zoosystema

2024 • 46 • 25

Amphibians of Togo: taxonomy, distribution and conservation status

Gabriel Hoinsoudé SEGNIAGBETO, Annemarie OHLER, Mark-Oliver RÖDEL, Luca LUISELLI & Alain DUBOIS

art. 46 (25) — Published on 8 October 2024
www.zoosystema.com

PUBLICATIONS SCIENTIFIQUES

MUSÉUM NAL HIST NATURELLE

Couverture / *Cover* :

Representatives of anuran species from Togo in life: *Hyperolius torrentis* Schiøtz, 1967.

Zoosystema est indexé dans / Zoosystema *is indexed in:*
– Science Citation Index Expanded (SciSearch®)
– ISI Alerting Services®
– Current Contents® / Agriculture, Biology, and Environmental Sciences®
– Scopus®

Zoosystema est distribué en version électronique par / Zoosystema *is distributed electronically by:*
– BioOne® (http://www.bioone.org)

Les articles ainsi que les nouveautés nomenclaturales publiés dans *Zoosystema* sont référencés par / *Articles and nomenclatural novelties published in* Zoosystema *are referenced by:*
– ZooBank® (http://zoobank.org)

Zoosystema est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris / **Zoosystema** *is a fast track journal published by the Museum Science Press, Paris*

Les Publications scientifiques du Muséum publient aussi / *The Museum Science Press also publish:*
Adansonia, ***Geodiversitas***, ***Anthropozoologica***, ***European Journal of Taxonomy***, ***Naturae***, ***Cryptogamie*** **sous-sections** ***Algologie***, ***Bryologie***, ***Mycologie***, ***Comptes Rendus Palevol.***

Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél. : 33 (0)1 40 79 48 05 / Fax : 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / https://sciencepress.mnhn.fr

ISSN (imprimé / *print*) : 1280-9551/ ISSN (électronique / *electronic*) : 1638-9387

Amphibians of Togo: taxonomy, distribution and conservation status

Gabriel Hoinsoudé SEGNIAGBETO
Laboratory of Ecology and Ecotoxicology, Faculty of Sciences, University of Lomé,
BP 6057 Lomé, Togo, BP 1515, Lomé (Togo)
and Institute for Development, Ecology, Conservation and Cooperation, Rome (Italy)
gsegniagbeto@gmail.com (corresponding author)

Annemarie OHLER
Institut de Systématique, Évolution, Biodiversité (ISYEB), Muséum national d'Histoire naturelle,
CNRS, Sorbonne Université, EPHE-PSL, Université des Antilles,
57 rue Cuvier, CP 30, F-75005, Paris (France)
annemarie.ohler@mnhn.fr

Mark-Oliver RÖDEL
Museum für Naturkunde – Leibniz Institute for Evolution and Biodiversity Science,
Invalidenstraße 43, 10115 Berlin (Germany)
mo.roedel@mfn.berlin

Luca LUISELLI
Laboratory of Ecology and Ecotoxicology, Faculty of Sciences, University of Lomé,
BP 6057 Lomé, Togo, BP 1515, Lomé (Togo)
and Institute for Development, Ecology, Conservation and Cooperation, Rome (Italy)
l.luiselli@ideccngo.org, lucamaria.luiselli@uniroma3.it

Alain DUBOIS
Institut de Systématique, Évolution, Biodiversité (ISYEB),Muséum national d'Histoire naturelle,
CNRS, Sorbonne Université, EPHE-PSL, Université des Antilles,
57 rue Cuvier, CP 30, F-75005, Paris (France)
alain.dubois@mnhn.fr

Submitted on 16 August 2023 | Accepted on 19 February 2024 | Published on 8 October 2024

urn:lsid:zoobank.org:pub:D4AC1F89-AC34-43C4-9761-3F2015A02265

Segniagbeto G. H., Ohler A., Rödel M.-O., Luiselli L. & Dubois A. 2024. — Amphibians of Togo: taxonomy, distribution and conservation status. *Zoosystema* 46 (25): 631-670. https://doi.org/10.5252/zoosystema2024v46a25. http://zoosystema.com/46/25

ABSTRACT
In 2007, a commented list of the amphibians of Togo, elaborated from the available literature, reported 49 species for the country. On the basis of that first paper, we herein add further museum vouchers and field data, and report the presence of 50 amphibian species in Togo. Three species are removed from the former list: *Phrynobatrachus* sp. aff. *calcaratus* (*sensu* Rödel & Agyei, 2003), *Ptychadena longirostris* (Peters, 1870) and *Ptychadena tournieri* (Guibé & Lamotte, 1955). Four species are added: *Hyperolius laticeps* Ahl, 1931, *Kassina schioetzi* Rödel, Grafe, Rudolf & Ernst, 2002, *Ptychadena arnei*

KEY WORDS
Anura,
faunal list,
ecological zones,
conservation,
Dahomey Gap.

Perret, 1997 and *Geotrypetes seraphini* (Duméril, 1859). Several other species, with a wide distribution in West Africa, still need to be confirmed for the country. The taxonomic and conservation status of the amphibian species is discussed, together with the impact of the current forest degradation. Meanwhile, notable species such as *Sclerophrys togoensis* (Ahl, 1924), *Conraua derooi* Hulselmans, 1972 and *Aubria subsigillata* (Duméril, 1856) and their respective stream and forest habitats are in an urgent need of conservation measures.

RÉSUMÉ
Amphibiens du Togo : taxonomie, distribution et statut de conservation.
En 2007, une liste commentée des amphibiens du Togo, élaborée à partir de la littérature disponible, faisait état de 49 espèces pour le pays. Sur la base de ce premier article, nous ajoutons ici des spécimens de musées et des données de terrain, et rapportons la présence de 50 espèces d'amphibiens au Togo. Trois espèces sont retirées de la liste précédente : *Phrynobatrachus* sp. aff. *calcaratus* (*sensu* Rödel & Agyei, 2003), *Ptychadena longirostris* (Peters, 1870) et *Ptychadena tournieri* (Guibé & Lamotte, 1955). Quatre espèces sont ajoutées : *Hyperolius laticeps* Ahl, 1931, *Kassina schioetzi* Rödel, Grafe, Rudolf & Ernst, 2002, *Ptychadena arnei* Perret, 1997 et *Geotrypetes seraphini* (Duméril, 1859). Plusieurs autres espèces, avec une large distribution en Afrique de l'Ouest, doivent encore être confirmées pour le pays. Le statut taxonomique et de conservation des espèces d'amphibiens est discuté, de même que l'impact de la dégradation actuelle des forêts. Quoi qu'il en soit, des espèces notables telles que *Sclerophrys togoensis* (Ahl, 1924), *Conraua derooi* Hulselmans, 1972 et *Aubria subsigillata* (Duméril, 1856) et leurs habitats forestiers et fluviaux respectifs ont un besoin urgent de mesures de conservation.

MOTS CLÉS
Anura,
liste faunistique,
zones écologiques,
conservation,
Dahomey Gap.

INTRODUCTION

Amphibians are a species-rich group of vertebrates, especially in tropical forest ecosystems (Stuart *et al.* 2004; Pyron & Wiens 2013). As predators of invertebrates and prey to various vertebrates (reptiles, birds and mammals), they play a fundamental role in various ecosystems (Channing 2001; Hocking & Babbitt 2014). Due to the habitat specificity of most species, they are also precious witnesses to the geological history of a region, reflected by their phylogeography, as well as to anthropogenic impact on landscapes by man (Zeisset & Beebee 2008; Blackburn *et al.* 2020; Cordier *et al.* 2021). On the short term, amphibians sensitively indicate ecosystem changes, as has been highlighted in the last two decades (Kiesecker *et al.* 2001). For instance, abundant literature has shown that amphibians of tropical forest ecosystems are highly sensitive to habitat degradation (Wake 1991; Blaustein *et al.* 1994; Ernst & Rödel 2005, 2006; Adum *et al.* 2013; Catenazzi 2015). Faunal inventories in West African areas revealed that many amphibian species only occur in pristine or near-pristine forests (Hillers *et al.* 2008; Adum *et al.* 2013; Ofori-Boateng *et al.* 2013). Thus, these forest taxa could be used as flagship species for conservation programs in West African countries.

Despite the important ecological role of amphibians for many terrestrial ecosystems, this group is still poorly documented in this region. This also applies to Togo, although Togolese amphibians were study subjects since the German colonisation period (1884-1918), when several species have been described from Togo forested areas: *Arthroleptis brevipes* Ahl, 1924, *Sclerophrys togoensis* (Ahl, 1924), *Hyperolius baumanni* Ahl, 1931 and *Werneria africana* (Werner, 1898).

In order to document the amphibian species of Togo, we have undertaken amphibian surveys in different ecoregions during the last 10 years. These surveys aimed particularly at improving our knowledge on the forest species (*Sclerophrys togoensis*, *Hyperolius torrentis* Schiøtz, 1967, *Hyperolius sylvaticus* Schiøtz, 1967 and *Conraua derooi* Hulselmans, 1972), and more specifically *Arthroleptis brevipes* and *Werneria africana.*

In the present paper, we broaden and update the checklist of amphibian species of Togo of Segniagbeto *et al.* (2007), based on voucher specimen data from some European natural history museum collections, and further own field records collected from 2006 to 2019. We provide commented specimen lists for each species from its Togolese range.

GEOGRAPHY, CLIMATE AND ECOLOGY

Togo is a narrow, elongated country bordering the Gulf of Guinea, West Africa. It is situated between 6 and 11° northern latitude, and 0 and 2° eastern longitude (Fig. 1). It extends over 660 km from North to South, the maximum East-West extension is 120 km, and only 56 km on the coast (PNAE 2002). The landscape of Togo is largely a gently undulating plain (Affaton 1990; Taïrou 1995; Agbossoumonde 1998) crossed in a Northeast-Southwest direction by the Atakora Range. Some summits reach over 900 meters in the southern part of the range. Peneplains between 100 and 400 m above sea level are found throughout the country. From these peneplains rise tablelands such as the Dapaong Plateau and the Bombouaka Plateau, both consisting of cuesta landscapes which reach 500 meters on their northern edge. The Bassar

Plateau is largely dominated by Voltaian sedimentary geologic shale beds. The Kante Hills are composed of schists of the structural elements of the Atakora Range and, in their southernmost part, by the Akposso-Akebou Plateau. The Togolese hydrography is mainly determined by the basin of the Oti River and its tributaries (Keran, Kara, Assoukoko rivers, etc.), which altogether cover nearly 45% of the northern part of the country. Other important hydrological areas are the Mono Basin (21 300 km²) in the Center and South of the country, and the Zio and Haho basins in the South.

Two kinds of winds predominate in Togo. The dry, hot north-eastern trade winds ("alizés") known as the Harmattan, and the wet and warm trade winds locally known as the Monsoon ("Mousson"). These winds define two main tropical climatic regimes, the North with one rainy and one dry season (Sudanian climate), and the South with a large and a short rainy season and two dry seasons (Guinean climate). Between these two main climatic regions, a transitional area in the centre of Togo comprises a single rainy season with a slight decrease in rainfall in August or September.

Along this climatic gradient, Togo comprises, from North to South, a succession of five major ecological zones (EZ) (Ern 1979; Fig. 1): EZ I, the zone of Sudan savannahs where leguminous plants of the families Mimosoideae DC., 1825 (*Acacia* spp.) and Combretaceae R.Br., 1810 (*Terminalia* spp., *Combretum* spp.) dominate; dry forests with *Anogeissus* (DC., 1828), gallery forests and grasslands around temporary or permanent ponds are important amphibian habitats (Fig. 2A, B); EZ II, a zone of hills covered in part with wooded savannah, dense dry and open forests (Fig. 2C); EZ III, an area with Guinean savannahs and dry forest, characterised by a relatively rich flora in which Combretaceae and Andropogoneae Dumort., 1824 dominate (Fig. 2D); EZ IV, a wet tropical area, that was originally largely covered with true tropical wet forests, or semi-deciduous forests (Fig. 2E, F). This type of forest ecosystem is mostly located in the Badou and Adele areas and some parts of the Fazao Malfakassa National Park (in the north of zone IV), and the Dany Mountain area, as well as the Kloto and Agou areas (in the south of IV). In this zone many waterfalls are characteristic habitats of specific torrenticolous amphibian species. Finally, the ecological zone V is restricted to the littoral area. This is nowadays a strongly disturbed landscape of littoral bushes, halophilous, or marshy grasslands and mangroves (Fig. 2G, H). We will refer to these five zones as EZ I-V throughout the text.

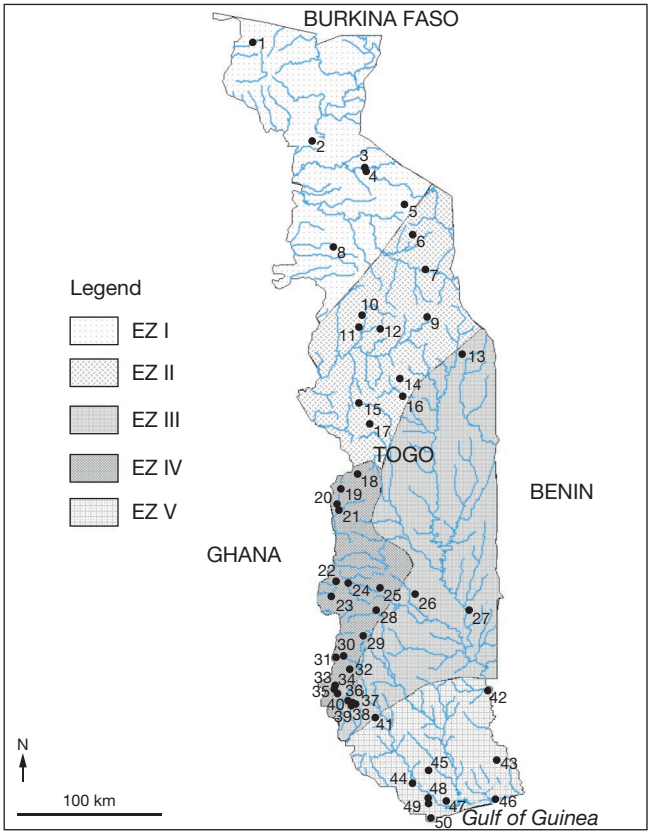

Fig. 1. — Collecting sites; for definitions of the five ecological zones, see text. For the locality data, see Table 1. Abbreviation: **EZ**, ecological zone.

MATERIAL AND METHODS

Field surveys

From 2006 to 2019, 14 amphibian field surveys were conducted in different localities all across Togo. Field surveys mostly focused on the ecological zones II and IV, but the three others ecological zones were studied as well (Fig. 1). All localities cited in this work are indicated by numbers in Figure 1; their geographic positions are summarised in Table 1.

The surveys were conducted with the support of local guides, during day and night, by up to five people. Searching techniques included visual scanning of the terrain and investigation of potential hiding places, or very specific habitats (e.g. small rivers and waterfalls; see also Heyer *et al.* 1994; Rödel & Ernst 2004). In particular, we patrolled along streams in the forests and visited ponds in the savannah. However, others suitable amphibian habitats were considered as well, i.e., gallery forests, dry forests, open forests, wooded savannahs, flooded savannahs, etc. Some species were also searched and recorded using acoustics (male advertisement calls). Finally, pitfall traps were installed at several study sites (Missahohé, Akloa, Diguengué). We took notes of important habitat data connected to the encountered amphibians, i.e., kind of breeding water, type of vegetation, hiding places and calling sites.

For those characters, that are quickly vanishing in preservation, observations were made in the field from live specimens. This concerns in particular colouration of skin and iris, pupil shape and skin structure.

Animals were euthanized in a chloroform solution. Once dead, the ventral parts of thighs were opened, and a piece of muscle was extracted. These tissue samples were then stored in 98% ethanol without denaturants. Specimens were first fixed in 4% formalin solution and later transferred to 75% ethanol for permanent storage. All collected specimens were attributed individual labels either as GHS-W (Gabriel Hoinsoude Segniagbeto) complemented by a serial number,

TABLE 1. — List of sampling localities with the respective ecological zone (see text), locality number (No. as in Figure 1) and their geographic position.

Localities	Ecological zone	No.	Latitude	Longitude
Nanergou	I	1	10°54'15.44"N	00°08'54.81"E
Mango	I	2	10°21'33.00"N	00°28'15.00"E
N'Gambi	I	3	10°12'29.30"N	00°47'19.20"E
Koumoungou	I	4	10°09'47.00"N	00°49'20.40"E
Kanté	II	5	09°56'44.76"N	01°03'05.84"E
Niamtougou	I	6	09°45'54.43"N	01°06'50.62"E
Kara	II	7	09°32'44.80"N	01°11'21.46"E
Guérin Kuka	II	8	09°41'03.80"N	00°36'47.48"E
Alédjo	II	9	09°15'00.17"N	01°12'03.88"E
Bassar	II	10	09°15'39.46"N	00°47'20.83"E
Binaparba	II	11	09°14'10.69"N	00°46'13.63"E
Bounako	II	12	09°11'01.13"N	00°54'01.61"E
Tchamba	III	13	09°00'58.05"N	01°25'01.14"E
Kalaré	II	14	08°53'56.59"N	00°57'49.41"E
Fazao	II	15	08°40'35.72"N	00°32'13.04"E
Aou Losso	III	16	08°44'57.96"N	01°02'58.70"E
Kpeisolongo	II	17	08°34'41.02"N	00°51'24.35"E
Koui	II	18	08°14'48.80"N	00°41'58.38"E
Yégué (Bismarkburg)	IV	19	08°10'58.80"N	00°38'60.00"E
Diguengué	IV	20	08°04'59.89"N	00°38'04.21"E
Assoukoko	IV	21	08°00'39.34"N	00°41'14.83"E
Badou	IV	22	07°35'48.95"N	00°37'33.71"E
Akloa	IV	23	07°30'23.00"N	00°35'58.40"E
Dobadié	IV	24	07°35'40.59"N	00°41'55.14"E
Oga	IV	25	07°36'15.14"N	00°49'20.96"E
Atakpamé	IV	26	07°31'28.17"N	01°07'27.47"E
Nangbéto	III	27	07°22'29.35"N	01°24'05.40"E
Sodo Zion	IV	28	07°19'57.20"N	00°50'29.40"E
Agoté	IV	29	07°15'22.48"N	00°47'39.89"E
Danyi Atigba	IV	30	07°12'08.29"N	00°41'03.87"E
Yikpa-Dzigbe	IV	31	07°07'28.62"N	00°37'33.23"E
Kpele Beme	IV	32	07°05'04.79"N	00°42'12.65"E
Kouma-Tokpli	IV	33	06°57'12.10"N	00°34'43.40"E
Missahohé	IV	34	06°56'60.00"N	00°34'58.80"E
Yo (Agomé Yo)	IV	35	06°56'38.00"N	00°35'50.10"E
Kpalimé	IV	36	06°54'08.16"N	00°37'57.23"E
Agou	IV	37	06°50'54.40"N	00°43'35.89"E
Gadjagan	IV	38	06°49'46.44"N	00°46'01.08"E
Klonou	IV	39	06°49'59.00"N	00°40'59.00"E
Tové	IV	40	06°48'36.70"N	00°38'24.24"E
Séva	IV	41	06°45'00.00"N	00°52'59.00"E
Adjarala	V	42	06°54'04.19"N	01°36'24.05"E
Afagnan	V	43	06°29'18.30"N	01°38'06.99"E
Kovié	V	44	06°20'51.06"N	01°09'20.23"E
Tsévié	V	45	06°25'11.18"N	01°12'39.49"E
Aného	V	46	06°14'42.58"N	01°37'05.99"E
Djagblé	V	47	06°14'39.38"N	01°18'25.60"E
Togblekopé	V	48	06°15'40.52"N	01°13'08.67"E
Agoé	V	49	06°12'53.76"N	01°12'38.19"E
Lomé	V	50	06°07'35.70"N	01°13'40.22"E

or as W and serial numbers, a field code provided by the Muséum national d'Histoire naturelle, Paris (MNHN). Some of these specimens were deposited in zoological museums in Europe (MNHN; ZBM, Berlin; and MRAC, Tervuren). In the latter cases, these specimens are herein referred with their respective accession numbers.

MUSEUM COLLECTION AND SPECIES IDENTIFICATION

In addition to the field records, we also investigated Togolese vouchers from museum collections, particularly those collected during the German colonial period, deposited in ZMB. In order to add further records and confirm the taxonomic status of some species, we further investigated material deposited in MNHN (Reptiles et Amphibiens) and MRAC.

MORPHOLOGICAL CHARACTERS

In this work, we present only a summary of the most essential morphological characters (for more in-detail data we refer to the original species descriptions and the books and monographs by Schiøtz [1967, 1999], Rödel [2000] and Channing & Rödel [2019]). Measurements were taken with a mechanical calliper (accuracy ± 0.1 mm). For measurements below 5 mm, we used an ocular micrometre on a dissecting microscope (accuracy ± 0.01 mm). The morphometric characters used in the species description were derived from Ohler (1996) and Veith *et al.* (2001). We measured 896 anurans and 24 caecilians.

The morphological and morphometric data given in the present study are based only on specimens from Togo. However, to confirm the taxonomic status of some of the species,

Fig. 2. — Some Togolese ecosystems: **A**, shrubby savannah in Oti-Kéran National Park in rainy season (near Gando, EZ I); **B**, shrubby savannah in Oti-Kéran National Park in dry season (Naboulgou, Otikera National Park, EZ I); **C**, wooded savannah in Fazao Malfakassa National Park (EZ II); **D**, dense dry forest in Alibi Community forest (EZ III); **E**, semi-deciduous forest in Akloa (EZ IV); **F**, semi-deciduous forest in a valley, surrounded by montane grassy savannah in Yikpa-Dzigbe (EZ IV); **G**, dense semi-deciduous forest in the Dévé area in Togodo National Park (EZ V); **H**, meadows and Mangroves (EZ V).

additional specimens were examined. These specimens are also listed in the present study. Species identification was mainly based on the publications by Schiøtz (1967, 1999), Rödel (2000) and Channing & Rödel (2019).

Data analysis

To compare the amphibian species composition between the different eco-zones, we calculated distances between assemblages, using species presence/absence data. Euclidean

distance was chosen as similarity measure, and a dendrogram constructed, applying the Ward method. In our case, clusters were joined to minimize increase in within-group variance, thus clarifying the observed patterns. Group selection was based on 40 bootstraps as branching measurements. The percentage of replicates where each node was still supported was given on the dendrogram. Dendrogram analysis was performed with SPSS.16 statistical software (Bow 1984; Hammer & Harper 2012).

Classification

For the generic and familial taxonomy and nomenclature of amphibians, we here follow the recent update of Dubois *et al.* (2021) and *Amphibian Species of the World* (ASW; Frost 2023). The scientific names of species follow Channing & Rödel (2019) and recent literature cited in the "Remark" sections. We do not use "common" names, as for most taxa these are from scientists created names in English, sometimes with quite numerous non-regulated synonyms. Such names are not better understandable for the potential local users than scientific names and introduce ambiguities which should be avoided in a scientific work, in particular if it should be used for conservation issues.

Abbreviations

Institutions

MNHN	Muséum national d'Histoire naturelle, Paris;
MRAC	Musée royal de l'Afrique centrale, Tervuren;
ZBM	Museum für Naturkunde, Berlin.

Mesurements

HL	distance from back of mandible to end of snout;
HW	head width, at jaw joint;
SVL	distance from snout to anus;
TL	length of the tibia;
TYD	largest diameter of the tympanum;
TYE	distance between the anterior edge of the tympanum and the posterior edge of the eye.

Other abbreviations

ASW	Amphibian Species of the World;
Coll. GHS	Gabriel Hoinsoude Segniagbeto collection.

RESULTS

Order ANURA Duméril, 1805
Family Arthroleptidae Mivart, 1869
Subfamily Arthroleptinae Mivart, 1869
Genus *Arthroleptis* Smith, 1849

Arthroleptis brevipes Ahl, 1924

Remark

This species is only known from the holotype (ZMB 26978). It had been collected in Bismarkburg (Adele area), in the forest area of Togo. Up to now, no additional specimens were collected in Togo despite numerous field survey conducted around the type locality. According to Rödel *et al.* (2005), *A. brevipes* is a valid species, larger (SVL 30.8 mm) than most of the Volta frogs of this genus seen by Rödel & Agyei (2003). Its most conspicuous character is the extremely short hind legs, thighs reaching less than 34% and lower legs less than 37% of body length (Channing & Rödel 2019). We collected numerous *Athroleptis* that we attribute all to *Arthroleptis poecilonotus* Peters, 1863 (see below). Recently a photo of a presumed *A. brevipes* has been published from the Ghanaian Atewa region by Channing & Rödel (2019).

Arthroleptis poecilonotus Peters, 1863
(Fig. 3A-D)

Material examined. — **Togo** • 10 ♂, 8 ♀; Missahohé; MNHN-RA-2008.0131, MNHN-RA-2008.2008.0132, MNHN-RA-2008.0134-0138, MNHN-RA-2008.0141-0143, ZMB 26981-26982, ZMB 26982a-d, ZMB 26982g, ZMB 26982i • 1 ♂; Yégué; Coll. GHS-W 0669 • 3 ♂; Yo (Agomé Yo); Coll. GHS-W 0648, Coll. GHS-W 0666, Coll. GHS-W 0681 • 1 ♂; Kovié; MNHN-RA-1993.6099 • 1 ♀; Lomé; MNHN-RA-1994.4472 • 1 ♀; Koui; MNHN-RA-2008.0139, MNHN-RA-2008.0140 • 1 ♀; Oga; MNHN-RA-2008.0130.

Description. — Frog of small body size (SVL 18.3-24.4 mm ♂, 23-25.9 mm ♀), with relatively slender body. Snout pointed. Head slightly longer than large (HW 30-38% SVL; HL 31-41% SVL). Tympanum distinct (TYD 3-7% SVL). Tibia short (TL 39-45% SVL). Webbing absent, all phalanges free. Skin essentially smooth on the back and above the head, and slightly granular on the posterior part of the back and flanks. Black dot posterior to tympanum.

Colouration. — This species exhibits a wide range of colouration patterns within all populations investigated. The most common colour variants are figured in Channing & Rödel (2019). Examples are:
1) A brownish back colour with a marked whitish or yellowish vertebral line from snout to vent. A few rare black spots on dorsal sides of thighs and legs. Upper edge of loreal region, orbit and tympanic region with an irregularly shaped black band (Fig. 3A).
2) A medium or dark brown colouration, with irregularly shaped darker spots along back. Flanks with irregularly shaped whitish spots. Dorsal part of legs and thighs brown with irregularly shaped and transverse spots. A yellow or whitish vertebral line present (Fig. 3B).
3) A distinct light vertebral line. Back with a dark band, much wider in the orbital region, and ending at vent; band starting from snout separating in two dorsolateral bands at the orbital region and ending in the inguinal region. Flanks whitish with some dark spots (Fig. 3C).
4) A wide yellowish or whitish band covering the entire back from snout to vent, with the vertebral line marked. This colouration also present at the heels. Flanks, dorsal part of thigh and legs black or dark brown (Fig. 3D).
In all specimens, the throat is dark and the belly whitish. The ventral parts of the thigh and leg are whitish to transparent.

