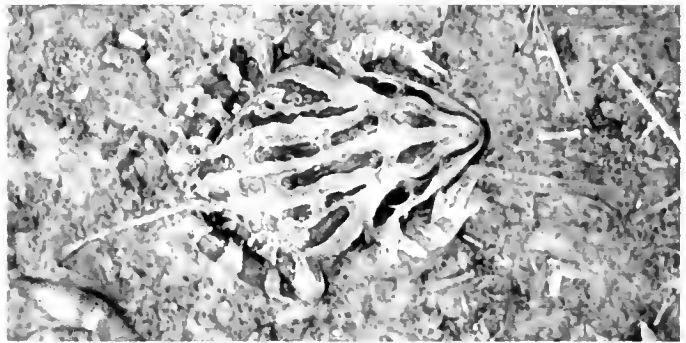


Fig. 7. *Hildebrandtia ornata* (NLU 70623), adult male, collected on a dirt road at Diaragbèla. Photo: M. Dixson.

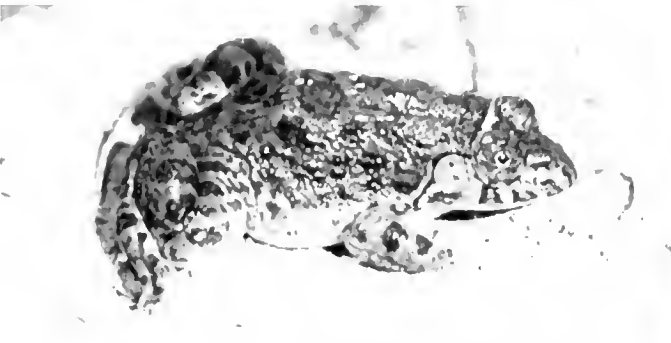


Fig. 8. *Hoplobatrachus occipitalis* (NLU 70545) collected in shallow pool of the Niger River, Somoria. Photo: E. Greenbaum.



Fig. 9. *Ptychocheilus tellini* (NLU 70625), adult female, collected on the side of a road at Diaragbèla. Photo: M. Dixson.



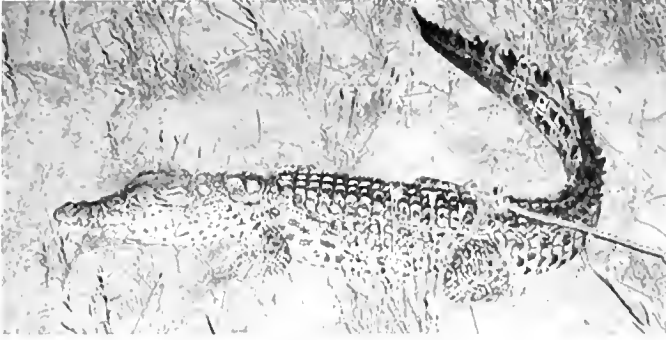


Fig. 10. *Crocodylus suchus* (KU CT 11915) photographed near Niger River at Matou Bila. Photo: M. Antwine.

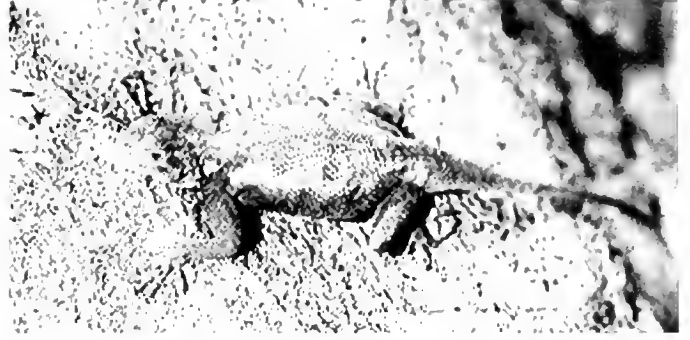


Fig. 11. *Agama agama* (CNSHB 108), adult female, collected on a tree trunk in the village of Somoria. Photo: E. Greenbaum.



Fig. 12. *Chameleo gracilis* (NLU 70547) collected after falling from a tree in the village of Somoria. Photo: E. Greenbaum.

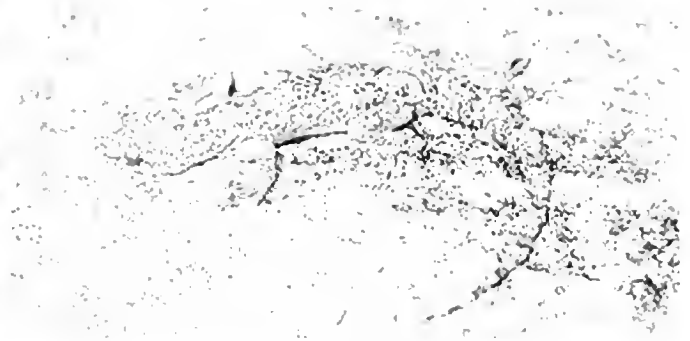


Fig. 13. *Hemidactylus brooki* (NLU 70536) collected on the wall of a hut at park headquarters. Photo: E. Greenbaum.



Fig. 14. *Leptosiphos togoensis* (KU 291903) collected in leaf litter in gallery forest adjacent to Kofing River. Photo: E. Greenbaum.

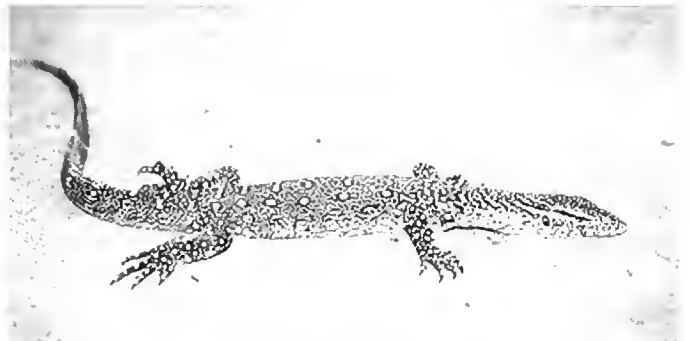


Fig. 15. *Varanus niloticus* (KU 291925) collected 5 km E of Somoria, Matou forest. Photo: E. Greenbaum.



Fig. 16. *Typhlops punctatus* (NLU 70569) collected in a pitfall trap in gallery forest adjacent to Kofing River. Photo: F. Greenbaum.



Fig. 17. *Philothamnus heterodermus* (NLU 70566) collected in funnel-trap in gallery forest adjacent to Kofing River. Photo: E. Greenbaum.

The SVL is  $46.4 \pm 0.62$  (40.6–56.5) mm in 25 adult males, 36.2 and 37.8 mm in two subadult males, and 66.9 mm in one adult female. One subadult male was active at night in dry forest. All other males were in the Niger River bed or adjacent gallery forest. Only 2 of 24 males from Somoria were captured during or immediately after rainfall; the others were calling on nights without rainfall 3–7 days later. The majority of males were calling from protected locations, either under boulders near the margin of the riverbed, or within the cover of low overhanging branches of small trees lining a small inlet on the south bank of the Niger River. No females were encountered during 13 days of collecting during May of 2002 and 2003. A female from Faranah (MHNG 1011.87) was previously identified as *B. pentoni* by Perret (1966); however, it is typical of females of *B. maculatus* in Guinea. Stomach contents of CNSHB 120 included ants (Hymenoptera) and true bugs (Heteroptera).

