New records of the Togo Toad, *Sclerophrys togoensis*, from south-eastern Ivory Coast

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Abstract. Reported are new records of the forest toad, *Sclerophrys togoensis*, from south-eastern Ivory Coast. A small population was found in the rainforest of Mabi and Yaya Classified Forests. These forests and Taï National Park in the western part of the country are the only known and remaining Ivorian habitats of this species. *Sclerophrys togoensis* is confined to primary and slightly degraded rainforest. Known sites should be urgently and effectively protected from further forest loss.

Keywords. Amphibia, Anura, Bufonidae, Conservation, Distribution, Mabi/Yaya Classified Forests, Upper Guinea forest

Introduction

The toad *Sclerophrys togoensis* (Ahl, 1924) has been described from Bismarckburg in Togo (Ahl, 1924). Apart from a parasitological study (Bourgat, 1978), no recent records are known from that country (Ségniagbeto et al., 2007; Hillers et al., 2009). Further records have been published from southern Ghana (Kouamé et al., 2007; Hillers et al., 2009), western Ivory Coast (e.g. Rödel and Branch, 2002; Hillers et al., 2008), south-eastern Guinea (Guibé and Lamotte, 1958; Rödel and Bangoura, 2004; Rödel et al., 2004), and Liberia (Hillers and Rödel, 2007; Rödel and Glos, 2019). It also occurs in eastern Sierra Leone (MOR, unpubl. data), and *Sclerophrys cristiglans* (Inger and Menzies, 1961), described from the Tingi Hills in Sierra Leone (Inger and Menzies, 1961), might be a synonym of *S. togoensis* (Rödel and Bangoura, 2004). All records thus are in the forests of the Upper Guinea forest hotspot (Bakarr et al., 2004), west of the Dahomey Gap, a natural gap in the West African rainforest zone.

In Ivory Coast the known records of *S. togoensis* are from the Cavally and Haute Dodo Classified Forests (Rödel and Branch, 2002), and the Taï National Park and its surroundings (e.g. Ernst and Rödel, 2006; Hillers et al., 2008), all situated in the westernmost part of the country (Fig. 1). During a decade of conflict, both classified forests have been deforested (P.J. Adeba, pers. comm.), thus restricting the species known Ivorian range to Taï National Park. Whereas *S. togoensis* is considered Near Threatened on the IUCN red list (Rödel and Tandy, 2016), it actually has a wide range, extending from Togo to Sierra Leone. Its absence in central and eastern Ivory Coast, thus seems strange. However, several attempts to find it in areas where remaining forests still prevailed, i.e., the Banco National Park, the Yakassé-Mé village forest, and the Tanoé-Ehy swamp forests (e.g. Assemian et al., 2006; Kouamé et al., 2014; Kpan et al., 2014), so far revealed no record.

The eastern Ivorian forests are presumed to host habitats of high conservation value in terms of rare and unknown biodiversity and ecosystem services (Assemian et al., 2006; Zadou et al., 2011; Kouamé et al., 2014; Kpan et al., 2018). Unfortunately, this geographic area is known to be part of the African regions with the highest rate of deforestation (Norris et al., 2010; Mayaux et al., 2013). Thus, we decided to search for *S. togoensis* in some poorly known forests of eastern Ivory Coast.

Material and Methods

Amphibian surveys were conducted in the Mabi Classified Forest (MCF: 5.8000°–5.9833°N,
3.5167°–3.5833°W) and the Yaya Classified Forest (YCF: 5.6167°–5.8000°N, 3.5333°–3.6333°W), two neighbouring rainforests in south-eastern Ivory Coast (Fig. 1). The MCF and YCF are parts of the prefecture of Alépé, the regional capital of the La Mé region. The MCF covers an area of 59,616 ha and is adjacent to the northern part of the YCF (23,877 ha). These lowland forests have a mean annual temperature of 26°C; the mean annual precipitation is 2000 mm. A drier period extends from December to March, and is followed by a rainy season with highest precipitation between March and July. Rainfall usually is lower between August and September (Eldin, 1971). Along their eastern borders the two forest blocks are limited by the Comoé River. Further rivers draining the region are the Kossan and Yaya, two tributaries of the Comoé, and other smaller streams, i.e., Ebohoa, Foussin, N’tchibié, Abouan and Kloukro, and brooks. The MCF and YCF are mainly characterized by moist, evergreen forests on predominantly sandy soils, with vegetation typical for south-eastern Ivorian rainforests (Béligné, 1994). Both forests are bordered by a total of 10 villages: the MCF is limited in the north by villages Bettié and Biéby, in the centre by Mébifon, and in the west by Nyan, Yapokoi and Kossandji. The YCF is limited by Aboisso-Comoé, Alosso and Kloukro in the east and Mopodji in the west. Cocoa, coffee and rubber plantations as well as subsistence farming, i.e. cassava plantation associated with yams, corns and plantains, dominated large parts of this forest zone. However, both forests still comprise large parts of almost primary forests, with drier and swampy parts.