Sexual dimorphism. — Males have a dark, almost purple single subgular vocal sac. Female oviducts are often visible, with the large yellow oocytes shining through the inguinal skin.

Habitats and distribution. — This species is more common in the forest area, although it occurs also in moist and heavily vegetated parts of all savannah ecosystems throughout the country. In the latter ecosystems, it lives in particular in gallery forest and woodlands. *Arthroleptis poecilonotus* is a common species in the West African gallery forests, in moist savannah and rainforest (Lamotte 1967a; Rödel 2000; Channing & Rödel 2019). It was reported from Togo

FIG. 3. — Representatives of anuran species from Togo in life: **A-D**, different colour morphs of *Arthroleptis poecilonotus* Peters, 1863 complex: **A**, (Akloa); **B**, (Alédjo); **C**, (Akloa); **D**, (Diguendue); **E**, *Leptopelis spiritusnoctis* Rödel, 2007 (Kouma Tokpli); **F**, *Leptopelis viridis* (Günther, 1869) (Siou).

by Bourgat (1979), Segniagbeto *et al.* (2007) and Hillers *et al.* (2009). It was recently recorded by Segniagbeto *et al.* (2022) along the Mono river between Tetetou and Nagbeto dam.

TAXONOMIC REMARKS. — The taxononmy of *A. poecilonotus* needs revision including specimens over all its rather large range (Lamotte 1967a; Rödel & Agyei 2003; Rödel & Bangoura 2004; Rödel *et al.* 2005; Leaché *et al.* 2006; Frétey 2008). Remarkably, it has a rather precise onymotope (type-locality), "holländische Besitzungen (Boutry) an der Küste von Guinea" [Dutch possessions (Boutry) on the coast of Guinea], now Boutre, a place in Ahanta West district, Western Region, Ghana. During field work, specimens of various shapes and colours were collected (see above). The same observations were made on specimens collected in the Atakora chain in northern Benin (Nago *et al.* 2006). Rödel & Bangoura (2004) already mentioned that species identification is difficult, as intra-specific variation exceeds inter-specific variation in many populations and the characters of the types of various West African *Arthroleptis* species do not allow identification (M.-O. Rödel, unpubl. data). Rödel & Bangoura (2004) also discussed the available names for West African *Arthroleptis* species. Genetic differences between populations with clear acoustic differences are minimal (M.-O. Rödel, unpubl. data). Thus, apart from the short-legged *A. brevipes* (see above) and the more recently described, much larger, *A. krokosua* (Ernst, Agyei & Rödel, 2008), all *Arthroleptis* from the eastern upper Guinea forest zone (eastern Côte d'Ivoire to western Nigeria) should be called *A. poecilonotus*. Records from beyond West Africa, published as *A. poecilonotus*, belong to different species (Blackburn 2008, 2010; Channing & Rödel 2019).

Subfamily LEPTOPELINAE Laurent, 1972
Genus *Leptopelis* Günther, 1859

Leptopelis bufonides Schiøtz, 1967

REMARK

First described from Ghana, *Leptopelis bufonides* is recorded from Togo by Bourgat (1979), who reported having dissected five Togolese specimens as part of his work on amphibian trematodes. He did not specify the precise localities of the specimens. According to Schiøtz (1967) and Rödel (2000), this species is characteristic of open savannahs. The presence of this species in northern Togo is very likely and congruent with the ecological characteristics of its habitat. It has been reported from Burkina Faso (Schiøtz 1967; Ayoro *et al.* 2020), Ghana, Nigeria (Schiøtz 1967) and Benin (Nago *et al.* 2006).

Leptopelis spiritusnoctis Rödel, 2007
(Fig. 3E)

MATERIAL EXAMINED. — **Togo** • 2 ♂; Akloa; MNHN-RA-2008.0118; Coll. GHS-W 0670 • 2 ♂; 1 ♀; Fazao; MNHN-RA-2008.0120, MNHN-RA-2008.0122, MNHN-RA-2008.0124 • 1 ♂; Oga; MNHN-RA-2008.0119 • 1 ♂; Yégué; Coll. GHS-W 0642 • 1 ♀; Alédjo; MRAC 73.9.B.372 • 2 ♀; Kouma-Tokpli; MNHN-RA-2008.0121, MNHN-RA-2008.0123.

DESCRIPTION. — Tree frog of medium size (SVL 32.5-36.5 ♂ mm, 38.5-45.5 mm ♀), with a fairly robust elongated body. Snout rounded and oval. Head wider than long (HW 37-46% SVL; HL 35-42% SVL). Tympanum distinct (TYD 6-9% SVL). Tibia short (TL 40-47% SVL). Webbing moderate, leaving two phalanges free; webbing formula: I 1 – 1 II 1 – 2 III 1 – 2 IV 2 – 1 V. Very prominent subarticular tubercles. Fingers and toes ending in discs without grooves. Smooth skin on back and flanks, belly strongly granular.

COLOURATION. — The dorsal colouration is brown with a transverse triangular dark spot in the orbital region, splitting into two branches and extending in the posterior part of the back. The loreal and tympanic regions are black. The iris is golden in live specimens, its upper part being orange-red in colour. The belly is whitish.

SEXUAL DIMORPHISM. — Males have glandular folds on the throat indicating the subgular vocal sac. Females with a convoluted oviduct have large white oocytes.

HABITATS AND DISTRIBUTION. — This species has been reported from Yégué, Akloa and Missahohé in Togo by Hillers *et al.* (2009). Segniagbeto *et al.* (2022) reports its occurrence in ecological zone III of the country. It occurs in forests or wooded savannahs. It is common in ecological zones IV and II (Kouma, Badou, Adélè, Fazao and Alédjo regions). Males are often found near streams (small rivers or torrents). Observations have been made in the Fazao Malfakassa National Park at elevations above 1000 m.

REMARK. — *Leptopelis spiritusnoctis* has many morphological similarities with *L. viridis* (Günther, 1869). With some experience, *L. viridis* can be recognised by its "rounder" and more "bulgy" body; *L. spiritusnoctis* has a more "edgy" body shape and a shorter head. The easiest criteria available for field identification are the male advertisement calls and the colouration of the upper edge of the eye in live specimens. In *L. viridis*, the male advertisement call is composed of two notes while the male calls in *L. spiritusnoctis* consist in only one note. *Leptopelis spiritusnoctis* often also utters a very faint territorial call ("krrkrrr"). For call variation in *L. viridis*, see Grafe *et al.* (2000). *L. spiritusnoctis* has a golden iris with an orange-red coloured spot in the upper part, whereas in *L. viridis* the iris is entirely golden brown and the sclera blackish. The two taxa may overlap in some habitats, i.e., wooded savannahs, dry and semi-deciduous forests. In open savannah, only *L. viridis* will be encountered, whereas this species does not enter closed forest. In alcohol, both taxa are difficult to distinguish.

TAXONOMIC REMARKS. — This species has long been called *Leptopelis hyloides* (Boulenger, 1906), but the study of the "*Hylambates hyloides*" type specimen identified *L. hyloides* as a synonym of *L. viridis* (Rödel 2007).

Leptopelis viridis (Günther, 1869)
(Fig. 3F)

MATERIAL EXAMINED. — **Togo** • 3 ♂; Akloa; MNHN-RA-2008.0126-0128 • 3 ♂; Kara; MNHN-RA-1993.6094-6096 • 2 ♂; Lomé; MNHN-RA-1993.6097, MNHN-RA-1993.6098 • 2 ♂; Siou; Coll. GHS-W 1379, Coll. GHS-W 1380.

DESCRIPTION. — Tree frog of medium size (SVL 31.5-35.5 mm ♂), relatively elongated. Snout rounded, slightly oval. Head wider than long (HW 36-43% SVL; HL 34-40% SVL). Tympanum distinct (TYD 7-9% SVL). Tibia short (TL 37-50% SVL). Webbing present, rudimentary, leaving up to four phalanges free; webbing formula: I 2 – 2 ½ II 2 – 3 III 2 – 4 IV 3 ½ – 2 V. Very prominent subarticular tubercles. Fingers and toes terminated by discs. Smooth skin on back and flanks; belly strongly granular.

COLOURATION. — The dorsal colouration is greyish with a triangular black spot in the orbital region, its tip pointing posteriorly and separating into two branches ending in the posterior part of the back. The loreal and tympanic regions are black. The iris is golden

in live specimens, with the sclera of the eye bluish. The dorsal faces of the forearm, thigh and tibia are grayish with dark transverse bands. The belly is white.

SEXUAL DIMORPHISM. — Males have glandular folds on the throat indicating the subgular vocal sac.

HABITATS AND DISTRIBUTION. — This species is characteristic of Guinean woodland savannahs, dry and semi-deciduous forests (Rödel 2000; Channing & Rödel 2019). Males are often perched on shrubs 3 to 4 m high, sometimes on trees 8 to 10 m high in forest areas. The species is common in ecological zone IV (Badou region) and in zone II along the Fazao mountain range to the latitude of Alédjo. Bourgat (1979), Hillers *et al.* (2009) and Segniagbeto *et al.* (2022) reported its presence in ecological zones II, III and IV of the country.

TAXONOMIC REMARKS. — Ahl (1924, 1929) described *Leptopelis nanus* Ahl, 1924 and *Leptopelis togoensis* Ahl, 1929 from Togo. Both are considered junior subjective synonyms of *Hylambates viridis*.

Family BUFONIDAE Gray, 1825
Genus *Sclerophrys* Tschudi, 1838

Sclerophrys maculata (Hallowell, 1854)
(Fig. 4A)

MATERIAL EXAMINED. — **Togo** • 2 ♂; Kara; MNHN-RA-2006.2183, MNHN-RA-2006.2186 • 1 ♂, 1 ♀; Koumoungou (near Naboulgou); MNHN-RA-2006.2182, MNHN-RA-2006.2185 • 1 ♂, 1 ♀; Kpalimé; MNHN-RA-2006.2184, MNHN-RA-2006.2187 • 1 ♂, 1 ♀; Yégué; Coll. GHS-W 0644, Coll. GHS-W 0645.

DESCRIPTION. — Large to medium sized toad (SVL 48.5-61 mm ♂, 56.4-65 mm ♀). Very short hind legs (TL 35-41% SVL). Snout rounded. Head wider than long (HW 33-43% SVL; HL 27-37% SVL). Tympanum distinct (TYD 6-9% SVL). Webbing present, small, leaving three phalanges free; webbing formula: I 1 ½ – 2 II 1 ½ – 2 III 2 – 3 IV 3 – 1 V. Skin with horny spinules on dorsal parts (back, flanks, thighs, legs), belly granular. Parotoid glands elongate and flat, with spiny warts, close to eyelid.

COLOURATION. — The dorsal colouration is ochre brown with dark, gray, beige and whitish spots of irregular shapes. The dorsal sides of the forearm, thigh and tibia have the same colour as the back. Belly, chest and throat are whitish. Breeding males may become bright yellow depending on the habitats.

SEXUAL DIMORPHISM. — Males have a subgular vocal sac, indicated by a black-yellow colouration. Males have stronger forelegs than females and black nuptial pads on the thumbs and dorsal part of digit II.

HABITATS AND DISTRIBUTION. — Very common in ecological zones IV and II, this toad is often present in degraded, open or dry forest ecosystems. The species is also found in ecological zones I, III and V of the country (Segniagbeto *et al.* 2022). Pujol & Exbrayat (2002) and Hillers *et al.* (2009) reported its distribution in Kpalimé, Badou and Adélé areas.

Sclerophrys pentoni (Anderson, 1893)

MATERIAL EXAMINED. — **Togo** • 1 subadult ♂; Nanergou; MRAC 73.9.B.403.

ADDITIONAL MATERIAL. — **Cameroon** • 1 ♂, 1 ♀; Koza; MRAC 75.3.B.196, MRAC 75.3.B.197.
Mauritania • 7 ♂, 6 ♀; no locality; MNHN-RA-1979.470-483.

DESCRIPTION. — Large to medium sized toad (SVL 52.2-60 mm ♂, 57.3-64.4 mm ♀). Very short hind legs (TL 34-36% SVL). Snout rounded. Head wider than long (HW 34-47% SVL; HL 25-41% SVL). Tympanum distinct (TYD 4-5.6 mm). Webbing rudimentary, leaving four phalanges free; webbing formula: I 1 – 2 II 1 ½ – 2 ½ III 2 – 4 IV 4 – 1 V. Skin with large, rounded warts on the dorsal parts (back, flanks, thighs, legs), belly granular. Parotoid gland prominent, smooth, widely separated from eyelids.

COLOURATION. — The colouration is gray or brownish on the back, the parotoid glands appearing darker. The dorsal face of arms, thighs, legs and feet is gray. The chest and belly are white.

SEXUAL DIMORPHISM. — The male has a subgular vocal sac of black and white colouration. The forelegs of males are more robust than those of females.

HABITATS AND DISTRIBUTION. — *Sclerophrys pentoni* is mainly a species of Sudanian savannahs throughout West Africa (Rödel 2000), but it occurs also in East Africa (Egypt, Eritrea) and even in the Middle East (Yemen). In Togo, the distribution of this species is limited to the far north in ecological zone I. Vouchers of this species deposited by Bourgat *et al.* (1983) at the Paris Museum under the numbers MNHN-RA-1980.1145-1148 could not be traced.

Sclerophrys regularis (Reuss, 1833)
(Fig. 4B)

MATERIAL EXAMINED. — **Togo** • 2 ♂, 2 ♀; Lomé; MNHN-RA-1995.7155, MNHN-RA-1995.7165-7167 • 3 ♀; Assoukoko; MNHN-RA-1995.4399-4401 • 3 ♀; Kara; MNHN-RA-2006.2177, MNHN-RA-2006.2180, MNHN-RA-2006.2188 • 1 ♀; Kpalimé; MNHN-RA-2006.2181.

DESCRIPTION. — Large toad (SVL 76-78 mm ♂, 63-92 mm ♀), with robust body. Snout rounded. Head wider than long (HW 36-42% SVL; HL 29-36% SVL). Tympanum distinct (TYD 7-8% SVL). Tibia short (TL 37-42% SVL). Webbing rudimentary, leaving four phalanges free; webbing formula: I 1 ½ – 2 ½ II 1 ½ – 3 III 2 – 4 IV 4 – 2 V. Skin with distinct warts on the dorsal parts (back, flanks, thighs, legs); belly granular. Parotoid glands large, flat, smooth, separated from the eyelids.

COLOURATION. — The dorsal colouration is gray, light brown, brown, with more or less dark spots. The flanks, tympanum and loreal region are brown, light brown or beige. The dorsal side of forearm, thigh, leg and feet is of light brown with darker stripes. Chest and belly are dark gray.

SEXUAL DIMORPHISM. — Males have a subgular vocal sac, indicated by a blackish colouration. It is often more robust and its forelegs are stronger than those of females. Males have well developed nuptial pads on their thumbs.

HABITATS AND DISTRIBUTION. — *Sclerophrys regularis* is the most common amphibian species in Togo, present in all regions, and widely distributed throughout Africa (Frost 1985; Rödel 2000; Channing & Rödel 2019). Its presence in Togo has been reported by Bourgat (1979), Salami-Cadoux (1979), Pujol & Exbrayat (1987, 2002), Hillers *et al.* (2009) and Segniagbeto *et al.* (2022).

Sclerophrys togoensis (Ahl, 1924)
(Fig. 4C)

MATERIAL EXAMINED. — **Togo** • 4 ♂, 1 ♀; Bismarckburg (currently Yégué in Adélé); ZMB 27010, ZMB 27011 (3 specimens) • 1 ♀; Diguengue; ZMB 77821.

DESCRIPTION. — Medium to large toad (SVL 47.2-55.5 mm ♂, 61.4 mm ♀), with somewhat stocky body. Snout rounded. Head wider than long (HW 37-39% SVL; HL 33-36% SVL). Tympanum distinct (TYD 6-7% SVL). Tibia short (TL 41-43% SVL). Webbing small, leaving about three phalanges free; webbing formula: I 1 – 2 II 1 – 3 III 2 – 3 ½ IV 3 ½ – 2 V. Skin with flat warts on the back; flanks, thighs and legs short with warts bearing horny spinules. Belly granular. Parotoid glands narrow, long, almost smooth, nearly touching the eyelids.

COLOURATION. — The dorsal colouration is characterised by brownish, whitish and black spots of irregular shapes. There is a transverse whitish band at the orbital level. The snout and anterior end of the head are brownish. The flanks have a brown to whitish spotted pattern. The dorsal part of forearm, arm, thigh and foot exhibit brown and whitish transverse bands.

SEXUAL DIMORPHISM. — The males have a subgular vocal sac indicated by a black colouration. They are often more robust and their forelegs stronger than those of females.

HABITATS AND DISTRIBUTION. — The current knowledge of this species in Togo is based on two new vouchers collected in Diguengué. Beside the specimens used in the original description (Ahl 1924), its presence has also been reported by Bourgat (1979) in Tinkoro (now Tintro in Adélé). No further mention of the species has been made in recent works on the herpetofauna of Togo and adjacent Ghana (Rödel & Agyei 2003; Leaché *et al.* 2006; Hillers *et al.* 2009). However, this species has been frequently found in the rainforests of the western part of the Upper Guinea forest zone (e.g. Rödel & Bangoura 2004; Rödel & Glos 2019; Gongomin *et al.* 2019). The current conservation status of this species in Togo is presumably critical because of the strong degradation of the remaining forests.

Family CONRAUIDAE Dubois, 1992
Genus *Conraua* Nieden, 1908

Conraua derooi Hulselmans, 1972
(Fig. 4D)

MATERIAL EXAMINED. — **Togo** • 2 ♂, 5 ♀; Missahohé; MRAC B.112074-112076, MRAC B-112084; MNHN-RA-2006.2169-2171.

DESCRIPTION. — Large frogs (SVL 77-83 mm ♂, 68-93 mm ♀), with elongated, robust, strong body. Snout rounded. Head as broad as long (HW 37-43% SVL; HL 38-44% SVL). Tympanum indistinct. Hind leg moderate (TL 47-51% SVL). Webbing complete, no free phalanges. Fingers and toes terminated by discs. Skin smooth on back and slightly granular on flanks; belly smooth.

COLOURATION. — Specimens are uniformly dark brown on the back with small whitish and dark (reddish) dots in life. The dorsal part of forearm, thigh and tibia are brown with dark transverse bands. The belly is lighter.

SEXUAL DIMORPHISM. — The sexual dimorphism is not very marked. Males are generally more robust and larger than females, and in particular may have broader and more bulgy heads.

HABITATS AND DISTRIBUTION. — This torrenticolous species is endemic to Togo hills. For a long time, the only known site was Missahohé, which is the type locality of the species (Hulselmans 1972). Bourgat (1979) and Kulo (1980) reported the species presence in the Danyi region (Danyi Atigba), less than 100 km north from the previous locality. Segniagbeto *et al.* (2017) investigated in Danyi-Atigba but did not record populations of the species. They discovered new populations in Yikpa-Dzigbe and reported that the population of Missahohé is severely fragmented. Rödel & Agyei (2003: 224) and Leaché *et al.* (2006) failed to find the species in Ghana, whereas Hillers *et al.* (2009) confirmed its presence in the Volta region of Ghana. Lamotte & Perret (1968) mentioned the species from Togo, still lumping it with the more western distributed *Conraua alleni* (Barbour & Loveridge, 1927). *Conraua derooi* is characteristic of the forest zone of Togo. It lives mainly around waterfalls. On Missahohé Mountain, individuals find refuge in rock crevices or in galleries dug into the mud. The male is a whistler, perching on rocky substrate at night near the waterfall area.

CONSERVATION STATUS. — This species is currently considered as Critically Endangered according to the IUCN Redlist (Rödel & Schiøtz 2004; Segniagbeto *et al.* 2013, 2017). The habitats of all *C. derooi* populations are seriously threatened by logging and agricultural encroachment. The few remaining forests throughout the hilly forest area along the border between Togo and Ghana are being converted into plantations (mostly coffee and cocoa) at increasing rates. In Missahohé forest, the population is fragmented into five small populations because of the agricultural invasion. During recent years, specimens of the species have been subject to the international pet trade, and domestic consumption mainly by Chinese restaurants in the capital Lomé. As previously indicated (Segniagbeto *et al.* 2017), it is important that attention be paid to protect the Togolese populations of this species. In Ghana, local conservation efforts to protect the Ghanaian populations have been made (Rödel *et al.* 2021). Central Ghanaian *Conraua* populations, which have been previously assigned to this species, have been recently described as a separate species (Neira-Salamea *et al.* 2021).

Family DICROGLOSSIDAE Dubois, 1987
Genus *Hoplobatrachus* Peters, 1863

Hoplobatrachus occipitalis (Günther, 1859)
(Fig. 4E)

MATERIAL EXAMINED. — **Togo** • 1 ♂, 36 ♀; Bado; MNHN-RA-1979.1067-1072, MNHN-RA-1979.1074-1084, MNHN-RA-1979.1086-1103 • 1 ♀; Kpalimé; MNHN-RA-2006.2178.

DESCRIPTION. — Very large frog (SVL 95-98 mm ♂), with robust and strong body, more or less dorso-ventrally flattened. Snout rounded. Head as long as broad (HW 38-41% SVL; HL 36-41% SVL). Tympanum very large and round (TYD 7-8% SVL). Hind legs strong, rather short (TL 44-47% SVL). Webbing complete, leaving no phalanges free. Back bearing numerous prominent short glandular folds, flanks with warts arranged longitudinally.

COLOURATION. — The dorsal surface is characterised by its variable colouration (olive, dark gray brown, whitish and gray). The dorsal part of the thigh, tibia and forearm are brown to greenish with dark transverse spots. Dark spots of varying sizes are present on the posterior part of the thigh and tibia. The ventral side is clearer but usually shows dark blotches.

SEXUAL DIMORPHISM. — The male is distinguished by a pair of vocal sacks laterally on the throat.

HABITATS AND DISTRIBUTION. — The species *Hoplobatrachus occipitalis* is very widely distributed in all regions of the country. It is both a savannah and forest form with its range extending from west to east Africa including the northern part of southern Africa. It frequents human dwellings and is present even in cities. Numerous observations were made in almost all localities visited. This species is exploited for human consumption in some restaurants in Lomé and some other cities (for very intense harvest of this species in neighbouring Benin, see Mohneke *et al.* 2010). Some communities

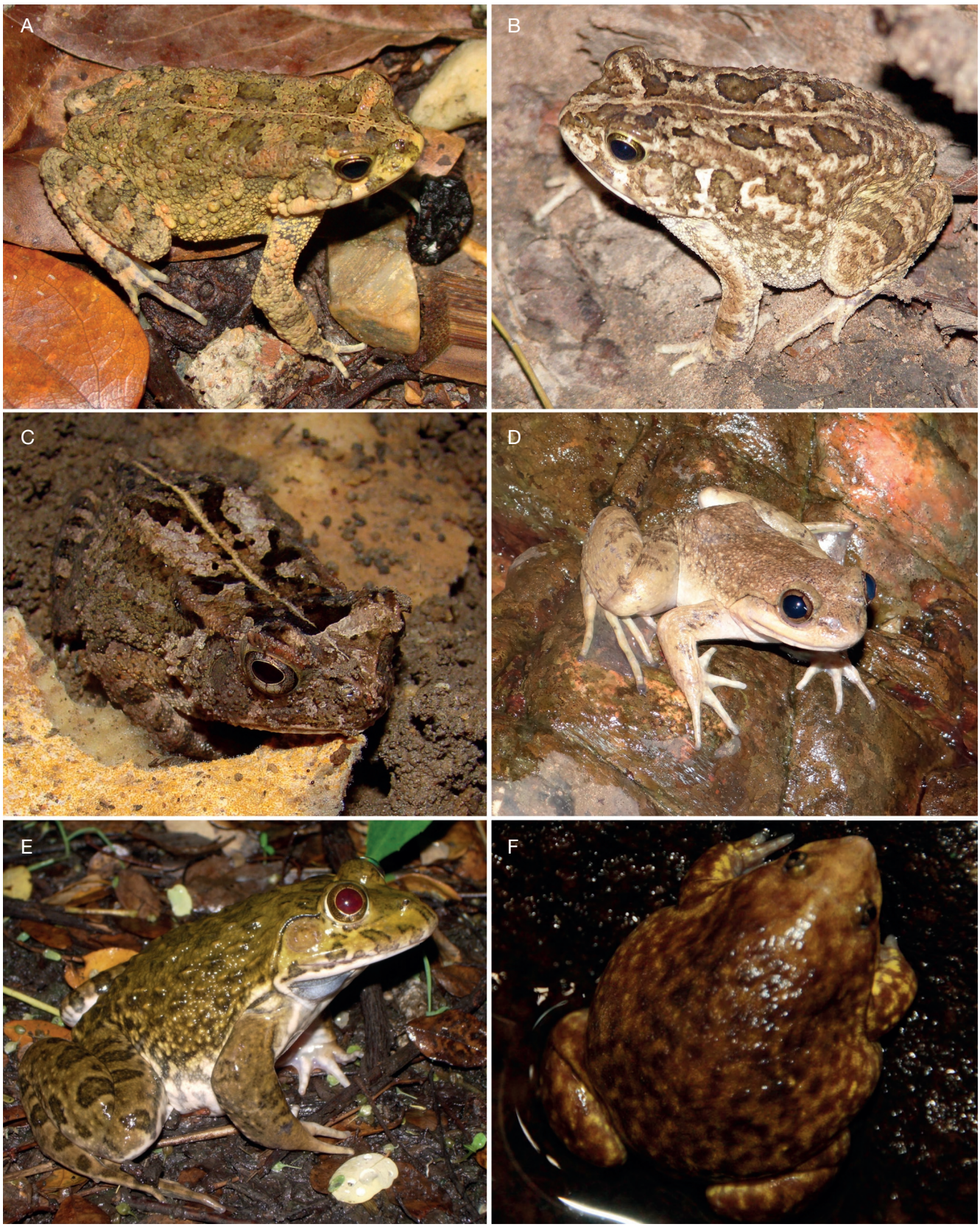

Fig. 4. — Representatives of anuran species from Togo in life: **A**, *Sclerophrys maculata* (Hallowell, 1854) (Kalaré, Fazao Malfakassa); **B**, *Sclerophrys regularis* (Reuss, 1833) (Adjarala); **C**, *Sclerophrys togoensis* (Ahl, 1924) (Diguendue); **D**, *Conraua derooi* Hulselmans, 1972 (Yikpa-Dzigbe); **E**, *Hoplobatrachus occipitalis* (Günther, 1859) (Akloa); **F**, *Hemisus marmoratus* (Peters, 1854) (Kpalimé).

in the North hunt this species for family food. It was reported in Togo by Bourgat (1979) from Atakpamé, Missahohé, Gadjagan, Kabou, Kanté, Katobodjo, Kovié, Niamtougou and Lomé, and by Segniagbeto *et al.* (2022) from Tetetou to Nagbeto dam area along the Mono River.

