

## **African biodiversity hotspots: the reptiles of Mt Nlonako, Cameroon**

Hans-Werner HERRMANN<sup>1,2</sup>, Wolfgang BÖHME<sup>3</sup>, Oliver EUSKIRCHEN<sup>4</sup>, Patricia A. HERRMANN<sup>2</sup> & Andreas SCHMITZ<sup>5</sup>

<sup>1</sup>Center for Reproduction of Endangered Species (C.R.E.S.), Zoological Society of San Diego, P.O. Box 120551, San Diego, CA 92112-055, U.S.A.

E-mail: hwherrmann@sandiegozoo.org

<sup>2</sup>P.O. Box 3055, Messa, Yaounde, Cameroon.

<sup>3</sup>Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany.

<sup>4</sup>Bismarckstrasse 10, D-56626 Andernach, Germany.

<sup>5</sup>Department of Herpetology and Ichthyology, Museum of Natural History, C.P. 6434, CH-1211 Geneva 6, Switzerland.

### **African biodiversity hotspots: the reptiles of Mt Nlonako, Cameroon. -**

The reptiles of Mt Nlonako, a mountain at the southeastern edge of the Cameroon mountain range ("Dorsale camerounaise"), were inventoried continually over a six year period from 1998 to 2004. This area encompasses 150 km<sup>2</sup> of lowland, submontane and montane rainforest with an elevation up to 1,825 m. Accounts of 89 species are provided based on collected and photo-documented material. This inventory proved Mt Nlonako to be the most species rich single-locality area in reptilian fauna in Africa. With 63 snake species Mt Nlonako exhibits the greatest number of species in Africa and possibly worldwide. Analysis showed the reptilian species composition to be most similar within Cameroon with that of Korup National Park followed by the Dja Faunal Reserve in the south. Relative to the snake composition the Korup NP and the Dimonika region in Congo-Brazzaville show the highest resemblance. In an African context the reptile fauna of Mt Nlonako is characterized by species which occur in both West and Central Africa as opposed to the mountain's amphibian species which more closely resemble Central African fauna. The high species richness and endemism is discussed from a paleoclimatic perspective. Conservation status and threats to the reptiles are noted.

**Keywords:** Amphisbaenia - Crocodylia - Chelonia - Sauria - Serpentes - species richness - endemism - biogeography - conservation.

## INTRODUCTION

Despite efforts in surveying the reptile (and amphibian) fauna of the rain forests of tropical central and west Africa (Perret, 1959, 1960, 1961; Leston & Hughes, 1968; Böhme, 1975; Joger, 1982; Trape, 1985; Böhme & Schneider, 1987; Ota *et al.*, 1987;

Trape & Roux-Esteve, 1990; Lawson, 1993; Böhme, 1994a, b; Rödel *et al.*, 1995; Schmitz, 1998; Rödel *et al.*, 1999; Böhme, 2000; Euskirchen *et al.*, 2000; Schmitz *et al.*, 2000; Gossmann *et al.*, 2002; Branch & Rödel, 2003) the knowledge on African rainforest reptile faunas falls behind that of its equivalents in tropical Middle and South America and in tropical Asia (Dunn, 1949; Inger & Colwell, 1977; Murphy *et al.*, 1994). Within the rainforest zones of central and west Africa however, Cameroon, Ghana and Ivory Coast have the best studied reptile faunas (Hughes, 1983; Rödel *et al.*, 1995; LeBreton, 1999; Rödel *et al.*, 1999). Lawson (1993) lists 83 reptile species for the Korup National Park (Korup NP), which makes this one of the most species rich areas for reptiles on the continent. Trape (1975) records 45 snake species from the Dinamika forest site in the People's Democratic Republik of Congo (Congo-Brazzaville).

In Cameroon, the Western and Southwestern Cameroon highlands also known as "Dorsale camerounaise" extending from Mt Cameroon in the south to Tchabal Mbabo in the north are characterized by a high amphibian and reptile species richness and an extraordinary high proportion of endemic species: a veritable hotspot of African herpetofauna diversity (Duellman, 1999; Poynton, 1999; Herrmann *et al.*, 2005).

Contrary to the high biodiversity value of such areas, especially in West and Central Africa, most have no formal conservation status protection (STUART *et al.*, 1990) and are endangered by habitat destruction, mainly by logging activities and human encroachment. Additionally, the natural history of most reptile species from tropical forests in Africa remains unknown. Quantitative ecological studies are entirely lacking with only the first steps taken towards quantitative studies of chameleons (Herrmann & Herrmann, 2005). Ultimately, only a comprehensive understanding of the reptiles of these areas and their natural history will provide the fundamental knowledge for their future survival.

This paper presents a comprehensive reptile species list for Mt Nlonako, which was derived over a period of six years, in which we compile the largest number of reptile species (89), in particular snake species (63), for any single-locality on the African continent.

## STUDY SITES

We surveyed the Mt Nlonako area (Fig. 1) which extends roughly from 4°49'-4°56'N and from 9°56'-10°01'E and encompasses ca. 15,000 ha. The western and northern flanks face the town of Nkongsamba, and the busy road between Douala and Bamenda. The slopes on this side are heavily cultivated with the forest destroyed up to an elevation of approximately 1,100 m. To the south and east however, the forest slopes are much less influenced by human activities. A vast lowland rainforest, encompassing several thousand km<sup>2</sup>, extends from the foothills of Mt Nlonako reaching past Nkondjok in the East and past Yabassi in the South. This area is divided by some unpaved roads and settlements. Logging is or has been carried out in many places within this area. Although hunting pressure is imminent, forest elephants, gorillas, chimpanzees, drills and other large mammals persist. Mt Nlonako itself raises from about 400 m elevation on the southern side to 1,825 m on its peak. The highest and central part of the mountain forms a cuvette, ca. 1.5 km in diameter, with much

