Analysis of the herpetofauna of the Republic of Mali, I. Annotated inventory, with description of a new *Uromastyx* (Sauria: Agamidae)

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At least 33 anuran, 7 chelonian, 3 crocodilian, 42 lizard and 54 snake species have been recorded in or at the borders of Mali. *Uromastyx maliensis*, a new species found between the Niger River and the Tanezrouft desert, is described. New country records from recent collections and museum material comprise *Bufo pentoni*, *B. maculatus*, *Ptychadena aequiplicata*, *Phrynobatrachus perpalmatus*, *Tomopterna* sp., *Afrixalus weidholzi*, *Trionyx triunguis*, *Hemidactylus mabouia*, *Agama paragama*, *Acanthodactylus guineensis*, *Mesalina pasteuri* and *Echis leucogaster* (*Tomopterna* and *Trionyx* are genera new to Mali).

Analyse de l'herpétofaune de la République du Mali, I. Inventaire commenté et description d'un nouvel Uromastyx *(Sauria: Agamidae).* — Au moins 33 anoures, 7 chéloniens, 3 crocodiliens, 42 lézards et 54 espèces de serpents ont été répertoriés à l'intérieur ou à la frontière du Mali. *Uromastyx maliensis*, une nouvelle espèce trouvée entre le fleuve Niger et le désert de Tanezrouft, est décrite. Sur base de récoltes et de matériel muséaire récents, les nouvelles citations pour le pays comprennent *Bufo pentoni*, *B. maculatus*, *Ptychadena aequiplicata*, *Phrynobatrachus perpalmatus*, *Tomopterna* sp., *Afrixalus weidholzi*, *Trionyx triunguis*, *Hemidactylus mabouia*, *Agama paragama*, *Acanthodactylus guineensis*, *Mesalina pasteuri* et *Echis leucogaster* (*Tomopterna* et *Trionyx* sont des genres nouveaux pour le Mali)

Key words: Amphibia, Reptilia, *Uromastyx*, Mali, faunal list, new records, new species

INTRODUCTION

Amphibian and reptile species from Mali have been included in a number of collections from West Africa (e.g. Pellegrin, 1909; Angel, 1922, 1933; Angel & Lhote, 1938; Grandison, 1956; Villiers, 1965). Papenfuss (1969) reviewed the literature recording reptile species in Mali and neighbouring countries, and described his own collections from West Africa. The amphibian species of the region were reviewed by Lamotte & Xavier (1981). More recent collections of amphibians and reptiles have been made during West African journeys by Joger (1981), Schätti (1986) and Meinig (Böhme *et al.*, 1996). Further work on certain genera and families has also been undertaken (e.g. Joger, 1979, 1980; Hughes, 1985). Taxa described from Mali are *Bufo chudeaui* Chabanaud, 1919; *Phrynobatrachus monodi* de Witte, 1930; *Schoutedenella milletihorsini* (Angel, 1922); *Kinixys belliana nogueyi* (Lataste, 1886); *Tarentola parvicarinata* Joger, 1980; *Agama boueti* Chabanaud, 1917; *Agama boulengeri* Lataste, 1886; *Leptotyphlops narirostris boueti* (Chabanaud, 1917); *Echis jogeri* Cherlin, 1990; *Naja katiensis* Angel, 1922, and a new *Uromastyx* (below).

The preparation of national and regional check lists is an important first step in assessing the impact of environmental change on amphibian and reptile species and their habitats in Africa, and enables centres of herpetofaunal richness and endemism to be identified (Howell, 1992). Few or no publications on herpetofaunal assemblages and habitat are available for biodiversity assessment in Mali (Warshall, 1989; Stuart & Adams, 1990). A species inventory, apart from adding new species and extending known ranges, could, with further collecting, provide the basis for additional information on habitat and status. Such information is also required for biogeographical studies, and a brief biogeographical analysis of our data is published elsewhere (Joger & Lambert, in press).

The objective of this work, therefore, was to describe a new species of the genus *Uromastyx*, and prepare an inventory of species for the Republic of Mali, using records available in the literature, and unpublished data from collections of the Muséum national d'Histoire naturelle, Paris (MNHN), the Natural History Museum, London (BMNH), the California Academy of Sciences (CAS), the Göteborgs Naturhistoriska Museet (GNHM) and the Hessisches Landesmuseum Darmstadt (HLMD). Much material from Mali in the last named collection originated from a visit by M. R. K. Lambert in 1991.

The former Soudan français included the Republic of Mali within its borders, and also part of south-east Mauritania. Errors from any earlier records for south-east Mauritania given under Soudan français have been avoided by referring to localities. Likewise, part of what is now western Mali was called Sénégal, and central and eastern Mali, Niger, in the 19th and early part of this century. Errors were similarly avoided.

Most amphibian and reptile activity is seasonally influenced in West Africa. Collections by Papenfuss (1969) and Joger (1981) were made during the dry season (November-May) —providing optimal conditions for road travel— the former in December 1961 and December 1965 in northern and eastern Mali, and the latter in January 1977 and March/April 1978 in southern and western Mali. Schätti (1986) also collected in southern Mali, during September and October 1984. Small collections in December 1993 to January 1994, and January to February 1995, were made by Meinig (Böhme *et al.*, 1996) in southern central Mali. The collection and

Fig. 1. — Holotype of *Uromastyx maliensis* n. sp. in life (snout-vent length 192 mm). Photo: U. Joger.

sightings of M. R. K. Lambert in northern central Mali were made between 26 May and 1 December 1991, with a less intense period between 16 June and 8 September, and spanned the rainy season (June-October).

DESCRIPTION OF *UROMASTYX MALIENSIS* N. SP.

A living specimen of *Uromastyx* acquired by H. Rudolf southeast of Gao in Mali (Fig. 1) was obviously different from any known members of this genus. An immunological comparison of the serum albumin with that of *U. (acanthinurus) geyri* (Joger, 1986) revealed a genetic distance of a magnitude typical for different species. Plasma protein characteristics (Fig. 2) are distinct from those of *U. a. acanthinurus*. Andersson (1935) had already distinguished two species of *Uromastyx* in Mali. An investigation of his specimens, deposited in the Göteborg Natural History Museum, proved the identity of his "*U. acanthinurus*" to be the undescribed taxon in question. Moreover, examination of material collected by Papenfuss around Tessalit and preserved in the California Academy of Sciences, San Francisco (Figs 3 and 4), revealed that *geyri* and the new taxon were sympatrically occurring different species.

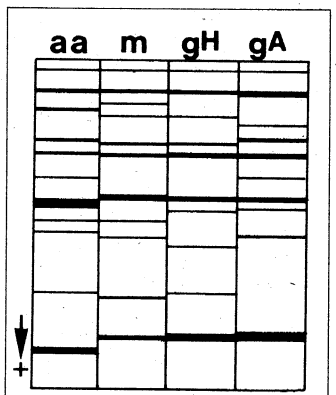

Fig. 2. — Plasma protein electropherograms of *U. a. acanthinurus*, S. Morocco (aa), *U. maliensis* n.sp. (m), *U. (acanthinurus) geyri*, Hoggar, Algeria (g^H) and Aïr, Niger (g^A). Discontinuous PAG electrophoresis, 7.5% running gel, Tris-Glycin buffer pH 8.7.

The question remained, however, whether the form was a new subspecies of *U. acanthinurus* or a separate species. In an unpublished morphological study, T. Wilms (pers. comm.) found an introgression between *geyri* and *acanthinurus* on the Tademaït plateau and Amguid area of Algeria, and concluded that *geyri* was merely a subspecies of *acanthinurus*. If this were true, the Malian *Uromastyx*, which is certainly not conspecific with *geyri*, would have to be described as a separate species. Current knowledge indicates that the form is separated from *U. a. acanthinurus* by at least 1000 km.

Holotype: HLMD RA 1545, 40 km S.E. of Gao, leg. H. Rudolf. — Paratypes: 13 specimens; MNHN 1965-2144, Taoudrart, west of Hoggar, Tanezrouft; CAS 123484, -486, -489, 135007-010, 135012-013, 135015-016, Tessalit; GNHM 1930.32-5744, Ti-N-Zaouâtene (recorded as *U. acanthinurus* by Andersson, 1935, *in* Papenfuss, 1969).

Diagnosis

A member of the *Uromastyx acanthinurus* group, distinguished from the sympatric *U. (acanthinurus) geyri* by :

1) shorter and less slender tail (less than 70% of snout-vent length, Fig. 3)
2) fewer tail verticillae (less than 20) bearing less prominent spines
3) lack of enlarged scales on body sides
4) rounded scales instead of pointed denticles on anterior margin of ear opening
5) smaller scales anterior to the ear opening (cheek region, Fig. 4)
6) juvenile pattern without transverse bars; distinguished from *U. a. acanthinurus* by :

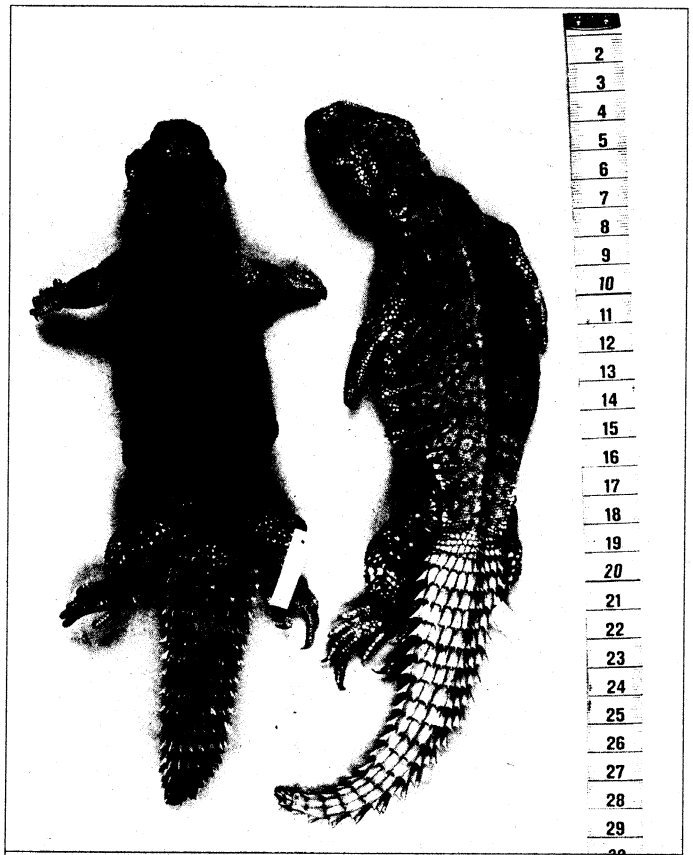

Fig. 3. — *Uromastyx maliensis* n. sp. (left) and *U. (acanthinurus) geyri*; sympatric specimens from the Tessalit series (California Academy of Sciences). Note different tail shapes.

(i) higher number of scales under 4th toe (more than 15),
(ii) higher number of ventral scales; different from both *geyri* and *acanthinurus* in:-
  a. higher number of scales between supralabials and eye
  b. smaller (and more numerous) scales in the lateral gular region (underneath the lower jaw-bones)
(iii) colour and pattern: yellow, olive and brown dominating; no red or orange colours, dark body parts brown, never black, no transverse bars on belly or back, net-like pattern dorsally, especially on top of throat.

Description of the holotype

(Figs 1 and 5)

Measurements (mm)

Snout-vent length 192, tail length 107 (55.7% of snout-vent), tail width 34, tail height 20, head 38, head width 36, head height 20, left foreleg 65, fourth finger (to joint with third) 17, left hindleg 76, fourth toe (to joint with third) 18.

Tail shape

Carrot-shaped from above; proximal third of maximal diameter; central third slightly thinner; distal third abruptly converging towards the tip.

Scalation

Midventral count (between gular fold and inguinal fold) 98, dorsal and lateral scales uniformly minute, no enlarged tubercles. Gular scales larger midventrally, much smaller laterally: count between lower anterior ear margin underneath lower jaw to mental 38, 6 scale rows between upper labials and eye; ear opening higher than broad, its height equivalent to 11 cheek scales (counted three scales anterior to the ear opening); 7 scales between upper anterior ear margin and enlarged row of subocular scales; 3 enlarged but not spinose scales at anterior ear margin. Eighteen verticillae on the tail, the third one composed of 14 spines, which are slightly protruding and orientated backwards. Seventeen scales under the fourth finger of left foreleg, 18 scales under the fourth toe of left hindleg (counted from the tip to the joint with the third toe). Light femoral pores, 12 lefthand and 13 righthand.

Colour and pattern

Head dark brown dorsally and laterally (except light eyelids, anterior ear margin and supralabials). Underside of head whitish with dark pigment in the median part of throat. Neck and chest dark brown, venter and underside of tail white-yellowish with irregular dark patches. Limbs dark brown dorsally and ventrally, underside of feet and knees yellowish. Back olive yellow in life, light grey in alcohol, with a brown net-like pattern dilimiting light patches which bear a dark dot in the centre.