Family Hemisotidae Cope, 1867
Genus *Hemisus* Günther, 1859

Hemisus marmoratus (Peters, 1854)
(Fig. 4F)

Material examined. — **Togo** • 1 ♂; Binaparba; MRAC 73.9. B.440 • 19 ♂, 10 ♀; Lomé; MNHN-RA-1994.3995, MNHN-RA-1994.3401-3428 • 1 ♀; Kpalimé; Coll. GHS-W 0318.

Description. — This species is easily recognisable by its unique body shape with pointed snout, small eyes and short legs. Small to medium sized frog (SVL 22-30 mm ♂, 30.3-41.2 mm ♀), with a more or less stocky body. Snout pointed and very prominent extending well beyond the oral cleft. Triangular head as wide as long (HW 30-38% SVL; HL 28-36% SVL). Tympanum indistinct. Tibia short (TL 31-41% SVL). Webbing absent, all phalanges free. Skin smooth on top of the head, glandular on the posterior part of the back and flanks; belly smooth.

Colouration. — The dorsal colouration shows small white, yellow and dark spots of irregular shapes, intertwined on the back. The ventral side is white.

Sexual dimorphism. — The male has a purple throat that outlines the subgular vocal sac. Females are larger than males.

Habitats and distribution. — This species is mainly distributed in the Guinean and Sudanian savannah, but occurs in all ecological zones of Togo. It is often observed in the rainy season near small pools, although this fossorial species lays eggs outside of water in burrows, and can start breading activity before the rains set in. Females help tadpoles to reach water bodies (Rödel *et al.* 1995; Kyle & du Preez 2020). Observations were made in Kpalimé and Naboulgou. This species has been reported from Togo by Bourgat (1979), PNAE (2002) and Segniagbeto *et al.* (2007, 2022).

Family Hyperoliidae Laurent, 1943
Genus *Afrixalus* Laurent, 1944

Afrixalus dorsalis (Peters, 1875)
(Fig. 5A-C)

Material examined. — **Togo** • 6 ♂, 2 ♀; Afagnan; MNHN-RA-1998.3081-3086, MNHN-RA-1998.3088, MNHN-RA-1998.3089 • 8 ♂, 4 ♀; Togblekopé; MNHN-RA-1993.3675-3677, MNHN-RA-2006.2291, MNHN-RA-2006.2292; Coll. GHS-W 0333, Coll. GHS-W 0340, Coll. GHS-W 0362, Coll. GHS-W 0363, Coll. GHS-W 0367-0369 • 2 ♀; Akloa; ZMB 77896, ZMB 77897 • 2 ♀; Yo (Agomé Yo); Coll. GHS-W 0684.

Description. — Small sized (SVL 19.5-25 mm ♂, 20-26 mm ♀), slender-bodied frog with a rounded snout. Head slightly longer than wide (HW 25-34% SVL; HL 30-37% SVL). Tympanum barely distinct, covered by skin (TYD 2-5% SVL). Tibia short (TL 40-45% SVL). Webbing small with three phalanges free; webbing formula: I 2 – 2 ½ II 1 – 3 III 2 – 3 IV 3 – ½ V. Fingers and toes ending in discs. Skin smooth with asperities on dorsal part of body and flanks; belly granular in the posterior part.

Colouration. — This species has variable whitish-yellow dorsal patterns on a brown dorsum. The most common form is two continuous pale, dorso-lateral bands running from the snout over the eyelids and ending shortly before the vent. In some specimens a narrower pale vertebral band is present. The flanks show a brown colouration similar to that of the back. In some populations the lateral bands are very wide, covering almost the entire back. The belly is white. In both males and females, the dorsal surface of the thighs and legs is brown with whitish pattern.

Sexual dimorphism. — The subgular vocal sac of male carries a large round and yellow gular gland.

Habitats and distribution. — This species is characteristic of densely vegetated savannahs and degraded forests near ponds, rivers or other water bodies. It is more frequent in the southern part of the country (ecological zones III, IV and V). Specimens have been observed in Lomé and its surroundings (Togblékopé, Djagblé and Amédéhoévé), Notsé, Wahala, and the forest zone (Badou, Akloa and Yo). The northernmost records of this species in Togo is the Badou region. Bourgat (1979), Schiøtz (1999) and Segniagbeto *et al.* (2007, 2022) have indicated the presence of the species in the ecological zones III and IV.

Afrixalus vittiger (Peters, 1875)
(Fig. 5D)

Material examined. — **Togo** • 3 ♂; Kanté; MNHN-RA-1997.1538-1540 • 7 ♂, 1 ♀; N'Gambi; Coll. GHS-W 0541, Coll. GHS-W 0547, Coll. GHS-W 0550-0552, Coll. GHS-W 0553, Coll. GHS-W 0554, Coll. GHS-W 0583 • 1 ♂; Akloa; ZMB 77898 • 1 ♂; Tchamba; ZMB 77899 • 1 ♀; probably from the North; MNHN-RA-1994.4493.

Description. — Small (SVL 21.9-23.5 mm ♂, 23-25 mm ♀), slender frogs with pointed snout. Fairly broad head, slightly longer than wide (HW 24-26% SVL; HL 29-30% SVL). Tympanum barely distinct, covered by skin (TYD 3-4% SVL). Tibia short (TL 37-43% SVL). Webbing small; webbing formula: I 2 – 2 ½ II 1 ½ – 3 III 2 – 3 IV 3 – 2 V. Fingers and toes terminating with discs. Skin smooth with asperities on the back and flanks, slightly granular skin on belly.

Colouration. — The dorsal colouration is characterised by three longitudinal white stripes, one vertebral and two dorso-lateral stripes extending from snout tip to posterior end of back. The white vertebral band ends at the vent, the others end in the inguinal region. They are separated by brown bands. The flanks have brown colouration, the ventral side is white.

Sexual dimorphism. — The male is distinguished from the female by a subgular vocal sac with a yellowish to reddish gland.

Habitats and distribution. — The species occurs mainly in savannah, but may enter degraded forest. It is very common in ecological zones I and II. Specimens were collected in Niamtougou, Kanté, N'Gambi, Payo and Fazao Malfakassa (Kalaré, Kpei Solongo, Bounako). Calling males often sit at a height of 1 to 1.5 m on grasses or shrubs in ponds. Most populations were encountered in the northern part of the Atacora range. The southern distribution of this species in the country is doubtful. This species has been reported in Togo by Bourgat (1979) and Segniagbeto *et al.* (2007, 2022).

Remark. — Concerning the taxonomy of this *Afrixalus* species, we follow Pickersgill (2007).

Fig. 5. — Representatives of anuran species from Togo in life: **A**-**C**, *Afrixalus dorsalis* (Peters, 1875): **A**, **B**, (Togbekope); **C**, (Akloa); **D**, *Afrixalus vittiger* (Peters, 1876) male (Kalaré); **E**, *Afrixalus weidholzi* (Mertens, 1938) (Guérin Kuka); **F**, *Hyperolius baumanni* Ahl, 1931 (Diguendue).

Afrixalus weidholzi (Mertens, 1938) (Fig. 5E)

MATERIAL EXAMINED. — **Togo** • 1 ♂; Kanté; MNHN-RA-2006.2809 • 1 ♀; Guérin Kuka; Coll. GHS-W 1383.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 1 ♂; Ndenou; MNHN-RA-1999.3771, MNHN-RA-2000.2720 • 3 ♀; Lamto; MNHN-RA-2000.4055-4057.

DESCRIPTION. — A small (SVL 18.9-19.1 mm ♂, 17.1-18.9 mm ♀), slender frog with an oval snout. Head longer than broad (HW 21-26% SVL; HL 28-35% SVL). Tympanum barely distinct, covered by skin (TYD 0.9 mm). Tibia short (TL 35-42% SVL). Webbing small; webbing formula: I 1 – 1 ½ II 1 – 2 ½ III 1 – 3 IV 2 ½ – 1 V. Fingers and toes terminating with disks. Smooth skin with asperities on back and flanks, slightly granular on belly.

COLOURATION. — The dorsal pattern is yellowish-brown. A distinct vertebral line is present. The upper part of the flank bears a longitudinal band from the posterior region of eye to the inguinal region. The lower part of the flank is white. The tympanic region is whitish, the dorsal surface of the hand, thigh, leg and foot is yellowish-brown. The ventral side (throat, chest, belly) is white.

SEXUAL DIMORPHISM. — The male has a yellow gland on the subgular vocal sac and a higly granular zone on the side of the head behind the mouth opening.

HABITATS AND DISTRIBUTION. — The presence of this species in Togo was reported for the first time by Leaché *et al.* (2006) from specimens collected in the Ghana-Togo border area. Observations without vouchers were made in Akloa, Tomegbe, Assoukoko and Fazao Malfakassa National Park (Kpei Solongo). This species occurs only in savannah areas. It is often found in habitats with grasses around pools. Ecological zone I constitutes its main distribution area in Togo. Populations of this species have been recently observed along the Mono River from Tetetou to Nagbeto dam (Segniagbeto *et al.* 2022). It is also present in ecological zones II and IV.

Genus *Hyperolius* Rapp, 1842

Hyperolius baumanni Ahl, 1931 (Fig. 5F)

MATERIAL EXAMINED. — **Togo** • 1 ♂; Akloa; MNHN-RA-2008.0104 • 2 ♂; Kouma-Tokpli; MNHN-RA-2008.0106; Coll. GHS-W 1792 • 4 ♂, 1 ♀; Missahohé; MNHN-RA-2008.0107, MNHN-RA-2008.0108, MNHN-RA-2008.0111, MNHN-RA-2008.0112, MNHN-RA-2008.0114, MNHN-RA-2008.0115 • 4 ♂, 1 ♀; Oga; MNHN-RA-2008.0103, MNHN-RA-2008.0105, MNHN-RA-2008.0109, MNHN-RA-2008.0110, MNHN-RA-2008.0113 • 1 ♂; Yégué; Coll. GHS-W 0695 • 1 ♂; Diguengué; ZMB 77900 • 1 ♂; Assoukoko; Coll. GHS-W 1742, Coll. GHS-W 1743.

DESCRIPTION. — Slender frog (SVL 25.7-29.5 mm ♂, 30.4-32.5 mm ♀). Snout slightly rounded. Head slightly longer than broad (HW 26-35% SVL; HL 32-38% SVL). Tympanum barely distinct, covered by skin (TYD 2-4% SVL). Hind leg moderately long (TL 47-50% SVL). Webbing moderately large, leaving up to two phalanges free; webbing formula I 1 – 1 ½ II ½ – 2 III ½ – 2 IV 1 ½ – ½ V. Fingers and toes terminated by discs. Skin smooth on the back, head and flanks; chest and belly granular.

COLOURATION. — The back colour is brown. The upper parts of the flanks are marked by a more yellow dorso-lateral band. The lower parts have a black band tinted with small white or yellowish dots. The loreal and tympanic regions are black with small white or yellow dots. The posterior surface of the thighs is reddish or pink. The ventral side has a whitish colouration.

SEXUAL DIMORPHISM. — Males with gland on subgular vocal sac. Females are distinctly larger than males.

HABITATS AND DISTRIBUTION. — Originally, the species was collected in Missahohé (Kpalimé), forest area of Togo (Ahl 1931). This species is endemic to the Togo-Ghana forest zone according to Schiøtz (1999), Rödel & Agyei (2003) and Leaché *et al.* (2006). It is very abundant throughout the forest area of Togo. It occurs likewise in savannahs associated with forest areas near watercourses or pools. Males are usually sitting on grasses (*Panicum* sp.) at heights of 1.5 to 3 m above the ground, usually above water. This species was observed from the lower Missahohé Mountain (Yo, Agome) to Yégué in Adélé. The northernmost record in Togo is from Malfakassa valley (9°10'45.54"N, 0°58'16.69"E).

Hyperolius concolor (Hallowell, 1844) (Fig. 6A, B)

MATERIAL EXAMINED. — **Togo** • 2 ♂; Akloa; MNHN-RA-2008.0101, MNHN-RA-2008.0102 • 4 ♂, 2 ♀; Badou; MNHN-RA-1993.6126-6131 • 1 ♂; Missahohé; ZMB 36090 • 3 ♂; Yégué; Coll. GHS-W 0696, Coll. GHS-W 0699, Coll. GHS-W 0993 • 3 ♂; Adjarala; Coll. GHS-W 1836, Coll. GHS-W 1837, Coll. GHS-W 1840 • 2 ♂; Yikpa-Dzigbe; Coll. GHS-W 1971, GHS-W 1972 • 3 ♂; MNHN-RA-1994.4496-4498 • 3 ♂; Tchamba; ZMB 77901-77903 • 3 ♀; Lomé; MNHN-RA-1993.6088-6091.

DESCRIPTION. — Slender to compact-bodied frog (SVL 24.8-32.5 mm ♂, 28.5-37.1 mm ♀), more robust than previous species. Snout rounded or oval. Head slightly longer than broad (HW 28-34% SVL; HL 31-39% SVL). Tympanum distinct, very small (TYD 2-5% SVL). Tibia moderately long (TL 46-49% SVL). Webbing large; webbing formula: I 1 – 1 ½ II ½ – 1 ½ III 1 – 1 IV 1 – ½ V. Fingers and toes terminated by disks. Skin uniformly smooth in the dorsal parts; smooth flanks; belly and chest granular.

COLOURATION. — The dorsum is uniformly yellow or yellowish in life in males (with darker dorsal pattern) and green in females during the day. At night both sexes are yellow. Colour turns gray in alcohol. The ventral side is white.

SEXUAL DIMORPHISM. — Sexes differ in colour and males have a yellow gland on the subgular vocal sac. Females are larger than males.

HABITATS AND DISTRIBUTION. — This species is distributed in all ecological zones of the country. Field observations and museum vouchers indicate a higher frequency in the forest area (Badou region up to the boundary of Fazao). It is characteristic of savannahs associated with forest areas near water points (ponds or rivers). A few specimens were collected in gallery forests along the Yégué River in Adélé and along the gallery forest that leads to the Akloa waterfall in Badou. This species was reported in Togo by Ahl (1931) under the junior subjective synonyms *Hyperolius depressus* Ahl, 1931, *Hyperolius togoensis* Ahl, 1931, *Hyperolius moseri* Ahl, 1931 and *Hyperolius narinus* Ahl, 1931 (see Bourgat 1979; Segniagbeto *et al.* 2007, 2022; Tillack *et al.* 2021).

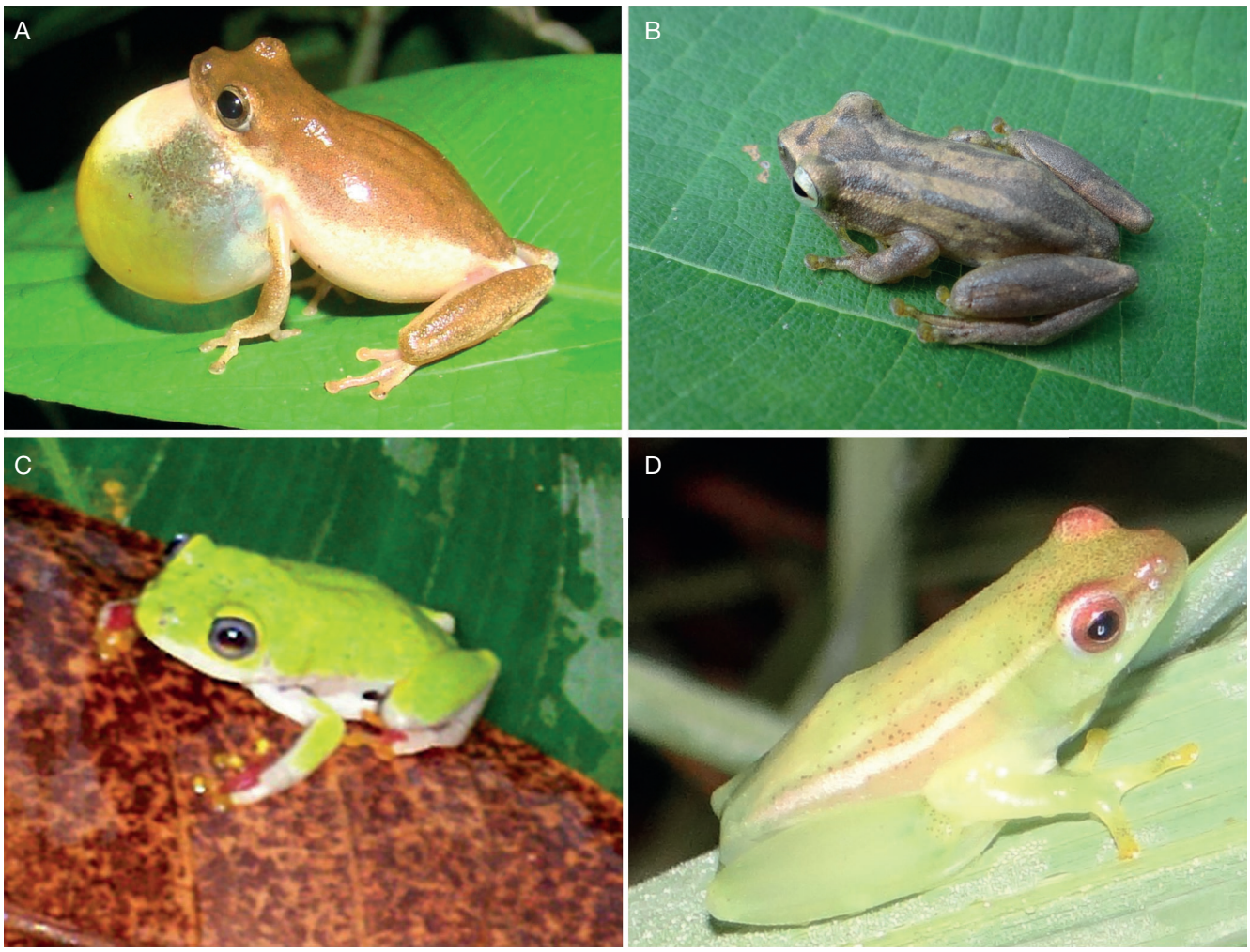

FIG. 6. — Representatives of anuran species from Togo in life: **A**, **B**, *Hyperolius concolor* (Hallowell, 1844) males (Kalaré); **C**, *Hyperolius fusciventris burtoni* (Boulenger, 1883) female (Togblekope); **D**, *Hyperolius igbettensis* Schiøtz, 1963 (Kpeisolongo).

Hyperolius fusciventris burtoni (Boulenger, 1883) (Fig. 6C)

MATERIAL EXAMINED. — **Togo** • 12 ♂, 3 ♀; Agoé; Coll. GHS-W 0151-0154, Coll. GHS-W 0364-0366, Coll. GHS-W 0373-0380 • 5 ♂, 6 ♀; Toglékopé; MNHN-RA-2006.2541-2547, MNHN-RA-2006.2549-2552 • 5 ♂, 1 ♀; MNHN-RA-1994.4499-4501 • 1 ♀; Kleine Popo (currently Aného); ZMB 36104 • 1 ♀; Kpalimé; MNHN-RA-2006.2548.

DESCRIPTION. — Small frog (SVL 18.4-21.0 mm ♂, 22.5-30.0 mm ♀), more or less robust body. Snout rounded. Head slightly longer than wide (HW 26-35% SVL; HL 30-41% SVL). A barely distinct tympanum covered by skin (TYD 1-1.3 mm). Hind legs moderately long (TL 36-53% SVL). Webbing large, leaving one phalange free; webbing formula: I ½ – 2 II ½ – 1 III ½ – 1 IV 1 – ½ V. Skin evenly smooth throughout the dorsal part and flanks of the animal; belly and chest granular.

COLOURATION. — The colouration of living animals varies from yellowish, green to dark green on the dorsal part of the body, limited by white or yellow strips on the flanks in some specimens (mainly females). The ventral side is white, with black spots from the chest to the vent in females. The underside of the thighs, legs and tarsi are red and black. The web is red and the tip of toes and fingers are yellow.

SEXUAL DIMORPHISM. — Males have a subgular vocal sac with a round greenish gland. Females are distinctly larger. Both sexes differ from each other in colour.

HABITATS AND DISTRIBUTION. — According to Laurent (1961), *Hyperolius fusciventris* was reported in Togo by Ahl (1931) as *Hyperolius rosaceus* Ahl, 1931 from Anhéo, Lacs Prefecture (Tillack *et al.* 2021). Schiøtz (1963), Bourgat (1979), Rödel (2000) and Segniagbeto *et al.* (2007) also reported the presence of this species in Togo. It is very common in wetlands in southern Togo, particularly in the rivers and ponds around Lomé (Toglékopé, Djagblé, Amédéhoévé and the swampy areas around Lake Togo). The northernmost record of this species in Togo is on a river next to Yo (Agome Yo) at the bottom of Missahohé Mountain.

TAXONOMIC NOTE. — According to Schiøtz (1967), the taxon *Hyperolius fusciventris* Peters, 1876 includes three subspecies: *Hyperolius fusciventris fusciventris* Peters, 1876, present from Sierra Leone to Côte d'Ivoire; *Hyperolius fusciventris lamtoensis* Schiøtz, 1965 centred on Côte d'Ivoire; and *Hyperolius fusciventris burtoni* (Boulenger, 1883), whose distribution extends from Ghana to Nigeria. However, at some sites two "subspecies" occur in syntopy (M.-O. Rödel, unpubl. data). Such a sympatry would point to reproductive isolation. Therefore new morphological and genetic works should clarify the taxonomy of this complex.

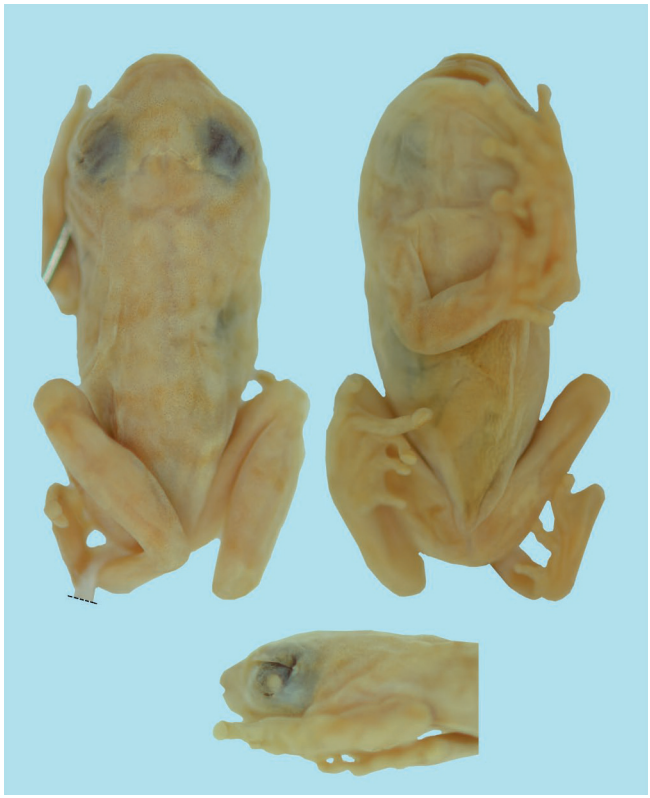

FIG. 7. — *Hyperolius laticeps* Ahl, 1931: 69. Onomatophore: holophoront (holotype) by monophory, ZMB 46529, juvenile frog, SVL 14.2 mm. Dorsal and ventral view of body, lateral view of head.

Hyperolius guttulatus Günther, 1859

MATERIAL EXAMINED. — **Togo** • 10 ♂, 3 ♀; Kloto; MNHN-RA-1993.6106, MNHN-RA-1993.6107, MNHN-RA-1993.6110-6118, MNHN-RA-1993.6108, MNHN-RA-1993.6109.

DESCRIPTION. — Medium sized tree frog (larger than most other Togolese tree frogs) (SVL 32.3-37.2 mm ♂, 41.6-43.5 mm ♀), with moderately slender but fairly robust body, wider anteriorly than posteriorly. Head slightly longer than broad (HW 29-34% SVL, HL 33-36% SVL). Snout rounded. Tympanum distinct (TYD 2-5% SVL). Tibia short (TL 44-53% SVL). Webbing large, leaving up to two phalanges free; webbing formula: I ½ – 1 ½ II ½ – 1 ½ III ½ – 1 IV 1 ½ – ½ V. Skin smooth on the snout and strongly shagreen on the back and flanks; belly and chest granular; some warts at the corner of the mouth.

COLOURATION. — The dorsal colouration of females is extremely variable, but fades in alcohol. Males are mostly uniformly greenish. For colour descriptions and figures see Schiøtz (1963, 1967, 1999), Rödel (2000), Amiet (2012), Kouamé *et al.* (2015) and Channing & Rödel (2019). This species differs from other large and robust *Hyperolius* species by a dark canthal stripe.

SEXUAL DIMORPHISM. — Males have a subgular, bluish-green vocal sac with a roundish gland. Females are distinctly larger.

HABITATS AND DISTRIBUTION. — *Hyperolius guttulatus* is essentially found in swampy forests. Our localities represent the typical habitat of the species according to Schiøtz (1967), Amiet (1975, 2012) and Rödel (2000).

Hyperolius igbettensis Schiøtz, 1963 (Fig. 6D)

MATERIAL EXAMINED. — **Togo** • 10 ♂; Kpeisolongo (close to Fazao Malfakassa National Park); Coll. GHS-W 2052-2056.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 4 ♂, 8 ♀; Lamto; MNHN-RA-2000.4077-4079, MNHN-RA-2000.4096, MNHN-RA-2000.4099, MNHN-RA-1996.8881, MNHN-RA-2000.4074, MNHN-RA-2000.4075, MNHN-RA-2000.4092, MNHN-RA-2000.4093, MNHN-RA-2000.4095, MNHN-RA-2000.4097 • 1 ♂, 1 ♀; Tchan Tabou; MNHN-RA-2000.5346, MNHN-RA-1997.9583.

DESCRIPTION. — Small (SVL 16.2-21.7 mm ♂, 21.1-23.7 mm ♀) and slender frog, with pointed snout. Head small, slightly longer than wide (HW 24-33% SVL; HL 31-38% SVL). Tympanum barely distinct, covered by skin (TYD 7-11% SVL). Hind leg moderately long (TL 40-58% SVL). Webbing rather large, leaving up to two phalanges free; webbing formula: I 1 – 1 ¼ II ½ – 2 III 1 – 2 IV 1 ½ – ½ V. Fingers and toes with terminal discs. Skin uniformly smooth on the back and flanks, slightly granular on the belly.