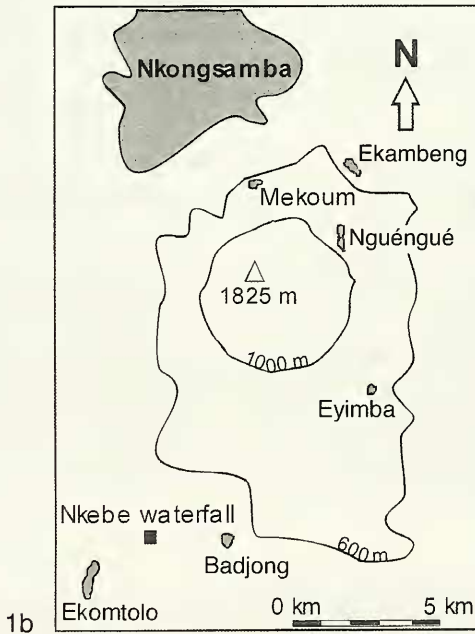
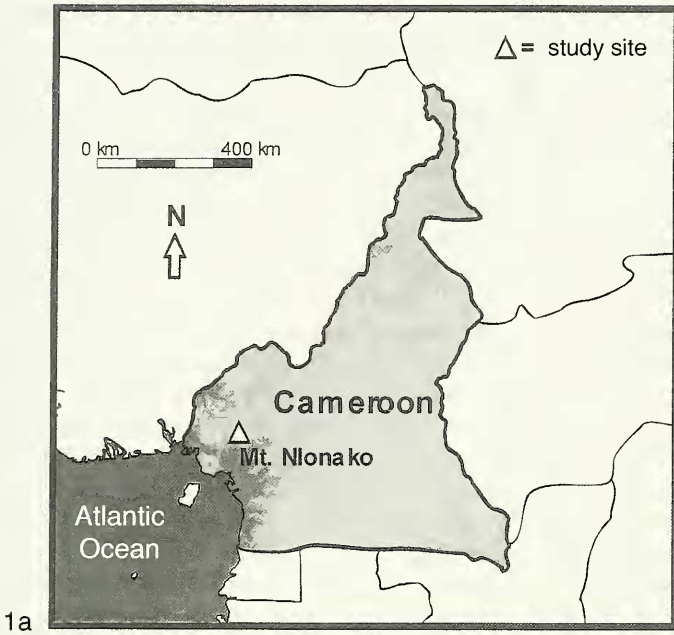


FIG. 1

Survey locations (a) in Cameroon and (b) at Mt Nlonako. Shaded areas are rural communities.

grass/bracken in its center and with forested rims at 1,600 m on the north, east and south sides and the peak on the western side (Dowsett-Lemaire & Dowsett, 1999).

The forest above 1,100 m is pristine with a tall canopy (25-30 m). The forest here seems to be drier and warmer than forests on the close-by Manengouba and Bakossi mountains or Mt Kupe at comparable altitudes. Botanically, Guttiferae (*Allanblackia* sp.) and Burseraceae (*Santiria trimera*) are especially common. Caesalpiniaceae (incl. *Tessmannia anomala*), Ebenaceae (*Diospyros*), Meliaceae, Mimosaceae (*Albizia*), Moraceae, Olacaceae (*Strombosia*), Sapotaceae (incl. *Chrysophyllum albidum*), Steruliaceae (*Cola*) and Apocynaceae (*Tabernaemontana* sp.) are recorded (Dowsett-Lemaire & Dowsett, 1999). Above 1,450 m some rare montane species such as *Polyscias fulva* can be found locally. Many small to medium-sized creeks, often fast flowing and rocky, can be found in the forest. Swamps and pools are rare.

The climate is warm and humid. Over a period of 34 years Nkongsamba (882 m elevation) received an average of 2,762 mm rainfall per year (table 1, Amiet, 1975). During that period the peak dry season extended from December to February with less than 50 mm precipitation per month. The peak rainy season extended from July to September with up to 482 mm precipitation per month. For detailed data on climate and rainfall see Herrmann *et al.* (2005).

Fieldwork initiated in November 1998 and continual sampling extended to June 2004. Sampling occurred in all seasons.

Our survey efforts concentrated on the northern, eastern and southern slopes of Mt Nlonako with the following localities being the main points of collecting:

- Ekambeng (EKA): village at the foot of the northern slopes in the vicinity of Nkongsamba, many coffee plantations, no primary forest
- Mekoum (MEK): village on northern side of the mountain, many coffee plantations, no primary forest
- Nguéngué (NGU): village on the rim between northwestern and southeastern slopes, N 4°55'02", E 9°59'21", 1,140 m elevation, some coffee plantations, secondary and predominately primary forest
- Summit (SUM): eastern side of the cuvette, N 4°54'47", E 9°57'93", 1,660 m elevation, rock outcrops, primary montane forest, some areas with grass and bushes
- Eyimba (EYI): very small village on the eastern side of the mountain, N 4°52'92", E 9°59'19", 710 m elevation, small cultivated areas, much primary forest
- Nkebe waterfall (NWF): area between the villages Ekomtolo and Badjong (but also including those two villages), N 4°49'83", E 9°55'49", 470 m elevation, coffee, oil palm and food crop plantations, predominately secondary forest, area with previous and current logging.

## METHODS

### SAMPLING METHODS

We used Y-shaped drift fence/pitfall trap arrays (Corn, 1994) with segments of 5 m length during the initial phase of the project at several localities. Catching success was very low to nil. This method was abandoned after some weeks.

Initially, gluetraps (Bauer & Sadler, 1992; Glor *et al.*, 2000) which were fixed on tree trunks at about 1.5 m height, were used to sample geckos and other arboreal

reptiles. Only a few skinks (*Trachylepis*) were caught using this method. The abundant ants tended to attack trapped reptiles immediately. This method was abandoned after the first two weeks.

We applied quadrat sampling with 8 x 8 m quadrats (Jaeger & Inger, 1994) at several localities at various elevations. Quadrats worked satisfactorily to gain quantitative data but are work intensive. For the quantitative results see Herrmann *et al.* (2000).

Visual encounter surveys along transects (Crump & Scott, 1994) or opportunistic searches during the day and at night were the dominant methods used. The number of persons surveying varied, but was usually two or three; this method yielded the best success and was carried out throughout the study periods. Acoustic monitoring was also applied but only species represented by at least one voucher specimen are included in the species list. Our data was complemented by donated specimens which were encountered by villagers during their daily movements.

Voucher specimens are deposited in the herpetological collection of the Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (ZFMK) and in the collection of the senior author (HWH) in the U.S. The latter collection will be transferred to the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). All specimens were either fixed in 10% buffered formaldehyde or 75% ethanol and consecutively preserved in 75% ethanol.

#### BIOGEOGRAPHIC ANALYSIS

To compare the species composition of Mt Nlonako with other areas in West and Central Africa we calculated the "coefficient of biogeographic resemblance" (CBR) after Duellman (1990) with the formula

$$CBR = 2C / (N_1 + N_2)$$

in which C is the number of shared taxa (here species) in two compared areas,  $N_1$  is the number of taxa (here species) in area one and  $N_2$  is the number of taxa (here species) in area two. A CBR value of 0 would mean that Mt Nlonako shares no reptilian species with the compared area, a CBR value of 1 would mean that the species inventory in both areas are identical (Jansen & Köhler, 2002). Jansen and Köhler (2002) excluded ubiquitous species from their analysis arguing that those species are not primary inhabitants of the mountain forest habitats they compared and thus do not bear any information on the biogeographic relationships of those areas. We do not follow this approach for (1) we do not know if ubiquitous species are or are not primary inhabitants of the areas in question, (2) possible "noise" by such species should be similar over the areas analyzed and (3) they are low in number and thus have a limited effect on the analysis.