Variation of the paratypes

The largest specimen, of the Tessalit series, has 203 mm snout-vent length and 139 mm tail length. This is less than in maximum individuals of *geyri* and *acanthinurus*. Colour and pattern vary in the extend of the dark brown colour on the head (cheeks and neck may be light, but then bear a net-like brown pattern like the back. The back, however, may be devoid of the net pattern, and then bears simple dark brown dots like many *U. a. acanthinurus*. Tail length and shape, number of verticillae and lack of enlarged scales on the body sides are constant characters distinguishing all specimens from the sympatric *U. (acanthinurus) geyri*. For variation in scale counts and other diagnostic characters, see Table 1. The only known juvenile (CAS 123486)

Fig. 4. — The same specimens as in Fig. 3: heads in lateral view. Note in *Uromastyx mailensis* n. sp. (left) smaller scales of cheek and subocular regions, and irregular bands across head (part of a net-like pattern). Note in *U. geyri* strong spines at anterior margin of ear opening.

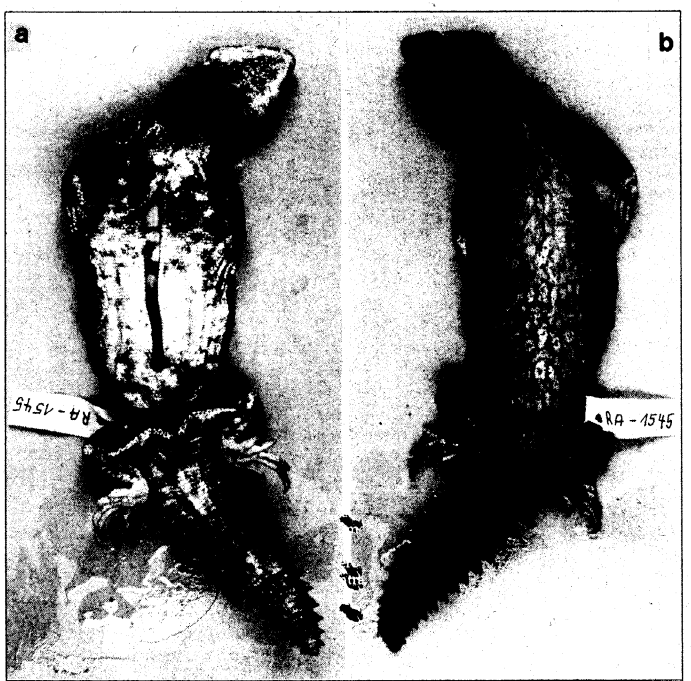

Fig. 5.— Holotype of *U. maliensis* n. sp. ventral (a) and dorsal (b) views.

Table 1. — Characters distinguishing between *Uromastyx maliensis* n. sp., *U. a. acanthinurus* and *U. (acanthinurus) geyri* (minimum, mean [in bold], maximum, and sample size)

Characters	*maliensis*	*geyri*	*acanthinurus*
groups of enlarged scales at body sides	absent	present	absent
denticles at anterior end of ear opening	weak	strong	weak
relative tail length (% of snout-vent l.)	55.7-**63.1**-69.4 n = 13	72.5-**80.9**-88.5 n = 13	52.1-**61.5**-67.7 n = 13
verticillae on tail	17- **18.6** -20 n = 14	20- **21.3** -23 n = 16	16- **18.5** -20 n = 13
scale rows between eye and labials	(5) 6 - 7	4 - 5 (6)	4 - 5 (6)
scale count ear to mental[1]	31- **36.0** -43 n = 14	22- **25.7** -32 n = 17	24- **27.5** -31 n = 13
preauricular scales[2]	60- **76.6** -98 n = 7	40- **49.1** -63 n = 12	50- **72.1** -112 n = 8
ventral scale count[3]	88- **97.7** -120 n = 14	70- **90.6** -111 n = 16	78- **84.0** -97 n = 13
scales under 4th toe[4]	16- **17.3** -20 n = 14	12- **16.3** -20 n = 14	11- **13.5** -17 n = 10

Scale counts:
[1] From the lowermost anterior margin of the ear opening under the lower jaw to the mental scale
[2] Product of two counts (axb):
a. From the uppermost anterior margin of the ear opening to the nearest enlarged scale of the subocular row
b. Parallel to the anterior margin of the ear, three scales proximal to the ear opening, from its upper end to its lower end.
[3] Along the middle of the venter, from the gular fold to the inguinal fold.
[4] Under fourth toe of left leg, from its joint with the third toe to its tip.

resembles young *geyri* in its ocellated dorsal pattern, but in contrast to typical young *geyri*, the ocellae are not separated by broad dark transverse bands.

Distribution

Northern Mali and extreme southwest Algeria (parts of the Tanezrouft desert, peripheral regions of the Adrar des Iforhas, Tilemsi valley, and north bank of the big bend of the Niger River). The species is partly sympatric with *U. (acanthinurus) geyri* in the peripheral part of the Adrar des Iforhas. In rocky terrain of the central part of the Adrar des Iforhas, only *geyri* is known; whereas in the Tilemsi valley and along the Niger river, *geyri* appears to be absent.

Habitat

According to the collector of the holotype, H. Rudolf, Sahelian steppe with sandy hills but few rocks.

ANNOTATED INVENTORY OF MALIAN AMPHIBIANS AND REPTILES

In the following inventory of Malian species, new species records (***), range extensions (**) and species endemic to Mali or having a major part of their range

within Mali (*) are indicated; records at borders with adjacent countries (X numbers in Appendix) are placed in parentheses []. Only unpublished material in museum collections is listed; accession numbers are included for records of new, or unpublished endemic, species. Records for reptiles in earlier references are covered by Papenfuss's (1969) review, but earlier references are given under certain species for purposes of clarification. If a species is given under a different name by earlier authors, the old name is given in parenthesis ("..."). The reference for a general Malian species record is excluded if specific localities are given.

Species recorded at numerous localities have been included with the inventory below (Appendix). These give an indication of collection intensity, and may provide information for future biodiversity assessment from herpetofaunal assemblages. Localities in Mali are enumerated from north to south (from low to high mean annual rainfall), and then west to east for those at the same latitude (letters are given for uncertain localities). A points map was generated from coordinates for the numbered localities (Appendix) listed in a flat ASCI file, and fitted into a map showing the international boundary of the Republic of Mali (Fig. 6).

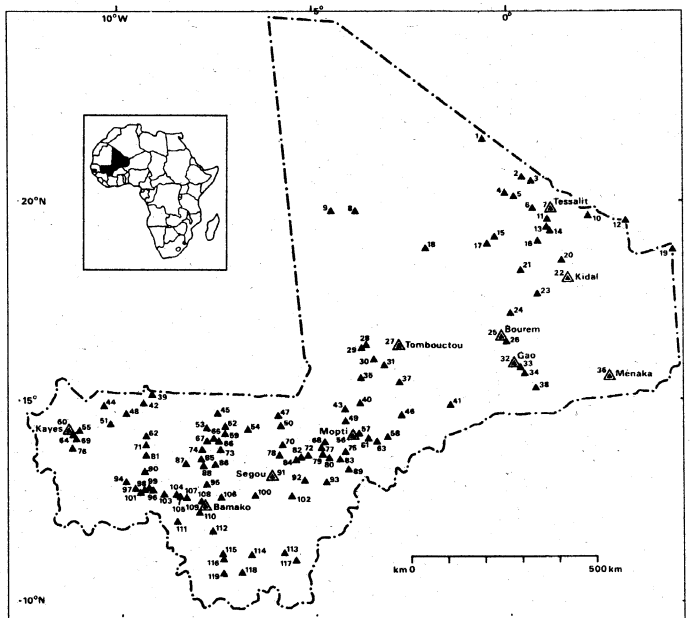

Fig. 6. — Collection localities in the Republic of Mali (see Appendix for key).

AMPHIBIA

At least 33 species (6 new records, 2 endemic)

Pipidae

[*Xenopus muelleri* (Peters, 1844) - X4. Common near the Malian border in Burkina Faso (Arnoult & Lamotte, 1968); therefore most likely present also in Mali].

Bufonidae

* *Bufo chudeaui* Chabanaud, 1919 - 42 (type locality), only four juvenile specimens known. Erroneously recorded from Sénégal (Frost, 1985).

*** *Bufo pentoni* Anderson, 1893 - 59 (HLMD RA 1942-1947, 1964, 1998). Recorded during rains with *Bufo xeros*, but much less abundant. Also known from Niger (Joger, 1981) and Mauritania (Dekeyser & Villiers, 1952), and recorded by Böhme *et al.* (in press) in Burkina Faso.

Bufo xeros Tandy, Tandy, Keith & Duff-Mackay, 1976 - 108 (*B. regularis*) (Angel, 1922); 10, 22, 25, 32, 38, 45 (Angel & Lhote, 1938); 64 (Joger, 1981); 59, 70, 72 (HLMD). Abundant, observed during rains (and near buildings where damp during the dry season) amassing under light with attracted insect prey.

Bufo regularis Reuss, 1834 - 98 (Mertens, 1938); 56 (Schiøtz, 1967); 64, 90 (Joger, 1981); 109, 115 (Schätti, 1986); 63, 83, 91, 98, 102, 109 (Böhme *et al.*, in press); 27 (MNHN); 80 (sight record). Angel & Lhote (1938) recorded *B. xeros* as *B. regularis*.

*** *Bufo maculatus* Hallowell, 1854 - 72 (MNHN 1955.22).

Ranidae

Hylarana galamensis (Dumèril & Bibron, 1841) - 45 (Angel & Lhote, 1938); 72 (Lamotte, 1966).

Hildebrandtia ornata (Peters, 1878) - 115 (Schätti, 1986).

Dicroglossus occipitalis (Günther, 1858) - 108 (Angel, 1922); 25, 45 (Angel & Lhote, 1938); 56 (Schiøtz, 1967); 94 (Joger, 1981); 63, 83, 91 (by Bani river, between Segou and Bla), 98, 102, 109 (Böhme *et al.*, in press); 27, 58, 72, 109 (MNHN); 7 (CAS); 59, 109 (HLMD); 50, 54, 79 (sight records). Commonest frog observed in central Mali near standing water and marshy areas; infrequent during dry season.

*** *Ptychadena aequiplicata* (Werner, 1898) - 63 (CAS 103733-103734).

[*Ptychadena floweri* (Boulenger, 1917) - X2. Known from savannas from Sénégal to Egypt and south to Tanzania and Malawi (Lamotte & Xavier, 1981; Frost, 1985)].

Ptychadena maccarthyensis (Andersson, 1937) - 94 (Joger, 1981); 98 (Mertens, 1938); 72 (Lamotte, 1966).

Ptychadena (mascareniensis) pumilio (Boulenger, 1920) - 79 (Lamotte, 1966, 1967); 94 (Joger, 1981); 98 (Mertens, 1938, as *P. m. mascareniensis*).

** *Ptychadena trinodis* (Boettger, 1881) - 108 (Angel, 1922); 72 (Lamotte, 1966; MNHN); 59 (HLMD). Infrequent in northern central Mali.

Ptychadena oxyrhynchus (Smith, 1849) - 103 (Joger, 1981).

Ptychadena schubotzi (Sternfeld, 1917) - 103 (Joger, 1981, as *P. cornii*), 114 (Schätti, 1986).

Phrynobatrachus accraensis (Ahl, 1923) - 56 (Schiøtz, 1967).

Phrynobatrachus acridoides (Cope, 1867) - 98 (Mertens, 1938).

Phrynobatrachus francisci Boulenger, 1912 - 56 (Schiøtz, 1967); 82 (type locality of *Phrynobatrachus monodi* de Witte, 1930). *Phrynobatrachus monodi* was synonymized with *P. francisci* by Lamotte & Xavier (1966). Taxonomically close to *P. francisci*.

Phrynobatrachus natalensis (Smith, 1849) - 45 (Angel & Lhote, 1938); 101 (Schätti, 1986).

*** *Phrynobatrachus perpalmatus* Boulenger, 1898 - 77 (MNHN 1955.20). This species has previously been recorded between Cameroon and Zambia (Frost, 1985).

[*Hemisus marmoratum* (Peters, 1854) - X6. Known from Niokolo-Koba in southeastern Sénégal (Lamotte, 1969) and from several localities in Burkina Faso (Lamotte, 1966). A fossorial species, only active after rains; sometimes regarded as representing a separate family, Hemisidae].

***Tomopterna* sp. - 0 (MNHN). A member of this crepuscular genus has recently been found in northern Mali. The taxonomy of the genus is recently under revision at MNHN (A.-M. Ohler, pers. comm.). Present both in the Aïr mountains of northern Niger (Angel & Lhote, 1938, as *Arthroleptis agadezi* Angel, 1936) and in the Mauritanian Adrar (Dekeyser & Villiers, 1952).