COLOURATION. — The dorsal colouration is green with white dorsolateral bands from tip of snout to groin. The canthus rostralis and upper eyelid are brown. The ventral body is white.

SEXUAL DIMORPHISM. — Males have a yellow gland on the subgular vocal sac. Nuptial spines are not distinct, prepollex not distinctly thickened.

HABITATS AND DISTRIBUTION. — The species is widely distributed in the Guinean savannah areas of West Africa. Rödel & Agyei (2003) and Leaché *et al.* (2006) reported its presence in the forest area between Togo and Ghana. Specimens have been studied by Bourgat (1979) in his work on the trematodes of Togo. During our survey, this species was collected in Kpei Solongo (Fazao Malfakassa National Park). Populations of this species have been observed along Mono River in ecological zone III.

TAXONOMY NOTE. — Older publications (Channing *et al.* 2002; Amiet 2005) discussed the taxonomy of these frogs, and regarded them as part of *Hyperolius nasutus* Günther, 1865, with a wide range in western, central and southern Africa. Channing *et al.* (2013) revised the group and validated the name originally proposed by Schiøtz (1963) and limited the distribution of this species to West Africa.

Hyperolius laticeps Ahl, 1931

REMARK

Onomatophore: holophoront (holotype) by monophory, ZMB 46529, juvenile frog (Fig. 7). Onymotope (type locality): Togo; the ergonymotope (Frétey *et al.* 2018) might be the vicinity of Bismarckburg (Sotouboua Prefecture, Centrale Region), the place where the collector, Leopold Fritz Wilhelm Edmund Conradt, was stationed from July 1892 to December 1893 (Tillack *et al.* 2021), thus on the date of collection, the 17 December 1892.

COMMENTS ON THE IDENTITY OF THE HOLOPHORONT OF *HYPEROLIUS LATICEPS*

Ahl (1931) described a species from Togo on a single specimen with a colour pattern which is present in the species of the *Hyperolius picturatus* complex (Kanga *et al.* 2021). This species was mentioned by Laurent (1958), Schiøtz (1967)

TABLE 2. — Principal factor analysis giving factors higher than 1, their individual variance and the cumulative variance of these six components.

	Factor					
Variable	**1**	**2**	**3**	**4**	**5**	**6**
RSVL	–0.299	0.765	0.335	–0.089	–0.059	–0.080
RHW	0.673	0.500	0.356	–0.136	0.175	–0.097
RHL	0.898	0.013	0.196	0.106	0.000	–0.016
RMN	0.854	0.018	0.097	0.219	–0.042	–0.032
RMFE	0.838	0.290	0.163	0.016	0.015	–0.149
RMBE	0.572	–0.062	0.210	–0.273	–0.118	–0.062
RIFE	0.766	–0.146	–0.068	0.289	0.209	–0.228
RIBE	0.786	0.119	0.212	–0.004	0.289	–0.039
RIN	0.613	0.138	0.041	0.187	0.245	–0.360
REN	0.265	–0.181	–0.160	0.776	0.026	0.156
REL	0.812	0.043	–0.136	0.059	0.275	0.074
RTYD	0.243	0.761	0.448	–0.160	0.057	0.037
RTYE	–0.071	–0.796	0.157	–0.337	–0.048	–0.168
RIUE	0.118	0.052	0.027	0.827	0.039	0.017
RUEW	0.672	0.416	0.198	–0.356	0.250	–0.111
RFLL	0.483	–0.203	0.107	0.432	0.007	–0.534
RHAL	0.396	0.279	0.680	–0.050	0.263	–0.043
RTFL	0.251	0.145	0.765	0.105	0.046	–0.133
RTL	–0.154	–0.588	0.156	0.604	–0.089	0.071
RFOL	0.272	0.465	0.713	–0.158	0.169	0.122
RFTL	0.014	0.031	0.635	–0.028	0.070	0.168
RTFOL	–0.144	–0.712	–0.210	0.535	–0.189	0.105
RIMT	0.263	0.672	0.468	–0.265	0.163	–0.212

and Frost (1985). Recent authors considered its taxonomic identity not resolvable. Laurent (1958) regarded its morphological characters more similar to *Leptopelis* without giving precise character states, but in Frost (1985) it was listed as a valid *Hyperolius* species. According to Tillack *et al.* (2021), the holophoront cannot be assigned to any species from West Africa. Consulted on 18 June 2023, the website *Amphibian Species of the World* lists the name among the "Nomina inquirenda", unassigned to a living population. We mention this name, although it is not assigned to a taxon, as, applying the Principle of priority of the International Code of Zoological Nomenclature, after further studies, namely sequencing of the DNA of the onomatophore, it might turn out a valid name.

The original description of *Hyperolius laticeps* by Ahl (1931) is rather detailed, giving morphological description of all body parts, colour characters and a simple drawing. We examined the holophoront (holotype) of the species deposited in the Berlin Museum (ZMB 46529, sex not determined; detailed description in Appendix 1). It is a small, juvenile or subadult frog (SVL 14.2 mm), with a slender body, and a very flattened head forming a dermal fold on snout, probably from squeezing it when fixed. The head width of this specimen is relatively larger than in all other specimens of *Hyperolius* measured for this study, probably due to the compacting. The snout is rounded, the tympanum is poorly distinct. The tibia represents 42% of SVL, which falls within the variation of the *Hyperolius* specimens measured. A small webbing is present on fore limbs. Webbing on feet is moderate, leaving two and half phalanges free (webbing formula: I 1 ½ – 2 II 1 ½ – 2 III 2 – 2 ½ IV 2 ½ – 1 ½ V). The tips of toes bear distinctly enlarged discs with circumventral grooves. The skin is evenly smooth throughout back and flanks; this also can

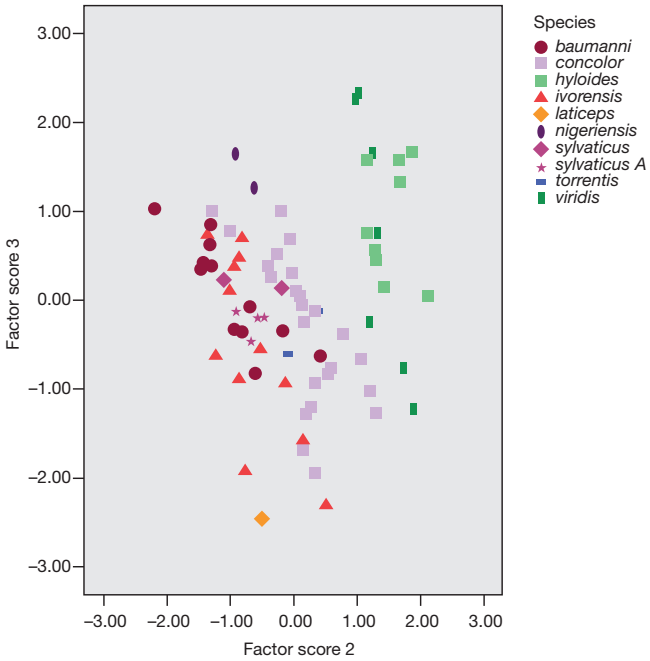

FIG. 8. — Scatterplot of Factor 2 ad 3 of Principal component analysis including 28 size corrected variables (compare Table 2). With **green signs**, *Leptopelis* Günther, 1859 species; **yellowish**, **reddish** or **violet signs**, *Hyperolius* Rapp, 1842 species.

be linked to poor conservation. Belly and chest are granular. The dorsal colour pattern is weak but it corresponds to the figure of Ahl, showing a dark interorbital triangle, large bands on shoulder and pelvic region.

Recently *Hyperolius sylvaticus* was mentioned from Togo (Yégué) (Hillers *et al.* 2009; this paper). This locality is only about 50 km from Sotouboua, where the holophoront of *H. laticeps* could have been collected, and it is far more

to the North than the other occurrences of *H. sylvaticus*. Considering that the dorsal pattern of *H. laticeps* is similar to the banded morph of the dorsal patterns observed in *H. sylvaticus*, it is possible that *H. laticeps* might be taxonomically close to *H. sylvaticus*.

Three subspecies were recognised by Schiøtz (1967) in *Hyperolius sylvaticus* based on morphological characters: *Hyperolius sylvaticus sylvaticus* Schiøtz, 1967, *Hyperolius sylvaticus ivorensis* Schiøtz, 1967 and *Hyperolius sylvaticus nigeriensis* Schiøtz, 1967. Relatively few specimens of these subspecies are known, and only for four vouchers (two from Ghana, two from Côte d'Ivoire) molecular data are available; one comes from the onymotope of *H. sylvaticus*.

Schiøtz (1967, 1999) published photos of the three subspecies and a table summarizing the characters allowing to separate them. The three taxa show two kinds of dorsal colour patterns composed of an interorbital triangle, in contact with a shoulder band, the lumbar band being either separated from this pattern (*H. s. ivorensis*, *H. s. nigeriensis*) or in contact by a narrower band (*H. s. sylvaticus*). Furthermore, *H. s. nigeriensis* can be distinguished by the presence of a dark band on the side of the head behind the eyes, absent in *H. l. ivorensis*. Schiøtz (1967, 1999) described differences between the subspecies in adult size, *H. s. nigeriensis* being distinctly lager than the other subspecies.

Considering the holophoront of *H. laticeps*, the drawing of the specimen shows three dorsal bands, the interorbital and the shoulder band linked but the lumbar band separated. In the specimen the three bands are recognisable but the link is not observable any more. Ahl (1931) mentioned a dark band on the canthus rostralis filling the loreal region, but in the holotype no such band can now be observed on the tympanic region, behind the eyes.

Morphometry

We tried to test the generic and specific allocation of the holophoront specimen of *Hyperolius laticeps* by using a multivariate approach (Ohler 1999). For this, 77 specimens of *Hyperolius* and *Leptopelis* were included in a Principal Component Analysis using 28 morphometric characters corrected for size. The result shows that the specimen ZMB 46529 clearly falls in the proximity of other *Hyperolius* species (Fig. 8), and not with *Leptopelis* species. Concerning the differentiation at the species level, the scatterplots of the species largely overlap in the diagram, which is rather normal in such analyses bearing on closely related congeneric species (Ohler *et al.* 2011). Factor 1 of the PCA (Table 2) shows large values for the head measurements which might be correlated to the head measurements, modified by squeezing, of the *H. laticeps* specimen.

As the morphometrical results are not conclusive, we recommend to proceed molecular analyses on the holophoront of *Hyperolius laticeps*, including topotypical material of West African *Hyperolius*, in particular *Hyperolius picturatus* complex, to allow taxonomic identification. As *Hyperolius laticeps* is an early described species it might be potentially a senior homonym, and thus a valid name.

Hyperolius nitidulus Peters, 1875
(Fig. 9A-D)

Material examined. — **Togo** • 7 ♂; Niamtougou; MNHN-RA-1997.9922-9926, MNHN-RA-1993.6103, MNHN-RA-1993.6104 • 3 ♂; Siou; Coll. GHS-W 1376-1378 • 19 ♂; N'Gambi (Oti-Kéran National Park); MNHN-RA-2008.0221-0228, Coll. GHS-W 0511-0520 • 6 ♂; Bounako (Fazao National Park); Coll. GHS-W 1932, Coll. GHS-W 1934, Coll. GHS-W 1935, Coll. GHS-W 1938, Coll. GHS-W 1941, Coll. GHS-W 1943 • 1 ♂; Tchamba; ZMB 77904 • 6 ♀; N'Gambi; Coll. GHS-W 0555-0557.

Description. — Relatively slender-bodied frog (SVL 20.4-31 mm ♂, 27-34.2 mm ♀), with comparatively stocky head and an oval snout. Head as long as broad (HW 27-31% SVL; HL 29-34% SVL). Tympanum barely distinct, covered by skin (TYD 2-5% SVL). Tibia moderately long (TL 43-55% SVL). Webbing rather large, leaving sup to two phalanges free; webbing formula: I 1 – 1 ½ II ½ - 1 ½ III ½ – 2 IV 1 ½ – ½ V. Toes and fingers terminated by discs. Skin uniformly smooth over entire back and flanks; belly and chest granular.

Colouration. — This species has a yellowish or grayish colour. Juveniles are uniform gray to brown, and turn white at temperatures above 35°C (see summary of the biology in Rödel [2000]). Adults vary from almost uniform yellow with darker lateral bands and blotches to yellow dorsal colouration with brown or dark spots of varying shapes and sizes much. The ventral side is white.

Sexual dimorphism. — The throat of male shows a yellow gland on the subgular vocal sac.

Habitats and distribution. — In Togo this species is characteristic for the Sudanian savannahs. It is very frequent in the North (Kéran Park and around Niamtougou). In the rainy season it often perches on grasses, shrubs or any other pond plant. The southern limit of its distribution in Togo is at Togodo National Park, in ecological zone IV. Specimens were collected in the north-western part along the Atakora mountain range between the villages of Souroukou and Malfakassa in the Bassar region, mainly in the locality of Bounako. The presence of this species in Togo has also been reported by Bourgat (1979) and Segniagbeto *et al.* (2022).

Hyperolius sylvaticus Schiøtz, 1967
(Fig. 10C)

Materials examined. — **Togo** • 1 ♂; Yégué; MNHN-RA-2008.0129 • 2 ♂; Diguengué; Coll. GHS-W-1632, Coll. GHS-W 1657 • 1 ♀; Kovié; MNHN-RA-1993.6093.

Additional materials. — **Liberia** • 4 ♂; Nimba, MNHN-RA-1998.1392-1395.
Côte d'Ivoire • 2 ♀; Lamto, MNHN-RA-1993.3720, MNHN-RA-1993.7693 • 1 ♂, 1 ♀, paratypes of *Hyperolius sylvaticus ivorensis* Schiøtz, 1967; 35 km north of Abidjan; MNHN-RA-1993.3722, MNHN-RA-1993.3723 • 4 ♂, paratypes of *Hyperolius sylvaticus ivorensis* Schiøtz, 1967; Ndenou; MNHN-RA-1993.3724-3727.
Ghana • 1 ♂, paratype of *Hyperolius sylvaticus sylvaticus* Schiøtz, 1967; Bobiri; MNHN-RA-1993.3729.
Nigeria • 2 ♂, paratypes of *Hyperolius sylvaticus nigeriensis* Schiøtz, 1967; 6 miles north of University of Ibadan; MNHN-RA-1993.3729.

Description. — Slender-bodied tree frog (SVL 22.5-23.7 mm ♂, 28-30 mm ♀), with pointed snout. Head slightly longer than broad (HW 30-36% SVL; HL 34-37% SVL). Tympanum poorly distinct (TYD 3-5% SVL). Tibia moderately long (TL 46-50% SVL).

Fig. 9. — Representatives of anuran species from Togo in life: **A**-**D**, *Hyperolius nitidulus* Peters, 1875: **A**, (N'Gambi); **B**, **C**, (Karalé); **D**, (Bounako).

Webbing large; webbing formula: I 1 – 1 ½ II ½ –1 ½ III ½ – 1 ½ IV 1 ½ – ½ V. Toes and fingers terminated by discs. Skin uniformly smooth over entire back and flanks; belly and chest granular.

Colouration. — The dorsal colouration is characterised by a dark mid-dorsal band that includes the inter-orbital band and a sacral spot; in other individuals three large, transversely orientated spots, an inter-orbital, a shoulder and a sacral spot, form the dorsal pattern. The ventral side is white.

Sexual dimorphism. — The male has a subgular vocal sac with a gland.

Habitats and distribution. — The small number of specimens collected makes it difficult to estimate the species range in Togo. The specimen MNHN-RA-2008.0129 was captured in the gallery forest along the Yégué River in Adélé (Hillers *et al.* 2009). Schiøtz (1999) indicated that it is mainly a forest species. The distribution localities mentioned in the Volta region between Togo and Ghana (Rödel & Agyei 2003) confirm the range of this species.

Taxonomy note. — See comment under *Hyperolius laticeps*.

Hyperolius torrentis Schiøtz, 1967
(Fig. 10A, B)

Material examined. — **Togo** • 4 ♂; Akloa; MNHN-RA-2008.0116, ZMB 77905-77907 • 1 ♂; Kouma Tokpli; Coll. GHS-W 0805 • 2 ♂; Missahohé; MNHN-RA-2008.0117; Coll. GHS-W 0827 • 1 ♂; Yégué; Coll. GHS-W 1149 • 2 ♂; Diguengué; ZMB 77908, ZMB 77909 • 2 ♂; Kalaré (Fazao National Park); Coll. GHS-W 1917, Coll. GHS-W 1918.

Description. — Fairly robust, but elongate frog (SVL 33-35 mm ♂, 41 mm ♀) (Schiøtz 1967). Snout rounded or oval. Head longer than broad (HW 33-34% SVL; HL 34-36% SVL). Tympanum distinct (TYD 4-5% SVL). Tibia moderately long (TL 48-50% SVL). Webbing large; webbing formula: I 1 – 1 II 0 – 1 III 0 – 1 IV 1 – 0 V. Toes and fingers terminated by disks. Skin uniformly smooth over the entire dorsal part and on the flanks; belly and chest granular.

Colouration. — The dorsal colouration is yellow to green in life, gray or brownish in alcohol. The flanks are yellow often with brown band or spots. The canthus rostralis is marked by a light-yellow line. The hidden parts of shanks, tips of fingers and toes and web are reddish. The ventral side is yellowish.

Sexual dimorphism. — Males have a subgular vocal sac with a gland.

Habitats and distribution. — This species is found around waterfalls areas in gallery forests of varying density, in montane areas. It becomes active only at very late hours during the night, later than other syntopic frog species. The holotype (ZMUC R074376) described by Schiøtz (1967: 218) originated from the forest area of Togo. This species has long been considered endemic to this area (Schiøtz 1967; Rödel & Agyei 2003; Leaché *et al.* 2006), but a paper by Nago *et al.* (2006) showed its presence in cascades of a forest at Kota, northern Benin. It is likely to have a wider distribution across the Atacora chain.

Genus *Kassina* Girard, 1853

Kassina cassinoides (Boulenger, 1903)

Material examined. — **Togo** • 1 ♂; Kara; MNHN-RA-1998.2304, MNHN-RA-1998.2305.

Additional material. — **Burkina Faso** • 1 ♂; Lay; MNHN-RA-1998.2309 • 1 ♂, 1 ♀; Samba; MNHN-RA-1998.2307, MNHN-RA-1998.2308.

Description. — Medium sized frog (SVL 44-45.3 mm ♂, 50.8-52.7 mm ♀), with elongated and robust body. Snout rounded. Head wider than long (HW 29-34% SVL; HL 27-30% SVL). Tympanum distinct (TYD 56% SVL). Tibia very short (TL 29-33% SVL). Webbing absent, phalanges all free. Tips of fingers and toes without discs. Skin uniformly smooth, only the lower parts of the flanks with some glandular warts; belly and chest strongly granular.

Colouration. — Dorsal colouration with four continuous longitudinal black stripes alternating, two of which are closer to each other, parallel to the vertebral line. The whole belly is white in females. In males the throat is black.

Sexual dimorphism. — The male has a black throat with well-developed glandular folds on the subgular vocal sac. Females are distinctly larger than males.

Habitats and distribution. — This species occurs in Sudanian savannah (Rödel 2000; Böhme 2005; Amiet 2012). We recently observed this species in Bounako and Kanté, in ecological zone II. Segniagbeto *et al.* (2022) reported the presence of this species in ecological zone III. Bourgat (1979) found it in northern Togo.

Kassina fusca Schiøtz, 1967 (Fig. 10D)

Material examined. — **Togo** • 1 ♂; Kanté; MNHN-RA-1998.2012.

Additional material. — **Burkina Faso** • 1 ♂; Lay; MNHN-RA-1998.2302 • 1 ♀; origin unknown; MNHN-RA-1998.2301.

Description. — Small to medium sized frog (SVL 31.5-37.5 mm ♂, 62.0 mm ♀), with a fairly robust and stocky body. Snout oval or rounded. Head as wide as long (HW 26-37% SVL; HL 26-34% SVL). Tympanum distinct (TYD 4-5% SVL). Tibia short (TL 30-39% SVL). Webbing absent, phalanges all free. Skin smooth on back, flank with glandular warts; very granular chest and belly.

Colouration. — Dorsal pattern with large brown, dark, light or white spots of irregular shape. The dorsal surfaces of the forearm, thigh and tibia have the same pattern as the back. The belly, chest and throat are white.

Sexual dimorphism. — In males, the throat is black, with well-developed glandular disc on subgular vocal sac.

Habitats and distribution. — This species is mainly a Sudanian savannah species (Hughes 1988; Böhme *et al.* 1996; Rödel 2000). Its distribution in Togo is limited to ecological zones I and II, similar to the species distribution in neighbouring Benin (Nago *et al.* 2006). The species was reported in Togo by Bourgat (1979) from Kanté. We observed this species in Bounaka and the northern Fazao Malfakassa National Park.

Kassina schioetzi Rödel, Grafe, Rudolf & Ernst, 2002 (Fig. 10E)

Material examined. — **Togo** • 5 ♂, 1 ♀; Tsévié; MNHN-RA-2018.0029, MNHN-RA-2018.0030; Coll. GHS-W 2001, Coll. GHS-W 2002, Coll. GHS-W 2005.

Additional material. — **Côte d'Ivoire** • 1 ♂; Orombo Bokai; MNHN-RA-1998.2230 • 2 ♂; Kotiessou; MNHN-RA-1998.2231, MNHN-RA-1998.2232 • ♀; Lamto; MNHN-RA-2018.0029.

Description. — Small sized (SVL 29.8-36.0 mm ♂, 38.0-38.4 mm ♀), slender frog. Snout rounded. Head wider than long (HW 34-38% SVL; HL 33-40% SVL). Tympanum distinct (TYD 7-9% SVL). Tibia short (TL 34-41% SVL). Webbing absent, phalanges all free. Generally smooth skin on back and sides, with horny spinules in the lower part of the flanks; throat, chest and belly smooth.

Colouration. — The dorsal colouration is marked by large black spots of rounded shape outlined by white on a brown background. The flanks, loreal and tympanic region and tympanum present the same pattern, as do the dorsal part of limbs, legs and feet. The ventral part of the body is white with small black spots.

Sexual dimorphism. — Males have glandular a disc on the subgular vocal sac. Females are larger.

Habitats and distribution. — First vouchered record. This species is characteristic to the Guinean Savannah in the southern part of Togo. Although it is exported in the international pet trade, under the name of *Kassina senegalensis* (Duméril & Bibron, 1841), there was no official record of its presence in Togo. So far, the species had been known from humid, densely vegetated savannahs from southwestern Guinea to northern Ghana. Channing & Rödel (2019) already included the Togolese record in their map.

Kassina senegalensis (Duméril & Bibron, 1841) (Fig. 10F)

Materials examined. — **Togo** • 3 ♂, 2 ♀; Kanté; MNHN-RA-1998.2013, MNHN-RA-1993.2241-2443, MNHN-RA-1993.3994 • 2 ♂, 2 ♀; Lomé; MNHN-RA-1993.3994, MNHN-RA-1998.2241-2243 • 4 ♂; Tsévié; MNHN-RA-2006.2693-2696.

Description. — Small sized frog (SVL 26.5-34.1 mm ♂, 29.5-32.5 mm ♀), with slender, but fairly robust body. Snout rounded. Head slightly longer than broad (HW 29-33% SVL; HL 31-35% SVL). Tympanum distinct, round, very small (TYD 4-5% SVL). Tibia very short (TL 30-37% SVL). Webbing absent, phalanges all free. Back and upper parts of flanks smooth; lower parts of flanks and belly with glandular warts.

Colouration. — The back shows three black longitudinal bands, either continuous or broken into blotches, on a beige background. These bands are starting from the snout and joining at the vent. The canthus rostralis and the loreal and tympanic regions are black. The snout is beige with some black spots, the edge of the upper lip is beige.

Sexual dimorphism. — Males have a glandular disc on the subgular vocal sac.

Habitats and distribution. — *Kassina senegalensis* is widespread throughout Africa, ranging from Senegal to southern Africa (Perret 1966; Lamotte 1967a; Schiøtz 1967; Channing & Rödel 2019). In Togo, it is very frequent in the region of Tsévié where it was observed in the rainy season around small pools bordered by grasses. It has a nationwide distribution. Bourgat (1979) indicated its presence in the South as well as in the North of Togo. Segniagbeto *et al.* (2022) reported the species presence in the ecological zones III, IV and II.

Fig. 10. — Representatives of anuran species from Togo in life: **A**, **B**, *Hyperolius torrentis* Schiøtz, 1967: **A**, (Kalaré); **B**, (Diguengué); **C**, *Hyperolius sylvaticus* Schiøtz, 1967 (Diguengué); **D**, *Kassina fusca* Schiøtz, 1967 (Bounako); **E**, *Kassina schioetzi* Rödel, Grafe, Rudolf & Ernst, 2002 (Tsévié); **F**, *Kassina senegalensis* (Duméril & Bibron, 1841) (Tsévié).

Family Phrynobatrachidae Laurent, 1941
Genus *Phrynobatrachus* Günther, 1862

Phrynobatrachus calcaratus
(Peters, 1863)
(Fig. 11A)

Material examined. — **Togo** • 1 ♂; Agoté; MNHN-RA-2008.0171 • 3 ♂; Alédjo; MNHN-RA-2008.0175-0177 • 1 ♂; Akloa; Coll. GHS-W 0663 • 1 ♂; Atakpamé; MNHN-RA-2006.2298 • 1 ♂, 2 ♀; Diguingué; Coll. GHS-W 0662, Coll. GHS-W 0665, MNHN-RA-2008.0133 • 11 ♂, 2 ♀; Dobadié; MRAC B-104378-B-104380, MRAC B-104351-B-104360 • 1 ♂; Kloto; MNHN-RA-2006.2300 • 1 ♂, 1 ♀; Kouma-Tokpli; MNHN-RA-2008.0172, MNHN-RA-2008.0174 • 3 ♂; Missahohé; Coll. GHS-W 0686, Coll. GHS-W 0687, Coll. GHS-W 0690 • 1 ♂, 1 ♀; Oga; MNHN-RA-2008.0178, MNHN-RA-2008.0173 • 6 ♂, 1 ♀; Yégué; Coll. GHS-W 0646, Coll. GHS-W 0649, Coll. GHS-W 0667, Coll. GHS-W 0682, Coll. GHS-W 0685, Coll. GHS-W 0688, Coll. GHS-W 0692 • 2 ♂; Yo (Agomé Yo); Coll. GHS-W 0661, Coll. GHS-W 0664 • 1 ♂; Kovié; MNHN-RA-2006.2299.