#### RESULTS

##### *SPECIES ACCOUNT*

In the following we present a systematic list of reptile species encountered during our survey. We list localities and voucher specimens for each taxon. Nomenclature follows Uetz *et al.* (2004), unless otherwise noted. For voucher specimens with no exact locality data we state the locality as Mt Nlonako (MtNL). Otherwise col-

lecting localities are Nkebe waterfall area (NWF), Ekambeng (EKA), Mekoum (MEK), Eyimba (EYI), Nguéngué (NGU) and the Mt Nlonako summit area (SUM). For habitat we differentiate between forest (F) and farmbush (FB). Farmbush are the ecotones between forests and cultivated areas as well as the vicinities of villages and the dirt roads. We also include degenerated secondary forest patches in this category.

## AMPHISBAENIA

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#### *Monopeltis* sp. (Duméril, 1859)

Locality: EYI. Voucher specimen: ZFMK 68960. Habitat: FB.

Remarks: Only two species, *Monopeltis jugularis* Peters, 1880 and *M. galeata* (Hallowell, 1852) are known from Cameroon. This is the first record of an amphisbaenid from Western Cameroon. Since this specimen is a roadkill in a rather bad conservation state, an identification to the species-level was not possible.

## CROCODYLIA

### CROCODYLIDAE

#### *Osteolaemus tetraspis* Cope, 1861

Locality: NWF, EYI. Voucher specimen: none. Habitat: F.

Remarks: Regularly seen in streams and pools. This species is commonly found as bushmeat in local markets such as in Nkongsamba (see Akani *et al.*, 1998 for the situation in Nigeria). Although under severe hunting pressure, this species seems to occur in stagnant river arms and pools at lower elevations throughout the study area. CITES appendix I.

## CHELONIA

### TESTUDINIDAE

#### *Kinixys erosa* (Schweiger, 1812)

Locality: NGU. Voucher specimen: ZFMK 68982. Habitat: F.

Remarks: Shells of this species can regularly be found in villages where this species is appreciated as bushmeat (Lawson, 2000). CITES appendix II.

#### *Kinixys homeana* Bell, 1827

Locality: NWF. Voucher specimen: none. Habitat: F.

Remarks: Shells of two specimens of this species are kept in the compound of the chief of Ekomtolo. Like *K. erosa*, this species is commonly eaten by local people. CITES appendix II.

## SAURIA

### AGAMIDAE

#### *Agama agama* (Linnaeus, 1758)

Locality: NGU. Voucher specimens: ZFMK 69017, 75376. Habitat: FB.

Remarks: This species was found in all settlements of the study area where it is very abundant in villages and along forest roads. It was never observed in the forest.

## CHAMAELEONIDAE

*Chamaeleo camerunensis* Müller, 1909

Locality: NWF. Voucher specimen: HWH 20. Habitat: F.

Remarks: Only one ♀ of this species was found and is treated in detail in Harbort & Herrmann (2002). CITES appendix II.

*Chamaeleo cristatus* Stutchbury, 1837

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 68961, 68980-1, 73063-6, 75146, 75394, HWH 31, 202-4, 617, 816-29, 893-6. Habitat: F, FB.

Remarks: CITES appendix II.

*Chamaeleo montium* Buchholz, 1874

Locality: MtNL, NGU. Voucher specimens: ZFMK 69117-20, 72855, 73067-74, 73491-5, 75388-93, HWH 208-12, 830-44. Habitat: F, FB.

Remarks: CITES appendix II.

*Chamaeleo oweni* Gray, 1831

Locality: MtNL, NWF. Voucher specimens: HWH 205-7. Habitat: F, FB.

Remarks: CITES appendix II.

*Chamaeleo pfefferi* Tornier, 1900

Locality: SUM. Voucher specimens: ZFMK 73490, 74336, HWH 1013. Habitat: F.

Remarks: CITES appendix II.

*Rhampholeon spectrum* (Buchholz, 1874)

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 69101-16, 72853-4, 73075-8, 73496, 75287-95, HWH 16, 194-200, 618, 845-85. Habitat: F.

## GEKKONIDAE

*Hemidactylus intestinalis* Werner, 1897

Locality: NWF. Voucher specimens: ZFMK 78684, 81713, HWH 213-4, 602. Habitat: F, FB.

Remarks: Henle & Böhme (2003) provide a detailed species account, though using the name *Hemidactylus ansorgii* Boulenger, 1901, which has been shown to be a junior synonym of *H. intestinalis* Werner, 1897 by Perret (1975), and this synonymy has also been mentioned in Kluge (1991).

*Hemidactylus echinus* O'Shaughnessy, 1875

Locality: NGU. Voucher specimen: ZFMK 69040. Habitat: F, FB.

*Hemidactylus fasciatus* Gray, 1842

Locality: NWF. Voucher specimen: ZFMK 77893. Habitat: F.

*Hemidactylus mabouia* (Moreau de Jonnés, 1818)

Locality: NGU. Voucher specimens: ZFMK 69026-39, 75377-9, HWH 1056-7. Habitat: FB.

Remarks: Like *Agama agama*, this species can be found in all human settlement in the study area. It is especially abundant on houses.

***Hemidactylus* sp. indet.**

Locality: NWF. Voucher specimen: ZFMK. Habitat: F, FB.

Remarks: Juvenile specimen which we could identify to species level.

***Lygodactylus conraui* Tornier, 1902**

Locality: EYI. Voucher specimen: ZFMK 68966. Habitat: F, FB.

## LACERTIDAE

***Poromera fordii* (Hallowell, 1857)**

Localities: NWF, NGU. Voucher specimens: ZFMK 69021-5, 78660, 81715, HWH 1058. Habitat: F, FB.

## SCINCIDAE

***Trachylepis affinis* (Gray, 1838)**

Localities: EYI, NGU. Voucher specimens: ZFMK 68962-4, 69062-73, 75383-7. Habitat: FB.

Remarks: Listed as *Mabuya affinis* in Uetz *et al.* (2004). We follow the nomenclature proposed by Bauer (2003) and use the genus name *Trachylepis*. Common in villages, farms and along roads throughout the study area.

***Trachylepis maculilabris* (Gray, 1845)**

Localities: NGU, SUM. Voucher specimens: 69041-61, 69434, 75576-7. Habitat: F, FB.