* *Schoutedenella milletihorsini* (Angel, 1922) - 108 (type locality). Stony habitat. Known only from the type locality (Frost, 1985).

Arthroleptis sp. - 90 (Joger, 1981). It is uncertain which species of this genus occur in Mali.

Microhylidae

Phrynomerus microps (Peters, 1875) - 101 (Schätti, 1986).

Rhacophoridae

Hyperolius (viridiflavus) nitidulus Peters, 1876 - 45 (Angel & Lhote, 1938); 58, 77 (Lamotte, 1966); 56 (Schiøtz, 1967); 72 (MNHN); 59 (sight record). *Hyperolius nitidulus* is part of the *H. viridiflavus* species complex (Schiøtz, 1971); it can be treated either as a full species or as a subspecies of *viridiflavus*. Frequently seen on grass stems during seasonal rains in northern central Mali (J. P. Grunshaw, pers. comm.).

*** *Afrixalus weidholzi* (Mertens, 1938) - 72 (MNHN 1979.3723).

Afrixalus (fulvovittatus) vittiger (Peters, 1876) - 72 (Lamotte, 1966); 56 (Schiøtz, 1967); 115 (Schätti, 1986). Species status of *vittiger* is not certain.

Kassina cassinoides (Boulenger, 1903) - 72 (Schiøtz, 1967).

Kassina senegalensis (Duméril & Bibron, 1841) - 37 (Angel & Lhote, 1938); 77 (Lamotte, 1966); 111 (Schätti, 1986).

[*Leptopelis bufonides* Schiøtz, 1967. - X6. A xerophilic treefrog, described from Koungheul, Sénégal, and from Samba, Burkina Faso; like the following species, likely to be found in southern Mali].

[*Leptopelis viridis* (Günther, 1868) - X6. Known both from Niokolo-Koba, southeastern Sénégal (Lamotte, 1969) and from Yako, northern central Burkina Faso (Schiøtz, 1967)].

REPTILIA

At least 106 species (1 new species, 6 new records, 5 endemic)

Crocodylia

Crocodylus niloticus Laurenti, 1768 - 77 (Pooley, 1980, in IUCN, 1982); 53, 74, 85, 86 (sight records). Well known to local people in Mali, especially in the River Niger Inner Delta, and depicted on postcards. Reduced in numbers in the Delta through habitat change and persecution; individuals occasionally seen elsewhere in seasonal pools.

Crocodylus cataphractus Cuvier, 1825 - 118 (Pooley, 1980, in IUCN, 1982). Status uncertain (IUCN, 1982).

[*Osteolaemus tetraspis* Cope, 1861 - X1 (Pooley, 1980, in IUCN, 1982). Not specifically recorded in Mali, but, extending into gallery forest in savanna areas of Sénégal (Villiers, 1958; IUCN, 1982), probably occurs there and is included by Warshall (1989)].

CHELONIA

Testudinidae

** *Geochelone sulcata* (Miller, 1780) - 27, 45 (Papenfuss, 1969); 18, 46, 47, 52, 59, 66 (Lambert, 1993). Occasional sightings only. Populations probably reduced from trade-collection and harvesting as food by villagers, combined with drought conditions from 1973 to 1988, in northern central Mali (Lambert, 1993).

Kinixys belliana nogueyi (Lataste, 1886) - 76 (type locality); 72 (Loveridge & Williams, 1957, whose location of the type locality is erroneous; Pama, Gourma district, should be under Burkina Faso, formerly Haute Volta).

Trionychidae

Cyclanorbis senegalensis (Duméril & Bibron, 1835) - 64 (Joger, 1981). Occasionally caught by fisherman in River Sénégal.

*** *Trionyx triunguis* (Forskål, 1775) - 72 (MNHN.1955.26).

Pelomedusidae

** *Pelomedusa subrufa* (Lacépède, 1788) - 108 (Papenfuss, 1969); 115 (Schätti, 1986); 91, 100 (Böhme *et al.*, in press); 87 (MNHN); A (BMNH); 59, 74, 78 (HLMD); 39, 88 (sight records). Frequently observed in and near water during the rainy season; aestivates during dry season. Collected between Adrar des Iforhas and Aïr mountains near I-n-Abangharit, Niger (northernmost locality) by G. B. Popov (BMNH specimens).

Pelusios adansonii (Schweigger, 1812) - 0 (Ernst & Barbour, 1989).

[*Pelusios castaneus* (Schweigger, 1812) - X5 (Ernst & Barbour, 1989). Previously included with *Pelusios subniger* (Lacépède, 1788) of East Africa; under that name reported from Badi (Niokolo-Koba, southeastern Sénégal; Villiers, 1956)].

SAURIA

About 42 species (one new species, 4 new records, 4 endemic).

Gekkonidae

Hemitheconyx caudicinctus (A. Duméril, 1851) - 42, 108 (Grandison, 1956); 60, 109, 112 (MNHN). Ground-dwelling species not often observed during dry season in western Mali.

Hemidactylus brooki complex - 25, 41, 45, 72, 91, 109 (Papenfuss, 1969); 60, 69, 107 (Joger, 1981); 101, 111, 115 (Schätti,

1986); 63, 92, 102 (Böhme *et al.*, in press); 26, 32, 72 (BMNH); 59, 70, 72 (HLMD). Commonly seen on mud-brick walls of village buildings at night in central and northern Mali.

*** *Hemidactylus mabouia* (Moreau de Jonnès, 1818) - 43 (BMNH 1957-1.3.97). Abundant and widespread in eastern and southern Africa; possibly present in Mali through human agency. First record in Sénégal (Böhme, 1978).

[*Lygodactylus (picturatus) gutturalis* (B. du Bocage, 1873) - X4. Recorded from Bobo-Dioulasso, Burkina Faso (Angel, 1950), and St. Louis, Sénégal (Grandison 1956; Böhme, 1958), and therefore likely to occur in Mali].

Ptyodactylus hasselquistii ragazzi (Anderson, 1898) - 12, 23, 41, 56, 56, 58, 63, 83 (Papenfuss, 1969); 61, 63, 98 (Böhme *et al.*, in press); 32 (BMNH); 7, 21 (CAS).

Stenodactylus petrii Andersson, 1896 - 24 (Papenfuss, 1969); 7 (CAS).

Stenodactylus sthenodactylus (Lichtenstein, 1823) - 1, 16, 20 (Papenfuss, 1969); 7 (CAS).

**,* *Tarentola parvicarinata* Joger, 1980 - 44, 64 (type locality) (Joger, 1980); 42, 51, 60, 62, 81, 103, 104, 109 (Joger, 1981); 116 (Schätti, 1986); 98, 109 (Böhme *et al.*, in press); 32, 106 (BMNH); 59, 72, 109 (HLMD). An abundant species inside and on the walls of buildings, especially in towns. Species has been confused with *Tarentola annularis* and *T. ephippiata* in Mali. Also known from eastern Sénégal, southern Mauritania, northern Guinea and from Mt. Loma, Sierra Leone (Joger, 1980).

Tarentola annularis (Geoffroy, 1809) - 16, 27, 30, 32, 56, 63 (Papenfuss, 1969); 63 (Böhme *et al.*, in press); 35 (BMNH); 22 (in stomach of *Telescopus tripolitanus*), 40, 58 (MNHN). Species has been confused with *T. parvicarinata* and *T. ephippiata* in Mali.

Tarentola ephippiata O'Shaughnessy, 1875 - 15 (de Witte, 1930); 30 (under *T. annularis* in Papenfuss, 1969), 91 (Angel & Lhote, 1938); 27, 32, 41 (Papenfuss, 1969); 22 (MNHN); 13, 32, 72 (BMNH); 59, 72 (HLMD). Infrequently recorded on large tree trunks, and on walls of buildings, less commonly than *T. parvicarinata*, at night. Species has been confused with *T. parvicarinata* and *T. annularis* in Mali. Two subspecies occur in Mali (Joger, 1984).

** *Tropiocolotes tripolitanus* (Peters, 1880) - 41, 58, 63 (Papenfuss, 1969); 7 (CAS); 59 (HLMD). Specimens found under rocks having sought refuge during the day. Probably fairly frequent, not only in rocky habitats, in the arid and Sahelian zones of Mali.

Chamaeleonidae

** *Chamaeleo africanus* Laurenti, 1768 - 27, 40, 45, 56, 57, 63, 72, 91 (Papenfuss, 1969); 56, 63 (Böhme *et al.*, in press); 59, 67 (HLMD); 54, 67, 73, 74, 95 (sight records). A very commonly seen species in daylight hours during and after the rainy season, especially on bushes and by trees in which refuge is sought at night. Seen on roads. Locality 74 is westernmost for the species.

Chamaeleo senegalensis Daudin, 1802 - 32 (Angel & Lhote, 1938); 105, 106 (Grandison, 1956); 69 (Joger, 1981); 101 (Schätti, 1986).

Agamidae

Agama agama (Linnaeus, 1758) - 23, 27, 30, 42, 63, 72, 91, 108 (Papenfuss, 1969); 42, 62, 64, 81, 104, 107, 109 (Joger, 1981); 109, 111, 115 (Schätti, 1986); 56, 61, 98, 102, 109 (Böhme *et al.*, in press); 0, 70, 118 (BMNH); 59 (photographic record). A very abundant species observed everywhere by and on buildings in Mali. Some of the records may in fact be *A. paragama*.

*** *Agama paragama* Grandison, 1956 - 59 (HLMD RA 1932, 1954, 1955-1957, 1983, 2065-2067), 70 (HLMD RA 2015). An abundant species active during daylight hours, often by buildings in northern central Mali. Near locality 59 (Fig. 2), eighteen *A. paragama* were sighted (19 November 1991) on rock outcrops (together with *Mabuya quinquetaeniata scharica*), at 10.3 man-hour^{-1} between 08.57 and 10.42 h (26-34°C.).

Agama impalearis Boettger, 1851 (= *A. bibronii* Duméril) - 4 (de Witte, 1930); 7 (CAS); 10, 12 (GNHM, as "*A. spinosa*, broad type" in Andersson, 1935).

Agama sankaranica Chabanaud, 1918 - 23, 63, 91 (Papenfuss, 1969); 42, 48, 51, 71, 96, 98, 104 (Joger, 1981). Common ground dwelling species in wooded savanna.

* *Agama boueti* Chabanaud, 1917b - 32 (type locality); 10 (Andersson, 1935, as "*A. spinosa*, slender type"); 32, 63 (Joger, 1979); 30, 45 (MNHN); 32, 38 (BMNH); 7, 14 (as "*Agama sp.*"), 21 (CAS). A Sahelian endemic, very frequent by the coast of southern Mauritania (I. Ineich, pers. comm.) and northwest Sénégal (Böhme, 1978), but infrequently found in Niger and Sénégal; the majority of records are from Mali.

* *Agama boulengeri* Lataste, 1886 - 76 (type locality); 64 (Joger, 1981). Very localized, aggregates (Joger, 1979).

* *Agama weidholzi* Wettstein, 1932 - 62, 97, 99, 104, 107 (Joger, 1981). Typical inhabitant of the dry forest floor, among fallen leaves. Also known from eastern Sénégal (Joger, 1982).

Trapelus mutabilis Merrem, 1820 - 1, 2, 4, 17 (de Witte, 1930, as "*Agama inermis*"); 7 (BMNH).

Uromastyx (acanthinurus) geyri Müller, 1922 - 10, 23 (Papenfuss, 1969); 1, 22 (MNHN); 7 (CAS).

***,* *Uromastyx maliensis* n.sp. - 1 (MNHN); 7 (CAS); 12 (GNHM); 32 (HLMD).

Lacertidae

Latastia longicaudata (Reuss, 1834) - 30, 33 (Papenfuss, 1969).

Philochortus cf. *spinalis* (Peters, 1874) - 25 (Andersson, 1935). Species designation not certain.

Acanthodactylus boskianus (Daudin, 1802) - 91 (Angel & Lhote, 1938); 33 (CAS). Common at locality 33 during dry season.

Acanthodactylus dumerili (Milne Edwards, 1829) - 11, 17, 29, 30 (Salvador, 1982).

*** *Acanthodactylus guineensis* (Boulenger, 1887) - 63 (Böhme *et al.*, in press). A rare and localized species, known also from Niger, Nigeria and Cameroon (Papenfuss, 1969).

Acanthodactylus longipes Boulenger, 1918 - 8, 9 (Salvador, 1982). Confined to mobile dunes.

Acanthodactylus scutellatus (Audouin, 1809) - 2, 17 (Papenfuss, 1969); 5, 6, 15 (BMNH). A species present in Mali which early authors have confused with *A. longipes* and *A. dumerili*. Relationship with *A. aureus* was discussed by Böhme (1978).

