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Amphibians and Reptiles of the Tchabal Mbabo Mountains, Adamaoua Plateau, Cameroon

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Abstract. Tchabal Mbabo is a remote mountain range in Central Cameroon which covers 79,000 ha; only three amphibian and no reptile species are listed for this area. We conducted two expeditions, in 1998 and 2000, to survey the herpetofauna. We used opportunistic visual encounter surveys and driftfence/pitfall trap arrays for sampling. Our findings increased the number of amphibian and reptile species known for the area to 15 each. We discovered one recently described new frog species (*Cardioglossa alsco*) and found an additional six species of anurans and one lizard species which could not be assigned to any described species. The deceptive endemism of amphibians for this area is remarkable. We report a range extension of 400 km and montane gallery forest as a novel habitat for the skink *Lacertaspis chriswildi*. The importance of the montane forests on the northern slopes as well as the gallery forests on the southern slopes of the mountain range are highlighted.

Keywords. Amphibia, Reptilia, Tchabal Mbabo Mtns, Adamaoua Plateau, Cameroon, faunistics, conservation.

1. INTRODUCTION

Although herpetological work in Cameroon has been recurrent during the last half century (PERRET 1959, 1960, 1961, 1966; AMIET 1971; BÖHME 1975; AMIET 1978; JOGER 1982; BÖHME & SCHNEIDER 1987; EUSKIRCHEN et al. 1999, 2000; LeBreton 1999; SCHMITZ et al. 1999, 2000; HERRMANN et al. 2000, 2005a, 2005b) large areas remain unsampled. Such an area is the Tchabal Mbabo Mtn range on the western border of the Adamoua Plateau (Fig. 1). The Tchabal Mbabo Mtns represent the last segment in the chain of mountains known as “Dorsale Camerounaise”, which extends northeasterly from the island of Bioko continuing inland with Mt. Cameroon, Mt. Kupe, the Manengouba Mtns, Mt. Lefo and Mt. Oku.

Tchabal Mbabo is a broad horseshoe-shaped mountain massif with a west-eastern orientation and altitudes of up to 2,400 m. Below 1,600 m the massif is connected to other mountains. The area above 1,600 m covers 79,000 ha with 4,900 ha of relict montane forest along the steep northern slopes (Fig. 2a and 2b) adjacent to the rim which represents the northernmost occurrence of this forest type in Cameroon (THOMAS & THOMAS 1996). The southern slopes are extensive grasslands with interspersed gallery

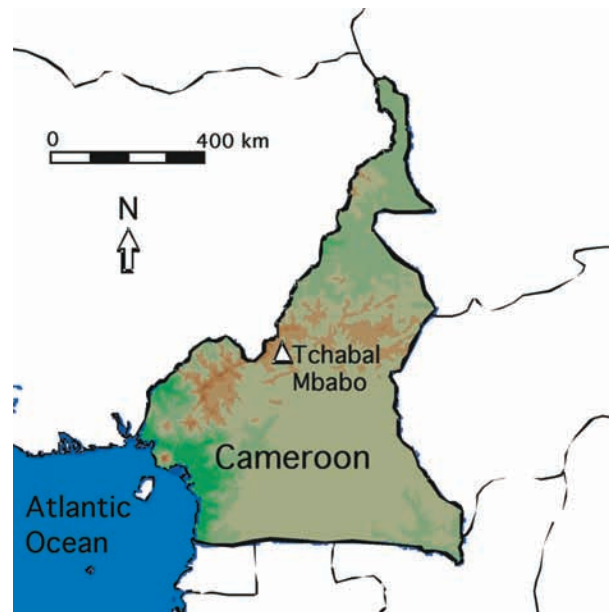


Fig. 1. Location of the Tchabal Mbabo Mtns within Cameroon.



Fig. 2. Different Tchabal Mbabo habitats: (a) northern slope near Fungoi with patches of cloud forest (ca. 2,000m elevation), (b) cloud forest along the rim (ca. 2,000 m elevation), (c) savanna and gallery forest on the southern slopes between Fungoi and Pinku peak (ca. 2,100 m elevation), (d) dry forest along Mayo Selbe (ca. 800 m elevation).

forests along creeks (Fig. 2c). The grasslands are managed by Fulani cattle herdsman and burned every year. Yearly precipitation at the southern base of the mountains is approximately 1,700 mm (THOMAS & THOMAS 1996). The dry season extends from November to February, precipitation measures < 50 mm/month; the peak rainy season extends from June to October with precipitation up to 300 mm/month. The hottest months are April and May with average daily temperatures of up to 30 °C. Annual temperatures on the plateau average 18 °C with a daily amplitude of 13–15 °C (THOMAS & THOMAS 1996).