Remarks: Listed as *Mabuya maculilabris* in Uetz *et al.* (2004). We follow the nomenclature proposed by Bauer (2003) and use the genus name *Trachylepis*. Found in human settlements but also in secondary forest and on rock faces at the summit of Mt Nlonako. Locally abundant.

***Lygosoma fernandi* (Burton, 1836)**

Localities: MtNL, EYI, NGU. Voucher specimens: ZFMK 68959, 69018, 73497, 78026-7, 78814. Habitat: F, FB.

Remarks: In Uetz *et al.* (2004) as *Mochlus fernandi*. We prefer the genus name *Lygosoma* as molecular analyses reveal a closer relationship with this genus (A. S. unpublished results).

***Panaspis breviceps* (Peters, 1873)**

Localities: NWF, NGU. Voucher specimens: ZFMK 69074-85, 72856, 75380, 77889-92, 78700, 78711, HWH 601. Habitat: F.

***Lacertaspis reichenowi* (Peters, 1874)**

Locality: EYI. Voucher specimen: ZFMK 68965. Habitat: F.

Remarks: Listed as *Panaspis reichenowi* in Uetz *et al.* (2004). We follow the nomenclature proposed by Schmitz *et al.* (2005) and use the genus name *Lacertaspis*.

***Lacertaspis rohdei* (Müller, 1910)**

Locality: NGU. Voucher specimens: ZFMK69086-99, 75382, HWH 1052-5. Habitat: F.



Remarks: Listed as *Panaspis rohdei* in Uetz *et al.* (2004). We follow the nomenclature proposed by Schmitz *et al.* (2005) and use the genus name *Lacertaspis*.

***Leptosiaphos vigintiserierum* (Sjöstedt, 1897)**

Localities: NGU, SUM. Voucher specimens: ZFMK 69426-32, 69549. Habitat: F.

***Leptosiaphos* spp.**

Locality: NGU. Voucher specimens: ZFMK 69529-31, 69550-4, 75381. Habitat: F.

Remarks: Our material of hitherto undescribed or unidentifiable *Leptosiaphos* includes five morphologically distinct groups. One group resembles *L. pauliani* (Angel, 1940) (Fig. 2) from the Bamboutos Mtns, Cameroon, another *L. vigintiserierum* (Fig. 3).

VARANIDAE

***Varanus ornatus* (Daudin, 1803)**

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 69016, HWH 18, 982. Habitat: F, FB.

Remarks: A common species which is often found as bushmeat in villages and local markets. Large specimens sometimes are encountered in snare traps. CITES appendix II.

SERPENTES

TYPHLOPIDAE

***Typhlops angolensis* (Bocage, 1866)**

Localities: EKA, NGU. Voucher specimens: ZFMK 75126, 75178-9. Habitat: FB.

***Typhlops congestus* (Duméril & Bibron, 1844)**

Locality: MtNL. Voucher specimens: ZFMK 77642, 78132-6, 78819-24, HWH 587. Habitat: FB.

***Typhlops lineolatus* Jan, 1864**

Locality: MtNL. Voucher specimens: HWH 588, 695. Habitat: FB.

***Typhlops punctatus* (Leach in Bowdich, 1819)**

Locality: MtNL. Voucher specimens: ZFMK 78815-8. Habitat: FB.

BOIDAE

***Calabaria reinhardtii* (Schlegel, 1848)**

Localities: MtNL, NGU. Voucher specimens: ZFMK 75780, HWH 690-1, 808-15, 897-901, 1009. Habitat: F, FB.

Remarks: This is one of the most abundant snakes in the area. Often found crossing roads or dead on the road (DOR). The species was observed in many different localities in the study area. CITES appendix II.

***Python sebae* (Gmelin, 1789)**

Locality: MtNL. Voucher specimens: HWH 890-1. Habitat: F, FB.



FIGS 2-3

2. *Leptosiaphos* sp. cf. *pauliani* from the forest above Nguéngué. 3. *Leptosiaphos* sp. cf. *vigintiserierum* from the forest above Nguéngué.

Remarks: This species is probably restricted to the lower elevations of the study area. People of NGU for example did not confirm the existence of the species in their area. On one occasion, villagers of Ekomtolo were observed preparing a medium sized *P. sebae* for consumption. The species is well known to the people of Ekomtolo and Badjong. It is not common. CITES appendix II.

## COLUBRIDAE

*Afronatrix anoscopus* (Cope, 1861)

Locality: MtNL, NWF. Voucher specimens: ZFMK 81716, HWH 400, 753.  
Habitat: F, FB.

*Boiga blandingii* (Hallowell, 1844)

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 68987, 75119, 75175-7, 75857-8, HWH 681, 749-51. Habitat: F, FB.

*Boiga pulverulenta* (Fischer, 1856)

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 75155-7, 77913-4, 78085, 78852-6, 81717, HWH 423-32. Habitat: F, FB.

*Bothrophthalmus brunneus* (Günther, 1863)

Locality: MtNL, NWF. Voucher specimens: ZFMK 75121, 78839, HWH 418, 450. Habitat: F.

Remarks: The former *B. lineatus* subspecies *brunneus* is considered to be a full species by Hughes (2000) and Gossmann *et al.* (2002).

*Chamaelycus fasciatus* (Günther, 1858)

Localities: MtNL, NWF, EKA, MEK, EYI, NGU, SUM. Voucher specimens: ZFMK 69002, 69433, 75224-32, 77631, 77663, 78103, 78845-6, HWH 407-17, 633. Habitat: F.

*Dasypeltis fasciata* Smith, 1849

Locality: MtNL. Voucher specimens: HWH 404-5. Habitat: F, FB.

*Dasypeltis scabra* (Linnaeus, 1758)

Localities: MtNL, NGU. Voucher specimens: ZFMK 78118-9, 78864-7.  
Habitat: F, FB.

*Dipsadoboa duchesnei* (Boulenger, 1901)

Locality: MtNL, NWF. Voucher specimens: ZFMK 81718, HWH 435-7, 715.  
Habitat: F.

*Dipsadoboa underwoodi* Rasmussen, 1993

Locality: NWF. Voucher specimen: ZFMK 81719. Habitat: F.

*Dipsadoboa unicolor* Günther, 1858

Localities: MtNL, NGU. Voucher specimens: ZFMK 75266-7, HWH 438, 716.  
Habitat: F.

*Dipsadoboa viridis* (Peters, 1869)

Locality: MtNL. Voucher specimens: ZFMK 78862-3, 79031, HWH 433-4, 717, 759-64. Habitat: F.

*Dipsadoboa weileri* (Lindholm, 1905)

Localities: MtNL, NGU. Voucher specimens: ZFMK 75340, 78121-2, HWH 439-40. Habitat: F.