Mesalina rubropunctata (Lichtenstein, 1823) - 1, 3, 23 (Papenfuss, 1969).

*** *Mesalina pasteuri* (Bons, 1960) - 19 (BMNH 1970.2398). Hitherto known from Hoggar Mountains, Algeria, and from Aïr Mountains, Niger (Papenfuss, 1969).

Scincidae

Mabuya quinquetaeniata scharica (Sternfeld, 1917) - 25, 27, 30, 32, 33, 36, 38, 63, 91, 106, 108 (Papenfuss, 1969); 64, 90, 104, 109 (Joger, 1981); 61, 98 (Böhme *et al.*, in press); 58 (MNHN); 32 (BMNH); 59 (HLMD); 109 (sight records). The species reaches its westernmost limits in western Mali. An abundant species active during daylight hours, including the hot dry season, in northern central Mali. Near locality 59 (Fig. 2), 23 *M. q. scharica* were sighted (19 November 1991) on rock outcrops (together with *Agama paragama*) at 13.1 man-hour^{-1} between 08.57 and 10.42 h (26-34°C.).

Mabuya perroteti (Duméril & Bibron, 1839) - 63, 72, 91 (Papenfuss, 1969); 60, 90, 96, 98, 107, 119 (Joger, 1981); 101, 115 (Schätti, 1986); 63, 102 (Böhme *et al.*, in press); 58, 106 (MNHN); 59 (HLMD); 109 (sight record). Recorded occasionally in northern central Mali, commoner further south and seen in gardens of houses in Bamako.

Chalcides thierryi pulchellus Mocquard, 1906 - 111, 115 (Schätti, 1986).

Scincus scincus (Linnaeus, 1758) - 10, 27 (Papenfuss, 1969).

Scincopus fasciatus Peters, 1864 - 27 (Papenfuss, 1969).

Sphenops delislei (Lataste, 1876) - 41 (Papenfuss, 1969); 59 (HLMD). A subterranean species, unearthed during seasonal rains near Mourdiah (J. P. Grunshaw, pers. comm.).

Amphisbaenidae

[*Cynisca leucura* (Duméril & Bibron, 1839) - X4. Recorded from Bobo-Dioulasso, southwestern Burkina Faso (Grandison, 1956), and therefore probably to be found in southern Mali].

Varanidae

Varanus exanthematicus (Bosc, 1792) - 22, 27, 30, 108 (Papenfuss, 1969); 63 (Böhme *et al.*, in press); 58 (MNHN); 59 (HLMD); 74 (sight record). Seen frequently in savanna habitat; hunted as food by local people in northern central Mali.

Varanus griseus (Daudin, 1803) - 10 (Papenfuss, 1969).

Varanus niloticus (Linnaeus, 1758) - 10, 25 (Papenfuss, 1969); 59 (photographic record).

SERPENTES

54 species (one new record, one endemic).

Typhlopidae

[*Typhlops lineolatus lineolatus* (Bocage, 1891) - X2 (Villiers, 1975). Probably included in southern Mali].

Typhlops punctatus punctatus (Leach, 1819) - 72 (Papenfuss, 1969).

Leptotyphlopidae

Leptotyphlops bicolor (Jan, 1860) - 72 (Papenfuss, 1969).

Leptotyphlops brevicaudus (Bocage, 1887) - 109 (Papenfuss, 1969.

Leptotyphlops macrorhynchus (Jan, 1862) - 25 (Papenfuss, 1969).

Leptotyphlops narirostris boueti (Chabanaud, 1917a) - 83 (type locality), 109 (Papenfuss, 1969).

[*Rhinoleptus koniagui* (Villiers, 1956) - X3 (Villiers, 1975).

Probably occurs in southern Mali].

Boidae

Eryx muelleri (Boulenger, 1892) - 63, 32, 42, 43 (Papenfuss, 1969); 59 (HLMD). Found not infrequently near buildings during seasonal rains in northern central Mali.

Python regius (Shaw, 1802) - 0 (Villiers, 1975); X4 (Roman, 1980).

Python sebae sebae (Gmelin, 1789) - 108, 117 (Papenfuss, 1969); 109 (Broadley, 1984); 63 (Böhme *et al.*, in press); 59 (HLMD).

Atractaspididae

** *Atractaspis micropholis* Boulenger, 1908 - 45, 63 (Papenfuss, 1969); 65 (HLMD). Abundant around Bandiagara and well known to Dogon people (pers. comm.), who boil corpses in water to extract fat for medical uses.

Atractaspis microlepidota Guenther, 1866 - 45, 72 (approximate localities, taken from map of Hughes, 1983).

Atractaspis aterrima Guenther, 1863 - 115 (Schätti, 1986).

Atractaspis dahomeyensis Bocage, 1887 - 114 (Schätti, 1986).

Colubridae

Crotaphopeltis hotamboeia (Laurenti, 1768) - 72 (Papenfuss, 1969).

Coluber dorri (Lataste, 1888) - 108, 109 (Papenfuss, 1969); 64, 104 (Joger, 1981); 58 (MNHN); 109 (HLMD). Localised in wooded savanna in Mali, and east to northern Ghana (Hughes, 1983).

Dasypeltis scabra (Linnaeus, 1758) - 72 (Papenfuss, 1969); 64 (Joger, 1981).

Dasypeltis fasciata Smith, 1849 - 101 (Schätti, 1986).

Dispholidus typus typus (A. Smith, 1829) - 117 (Papenfuss, 1969).

Dromophis lineatus (Duméril, Bibron & Duméril, 1854) - 108 (Papenfuss, 1969).

Dromophis praeornatus praeornatus (Schlegel, 1837) - 58, 117 (Papenfuss, 1969).

[*Grayia smythii* (Leach, 1812) - X6. Reported from Niokolo-Koba, southwestern Sénégal (Villiers, 1956), southwest Burkina Faso (Roman, 1980) and Niger (Roman, 1989); this water snake should therefore occur in Mali].

Lamprophis fuliginosus (Boie, 1827) - 72, 108 (Papenfuss, 1969).

Lamprophis lineatus Duméril, Bibron & Duméril, 1854 - 111 (Schätti, 1986).

Lycophidion semicinctum Duméril, Bibron & Duméril, 1854 - 117 (MNHN).

Lycophidion albomaculatum Steindachner, 1870 - 44, 109 (Condamin, 1995). This former subspecies of *L. semicinctum* has been elevated to a full species (Condamin, 1995). The probable sympatric occurrence of both in Mali supports their separation. A regional endemic, ranging from western Mali south to Mt. Nimba, Guinea, and west to Dakar, Sénégal.

Malpolon moilensis (Reuss, 1834) - 10, A (Papenfuss, 1969).

Mehelya crossii (Boulenger, 1895) - 118 (Villiers, 1965).

Meizodon coronatus (Schlegel, 1837) - 72, 77, 108 (Papenfuss, 1969).

Natriciteres olivaceus (Peters, 1854) - 32 (Papenfuss, 1969).

Philothamnus irregularis (Leach, 1819) - 72, 79, 84, 108, 117 (Papenfuss, 1969); 32 (Hughes, 1983); 59 (sight record of probably this species).

Philothamnus semivariegatus (A. Smith, 1847) - 63 (Papenfuss, 1969); 32 (Hughes, 1985).

Prosymna meleagris greigerti Mocquard, 1906 - 44 (Chabanaud, 1916); 108 (Angel, 1922); 93 (Angel & Lhote, 1938); 109 (Broadley, 1980). Subspecies designation based on Broadley (1980).

Psammophis elegans (Shaw, 1802) - 31 (Angel, 1933); 43, 63, 108 (Papenfuss, 1969); 98 (Joger, 1981); 59 (HLMD). Active during dry season; not infrequent in central Mali.

[*Psammophis rukwae leucogaster* Spawls, 1983 - X7 (Böhme, 1986). Described as a full species from northern Ghana, but subsequently reduced to subspecific status by Böhme (1986), and recorded from Sénégal, Cameroon and Hoggar Mountains, Algeria. Some of the earlier Malian records of *P. sibilans* may in fact be this species.]

Psammophis (sibilans) phillipsi (Hallowell, 1844) - 40, 56, 63, 72, 108, 109, 117 (Papenfuss, 1969); 69 (Joger, 1981); 56, 83, 89, 102 (Böhme *et al.*, in press); 28, 113 (MNHN). It is uncertain whether true *P. sibilans* occur in West Africa. All specimens we have seen were attributable to *phillipsi* which could either be a western subspecies of the East African *sibilans*, or a separate species. Spawls (1983), however, claims having found *sibilans*, *phillipsi*, *leucogaster* and *elegans* sympatrically in northern Ghana.

Psammophis schokari (Forskål, 1775) - 27 (Papenfuss, 1969).

Rhamphiophis oxyrhynchus oxyrhynchus (Reinhardt, 1843) - 72, 108 (Papenfuss, 1969); 98 (Joger, 1981). Designated as the nominate subspecies by Chirio & Ineich (1991).

Spalerosophis diadema (Schlegel, 1837) - 30 (Angel, 1933).

Telescopus obtusus (Reuss, 1834) - 22 (Andersson, 1935); 59 (HLMD). *Tarbophis guidimakaensis* Chabanaud, 1916, from Guidimaka in southeastern Mauritania, close to the Malian border, is probably synonymous with this species. Another specimen (CAS 123408, not MNHN, given in Böhme *et al.* (1989)), originates from Tindouf, southwest Algeria, also not far from Malian territory. All these specimens (including ours, and the type of *T. guidimakaensis*) are characterised by a uniform dark brown colouration of head and neck. The name *T. tripolitanus* (Werner, 1909), used by Papenfuss (1969) also for Malian *Telescopus*, is considered a synonym of *obtusus*, as *dubium* by Böhme *et al.* (1989), and Broadley (1994). Not infrequent in northern central Mali, one specimen was found inside a building at Mourdiah.

Telescopus variegatus (Reinhardt, 1843) - 108 (Angel, 1922).

Viperidae

Bitis arietans (Merrem, 1820) - 49, 56, 110 (Papenfuss, 1969); 101 (Schätti, 1986); 89, 102 (Böhme *et al.*, in press). Well known to local people in Mali.

Causus maculatus (Hallowell, 1842) - 43, 68, 75, 108, 109, 117 ("*C. rhombeatus*") (Papenfuss, 1969); 111, 115 (Schätti, 1986). Additional localities in map of Hughes (1977).

Cerastes cerastes (Linnaeus, 1758) - 1, 17 (Papenfuss, 1969); 72 (MNHN); 7 (CAS).

Cerastes vipera (Linnaeus, 1758) - 1, 4 (Papenfuss, 1969).

Echis ocellatus Stemmler, 1970 - 108, 109 ("*E. carinatus pyramidum*") (Papenfuss, 1969); 62 (Joger, 1981); 101, 115 (Schätti, 1986); 98 (MNHN).

[In older literature, all *Echis* were placed under the name *E. carinatus*].

*** *Echis leucogaster* Roman, 1972 - 63 (Angel, 1933); 22 (Andersson, 1935); 10 (Angel & Lhote, 1938); 56 (MNHN 1990. 3956-4041); 59 (HLMD RA 1922-23). Cherlin (1990) regards *leucogaster* as a subspecies of *E. arenicola* Boie, 1827, but only records the nominate subspecies *E. a. arenicola* from Mali. Golay et al. (1993) synonymize *E. a. arenicola* with *E. pyramidum* and retain *E. leucogaster* as a full species (without indicating Mali as part of its range). We do not think that the northeast African *E. pyramidum* occurs in Mali. Frequently observed at night during seasonal rains in northern central Mali.

* *Echis jogeri* Cherlin, 1990 - 27 (type locality), 55, 98, 104 (Joger, 1981). The only reptile to date recorded nowhere else but Mali; not infrequent in the western part of the country.

Elapidae

Naja haje haje (Linnaeus, 1758) - 27 (Hughes, 1983); 64 (sloughed skin), 59, 88 (HLMD).

Naja melanoleuca Hallowell, 1857 - 108 (Papenfuss, 1969); 101 (Schätti, 1986).

Naja nigricollis Reinhardt, 1843 - 116 (Papenfuss, 1969).

Naja katiensis Angel, 1922 - 108 (type locality); 101, 110, 115 (Schätti, 1986). A regional endemic known to occur from Mali to northern Nigeria (Golay *et al.*, 1993), but possibly extending further east and west. Characters given by Villiers (1950) for Senegalese "*N. nigricollis*" and by Stucki-Stirn (1979) from West Cameroon could in fact be for *katiensis*.

[*Dendroaspis polylepis* (Günther, 1864) - X4 (Roman, 1980). Probably includes southern Mali].