We mounted data loggers on tree trunks (two meters height) in forests in the vicinity of Fungoi, at an elevation of circa 2,100 m, which recorded air temperature and relative humidity at one hour intervals. The climatic data for a gallery forest on the south flank is presented in Figure 3. During a data collecting period of 906 days comprising February 2000 to July 2002, the temperature ranged from 8.6 to 26.7 °C (\bar{x} = 15.4 °C). The relative humidity ranged from 13 to 100 % (\bar{x} = 81 %). Data was also collected on the north flank of the mountain at an ele-

vation of circa 2,100 m from February 2000 to May 2001 over a period of 465 days. Here the temperature ranged from 10.2 to 34.9 °C (\bar{x} = 16.2 °C) and the relative humidity ranged from <5 to 100 % (\bar{x} = 65 %). These data indicate the northern slope to be considerably warmer and drier.

The presence of a well developed montane forest ecosystem of the rare northern type and the geographical isolation of the area have led to a number of hypotheses postulating undescribed herpetological species, especially in the montane forest patches of the Tchabal Mbabo (BÖHME & KLAVER 1981; BÖHME & SCHNEIDER 1987).

Jean-Louis AMIET (Nyons, pers. comm. 2003) surveyed the area around Hama Aoudi in May 1970 and December 1972. In 1978, Amiet lists an undescribed species of *Bufo* (*B. sp. 2*, “espèce orophile du Tchabal Mbabo”) and an undescribed species of *Phrynobatrachus* (*P. sp. 5*, “espèce orophile endémique du Tchabal Mbabo”) in his “Liste provisoire des amphibiens anoures du Cameroun”. THOMAS & THOMAS (1996) report on a forthcoming herpetologi-