Field work was conducted in the dry season for seven days from 15 to 21 December 2017. Toads were mainly located opportunistically during visual encounter surveys, by one person (BAIG), between 9:00–17:30 GMT. The total search time amounted to 59.5 person-hours. In all available habitats, search techniques included visual scanning of the terrain and refuge examination, which consisted of lifting logs and rocks, and looking around water bodies. The geographical positions of all study sites were recorded with a hand-
held GPS receiver (Garmin etrex 20). Data for habitat characteristics including anthropogenic influence were collected as well.

After capture, toads were measured and sexed, and either kept as vouchers, or released in their respective habitats. Sex identification was based on throat colour: males have a dark, almost black throat, females’ throats are the lighter. Vouchers were euthanized in a chlorobutanol solution and thereafter preserved in 75% ethanol. Vouchers have been deposited in the working collection of NGK at the Université Jean Lorougnon Guédé in Daloa (K-MY). Diagnostic characters for identifying the toads as *Sclerophrys togoensis* were based on the description by Rödel and Bangoura (2004), and namely comprised shape of parotid glands, distribution and shape of warts, and colour pattern. Measurements of morphological characters were taken by one person (BAIG) with dial callipers (accuracy ± 0.5 mm), and are given as means with standard deviations (x̅ ± sd).

Recorded measures are given in mm and comprise snout-urostyle-length (SUL), head width at level of jaw articulation (HW), length of femur (FL), length of tibia-fibula (TL), length of foot including tarsus and longest toe (FTL), horizontal eye-diameter (ED), inter-orbital distance (IOD), distance from anterior corner of eye to nostril (EN), distance from anterior corner of the eye to tip of snout (ES), horizontal tympanum-diameter (TD), and inter-nostril distance (IND).

**Results**

In both forests a total of five toads were recorded at four sites. Four of them, i.e., K-MY001, K-MY002, K-MY003 and K-MY004 were retained as vouchers while one was released (Fig. 2; Table 1). The records comprised a juvenile at site 1 (MCF: 5.8056°N, 3.5225°W; 177 m a.s.l.), two adult males at site 2 (YCF: 5.7213°N, 3.5852°W; 91 m a.s.l.), another adult male at site 3 (MCF: 5.8116°N, 3.5358°W; 147 m a.s.l.) and

![Figure 2. Habitats of *Sclerophrys togoensis* in eastern Ivory Coast during the dry season; a = stream in a primary part of the Yaya Classified Forest; b = forest with dense leaf-litter within Mabi Classified Forest; c = forest road with water filled tire tracks in degraded forest of the Yaya Classified Forest, these puddles are not used for reproduction by *S. togoensis*; d = degraded part of the Mabi Classified Forest. Photos by N’Goran Germain Kouamé.](image-url)
The juvenile from site 1 (Fig. 3e) was found near dead wood on a small hill. The site was characterized by high canopy cover, sparse undergrowth, and dry multi-layer leaf litter covering the forest ground (Fig. 2b). Sympatric species were the gecko *Hemidactylus muriceus* Peters, 1870, and three frog species namely, *Arthroleptis poecilonotus* -complex (compare comment in Rödel and Bangoura, 2004), *Phrynobatrachus alleni* Parker, 1936, and *P. annulatus* Perret, 1966. At site 2 one male (Fig. 3a, b) was recorded in a dense forest, intersected by a small stream (Fig. 2a), while another male (Fig. 3c) was found close to a temporary pond on a forest road. The forest at that site had large gaps in the canopy (Fig. 2c). Sympatric species at this site were *A. poecilonotus* -complex, *P. alleni* and *P. plicatus* (Günther, 1858). At site 3, a male (Fig. 3d) was found in a degraded and dry part of the forest with no water bodies nearby (Fig. 2d), at the edge of an illegal plantation, cultivating plantain and cassava. Sympatric species at this site were *A. poecilonotus* -complex and the skink *Trachylepis affinis* (Gray, 1838). At site 4, a juvenile (Fig. 3f) was seen near dead wood on a forest trail. Here the vegetation comprised tall trees with a closed canopy. No water bodies were observed in this habitat and the frogs co-occurring with *S. togoensis* were only from the *A. poecilonotus* -complex.

The morphological measurements from all five *S. togoensis* are summarized in Table 1. The colour pattern of the recorded specimens was very variable (Figs. 3, 4a). The basic colouration of the back varied from brown, a somewhat dark olive brown to a reddish-brown. A narrow yellow vertebral line could be present (adults) or absent (juveniles) and usually some symmetrical pairs of blackish and/or whitish spots were present (Fig. 3). Adults had a V-shaped dark interorbital marking. The warts on flanks of adult toads varied in size, were thorny, and widely spaced. A dense area of prominent warts could be found above the angles of the mouth. The skin on the back was smooth. The parotid glands were in or almost in contact with the eyelids. The glands were straight, narrow, angular and ran parallel to the side of the body. Sometimes they were less well-defined and hard to see. The venter in adults was granular, beige to yellow (Fig. 3a).