Coloration of males in life: Dorsal ground color dull yellow or olive-green with 2 or 3 pairs of dark brown blotches (commonly outlined in black) on the dorsum; flanks bright yellowish green; parotoid and rictal glands brown or yellow; dark brown blotches on the upper lips and transverse bars on the limbs; venter immaculate white or yellow except for blackish throats in all adult males. Males with nuptial excrescences on the thenar tubercle and Digits I and 2. Entire dorsum, limbs, and parotoid glands rugose with asperities on tubercles. With the exception of generally having poorly demarcated parotoid glands and lacking a vertebral stripe on the dorsum, our specimens agree in morphology, size, and color pattern with those described by Rödel (2000).

This species has previously been reported from Guinea by Rödel (2000).

#### *Bufo regularis* Reuss, 1833

MATERIAL: JLC 749–750, CNSHB 86–88, 98–99, 110, 115–117, 130, 143, KU 291877–78, NLU 70542–43, 70555, Niger River at Somoria; CNSHB 271–74, NLU 70616–18, Diaragbèla; MHNG 1011.85–86, Faranah; ZFMK 64483, park headquarters near Sidakoro.

The SVL is  $69.5 \pm 1.04$  (60.2–77.5) mm in nineteen adult males,  $78.1 \pm 2.36$  (66.2–90.3) mm in eight adult females, and 51.8 mm in one subadult male. Ten of 19 specimens, including both sexes, were collected on the only rainy night during our stay in Somoria. One pair (CNSHB 110 and 116) was in amplexus. Males were calling only during light rainfall at night following a downpour. Males called while sitting in shallow water near the margins of isolated pools (no more than 25–30 cm deep, with a coarse sand substrate and many large boulders) or on isolated boulders barely projecting above the water surface in the bed of the Niger River. Stomach contents of NLU 70616 included grasshoppers (Orthoptera) and reproductive termites (Isoptera).

Coloration in life: Dorsum mottled olive-green, tan, gray, or brown, usually with 4–6 pairs of large, dark brown blotches, commonly with additional small, dark brown blotches on dorsum and flanks; venter white with olive-black spots on throat in males and yellow throat in females. Males with nuptial excrescences on the thenar tubercle and Digits I and II. Parotoid glands smooth to tuberculate with black asperities in males. Females with few, if any, widely scattered brown asperities on dorsum, and typically none on parotoids.

These specimens agree with the description of size, morphology, and color pattern of Lamotte and Xavier (1981), Tandy et al. (1985), and Rödel (2000), except for the extreme rugosity of parotoid glands in many males.

This species was recorded from Kouroussa by Mocquard (1902). Two females from Faranah (MHNG 1011.85–86) collected in July 1962 were identified as *Bufo pentoni* by Perret (1966). Subsequently, Tandy (1972) referred MHNG 1011.86 to his *Bufo* sp. C (= *B. xeros*); however, he did not list the specimen among those examined in the description of *B. xeros* (Tandy et al., 1976). Hulselmans (1977) listed this same specimen among the material examined as part of the description of *B. wazae*, a junior synonym of *B. xeros*.

#### HEMISOTIDAE

##### *Hemisus marmoratus* (Steindachner, 1863) (Fig. 5)

MATERIAL: MNHN 1902.0022, 1904.0444–45, Kouroussa; NLU 70622, Diaragbèla.

The SVL is  $39.4 \pm 1.45$  (37.8–42.3) mm in three adult females and 29.1 mm in one subadult of unknown gender. The subadult was in leaves and grass approximately 1 m off a road on the side facing the Niger River at night. Stomach contents of this specimen included reproductive termites (Isoptera).

Color in life: Dorsum of head reddish gray, becoming dark brown posteriorly; marbled pattern of yellow blotches on dark brown dorsum and limbs; flanks and limbs reddish brown; venter immaculate pale pink.

Rödel (2000) considered West African savanna records to be *Hemisus marmoratus sudanensis*, and the description of color pattern and illustrations of this taxon are consistent with the specimens described herein. This identification also is consistent with Rödel and Ernst (2003), who remarked that *H. marmoratus* is associated more with savanna habitats than forest, but further taxonomic work is needed on the *Hemisus* taxa of West Africa. Published Guinean records include specimens from Kouroussa (Mocquard, 1902; Laurent, 1972).

#### HYPEROLIIDAE

##### *Hyperolius concolor* (Hallowell, 1844)

MATERIAL: MHNG 1011.90, Faranah; ZFMK 64487, unknown locality within the park.

An adult male has a SVL of 26.7 mm, and a subadult of unknown gender has a SVL of 18.4 mm. In preservative the dorsum is mottled dull yellow and the venter is yellowish cream. This species was listed from Guinea by Rödel (2000).

*Hyperolius nasutus* Günther, 1865

MATERIAL: MNHN 1904.0440, Kouroussa.

The color pattern of the single adult female with a SVL of 22.9 mm is faded, but there are no indications of any dark pigment on the body, and the snout is elongate and blunt (Schiotz, 1999:fig. 165). Rödel (2000) noted this species from Guinea.

*Hyperolius nitidulus* Peters, 1875 (Fig. 6)

MATERIAL: KU 291900, park headquarters; MNHN 1904.0442–43, 1999.8148–49, Kouroussa; ZFMK 64486, unknown locality within the park.

The SVL is  $24.2 \pm 0.68$  (22.6–26.0) mm in five adult males and 20.1 mm in one subadult male. A subadult male was collected at night as it emerged from forest-floor leaf litter in closed dry forest during heavy rainfall.

Coloration of subadult in life: Dorsum tan with mottled brown pigment forming vague indications of a dorsolateral stripe; posterior surfaces of thighs and feet reddish orange; venter immaculate cream; iris bronze; spots of brown pigment on underside of jaw, most concentrated toward margin of jaw.

A distinctive blunt snout and small rectangular gular flap are present. The coloration and morphology are consistent with male Phase A specimens described by Schiotz (1967). Rödel (2000) noted that subadults of this species are almost unicolor with a beige to brown dorsum. The only published record from Guinea is Kouroussa (Laurent, 1951).

*Kassina senegalensis* (Duméril and Bibron, 1841)

MATERIAL: MNHN 1904.0441, Kouroussa

The color pattern and morphology of one adult female with a SVL of 22.6 mm are consistent with the description by Rödel (2000), who noted this species from Guinea.

*Leptopelis viridis* (Günther, 1869)

MATERIAL: EBG 833, CNSHB 144, Niger River at Somoria; NLU 70570, Somoria

The SVL is 26.2 and 34.0 mm in two adult males and 38.9 mm in one adult female. The smaller male was calling on top of leaves of a plant and the larger male was calling from a crevice in a large boulder near the margin of the river bed. The female was on a rock near ground level in the village, no more than about 100 m from the Niger River. All specimens were collected at night. The color pattern and morphology are consistent with descriptions by Schiotz (1967) and Rödel (2000). This species was reported from Guinea by Rödel (2000).

PIPIDAE

*Silurana tropicalis* Gray, 1864

MATERIAL: MNHN 1904.0446–49, Kouroussa.

Four adults of unknown gender have SVLs of 33.8–44.8 mm ( $40.5 \pm 2.49$ ). The color pattern and morphology are like that described by Rödel (2000). This species was recorded from Guinea by Arnoult and Lamotte (1968).

RANIDAE

*Amnirana fonensis* Rödel and Bangoura, 2004

MATERIAL: ZFMK 64481–82, stream ca. 50 m from road leading to park headquarters.

Two adult males (60.1 and 61.4 mm SVL) that were calling from a stream in November (G. Nikolaus, pers. comm.) have numerous small, whitish tubercles on the dorsum. These specimens were listed as paratypes in the species description (Rödel and Bangoura, 2004).