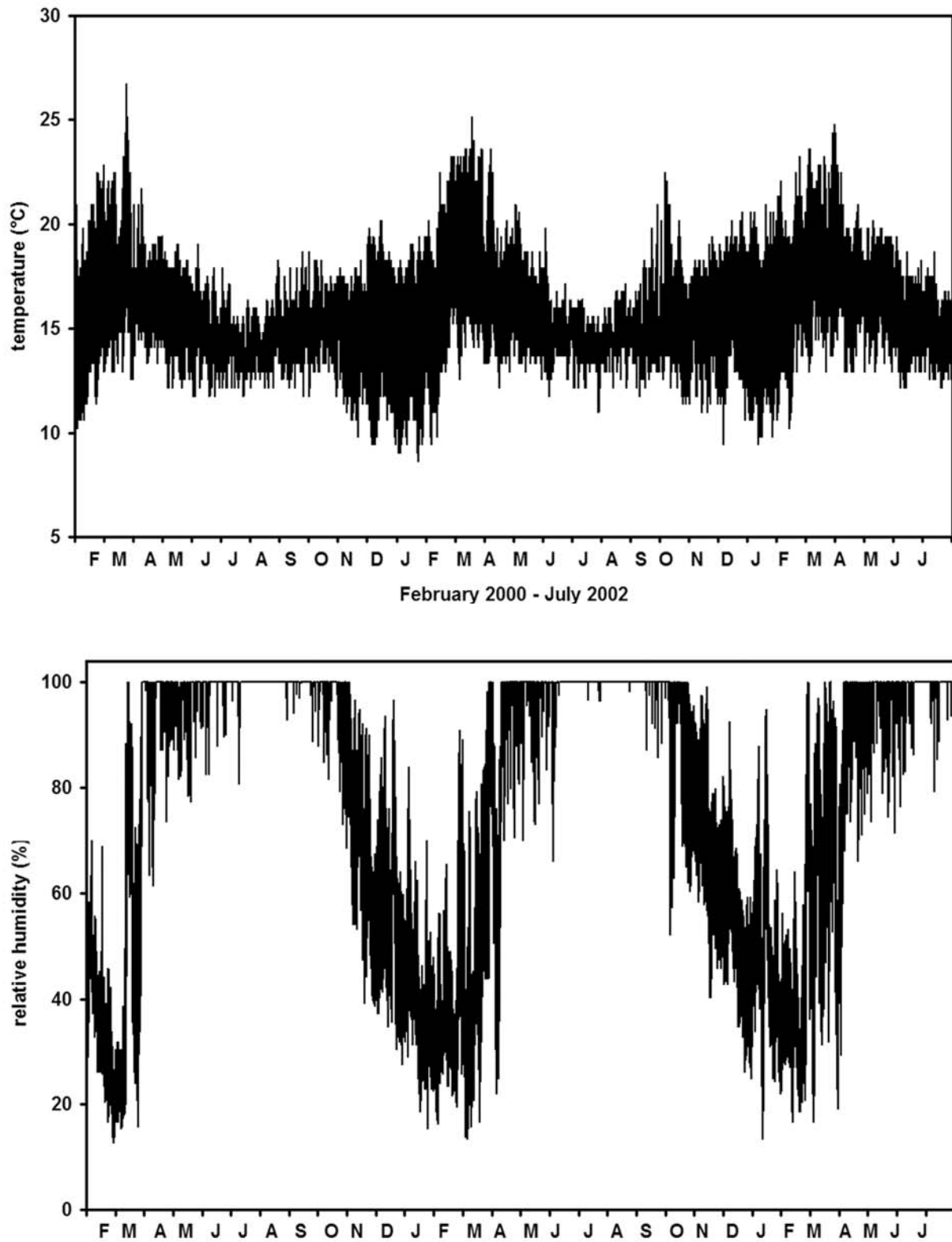


Fig. 3. Temperature in °C (a) and relative humidity in % (b) over a period of 30 months in a gallery forest in the vicinity of Fungoi on the south flank of Tchabal Mabao at an elevation of approximately 2,100 m.

cal survey by Dwight Lawson, who apparently visited the area in August 1997 (LAWSON 2000). In the literature very few amphibians and reptiles have been reported from Tchabal Mbabo: *Astylosternus rheophilus tchabalensis* Amiet, 1977, *Leptopelis nordequatorialis* Perret, 1966 (in BÖHME & SCHNEIDER 1987) and *Crotaphatrema tchabalm-baboensis* Lawson, 2000 (see LAWSON 2000).

In January / February 2000 we (H.-W.H., A.S. & P.A.H.) surveyed the herpetofauna of Tchabal Mbabo for 14 days. This period is at the end of the dry season and was chosen by need of vehicle accessibility. Accordingly, we experienced no rain which may have influenced the number of species found. Additionally, in November 1998 a two week herpetological sampling expedition was conducted by two native field assistants at the beginning of the dry season. Here we present a systematic list of the combined findings of these two expeditions.

2. RESULTS

2.1. Survey sites

We surveyed the following localities (vegetation characterization follows LETOUZEY 1968 and THOMAS & THOMAS 1996). Altitude was measured with a Global Positioning System (GPS) unit and verified with a conventional altimeter.

1. Sambolabo, 7°04'94"N, 11°59'06"E, 1,032 m elevation, southern slope, Sudano-guinean savanna with *Daniellia oliveri* and *Lophira lanceolata*, very degraded and managed as permanent pasture.
2. Mayo Kelele, 7°10'78"N, 12°01'68"E, 1,675 m elevation, southern slope, submontane wooded *Hyparrhenia* savanna, gallery forests with *Syzygium guineense*.
3. 5 km NEE of Fungoi, 7°15'11"N, 12°03'58"E, 2,060 m elevation, on crest of southern slope, montane grassland with *Sporobolus indicus* and gallery forest dominated by *Syzygium guineense*, *Ilex mitis* and *Symphonia globulifera*, northern slope with montane forest and scrub.
4. Hunter's Hut, 7°18'81"N, 12°02'83"E, 1,282 m elevation, northern slope, savanna with *Lophira alata* and *Daniella oliveri*, gallery forest diverse with many semi-deciduous species.
5. Mayo Selbe (Fig. 2d), 7°21'88"N, 12°02'58"E, 790 m elevation, for landscape and vegetation see Hunter's Hut.

6. Dodeo, 7°28'03"N, 12°04'10"E, 681 m elevation, savanna with *Isobertinia doka*, including gallery forests along flat flood plains, often with wetland prairies.

7. Sanganadje, no coordinate data, 1,000 m elevation, ca. 15 km SSE of Galim, for landscape and vegetation see Hunter's Hut.