***Gastropyxis smaragdina*** (Schlegel, 1837)

Localities: MtNL, NWF, EKA, MEK, EYI, NGU. Voucher specimens: ZFMK 68975, 68989-91, 75134, 75152-4, 75262-4, 77657-60, 77906, 78077, 78093-4, 79029-30, HWH 399, 626, 802. Habitat: F, FB.

***Gonionotophis brussauxi*** (Mocquard, 1889)

Localities: MtNL, NWF, EYI. Voucher specimens: ZFMK 77636, 77915, 78850-1. Habitat: F.

***Grayia caesar*** (Günther, 1863)

Locality: NGU. Voucher specimen: ZFMK 78120. Habitat: F.

***Grayia smythii*** (Leach, 1818)

Locality: NWF. Voucher specimen: HWH 1208. Habitat: F, FB.

***Hapsidophrys lineatus*** Fischer, 1856

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 75125, 75265, 75373, 78078-9, 79022-8, HWH 387-93, 803-6. Habitat: F, FB.

***Hormonotus modestus*** (Duméril, Bibron & Duméril, 1854)

Locality: MtNL. Voucher specimens: ZFMK 78859-61. Habitat: F.

***Hydraethiops melanogaster*** Günther, 1872

Locality: MtNL. Voucher specimens: ZFMK 72729, HWH 694, 752. Habitat: F.

***Lamprophis fuliginosus-lineatus-complex***

Thorpe & McCarthy (1978) state, that the two species *L. fuliginosus* and *L. lineatus* are difficult to differentiate in some areas. Our material allowed the assignment of specimens to either of the two species.

***Lamprophis fuliginosus*** (Boie, 1827)

Locality: NGU. Voucher specimens: ZFMK 69010-5, 78219. Habitat: F, FB.

***Lamprophis lineatus*** Duméril, Bibron & Duméril, 1854

Localities: MtNL, NWF, NGU. Voucher specimens: HWH 441-9, 628-30, 702-9, 778-94, 965-74, 976, 1008, 1163. Habitat: F, FB.

***Lamprophis olivaceus*** (Duméril, 1856)

Localities: MtNL, NWF, MEK, NGU. Voucher specimens: ZFMK 68976, 75122, 75240, 75343, 77920, 79037-9, HWH 590, 981. Habitat: F, FB.

***Lamprophis virgatus*** (Hallowell, 1854)

Localities: MtNL, NWF, EKA, MEK, EYI, NGU. Voucher specimens: ZFMK 68977, 69007-9, 75116-8, 75138-45, 75147-51, 75344-71, 77637-8, 77662, 77921-2, 78203-18, 79040-66.

***Lycophidion laterale*** Hallowell, 1857

Localities: MtNL, NGU. Voucher specimens: ZFMK 69398, 75233-5, 75374, 78080-1, 78843-4, HWH 406, 754-5. Habitat: F.

***Mehelya guirali*** (Mocquard, 1887)

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 69001, 75169-74, 75270, 77909, 78082-4, 78092, 78830-2. Habitat: F, FB.

***Mehelya poensis*** (Smith, 1847)

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 75268, 77910-2, 78825, 78827-9, HWH 419, 616, 713, 756-8. Habitat: F, FB.

***Mehelya riggenbachi*** (Sternfeld, 1910)

Localities: MtNL, NWF. Voucher specimens: HWH 420, 631, 718. Habitat: F.

***Mehelya stenophthalmus*** (Mocquard, 1887)

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 75269, 78131, 78826, HWH 632, 984. Habitat: F, FB.

***Natriciteres fuliginoides*** (Günther, 1858)

Localities: MtNL, NWF, EKA, EYI, NGU. Voucher specimens: 75220, 77643-56, 77916-7, 78104, 78178-202, 78985-79003, HWH 451-74, 610-1, 613-4, 696-8, 701, 767-74, 942-58, 1010. Habitat: F, FB.

***Natriciteres olivacea*** (Peters, 1854)

Localities: MtNL, MEK, NGU. Voucher specimens: ZFMK 68974, 68992, 68997-9, 75201-19, 75341-2, 75372, 78979. Habitat: F, FB.

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

Localities: MtNL, NWF, NGU. Voucher specimens: ZFMK 68993-6, 75180-200, 77918-9, 78095, 78173-7, 78980-4, HWH 475-89, 698-700, 776-7, 959-64. Habitat: F, FB.

***Philothamnus carinatus*** (Andersson, 1901)

Localities: MtNL, MEK, NGU. Voucher specimens: ZFMK 75236-9, 75339, 78127, 79032-6, HWH 634-6, 712, 798, 985. Habitat: F.

Remarks: In Uetz *et al.* (2004) not listed for Cameroon and in LeBreton (1999) as a subspecies of *heterodermus*.

***Philothamnus heterodermus*** (Hallowell, 1857)

Localities: MtNL, EYI, NGU. Voucher specimens: ZFMK 77632-5, 78123-6, HWH 710-1, 795-7, 807. Habitat: F, FB.

***Philothamnus nitidus*** (Günther, 1863)

Locality: MtNL. Voucher specimen: HWH 637. Habitat: F.

***Poecilipholis cameronesis*** Boulenger, 1903

Locality: MtNL. Voucher specimen: HWH 589. Habitat: F.

***Rhamnophis aethiopissa*** Günther, 1862

Locality: NGU. Voucher specimen: ZFMK 68979. Habitat: F, FB.

***Rhamnophis batesii*** (Boulenger, 1908)

Localities: MtNL, NWF, EKA, NGU. Voucher specimens: ZFMK 75334, 77661, 78105-10, 78833-8, 79067, HWH 401-2, 627. Habitat: F.

***Thelotornis kirtlandii*** (Hallowell, 1844)

Localities: MtNL, NWF, EKA, EYI, NGU. Voucher specimens: ZFMK 68988, 75271-5, 77664, 78073-4, 78871-9, HWH 421-2, 615, 625, 680, 975, 1006-7. Habitat: F, FB.

***Thrasops flavigularis*** (Hallowell, 1852)

Localities: MtNL, NGU. Voucher specimens: ZFMK 78032-3, 78840-2, HWH 403. Habitat: F, FB.

## ATRACTASPIDIDAE

*Aparallactus modestus* (Günther, 1859)

Localities: NWF, EYI, MEK, NGU. Voucher specimens: ZFMK 68978, 69003-6, 75123-4, 75241-60, 75335, 75337-8, 77640-1, 77907-8, 78150-72, 79006-21, 79221-2, HWH 640-9, 977-80, 1011-2. Habitat: F, FB.

*Aparallactus niger* Boulenger, 1897

Locality: MtNL. Voucher specimen: ZFMK 79005. Habitat: F.