[*Elapsoidea semiannulata moebiusi* (Werner, 1897) - X4 (Roman, 1980). Also recorded from Guidimaka, southeastern Mauritania (Broadley, 1971), and therefore almost certainly occurring in Mali].

DISCUSSION

A total of least 34 Amphibia (Anura) and 106 Reptilia (seven Chelonia, three Crocodilia, 42 Sauria and 54 Serpentes) have been recorded in Mali, or at its borders.

New records and probable occurrences

Uromastyx maliensis described here is a species new to science; *Tomopterna* and *Trionyx* are genera recorded from Mali for the first time. First species records for Mali are Amphibia: *Bufo pentoni*, *Bufo maculatus*, *Ptychadena aequiplicata*, *Phrynobatrachus perpalmatus*, *Tomopterna* sp. and *Afrixalus weidholzi*, and Reptilia: *Trionyx triunguis*, *Hemidactylus mabouia*, *Agama paragama*, *Acanthodactylus guineensis*, *Mesalina pasteuri* and *Echis leucogaster*. The list for Mali is thus increased by thirteen species. The predominance of anurans among these records indicates that this group has been given less attention than lizards and other

reptiles. *Hemidactylus mabouia* is a very common house gecko and widespread in eastern and southern Africa with evidence of an expanding range probably through human agency. It has now been recorded in Mali. Only isolated records of *Acanthodactylus guineensis* (courtesy of W. Böhme) have been made in western Africa (Papenfuss, 1969).

The snakes are reasonably well known, but less so than in neighbouring countries. Records for six snake species outside Mali (*Typhlops l. lineolatus, Rhinoleptus koniagui, Grayia smythii, Psammophis rukwae leucogaster, Dendroaspis polylepis* and *Elapsoidea semiannulata moebiusi*) are close enough to the border to occur also within the Republic of Mali. The chelonian, *Pelusios castaneus*, gekkonid lizard, *Lygodactylus (picturatus) gutturalis* and worm lizard, *Cynisca leucura*, together with five anurans, *Xenopus muelleri, Ptychadena floweri, Hemisus marmoratum, Leptopelis bufonides* and *L. viridis*, recorded in adjacent countries, also probably occur in Mali. Definite records for the crocodile, *Osteolaemus tetraspis*, in southern Mali are also lacking. A number of Saharan species, e. g. *Lytorhynchus diadema, Trapelus tournevillei* and *Tarentola neglecta*, may occur in the extreme north, but have yet to be recorded. Attempts should therefore be made to record these species at specific localities.

Of the Amphibia, *Xenopus muelleri* and *Leptopelis bufonides* in particular should be looked for in southern Mali. Of the Reptilia, the presence of *Osteolaemus tetraspis* (also *Crocodylus cataphractus*) in riverine gallery forest of western and southern Mali, *Mesalina pasteuri* in the Sahara Desert of northern Mali, *Grayia smythii* in wetland habitats, and *Rhinoleptus koniagui* and *Elapsoidea semiannulata* in respectively southern and northern Mali, should be confirmed.

Unlikely records

A few palaearctic, non-desert species have been recorded from Mali in earlier literature, and subsequently cited. They include the toads *Bufo viridis* and *B. mauritanicus* from the Niger bend (de Witte, 1930), and the freshwater turtle *Mauremys leprosa* (as *Clemmys caspica*) from the area between the Adrar des Iforhas and the Aïr Mountains in Niger (Angel & Lhote, 1938). The *Mauremys* record was not based on a specimen, but on a record of the species also made at Agadez in northern Niger (Guibé, 1950). The same record was given for *Bufo mauritanicus* (Villiers, 1950). These apparently relict populations were interpreted as evidence for former transSaharan riverine systems (Braestrup 1947). Caution is appropriate, however, at least for Mali, for it should be emphasized that after originally being recorded in the first half of this century, none of these species has ever been found in Mali or elsewhere south of the Sahara since. The most likely explanation is misrecorded localities. The toad specimens were collected during a transSaharan expedition, which also passed through northern Saharan oases populated by both *Bufo mauritanicus* and *B. viridis*. Determinations were not made on the spot by herpetologists, but by museum specialists back in Europe. If, however, the localities were correctly recorded, species' presence could be due to the displacement of specimens by transSaharan caravans. Competition with afrotropical species, favoured by such human activities as irrigation projects, would have prevented viable populations establishing themselves, or, if any such populations ever existed, the tropical species would have eradicated them. There is no evidence of *Bufo viridis, B. mauritanicus* and *Mauremys leprosa* still occurring in Mali today.

Fig. 7. — Mixed outcrop and savanna woodland habitat 1 km S. of Mourdiah, northern central Mali (locality 59), 19 November 1991, with collection base buildings in background. *Bufo pentoni* and *Agama paragama* were new country records among 25 species reported at the locality, 26 May-1 December 1991. Photo: M. R. K. Lambert.

Two snake species on Papenfuss's (1969) list must be excluded as Malian forms because later taxonomic revisions have subdivided the species and restricted the occurrence of one of the formerly used names to populations outside Mali. Thus, *Psammophis s. sibilans* is now either *P. (sibilans) phillipsi* or *P. rukwae leucogaster*, and *Echis carinatus pyramidum* is now either *E. jogeri*, *E. leucogaster* or *E. ocellatus*.

Sparcity of records

The inventory in this work has been compiled from records of species at a comprehensive range of localities, apart from certain areas indicated above, within or adjacent to the Republic of Mali in West Africa. It has resulted from the accumulation of specimens in a range of museums collected intermittently or spasmodically at scattered locations over a period of many years. Only at four sites is there reasonable qualitative species representation; from north to south these are 1 km S. of Mourdiah (locality 59; Fig. 7), 25 species; Diafarabé, with nearby Kara and Tilembaya (locality 72), 32 species; Kati (locality 108), 25 species, and Bamako (locality 109), 19 species. Bamako, the administrative capital of Mali, is situated in the River Niger valley. Its urban spread is separated by only about 12 km from Kati in the north-east (a former French military base) set on an escarpment above. Difference in species representation at these two localities is due to ecological variation.

Apart from latitude and a range of ecological requirements, the behaviour of both amphibians and reptiles is seasonally-influenced in Mali, and results in many species having reduced activity or aestivating during the dry period of the year. Comprehensive collections over a 12-month period spanning both wet and dry seasons at specific locations are entirely lacking. Many species therefore have only scattered records in Mali, but may in fact have populations widespread over much of the country. Their apparently fragmented or isolated distribution is due mainly to poor representation in collections.

It was reported by N. D. Jago & S. Coulibaly (pers. comm.) that a collection of snakes was housed in the library of OICMA (Organisation Internationale Contre le Criquet Migrateur Africain) at Kara, near Diafarabé. Collected during locust field surveys in Mali mostly in the 1950s and 60s, the snakes had been labelled and preserved by M. Descamps and D. Wintrebert. Although remaining for some months after the organization had been closed down in early 1986, the collection was no longer available when a visit to Kara was made by M.R.K. Lambert on 13 November 1991. Information on this collection and its current whereabouts (now a mystery) is earnestly required, for specimens would probably include new country records.

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REFERENCES

Andersson, L. G. 1935. Reptiles and batrachians from the Central Sahara. *Kungl. Vet. o. Vitterh. Samh. Handl.*, Göteborg, Ser. B, 4: 3-19.

Angel, F. 1922. Sur une collection de reptiles et de batraciens, recueillis au Soudan français par la mission du Dr Millet Horsin. *Bull. Mus. natl. Hist. nat., Paris*, 28: 39-41.

———. 1933. Sur quelques reptiles et batraciens du nord du Soudan français. *Bull. Mus. natl. Hist. nat. Paris, sér. 2* 5: 68-69.

———. 1950. Lézards. *In:* Monod, T. (ed.), *Contribution à l'étude de l'Aïr (Mission L. Chopard et A. Villiers)*, pp. 331-336. *Mém. Inst. fr. Afr. noire* 10: 1-562.

Angel, F. & Lhote, H. 1938. Reptiles et amphibiens du Sahara central et du Soudan. *Bull. Com. Etud. hist. scient. Afr. occid. fr.* 21: 345-384.

Arnoult, J. & Lamotte, M. 1968. Les Pipidae de l'Ouest africain. *Bull. Inst. fond. Afr. noire, sér. A* 30: 270- 306.

Böhme, W. 1978. Zür herpetofaunistik des Senegal. *Bonn Zool. Beitr.* 29: 360-417.

———. 1986. Preliminary note on the taxonomic status of *Psammophis leucogaster* Spawls, 1983. *Litteratura Serpentium* 6: 171-180.

Böhme, W., Meinig, H. & Rödel, M.-O. In press. New records of amphibians and reptiles from Burkina Faso and Mali. *Brit. Herpet. Soc. Bull.*

Böhme, W., Schmitz, G. & Meßer, J. 1989. Erster Nachweis der Gattung *Telescopus* für die Schlangenfauna Marokkos. *Salamandra* 25: 73-76.

Braestrup, F. W. 1947. Remarks on faunal exchange through the Sahara. *Vidensk. Meddr Dansk naturh. Foren.* 110: 1-15.

Broadley, D. G. 1971. A revision of the African snake genus *Elapsoidea* Bocage (Elapidae). *Occ. Pap. natl. Mus. Rhod.* B4: 577-626.

———. 1980. A revision of the African snake genus *Prosymna* Gray. *Bull. Mus. natl. Hist. nat., Paris* 22:362-382.

———. 1984. A review of geographical variation in the African python, *Python sebae* (Gmelin). *Br. J. Herpet.* 6: 359-367.

———. 1994. A collection of snakes from eastern Sudan, with the description of a new species of *Telescopus* Wagler, 1830 (Reptilia: Ophidia). *J. Afr. Zool.* 108: 201-208.

Chabanud, P. 1916. Révision du genre *Prosymna* Gray. *Bull. Mus. natl. Hist. nat., Paris* 22: 362-382.

———. 1919. Description d'une espèce nouvelle de batracien du Sénégal. *Bull. Mus. natl. Hist. nat., Paris* 25: 454-455.

Cherlin, V.A. 1990. Taxonomic revision of the snake genus *Echis* (Viperidae). II. An analysis of taxonomy and description of new forms. *Proc. zool. Inst., Leningrad* 207: 193-223.

Chirio, L. & Ineich, I. 1991. Les genres *Rhamphiophis* Peters, 1854 et *Dipsina* Jan, 1863 (Serpentes, Colubridae): revue des taxons reconnus et description d'une espèce nouvelle". *Bull. Mus. natl. Hist. nat., Paris, 4è sér.* 13A (1-2): 217-235.

Condamin, M. 1995. *Lycophidion semicinctum albomaculatum* (Serpentes, Colubridae), élevé au rang d'espèce. *Bull. Soc. Herpèt. France*, 69-71: 51-56.

Dekeyser, P. L. & Villiers, A. 1956. Notations écologiques et biogéographiques sur la faune de l'Adrar (mauritanien). *Mém. Inst. fr. Afr. noire* 40: 40-41.

Ernst, C. H. & Barbour, R. W. 1989. *Turtles of the world.* Smithsonian Institution Press, Washington, D.C., 313 pp.

Frost, D.R. (ed.). 1985. *Amphibian species of the world: a taxonomic and geographical reference.* Allen Press and the Association of Systematics Collections, Lawrence, Kansas, 732 pp.

Golay, P., Smith, H.M., Dixon, J.R., McCarthy, C., Rage, J.C., Schätti, B. & Toriba, M. 1993. *Endoglyphs and other major venomous snakes of the World.* Azemiops S.A., Genève, 478 pp.

Grandison, A.G.C. 1956. On a collection of lizards from West Africa. *Bull. Inst. fr. Afr. noire, sér. A* 18: 224- 245.

Guibé, J. 1950. Batraciens. In: Contribution à l'étude de l'Aïr. *Mém. Inst. fr. Afr. noire* 10: 329-331.

Howell, K.M. 1992. African Reptile and Amphibian Specialist Group. *Species, newsletter of the IUCN Species Survival Commission* No. 18: 51.

Hughes, B. 1977. Latitudinal clines and ecogeography of the West African Night Adder, *Causus maculatus* (Hallowell, 1842) (Serpentes, Viperidae). *Bull. Inst. fond. Afr. noire, sér. A.* 39: 368-384.

———. 1983. African snake faunas. *Bonn. zool. Beitr.* 34 (1-3): 311-356.

———. 1985. Progress on a taxonomic revision of the African green tree snakes (*Philothamnus* spp.). *In:* Schuchmann, K.-L. (ed.), *Proc. Intern. Symp. African Vertebr.* 1985, pp. 511-530.

IUCN. 1982. *The IUCN Amphibia-Reptilia red data book. Part 1. Testudines, Crocodylia, Rhynchocephalia.* Compiled by B. Groombridge and L. Wright. IUCN, Gland, xliii + 426 pp.