*Amnirana galamensis* (Duméril and Bibron, 1841)

MATERIAL: MNHN 1902.0021, 1904.0428–32, Kouroussa.

The SVL is 62.2 mm in one adult male,  $50.1 \pm 3.12$  (45.2–59.2) in four adult females, and 35.9 mm in one subadult of unknown gender. Mocquard (1902) erroneously reported one of these specimens (probably the adult male [MNHN 1902.0021] based on his measurement of 63 mm SVL) as *Ptychadena longirostris*. *Amnirana galamensis* has not been reported from Guinea (Rödel, 2000).

*Hildebrandtia ornata* (Peters, 1878) (Fig. 7)

MATERIAL: NLU 70623, Diaragbela.

An adult male (54.1 mm SVL) was collected at night on a dirt road. Stomach contents consisted of anuran skin, presumably its own eaten after ecdysis. In life, the dorsum had alternating pale and dark brown longitudinal stripes edged in cream, with green interspaces. The throat was brown with two bright white stripes extending to the posterior of gular region. The venter of the body was immaculate white. This species was not known previously from Guinea.

*Hoplobatrachus occipitalis* (Günther, 1858) (Fig. 8)

MATERIAL: NLU 70545, 70578, Niger River at Somoria; CNSHB 278, NLU 70624, Diaragbela

An adult male (85.2 mm SVL) and three adult females (74.8, 80.9, and 82.9 mm SVL) were collected at night. Specimens at Somoria were either in or near the edges of shallow pools in the river bed. They dove and swam vigorously when approached. Stomach contents of NLU 70624 included grasshoppers (Orthoptera).

Color in life: Dorsum dark green with numerous black blotches on dorsum, flanks, and limbs; brown bars edged in black on jaw; interspaces between bars lime green; lime-green transverse stripe just posterior to eyes on dorsum of head; flanks white with grayish and black-mottled

blotches; venter mostly white with some black mottling on hind limbs. Numerous tubercles cover the dorsum and flanks. This species was reported from Guinea by Rödel (2000).

*Phrynobatrachus accraensis* (Ahl, 1925)

MATERIAL: AHR 206, EBG 803–05, 807, 812–13, 815, 846, 848–49, JLC 753, CNSHB 101–104, 106, 129, 145–69, KU 291906, NLU 70551–52, 70562, 70568, 70573–74, 70579–84, Niger River at Somoria; NLU 70563, Somoria; JLC 741, NLU 70557, Sulukudjamba.

Four adult females ( $20.0 \pm 0.61$  [18.5–21.1] mm SVL) and fifty-five unknown gender ( $15.3 \pm 0.25$  [11.6–19.0] mm SVL) were collected during the day and at night; most were among dead leaf piles at the bank of the major river pools, or under rocks. Stomach contents from EBG 813 included reproductive termites (Isoptera).

Color in life: KU 291906—dorsum pale brown with lime-green vertebral stripe; black lateral stripe from posterior edge of eye to inguinal region; flanks below stripe white. Dorsum smooth or with numerous prominent tubercles; supratympanic ridge barely visible in smaller specimens to distinct in large females; most without enlarged toe tips.

The color pattern and morphology are consistent with the virtually indistinguishable taxa *Phrynobatrachus accraensis* and *P. latifrons*, but Guibé and Lamotte (1963), Böhme (1994a), and Rödel (2000) noted larger sizes for *P. accraensis* (ca. 24 mm SVL). Moreover, *P. accraensis* has enlarged toe tips and a preference for rainforest or anthropogenic habitats (Rödel, 2000). *Phrynobatrachus latifrons* reportedly congregates at the edges of rivers during the dry season (Rödel, 2000), which is consistent with our findings at the park. Based on molecular data, Rödel and Agyei (2003) placed *P. latifrons* into the synonymy of *P. accraensis*, and we use the latter name for the specimens described herein. This species was reported from Guinea by Rödel (2000).

*Phrynobatrachus calcaratus* (Peters, 1863)

MATERIAL: CNSHB 182, drift fence #1; NLU 70588, drift fence #2.

Two females (16.3 and 13.3 mm SVL) were collected in pitfall traps in gallery and open forest. Stomach contents from NLU 70588 consisted entirely of ants (Hymenoptera: Formicidae).

The entire dorsum is tuberculate and a supratympanic ridge is distinct; eyelid cornicles (*sensu* Rödel, 2000) are present. Color pattern and morphology are consistent with Rödel (2000), who reported this species from Guinea.

*Phrynobatrachus francisci* Boulenger, 1912

MATERIAL: NLU 70537, park headquarters; EBG 806, 823, CNSHB 89, 105, 118–19, KU 291910, NLU 70585, Niger River at Somoria.

Four adult females ( $21.1 \pm 1.65$  [18.5–25.9] mm SVL), and five of unknown gender ( $16.3 \pm 0.55$  [14.6–17.9] mm SVL) were collected with *Phrynobatrachus accraensis*, the

majority of which were among dead leaf piles on the bank of the major pools of the Niger River. One specimen (NLU 70537) was amid leaf litter in closed dry forest. Stomach contents of KU 291910 included reproductive termites (Isoptera).

Color in life: KU 291910—dorsum pale brown with dark brown and cream blotches. Snout short and blunt; supratympanic fold distinct; tympanum distinct in larger individuals; most with prominent tubercles on dorsum; webbing moderate; tarsal tubercle present; toe tips not expanded.

This species has not been recorded from Guinea previously.

*Phrynobatrachus natalensis* (Smith, 1849)

MATERIAL: MNHN 1904 0439, Kouroussa.

One subadult of unknown gender with a SVL of 16.2 mm is consistent morphologically with the description provided by Rödel (2000), who reported this species from Guinea.

*Ptychadena oxyrhmynchus* (Smith, 1849)

MATERIAL: CNSHB 107, Niger River at Somoria.

An adult male (51.0 mm SVL) was found among large boulders near the Niger River at night. The color pattern and morphology are consistent with that described by Rödel (2000), who reported the species from Guinea.

*Ptychadena pumilio* (Boulenger, 1920)

MATERIAL: AHR 158–159, 198, CNSHB 84–85, 92–96, 170, NLU 70540–41, 70564, KU 291911, Niger River at Somoria.

Two adult males (23.0 and 29.6 mm SVL), five adult females ( $23.9 \pm 0.74$  [22.8–26.8]) and eight unknown gender ( $25.1 \pm 0.51$  [23.0–27.0]) were on rocks in shallow pools of the Niger River at night after a heavy rain; one individual (CNSHB 170) was in leaf litter on the bank of the river. Stomach contents from AHR 159 included arachnids of the family Araneidae.

Color in life: Dorsum pale brown with numerous dark brown blotches; limbs with brown bars; thin creamy yellow line from posterior border of eye to inguinal region.

This species was reported from Guinea by Rödel et al. (2004).

*Ptychadena tellinii* (Peracca, 1904) (Fig. 9)

MATERIAL: NLU 70625, Diaragbela.

An adult female (48.2 mm SVL) was in a dry rut on the side of a road at night. Stomach contents of this individual included grasshoppers (Orthoptera) and reproductive termites (Isoptera).

Color in life: Dorsum immaculate dull orange, becoming reddish brown on hind limbs; black stripes from rostrum through eye and tympanum to midbody; hidden parts of hind limbs variegated black and lime green; venter

immaculate white from chin to midbody, lime green on underside of hind limbs.