2.2. Survey methods

Opportunistic visual encounter surveys (CRUMP & SCOTT 1994) were the predominant survey method we used. We sampled during day and night time. Additionally we installed three Y-shaped drift fence/pitfall trap arrays with 5 m long segments (CORN 1994) in the vicinity of study site 3 near Fungoi. Two arrays were situated in a gallery forest (southern slope), one close to a creek. The third array was on a steep slope in the montane forest of the northern slope of the ridge. We worked the drift fences for the full study period of two weeks in January / February 2000, with two controls of pit falls every day (morning and evening), without trapping success.

2.3. Species account

Nomenclature in the subsequent systematic list of amphibian and reptile species follows FROST (2002) for amphibians and UETZ et al. (2004) for reptiles. All voucher specimens are deposited in the Zoologisches Forschungsmuseum Alexander Koenig, Bonn (ZFMK) or in the collection of the senior author (HWH) in Cameroon. The latter specimens will be transferred to the herpetological collection of the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM).

Anura Bufonidae

Bufo maculatus Hallowell, 1854

Locality: 10 km E of Sambolabo, in village, 1 specimen, ZFMK 68945 (15.XI.–7.XII.1998).



Fig. 4. *Bufo* sp. (cf. *Bufo* sp. 2 sensu AMIET, 1978).

Bufo regularis Reuss, 1834

Localities: Sambolabo, in village, 2 specimens, ZFMK 75630 (♂, 24.I.2000), ZFMK 75730 (7.II.2000); Dodeo, in village, 1 specimen, ZFMK 75631 (♂, 2.II.2000).

Bufo sp. (cf. *Bufo* sp. 2 sensu AMIET 1978) (Fig. 4)

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 1 specimen, ZFMK 75769 (subadult, 30.I.2000).

Remarks: The specimen possesses smooth paratoid glands which are medially constricted.

Arthroleptidae

Arthroleptinae

Arthroleptis sp. (Fig. 5)

Locality: Hunter's Hut, near small creek in gallery forest, 1 specimen, ZFMK 75704 (31.I.2000).

Cardioglossa alsco Herrmann, Herrmann, Schmitz & Böhme, 2004 (HERRMANN et al. 2004)

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 73 specimens, ZFMK 75713-25, 77677-736 (11 ♂, 13 ♀, 49 subadults, 28.–29.I.2000).



Fig. 5. *Arthroleptis* sp. from small creek on northern slope at ca. 1,200 m elevation.

Astylosterninae

Astylosternus Werner, 1898

Remarks: All *Astylosternus* were strongly polymorphic and difficult to assign to any described taxon. We identified *A. rheophilus tchabalensis* based on morphology. Based on a 600 bp long segment of the 16S rRNA gene we identified two of the other polymorphic *Astylosternus* as conspecific with the latter species.

Astylosternus rheophilus tchabalensis AMIET, 1977

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 5 specimens, ZFMK 75770-4 (30.I.–5.II.2000).

Remarks: Our specimens show a remarkable polymorphism and differ from topotypic *A. r. rheophilus* of Mt Lefo (Fig. 6a and 6b).

Astylosternus sp. (Fig. 6c and 6d)

Locality: Mayo Selbe, in creek in gallery forest, 4 specimens, ZFMK 75775-8 (2./3.II.2000).

Astylosternus sp. indet.

Locality: Dodeo, in creek in gallery forest, 15 tadpoles, ZFMK 75632-42 (5.II.2000).

Leptodactylodon sp.

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 1 juvenile specimen, ZFMK 75703 (4.II.2000).

Ranidae

Raninae

Amnirana longipes (Perret, 1960)

Locality: Sanganadje, 2 specimens, ZFMK 68946-7 (15.XI.–7.XII.1998).

Ptychadena sp.

Locality: Sanganadje, 1 specimen, ZFMK 68948 (15.XI.–7.XII.1998).

Phrynobatrachus steindachneri Nieden, 1910 (Fig. 7a)

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 8 specimens, ZFMK 75705-12 (28.I.2000).

Phrynobatrachus spp. (Fig. 7b)

Locality: 5 km NEE of Fungoi, in creek in gallery forest on southern slope, 64 specimens, ZFMK 75643-702, 75726-9 (28.I./4.II.2000).

Remarks: Juvenile to subadult specimens with some probably being *P. steindachneri*. Others could not be identified.

Hyperoliidae

Hyperolius riggenbachi Nieden, 1910

Locality: Sanganadje, 8 specimens, ZFMK 68949-56 (5 ♂, 3 ♀, 15.XI.–7.XII.1998).