DESCRIPTION. — Very small frog (SVL 12.1-19.4 mm ♂, 22.0-25.9 mm ♀), with relatively compact body. Snout pointed, slightly protruding. Head hardly longer than broad (HW 30-39% SVL; HL 34-44% SVL). Tympanum distinct (TYD 4-9% SVL). Eyelids with suprapalpebral cornicle. Hind leg rather long (TL 46-62% SVL). Webbing absent, all phalanges free. Skin shagreen on snout and in interorbital space, smooth on sides of head; anterior and posterior parts of the back as well as the flanks with numerous very prominent glands; supratympanic fold indistinct; dorsal part of the forearm, tarsus and tibia shagreen, dorsal part of the thigh bearing glands; throat, chest, belly and ventral surface of the thigh smooth.

COLOURATION. — The dorsal colouration is brown, olive or black, sometimes with a light or red mid-dorsal line. The flanks have the same colouration as the back. The dorsal part of the forearm, tarsus, tibia and thigh is brown with darker transverse bands. The chest and belly are white and finely spotted with small black spots.

SEXUAL DIMORPHISM. — The adult males are smaller than females. Males have a strongly pleated subgular vocal sac, black in colour.

HABITATS AND DISTRIBUTION. — *Phrynobatrachus calcaratus* is a forest species, occurring as well in forests of the humid savannah zone (Rödel 2000). It lives in leaf litter, often quite far from water bodies. The specimens examined were collected in ecological zones II and IV. The northernmost record of the species in Togo is in the Alédjo forest. The species has been reported in Togo by Bourgat (1979), Bourgat *et al.* (1996), Segniagbeto *et al.* (2007), and Hillers *et al.* (2009).

Phrynobatrachus francisci Boulenger, 1912
(Fig. 11B)

MATERIAL EXAMINED. — **Togo** • 1 ♂, 2 ♀; Kanté; MNHN-RA-1994.4457-4459 • 9 ♂, 1 ♀; Tsévié; MNHN-RA-1997.2518-2526 • 2 ♀; Aou Losso; MNHN-RA-2008.0200, MNHN-RA-2008.0201 • 3 ♀; Atakpamé; MNHN-RA-1994.4465-4467.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 18 ♂, 3 ♀; Lamto; MRCA-B-104928-B-104930, B-104936-B-104937, MNHN-RA-1993.3605-3620.
Sierra Leone • 1 ♂, 2 ♀; Kassewe; MNHN-RA-1995.878, MNHN-RA-1995.880.
Tchad • 3 ♂, 2 ♀; Léré; MNHN-RA-1993.4284-4291.

DESCRIPTION. — Small frog (SVL 15.0-23.0 mm ♂, 19.2-27.5 mm ♀), with a more or less stocky body. Snout short, pointed, slightly exceeding mouth slit. Head longer than broad (HW 27-37% SVL; HL 27-44% SVL). Tympanum reduced (TYD 5-9% SVL). Tibia rather long (TL 39-60% SVL). Webbing small with three phalanges free; webbing formula: I 1 – 2 II 1 – 3 III 2 – 3 IV 3 – 2 V. Upper snout smooth, rough interorbital space and loreal region, back with very prominent warts, flanks with small glandular warts; distinct supratympanic fold; dorsal side of forearm, tarsus and shank shagreen, that of the thigh with small glandular warts; ventral and posterior sides of thigh shagreen; throat, chest and belly smooth.

COLOURATION. — The general colouration of the back is brown (dark brown when stored in alcohol). In some specimens, the back has dark, light, irregularly shaped spots, especially on the varicosities. The dorsal parts of forearm, tarsus, tibia and thigh has dark and light transverse bars. The back of the thigh has light brown longitudinal bands. The chest, belly and underside of the thigh are whitish. The throat is white with some brown spots in some females and juveniles.

SEXUAL DIMORPHISM. — The males are smaller than the females and have a subgular vocal sac marked by grooves or longitudinal gular folds; their skin more heavily pigmented than in the females, resulting in a dark or black colouration.

HABITATS AND DISTRIBUTION. — *Phrynobatrachus francisci* is mainly a savannah species and rarely occurs in degraded forest areas. It is usually found near ponds, swamps and small rivers in savannah during the rainy season. Lamotte & Xavier (1966a) indicated that the species is more terrestrial than the more aquatic *P. latifrons* (Ahl, 1924). In Togo, it was reported by Bourgat (1979) and Segniagbeto *et al.* (2007). The distribution of the species as reported by Lamotte & Xavier (1966a) and Rödel (2000) extends from Senegal to Nigeria.

Phrynobatrachus gutturosus (Chabanaud, 1921)
(Fig. 11C)

MATERIAL EXAMINED. — **Togo** • 1 ♂; Diguengue; ZMB 77916.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 5 ♂, 10 ♀; Lamto; MNHN-RA-1993.7962, MNHN-RA-2000.3671, MNHN-RA-2000.3672, MNHN-RA-2000.5361, MNHN-RA-2000.5581, MNHN-RA-1979.5693-5695, MNHN-RA-1979.5697, MNHN-RA-1979.5698, MNHN-RA-1993.7960, MNHN-RA-1993.7967, MNHN-RA-2000.5358, MNHN-RA-2000.5578, MNHN-RA-2000.5579.
Guinea • 3 ♂, 7 ♀; Nimba; MNHN-RA-1952.0144-A-144-E, MNHN-RA-1970.0101, MNHN-RA-1970.0104, MNHN-RA-1970.0105, MNHN-RA-1970.0108.

DESCRIPTION. — Small (SVL 15.1-17.8 mm ♂, 17.4-21.7 mm ♀), slender species. Snout pointed, protruding beyond mouth slit. Head very small, longer than broad (HW 27-34% SVL; HL 34-42% SVL). Tympanum indistinct. Tibia short (TL 48-56% SVL). Webbing absent or rudimentary, all phalanges free. Upper snout, loreal region and interorbital space smooth; back with flat glandular warts; flanks smooth; dorsal side of forearm, tarsus, tibia and thigh smooth; ventral and posterior part of thighs smooth; throat, chest, and belly in females and juveniles smooth.

COLOURATION. — The dorsal colouration is brown with darker dorsal warts. The flanks, the loreal and tympanic regions are brown with some dark spots. The dorsal parts of the forearm, tarsus, tibia and thigh shows light brown transverse bars. The back of the thigh has light brown longitudinal bands. The chest, belly, ventral thigh and palm are whitish.

SEXUAL DIMORPHISM. — The males are smaller than females and have a black throat and a subgular vocal sac with glandular folds, bordered laterally by longitudinal folds.

HABITATS AND DISTRIBUTION. — *Phrynobatrachus gutturosus* has forest and savannah populations, especially in gallery forests (Rödel 2000), and consists of a complex of cryptic species (Zimkus *et al.* 2010). Bourgat (1979) reported the presence of the species in Togo. Segniagbeto *et al.* (2007) could not examine Togolese *P. gutturosus*. A presumed record, MNHN-RA-2000.3684-3687, collected in Kloto and registered under the name *P. gutturosus*, in fact proved to be a *P. latifrons*. Further work is needed to establish the distribution of the species in Togo.

Phrynobatrachus latifrons (Ahl, 1924)
(Fig. 11B)

MATERIAL EXAMINED. — **Togo** • 1 ♂, 2 ♀; Agoté; MNHN-RA-2008.0188, MNHN-RA-2008.0191, MNHN-RA-2008.0195 • 1 ♂; Kouma-Tokpli; MNHN-RA-2008.0192 • 2 ♂, 4 ♀; Kovié; MNHN-RA-1979.6864, MNHN-RA-1979.7267, MNHN-RA-1979.7313, MNHN-RA-1979.7347, MNHN-RA-1979.7288, MNHN-RA-1979.8286 • 1 ♂; Niamtougou; MNHN-RA-1979.6877

Fig. 11. — Representatives of anuran species from Togo in life: **A**, *Phrynobatrachus calcaratus* (Peters, 1863) (Kalaré); **B**, *Phrynobatrachus francisci* Boulenger, 1912 (Mango); **C**, *Phrynobatrachus gutturosus* (Chabanaud, 1921) (Assoukoko); **D**, *Phrynobatrachus latifrons* (Ahl, 1924) (Akloa); **E**, *Phrynobatrachus natalensis* (Smith, 1849) (Koui); **F**, *Phrynobatrachus plicatus* (Günther, 1859) (Assoukoko).

• 5 ♂, 8 ♀; Oga; MNHN-RA-2008.0180-0187, MNHN-RA-2008.0190, MNHN-RA-2008.0193, MNHN-RA-2008.0194, MNHN-RA-2008.0196 • 1 ♀; Alédjo; MNHN-RA-2008.0179 • 1 ♀; Aou Losso; MNHN-RA-2008.0199 • 2 ♀; Badou; MNHN-RA-1979.7212, MNHN-RA-1979.7294 • 1 ♀; Gadjagan; MNHN-RA-2008.0189 • 9 ♀; Kloto; MNHN-RA-1979.6878, MNHN-RA-1979.6885, MNHN-RA-1979.6957, MNHN-RA-1979.6975, MNHN-RA-1979.7355, MNHN-RA-2000.3684-3687.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 4 ♂, 1 ♀; Kotiessou; MNHN-RA-1989.4886, MNHN-RA-1989.4887, MNHN-RA-1989.4889, MNHN-RA-1989.4892, MNHN-RA-1989.4895 • 4 ♂, 1 ♀; Lamto; MNHN-RA-1989.4905, MNHN-RA-1989.4909, MNHN-RA-1989.4912-4914 • 1 ♀; Tommodé; MNHN-RA-1993.4141, MNHN-RA-1993.4142.

DESCRIPTION. — Slender small sized frog (SVL 15.3-20.0 mm ♂, 18.3-27.3 mm ♀). Snout pointed, slightly protruding beyond mouth slit. Head longer than broad (HW 26-35% SVL; HL 32-45% SVL). Tympanum distinct (TYD 4-9% SVL). Hind leg moderately long (TL 45-56% SVL). Webbing moderate with some phalanges free; webbing formula: I ½ – 1 II 0 – 1 III ½ – 2 IV 2 – ½ V. Tips of fingers and toes pointed. Skin smooth on snout, slightly shaggy or granular in orbital space of most specimens; back and flanks with glandular warts of varying size; distinct supratympanic fold; dorsal surfaces of forearm, tarsus, tibia and thigh smooth or with small, often rounded glandular warts; throat, chest and belly smooth or with transversal folds on the belly; ventral surface of thighs granular.

COLOURATION. — The dorsal colouration is variable: brown, dark brown or black-brown, beige or grayish uniform, or sometimes with green spots. Red, green or yellow vertebral bands and lines may be present. The dorsal face of forearm, thigh and tibia is crossed with light and dark brown transverse bands.

SEXUAL DIMORPHISM. — The adult males are smaller than the females. Males have a bright yellow subgular vocal sac with hardly distinct folds and prominent nuptial pads on first finger.

HABITATS AND DISTRIBUTION. — This species occurs in all ecosystems and ecological zones throughout the country. It was described in Togo by Ahl (1924) as *Phrynobatrachus latifrons togoensis*. Bourgat (1979), Segniagbeto *et al.* (2007, 2022) and Hillers *et al.* (2009) have reported the presence of this species in Togo under the name *Phrynobatrachus accraensis* (Ahl, 1925).

Phrynobatrachus natalensis (Smith, 1849) (Fig. 11E)

MATERIAL EXAMINED. — **Togo** • 3 ♂, 2 ♀; Alédjo; MNHN-RA-2008.0158-0162 • 1 ♂, 1 ♀; Aou Losso; MNHN-RA-2008.0197, MNHN-RA-2008.0198 • 6 ♂, 2 ♀; Koui; MNHN-RA-2008.0163-0170 • 2 ♂, 1 ♀; Klonou; MRAC B-104266, MRAC B-104267, MRAC B-104271 • 3 ♂, 1 ♀; Séva (sur la route de Kpalimé); MRAC B-104324-B-104327.

ADDITIONAL MATERIAL. — **RD Congo** • 3 ♂, 2 ♀; Kaziaba; MRAC B-71720, MRAC B-71722-71725.

DESCRIPTION. — Frog of medium size (SVL 25.4-31.1 mm ♂, 27.6-35.5 mm ♀), with a stocky body. Snout short, oval, barely exceeding mouth slit. Head massive, as long as broad (HW 30-45% SVL; HL%30-41% SVL). Tympanum distinct (TYD 6-10% SVL). Hind leg rather long (TL 44-56% SVL). Webbing small, leaving three phalanges free; webbing formula: I 1 – 2 II 1 – 3 III 2 – 3 IV 3 – 2 V. Back with distinctly protruding warts; flanks with small glandular warts; distinct supratympanic fold, from the posterior end of the eye to the shoulder; dorsal parts of forearm, tarsus and shank shagreen, that of thigh bearing numerous glandular granules; ventral and posterior sides of the thighs shagreen; throat, chest and belly smooth.

COLOURATION. — The general colouration of the back is brown (dark brown when stored in alcohol) or grayish, more or less dark. In some specimens, spinules give the appearance of dark and light spots of irregular shape. The dorsal parts of forearm, tarsus, tibia and thigh have dark and light transverse bars. The rear side of the thigh is marbled with dark and light longitudinal bands of approximately the same size. The chest, belly and ventral side of the thigh are whitish. The throat is white with some brown spots in females and juveniles.

SEXUAL DIMORPHISM. — The males are smaller than the females and have a subgular vocal sac marked by longitudinal gular folds, heavily pigmented, thus showing a dark gray or black colour.

HABITATS AND DISTRIBUTION. — *Phrynobatrachus natalensis* is essentially a Guinean savannah species. It is also associated with dense dry forest and open forest ecosystems characteristic of ecological zone II. The species is relatively common in the Koui region and in the Alédjo forest. It is found especially near ponds, small swamps, and small rivers in savannah in the rainy season. The species has been reported in Togo by Bourgat (1979) and Segniagbeto *et al.* (2007, 2022).

Phrynobatrachus plicatus (Günther, 1849) (Fig. 11f)

MATERIAL EXAMINED. — **Togo** • 2 ♂, 6 ♀; Tové; MNHN-RA-1994.4449-4456.

ADDITIONAL MATERIAL. — **Côte d'Ivoire** • 14 ♂, 19 ♀; Lamto; MNHN-RA-1979.6520, MNHN-RA-1979.6529, MNHN-RA-1979.6530, MNHN-RA-1979.6542, MNHN-RA-1979.6547, MNHN-RA-1979.6567, MNHN-RA-1979.6569-6577, MNHN-RA-1979.6591, MNHN-RA-1979.6593, MNHN-RA-1979.6602, MNHN-RA-1979.6605, MNHN-RA-1979.6634, MNHN-RA-1979.6635, MNHN-RA-1979.6640-6642, MNHN-RA-1979.6663, MNHN-RA-1979.6668, MNHN-RA-1979.6670, MNHN-RA-1979.6672-6676, MNHN-RA-1993.2686, MNHN-RA-1993.2689.
Guinea • 4 ♂; MNHN-RA-1944.0078, MNHN-RA-1944.0079, MNHN-RA-1952.86, MNHN-RA-1952.147.
Liberia • 1 ♂, 2 ♀; Nimba; MNHN-RA-1995.5778, MNHN-RA-1995.5796, MNHN-RA-1995.5797.

DESCRIPTION. — Medium sized (SVL 22.5-35.0 mm ♂, 25.4-40.7 mm ♀), slender-looking species. Snout obtuse, barely exceeding mouth slit. Head massive, longer than broad (HW 27-40% SVL; HL 33-46% SVL). Tympanum distinct (TYD 5-8% SVL). Shank long (TL 43-72% SVL). Webbing small with three phalanges free; webbing formula: I 1 – 2 II 1 – 2 ½ III 2 – 3 IV 3 – 2 V. Upper snout, loreal region, interorbital space, flanks and back slightly shagreen; back marked by two glandular folds from the eyelids, converging towards the scapular region, then moving externally before ending in the sacral region; some spinules on the flanks and posteriorly in the dorsal region; distinct supratympanic fold; dorsal sides of the forearm, tarsus, tibia and thigh finely granular; throat smooth in females and juveniles.

COLOURATION. — The general colouration of the back is brownish or brownish gray. The loreal and tympanic region are dark brown to black. The dorsal parts of forearm, tarsus, tibia and thigh have dark and light transverse bars. The dorsal side of the tarsus is usu-

ally black in colour. The back side of the thigh has dark and light longitudinal bands. The chest, belly and ventral side of the thigh are whitish. The throat and chest have small cloudy spots intensely coloured in brown.

Sexual dimorphism. — The males are smaller than the females. They have a subgular vocal sac marked by longitudinal glandular gular folds, intensely pigmented, giving the appearance of a black colouration on the throat and chest. Nuptial pads are very prominent and occupy the dorsal and inner sides of the thumb and prepollex.

Habitats and distribution. — *Phrynobatrachus plicatus* is a West African forest species (Rödel *et al.* 2009). Its distribution extends from Guinea to western Nigeria (Channing & Rödel 2019). All specimens examined were collected in the forest zone of Togo (Tové, ecological zone IV). The collection areas of the species in Togo published by Lamotte & Xavier (1966b), Lamotte (1967a) and Rödel *et al.* (2005) agree with this habitat characterisation. This species has further been reported in Togo by Lamotte & Xavier (1966b), Bourgat (1979), Segniagbeto *et al.* (2007) and Hillers *et al.* (2009).

Family Phrynomeridae Noble, 1931

Phrynomantis microps Peters, 1875
(Fig. 12A)

Material examined. — **Togo** • 1 ♂, 1 ♀; Tsévié; MNHN-RA-2006.2176, MNHN-RA-2006.2179.

Additional material. — **Guinea** • 1 individual; ZMB 6437.

Description. — Frog of medium size (SVL 38 mm ♂, 46.2 mm ♀). Head slightly wider than long (HW 27-28% SVL; HL 23-24% SVL mm). Tympanum distinct (TYD 7% SVL). Tibia short (TL 35-36% SVL). Webbing absent, all phalanges free. Entire skin smooth.

Colouration. — The back is entirely red; the inguinal region and the flanks are black. The top of the forearm, arm, thigh and tibia are black with red spots. The ventral side is black with some small white dots.

Sexual dimorphism. — The male is smaller than the female, with a darker throat.

Habitats and distribution. — This is a savannah species (Rödel 2000; Ayoro *et al.* 2020). It is very frequent in ecological zone V around Tsévié, where specimens are regularly collected for export: 1055 specimens were exported by Togo between 2002 and 2004 according to the Reports of the CITES Management Authority of the Ministry of Environment and Forest Resources of Togo. Its presence in Togo was reported by Bourgat (1979) and Segniagbeto *et al.* (2022).

Family Pipidae Gray, 1825
Subfamily Dactylethrinae Hogg, 1838
Genus *Xenopus* Wagler, 1827

Xenopus fischbergi
Evans, Carter, Greenbaum, Gvoždík, Kelley, McLaughlin, Pauwels, Portik, Stanley, Tinsley, Tobias & Blackburn, 2015
(Fig. 12B)

Material examined. — **Togo** • 9 ♂; Bassar; MNHN-RA-1979.5304-5312 • 2 ♂, 3 ♀; Kanté; MNHN-RA-2006.2244-2248.

Description. — Medium sized frog (SVL 27.5-32.5 mm ♂, 44-53.8 mm ♀), with flattened body. Snout rounded. Head as long as broad (HW 22-29% SVL; HL 26-32% SVL). Eye larger (EL 1.6-2.8 mm) than in *Xenopus tropicalis*; subocular tentacle short, about half eye diameter. Tympanum indistinct. Hind leg rather short (TL 38-45% SVL). Webbing complete, no free phalanges. Three horny claws on toes I, II and III; metatarsal tubercles without horny claw. Skin smooth, with 22-24 dorsolateral lateral-line marks from the back of eyelid to rear back; belly smooth.

Colouration. — The dorsal colouration is gray. The flanks, upper forearm, thigh and tibia are also gray. The belly is lighter.

Sexual dimorphism. — The males are smaller than the females. They have no vocal sac.

Habitats and distribution. — This species was formerly included in *Xenopus muelleri* (Peters, 1844), which is now known to be restricted to eastern and southern Africa. The West African populations have been described as a distinct species, *Xenopus fischbergi* (Evans *et al.* 2015). Essentially a savannah form, this species is present in the savannahs of ecological zones I and II. It is very common in the Bassar and Kanté regions. Its distribution in the southern regions of the country remains doubtful. A population of the species was reported from the ecological zone III (Segniagbeto *et al.* 2022). This species was reported in Kanté and Kara regions by Bourgat (1979).

Xenopus tropicalis (Gray, 1864)
(Fig. 12C)

Material examined. — **Togo** • 4 ♀; Agoté; MNHN-RA-2006.2172-2175.

Description. — Medium to large frog (SVL 40-56 mm ♀), with flattened body. Snout rounded. Head very small, wider than long (HW 26-29% SVL; HL 21-26% SVL). Very small eyes and eyelids (EL 1.4-1.6 mm diameter); a very small subocular tentacle, about one third of eye dimeter. Tympanum indistinct. Hind leg rather short (TL 36-50% SVL). Webbing complete, no free phalanges. Four horny claws, three at the toes I, II, III and one covering the metatarsal tubercle. Skin smooth, lateral line system with 18-20 tubercles from eyelid to rear part of flanks, also on neck region and border of lower jaw; belly smooth.

Colouration. — The dorsal colouration is dark brown or black depending on the habitat. The dorsal part of forearm, thigh and tibia is also dark. The belly is lighter.

Sexual dimorphism. — Differences between males and females are little marked (Arnoult & Lamotte 1968). Males are thinner and smaller than females, the outer sides of their fingers carry black nuptial pads and their dermal lobes above vent are larger than in females. The head is narrower in males than in females.

Habitats and distribution. — *Xenopus tropicalis* is a forest species that enters the savannah zone along gallery forests (Rödel 2000). It is most frequent in the ecological zone IV (Kpélé and Badou regions). It lives in ponds or abandoned wells where it hides in the mud during the dry season. It is widespread in humid forests and savannahs with forest areas or forest galleries in Kpélé and Akposso. Fifty-nine specimens of this species were collected by Bourgat (1979) in Kandé (Kanté), Lamakara (Kara), Niamtougou, Sotougoua (Sotouboua), Badou and Klouto. The occurrence of this species in the ecological zones I, II, III and IV is known from these specimens.

Family Ptychadenidae Dubois, 1987
Genus *Hildebrandtia* Nieden, 1907

Hildebrandtia ornata (Peters, 1878)

Material examined. — **Togo** • 1 ♂; Kanté; MNHN-RA-1993.6143.

Additional material. — **Burkina Faso** • 1 ♂, 1 ♀; Pabré; MNHN-RA-1985.1371, MNHN-RA-1995.5755 • 1 ♀; Ouagadougou; MNHN-RA-2000.5619 • 1 ♂; MNHN-RA-1996.3928.

Description. — Large frog (SVL 57.3-64.6 mm ♂, 52.1-57.4 mm ♀), with long, robust body. Snout rounded. Head longer than broad (HW 37-45% SVL; HL 38-43% SVL). Tympanum distinct (TYD 9-12% SVL). Hind legs moderately long (TL 41-48% SVL). Toes short and strong. Webbing small, leaving more than three of the phalanges free; webbing formula: I 1– 2 ½ II 2 – 3 III 2 – 3 ½ IV 3 ½ – 1 ½ V. Back smooth, lower part of flank with small horny spinules; dorsal folds absent.

Colouration. — A distinct creamy white, green or brown lateral line is present on the side of the back from the tip of snout to the end of the body, separated by two dark longitudinal bands from the posterior region of the head to vent. The two dark longitudinal bands are followed by a dorsolateral brown band from the snout ending in the inguinal region. This last band is separated at the scapular region by a dark band followed by a brown band on the flank. The sides of head including the tympanic region and the tympanum, as well as the flanks, are dark brown. The most characteristic feature of this species are two white Y-shaped figures on the black throat.

Sexual dimorphism. — Males have vocal sac openings with slits extending to the armpits and nuptial pads on first to third fingers.

Habitats and distribution. — *Hildebrandtia ornata* is a savannah species known from Senegal to Ethiopia, south to northern parts of South Africa, Botswana and Namibia (Channing & Rödel 2019). In Togo, the presence of the species was reported by Bourgat (1979) and Rödel (2000: 84).

Genus *Ptychadena* Boulenger, 1917

Ptychadena aff. ***aequiplicata*** (Werner, 1898)

Remark

No specimen was observed. The occurrence of the species in the forest zone between Togo and Ghana was reported by Rödel & Agyei (2003). Our field work could not confirm its presence in Togo. We assume its presence in the country, and especially in ecological zone IV. The area from Akloa to Diguengue might be favourable to this species. The species as currently understood has a wide distribution in West and Central Africa (Rödel *et al.* 2002), but actually comprises a complex of species (revision in preparation; Rödel *et al.* unpubl. data).

Ptychadena arnei Perret, 1997

Material examined. — **Togo** • 1 ♂; Lomé; MNHN-RA-2000.0993.

Additional material. — **Côte d'Ivoire** • 15 ♂; Lamto; MNHN-RA-1993.6160, MNHN-RA-1996.3595, MNHN-RA-1996.3605-3607, MNHN-RA-1996.3609, MNHN-RA-1996.3611, MNHN-RA-1996.8788, MNHN-RA-1996.8909, MNHN-RA-1996.8928-8930, MNHN-RA-1996.8953-8955, MNHN-RA-1998.8961; 20 ♀; Lamto; MNHN-RA-1993.6158, MNHN-RA-1994.5468, MNHN-RA-1996.3584, MNHN-RA-1996.3596, MNHN-RA-1996.3598, MNHN-RA-1996.3603, MNHN-RA-1996.3604, MNHN-RA-1996.3612, MNHN-RA-1996.8770, MNHN-RA-1996.8789, MNHN-RA-1996.8790, MNHN-RA-1996.8910, MNHN-RA-1996.8911, MNHN-RA-1996.8930-8932, MNHN-RA-1996.8956-8958, MNHN-RA-1998.8962.

Description. — Medium sized frog (SVL 29.3-33.7 mm ♂, 31.2-38.9 mm ♀), with slender, elongated body. Snout pointed, protruding, extending beyond mouth slit. Head longer than broad (HW 26-27% SVL; HL 36-37% SVL). Tympanum distinct (TYD 4-7% SVL). Tibia long (TL 60-65% SVL). Webbing small, leaving several phalanges free; webbing formula I 2 – 2 ½ II 1 ½ – 3 III 2 – 3 IV 3 – 2 V. Back with four pairs of regularly symmetrical and continuous glandular folds, the innermost pair being short, the outermost forming the dorsolateral folds; skin of back finely granular.

Colouration. — The back and flanks are brown in colour. A distinct medio-dorsal band, whitish in colour, starting from snout and ending at vent. The posterior parts of the tibia and thigh have dark transverse bars. The ventral side is whitish.