Until recently, this species was known as *Ptychadena schubotzi*, which was placed into the synonymy of *P. tellinii* by Largen (2001). This species has not been recorded previously from Guinea.

*Ptychadena trinodis* (Boettger, 1881)

MATERIAL: MNHN 1902.0020, 1904.0425–27, Kouroussa; NLU 70626, Diaragbela.

The SVL is 54.4 mm in an adult male and  $56.7 \pm 1.21$  (54.3–59.0) mm in four adult females. The male was on a dry trail at night. Stomach contents of NLU 70626 included grasshoppers (Orthoptera) and reproductive termites (Isoptera).

Color in life: Dorsum grayish brown with scattered small black blotches; yellow vertebral stripe along entire length of dorsum; two lateral yellow stripes from tympanum to midbody where they become broken until termination at insertion of hind limb; hidden parts of thighs mottled black and yellow green; orange stripe above tympanum; venter immaculate white.

Mocquard (1902) described a specimen from Kouroussa that had a SVL of 65 mm; this exceeds the maximum length of 57 mm given by Rödel (2000).

TESTUDINES

PELOMEDUSIDAE

*Pelomedusa subrufa* (Lacépède, 1788)

MATERIAL: KU CT 11913, ca. 20 km E of Somoria near the Niger River.

An apparent juvenile (CL ~ 13 cm) was found on a dirt road just south of the Niger River and photographed in February 2002 during the dry season. The turtle presumably must have just emerged from aestivation inasmuch as it is covered by dirt. This species is widespread in savanna regions in sub-Saharan Africa and reportedly spends much of the dry season underground (Loveridge, 1941; Ernst and Barbour, 1989). Although known from the surrounding countries of Sierra Leone, Senegal, Mali, and Côte d'Ivoire (Iverson, 1992), this is the first record from Guinea.

*Pelusios castaneus* (Schweigger, 1812)

MATERIAL: MNHN 1904.407A-B, Kouroussa

Photographs of two juveniles have been examined. The smallest (CL = 39.7 mm) appears to have grown minimally after hatching and the other (CL = 50.2 mm) has one large growth ring on each scute.

Coloration in preservative: Carapace nearly uniform pale to dark brown; plastron with straw-yellow to yellow-brown central area grading into dark brown to black areas at the periphery of each scute; one specimen with entirely dark brown to black anal scutes. Carapace with a vertebral keel, particularly prominent on Vertebrae 2–4;

no indication of plastral hinge; anal notch shallow and wide.

This species is known from localities in southern Guinea and surrounding countries (Loveridge, 1941; Bour, 1983; Iverson, 1992).

TESTUDINIDAE

*Kinixys belliana* Gray, 1831

MATERIAL: KU CT 11923–24, ca. Somoria.

Two individuals were found at the margin of savanna and forest during daylight in the vicinity of Somoria (P. DeRidder, pers. comm.) in early April 2002 (dry season) and 24 August 2002 (wet season). Two color photographs of the latter show the coloration of the carapace to be typical for the West African subspecies *Kinixys belliana nogueyi* (Lataste, 1886), in that it has a mostly brown carapace with diffuse, scattered dark brown to black smudges. The individual appears to be an adult (CL ~ 14–18 cm) with worn growth rings on the carapacial scutes and a well-developed carapacial hinge. This species is widely distributed in savannas and has been reported from several localities in Guinea (Loveridge and Williams, 1957; Villiers, 1958; Broadley, 1989a; Ernst and Barbour, 1989; Iverson, 1992).

TRIONYCHIDAE

*Trionyx triunguis* (Forskål, 1775)

MATERIAL: KU CT 11914, unknown locality within the park.

An adult, dried specimen (carapace only, 25.5 cm long) has remnants of longitudinally arranged, elongate rugosities on the bony carapace and shriveled posterior periphery; the carapace is dark brown to black. David Brugière (pers. comm.) reported sighting a large, flat turtle with a black shell basking on a rock in the Niger River; it was almost certainly this species (too large to have been a pelomedusid, and *Cyclanorbis senegalensis* has a brown or tan, mottled carapace). This species is known from the Niger River in Mali (Iverson, 1992; Joger and Lambert, 1996), but this is the first record for Guinea.

CROCODYLIA

CROCODYLIDAE

*Crocodylus cataphractus* Cuvier, 1825

MATERIAL: KU CT 11912, unknown locality within the park.

A dried skin of a juvenile is 121 cm in total length and has a head length of 19 cm and a snout length (from anterior margin of orbit to tip) of 11.5 cm; the snout width at the level of the anterior margins of the orbits is 5.4 cm. This species is found in the Mafou River (D. Brugière, pers. comm.), and has previously been reported from Guinea (Villiers, 1958; Groombridge, 1982; King and Burke, 1989; Messel et al., 1992).

*Crocodylus suchus* Geoffroy Saint-Hilaire, 1807  
(Fig. 10)

MATERIAL: KU CT 11915, near Matou Bila; PNHN ecomuseum specimen from unknown locality within the park.

The following measurements are for the juvenile in the ecomuseum: total length 81.7 cm, head length 11.1 cm, snout length (from anterior margin of orbit to tip) 6.0 cm, width of snout at level of anterior margins of orbits 3.8 cm. Individuals attain lengths of up to 5 m (D. Brugière, pers. comm.). Color in life based on KU CT 11915: Dorsum dark olive-brown, grading into tan on flanks; numerous dark brown, yellowish tan, and black spots on dorsum and flanks; venter immaculate cream. We accept the taxonomic change of Schmitz et al. (2003), who demonstrated that West and Central African Nile crocodiles form a clade distinct from those of East Africa. This species is reported from both the Niger and Mafou Rivers (D. Brugière, pers. comm.), and has previously been reported from Guinea (Villiers, 1958; Wermuth and Mertens, 1977; King and Burke, 1989; Messel et al., 1992).

SAURIA  
AGAMIDAI

*Agama agama* (Linnaeus, 1758) (Fig. 11)

MATERIAL: NLU 70575, Niger River at Somoria; FBG 800, 831, CNSHB 91, 108–09, 126, 171, Somoria; NLU 70586, Matou Bila; CNSHB 270, Diaragbela, ZFMK 64473–79, Sidakoro.

Seven adult males ( $126.8 \pm 4.30$  [106.3–140.0] mm SVL), three adult females (90.0, 94.1, and 95.8 mm SVL), and seven adults and subadults of unknown gender ( $79.5 \pm 6.12$  [60.0–103.8]) were around human habitations, on boulders, and on trees. Stomach contents of CNSHB 270 included ants (Hymenoptera: Formicidae) and metallic wood-boring beetles (Coleoptera: Buprestidae).

Color in life: Dorsum of male dark blue; head and tail bright yellow or orange-yellow. Dorsum of female brown with wavy orange stripes; yellow and orange blotches on flanks; head brown with paired cream spots on neck; gular region pink with wavy black stripes running from snout to posterior gular region; venter cream with numerous dark brown spots.

This species was reported from Guinea by Ineich (2003).

CHAMAELONIDAI

*Chamaeleo gracilis* Hallowell, 1842 (Fig. 12)

MATERIAL: NLU 70547, ZFMK 64480, Somoria.

Two adult males have SVLs of 96.7 and 100.0 mm and tail lengths of 121.1 and 81.0 mm. NLU 70547 was captured after it fell from a tree onto a tent; its stomach contents included various families of beetles (Coleoptera).