Remarks: The specimen possesses a single prefrontal with the nasals in broad contact. This specimen represents the first record of this species for Cameroon.

*Atractaspis aterrima* Günther, 1863

Locality: MtNL. Voucher specimen: HWH 766. Habitat: F, FB.

*Atractaspis boulengeri* Mocquard, 1897

Locality: EKA. Voucher specimen: ZFMK 75136. Habitat: F.

*Atractaspis irregularis* (Reinhardt, 1843)

Locality: EKA. Voucher specimen: ZFMK 75137. Habitat: F, FB.

*Atractaspis reticulata* Sjöstedt, 1896

Localities: MtNL, NGU. Voucher specimens: ZFMK75261, HWH 639, 714, 765. Habitat: F.

*Polemon collaris* (Peters, 1881)

Localities: MtNL, NGU. Voucher specimens: ZFMK 69000, 75221-3, 78137-49, 78847-9, HWH 364-5, 693. Habitat: F.

*Polemon gabonensis* (Duméril, 1856)

Locality: NWF. Voucher specimen: ZFMK 75120. Habitat: F.

*Polemon gracilis* (Boulenger, 1911)

Locality: NGU. Voucher specimen: ZFMK 78129. Habitat: F.

Remarks: This is the first voucher specimen from Cameroon.

*Polemon notatus* (Peters, 1882)

Localities: NWF, EYI, NGU. Voucher specimens: ZFMK 77905, 78128, HWH 17. Habitat: F.

## ELAPIDAE

*Dendroaspis jamesoni jamesoni* (Traill, 1843)

Localities: MtNL, NWF, EKA, EYI, NGU. Voucher specimens: ZFMK68957, 75276, 75336, 77672-4, 77898, 78096-102, 78887-95, HWH 380-2, 719-24, 996-8. Habitat: F, FB.

*Naja melanoleuca* Hallowell, 1857

Localities: MtNL, NWF, EKA, EYI, NGU. Voucher specimens: ZFMK 68985-6, 69019-20, 75127-33, 75158-62, 75277-84, 75793, 77630, 77667-71, 77900-4, 78034-53, 78947-78, 79004, HWH 384-6, 604-5, 612, 619-22, 676-9, 727-36, 889, 925-41, 1000-5. Habitat: F, FB.

Remarks: In the study area this is the most abundant snake in villages where specimens are often attracted by poultry.

*Pseudohaje goldii* (Boulenger, 1895)

Localities: MtNL, NWF, EKA, EYI, NGU. Voucher specimens: ZFMK 68984, 69598, 75163, 77629, 77665-6, 77897, 78028-31, 78880-6, HWH 370-9, 682-4, 725-6, 999. Habitat: F, FB.

## VIPERIDAE

*Atheris squamigera* (Hallowell, 1854)

Localities: MtNL, EYI, NGU. Voucher specimens: ZFMK 75285-6, 77622-3, 78111-7, 78868-70, HWH 394-5, 692, 1183. Habitat: F.

*Causus lichtensteinii* (Jan, 1859)

Localities: MtNL, EYI, NGU. Voucher specimens: ZFMK 68959, 75164, 77624-8, 78075-6, 78896-901, HWH 396-8, 607-9. Habitat: F, FB.

*Causus maculatus* (Hallowell, 1842)

Localities: MtNL, NWF, EKA. Voucher specimens: ZFMK 75135, 77899, 78902, HWH 687-9, 740-8. Habitat: F, FB.

*Bitis gabonica* (Duméril, Bibron & Duméril, 1854)

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 68983, 75168, 75331-3, 77894-6, 78070, 78086-91, 78903-9, HWH 367-9, 888, 902, 993-5. Habitat: F, FB.

*Bitis nasicornis* (Shaw, 1802)

Localities: MtNL, NWF, EYI, NGU. Voucher specimens: ZFMK 75165-7, 75296-330, 75375, 77617-21, 78054-69, 78071-2, 78130, 78910-46, HWH 366, 606, 623-4, 685-6, 737-9, 903-24, 987-92. Habitat: F, FB.

## DISCUSSION

We recorded a total of 89 reptile species from Mt Nlonako (table 1 and 3). Thirty-six percent of all 249 reptile species (excluding sea turtles) and 42 percent of the 151 snake species recorded for Cameroon (LeBreton, 1999) occur at Mt Nlonako. Thus Mt Nlonako hosts the most species rich single-locality reptile and especially snake fauna in Africa (Böhme, 2000). For snakes Mt Nlonako at this stage possibly represents the most species rich single-locality in the world. The subsequent area of reptile species richness is represented by Korup NP approximately 130 km W of Mt Nlonako with 83 reptile species (Lawson, 1993). This is followed by the Dja Faunal Reserve in Cameroon (80 species, LeBreton, 1999). Relative to snakes Mt Nlonako is again followed by the Korup NP (55 species), Mt Nimba in Guinea (52 species, Ineich, 2003), the Dja Faunal Reserve (49 species, LeBreton, 1999), the Dimonika forest site in Congo-Brazaville (45 species, Trape, 1975), the Comoe NP in Ivory Coast (44 species, Rödel 1995 and 1999), the Ziama Forest in Guinea (41 species, Böhme, 2000) and 40 species found in the Taï NP in Ivory Coast (Rödel & Mahsberg, 2000; Ernst & Rödel, 2002). Four snake species assemblages, reported from Ivory Coast, Ghana, Gabon and the Central African Republic, ranged between 35 and 39 species (Böhme, 2000). These results may not only represent the actual pattern of snake species richness in the rainforest areas of West and Central Africa but may also indicate survey activities and gaps as many areas with a very high potential for exceptional species richness have not been sampled adequately.

TABLE 1. Reptile species richness of three different rainforest areas in southwestern and southern Cameroon. Numbers in parentheses are the number of species directly recorded by the authors for the areas. NP = National Park; FR = Faunal Reserve. From LeBreton's list only species found or mentioned from the Dja FR or adjacent areas were included in this analysis.