Sexual dimorphism. — The male has two vocal sac openings through oblique bilateral slits on each side of the throat, and nuptial pads on first to third finger.

Habitats and distribution. — **First record**. This species is reported herein for the first time for Togo. Its habitat is humid or secondary savannahs and gallery forests, and it has a distribution from Senegal to Côte d'Ivoire (Perret 1997; Lamotte & Ohler 2000; Kanga *et al.* 2021). Due to anthropogenic activities, natural habitats around Lomé and in the southern region of the country are quickly disappearing. The areas which are still near natural in the southern parts of the country should be investigated for further records of this species.

Ptychadena bibroni (Hallowell, 1845)
(Fig. 12D)

Material examined. — **Togo** • 4 ♂, 20 ♀; Kanté; MNHN-RA-2006.2211, MNHN-RA-2006.2213, MNHN-RA-2006.2214, MNHN-RA-2006.2218, MNHN-RA-1979.6801-6814, MNHN-RA-1979.6916, MNHN-RA-1979.6818-6822.

Description. — Medium sized frog (SVL 31-39 mm ♂, 32-40 mm ♀), with more or less elongated body. Snout pointed and protruding beyond mouth slit. Head longer than broad (HW 30-38% SVL; HL 37-48% SVL). Tympanum distinct (TYD 5-8% SVL). Hind leg long (TL 45-62% SVL). Webbing moderate, leaving up to three phalanges free; webbing formula: I 2 – 2 ½ II 1 ½ – 2 ½ III 1 ½ – 3 IV 2 ½ – ½ V. Back with four pairs of glandular folds, including a pair of sacral folds, the outermost forming the dorsolateral folds; skin of the finely granular back; some glandular granules on the flanks.

Colouration. — The dorsal colouration is brown with some darker spots, often with a distinct vertebral line. The dorsal parts of the tibia and thigh have dark transverse bars. The rear side of the thighs is marbled with light brown longitudinal stripes. The belly is white.

Sexual dimorphism. — The male is distinguished by vocal sacs visible as oblique lateral slits at the corner of the mouth, and nuptial pads on first to third fingers.

FIG. 12. — Representatives of anuran species from Togo in life: **A**, *Phrynomantis microps* Peters, 1875 (Tsévié); **B**, *Xenopus fischbergi* Evans, Carter, Greenbaum, Gvoždík, Kelley, McLaughlin, Pauwels, Portik, Stanley, Tinsley, Tobias & Blackburn, 2015 (Siou); **C**, *Xenopus tropicalis* (Gray, 1864) (Agoté); **D**, *Ptychadena bibroni* (Hallowell, 1845) (Kovié); **E**, *Ptychadena mascareniensis* (Duméril & Bibron, 1841) (Kovié); **F**, *Ptychadena oxyrhynchus* (Smith, 1849) (Tchamba),

HABITATS AND DISTRIBUTION. — This species is very common in both the South and North of Togo. It is frequent in savannah, dry and open forest areas. It can be observed around ponds and rivers during the rainy season. It was reported by Bourgat (1979) from Lomé, Kovié and Kanté, by Lamotte & Ohler (1997) from Kovié and Kanté and by Segniagbeto *et al.* (2022) from the ecological zone III. This species is also common in the ecological region between Togo and Ghana, in particular an area that would mirror the ecological zones II and IV of Togo (Rödel & Agyei 2003; Leaché *et al.* 2006).

Ptychadena mascareniensis (Duméril & Bibron, 1841) (Fig. 12E)

Materials examined. — **Togo** • 4 ♂, 24 ♀; Agoé; MNHN-RA-2006.2108-2112, MNHN-RA-2006.2118-2123, MNHN-RA-2006.2140-2155 • 1 ♂, 6 ♀; Djagblé; MNHN-RA-2006.2105, MNHN-RA-2006.2101-2104, MNHN-RA-2006.2106, MNHN-RA-2006.2107 • 5 ♂, 24 ♀; Kovié; MNHN-RA-1995.1999, MNHN-RA-1995.2000, MNHN-RA-1995.2018, MNHN-RA-1995.2024, MNHN-RA-1995.2027, MNHN-RA-1995.1233-1235, MNHN-RA-1995.1940, MNHN-RA-1995.1985, MNHN-RA-1995.1987, MNHN-RA-1995.1989-1996, MNHN-RA-1995.2019-2023, MNHN-RA-1995.2026, MNHN-RA-1995.2033, MNHN-RA-1995.2034, MNHN-RA-1995.2039, MNHN-RA-1995.2044 • 1 ♂, 24 ♀; Togblékopé; MNHN-RA-2006.2113-2118, MNHN-RA-2006.2125-2139.

Description. — Frog of moderate size (SVL 30-43 mm ♂, 28-53 mm ♀), usually slender and elongated body. Snout pointed, protruding beyond mouth slit. Head longer than broad HW 25-33% SVL; HL 34-44% SVL). Tympanum distinct (TYD 6-9% SVL). Hind legs long (TL 51-68% SVL). Webbing small, leaving three phalanges free; webbing formula: I 1 ½ – 2 ½ II 1 ½ – (2 ½ or 3) III (1 ½ or 2) – 3 IV 3 – 1 ½ V. Back with four pairs of continuous glandular folds, the innermost pair bordering the medio-dorsal line from the palpebral region to the vent, the fourth outermost pair of folds constituting the dorsolateral folds; finely granular skin on the back; some glandular granules on the flanks; belly smooth.

Colouration. — The dorsal colouration is essentially brown, sometimes gray, the glandular folds are darker. The vertebral line is whitish for most specimens, sometimes green in some living specimens. The ventral side is white and the posterior side of the thighs has large dark transverse spots.

Sexual dimorphism. — The males have a pair of laterally opening vocal sacks, with the external opening parallel to the lower jaw, and nuptial pads on first to third fingers.

Habitats and distribution. — *Ptychadena mascareniensis* is present throughout the country. In the suburbs of Lomé, individuals sometimes enter houses during the rainy season. The species is very abundant in the wetlands around Lomé (Zio, Haho, Lake Togo and the small ponds around these rivers). We observed specimens in ecological zones I, II, III and IV of the country. The species was reported by Bourgat (1979) from Lomé, Kovié and Kloto, and by Segniagbeto *et al.* (2022) from Tetetou to Nagbeto dam along the Mono River.

Taxonomic note. — This nominal taxon consists of a species complex. Lamotte (1967b) distinguished two forms on the size of the individuals. He considered the West African form described as *Rana* (*Ptychadena*) *hylaea* Schmidt & Inger, 1959 as a larger form (♂ 49-56 mm, ♀ 59-72 mm), specifically related to forest ecosystems in Côte d'Ivoire, Guinea, Liberia, Sierra Leone, and the smaller species *Ptychadena pumilio* (Boulenger, 1920) (♂ 29-36 mm, ♀ 36-40 mm) related to savannah ecosystems in central Côte d'Ivoire and Burkina Faso. The name *Ptychadena pumilio* applies to small frogs, and may comprise several species, living in degraded rainforest and savannah areas of West Africa, respectively (Rödel 2000 and M.-O. Rödel unpubl. data). *Ptychadena mascareniensis* is larger and also occurs in both ecosystems, but is usually best observed in rice paddies. Several morphological and colour morphs have been observed (see e.g. Rödel & Glos 2019; M.-O. Rödel unpubl. data). In Togo we observed specimens that do not resemble the *hylaea* form of Lamotte (1967b) with regard to size. Some examined specimens that are adult males and females have an intermediate size (SVL) ranging from 40 to 52 mm. It has been shown that *Ptychadena mascareniensis* as currently understood is a complex of species (Vences *et al.* 2004; Zimkus *et al.* 2017). The latter publication revealed a high level of genetic differentiation, i.e., 10 distinct lineages or operational taxonomic units. Further morphological and molecular work is needed to clarify the taxonomy of West African populations.

Ptychadena oxyrhynchus (Smith, 1849) (Fig. 12F)

Material examined. — **Togo** • 1 ♂, 2 ♀; Agou; MNHN-RA-1979.7145, MNHN-RA-1979.7146, MNHN-RA-1979.7149 • 2 ♂, 1 ♀; Agoté; MNHN-RA-2006.2156-2158 • 1 ♂; Kanté; MNHN-RA-1979.7148 • 3 ♂, 2 ♀; Lomé; MNHN-RA-1979.7147, MNHN-RA-1979.7150, MNHN-RA-1979.7151, MNHN-RA-2006.2208 • 1 ♂; Tové; MNHN-RA-1979.7144.

Description. — Large frog (SVL 51-60 mm ♂, 65-72 mm ♀), with robust body. Snout pointed, protruding beyond mouth slit. Head longer than broad (HW 30-35% SVL; HL 37-41% SVL). Tympanum distinct (TYD 6-8% SVL). Hind legs very long (TL 62-75% SVL). Webbing moderate; webbing formula: I 0 – 1 ½ II 0 – 2 III ½ – 3 IV 2 – ½ V. Toe tips pointed. Back marked by three pairs of glandular folds: the inner pair starting at the rear of the interorbital space, without contact with the eyelids and extending to the posterior end of the body; the middle pair starting at the posterior edge of the eyelids and ending at the groin; and the outer pair constituting the supra-tympanic folds, extending to the inguinal region; slightly shagreen skin on the back and flanks.
The most conspicuous characters of this species are its extremely long hind limbs

Colouration. — The dorsal colouration is grayish or olive-greenish, brownish in some specimens, with irregularly set white spots. The vertebral line is distinct. The dorsal sides of the thighs and legs have brownish transverse bars. The belly is white. In West Africa it is the only *Ptychadena* which combines a snout with colour paler than the rest of the head and reddish colouration on the posterior part of the eyelids.

Sexual dimorphism. — Males have two pairs of infer vocal sac openings, laterally on either side of the throat, and nuptial pads on first to third fingers.

Habitats and distribution. — This species is characteristic of savannah associated with forest areas. Very frequent in ecological zones II, III and IV, it is observed in the regions of Kpélé, Adélé (M'Poti and Koui), Fazao (Kalaré), Tchamba, Alibi, etc. Females lay eggs in the rainy season in small pools or water reservoirs. The species was reported by Bourgat (1979) from Kovié, Lomé and Kanté, and by Segniagbeto *et al.* (2022) from Tetetou to Nagbeto dam. Rödel (2000) reported its presence in ecological zones II and IV of the country.

Ptychadena pumilio (Boulenger, 1920) (Fig. 13A)

Material examined. — **Togo** • 7 ♂, 10 ♀; Kanté; MNHN-RA-1996.8861-8863, MNHN-RA-2006.2219, MNHN-RA-2006.2221, MNHN-RA-2006.2223-2229, MNHN-RA-1996.8322, MNHN-RA-1996.8323, MNHN-RA-1996.8324, MNHN-RA-1996.8860 • 4 ♂, 4 ♀; Mango; MNHN-RA-1996.8330-8341 • 7 ♂; Oga; MNHN-RA-2008.0154-0157.

DESCRIPTION. — Small frog (SVL 21.3-29.8 mm ♂, 24.4-37.1 mm ♀), with fairly slender body. Snout pointed, protruding above the mouth slit. Head slightly longer than broad (HW 27-34% SVL; HL 37-45% SVL). Tympanum distinct (TYD 4-9% SVL). Hind legs long (TL 51-67% SVL). Webbing small, leaving some phalanges free; webbing formula: I 1 – 2 II 1 – 2 ½ III 1 ½ – 3 IV 3 – 1 V. Tip of toes pointed. Back marked by four pairs of glandular folds, the inner most pair starting from the back of the eye, running along the medial dorsal line and ending at the vent, the third pair being the shortest and in a median position with respect to the first two, the fourth, the most outer, being dorsolateral; distinct and very short supratympanic fold; smooth skin on the back and more granular on the flanks.

COLOURATION. — The colouration is olive-gray or brown on the back, with a whitish, orange or green vertebral line. Some darker spots can be seen on the back. The dorsolateral folds are light gray. From the tip of the snout to the eye, the canthus is marked by a dark band. The dorsal parts of the forearm, thigh and tibia are crossed out by darker bands. The belly is white.

SEXUAL DIMORPHISM. — The males are distinguished by a pair of vocal sacs, opening on either side of the throat, parallel to the lower jaw, and nuptial pads on first to third fingers.

HABITATS AND DISTRIBUTION. — *Ptychadena pumilio* is essentially a savannah species. It is distributed in ecological zones I, II, III and IV. Its frequency in the ecological zone IV becomes more and more important because of the savannisation of the forest zone. It has been reported in Togo by Bourgat (1979), Bourgat *et al.* (1996) and Segniagbeto *et al.* (2007, 2022).

Ptychadena tellinii (Peracca, 1904) (Fig. 13B)

MATERIAL EXAMINED. — **Togo** • 7 ♂, 6 ♀; Kanté; MNHN-RA-1978.292, MNHN-RA-1978.293, MNHN-RA-1996.8376-8380, MNHN-RA-1996.8382-8387.

DESCRIPTION. — Medium sized (SVL 29-37 mm ♂, 35-45 mm ♀) frog, with moderately elongated body. Snout pointed and protruding beyond mouth slit. Head longer than broad (HW 32-37% SVL; HL 34-40% SVL). Tympanum round and distinct (TYD 6-8% SVL). Hind legs very long (TL 58-67% SVL). Webbing moderate; webbing formula: I 0 – 2 II 0 – 2 III 1 – 2 IV 1 ½ – 0 V. Back with fine, vaguely defined glandular folds; finely granular skin on back and sides, belly smooth.

COLOURATION. — The dorsal colouration is uniformly reddish or beige in living individuals, getting whitish on preserved specimens. There is a black band from the tip of the snout to the shoulder, passing over the eardrum. Dorsal ridges are present, but very narrow and inconspicuous. The dorsal parts of the thigh and leg is also uniform (reddish).

SEXUAL DIMORPHISM. — The males have a pair of vocal sacs, openings on both sides of the throat with external openings extending to arm insertion, and nuptial pads on first to third fingers.

HABITATS AND DISTRIBUTION. — This species is characteristic of wooded and humid savannahs. It is common especially in ecological zone II (Fazao and Koui), in the northern part of zone IV (Assoukoko and Yégué), and in the southern part of ecological zone I (Kanté). This species has been reported in Togo by Bourgat (1979) and Segniagbeto *et al.* (2007, 2022).

Ptychadena trinodis (Boettger, 1881)

MATERIAL EXAMINED. — **Togo** • 1 ♂, 2 ♀; Kanté; MNHN-RA-1995.1429-1431.

ADDITIONAL MATERIAL. — **Burkina Faso** • 2 ♂, 1 ♀; Bobo Kouviala; MNHN-RA-1996.3939-3941 • 1 ♀; Kippo; MNHN-RA-1996.618 • 2 ♀; Kosoghen; MNHN-RA-1997.5571, MNHN-RA-1997.5572 • 1 ♀; Kou; MNHN-RA-1996.8391.
Senegal • 2 ♀; Ndella; MNHN-RA-1998.2813, MNHN-RA-1998.2814.

DESCRIPTION. — Medium to large frog (SVL 52-56 mm ♂, 45-63 mm ♀), with robust body. Snout pointed, protruding beyond mouth slit. Head longer than broad (HW 29-40% SVL; HL 35-43% SVL). Tympanum distinct (TYD 7-8% SVL). Hind legs long (TL 50-60% SVL). Webbing moderate; webbing formula: I 0 – 1 II 0 – 2 III 1 – 3 IV 2 ½ – 0 V. Toe tips pointed. A tarsal tubercle. Back marked by three slightly distinct pairs of glandular folds in the scapular and inguinal regions but more distinct in the median region of the body, the two inner pairs being longer than the outer pair; distinct dorsolateral and supratympanic folds; skin slightly shagreen on the back and flanks; belly smooth.

COLOURATION. — The dorsal colouration is brownish with much darker spots and a narrow, yellow vertebral line. The flanks, loreal and tympanic regions are brown with darker spots. Some whitish spots are present on the tympanum. The dorsal parts of the forearm, thigh and tibia have alternating light brown and dark brown transverse bars. The back of the thigh has irregular brownish spots. The marginal edge of the throat has alternating dark and whitish spots, the throat being white with some dark spots. The belly, the chest, the ventral side of the thigh and the webbing are white.

SEXUAL DIMORPHISM. — The males are distinguished from the females by a pair of vocal sac openings, parallel to the lower jaw, on each side of the throat. Nuptial pads are present on first to third fingers.

HABITATS AND DISTRIBUTION. — *Ptychadena trinodis* occurs mainly in dry Sudanian savannah. Its known distribution in Togo is dominantly in ecological zone I. It can be found in ecological zone II and in the northern part of ecological zone III. It was reported in the northern zone of Togo by Bourgat (1979), and is distributed in Côte d'Ivoire, Ghana, Benin and Nigeria (Rödel 2000; Nago *et al.* 2006).

Family PYXICEPHALIDAE Bonaparte, 1850
Genus *Aubria* Boulenger, 1917

Aubria subsigillata (Duméril, 1856) (Fig. 13C)

MATERIAL EXAMINED. — **Togo** • 5 ♂, 16 ♀; Kovié; MNHN-RA-1989.2047, MNHN-RA-1989.2049, MNHN-RA-1989.2050, MNHN-RA-1989.2052-2055, MNHN-RA-1989.1465, MNHN-RA-1989.1466, MNHN-RA-1989.2056, MNHN-RA-1989.4054, MNHN-RA-1989.4056, MNHN-RA-1989.4057, MNHN-RA-1993.1462-1464, MNHN-RA-1993.1467-1469, MNHN-RA-1993.1471.

DESCRIPTION. — Very large frog (SVL 51.5-80.6 mm ♂, 76-91 mm ♀), with an elongated and robust body. Snout rounded, ogival. Head longer than broad (HW 32-35% SVL; HL 36-41% SVL). Tympanum round and distinct (TYD 5-7% SVL). Hind legs

short (TL 36-42% SVL). Webbing moderate, leaving more than phalanges free; palmar webbing: I 1 – 1 ½ II 1 – 2 III 1 ½ – 2 ½ IV 2 ½ – 1 V. Toe tips pointed. Skin smooth on the back and on the flanks with very fine glandular warts; presence of rounded femoral glands on the ventral surface of the thighs.

COLOURATION. — Dorsal colouration is uniform, brown to grayish with dark spots barely visible on live specimens. The flanks are light brown to grayish with whitish round spots. The ventral side has this pattern but is clearer.

SEXUAL DIMORPHISM. — It is not very marked. Adult females have round femoral glands on the lower side of thighs.

HABITATS AND DISTRIBUTION. — In Togo this species is only known from the Kovié region in ecological zone V, although it is distributed throughout the coastal western and central African subregions (Ohler 1996; Channing & Rödel 2019). The species has been reported in Togo by Bourgat (1979), Kulo (1980, 1981), Ohler & Kazadi (1989), Ohler (1996) and Segniagbeto *et al.* (2007). The Togolese habitats of this species are currently degraded because of the exploitation of the Zio basin for agriculture, seriously threatening the survival of this species in Togo.

Family RANIDAE Batsch, 1796
Genus *Hylarana* Tschudi, 1838

Hylarana galamensis
(Duméril & Bibron, 1841)
(Fig. 13D)

MATERIAL EXAMINED. — **Togo** • 12 ♂, 1 ♀; Kloto; MNHN-RA-1979.7130-7142 • 1 ♂; Nangbéto; MNHN-RA-2006.2161 • 1 ♂; N'Gambi; MNHN-RA-2006.2162 • 6 ♂; Toglekope; MNHN-RA-2006.2159-2164.

DESCRIPTION. — Large frog (SVL 72-81 mm ♂, 63-75.5 mm ♀), with an elongate, robust body. Snout rounded. Head roughly as long as broad (HW 29-38% SVL; HL 33-45% SVL). Tympanum distinct (TYD 7-9% SVL). Hind legs moderately long (TL 40-50% SVL). Webbing small leaving three phalanges free; webbing formula: I 2 – 2 ½ II 1 – 3 III 1 – 3 IV 3 - 1 ½ V. Toe tips pointed. Skin of head and anterior part of back smooth; posterior part of the back and flanks with smooth glandular warts; chest and belly smooth.

COLOURATION. — The back and sides are olive-gray with creamy white dorsolateral folds. The white band on upper lips continues as a white glandular ridge ending in the inguinal region. The flanks show gray and whitish spots of irregular shapes. The ventral side is white.

SEXUAL DIMORPHISM. — The male of the species is distinguished by two vocal sacs on either side of the throat and the presence of the bulging humeral glands.

HABITATS AND DISTRIBUTION. — This species occurs in savannahs, but can also be found in the forest zone. It has been observed in all ecological zones of the country. It is more frequent in the Fazao and Bassar regions and along the Zio and Haho basins in the south. The presence of the species in Togo has been reported by Bourgat (1979: 604), in the monograph on biodiversity in Togo (PNAE 2002), Rödel & Agyei (2003) and Leaché *et al.* (2006).

Hylarana parva (Griesbaum, Jongsma, Penner, Kouamé, Doumbia, Gonwouo, Hillers, Glos, Blackburn & Rödel, 2023)
(Fig. 13E)

MATERIAL EXAMINED. — **Togo** • 1 ♂; Danyi Atigba; MNHN-RA-1979.6838 • 1 ♂; Kovié; MNHN-RA-1979.6832 • 4 ♂, 9 ♀; Tové; MNHN-RA-1979.6824-6831, MNHN-RA-1979.6833-6836, MNHN-RA-1989.6841 • 2 ♀; Kloto; MNHN-RA-1993.1491, MNHN-RA-1993.1492 • 4 ♀; Kpele Beme; MNHN-RA-2006.2165-2168 • 1 ♀; Yégué; Coll. GHS-W 0683 • 1 juvenile; Kovié; MNHN-RA-1979.6840 • 1 juvenile; Yégué; Coll. GHS-W 0691.

DESCRIPTION. — Large frog (SVL 48-59 mm ♂, 65-78 mm ♀), with elongate but robust body. Snout rounded, ogival. Head longer than broad (HW 30-34% SVL; HL 35-41% SVL). Tympanum distinct (TYD 8-12% SVL). Hind legs moderately long (TL 48-57% SVL). Webbing moderate leaving up to three phalanges free; webbing formula: I 1 – 2 II ½ – 2 ½ III ½ – 2 ½ IV 2 – ½ V. Back with two dorsal-lateral folds starting from the palpebral region and ending in the inguinal region; skin of the back finely granular; some glandular warts on the flanks; breast and belly smooth.

COLOURATION. — The dorsal colouration is olive green in life and becomes grayish in alcohol. The flanks have darker bands. In some specimens, the lateroventral part has irregularly shaped whitish and dark spots. In others, the body is uniformly olive green. The upper lip is underlined by a white band. The ventral side is white.

SEXUAL DIMORPHISM. — The male is distinguished from the female by a pair of vocal bags opening on each side of the throat, and the presence of humeral glands.

HABITATS AND DISTRIBUTION. — This species is occurring in rainforest and forest patches in humid savannah, usually associated to flowing water. In Togo is mainly occurs in the ecological zone IV. It is frequent in the Adélé region, on the Akposso-Akébou and Danyi plateaus and on the Kouma-Konda Mountains and in Tové. The presence of the species in Togo has been reported by Bourgat (1979), Kulo (1980: 35), Bringsøe (1995), Segniagbeto *et al.* (2007) and Hillers *et al.* (2009) under the name *Amnirana albolabris*. Jongsma *et al.* (2018) however showed that West African populations are not conspecific with *Hylarana albolabris* from Central Africa. The West African species has recently been described by Griesbaum *et al.* (2023). We here formally transfer it to the genus *Hylarana* as phylogenetic relationships within this genus are not resolved (Dubois *al.* 2021).

Order GYMNOPHIONA Rafinesque, 1814
Family CAECILIIDAE Rafinesque, 1814
Genus *Geotrypetes* Peters, 1880

Geotrypetes seraphini (Duméril, 1859)
(Fig. 13F)

MATERIALS EXAMINED. — **Togo** • 23 unknown sex; Agou; MNHN-RA-2008.0144-0152, Coll. GHS-W 1326-1339 • 1 individual; Sodo Zion; Coll. GHS-W 1340.

DESCRIPTION. — Amphibians without legs and with serpentine body; total length of body 185-295 mm. Head quite distinct from the neck, which is materialized in the form of a ring. Snout rounded, eyes and nostrils round. Body with two types of rings: 94 to 101 primary rings and 40 to 48 secondary rings.

COLOURATION. — The colouration is black or dark; the rings are whitish. The top of the head appears brown with darker orbital regions. The chin is brown.

Fig. 13. — Representatives of anuran species from Togo in life: **A**, *Ptychadena pumilio* (Boulenger, 1920) (Mango); **B**, *Ptychadena tellinii* (Peracca, 1904) (Koui); **C**, *Aubria subsigillata* (Duméril, 1856) (Kovié); **D**, *Hylarana galamensis* (Duméril & Bibron, 1841) (Avévé); **E**, *Hylarana parva* (Griesbaum, Jongsma, Penner, Kouamé, Doumbia, Gonwouo, Hillers, Glos, Blackburn & Rödel, 2023) (Diguengue); **F**, *Geotrypetes seraphini* (Duméril, 1859) (Agou).

Sexual dimorphism. — Not studied.

Habitats and distribution. — **First record.** This species is essentially found in forests. The explorations were carried out in the forest zone (Agou, Yo and Sodo Zion). *Geotrypetes seraphini* is fossorial and can only be observed above ground during rain, or when digging in the ground.

Remark. — The number of secondary rings of the specimens from Togo falls into the range given by Taylor (1968) for the subspecies *G. seraphini seraphini*. The presence of this species in Togo closes the distributional gap between the two subspecies (the western one is *G. s. occidentalis*). Molecular data would be necessary to evaluate the status of the subspecies.

DISCUSSION

Amphibian species diversity in Togo

Segniagbeto *et al.* (2007) published the first comprehensive list of amphibian species from Togo, mostly based on literature data. In this work, 50 species were presented, including two yet unconfirmed records: *Phrynobatrachus* sp. aff. *calcaratus*, sensu Rödel & Agyei (2003) and *Ptychadena longirostris* (Peters, 1870). In the present paper, based on the analyses of museum voucher specimens and additional survey records, we added three new species to the amphibian list of the country: *Kassina schioetzi* Rödel, Grafe, Rudolf & Ernst, 2002; *Ptychadena arnei* Perret, 1997; and *Geotrypetes seraphini* (Duméril, 1859). Several other species with wide distributions in West Africa, including records east and west from Togo, still need to be confirmed. These species are: *Afrixalus nigeriensis* Schiøtz, 1963; *Phlyctimantis boulengeri* Perret, 1986; *Sclerophrys chevalieri/superciliaris*; *Phrynobatrachus alleni* Parker, 1936; *Chiromantis rufescens* (Günther, 1869); and *Tomopterna cryptotis* (Boulenger, 1907). On the other hand, intraspecific variations were observed in taxa such as *Hyperolius fusciventris burtoni*, *Afrixalus dorsalis* and *Ptychadena mascareniensis*, and the identity of the Togolese populations of these taxa needs to be clarified.