In life, the dorsum was bluish gray with green transverse bars; the venter and underside of the legs and feet were

pale gray. These males have tarsal spurs like those noted for *Chamaeleo gracilis* in Cissé and Karns (1978:176). This species was reported from Guinea by Klaver and Böhme (1997).

GEKKONIDAI

*Hemidactylus brookii* Hallowell, 1852 (Fig. 13)

MATERIAL: NLU 70550, drift fence #1; AHR 221, drift fence #2; NLU 70561, Niger River at Somoria; CNSHB 90, 100, Somoria; JLC 765, CNSHB 81, 177–81, NLU 70536, park headquarters; CNSHB 275–77, NLU 70620–21, Diaragbela.

The SVL is 47.3 and 51.2 mm for two adult males; 44.1, 46.3, and 52.7 mm for three adult females; and  $28.0 \pm 1.25$  (21.6–34.6) mm for 13 specimens of unknown gender. Stomach contents of CNSHB 178 included true bugs (Hemiptera).

In life, the dorsum is pale tan and cream with bold dark brown blotches and darker brown or black tubercles; juveniles have alternating bands of gray and pink or orange on tail. The dorsum is heavily tuberculate. Several Guinean localities for this species were listed in Loveridge (1947).

*Hemitheconyx caudicinctus* (Duméril, 1851)

MATERIAL: KU CT 11907, unknown locality within the park.

We examined one adult of unknown gender (132 mm SVL, 52 mm TL). Mocquard (1902) and Loveridge (1947) noted this species from Kouroussa.

SUNCIDAI

*Leptosiaophos togoensis* (Werner, 1902) (Fig. 14)

MATERIAL: FBG 837, CNSHB 112–13, 174, KU 291903, NLU 70565, gallery forest at Kofing River; NLU 70554, dry forest near Somoria.

One adult female (43.5 mm SVL) and six adults of unknown gender ( $44.17 \pm 0.93$  [40.0–47.0] mm SVL, 65.1 and 72.7 mm TL for two individuals with complete tails) were collected during the day in leaf litter on the forest floor, including the litter-covered dry bed of the Kofing River. Stomach contents of NLU 70554 included cockroaches (Blattaria).

Color in life: Dorsum rusty brown; black stripe on side of head and flanks, which grades into pale gray ventrally on flanks; base of tail pinkish orange changing to pinkish brown distally; hind limbs reddish brown. Scale rows at midbody 28–30.

Broadley (1989b) recognized the genus *Leptosiaophos* to include skinks with movable lower eyelids, 4–5 supraoculars, and inhabiting forests. This taxonomic change was followed by Haft (1993), who recognized *Leptosiaophos* as a valid genus for numerous West African skinks formerly in the genus *Panaspis*. Perret (1975) validated the specific status of this taxon, an action upheld by Bauer et al. (2003). Perret (1973) mentioned Guinea in the distribution of this species, but no specific localities were listed.

*Trachylepis affinis* (Gray, 1838)

MATERIAL: CNSHB 83, NLU 70539, park headquarters; CNSHB 121, 22, 127, 131–32, 173, NLU 70548, gallery forest at Kofing River, CNSHB 123, drift fence #1; NLU 70571, drift fence #2; KU 291919, Niger River at Somoria; CNSHB 125, Somoria

Three adult males (50.5, 50.8, 53.1 mm SVL; tails incomplete) and seven unknown gender ( $51.23 \pm 1.36$  [45.8–55.8] mm SVL;  $80.72 \pm 7.03$  [61.0–94.0] mm TL) collected in leaf litter or from a tree trunk during the day, and at night while asleep on top of leaves of plants. Individuals were observed to climb trees and fallen tree trunks, and all were found in either gallery forest or dry forest.

Individuals of this species display a large amount of variation (possibly ontogenetic) in pigmentation and stripes on the flanks. In life, the dorsum of NLU 70548 was pale tan with numerous dark brown flecks on the body and limbs; the dorsum of the head was rusty brown. A dark brown irregular stripe extends from the posterior edge of the eye along the flank to the base of the tail; the head and neck below this stripe are cream, and the flanks below the stripe are pale gray. The tail is creamy tan. Hoogmoed (1974) noted that this species has two scales between the last supraocular and the anterior supratemporal, and that if the prefrontals make contact (1/3 of his examined specimens had separated prefrontals), the suture is short. One of our specimens (CNSHB 131) had only one scale between the last supraocular and anterior supratemporal (diagnostic of *Trachylepis albilabris*), but the prefrontals were not in contact (diagnostic of *T. affinis*). Two specimens of *T. affinis* collected in disturbed habitats in other areas of Guinea (CNSHB 29, KU 291922) had two scales between the last supraocular and the anterior supratemporal but broad contact between the prefrontals. Additional work is needed on this species complex to determine diagnostic characters of putative taxa.

In a molecular phylogenetic analysis of the genus *Mabuya*, Mausfeld et al. (2002) recognized four monophyletic groups within the genus and assigned the generic name *Euprepis* to the Afro-Malagasy clade. However, Bauer (2003) demonstrated that *Euprepis* is a junior synonym of *Mabuya*, and *Trachylepis* is the next available name for the Afro-Malagasy clade of skinks. Hoogmoed (1974) noted numerous localities for this species in Guinea.

## VARANIDAE

*Varanus exanthematicus* (Bosc, 1792)

MATERIAL: ZFMK 64471, surroundings of Manstramombaya.

Only the head is preserved (85.8 mm head length; 47.4 mm head width) of an adult of unknown gender; the specimen was obtained from a meat market in February (G. Nikolaus, pers. comm.). This species was documented from Guinea by Mertens (1942).

*Varanus niloticus* (Linnaeus, 1766) (Fig. 15)

MATERIAL: KU 291925, ca. 5 km E. of Somoria at Niger River; CNSHB 124, ca. Somoria; ZFMK 64470, Sidakoro.

One juvenile (224 mm SVL, 383 mm TL) was found by a villager near the river; one adult (344.4 mm SVL, broken tail) came from an abandoned well pit, and one subadult (238 mm SVL; 404 mm TL) lacks specific microhabitat information. Stomach contents of the juvenile included remains of grasshoppers (Orthoptera) and several dozen parasitic nematodes.

Color in life: Dorsum of body, limbs, and tail grayish brown with numerous pale yellow cross bands; the brown on the flanks grades into pinkish or yellowish cream towards the venter. The juvenile has a gray dorsum, and the limbs are dark gray; the cross bands are composed of small circular blotches that are yellow on the body and orange on the tail. The juvenile has fewer than six pale cross bands between the extremities and 157 scale rows at midbody. The adult and subadult have eight cross bands between the extremities and 158 and 149 scale rows at midbody, respectively. The number of scale rows in all individuals is within the range of both *Varanus niloticus* and *V. ornatus*. However, the number of cross bands and the black tongues of these specimens are characteristic of *V. niloticus*. Although Böhme and Ziegler (1997) did not list Guinean localities in their taxonomic revision of this species, Chabanaud (1921) commented that *V. niloticus* was common throughout Guinea.

## SERPENTES

## TYPHILOPIDAE

*Typhlops punctatus* (Leach, 1819) (Fig. 16)

MATERIAL: NLU 70569, drift fence #1

An adult of unknown gender (280 mm total length) was caught in a pitfall trap in gallery forest. The dorsum is slate gray, which grades into reddish pink on the flanks and venter; the sides of the head are reddish pink. Morphology of this specimen is consistent with the description of this species by Roux-Estève (1974); there are 32 scale rows at midbody. Mocquard (1902) described a specimen from Kouroussa with 32 scale rows at midbody; another specimen was listed as *Typhlops caecus*. Roux-Estève (1974) listed several localities for both *T. p. punctatus* and *T. punctatus liberiensis* from Guinea.