Joger, U. 1979. Zur Ökologie und Verbreitung wenig bekannter Agamen Westafrikas (Reptilia: Sauria: Agamidae). *Salamandra* 15: 31-52.

———. 1980. Eine neue Art der Gattung *Tarentola* (Sauria: Gekkonidae) aus Westafrika. *Amphibia-Reptilia* 1: 137-147.

———. 1981. Zur Herpetofaunistik Westafrikas. *Bonn. zool. Beitr.* 32: 297-340.

———. 1984. Taxonomische Revision der Gattung *Tarentola* (Reptilia: Gekkonidae). *Bonn. zool. Beitr.* 35: 129-174.

———. 1986. Phylogenetic analysis of *Uromastyx* lizards, based on albumin immunological distances. *In:* Rocek, S. (ed.), *Studies in Herpetology*. Charles University, Prague, pp. 187-192.

Joger, U & Lambert, M. R. K. In press. Analysis of the herpetofauna of the Republic of Mali, II. Species diversity and biogeographical assemblages. *In:* Ulrich, H. (ed.), Proceedings of the International Symposium on Biodiversity and Systematics in Tropical Ecosystems, Bonn 1994. *Bonn. zool. Beitr.*

Lambert, M. R. K. 1993. On growth, sexual dimorphism, and the general ecology of the African spurred tortoise, *Geochelone sulcata*, in Mali. *Chelon. Conserv. Biol.* 1(1): 37-46.

Lamotte, M. 1966. Types de répartition géographiques de quelques batraciens dans l'Ouest Africain. *Bull. Inst. fond. Afr. noire, sér. A* 28: 1140-1148.

———. 1967. Le problème des *Ptychadena* (Ranidae) du group *mascariensis* dans l'Ouest Africain. *Bull. Mus. natl. Hist. nat., Paris (2)* 39(4): 647-656.

———. 1969. III. Amphibiens. Deuxième note. *In:* Le Parc National du Niokolo-Koba (Sénégal). *Mém. Inst. fond. Afr. noire*, 84: 421-426.

Lamotte, M. & Xavier, F. 1966. *Phrynobatrachus natalensis* (Smith) et *Phrynobatrachus francisci* (Boulenger): deux espèces de l'Ouest africain difficiles à distinguer. *Bull. Inst. fr. Afr. noire*, 28: 343-361.

———. 1981. Amphibiens. *In:* Durand, J. R. & Lévеque, C. (eds.), *Flore et faune de l'Afrique sahélo-soudanienne, Tome II*. Documentations Techniques 45. O.R.S.T.O.M., Paris, pp. 773-816.

Loveridge, A. 1957. Check list of the reptiles and amphibians of East Africa (Uganda; Kenya; Tanganyika; Zanzibar). *Bull. Mus. comp. Zool.* 117(2): 153-362.

Loveridge, A. & Williams, E.E. 1957. Revision of the African tortoises and turtles of the suborder Cryptodira. *Bull. Mus. comp. Zool.* 115(6): 163-541.

Mertens, R. 1938. Über eine Froschsammlung aus Westafrika. *Zool. Anz.* 123: 16-245.

Papenfuss, T.J. 1969. Preliminary analysis of the reptiles of arid central West Africa. *Wasmann J. Biol.* 27:249-325.

Pellegrin, J. 1909. Reptiles du Soudan récoltés par la Mission Tilho-Gaillard. Description d'une espèce nouvelle. *Bull. Mus. natl. Hist. nat., Paris* 15: 413-415.

Pooley, A.C. 1980. *The status of crocodiles in Africa - 1980.* Paper contributed to 5th Working Meeting of IUCN Crocodile Specialist Group, Gainesville, Florida, 12-16 August 1980.

Roman, B. 1980. *Serpents de Haute-Volta.* C.N.R.S.T., Ouagadougou, 130 pp.

———. 1984. *Serpents des Pays de l'Entente.* C.N.R.S.T., Ouagadougou, 45 pp.

Salvador, A. 1982. A revision of the genus *Acanthodactylus* (Sauria: Lacertidae). *Bonn. zool. Monogr.* 16: 1-167.

Schätti, B. 1986. Herpetologische Ausbeute einer Sammelreise nach Mali (Amphibia, Reptilia). *Rev. suisse Zool.* 93: 765-778.

Schiøtz, A. 1967. *The treefrogs (Rhacophoridae) of West Africa.* Bianco Lunos Bogtrykkeri A-S, Copenhagen, 346 pp.

———. 1971. The Superspecies *Hyperolius viridiflavus*. *Vidensk. Meddr. dansk naturh. Foren.* 134: 21-76.

Spawls, S. 1983. A new *Psammophis* from northern Ghana. *Br. J. Herpet.* 6: 311-312.

Stuart, S.N. & Adams, R.J. 1990. *Biodiversity in sub- saharan Africa and its islands.* Occ. Pap. IUCN Species Survival Comm. 6, IV + 242 pp.

Stucki-Stirn, M.C. 1979. *Snake report 721. A comparative study of the herpetological fauna of the former West Cameroon/Africa.* Herpeto-Verlag, Teuffenthal, Switzerland, 650 pp.

Villiers, A. 1950. *La collection de serpents de l'I.F.A.N.* Catalogues, 6. Institut Fondamental d'Afrique Noire, Dakar: 155 pp.

———. 1956. V. Reptiles. In: *Le Park National du Niokolo -Koba, I. Mém. Inst. fr. Afr. noire* 48: 143-162.

———. 1958. Tortues et crocodiles de l'Afrique noire française. *I.F.A.N., Init. afr.* 15: 1-354.

———. 1965. Serpents récoltés au Mali et en Haute-Volta par le Dr Lamontellerie. *Bull. Inst. fr. Afr. noire* 27, sér A: 1192-1195.

———. 1975. Les serpents de l'Ouest Africain. *I.F.A.N., Init. Et. afr.* 11 (3è édition), Dakar: 1-195.

Warshall, P. 1989. *Mali: biological diversity assessment.* Aid Project No. 698-0467. Washington, DC: US Agency for International Development. 95 pp.

Witte, G.-F. de 1930. Mission Saharienne Augiéras-Draper, 1927-1928. Reptiles et batraciens. *Bull. Mus. natl. Hist. nat. sér. 2, Paris* 2(6): 614-618.

Appendix. — Localities where amphibian and reptile species were recorded.

Locality and No	Co-ordinates	Species record and authority/collection
0. Republic of Mali	Without specification	Villiers, 1975: *Python regius*
1. Tanezrouft	22°00'N, 0°45'W	de Witte, 1930: *Stenodactylus sthenodactylus, Uromastyx* sp. (*"U. acanthinurus"*), *Trapelus mutabilis, Mesalina rubropunctata, Cerastes vipera*; Andersson, 1935: *Cerastes cerastes*; MNHN: *Uromastyx geyri, U. maliensis* n. sp. Border region of Algeria and Mali; specimens may originate from either territory
2. Tisserlitine	21°00'N, 0°17'E	de Witte, 1930: *Trapelus mutabilis, Acanthodactylus scutellatus*
3. Sounfat area (Tessounfat)	20°53'N, 0°32'E	de Witte, 1930: *Mesalina rubropunctata*
4. Between Tisserlitine and Timétrine	20°36'N, 0°11'W	de Witte, 1930: *Agama impalearis, Cerastes vipera*
5. Tadhak	20°32'N, 0°03'E	BMNH: *Acanthodactylus scutellatus*
6. Sahara Desert	20°12'N, 0°32'E	BMNH: *Acanthodactylus scutellatus*
7. Tessalit and vicinity	20°12'N, 1°00'E	BMNH: *Trapelus mutabilis*; CAS: *Dicroglossus occipitalis, Ptyodactylus hasselquistii ragazzi, Stenodactylus petrii, S. sthenodactylus, Tropiocolotes tripolitanus, Uromastyx maliensis* n. sp., *U. geyri, Agama impalearis, A. boueti, Cerastes cerastes*
8. Sahara Desert	20°10'N, 4°09'W	BMNH: *Acanthodactylus longipes*
9. Sahara Desert	20°09'N, 4°49'W	BMNH: *Acanthodactylus longipes*
10. Adrar des Iforhas	20°00'N, 2°00'E (approx.)	Angel & Lhote, 1938: *Bufo xeros, Scincus scincus, Varanus griseus, Malpolon moilensis, Echis* sp. (*E. "carinatus"*); Andersson, 1935: *Agama impalearis, A. boueti* (both as *A. "spinosa"*), *Uromastyx geyri*
11. Ananko	19°55'N, 0°55'E	BMNH: *Acanthodactylus dumerili*
12. Ti-N-Zaouâtene	19°50'N, 2°58'E	Andersson, 1935: *Ptyodactylus hasselquistii ragazzi, Agama impalearis* (*A. "spinosa"*), *Uromastyx maliensis* n.sp. (*U. "acanthinurus"*)
13. Taghlit	19°42'N, 0°55'E	BMNH: *Tarentola ephippiata*
14. 64 km S. of Tessalit	19°38'N, 0°57'E	CAS: *Agama boueti* (*"A. sp."*)
15. Northern Tilemsi valley	19°30'N, 0°30'W	de Witte, 1930: *Tarentola ephippiata*; BMNH: *Acanthodactylus scutellatus*
16. El Ouit	19°23'N, 0°39'E	Papenfuss, 1969: *Stenodactylus sthenodactylus, Tarentola annularis*
17. Timétrine	19°20'N, 0°42'W	de Witte, 1930: *Uromastyx* sp. (*"U. acanthinurus"*), *Trapelus mutabilis, Acanthodactylus dumerili* (*"A. scutellatus"*), *Cerastes cerastes*
18. El Mraiti	19°13'N, 2°18'W	Villiers, 1958: *Geochelone sulcata*
19. Tin Amzi valley, approximately where frontiers of Algeria, Mali and Niger meet	19°04'N, 4°12'E	BMNH: *Mesalina pasteuri*
20. Asselar (Asler)	18°53'N, 1°16'E	Papenfuss, 1969: *Stenodactylus sthenodactylus*
21. 93 km S. of Aguelhok	18°38'N, 0°11'E	CAS: *Ptyodactylus hasselquistii ragazzi, Agama boueti*
22. Kidal and vicinity	18°26'N, 1°24'E	Andersson, 1935: *Varanus exanthematicus, Telescopus obtusus, Echis leucogaster* (*"E. carinatus"*); Angel & Lhote, 1938: *Bufo xeros*; Papenfuss, 1969: *Echis sp.* (*E. "carinatus"*); MNHN: *Tarentola annularis, T. ephippiata, Uromastyx geyri*