Squamata

Gekkonidae

Hemidactylus brooki Gray, 1845

Locality: Dodeo, 1 specimen, ZFMK 75749 (♀, 2.II.2000).

Agamidae

Agama agama (Linnaeus, 1758)

Localities: Sambolabo, 4 specimens, ZFMK 75731-34 (2 ♂, 2 ♀, 7.II.2000); Mayo Kelele, 4 specimens, ZFMK 75736-39 (2 ♂, 2 ♀, 7.II.2000).

Agama doriae benuensis Monard, 1951

Locality: Dodeo, 1 specimen, ZFMK 75748 (♀, 2.II.2000).



Fig. 6. (a) *Astylosternus rheophilus rheophilus* from Mt Lefo, (b) *Astylosternus* cf. *rheophilus* tchabalensis from near Fungoi at an elevation of ca. 2,000 m, (c) and (d) *Astylosternus* sp. from Mayo Selbe at ca. 800 m elevation.

Chamaeleonidae

Chamaeleo gracilis gracilis Hallowell, 1842

Locality: 15 km E of Sambolabo, 1 specimen, ZFMK 68942 (♀, 15.XI.–7.XII.1998).

Chamaeleo senegalensis Daudin, 1802

Locality: Dodeo, 2 specimens, ZFMK 73092, 75747 (2 ♀, 2.II.2000), Mayo Kelele, 1 specimen, HWH 1214 (♀, no date).

Chamaeleo wiedersheimi wiedersheimi Nieden, 1910

Localities: Mayo Kelele, 1 specimen, ZFMK 68943 (♂, 15.XI.–7.XII.1998), 4 specimens, ZFMK 75740-43 (3 ♂, 1 ♀, 7.II.2000), 4 specimens, HWH 1210-13 (3 ♂, 1 ♀, no date); 5 km NEE of Fungoi, in gallery forest on southern slope, 3 specimens, ZFMK 75744-46 (1 ♂, 2 ♀, 25.I.2000).

Scincidae

Lacertaspis chriswildi (Böhme & Schmitz, 1996)

Locality: 5 km NEE of Fungoi, in gallery forest on southern slope, 1 specimen, ZFMK 75735 (29.I.2000).

Trachylepis sp.

Locality: 3 km NEE of Mayo Kelele, on path in grassland, 1 juvenile specimen (25.I.2000, Fig. 8).

Remarks: This specimen persisted only as photograph and tissue voucher. We follow MAUSFELD et al. (2002) but prefer to use the genus name *Trachylepis* instead of *Euprepis* (sensu BAUER 2003). This specimen resembles juvenile *T. perrotetii* (Duméril & Bibron, 1839) but has a blue tail and shows a clear genetic differentiation from the latter species (MAUSFELD-LAFDHIYA et al. 2004). A blue tail in juveniles is otherwise only known in *T. quinquetaeniata* (Lichtenstein, 1823) which, however, has a distinctly striped body.

Varanidae

Varanus niloticus (Linnaeus, 1758)

Locality: Sambolabo, 1 specimen (head and skin), ZFMK 68930 (15.XI.–7.XII.1998).

Boidae

Python sebae (Gmelin, 1789)

Locality: Mayo Kelele, 1 specimen (Fig. 9, no date), head of a specimen caught by villagers.