	Mt Nlonako	Korup NP	Dja FR
area in km <sup>2</sup>	150	1,240	8,400
reptile species	89	83 (69)	80 (14)
reptile species/km <sup>2</sup>	0.59	0.07	0.01
snake species	63	55 (41)	49 (10)
snake species/km <sup>2</sup>	0.42	0.04	0.01
source	this study	Lawson, 1993	LeBreton, 1999

TABLE 2. West and Central African rainforest reptile and snake faunas and their relationships with the Mt Nlonako reptile and snake fauna.

country	locality	reptile species	CBR	snake species	CBR	source
Cameroon	Korup National Park	83	0.65	55	0.72	Lawson, 1993
Congo (RC)	Dimonika region	-	-	45	0.70	Trape, 1985
Cameroon	Dja Faunal Reserve	80	0.60	49	0.66	LeBreton, 1999
Guinea, Ivory Coast, Liberia	Mt Nimba	69	0.51	52	0.57	Ineich, 2003
Gabon	Mounts de Cristal	48	0.54	32	0.55	Pauwels <i>et al.</i> , 2002
Gabon	Massif du Chaillu	46	0.47	29	0.50	Pauwels <i>et al.</i> , 2002
Guinea	Zima forest	46	0.43	41	0.50	Böhme, 2000
Ivory Coast	Tai NP	-	-	40	0.50	Rödel & Mahsberg, 2000, Ernst & Rödel, 2002
Cameroon	Mt Kupe & Bakossi Mtns	38	0.47	18	0.35	Schmitz, 1998
Ivory Coast	Haute Dodo	17	0.23	9	0.19	Branch & Rödel, 2003

Within Cameroon, our data shows not only the highest species richness for a single locality, but also the highest number of species per area (km<sup>2</sup>) as presented in table 1.

Of the 89 species recorded for Mt Nlonako, one species is an amphisbaenid (1%), one is a crocodile (1%) and two are tortoises (2%). Of the 22 lizard species (25%) one is an agamid (5%), one a lacertid (5%), one a varanid (5%), five are geckos (23%), six are chameleons (26%), and eight skinks (36%). The 63 snake species (71%) include two booids (3%), three elapids (5%), four typhlopids (6%), five vipers (8%), ten atractaspidids (16%), and 39 colubrids (62%). The lizard fauna appears depauperated compared to lizard faunas in arid or semiarid African environments. However, similar findings are presented by Böhme (2000) for the Zima Forest in Guinea and Branch & Rödel (2003) for areas in western Ivory Coast.



TABLE 3. Abundance, altitudinal distribution at Mt Nlonako and zoogeographic distribution in Africa of reptile species from Mt Nlonako.

taxa	abundance <sup>1</sup>	500m	700m	altitudinal distribution <sup>2</sup>	1,100m	1,700m	CE	WA	CA	SSA
<b>AMPHISBAENIA</b>										
AMPHISBAENIDAE										
<i>Monopeltis</i> sp.	+	—	—						+	
<b>CROCODYLIA</b>										
CROCODYLIDAE										
<i>Osteolaemus tetraspis</i>	+	—	—					+	+	
<b>CHELONIA</b>										
TESTUDINIDAE										
<i>Kinixys erosa</i>	+	—	—					+	+	
<i>Kinixys homeana</i>	+	—	—					+	+	
<b>SAURIA</b>										
AGAMIDAE										
<i>Agama agama</i>	+++	—	—							+
CHAMAELEONIDAE										
<i>Chamaeleo camerunensis</i>	+	—	—				+			
<i>Chamaeleo cristatus</i>	+++	—	—				+		+	
<i>Chamaeleo monitium</i>	+++	—	—						+	
<i>Chamaeleo oweni</i>	+	—	—						+	
<i>Chamaeleo pfefferi</i>	++	—	—			—	+		+	
<i>Rhampholeon spectrum</i>	+++	—	—						+	
GEKKONIDAE										
<i>Hemidactylus intestinalis</i>	++	—	—							
<i>Hemidactylus echinus</i>	+	—	—					+	+	
<i>Hemidactylus fasciatus</i>	+	—	—					+	+	
<i>Hemidactylus mabouia</i>	+++	—	—							+
<i>Lygodactylus conraui</i>	+	—	—					+	+	
LACERTIDAE										
<i>Poromera fordii</i>	++	—	—						+	
SCINDIDAE										
<i>Trachylepis affinis</i>	+++	—	—					+	+	
<i>Trachylepis maculilabris</i>	+++	—	—			—				+
<i>Lygosoma fernandi</i>	++	—	—					+	+	

taxa	abundance <sup>1</sup>	altitudinal distribution <sup>2</sup>			1,700m	CE	zoogeographic distribution <sup>3</sup>			
		500m	700m	1,100m			WA	CA	SSA	
<i>Panaspis breviceps</i>	++	—	—	—				+		
<i>Lacertaspis reichenowi</i>	+	—	—	—				+		
<i>Lacertaspis rohdei</i>	++	—	—	—				+		
<i>Leptosiaptilos vigintiserierum</i>	+	—	—	—	—	+				
<i>Leptosiaptilos</i> spp.	+	—	—	—						
VARANIDAE										
<i>Varanus ornatus</i>	+++	—	—	—			+		+	
SERPENTES										
TYPHLOPIDAE										
<i>Typhlops angolensis</i>	+	—	—	—					+	
<i>Typhlops congestus</i>	++	—	—	—					+	
<i>Typhlops lineolatus</i>	+	?	?	?				+	+	
<i>Typhlops punctatus</i>	+	?	?	?				+	+	
BOIDAE										
<i>Calabaria rheinhardtii</i>	+++	—	—	—					+	+
<i>Python sebae</i>	+	—	—	—					+	+
COLUBRIDAE										
<i>Afromatrix auscropsus</i>	+	?	?	?					+	
<i>Boiga blandingii</i>	++	—	—	—					+	+
<i>Boiga pulchellenta</i>	+++	—	—	—					+	+
<i>Boitrophiluhinus brunneus</i>	+	—	—	—					+	+
<i>Chamaelycus fasciatus</i>	++	—	—	—	—				+	+
<i>Dasypeltis fasciata</i>	+	?	?	?					+	
<i>Dasypeltis scabra</i>	+	—	—	—						+
<i>Dipsadoboa duchesnei</i>	++	?	?	?					+	
<i>Dipsadoboa underwoodi</i>	+	—	—	—					+	+
<i>Dipsadoboa unicolor</i>	++	?	?	?					+	+
<i>Dipsadoboa viridis</i>	++	—	—	—					+	+
<i>Dipsadoboa weileri</i>	++	—	—	—					+	+
<i>Gastropyxis smaragdina</i>	+++	—	—	—					+	+
<i>Gonionotophis brasscauxi</i>	+	—	—	—					+	+
<i>Grayia caesar</i>	+	—	—	—						+