23. 64 km N.E. of Anefis I-N-Darane	18°03'N, 0°36'E	Papenfuss, 1969: *Ptyodactylus hasselquistii ragazzi, Uromastyx geyri* ("*U. acanthinurus*"), *Agama agama, A. sankaranica, Mesalina rubropunctata*
24. 67 km N. of Bourem	17°33'N, 0°06'W	Papenfuss, 1969: *Stenodactylus sthenodactylus*
25. Bourem and vicinity	16°57'N, 0°21'W	Andersson, 1935: *Varanus niloticus, Philochortus spinalis, Mabuya quinquetaeniata scharica, Hemidactylus brooki*; Angel & Lhote, 1938: *Bufo xeros, Dicroglossus occipitalis*; Papenfuss, 1969: *Leptotyphlops macrorhynchus*
26. 5 km S. of Bourem	16°53'N, 0°17'W	BMNH: *Hemidactylus brooki*
27. Tombouctou and vicinity	16°46'N, 3°01'W	Papenfuss, 1969: *Geochelone sulcata, Varanus exanthematicus, Tarentola annularis, T. ephippiata, Chamaeleo africanus, Agama agama, Psammophis schokari, Echis leucogaster* ("*E. carinatus pyramidum*"); Hughes, 1983: *Naja h. haje*; Cherlin, 1990: *Echis jogeri* (type locality); MNHN: *Bufo regularis, Dicroglossus occipitalis, Mabuya quinquetaeniata scharica, Scincus scincus, Scincopus fasciatus*
28. Lac Faguibine, Region of Tombouctou	16°45'N, 3°54'W	MNHN: *Psammophis sibilans*
29. Mbouna	16°41'N, 3°58'W	Angel, 1933: *Acanthodactylus dumerili* ("*A. scutellatus*")
30. Goundam	16°25'N, 3°40'W	Angel, 1933: *Varanus exanthematicus, Tarentola annularis, Agama agama, Latastia longicaudata, Acanthodactylus dumerili* ("*A. scutellatus*"), *Mabuya quinquetaeniata scharica, Spalerosophis diadema*; MNHN: *Agama boueti*
31. Diré	16°16'N, 3°24'W	Angel, 1933: *Psammophis elegans*
32. Gao and vicinity, with Lobou	16°16'N, 0°03'W	Angel & Lhote, 1938: *Bufo xeros*; Papenfuss, 1969: *Tarentola annularis, T. ephippiata, Chamaeleo senegalensis, Mabuya quinquetaeniata scharica, Eryx muelleri, Natriciteres olivaceus*; Joger, 1979: *Agama boueti* (type locality); Hughes, 1983: *Philothamnus irregularis*; Hughes, 1985: *Philothamnus semivariegatus*; BMNH: *Hemidactylus brooki, Ptyodactylus hasselquistii ragazzi, Tarentola parvicarinata, T. ephippiata, Agama boueti, Mabuya quinquetaeniata scharica*
33. 19 km S. of Gao	16°10'N, 0°05'E	Papenfuss, 1969: *Latastia longicaudata, Mabuya quinquetaeniata scharica*; CAS: *Acanthodactylus boskianus*
34. 40 km S.W. of Gao	16°02'N, 0°12'E	HLMD: *Uromastyx maliensis* n. sp. (type locality)
35. Niafounké	15°56'N, 4°00'W	BMNH: *Tarentola annularis*
36. Ménaka	15°55'N, 2°24'E	Papenfuss, 1969: *Mabuya quinquetaeniata scharica*
37. Lac Niangay, Region of Tombouctou	15°50'N, 3°00'W	Angel & Lhote, 1938: *Kassina senegalensis*
38. Ansongo and vicinity	15°40'N, 0°30'E	Angel & Lhote, 1938: *Bufo xeros*; Papenfuss, 1969: *Mabuya quinquetaeniata scharica*; BMNH: *Agama boueti*
39. Between Diandioumé and Sénéwali	15°26'N, 9°22'W	M. Niaré, pers. comm. (sight record): *Pelomedusa subrufa*
40. Gourao, with Lac Debo (River Niger Inner Delta)	15°19'N, 4°02'W	Papenfuss, 1969: *Chamaeleo africanus, Psammophis sibilans*; Pooley, 1980, in IUCN, 1982: *Crocodylus niloticus*; Joger, 1981; MNHN: *Tarentola annularis*
41. Hombori	15°17'N, 1°42'W	Papenfuss, 1969: *Hemidactylus brooki, Ptyodactylus hasselquistii ragazzi, Tarentola ephippiata, Tropiocolotes tripolitanus, Sphenops delislei*
42. Nioro du Sahel and vicinity	15°14'N, 9°35'W	Chabanaud, 1919: *Bufo chudeaui* (type locality - "Sénégal: Mare de Bata, Sahel de Nioro" (sic)); Papenfuss, 1969 : *Hemitheconyx caudicinctus, Agama agama, Eryx muelleri*; Joger, 1981: *Tarentola parvicarinata, Agama agama, A. sankaranica*

43. Dogo	15°10'N, 4°26'W	Papenfuss, 1969: *Eryx muelleri, Psammophis elegans, Causus maculatus*; BMNH: *Hemidactylus mabouia*
44. Yélimané	15°08'N, 10°34'W	Joger, 1980: *Tarentola parvicarinata*; Chabanaud, 1916: *Prosymna meleagris greigerti*; Condamin, 1995: *Lycophidion albomaculatum*
45. Douentza	15°00'N, 2°57'W	Angel & Lhote, 1938: *Bufo xeros* ("*B. regularis*"), *Hylarana galamensis, Dicroglossus occipitalis, Phrynobatrachus natalensis, Hyperolius (viridiflavus) nitidulus*; Papenfuss, 1969: *Geochelone sulcata, Hemidactylus brooki, Chamaeleo africanus, Agama boueti* ("*A. agama*"), *Atractaspis microlepidota*; Hughes 1983 (approximate locality): *Atractaspis microlepidota*
46. Dilli	15°00'N, 7°40'W	Lambert, 1993: *Geochelone sulcata*
47. Farabougou	14°58'N, 6°08'W	Lambert, 1993: *Geochelone sulcata*
48. Southwest of Monsombougou	14°57'N, 10°00'W	Joger, 1981: *Agama sankaranica*
49. Sormé, near the Macina	14°52'N, 4°25'W	Villiers, 1950: *Bitis arietans*
50. 5 km E.S.E. of Sokolo	14°44'N, 6°04'W	Lambert, pers. obs.: *Dicroglossus occipitalis*
51. 10 km W. of Sandaré	14°42'N, 10°24'W	Joger, 1981: *Tarentola parvicarinata, Agama sankaranica*
52. About 24 km from Mourdiah on road to Goumbou	14°41'N, 7°28'W	Lambert, 1993: *Geochelone sulcata*
53. Fallou	14°37'N, 7°56'W	I. Coulibaly, pers. comm. (sight record): *Crocodylus niloticus*
54. Bengo	14°36'N, 6°54'W	Lambert, pers. obs.: *Dicroglossus occipitalis, Chamaeleo africanus*
55. West of Niamiga	14°30'N, 11°12'W	Joger, 1981: *Hemidactylus brooki, Echis jogeri* ("*E. sp.*")
56. Mopti and vicinity, with Sevaré	14°30'N, 4°12'W	Schiøtz, 1967: *Bufo regularis, Dicroglossus occipitalis, Phrynobatrachus accraensis, P. francisci, Hyperolius viridiflavus, Afrixalus fulvovittatus*; Papenfuss, 1969: *Ptyodactylus hasselquistii ragazzi, Tarentola annularis, Chamaeleo africanus, Psammophis sibilans, Bitis arietans*; Böhme *et al.*, in press: *Agama agama, Chamaeleo africanus, Psammophis* (*sibilans*) *phillipsi*; MNHN: *Echis leucogaster*
57. On road from Mopti to Bandiagara	14°26'N, 4°30'W	Papenfuss, 1969: *Chamaeleo africanus*
58. Sangha and Falaises de Bandiagara	14°28'N, 3°19'W	Lamotte, 1966: *Hyperolius (viridiflavus) nitidulus*; Papenfuss, 1969: *Ptyodactylus hasselquistii ragazzi, Tropiocolotes tripolitanus, Dromophis praeornatus*; MNHN: *Dicroglossus occipitalis, Ptyodactylus hasselquistii ragazzi, Tarentola annularis, Mabuya quinquetaeniata scharica, M. perroteti, Varanus exanthematicus, Coluber dorri*
59. 1 km S. of Mourdiah (Fig. 7)	14°28'N, 7°28'W	Lambert, 1993: *Geochelone sulcata*; HLMD: *Bufo pentoni, B. xeros, Dicroglossus occipitalis, Ptychadena trinodis, Pelomedusa subrufa, Hemidactylus brooki, Tarentola parvicarinata, T. ephippiata, Tropiocolotes tripolitanus, Chamaeleo africanus, Agama agama* (photograph), *A. paragama, Mabuya quinquetaeniata scharica, M. perroteti, Sphenops delislei, Varanus exanthematicus, V. niloticus* (photograph), *Eryx muelleri, Python s. sebae, Philothamnus irregularis* (sight record), *Psammophis elegans, Telescopus obtusus, Echis leucogaster, Naja h. haje*; J.P. Grunshaw, pers. comm. (sight record): *Hyperolius (viridiflavus) nitidulus*
60. Kayes	14°27'N, 11°26'W	Joger, 1981: *Tarentola parvicarinata*; MNHN: *Hemitheconyx caudicinctus, Mabuya perroteti*
61. Kéma, near Bandiagara	14°25'N, 3°49'W	Böhme *et al.*, in press: *Agama agama, Ptyodactylus hasselquistii ragazzi, Mabuya quinquetaeniata scharica*
62. 9 km N. of Fatao	14°24'N, 9°29'W	Joger, 1981: *Hemidactylus brooki, Tarentola parvicarinata, Agama agama, A. weidholzi, Echis ocellatus*

63. Bandiagara	14°21'N, 3°37'W	Angel, 1933: *Eryx muelleri, Atractaspis micropholis, Philothamnus semivariegatus, Psammophis elegans, P. sibilans, Echis "carinatus"*; Papenfuss, 1969: *Ptyodactylus hasselquistii ragazzi, Tarentola annularis, Tropiocolotes tripolitanus, Agama agama, A. sankaranica, Mabuya quinquetaeniata scharica, M. perroteti*; Joger, 1979: *Agama boueti*; Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Phrynobatrachus* sp., *Chamaeleo africanus, Hemidactylus brooki, Ptyodactylus hasselquistii ragazzi, Tarentola annularis, Mabuya perroteti, Acanthodactylus guineensis, Varanus exanthematicus, Python s. sebae*; MNHN: *Echis leucogaster*; CAS: *Ptychadena aequiplicata, Chamaeleo africanus*
64. Chutes du Félou	14°21'N, 11°21'W	Joger, 1980: *Tarentola parvicarinata* (type locality); Joger, 1981: *Bufo xeros, B. regularis, Cyclanorbis senegalensis, Agama agama, A. boulengeri, Mabuya quinquetaeniata scharica, Coluber dorri, Dasypeltis scabra, Naja h. haje*
65. 10 km W. of Madina-Kagoro	14°20'N, 7°45'W	HLMD: *Atractaspis micropholis*
66. 3 km N. of Girindingué	14°20'N, 7°40'W	Lambert, 1993: *Geochelone sulcata*
67. 12-52 km W.S.W. of Mourdiah	14°19'N, 7°54'W	Lambert, pers. obs.: *Chamaeleo africanus*
68. Taga Diabozo	14°18'N, 4°57'W	Papenfuss, 1969: *Causus maculatus*
69. Kakoulou	14°17'N, 11°17'W	Joger, 1981: *Chamaeleo senegalensis, Psammophis phillipsi*
70. Niono and vicinity, with Molodo	14°14'N, 6°02'W	BMNH: *Agama agama*; HLMD: *Bufo xeros, Hemidactylus brooki, Agama paragama*
71. 14 km S. of Fatao	14°12'N, 9°29'W	Joger, 1981: *Agama sankaranica*
72. Diafarabé, with Kara and Tilembaya	14°09'N, 5°01'W	de Witte, 1930: *Chamaeleo africanus*; Loveridge & Williams, 1957: *Kinixys belliana nogueyi; Leptotyphlops* Papenfuss, 1969: *Hemidactylus brooki, Agama agama, Mabuya perroteti, Typhlops p. punctatus, bicolor, Lamprophis fuliginosus, Crotaphopeltis hotamboeia, Dasypeltis scabra, Meizodon coronatus, Philothamnus irregularis, Psammophis sibilans, Rhamphiophis o. oxyrhynchus*; Lamotte, 1966: *Hylarana galamensis, Ptychadena maccarthyensis, P. trinodis, Afrixalus fulvovittatus*; Schiøtz, 1967: *Kassina cassinoides*; Hughes, 1983 (approximate locality): *Atractaspis microlepidota*; MNHN: *Bufo maculatus, Dicroglossus occipitalis, Hyperolius (viridiflavus) nitidulus Afrixalus weidholzi, Trionyx triunguis, Cerastes cerastes*; BMNH: *Hemidactylus brooki, Tarentola ephippiata*; HLMD: *Bufo xeros, Hemidactylus brooki, Tarentola parvicarinata, T. ephippiata*
73. Dyédyé	14°06'N, 7°34'W	Lambert, pers. obs.: *Chamaeleo africanus*
74. 18-20 km N.N.E. of Didiend	14°05'N, 8°02'W	HLMD: *Pelomedusa subrufa*; Lambert, pers. obs.: *Crocodylus niloticus, Chamaeleo africanus, Varanus exanthematicus*
75. Saré Malé	14°05'N, 4°26'W	Papenfuss, 1969: *Causus maculatus*
76. Médine	14°02'N, 11°22'W	Lataste, 1886: *Kinixys belliana nogueyi* (type locality); *Agama boulengeri* (type locality)
77. Wana Boubou	14°01'N, 4°58'W	Lamotte, 1966: *Hyperolius (viridiflavus) nitidulus, Kassina senegalensis*; Papenfuss, 1969: *Meizodon coronatus*; Pooley, 1980 in IUCN, 1982: *Crocodylus niloticus*; MNHN: *Phrynobatrachus perpalmatus*
78. 36 km from Niono on road to Ségou	13°59'N, 6°05'W	HLMD: *Pelomedusa subrufa*
79. Ké-Macina, with Kokry	13°58'N, 5°23'W	Lamotte, 1967: *Ptychadena (mascareniensis) pumilio*; Papenfuss, 1969: *Philothamnus irregularis*; Lambert, pers. obs.: *Dicroglossus occipitalis*
80. 19 km E. of Sai	13°56'N, 4°50'W	Lambert, pers. obs.: *Bufo regularis*