Conservation status of the Amphibian species in Togo

The Togolese herpetofauna comprises several regional endemics, occurring in the forest area between Togo and Ghana, which has been isolated from the two major forest blocks of Central and West Africa by the "Dahomey Corridor" (Dahomey Gap) (Jenik 1984, 1994; Maley 1996). These species include: *Arthroleptis brevipes*, *Hyperolius baumanni*, *H. torrentis* and *Conraua derooi*. However, *H. torrentis* has been reported from northern Benin (Nago *et al.* 2006), and Channing & Rödel (2019) provide evidence for the occurrence of *A. brevipes* in central Ghana. Most other species are typical West African forms or savannah species with a wider African distribution (Rödel 2000; Channing & Rödel 2019). An exception is *Aubria subsigillata,* a forest species from West and Central Africa, which has been found in the Kovié region. According to Lamotte (1966) and Schiøtz (1967), *Aubria* species are limited to forest ecosystems. According to Knoepffler (1976), Hughes (1979), Assemian *et al.* (2006) and Rödel *et al.* (2007), *A. subsigillata* occurs as well in swamps of degraded forest. In Togo, *Aubria* seems to be limited to the Kovié region in ecological zone V. As forests or more or less continuous habitats with large trees are absent from this region, this might indicate that the species has an even broader ecological tolerance. This assumption is supported by a recent report from neighbouring Benin, where *Aubria* has been recorded from swampy areas outside of forest (Gansa *et al.* 2022).

The herpetofauna of Togo, like that of other West African countries, was inventoried first during the colonial period; especially the German colonial period from 1883 to 1914. During that period, several amphibian species have been described from Togo, for instance: *Arthroleptis brevipes* Ahl, 1924; *Hyperolius baumanni* Ahl, 1931; *Hyperolius torrentis* Schiøtz, 1967; and *Sclerophrys togoensis* (Ahl, 1924). Several additional taxa have been described, but their names are currently regarded as synonyms, e.g. of the following valid species: *Hyperolius concolor* (Hallowell, 1844), *Hyperolius fusciventris* Peters, 1876, and *Leptopelis viridis* (Günther, 1869).

Some of the species listed above had not been mentioned in recent inventory works carried out in the area (Huiselmans *et al.* 1970, 1971; Bourgat 1979; Rödel & Agyei 2003; Leaché *et al.* 2006; Hillers *et al.* 2009), and are only known by one or a few specimens from the colonial collections; in particular this concerns *Arthroleptis brevipes* Ahl, 1924 and *Werneria africanus* (Werner, 1898). Their current status in Togo is unknown and it is unclear whether they have disappeared (or even if they are valid at all). In the case of *A. brevipes*, it seems possible that the species got extinct in Togo due to the current degradation of all forest ecosystems in the country. The morphology of this species is so unique (extremely short hind limbs), that it is unlikely to be overlooked. Very recently, a photo from the Ghanaian Atewa range seems to illustrate this taxon (Channing & Rödel 2019). However, the *Conraua* populations from Atewa, which have been formerly considered to be conspecific with *C. derooi* from the Togo-Ghana border region, have now been shown to represent a distinct species (Neira-Salamea *et al.* 2021). It thus is also possible that the *A.* cf. *brevipes* from Atewa are not conspecific with the Togolese taxon. In order to clarify this question however, vouchers from Togo and Ghana would be needed.

Another amphibian species with controversial status in Togo is the toad *Werneria africana*. Werner (1898: 201) described *Atelopus africanus* from Bismarckburg (now Yégué) based on 30 syntypes. Currently this name is considered to be a synonym of the Cameroonian *W. preussi* (Matschie, 1893) (Boulenger 1906; Amiet 1972, 1976). This assumption is based on the morphological similarity of vouchers from both taxa, and the possibility that the Togo record is wrong (Rödel *et al.* 2004).

The specimens described as *Atelopus africanus*, which have been sent from Berlin to Werner, might be actually syntypes of *Bufo preussi*. According to the ZMB inventory, of the 60 syntypes of the original description of *Bufo preussi*, 54 are still in the collections of ZMB, two are in London, one in Museum of Comparative Zoology (Harvard University, Cambridge). In the ZMB, three jars are labelled *Atelopus africanus* (including the specimen ZMB 13917), and another specimen is in Vienna (NMW 20995) (Gemel *et al.* 2019). The total available thus is 58, quite close to the 60 toads mentioned in Matschie (1893). Werner did not mention to have received *Bufo preussi* from Berlin, a then only recently described species with a large type-series, which speaks also in favour of an error in labelling Werner's new toad. The presence of *Werneria* in Togo would extend the known occurrence of the genus, which otherwise is only known from western central African montane areas (Rödel *et al.* 2004). Thus, the most parsimonious conclusion is to consider the origin of the syntypes of *Atelopus africanus* Werner, 1898 in error and regarding them as part of the original syntypes of *Bufo preussi*. However, as other "central African" frogs, e.g. *Acanthixalus* spp. (Rödel

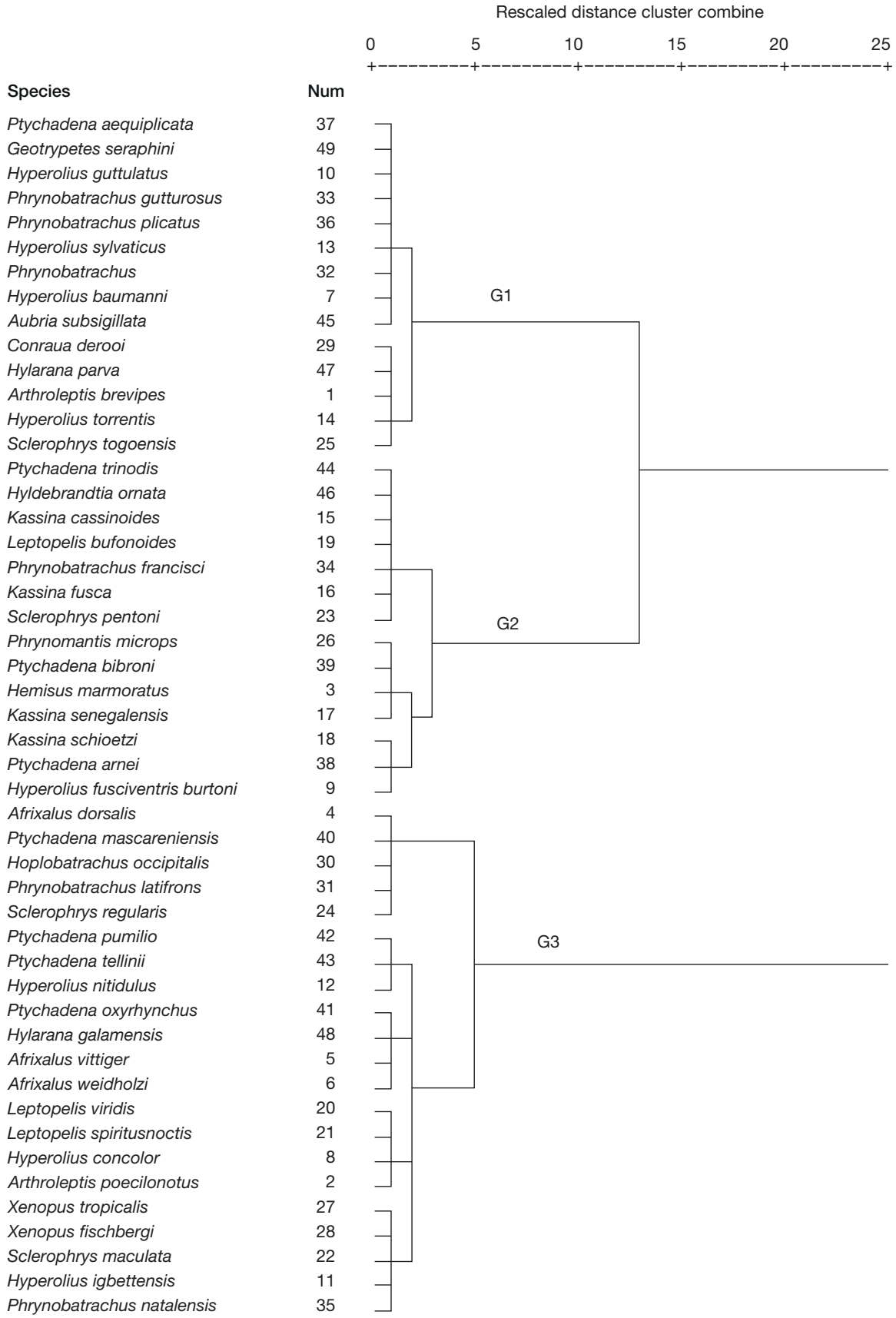

Fig. 14. — Dendrogram of the distribution using Ward method of amphibian species of Togo present in the different ecosystems.

et al. 2003) have also been shown to have sister taxa far from their range in West Africa, future surveys should continue to watch out for these toads. A final solution to the question if *W. africana* is valid, would be a comparison of the genetic data of both type series.

Distribution and ecology of the Amphibians species of Togo

The hierarchical cluster analysis (Fig. 14) provided an idea of the amphibian composition of the different terrestrial eco-zones in Togo. This analysis allowed to recognise in the country three groups of species.

Forest species

The group G1 concerns species of semi-deciduous forests and open forests in the Guinean mountain zone of ecological zone IV, riparian forests and gallery forests, especially for ecological zones II and III. In this group two main subgroup can be distinguished. The first concerns species linked to the streams, often torrents, in semi-deciduous forest areas (*Hyperolius torrentis*, *Amnirana parva*, *Conraua derooi*, *Sclerophrys togoensis*, *Arthroleptis brevipes*) and the second subgroup species linked to the semi-deciduous forests (*Phrynobatrachus calcaratus*, *P. plicatus*, *P. gutturosus*, *Hyperolius sylvaticus*, *Ptychadena* cf. *aequiplicata*). *Arthroleptis brevipes* is not supposed to need streams: most likely it is a direct developer like other congeners (Guibé & Lamotte 1958; Lamotte & Perret 1963). It was assigned to this group by its collection locality.

Ecological zone IV had the greatest diversity of amphibian species in Togo. All these species are characteristic of the semi-deciduous forests of West and/or Central Africa and are exclusively sylvicolous. In addition, ecological zone IV contains pockets of Guinean savannah that are currently extending due to the degradation of forest ecosystems. This has allowed then influx of savannah species. Another factor related to this specific richness is the fact that ecological zone IV is the most densely sampled area. Most of the collections made during this work as well as those from the period of German colonisation came from this area.

Savannah species

The second group (G2) includes two subgroups of savannah species. The first are Guinean savannah species that extend from the coast to the latitude of Fazao Malfakassa National Park or Tchamba in the ecological zone III. These habitats are characterised by shrubby, locally tree-lined or wooded savannahs. Some of these species are found in forest areas (open forests, dry forest), mountain Guinean savannahs, gallery forests, woodlands, wooded savannah, or Soudan savannah ecosystem. The species of group G2 occur mainly in ecological zones II, III and IV.

Another subgroup contains species linked mainly to the drier Sudanian savannah (*Ptychadena trinodis*, *Hildebrandtia ornata*, *Sclerophrys pentoni*, *Phrynobatrachus francisci*, *Kassina cassinoides*, *Kassina fusca*, *Leptopelis bufonides*). These species occur in the ecological zones I and II. They were mainly collected in Oti-Keran National Parc, Oti-Mandouri national reserve.

Widespread species

A last group (G3) comprises the most widespread taxa. Their distribution ranges cover several ecosystems of the country: *Arthroleptis poecilonotus*, *Leptopelis spiritusnoctis*, *Sclerophrys maculata*, *S. regularis*, *Ptychadena bibroni*, *P. pumilio*, *P. mascareniensis*, *Phrynobatrachus natalensis*, *P. latifrons*, *Amnirana galamensis*, *Hyperolius concolor*. A subgroup of these savannah specialists is common in the Sudan savannah and limited to the northern regions of the country, particularly zones I and II (*Hyperolius nitidulus*, *Afrixalus vittiger*, *Ptychadena tellinii*, *Afrixalus weidholzi*). Some other taxa are more common in the southern part of the country (*Afrixalus dorsalis*, *Silurana tropicalis*).

Forest degradation and amphibian conservation in Togo

In recent decades, forest ecosystems in Togo and throughout West Africa have been severely disrupted by agriculture, forestry and mining activities (Bakarr *et al.* 2001; Poorter *et al.* 2004; Ernst & Rödel 2005; Rödel *et al.* 2021). The forest area in Togo is highly fragmented, mainly due to coffee and cocoa plantations. The production of charcoal by the local populations in recent years, following the fall in coffee and cocoa prices, has accelerated this forest fragmentation. What remains of these forests today is virtually nothing more than islets in hard-to-reach areas and along watercourses. Due to the rapid population growth and their demand for wood (for construction and fire wood), forest relics are also being cut, unlike riparian forests, which are still relatively unaffected by local populations. According to an FAO report (2006), 43.6% of forest ecosystems in Togo have been destroyed since 1990. In the same report (FAO 2006), Togo was recognised as one of the world's countries with a particularly high rate of deforestation (4.5% per year). The disappearance of these forest ecosystems, due to human activities, drastically reduces biological diversity. Our failure to find, in recent inventory work, several species described during the colonial period seems to be linked to forest loss. According to the works of Ahl (1924, 1931), Schiøtz (1967), Rödel & Agyei (2003) and Rödel & Bangoura (2004), and our own field observations, species such as *Arthroleptis brevipes*, *Sclerophrys togoensis* and *Hyperolius torrentis* are characteristic of primary forests. It is clear that the current conservation status of these species in Togo is critical; unfortunately, their extinction in Togo has to be expected unless conservation actions are dedicated to these notable anuran species.

Another forest destruction is the conversion of forest areas into savannah like ecosystems in the ecological zone IV. As a consequence, typical savannah specialists spread into the former forest area. Ernst & Rödel (2005) and Hillers *et al.* (2008) conducted studies in Côte d'Ivoire on the impacts of forest ecosystem fragmentation and degradation on amphibian community composition. The conclusions of their work are that forest degradation severely changes community composition, but the fragmentation in contrast had only little effect (as long as the fragments were large enough). Regeneration of these altered communities to those comparable in

primary forest was not achieved, even 45 years after selective logging occurred (Kpan *et al.* 2021). Our own observations indicate that invasive species are proliferating in the former forest area. Typically, savannah species such as *Sclerophrys maculatus*, *S. regularis*, *Afrixalus dorsalis*, *Hyperolius concolor*, *Hoplobatrachus occipitalis*, *Ptychadena oxyrhynchus*, *P. pumilio* and *Phrynobatrachus latifrons* are present in these forests. Recent work by Segniagbeto (2009) and Hillers *et al.* (2009) between Ghana and Togo, revealed similar observations in the Volta region of Ghana. Similarly, the frequency of typical savannah snake species is increasing in ecological zone IV (Segniagbeto *et al.* 2011, 2015), while at the same time, typically forest species became rare. Very few specimens of rare forest species were collected during our field work. Most respective records were due to the vouchers in collections at the MNHN, MRAC and ZMB. The re-composition of the forest fauna deserves more attention and should be considered in conservation programmes.

Outside the proper forest area, the different forest types in the ecological zones I, II and III are also much degraded and only small remnants remain. These forest patches, which often have only persisted because of being sacred to local communities (Kokou & Sokpon 2006), could still provide scientific information on the former faunal composition of these areas. Until 1990, Togo theoretically had nearly 83 state-owned natural sites, covering about 800 000 ha. Nowadays, most of these protected areas have been overtaken and conversed, even national parks have been drastically reduced in size. For example, the Oti-Keran National Park in ecological zone I suffered more than 50% surface reduction during the 1990s (PNAE 2002).

Note on the exploitation of Togolese amphibian specimens for the international trade

Many amphibian specimens are annually exported from Togo for the international trade. This concerns in particular *Kassina senegalensis*, *K. schioetzi* and *Phrynomantis microps*. For numbers of exported specimens, see the species accounts above. Until 2014, specimens of *Conraua derooi* were also exploited. None of the traded amphibian species are CITES listed. The fundamental problem is that not all the amphibian species currently exported from Togo and the rest of the sub-region are CITES species. They are therefore not included in the official statistics of the Convention. We highly recommend following and documenting this trade, examine if the exported number of specimens are sustainable or collected number of specimens is too high, and possibly define quota per species, that can be exported.

CONCLUSION

Togo has a diverse batrachofauna. To date, 50 amphibian species have been recorded. Field surveys are ongoing and the discovery of additional species for the country is likely. In the past, quite some research has been devoted to the herpetofauna of Togo, e.g. Werner (1898, 1902), Ahl (1924, 1931), Hulselmans & Verheyen (1970), Hulselmans *et al.* (1970) and Bourgat (1979). The present study provides a synthesis of these previous studies and adds its own new data, thus provides up-to-date information on the different taxa present in Togo, their distribution and their taxonomic status. On the other hand, our work also indicates persisting gaps in our knowledge, and thus opportunities for the future.

Due to its position in the Gulf of Guinea, and the presence of forest ecosystems in its southern part (although located in the Dahomey Gap), Togo comprises most ecosystems of West Africa, in particular: Guinean semi-deciduous and dry forest, Sudanese and Guinean savannahs. The current threats to Togo natural ecosystems raise concern that some taxa, especially those characteristic of primary forests such as *Arthroleptis brevipes*, *Sclerophrys togoensis*, *Hyperolius sylvaticus*, *H. torrentis*, *Conraua derooi*, will disappear. Today we were able to trace some of these species only by specimens collected during the period of colonisation, more than a hundred years ago. Everything possible should be done to hold further biodiversity erosion, by protecting the few remaining natural and near natural ecosystems that prevailed so far.

Acknowledgements

The first author is indebted to the "Service de Coopération et d'Action culturelle" (SCAC) of the French embassy in Togo for the financial support during his training stay in France, to the German Academic Exchange Services (DAAD) for the financial support to study specimens in Museum für Naturkunde (Berlin), and to the "Centre d'Information sur la Biodiversité africaine" (CIBA) of the "Musée royal de l'Afrique centrale" in Tervuren, Belgium, for the financial support to make his visits possible. We thank sincerely the IUCN Committee of Nederland, the FFEM and the IUCN-PAPACO of West and Central Africa through AGBO-ZEGUE NGOs for their financial support for field surveys. We are also grateful to Koffi Akpagana (Laboratoire de Botanique et Écologie végétale appliquée, Université de Lomé) and the RIPIESCA project. We thank the referees for their constructive and helpful comments.

REFERENCES

Adum G. B., Eichhorn M. P., Oduro W., Ofori-Boatng C. & Rödel M.-O. 2013. — Two-stage recovery of amphibian assemblages following selective logging of tropical forests. *Conservation Biology* 27 (2): 354-363. https://doi.org/10.1111/cobi.12006

Affaton P. 1990. — *Le Bassin des Volta (Afrique de l'Ouest) : une marge passive, d'âge protérozoïque supérieur, tectonisée au panafricain (600 ± 50 Ma)*. Éditions ORSTOM (coll. Études et Thèses), Paris, 310 p.

Agbossoumonde Y. 1998. — *Les Complexes ultrabasiques-basiques de la chaîne panafricaine au Togo (Axe Agou-Atakpamé, Sud Togo): étude pétrographique, minéralogique et géochimique*. PhD thesis, Université Jean Monnet, Saint Etienne, 345 p.

Ahl E. 1924. — Neue Reptilien und Batrachier aus dem Zoologischen Museum Berlin. *Archiv für Naturgeschichte* (A) 90: 245-254.

Ahl E. 1929. — Zur Kenntnis der afrikanischen Baumfrosch-Gattung *Leptopelis*. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 1929: 185-222.

AHL E. 1931. — Zur Systematik der afrikanischen Arten der Baumfroschgattung *Hyperolius* (Amph. Anur.). *Mitteilungen aus dem Zoologischen Museum in Berlin* 17 (6): 1-132. https://doi.org/10.1002/mmnz.19310170604

AMIET J.-L. 1972. — Description de trois Bufonidés orophiles du Cameroun appartenant au groupe de *Bufo preussi* Matschie (Amphibiens Anoures). *Annales de la Faculté des Sciences du Cameroun* 11: 121-140.

AMIET J.-L. 1975. — Écologie et distribution des Amphibiens Anoures de la région de Nkongsamba (Cameroun). *Annales de la Faculté des Sciences Yaoundé* 20: 30-107.

AMIET J.-L. 1976. — Observations anatomiques et biologiques sur le genre *Werneria* Poche, 1903. *Revue Zoologique Africaine* 90: 33-45.

AMIET J.-L. 2005. — Les *Hyperolius* camerounais du groupe d'*H. nasutus* (Amphibia, Anura, Hyperoliidae). *Revue suisse de Zoologie* 112: 271-310. https://doi.org/10.5962/bhl.part.80299

AMIET J.-L. 2012. — *Les rainettes du Cameroun*. Édition J.-L. Amiet, Nyons; La Nef des Livres, Saint Nazaire, 591 p.

ARNOULT J. & LAMOTTE M. 1968. — Les Pipidae de l'Ouest africain et du Cameroun. *Bulletin de l'Institut Fondamental d'Afrique Noire* (A) 30: 270-306.

ASSEMIAN N. E., KOUAMÉ N. G., TOHÉ B., GOURÈNE G. & RÖDEL M.-O. 2006. — The anurans of the Banco National Park, Côte d'Ivoire, a threatened West African rainforest. *Salamandra* 42: 41-51.

AYORO H. J., SEGNIAGBETO G. H., HEMA E. M., PENNER J., OUEDA A., DUBOIS A., RÖDEL M.-O., KABRÉ G. B. & OHLER A. 2020. — List of amphibian species (Vertebrata, Tetrapoda) of Burkina Faso. *Zoosystema* 42 (28): 547-582. https://doi.org/10.5252/zoosystema2020v42a28

BAKARR M., BAILEY B., BYLER D., HAMS R., OLIVIERI S. & OMLAND M. 2001. — *From the forest to the sea: biodiversity connections from Guinea to Togo. Conservation Priority-Setting workshop, December 1999*. Conservation International, Washington D.C., 78 p.

BLACKBURN D. C. 2008. — Diversity and evolution of male secondary sexual characters in African squeakers and long-fingered frogs. *Molecular Phylogenetics and Evolution* 49 (3): 553-573. https://doi.org/10.1016/j.ympev.2008.08.015

BLACKBURN D. C. 2010. — A new squeaker frog (Arthroleptidae: *Arthroleptis*) from Bioko Island, Equatorial Guinea. *Herpetologica* 66 (3): 320-334. https://doi.org/10.1655/09-039.1

BLACKBURN D. C., NIELSEN S. V., BAREJ M. F., DOUMBIA J., HIRSCHFELD M., KOUAMÉ N. G., LAWSON D., LOADER S., OFORI-BOATENG C., STANLEY E. & RÖDEL M.-O. 2020. — Evolution of the African slippery frogs (Anura: *Conraua*), including the world's largest living frog. *Zoologica Scripta* 49 (6): 684-696. https://doi.org/10.1111/zsc.12447

BLAUSTEIN A. R., WAKE D. B. & SOUSA W. P. 1994. — Amphibian declines: judging stability, persistence, and susceptibility of populations to local and global extinctions. *Conservation Biology* 8 (1): 60-71. https://doi.org/10.1046/j.1523-1739.1994.08010060.x

BÖHME W. 2005. — Presence of *Kassina cassinoides* (Boulenger, 1903) in Senegal. *Herpetozoa* 18: 177-178.

BÖHME W., MEINIG H. & RÖDEL M.-O. 1996. — New records of amphibians and reptiles from Burkina Faso and Mali. *British Herpetological Society Bulletin* 55: 7-26.

BOULENGER G. A. 1906. — Report on the Batrachians collected by the late L. Fea in West Africa. *Annali del Museo Civico di Storia Naturale di Genova* 2: 157-172.

BOURGAT R. 1979. — Trématodes d'amphibiens du Togo. *Bulletin du Muséum national d'Histoire naturelle* (4e série) 3: 597-624.

BOURGAT R., MORÈRE J. J. & KULO S. D. 1983. — Nouvelles récoltes de *Eupolystoma alluaudi* (de Beauchamp, 1913) en Afrique. Considérations sur l'aire et les hôtes de ce Monogenea (Vermes). *Revue de zoologie africaine* 97 (3): 567-580.

BOURGAT R., ROURE C. & KULO S.-D. 1996. — Nouvelles données sur les Trématodes d'amphibiens d'Afrique occidentale. Description d'*Haematoloechus aubrae* n. sp. *Revue suisse de Zoologie* 103 (2): 383-394. https://doi.org/10.5962/bhl.part.79953

BOW S. T. 1984. — *Pattern recognition: applications to large data-set problems. Electrical Engineering and Electronics*. M. Dekker, New York: I-VII + 1-323.

BRINGSØE H. 1995. — Erstnachweis von *Hylarana albolabris* (Hallowell, 1856) für Togo. *Herpetofauna* 17 (96): 26.

CATENAZZI A. 2015. — State of the World's Amphibians. *Annual Review of Environment and Resources* 40: 91-119. https://doi.org/10.1146/annurev-environ-102014-021358

CHANNING A. 2001. — *Amphibians of Central and Southern Africa*. Cornell University press, Ithaca, New York, 470 p.

CHANNING A. & RÖDEL M.-O. 2019. — *Field guide to the frogs and other amphibians of Africa*. Struik Nature, Cape Town, 408 p.

CHANNING A., MOYER D. & BURGER M. 2002. — Cryptic species of sharp-nosed reed frogs in the *Hyperolius nasutus* complex: advertisement call differences. *African Zoology* 37 (1): 91-99. https://doi.org/10.1080/15627020.2002.11657159

CHANNING A., HILLERS A., LÖTTERS S., RÖDEL M.-O., SCHICK S., CONRADIE W., RÖDER D., MERCURIO V., WAGNER P., DEHLING J. M., DU PREEZ L. H., KIELGAST J. & BURGER M. 2013. — Taxonomy of the super-cryptic *Hyperolius nasutus* group of long reed frogs of Africa (Anura: Hyperoliidae), with descriptions of six new species. *Zootaxa* 3620 (3): 301-350. https://doi.org/10.11646/zootaxa.3620.3.1

CORDIER J. M., AGUILAR R., LESCANO J. N., LEYNAUD G. C., BONINO A., MILOCH D., LOYOLA R. & NORI J. 2021. — A global assessment of amphibian and reptile responses to land-use changes. *Biological Conservation* 253: 108863. https://doi.org/10.1016/j.biocon.2020.108863

DUBOIS A., OHLER A. & PYRON R. A. 2021. — New concepts and methods for phylogenetic taxonomy and nomenclature in zoology, exemplified by a new ranked cladonomy of recent amphibians (Lissamphibia). *Megataxa* 5 (1): 1-738. https://doi.org/10.11646/megataxa.5.1.1

ERN H. 1979. — Die Vegetation Togos. Gliederung, Gefährdung, Erhaltung. *Willdenowia* 9 (2): 295-312. https://www.jstor.org/stable/3995654

ERNST R. & RÖDEL M.-O. 2005. — Anthropogenically induced changes of predictability in tropical anuran assemblages. *Ecology* 86 (11): 3111-3118. https://doi.org/10.1890/04-0800

ERNST R. & RÖDEL M.-O. 2006. — Community assembly and structure of tropical leaf-litter anurans. *Ecotropica* 12: 113-129.