## PYTHONIDAE

*Python sebae* (Gmelin, 1788)

MATERIAL: KU 291915, Niger River ca. Somoria.

An adult female (ca. 4.2 meters total length in life) was caught in a gill net strung across the Niger River. The dorsum and flanks were pale tan with numerous dull yellow blotches partially outlined with black and white



borders; the venter was white with mottled tan, brown, and black blotches. There are 283 ventrals, 67 subcaudals, and 88 scale rows at midbody. Several Guinean localities were mapped by Chippaux (1999).

#### COLUBRIDAE

##### *Crotaphopeltis hotamboeia* (Laurenti, 1768)

MATERIAL: ZFMK 64467–68, Sidakoro.

Two adult females (323 and 381 mm SVL; 47 and 60 mm TL) have 8 supralabials (3–5 in contact with eye), 10 intralabials, 1 preocular, 2 postoculars, 1 anterior and 2 posterior temporals, 19 rows of dorsal scales at midbody, 164 ventrals (1 undamaged specimen), 34–41 subcaudals, and entire anal plates. Mocquard (1902) listed this species from Kouroussa, and several Guinean localities were shown in Chippaux (1999). However, *Crotaphopeltis hippocrepis* was recently recognized as a valid taxon, and previous records of *C. hotamboeia* from Guinea might refer to the former species (B. Hughes, pers. comm.).

##### *Dasypeltis scabra* (Linnaeus, 1758)

Mocquard (1902) reported a specimen from Kouroussa. Chippaux (1999) mapped another locality from Guinea.

##### *Dromophis praecornatus* (Schlegel, 1837)

Mocquard (1902) reported a specimen from Kouroussa. Chippaux (1999) mapped a locality from Guinea.

##### *Grayia smithii* (Leach, 1818)

MATERIAL: CNSHB 175–76, Mafou Bila; NLU 70558, Sulukud-jamba.

Two males (840 and 920 mm SVL; 340 and 440 mm TL) and one of unknown gender (850.5 mm SVL; 315 mm TL) were caught in gill nets set in the Niger River. In life, the dorsum was brown with 6–20 dark gray patches on the flanks; these disappear on the posterior end of body. The venter is cream with numerous double rows of gray blotches laterally, either only on anterior third of body or entire ventral surface. Scutellation is: 7 supralabials, 11 infralabials, 1 preocular, 2 postoculars, 2 anterior temporals, 3 posterior temporals, 17 scale rows at midbody, 151–161 ventrals, 81–91 subcaudals (all tails incomplete). The specific name has been repeatedly misspelled in numerous publications (Pauwels et al., 2002). Several Guinean localities were shown by Chippaux (1999).

##### *Meizodon coronatus* (Schlegel, 1837)

Mocquard (1902) reported a juvenile (123 mm SVL; 37 mm TL) from Kouroussa with 19 scale rows, 173 ventrals, 71 subcaudals, and a divided anal plate. There are 17 maxillary teeth—the last two are the largest and are separated from the preceding teeth by a gap. Additional Guinean localities were shown by Chippaux (1999).

##### *Natriciteres variegata* (Peters, 1861)

Mocquard (1902) reported a specimen from Kouroussa with 15 scale rows, 129 ventrals, a divided anal plate, and a mutilated tail. Additional Guinean localities were shown by Chippaux (1999).

##### *Philothamnus heterodermus* (Hallowell, 1857) (Fig. 17)

MATERIAL: NLU 70566, drift fence #1; PNHN ecomuseum specimens (2) from unknown localities within the park.

An adult male (645 mm SVL; 230 mm TL) was taken from a funnel trap in gallery forest in the afternoon. An additional male (652 mm SVL; 206 mm TL) and an individual of unknown gender (427 mm SVL; 162 mm TL) were examined at the ecomuseum in the park.

In life, the dorsum was bright green with blue or black between each scale; the ventrals were pale green with pale blue between the scales. Scutellation is: 8 or 9 supralabials (5 and 6 in contact with eye), 10 or 11 infralabials, 1 preocular, 2 postoculars, 1 anterior temporal, 1 posterior temporal, 13–15 scale rows at midbody, 146–148 (males) and 155 (unknown gender) ventrals, 76–80 (males) and 78 (unknown gender) subcaudals, and anal plate entire. Several Guinean localities were shown by Chippaux (1999).

##### *Philothamnus irregularis* (Leach, 1819)

MATERIAL: CNSHB 82, park headquarters; ZFMK 64469, Sidakoro; KU CT 11908, unknown locality within the park.

One male (657 mm SVL; 244 mm TL) and two females (296 and 563 mm SVL; 101 and 250 mm TL) have 9 supralabials (5 and 6 or 4–6 in contact with eye), 10 or 11 infralabials, 1 preocular, 2 postoculars, 1 anterior and 1 posterior temporal, 15 dorsal scale rows at midbody, 178 (male) and 175 (undamaged female) ventrals, 110 (male) and 115 (female with complete tail) subcaudals, and divided anal plates. This species was recorded from Guinea by Hughes (1985) and Chippaux (1999).

##### *Psammophis elegans* (Shaw, 1802)

MATERIAL: ZFMK 64462–64, Sidakoro, KU CT 11909, unknown locality within the park.

Two adult males (696 and 759 mm SVL; both tails damaged), one adult female (642 mm SVL; 396 mm TL), and one adult of unknown gender (877 mm SVL; 556 mm TL) have 8 or 9 supralabials (5 and 6 or 4–6 in contact with eye), 11 intralabials, 1 or 2 preoculars, 2 postoculars, 2 anterior temporals, 2 or 3 posterior temporals, 17 dorsal scale rows at midbody, 195–200 (males), 191 (female), and 197 (unknown gender) ventrals, 159 (female) and 158 (unknown gender) subcaudals, and divided anal plates. This species was reported from Guinea by Chabanaud (1921).



*Telescopus variegatus* (Reinhardt, 1843)

Mocquard (1902) described "*Leptodira Pobeguini*," which is now considered a synonym of *T. variegatus*. The single specimen from Kouroussa (692 mm SVL; 123 mm TL) was reported to have 19 scale rows, 207 ventrals, a divided anal scale, and 59 subcaudals. Chippaux (1999) mapped a locality from Guinea.

*Toxicodryas blandingii* (Hallowell, 1844)

MATERIAL: NLU 70549, Somoria.

An adult female (1545 mm SVL; 450 mm TL) was climbing through a tree in the village during the day. Stomach contents included three intact individuals of a molossid bat (*Mops condylurus*) and the hindlegs and tail of a lizard in the genus *Chamaeleo*. The record of *Mops condylurus* adds another species to the diverse mammalian fauna known from the park (Ziegler et al., 2002), and provides confirmation of its presence in Guinea (listed as "unconfirmed" in the checklist of Barnett and Prangley, 1997).

In life, the dorsum and flanks were pinkish tan with 39 brown blotches outlined in a creamy tan border along the flanks. The dorsum of the head is brown; the labials are tan with brown outlines, and the venter is white. Scutellation is: 9 supralabials, 12 infralabials, 2 preoculars, 3 postoculars, 2 anterior temporals, 2 posterior temporals, 23 dorsal scale rows at midbody, 271 ventrals, 129 subcaudals, and anal plate divided. This species was known previously from Guinea (Chippaux, 1999).

## ELAPIDAE

*Dendroaspis polylepis* Günther, 1864

MATERIAL: ZFMK 64459–60, Sidakoro.