81. 5 km N. of Guétala	13°55'N, 9°28'W	Joger, 1989: *Tarentola parvicarinata, Agama agama*
82. Niger River between Kokry and Kayo	13°56'N, 5°34'W	de Witte, 1930: *Phrynobatrachus francisci* (as *"P. monodi, n. sp."*)
83. Djenné	13°54'N, 4°33'W	Papenfuss, 1969: *Ptyodactylus hasselquistii ragazzi, Leptotyphlops narirostris boueti* (type locality); Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Psammophis (sibilans) phillipsi*
84. Kayo	13°53'N, 5°37'W	Papenfuss, 1969: *Philothamnus irregularis*
85. Oulokoro	13°50'N, 8°04'W	A. Kremer, pers. comm. (sight record): *Crocodylus niloticus*
86. Banankoro	13°44'N, 7°44'W	A. Kremer, pers. comm. (sight record): *Crocodylus niloticus*
87. Missira (Mimira), Station Biologique de Bembourou - location possibly erroneous	13°43'N, 8°27'W	MNHN: *Pelomedusa subrufa*
88. 14-26 km from Didieni on road to Kolokani	3°42'N, 8°02'W	HLMD: *Naja h. haje*; J.P. Grunshaw, pers. comm. (sight record): *Pelomedusa subrufa*
89. 158 km S.W. of Sevaré	13°40'N, 4°20'W	Böhme *et al.*, in press: *Psammophis (sibilans) phillipsi, Bitis arietans*
90. Between Manbiri and the Baoulé River	13°30'N,9°30'W	Joger, 1981: *Bufo regularis, Arthroleptis sp., Hemidactylus brooki, Mabuya quinquetaeniata scharica, M. perroteti*
91. Ségou	13°27'N, 6°16'W	Angel & Lhote, 1938: *Tarentola ephippiata*; Papenfuss, 1969: *Hemidactylus brooki, Chamaeleo africanus, Agama agama, A. sankaranica, Acanthodactylus boskianus, Mabuya quinquetaeniata scharica, M. perroteti*; Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Pelomedusa subrufa*
92. 50 km N.E. of Bla	13°21'N, 5°27'W	Böhme *et al.*, in press: *Hemidactylus brooki*
93. San	13°18'N, 4°54'W	Angel & Lhote, 1938: *Prosymna meleagris greigerti*
94. 3 km S.E. of Boulouli	13°15'N, 9°58'W	Joger, 1981: *Dicroglossus occipitalis, Ptychadena maccarthyensis, P. pumilio, Phrynobatrachus sp.*
95. 14 km N. of Nossombougou	13°14'N, 7°55'W	Lambert, pers. obs.: *Chamaeleo africanus*
96. 17 km E. of Kita	13°04'N, 9°19'W	Joger, 1981: *Agama sankaranica, Mabuya perroteti*
97. 20 km W. of Kita	13°03'N, 9°42'W	Joger, 1981: *Agama weidholzi*
98. Kita and vicinity	13°03'N, 9°29'W	Joger, 1981: *Agama sankaranica, Mabuya perroteti, Psammophis elegans, Rhamphiophis o. oxyrhynchus, Echis jogeri* (*"E. sp."*); MNHN: *Echis ocellatus*; Mertens, 1938: *Bufo regularis, Ptychadena maccarthyensis, P. (mascareniensis) pumilio, Phrynobatrachus acridoides*; Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Agama agama, Ptyodactylus hasselquistii ragazzi, Tarentola parvicarinata, Mabuya quinquetaeniata scharica*
99. 5 km E. of Kita	13°03'N, 9°25'W	Joger, 1981: *Agama weidholzi*
100. Ouakoro, District of Bla	12°36'N, 6°41'W	Böhme *et al.*, in press: *Pelomedusa subrufa*
101. Kokounkourou (Kokungru)	12°58'N, 9°37'W	Schätti, 1986: *Phrynobatrachus natalensis, Phrynomerus microps, Hemidactylus brooki, Chamaeleo senegalensis, Mabuya perroteti, Dasypeltis fasciata, Bitis arietans, Echis ocellatus, Naja Melanoleuca, N. katiensis*
102. Bla	12°57'N, 5°46'W	Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Agama agama, Hemidactylus brooki, Mabuya perroteti, Psammophis (sibilans) phillipsi, Bitis arietans*
103. West of Sébékoro	12°57'N, 9°00'W	Joger, 1981: *Ptychadena schubotzi, P. oxyrhynchus, Tarentola parvicarinata*

104. Between Négala and Kassaro	12°55'N, 8°40'W	Joger, 1981: *Tarentola parvicarinata, Agama agama, A. sankaranica, A. weidholzi, Mabuya quinquetaeniata scharica, Coluber dorri, Echis jogeri ("E. sp.")*
105. Baoulé	12°53'N, 8°37'W	Papenfuss, 1969: *Chamaeleo senegalensis*
106. Koulikoro	12°53'N, 7°33'W	Grandison, 1956: *Chamaeleo senegalensis, Mabuya quinquetaeniata scharica*; MNHN: *Mabuya perroteti*; BMNH: *Tarentola parvicarinata*
107. Négala	12°52'N, 8°27'W	Joger, 1981: *Agama agama, A. weidholzi, Mabuya perroteti*
108. Kati and vicinity	12°43'N, 8°2'W	Angel, 1922: *Bufo xeros ("B. regularis"), Dicroglossus occipitalis, Ptychadena trinodis, Schoutedenella milletihorsini* (type locality); Papenfuss, 1969: *Pelomedusa subrufa, Varanus exanthematicus, Hemitheconyx caudicinctus, Agama agama, Mabuya quinquetaeniata scharica, Python s. sebae, Lamprophis fuliginosus, Coluber dorri, Dromophis lineatus, Meizodon coronatus, Philothamnus irregularis, Prosymna meleagris greigerti, Pelomedusa subrufa, Psammophis elegans, P. sibilans, Rhamphiophis o. oxyrhynchus, Telescopus variegatus, Causus maculatus ("C. rhombeatus"), Echis ocellatus ("E. carinatus pyramidum"), Naja melanoleuca, N. nigricollis, N. katiensis* (type locality)
109. Bamako town area	12°39'N, 8°00'W	Papenfuss, 1969: *Hemidactylus brooki, Leptotyphlops narirostris boueti, Coluber dorri, Psammophis sibilans, Causus maculatus ("C. rhombeatus"), Echis ocellatus ("E. carinatus pyramidum")*; Joger, 1981: *Tarentola parvicarinata, Agama agama, Mabuya quinquetaeniata scharica*; Broadley, 1984: *Python s. sebae*; Schätti, 1986: *Bufo regularis, Agama agama, Leptotyphlops brevicauda*; Lambert, 1993: *Geochelone sulcata*; Broadley, 1980: *Prosymna meleagris greigerti*; Condamin, 1995: *Lycophidion albomaculatum*; Böhme *et al.*, in press: *Bufo regularis, Dicroglossus occipitalis, Agama agama, Tarentola parvicarinata*; MNHN: *Dicroglossus occipitalis, Hemitheconyx caudicinctus*; HLMD: *Dicroglossus occipitalis, Tarentolaparvicarinata, Coluber dorri*; Lambert, pers. obs.: *Mabuya quinquetaeniata scharica, M. perroteti*
110. Katibougou	12°30'N, 8°05'W	Papenfuss, 1969: *Bitis arietans*
111. Naréna	12°14'N, 8°38'W	Schätti, 1986: *Kassina senegalensis, Hemidactylus brooki, Agama agama, Chalcides thierryi pulchellus, Lamprophis lineatus, Causus maculatus, Naja katiensis*
112. Bamakoni (Bamako Nay), Dogo (Dogon)	12°02'N, 7°45'W	MNHN: *Hemitheconyx caudicinctus*
113. Between Sikasso and Sinndi (Sindon)	11°30'N, 5°56'W	MNHN: *Psammophis sibilans*
114. Tabakoro	11°26'N, 6°46'W	Schätti, 1986: *Atractaspis dahomeyensis*
115. Bougouni	11°25'N+|°29'W	Schätti, 1986: *Bufo regularis, Hildebrandtia ornata, Ptychadena schubotzi, Hemidactylus brooki, Agama agama, Mabuya perroteti, Chalcides thierryi pulchellus, Atractaspis aterrima, Causus maculatus, Echis ocellatus, Naja katiensis*
116. 20 km S. of Bougouni	11°20'N, 7°29'W	Schätti, 1986: *Afrixalus vittiger, Pelomedusa subrufa, Tarentola parvicarinata*
117. Sikasso	11°19'N, 5°40'W	Papenfuss, 1969: *Python s. sebae, Dispholidus t. typus, Dromophis p. praeornatus, Mehelya crossii, Philothamnus irregularis, Psammophis sibilans, Causus maculatus ("C. rhombeatus"), Naja nigricollis*; MNHN: *Lycophidium semicinctum*
118. Southern Mali	11°00'N, 7°00'W	Pooley, 1980, in IUCN, 1982: *Crocodylus cataphractus*; BMNH: *Agama agama*
119. Garalo (south of Bougouni)	10°59'N, 7°28'W	Joger, 1981: *Mabuya perroteti*

A. Tamesna between Adrar desIforas and Air Mountains	—	Angel & Lhote, 1938: *Malpolon moilensis*; BMNH: *Pelomedusa subrufa*
X1. Savannas of Guinea and Sénégal bordering Mali	—	Pooley, 1980, in IUCN, 1982: *Osteolaemus tetraspis*
X2. Savannas from Sénégal to eastern Africa	—	Frost, 1985: *Ptychadena floweri*; Villiers, 1975: *Typhlops l. lineatus*
X3. Northern Guinea	—	Villiers, 1975: *Rhinoleptus koniagui*, and probably therefore southern Mali.
X4. Western border region of Burkina Faso	—	Lamotte 1966: *Xenopus muelleri, Phrynomerus microps*; Papenfuss, 1969: *Cynisca leucura, Lygodactylus (picturatus) gutturalis*; Roman 1980: *Elapsoidea semiannulata, Dendroaspis polylepis, Python regius*, and probably southern Mali.
X5. Mauritania, Sénégal, Guinea to Nigeria	—	Ernst & Barbour, 1989: *Pelusios castaneus*, and also probably southern Mali.
X6. Both southeastern Sénégal (Lamotte, 1969; Villiers, 1956) and Burkina Faso (Lamotte, 1966; Lamotte & Xavier, 1981; Roman, 1980)	—	*Hemisus marmoratus, Leptopelis viridis, L. bufonides, Grayia smythii*, and also probably southern Mali
X7. Both Hoggar mountains (Algeria) and West African savanna region	—	Böhme, 1986: *Psammophis rukwae leucogaster*, and therefore likely to occur in Mali.

Collection abbreviations: MNHN (Muséum national d'Histoire naturelle, Paris), BMNH (Natural History Museum, London), CAS (California Academy of Sciences), GNHM (Göteborgs Naturhistoriska Museet) and HLMD (Hessisches Landesmuseum Darmstadt).

Analysis of the herpetofauna of the Republic of Mali, II. Species diversity and biogeographical assemblages

Ulrich Joger & Michael R.K. Lambert

Abstract. The herpetofauna of Mali consists of at least 33 Amphibia and 107 Reptilia. The territory of Mali is biogeographically a transition zone in West Africa; Saharan elements from the north meet tropical savanna elements from the south. High species richness is attained in the Sahelian zone along the big bend of the Niger river, where savanna and desert fauna mix with a number of specialized Sahelian species. The degree of endemism in the fauna is low. Endemism is, however, higher in a rock outcrop and dry forest area of southwestern Mali that extends into neighbouring parts of Guinea, Sénégal and Mauritania. Species endemic to this region are *Bufo chudeaui* (questionable species), *Schoutedenella milletihorsini*, *Tarentola parvicarinata*, *Agama boulengeri*, *A. weidholzi*, *Rhinoleptus koniagui* (probable), *Lycophidion albomaculatum* and *Echis jogeri*.

Key words. Amphibia, Reptilia, Mali, zoogeography, species list, endemism, biodiversity.

Introduction

The Sahelian inland countries of West Africa — Mali, Burkina Faso and Niger — have been neglected faunistically. For reptiles, only a single comprehensive review has been published (Papenfuss 1969). The amphibian species of the region were reviewed by Lamotte & Xavier (1981). Reptile and amphibian collections from Mali have been reported since by Joger (1981) and by Schätti (1986). A recent collection by M.R.K. Lambert from northern central Mali (May to December 1991) stimulated us to review all published literature and major museum collections for Malian records. A detailed inventory and bibliography of the herpetofauna of Mali is being published elsewhere (Joger & Lambert, 1996). Lack of information on reptiles and amphibians for biodiversity assessment in Mali was indicated by Warshall (1989).

The objective of this contribution is to evaluate the biogeographical composition of the herpetofauna of Mali and to determine areas of endemism and high biodiversity. Such areas should be of special concern in relation to conservation.

H. Ulrich (ed.): Tropical biodiversity and systematics. Proceedings of the International Symposium on Biodiversity and Systematics in Tropical Ecosystems, Bonn, 1994. Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, 1997.