**Discussion**

Despite its relatively wide distributional range in West Africa west of the Dahomey Gap, the known Ivorian records of *S. togoensis* were restricted to three forests in south-westernmost Ivory Coast (Rödel and Branch, 2002; Ernst and Rödel, 2006; Hillers et al., 2008). Meanwhile, as a consequence of total deforestation, two
of these forests, the Cavally and Haute Dodo Classified Forests, no longer exist (P.J. Adeba, pers. comm.), which is a worrying continuation of a development of forest loss that has been observed for many years in this region (Chatelain et al., 1996). Anuran assessments in other Ivorian forests stretching from central to south-eastern Ivory Coast have failed to detect *S. togoensis* so far; this includes Lamto Forest Reserve (Lamotte, 1967; Adeba et al., 2010), Banco National Park (Assemian et al., 2006), the village forests of Yakassé-Mé (Kouamé et al., 2014), and Tanoé-Ehy swamp forests (Kpan et al., 2014). This was particularly puzzling, as the species is known from the Ankasa National Park in south-western Ghana (Hillers et al., 2009), a region which shares a

![Figure 3. Colour pattern variation of Sclerophrys togoensis from south-eastern Ivory Coast (Yaya Classified Forest: a and b = K-MY001; c = K-MY002; Mabi Classified Forest: d = K-MY003; e = K-MY004; f = juvenile specimen, released after measurements). Photos by N’Goran Germain Kouamé.](image-url)
high faunal similarity with south-eastern Ivory Coast concerning frogs, e.g. *Astylosternus laticephalus* (Rödel et al., 2012), *Hyperolius laurenti* and *H. viridigulosus* (Schiotz, 1999). Here we close a gap in the distribution of *S. togoensis*, by adding to its known range two forests in south-eastern Ivory Coast.

In MCF and YCF, we found *S. togoensis* in a patch of a primary forest and three other sites with varying states of forest degradation (Fig. 2). Similar habitat preferences have been reported from western Ivory
Coast, Liberia and Guinea, where *S. togoensis* inhabits true primary forests as well as slightly degraded and fragmented forests (Rödel and Branch, 2002; Rödel and Bangoura, 2004; Hillers and Rödel, 2007; Hillers et al., 2008). However, the toad seems to be more common in primary forests, where it can often be found in the leaf-litter of drier parts with gravel, far from open water, or close to slow flowing forest streams, both on sandy soil and rocks (Rödel et al., 2004; Ernst and Rödel, 2006; Hillers et al., 2008; Rödel and Glos, 2019). *Sclerophrys togoensis* reproduces during the beginning of the dry season in clear, shallow forest streams (Rödel and Bangoura, 2004; MOR unpubl. data). Its tadpole has been described by Channing et al. (2012) and it has no special morphological adaptations to running water.

In primary forests *S. togoensis* may only overlap with two other forest toads, namely *S. taeniensis*, which is small and has an almost spiny appearance (Rödel and Ernst, 2000), and *S. superciliaris chevalieri*, which is considerably larger and has smooth skin (Barej et al., 2011). In contrast, in degraded forests and at forest edges *S. togoensis* may be confused with the widespread species *S. maculata* and *S. regularis* (Rödel and Bangoura, 2004). However, although *S. togoensis* may have very variable colour pattern, skin structure and parotid shape allows for easy identification of these toad species (Fig. 4).

The size of *S. togoensis* males from the MCF and YCF exceeded the known size of males from the Cavally and Haute Dodo Classified Forests, as well as from Pic de Fon Classified Forest (Rödel and Branch, 2002; Rödel and Bangoura, 2004). However, otherwise our toads fit within the morphology and colour pattern as e.g. described by Rödel and Bangoura (2004).

The new records in eastern Ivory Coast are a promising sign that more interesting species could be expected in the so far under-sampled forests of that region. The five *S. togoensis* specimens may hint that the species is more widespread in eastern Ivory Coast. Unfortunately, this area is highly threatened by logging, shifting agriculture and conversion of forests into plantations (Norris et al., 2010; Mayaux et al., 2013; Kouamé et al., 2014). Furthermore, requests for new agricultural land do not decline and it has been announced that further forests will be destroyed to promote social housing and other development in the years to come (Bible, 2013). Currently, *S. togoensis* is classified as Near Threatened (Rödel and Tandy, 2016). However, within Ivory Coast *S. togoensis* has only three known occurrences, the Tai National Park, MCF and YCF. Nationally it should thus be considered Endangered. A more in-depth study of the population sizes, population genetics and the microhabitat preferences of this species and protection of its habitats is urgently needed. Field work in the wet season may provide further useful data.

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References


Chatelain, C., Gautier, L., Spichiger, R. (1996): A recent history of...


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