taxa	abundance <sup>1</sup>	altitudinal distribution <sup>2</sup>			1,700m	CE	zoogeographic distribution <sup>3</sup>			SSA
		500m	700m	1,100m			WA	CA	CA	
<i>Grayia snyderi</i>	+	—	—	—			+			
<i>Hapsidophrys lineatus</i>	+++	—	?	—			+			
<i>Homonotus modestus</i>	+	?	?	?			+			
<i>Hydraethiops melanogaster</i>	+	?	?	?			+			
<i>Lamprophis fuliginosus</i>	++	—	—	—						+
<i>Lamprophis lineatus</i>	+++	—	—	—			+			
<i>Lamprophis olivaceus</i>	+++	—	—	—			+			
<i>Lamprophis virgatus</i>	+++	—	—	—			+			
<i>Lycophilidion laterale</i>	++	—	—	—			+			
<i>Mehelya guirali</i>	++	—	—	—			+			
<i>Mehelya poensis</i>	++	—	—	—			+			
<i>Mehelya rigseubachi</i>	+	—	—	—		+				
<i>Mehelya stenophthalma</i>	++	—	—	—			+			
<i>Natriciteres fuliginoides</i>	+++	—	—	—			+			
<i>Natriciteres olivacea</i>	+++	—	—	—						+
<i>Natriciteres variegata</i>	+++	—	—	—						+
<i>Philothamnus carinatus</i>	+++	—	—	—			+			
<i>Philothamnus heterodermus</i>	++	—	—	—			+			
<i>Philothamnus nitidus</i>	+	?	?	?			+			
<i>Poecilipholis camerounensis</i>	+	?	?	?		+				
<i>Rhammophis aethiopiassa</i>	+	—	—	—			+			
<i>Rhammophis batesii</i>	++	—	—	—			+			
<i>Thelotornis kirtlandii</i>	+++	—	—	—			+			
<i>Thrasops flavigularis</i>	++	—	—	—			+			
TRACTASPIDIDAE										
<i>Aparallactis modestus</i>	+++	—	—	—			+			
<i>Aparallactis niger</i>	+	?	?	?			+			
<i>Atractaspis aterrima</i>	+	?	?	?			+			
<i>Atractaspis boulengeri</i>	+	—	—	—			+			
<i>Atractaspis irregularis</i>	+	—	—	—			+			
<i>Atractaspis reticulata</i>	+	—	—	—			+			
<i>Polemon collaris</i>	+++	—	—	—			+			

taxa	abundance <sup>1</sup>			altitudinal distribution <sup>2</sup>			zoogeographic distribution <sup>3</sup>		
	500m	700m	1,100m	1,700m	CE	WA	CA	SSA	
<i>Poleuon gabouensis</i>	—	—	—	—	+	+	+	+	
<i>Poleuon gracilis</i>	—	—	—	—	+	—	—	—	
<i>Poleuon notatus</i>	—	—	—	—	—	—	—	—	
ELAPIDAE									
<i>Dendroaspis jamesoni jamesoni</i>	—	—	—	—	—	+	+	+	
<i>Naja melanoleuca</i>	—	—	—	—	—	—	—	—	
<i>Pseudohaje goldii</i>	—	—	—	—	—	—	—	+	
VIPERIDAE									
<i>Atheris squamigera</i>	—	—	—	—	—	+	+	+	
<i>Causus lichtensteini</i>	—	—	—	—	—	+	+	+	
<i>Causus maculatus</i>	—	—	—	—	—	+	+	+	
<i>Bitis gabonica</i>	—	—	—	—	—	+	+	+	
<i>Bitis nasicatoris</i>	—	—	—	—	—	+	+	+	

<sup>1</sup>based on voucher specimens and observations, + = rare, ++ = moderately abundant, +++ = abundant; <sup>2</sup>based on voucher specimens and observations, elevation in meters corresponds to the major study sites; <sup>3</sup>based on Uetz et al., 2002, CE = Cameroon endemic, WA = West Africa, CA = Central Africa, SSA = Sub-Saharan Africa.

The distribution of species along an elevational gradient shows that most species are found at lower elevations (table 3). Only a few species can be considered purely montane such as *Chamaeleo pfefferi* and three skink species (*Lacertaspis rohdei*, *Leptosiaphos vigintiserierum*, *Leptosiaphos* spp.).

In a broader biogeographic context, 51 of the reptile species of Mt Nlonako can be considered West / Central African in distribution (table 3). Only two species have a pure West African distribution, of which one, *Aparallactus niger* is recorded here for the first time in Cameroon and Central Africa and had its eastern distribution border in Ivory Coast. Twenty-one are distributed in Central Africa only. Ten of the recorded species are endemic to Cameroon. Eight species, *Agama agama*, *Hemidactylus mabouia*, *Trachylepis maculilabris*, *Dasyplepis scabra*, *Lamprophis fuliginosus*, *Natriciteres olivaceus* and *N. variegata*, and *Naja melanoleuca* have a wider distribution in Sub-Saharan Africa.

Overall, Mt Nlonako is dominated by a West / Central African reptile fauna. This is supported by the relatively high coefficient of biogeographic resemblance (CBR) as demonstrated in table 2. This is different to the biogeographic relationships of the amphibian fauna which showed closer relations to the Central African amphibian fauna as compared to the west African amphibian fauna (Herrmann *et al.*, 2005). Here, the reptile faunas of the southwest Cameroonian Korup NP and the south Cameroonian Dja Faunal Reserve show a high degree of resemblance. As for snakes the CBR's exhibited by the Korup NP, the Dimonika region in Congo-Brazzaville, the Dja Faunal Reserve and Mt Nimba in West Africa indicate the highest resemblance.

The exceptional species richness and high degree of endemism in lizards of Mt Nlonako and the West Cameroonian mountain range can be explained by palaeogeographic events. Historically this area has served as a refuge during drastic climate fluctuations. During the Pleistocene circa 20,000 years ago, African wet forests were restricted to a few isolated areas (Livingstone, 1982). Those fluctuations and refuges played an important role in the evolution of the high number of (endemic) reptile species as Lawson (1993) also describes for the Korup NP.

*Osteolaemus tetraspis*, *Kinixys erosa* and *K. homeana*, all five *Chamaeleo* species, *Varanus ornatus*, *Calabaria reinhardtii* and *Python sebae* are listed in CITES appendices for which international trade is regulated. The only species listed as threatened is *Osteolaemus tetraspis* (vulnerable, IUCN 2003). Akani *et al.* (1998) provide further insight into the local trade and consumption of this species in Nigeria; the situation in Cameroon can be considered very similar. The two tortoise species *Kinixys erosa* and *homeana* are listed as data deficient by the IUCN (2003). Lawson (2000) provides data on their conservation status in Cameroon. *Osteolaemus tetraspis*, *Python sebae* and *Naja melanoleuca* are protected by Cameroonian law. Threats to the Mt Nlonako reptile fauna are (1) habitat destruction by logging in the eastern and southern parts of the area, (2) habitat destruction by human encroachment as notable on the northern and western slopes of Mt Nlonako adjacent to the town Nkongsamba and (3) the hunting and consumption as food of species like *Osteolaemus tetraspis*, the two *Kinixys* species and *Python sebae*.

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