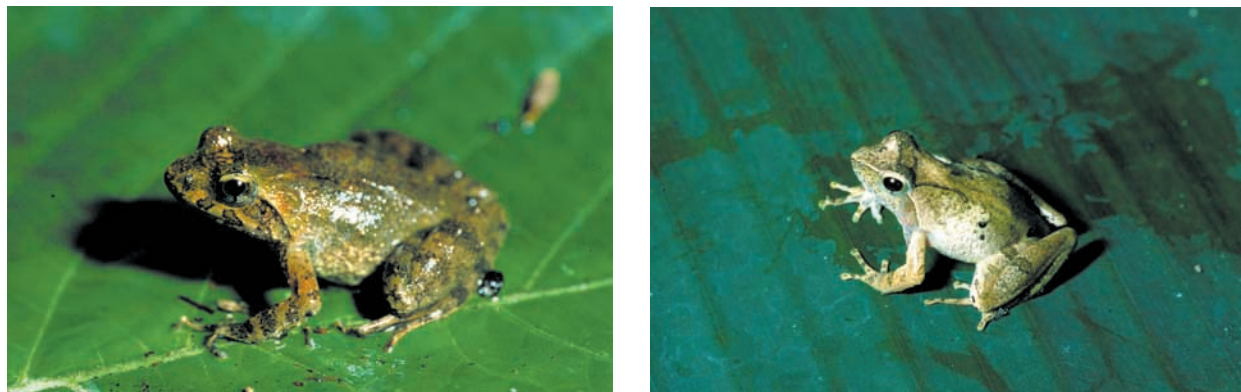


Fig. 7. (a) *Phrynobatrachus* cf. *steindachneri* from gallery forest near Fungoi at an elevation of ca. 2,000 m, (b) *P.* sp. from the same locality.



Fig. 8. Juvenile *Trachylepis* sp. from Mayo Kelele.



Fig. 9. Head of adult *Python sebae* from hunters at Mayo Kelele.

Colubridae

Philothamnus angolensis Bocage, 1882

Localities: Sangandje, 11 specimens, ZFMK 68931-41

(15.XI.–7.XII.1998); Mayo Kelele, 1 specimen (head), HWH 1218 (no date); 5 km NEE of Fungoi, in gallery forest on southern slope, 1 specimen, ZFMK 75751 (subadult, 2.II.2000).

Elapidae

Dendroaspis jamesoni jamesoni (Traill, 1843)

Locality: Dodeo, 1 specimen, ZFMK 75750 (subadult, 2.II.2000).

Naja nigricollis Reinhardt, 1843

Locality: Mayo Kelele, 1 specimen (head), HWH 1219 (no date).

Viperidae

Bitis arietans (Merrem, 1820)

Locality: 10 km E of Sambolabo, 1 specimen (head), ZFMK 68944 (15.XI.–7.XII.1998).

Causus rhombeatus (Lichtenstein, 1823)

Locality: Mayo Kelele, 3 specimens (heads), HWH 1215-17 (no date).

3. DISCUSSION

A total of 30 herpetological species (one caecilian, 14 anurans, nine lizard and six snake species) are recorded from the Tchabal Mbabo Mtns. The number of recorded amphibian species corresponds with comparable surveys in Western and Central Africa as listed in RÖDEL & AGYEI (2003). However, numbers from thoroughly surveyed savanna/forest areas in West Africa suggest amphibian species counts of at least twice of those presented here.

All species, except *Lacertaspis chriswildi*, are known as either savanna or farmbush/forest edge species and are not restricted to forests. *Astylosternus*, *Cardioglossa* or *Lep-*

todactylodon are predominately found in forests with exception of those species adapted to high elevation grasslands and gallery forests.

Lacertaspis chriswildi is known from only two specimens, the holotype which originated from the high elevation montane forest at Mt Kupe (BÖHME & SCHMITZ 1996) and one further specimen from the Takamanda lowland rainforest, both in Southwestern Cameroon. Our finding represents the first record of this species from a gallery forest within high elevation grassland. It also extends the range of the species approximately 400 km to the north-east. This suggests its occurrence in other areas along the "Dorsale Camerounaise".

The high number of taxa which could not be assigned to any described species (i.e., *Bufo* sp., *Arthroleptis* sp., *Astyloternus* sp., *Leptodactylodon* sp., *Ptychadena* sp. and *Phrynobatrachus* spp.) as well as the discovery of *Astyloternus rheophilus tchabalensis*, *Crotaphatrema tchabalmbaboensis* (LAWSON, 2000) and *Cardioglossa alsco* (HERRMANN et al. 2004) are indicative of both the paucity of knowledge on the Tchabal Mbabo herpetofauna in general and the uniqueness of the anuran fauna with its endemism in particular.

Future surveys to the Tchabal Mbabo Mtns are warranted in order to clarify the taxonomic status of specimens collected during our surveys and to gain comprehension on the extant herpetofauna. The discovery of hitherto undescribed species is likely. Due to the area's remoteness and to the traditional lifestyle of the Fulani herdsmen, no immediate threat to the herpetofauna of the area was observed. Nonetheless, efforts to preserve the unique montane forests on the northern slopes as well as the semi-deciduous and gallery forests are warranted to ensure their welfare in the future. The montane forests on the north-facing slopes are relatively secure due to their extreme topography. The gallery forests on the southern slopes however, are accessible to the Fulani cattle and are increasingly degraded by husbandry practices.

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