One subadult male (1085 mm SVL; 318 mm TL) collected in March and one adult (head only; 230 mm total length in life [G. Nikolaus, pers. comm.]) collected in December have 8 supralabials (4th in contact with eye), 11 infralabials, 3 preoculars, 3 postoculars, 3 anterior and 4 posterior temporals, dorsal scales in 21 rows at midbody, 253 ventrals, 121 subcaudals, and a divided anal plate. This species was reported previously from Guinea by Greenbaum et al. (2003).

*Dendroaspis viridis* (Hallowell, 1844)

MATERIAL: KU CT H910, unknown locality within the park.

A subadult of unknown gender (464 mm SVL; 146 mm TL) has 9 supralabials (4th in contact with eye), 9 infralabials, 2 preoculars, 4 postoculars, no loreal, 2 anterior and 2 posterior temporals, dorsal scales in 13 rows at midbody, 215 ventrals, 105 subcaudals, and a divided anal plate. This species was reported previously from Guinea by David and Ineich (1999).

*Elapsoidea semiannulata* Bocage, 1882

MATERIAL: ZFMK 64461, Sidakoro

An adult female (385 mm SVL; 29 mm TL) preserved specimen with 23 cream bands (1 scale wide) that run transversely across the body and tail. Scutellation is: 7 supralabials (3–4 contact eye), 7 infralabials, 1 preocular, 2 postoculars, 1 anterior and 2 posterior temporals, dorsal scales in 13 rows at midbody, 152 ventrals, 18 subcaudals, and anal plate entire. This species was reported previously from Guinea by David and Ineich (1999).

*Naja nigricollis* Reinhardt, 1843

Mocquard (1902) reported a specimen from Kouroussa. The species is known from Conakry (MacLaud and Mocquard, 1896) and other Guinean localities (Chippaux, 1999).

## VIPERIDAE

*Bitis arietans* (Merrem, 1820)

MATERIAL: CNSHB 172, gallery forest of Kofing River; ZFMK 64472, Sidakoro; PNHN ecomuseum specimen from unknown locality within the park.

A subadult of unknown gender (390 mm SVL; 25 mm TL) collected by mammal survey field workers, an adult male (1020 mm SVL; PNHN specimen), and an adult of unknown gender (head only; ZFMK 64472) were examined.

In life, the dorsum of the body of the subadult had gray bands containing dark gray and black spots and blotches alternating with crescent-shaped salmon bands; irregular blotches and spots of white outlined in dark gray contact both salmon and gray bands. The dorsum of the head was gray; salmon stripes were present on the side of the head and across the dorsum of the head, and the lower lip was white. Scutellation is: 16 supralabials, 135 (juvenile) and 136 (male) ventrals, 17 (juvenile) and 25 (male) subcaudals. This species was reported from Guinea by David and Ineich (1999).

*Bitis rhinoceros* (Schlegel, 1855)

MATERIAL: KU CT H911, unknown locality within the park.

An adult of unknown gender (head only). Lenk et al. (1999) elevated this West African subspecies of *Bitis gabonica* to specific status. The species was reported from Guinea by David and Ineich (1999).

*Causus maculatus* (Hallowell, 1842)

MATERIAL: CNSHB 111, ca. 1 km SW of Somoria; NLU 70619, Diaragbela; PNHN ecomuseum specimen from unknown locality within park.

An adult of unknown gender (330 mm SVL; 28 mm TL) was dead on a road. An adult female (230 mm SVL; 16 mm TL) was on a path in a recently burned area of

grassland early in the morning. An additional specimen of unknown gender (218 mm SVL; 16 mm TL) was examined from the ecomuseum. Scutellation data are available only for CNSHB III: 7 supralabials, 136 ventrals, 19 subcaudals.

Mocquard (1902) reported specimens of *Causus rhombeatus* from Kouroussa; however, Hughes (1977) referred this record and all other similar specimens from Guinea to *C. maculatus*.

DISCUSSION

We recorded 22 species of amphibians and 34 species of reptiles from Upper Niger National Park; four species of amphibians (*Ammirana galamensis*, *Hildebrandtia ornata*, *Phrynobatrachus francisci*, and *Ptychadena tellinii*) and two of reptiles (*Pelomedusa subrufa* and *Trionyx triunguis*) are the first records for Guinea. Numerous other species of amphibians and reptiles are likely to occur in the park given their known habitat preferences for Guinea savanna, gallery forest, and dry forest in other areas of Guinea, Mali, and Côte d'Ivoire (Joger, 1981; Böhme, 1985; Böhme et al., 1996; Chippaux, 1999; Rödel, 2000, 2003; Ineich, 2003; Rödel and Ernst, 2003). Thus, our findings should be considered preliminary, and further collecting (especially during the rainy season) in the park should document many additional species. Moreover, some of the taxa (e.g., *Hemisis marmoratus*, *Trachylepis affinis*, *Schoutedenella poecilonota*) discussed herein are in need of additional taxonomic work and may represent undescribed taxa (E. Greenbaum, pers. obs.; Rödel and Agyei, 2003; Rödel and Ernst, 2003).

Comparisons of the herpetofauna of Upper Niger National Park to other sites surveyed in West Africa are shown in Tables 2 and 3. Using either the raw percentage similarity or CBR, PNHN shows the greatest similarity to Comoé National Park (Côte d'Ivoire), which is in the same broad vegetation zone, and the least similarity to the rainforest and montane forest habitats at Mt. Nimba, Guinea. However, caution should be used to interpret these results, because the sampling of PNHN is relatively incomplete. Although PNHN has more species and habitats (i.e., savanna) in common with Comoé National Park (Côte d'Ivoire) than any of the other surveyed sites in West Africa, three species that occur in PNHN were not detected in Comoé or any of the other surveys in nearby

countries (Table 3). One likely explanation for this finding is incomplete sampling. However, *Trionyx triunguis* is limited to coastal brackish water and major rivers (Iverson, 1992), which likely accounts for its absence at other West African sites. *Dendroaspis polylepis* is one of the fastest and most dangerous snakes in the world, which might explain why previous collectors have not recorded it in other West African surveys. Given its currently known distribution in West Africa, this elapid is likely to occur throughout the semiarid and Guinea savanna habitats (Greenbaum et al., 2003). The third species is a recently described *Ammirana* known only from Guinea (M. -O. Rödel, pers. comm.).

Stuart (1990) suggested that wooded savanna habitats in Guinea should be explored biologically and protected. Upper Niger National Park protects one of the last large blocks of savanna and dry forest in Guinea. Among species of international conservation concern that were found to inhabit the park are several globally threatened species of the Guinean herpetofauna (Table 4). Seven of the dozen non-marine species listed as threatened or endangered occur in the park (CITES, 2003; IUCN, 2003), and several additional species from this list are likely to occur in the park. All anurans currently known from the park are considered of "Least Concern" in the Global Amphibian Assessment (IUCN et al., 2004). Unfortunately, poaching is known to be an ongoing problem for many large mammals in the park core area and hunting is permitted in the buffer zones (Ziegler, 1996; Brugiere and Magassouba, 2001; Ziegler et al., 2002; Brugière et al., 2005). It is also known that numerous kinds of amphibians and reptiles that occur throughout West Africa are hunted for skins or human consumption (Messel et al., 1992; Akani et al., 1998; G. Nikolaus, pers. comm.; P. DeRidder, pers. comm.). Because many of the species of mammals, birds, reptiles,

Table 2. Comparison of number of species in common and Coefficient of Biogeographic Resemblance (CBR) among amphibians and reptiles of Upper Niger National Park (56 species) and other sites surveyed in West Africa. N. P. = national park. See Table 3 for sources of data.

	Abuko Reserve, Gambia	Niokola-Koba N.P., Senegal <sup>†</sup>	Mt. Nimba, Guinea	Comoé N.P., Côte d'Ivoire
Species in common with PNHN	32/56 (57.1%)	34/56 (60.7%)	29/56 (51.8%)	52/56 (92.9%)
CBR with PNHN	0.571	0.535	0.307	0.658
Total species known from site	56	71	133	102

<sup>†</sup> Localities in southeastern Senegal near the national park are included

Table 3. List of 56 species of amphibians and reptiles known from Upper Niger National Park, Guinea, and their presence in other areas surveyed in West Africa. ? = presence not clear from citation; N. P. = national park.

Taxon	Abuko Reserve, Gambia (Barnett et al., 2001)	Niokola-Koba N.P., Senegal <sup>1</sup> (Joger and Lambert, 2002)	Mt. Nimba, Guinea (Ineich, 2003; Rödel et al., 2004)	Comoé N.P., Côte d'Ivoire <sup>2</sup>
<i>Schoutedenella poecilonota</i>	—	—	+	+
<i>Bufo maculatus</i>	+	+	+	+
<i>Bufo regularis</i>	+	+	+	+
<i>Hemisis marmoratus</i>	+	+	?	+
<i>Hyperolius concolor</i>	+	—	+	+
<i>Hyperolius nasutus</i>	—	—	?	+
<i>Hyperolius nitidulus</i>	—	+	+	+
<i>Kassina senegalensis</i>	+	+	+	+
<i>Leptopelis viridis</i>	+	+	+	+
<i>Silurana tropicalis</i>	+	—	+	+
<i>Amnionia fowensis</i>	—	—	—	—
<i>Amnionia galamensis</i>	—	+	—	+
<i>Hildebrandtia ornata</i>	—	—	—	+
<i>Hoplobatrachus occipitalis</i>	+	+	+	+
<i>Phrynobatrachus accraensis</i>	+	+	+	+
<i>Phrynobatrachus calcaratus</i>	—	+	+	+
<i>Phrynobatrachus francisci</i>	+	+	—	+
<i>Phrynobatrachus natalensis</i>	—	—	?	+
<i>Ptychadena oxyhynchus</i>	+	+	—	+
<i>Ptychadena pumilio</i>	—	+	+	+
<i>Ptychadena tellinii</i>	—	+	—	+
<i>Ptychadena trimotis</i>	+	+	—	+
<i>Pelomedusa subrufa</i>	—	+	—	+
<i>Pelusios castaneus</i>	+	—	+	+
<i>Kuaxys belliana</i>	+	+	—	+
<i>Tritonix tringuis</i>	—	—	—	—
<i>Crocodylus cataphractus</i>	—	+	—	+
<i>Crocodylus suchus</i>	+	+	—	+
<i>Agama agama</i>	+	+	+	+
<i>Chamaeleo gracilis</i>	+	+	+	+
<i>Hemidactylus brooki</i>	+	+	+	+
<i>Hemithemionyx caudocinctus</i>	—	+	—	+
<i>Leptosiaphus togoensis</i>	—	—	—	+
<i>Trachylepis affinis</i>	+	+	+	+
<i>Varanus exanthematicus</i>	+	—	—	+
<i>Varanus niloticus</i>	+	+	—	+
<i>Typhlops punctatus</i>	+	+	+	+
<i>Psyllion sebuc</i>	+	+	+	+
<i>Crotaphopeltis hotamboea</i>	+	+	—	+
<i>Dasypeltis scabra</i>	—	—	+	+
<i>Dromophis pacoimatus</i> <sup>3</sup>	—	—	—	+
<i>Graua smithii</i>	+	+	+	+
<i>Merzodoni coronatus</i> <sup>3</sup>	—	+	—	+
<i>Natriciteres variegata</i>	—	—	+	+
<i>Pluiothamnus heterodermus</i>	—	—	+	+
<i>Pluiothamnus irregularis</i>	+	+	+	+
<i>Psammophis elegans</i>	+	+	—	+
<i>Telescopus variegatus</i>	+	—	—	+
<i>Toxicobryas blandingeri</i>	—	—	+	+
<i>Dendroaspis polyolepis</i>	—	—	—	—
<i>Dendroaspis viridis</i>	+	—	+	+
<i>Hapsosauca semimaculata</i>	+	—	—	+
<i>Naja nigricollis</i> <sup>3</sup>	+	—	+	+
<i>Bitis arctans</i>	+	+	—	+
<i>Bitis rhinoceros</i>	—	—	+	—
<i>Causus maculatus</i>	—	+	+	+

<sup>1</sup>Localities in southeastern Senegal near the park are included<sup>2</sup>Park species list compiled from Rödel and Grabow, 1995; Rödel et al., 1997, 1999; and Rödel and Spieler, 2000.<sup>3</sup>The presence of these taxa in Upper Niger National Park, Guinea is based on literature records from Mocquard, 1902

Table 4. List of threatened non-marine species of amphibians and reptiles in Guinea based on ratings by CITES, IUCN Red List, and Global Amphibian Assessment. The park occurrence column denotes species known (+), or with potential (?) to occur in Upper Niger National Park.

Taxon	CITES	IUCN	Park Occurrence
<i>Nimbaphrynoides occidentalis</i>	Appendix I	Critically endangered	—
<i>Crocodylus cataphractus</i>	Appendix I	Data deficient	+
<i>Crocodylus suchus</i>	Appendix I	—	+
<i>Osteolaemus tetraspis</i>	Appendix I	Vulnerable	?
<i>Kinixys belluana</i>	Appendix II	—	+
<i>Chamaeleo gracilis</i>	Appendix II	—	+
<i>Chamaeleo senegalensis</i>	Appendix II	—	?
<i>Varanus exanthematicus</i>	Appendix II	—	+
<i>Varanus niloticus</i>	Appendix II	—	+
<i>Varanus ornatus</i>	Appendix II	—	?
<i>Python regius</i>	Appendix II	—	?
<i>Python sebae</i>	Appendix II	—	?

and amphibians in the park are West African regional endemics and threatened, the park should continue to be a high conservation priority for Guinea.

Three species from the park, *Silurana tropicalis*, *Anniarana foveensis*, and *Bitis rhinoceros*, are mostly restricted to rainforest habitats in West Africa, which suggests that PNHN might harbor some species that are adapted to lowland tropical rainforests. Moreover, several species of mammals that occur within the park have West African distributions that are mainly restricted to tropical rainforest; these include the Western pied colobus monkey (*Colobus polykomos*), giant pangolin (*Mantis gigantea*), tree hyrax (*Dendrohyrax dorsalis*), giant hog (*Hylochoerus*

*meinertzhageni*), fire-footed rope squirrel (*Funisciurus pyrropus*), Gambian sun squirrel (*Heliosciurus gambianus*), hump-nosed mouse (*Hybomys planifrons*), and brush-tailed porcupine (*Atherurus africanus*) (Kingdon, 1997; Ziegler et al., 2002). At Comoé National Park, Côte d'Ivoire, gallery forests serve as stepping stone habitats, linking savanna areas with the rainforest zone, thus providing survival possibilities for species that normally do not occur outside of rainforests (M. -O. Rödel, pers. comm.). A similar situation seems to pertain to Upper Niger National Park, which serves to accentuate the conservation importance of the park.

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