ERNST R., AGYEI A. C. & RÖDEL M.-O. 2008. — A new giant species of *Arthroleptis* (Amphibia: Anura: Arthroleptidae) from the Krokosua Hills Forest Reserve, south-western Ghana. *Zootaxa* 1697 (1): 58-68. https://doi.org/10.11646/zootaxa.1697.1.2

EVANS B. J., CARTER T. F., GREENBAUM E., GVOŽDÍK V., KELLEY D. B., MCLAUGHLIN P. J., PAUWELS O. S. G., PORTIK D. M., STANLEY E. L., TINSLEY R. C., TOBIAS M. L. & BLACKBURN D. C. 2015. — Genetics, morphology, advertisement calls, and historical records distinguish six new polyploid species of African Clawed Frog (Xenopus, Pipidae) from West and Central Africa. *PLoS ONE* 10 (12): e0142823. https://10.1371/journal.pone.0142823

FAO (FOOD AND AGRICULTURE ORGANIZATION) 2006. — *Global forest resources assessment 2005; progress towards sustainable forest management*., FAO Forestry Paper, Rome, 147, 320 p.

FROST D. R. 1985. — *Amphibian Species of the World, a Taxonomic and Geographical References*. Allen Press, Lawrence, Kansas, 732 p.

FROST D. R. 2023. — *Amphibian Species of the World: An online reference. Version 6.2*. American Museum of Natural History, New York. Electronic Database accessible at : https://doi.org/10.5531/db.vz.0001 (accessed on 25 September 2023).

FRÉTEY T. 2008. — Revue des genres africains *Arthroleptis* Smith, 1849 et *Phrynobatrachus* Günther, 1862 (Amphibia, Anura). *Alytes* 25: 99-172.

FRÉTEY T., DEWYNTER M. & OHLER A. 2018. — Onymotopes in zoological nomenclature: some additional terms, with fixation of a lectonymotope for *Xenopus petersii* Bocage, 1895 (Amphibia, Anura). *Bionomina* 13 (1): 37-50. https://doi.org/10.11646/bionomina.13.1.3

GANSA H. A. C., AGADJIHOUÉDÉ H., HOUNKANRIN M. B. & RÖDEL M.-O. 2022. — Frogs of Toho Lagoon (Ramsar site 1017), Ouidah municipality, Republic of Benin, West Africa. *Herpetology Notes* 15: 437-441.

GEMEL R., GASSNER G. & SCHWEIGER S. 2019. — Katalog der Typen der Herpetologischen Sammlung des Naturhistorischen Museums Wien – 2018. *Annalen des Naturhistorischen Museums in Wien* (B) 121: 33-248.

GONGOMIN B. A.-I., KOUAMÉ N. G. & RÖDEL M.-O. 2019. — New records of the Togo Toad, *Sclerophrys togoensis*, from south-eastern Ivory Coast. *Herpetology Notes* 12: 501-508.

GRAFE T. U., STEFFEN J. & STOLL C. 2000. — Vocal repertoire and effect of advertisement call intensity on calling behaviour in the West African tree frog, *Leptopelis viridis*. *Amphibia-Reptilia* 21 (1): 13-23.

GRIESBAUM F., JONGSMA G. F. M., PENNER J., KOUAMÉ N. G., DOUMBIA J., GONWOUO N. L., HILLERS A., GLOS J., BLACKBURN D. C. & RÖDEL M.-O. 2023. — The smallest of its kind: description of a new cryptic *Amnirana* species (Amphibia, Anura, Ranidae) from West African rainforests. *Zootaxa* 5234 (3): 301-339. https://doi.org/10.11646/zootaxa.5254.3.1

GUIBÉ J. & LAMOTTE M. 1958. — Morphologie et reproduction par développement direct d'un anoure du Mont Nimba, *Arthroleptis crusculum* Angel. *Bulletin du Muséum national d'Histoire naturelle* (2e Série) 30: 125-133.

HAMMER Ø. & HARPER D. A. T. 2012. — *PAST Paleontological statistics version 2.17 Reference manual*. Natural History Museum, University of Oslo, 229 p.

HEYER W. R., DONNELLY M. A., MCDIARMID R. W., HAYEK L.-A. C. & FOSTER M. S. 1994. — *Measuring and monitoring biological diversity, standard methods for amphibians*. Smithsonian Institution Press, Washington D.C., 364 p.

HILLERS A., RÖDEL M.-O., MENKEN S. B. J. & VEITH M. 2008. — Microrefugia within macrorefugia: Reconstructing West African rainforest history using multiple leaf-litter frog phylogeographies, *in* HILLERS A. (ed.), *West African forest frogs: ecology, evolution, and conservation*. PhD Thesis, University of Amsterdam, 182 p.

HILLERS A., BOATENG C. O., SEGNIAGBETO G. H., AGYEI A. C. & RÖDEL M.-O. 2009. — The amphibians in the forests of southern Ghana and western Togo. *Zoosystematics and Evolution* 85 (1): 127-141. https://doi.org/10.1002/zoos.200800019

HOCKING D. J. & BABBITT K. J. 2014. — Amphibian contributions to ecosystem services. *Herpetological Conservation and Biology* 9 (1): 1-7.

HUGHES B. 1979. — Feeding habits of the frog *Aubria subsigillata* in Ghana. *Bulletin de l'Institut fondamental d'Afrique noire* (A) 41: 654-663.

HUGHES B. 1988. — Herpetology in Ghana (West Africa). *British Herpetological Society Bulletin* 25: 29-38.

HULSELMANS J. L. J. 1972. — Contribution à l'herpétologie de la République du Togo: description de *Conraua derooi*, n. sp. *Revue de Zoologie et de Botanique Africaines* 84: 153-159.

HULSELMANS J. L. J. & VERHEYEN W. N. 1970. — Contribution à l'herpétologie de la République du Togo : liste préliminaire des serpents récoltés par la deuxième Mission zoologique belge au Togo. *Revue de Zoologie et de Botanique Africaines* 82 (1-2): 200-204.

HULSELMANS J. L. J., DE ROO A. & DE VREE F. 1970. — Contribution à l'herpétologie de la République du Togo: Liste préliminaire des serpents récoltés par la première Mission zoologique belge au Togo. *Revue de Zoologie et de Botanique Africaines* 81 (1-2): 193-196.

HULSELMANS J. L. J., DE VREE F. & VAN DER STRAETEN E. 1971. — Contribution à l'herpétologie de la République du Togo: Liste préliminaire des serpents récoltés par la troisième Mission zoologique belge au Togo. *Revue de Zoologie et de Botanique Africaines* 84 (1-2): 46-49.

JENIK J. 1984. — Coastal upwelling and distributional pattern of West African vegetation. *Preslia* 56 (3): 193-204.

JENIK J. 1994. — The Dahomey Gap: an important issue in Africa phytogeography. *Mémoires Société de Biogéographie* 4 (3): 125-133.

JONGSMA G. F. M., BAREJ M. F., BARRATT C. D., BURGER M., CONRADIE W., ERNST R., GREENBAUM E., HIRSCHFELD M., LEACHÉ A. D., PENNER J., PORTIK D. M., ZASSI-BOULOU A.-G., RÖDEL M.-O. & BLACKBURN D. C. 2018. — Diversity and biogeography of frogs in the genus *Amnirana* (Anura: Ranidae) across sub-Saharan Africa. *Molecular Phylogenetics and Evolution* 120: 274-285. https://doi.org/10.1016/j.ympev.2017.12.006

KANGA K. P., KOUAMÉ N. G., ZOGBASSÉ P., GONGOMIN B. A., AGOH K. L., KOUAMÉ A. M., KONAN J. C. B. Y. N., ADEPO-GOURÈNE A. B., GOURÈNE G. & RÖDEL M.-O. 2021. — Amphibian diversity of a West African biodiversity hotspot: an assessment and commented checklist of the batrachofauna of the Ivorian part of the Nimba Mountains. *Amphibian & Reptile Conservation* 15 (1): 71-107 (e275).

KIESECKER M., BLAUSTEIN A. R. & BELDEN L. K. 2001. — Complex causes of amphibian population declines. *Nature* 410: 681-683. https://doi.org/10.1038/35070552

KNOEPFFLER L.-P. 1976. — Food habitats of *Aubria subsigillata* in Gabon. *Zoologica Africana* 11 (2): 369-371. https://doi.org/10.1080/00445096.1976.11447542

KOKOU K. & SOKPON N. 2006. — Les forêts sacrées du couloir du Dahomey. *Bois et Forêts des Tropiques* 288 (2): 15-23. https://doi.org/10.19182/bft2006.288.a20312

KOUAMÉ A. M., KOUAMÉ N. G., KONAN J. C. B. Y. N., ADEPO-GOURÈNE A. B. & RÖDEL M.-O. 2015. — Contributions to the reproductive biology and behaviour of the dotted reed frog, *Hyperolius guttulatus*, in southern-central Ivory Coast, West Africa. *Herpetology Notes* 8: 633-641.

KPAN T. F., ERNST R. & RÖDEL M.-O. 2021. — Follow the forest: Slow resilience of West African rainforest frog assemblages after selective logging. *Forest Ecology and Management* 497: 119489. https://doi.org/10.1016/j.foreco.2021.119489

KULO S.-D. 1980. — *Mode de transmission des Trématodes au Togo*. Doctoral thesis, Université de Perpignan, 165 p.

KULO S.-D. 1981. — Présence au Togo de *Metapolystoma cachani* (Gallien, 1957) Combes, 1976 (Monogena) chez l'Amphibien *Ptychadena longirostris* (Peters, 1870). *Bulletin de la Société zoologique de France* 106: 177-181.

KYLE K. & DU PREEZ L. H. 2020. — Mom's taxi – Maternal care in shovel-nosed frogs *Hemisus marmoratus* and *Hemisus guttatus*. *African Zoology* 55 (1): 1-4. https://doi.org/10.1080/15627020.2019.1677497

LAMOTTE M. 1966. — Types de répartition géographique de quelques batraciens dans l'Ouest Africain. *Bulletin de l'Institut français d'Afrique noire* (A) 28: 1140-1148.

LAMOTTE M. 1967a. — Les Batraciens de la région de Gpakobo (Côte d'Ivoire). *Bulletin de l'Institut français d'Afrique noire* (A) 29: 218-294.

LAMOTTE M. 1967b. — Le problème des *Ptychadena* (Fam. Ranidae) du groupe *mascareniensis* dans l'Ouest Africain. *Bulletin du Muséum national l'histoire naturelle* (2e Série) 39: 647-656.

LAMOTTE M. & OHLER A. 1997. — Redécouverte de syntypes de *Rana bibroni* Hallowell, 1845, désignation d'un lectotype et description d'une espèce nouvelle de *Ptychadena* (Amphibia, Anura). *Zoosystema* 19 (4): 531-543.

LAMOTTE M. & OHLER A. 2000. — Révision des espèces du groupe de *Ptychadena stenocephala* (Amphibia, Anura). *Zoosystema* 22 (3): 569-583.

LAMOTTE M. & PERRET J.-L. 1963. — Contribution à l'étude des batraciens de l'Ouest Africain XV.– Le développement direct de l'espèce *Arthroleptis poecilonotus* PETERS. *Bulletin de l'Institut fondamental de l'Afrique noire* (A) 25 (1): 277-284.

LAMOTTE M. & PERRET J.-L. 1968. — Révision du genre *Conraua* Nieden. *Bulletin de l'Institut français d'Afrique noire* (A) 30: 1603-1644.

LAMOTTE M. & XAVIER F. 1966a. — *Phrynobatrachus natalensis* (Smith) et *Phrynobatrachus francisci* (Boulenger) : deux espèces de l'Ouest Africain difficiles à distinguer. *Bulletin de l'Institut français d'Afrique noire* (A) 28 (1): 333-361.

LAMOTTE M. & XAVIER F. 1966b. — Étude comparée de deux espèces de *Phrynobatrachus* souvent confondues: *Phrynobatrachus plicatus* Günther et *Phrynibatracus auritus* Boulenger. *Bulletin de l'Institut français d'Afrique noire* (A) 28 (1): 1605-1619.

LAURENT R. F. 1958. — La réserve naturelle intégrale du mont Nimba. XIII. Les rainettes du genre *Hyperolius*. *Mémoires de l'Institut Francais d'Afrique Noire* 53: 275-299, 3 pls.

LAURENT R. F. 1961. — Notes sur les *Hyperolius* et quelques *Afrixalus* (Salientia) du Musée de Berlin. *Revue de Zoologie et de Botanique Africaines* 64: 65-96.

LEACHÉ A. D., RÖDEL M.-O., LINKEM C. W., DIAZ R. E., HILLERS A. & FUJITA M. K. 2006. — Biodiversity in a forest island: reptiles and amphibians of the West African Togo hills. *Amphibian & Reptile Conservation* 4: 22-45. https://www.biodiversitylibrary.org/page/51145036

MALEY J. 1996. — The African rainforest. Main characteristics of changes in vegetation and climate from the Upper Cretaceous to the Quaternary. *Proceeding of the Royal Society of Edimburgh* 104B: 31-73. https://doi.org/10.1017/S0269727000006114

MATSCHIE P. 1893. — Die Reptilien und Amphibien des Togogebietes. *Mittheilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten* 6: 207-215.

MOHNEKE M., ONADEKO A. B., HIRSCHFELD M. & RÖDEL M.-O. 2010. — Dried or fried: amphibians in local and regional food markets in West Africa. *TRAFFIC Bulletin* 22: 117-128.

NAGO S. G. A., GRELL O., SINSIN B. & RÖDEL M.-O. 2006. — The amphibian fauna of the Pendjari National Park and surroundings, northern Benin. *Salamandra* 42: 93-108.

NEIRA-SALAMEA K., OFORI-BOATENG C., KOUAMÉ N. G., BLACKBURN D. C., SEGNIAGBETO G. H., HILLERS A., BAREJ M. F., LEACHÉ A. D. & RÖDEL M.-O. 2021. — A new critically endangered slippery frog (Amphibia, Conrauidae, *Conraua*) from the Atewa Range, central Ghana. *Zootaxa* 4995 (1): 71-95. https://doi.org/10.11646/zootaxa.4995.1.4

OFORI-BOATENG C., ODURO W., HILLERS A., NORRIS K., OPPONG S. K., ADUM G. B. & RÖDEL M.-O. 2013. — Differences in the effects of selective logging on amphibian assemblages in three West African forest types. *Biotropica* 45 (1): 94-101. https://doi.org/10.1111/j.1744-7429.2012.00887.x

OHLER A. 1996. — Systematics, morphometrics and biogeography of the genus *Aubria* (Ranidae, Pyxicephalinae). *Alytes* 13 (4): 141-166.

OHLER A. 1999. — The identity of *Dendrobatorana* Ahl, 1927 (Amphibia, Ranoidea). *Zoosystematics and Evolution* 75 (1): 37-45. https://doi.org/10.1002/mmnz.19990750105

OHLER A. & KAZADI M. 1989. — Description d'une nouvelle espèce du genre *Aubria* Boulenger, 1917 (Amphibiens, Anoures) et redescription du type d'*Aubria subsigillata* (A. Duméril, 1856). *Alytes* 8: 25-40.

OHLER A., WOLLENBERG K. C., GROSJEAN S., HENDRIX R., VENCES M., ZIEGLER T. & DUBOIS A. 2011. — Sorting out *Lalos*: description of new species and additional taxonomic data on megophryid frogs from northern Indochina (genus *Leptolalax*, Megophryidae, Anura). *Zootaxa* 3147 (1): 1-83. https://doi.org/10.11646/zootaxa.3147.1.1

PERRET J.-L. 1966. — Les amphibiens du Cameroun. *Zoologische Jahrbücher. Abteilung für Systematik, Ökologie und Geographie der Tiere* 8: 289-464.

PERRET J.-L. 1997. — Description de *Ptychadena arnei* n. sp. (Amphibia, Ranidae), une espèce méconnue d'Afrique Occidentale. *Bulletin de la Société des Sciences naturelles de Neuchâtel* 120: 77-86.

PICKERSGILL M. 2007. — A redefinition of *Afrixalus fulvovittatus* (Cope, 1860) and *Afrixalus vittiger* (Peters, 1876) (Amphibia, Anura, Hyperoliidae). *African Journal of Herpetology* 56 (1): 23-37. https://doi.org/10.1080/21564574.2007.9635551

PNAE 2002. — *Monographie nationale sur la diversité biologique*. Rapport intégral, MERF-Togo, 172 p.

POORTER L., BONGERS F. & LEMMENS R. H. M. J. 2004. — West African forests: introduction, *in* POORTER L., BONGERS F., KOUAME F. N. & HAWTHORNE W. D. (eds), *Biodiversity of West African forests: an ecological atlas of woody plant species*. CABI Publishing, Cambridge, Massachusetts: 5-14.

PUJOL P. & EXBRAYAT J. M. 1987. — Observations préliminaires sur la structure et les sécrétions mucipares de l'oviducte de *Bufo regularis* (Reuss, 1834), amphibien anoure tropical. *Bulletin de la Société Herpétologique de France* 44: 8-15.

PUJOL P. & EXBRAYAT J.-M. 2002. — Quelques aspects de la biologie de reproduction et des cycles sexuels chez *Bufo regularis* Reuss (1834), Amphibien Anoure. *Bulletin mensuel de la Société linnéenne de Lyon* 71 (1): 12-52. https://doi.org/10.3406/linly.2002.13366

PYRON R. A. & WIENS J. J. 2013. — Large-scale phylogenetic analyses reveal the causes of high tropical amphibian diversity. *Proceedings of the Royal Society B: Biological Sciences* 280 (1770): 20131622. https://doi.org/10.1098/rspb.2013.1622

RÖDEL M.-O. 2000. — *Herpetofauna of West Africa. Vol 1. Amphibians of the West African savanna*. Frankfurt am Main, Chimaira, 335 p.

RÖDEL M.-O. 2007. — The identity of *Hylambates hyloides* Boulenger, 1906 and description of a new small species of *Leptopelis* from West Africa. *Mitteilungen aus dem Museum für Naturkunde in Berlin. Zoologische Reihe* 83 (S1): 90-100. https://doi.org/10.1002/mmnz.200600031

RÖDEL M.-O. & AGYEI A. C. 2003. — Amphibians of the Togo-Volta highlands, eastern Ghana. *Salamandra* 39: 207-234.

RÖDEL M.-O. & BANGOURA M. A. 2004. — A conservation assessment of amphibians in the Forêt Classée du Pic de Fon, Simandou Range, southeastern Republic of Guinea, with the description of a new *Amnirana* species (Amphibia Anura Ranidae). *Tropical Zoology* 17 (2): 201-232. https://doi.org/10.1080/03946975.2004.10531206

RÖDEL M.-O. & ERNST R. 2004. — Measuring and monitoring amphibian diversity in tropical forests. I. An evaluation of methods with recommendations for standardization. *Ecotropica* 10: 1-14.

RÖDEL M.-O. & GLOS J. 2019. — Herpetological surveys in two proposed protected areas in Liberia, West Africa. *Zoosystematics and Evolution* 95 (1): 15-35. https://doi.org/10.3897/zse.95.31726

RÖDEL M.-O. & SCHIØTZ A. 2004. — *Conraua derooi*. The IUCN Red List of Threatened Species 2004: e.T58253A11758064. https://doi.org/10.2305/IUCN.UK.2004.RLTS.T58253A11758064.en

RÖDEL M.-O., SPIELER M., GRABOW K. & BÖCKHELER C. 1995. — *Hemisus marmoratus* (PETERS, 1854) (Anura: Hemisotidae), Fortpflanzungsstrategien eines Savannenfrosches. *Bonner zoologische Beiträge* 45: 191-207.

RÖDEL M. O., KRÄTZ D. & ERNST R. 2002. — The tadpole of *Ptychadena aequiplicata* (Werner, 1898) with the description of a new reproductive mode for the genus (Amphibia, Anura, Ranidae). *Alytes* 20 (1-2): 1-12.

RÖDEL M.-O., KOSUCH J., VEITH M. & ERNST R. 2003. — First record of the genus *Acanthixalus* Laurent, 1944 from the Upper Guinean rain forest, West Africa, with the description of a new species. *Journal of Herpetology* 37 (1): 43-52. https://doi.org/10.1670/0022-1511(2003)037[0043:FROTGA]2.0.CO;2

RÖDEL M.-O., SCHMITZ A., PAUWELS O. S. G. & BÖHME W. 2004. — Revision of the genus *Werneria* Poche, 1903, including the descriptions of two new species from Cameroon and Gabon (Amphibia: Anura: Bufonidae). *Zootaxa* 720 (1): 1-28. https://doi.org/10.11646/zootaxa.720.1.1

RÖDEL M.-O., GIL M., AGYEI A. C., LEACHÉ A. D., DIAZ R. E., FUJITA M. K. & ERNST R. 2005. — The amphibians of the forested parts of south-western Ghana. *Salamandra* 41: 107-127.

RÖDEL M.-O., BREDE C., SCHIEFENHÖVEL P., PENNER J., SINSIN B. & NAGO S. G. A. 2007. — The amphibians of the Lokoli Forest, a permanently inundated rainforest in the Dahomey Gap, Benin. *Salamandra* 43: 231-238.

RÖDEL M.-O., OFORI-BOATENG C., PENNER J. & HILLERS A. 2009. — A new cryptic *Phrynobatrachus* species (Amphibia: Anura: Phrynobatrachidae) from Ghana, West Africa. *Zootaxa* 1970 (1): 52-63. https://doi.org/10.11646/zootaxa.1970.1.2

RÖDEL M.-O., ADUM G. B., ARUNA E., ASSEMIAN N. E., BAREJ M. F., BELL R., DOHERTY-BONE T., BURGER M., DOUMBIA J., ERNST R., GONWOUO N. L., HILLERS A., HIRSCHFELD M., KOUAMÉ N. G., KPAN T. F., MOHNEKE M., NAGO G. A., OFORI-BOATENG C., ONADEKO A., PAUWELS O. S. G., SANDBERGER-LOUA L., SEGNIAGBETO G. H., TCHASSEM A. M. F., TOHÉ B., ZIMKUS B. & PENNER J. 2021. — Diversity, threats and conservation of western and central African amphibians (Senegal, The Gambia, Guinea Bissau, Mali, Guinea, Sierra Leone, Liberia, Ivory Coast, Burkina Faso, Ghana, Togo, Benin, Nigeria, Niger, Cameroon, Gabon, São Tome & Principe, Equatorial Guinea, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, northern Angola), *in* HEATWOLE H. & RÖDEL M.-O. (eds), *Status and threats of Afrotropical Amphibians – Sub-Saharan Africa, Madagascar, Western Indian Ocean Islands. Amphibian Biology, Vol. 11, Part 7 Status of Conservation and Decline of Amphibians: Eastern Hemisphere*. – Frankfurt Contributions to Natural History, Vol. 78. Edition Chimaira, Frankfurt: 11-101.

SALAMI-CADOUX M.-L. 1979. — *Cycle et épidémilogie de la Polystomatidae parasite de l'Amphibien* Bufo regularis *au Togo*. Doctoral thesis, Université de Perpignan, 394 p.

SCHIØTZ A. 1963. — The amphibians of Nigeria. *Videnskabelige meddelelser fra den Naturhistoriske forening i Kjöbenhavn* 125: 1-92.

SCHIØTZ A. 1967. — The treefrogs (Rhacophoridae) of West Africa. *Spolia zoologica Musei hauniense*s 25: 1-346.

SCHIØTZ A. 1999. — *Treefrogs of Africa.* Chimaira, Frankfurt am Main, 352 p.

SEGNIAGBETO H. 2009. — *Herpétofaune du Togo : taxinomie, biogéographie*. Doctoral thesis, Université de Lomé, Togo; Muséum national d'Histoire naturelle, Paris : T. 1, 172 p.; T. 2: 192 p.

SEGNIAGBETO G. H., BOWESSIDJAOU J. E., DUBOIS A. & OHLER A. 2007. — Les Amphibiens du Togo: état actuel des connaissances. *Alytes* 24 (1-4): 72-90.

SEGNIAGBETO G. H., TRAPE J.-F., DAVID P., OHLER A., DUBOIS A. & GLITHO I. A. 2011. — The snake fauna of Togo : systematics, distribution, and biogeography, with remarks on selected taxonomic problems. *Zoosystema* 33 (3): 325-360. https://doi.org/10.5252/z2011n3a4

SEGNIAGBETO G. H., OKANGNY D. & LUISELLI L. 2013. — The endemic *Conraua derooi* in immediate conservation need in Togo. *FrogLog* 108: 23-24.

SEGNIAGBETO G. H., TRAPE J.-F., AFIADEMANYO K., RÖDEL M.-O., OHLER A., DUBOIS A., DAVID P., MEIRTE D., GLITHO A., PETROZZI F. & LUISELLI L. A. 2015. — Checklist of the lizards of Togo, (West Africa), with comments on systematics, distribution, ecology, and conservation. *Zoosystema* 37 (2): 381-402. https://doi.org/10.5252/z2015n2a7

SEGNIAGBETO G. H., ASSOU D., DENDI D., RÖDEL M.-O., OHLER A., DUBOIS A. & LUISELLI L. 2017. — The distribution and local density of the critically endangered frog *Conraua derooi* Hulselmans, 1972 in Togo, West Africa. *The Herpetological Bulletin* 141: 23-27.

SEGNIAGBETO G. H., DEKAWOLE J. K., KETOH G. K., DENDI D. & LUISELLI L. 2022. — Herpetofaunal diversity in a Dahomey Gap savannah of Togo (West Africa): effects of seasons on the populations of amphibians and reptiles. *Diversity* 14, 964.

STUART S. N., CHANSON J. S., COX N. A., YOUNG B. E., RODRIGUES A. S., FISCHMAN D. L. & WALLER R. W. 2004. — Status and trends of amphibian declines and extinctions worldwide. *Science* 306 (5702): 1783-1786.

TAÏROU M. S. 1995. — *Étude pétrographique et structurale d'un segment de la chaîne des Dahomeyides entre Sokodé et Bafilo (Région Centrale)*. Master's thesis, Université de Cocody, 176 p.

TAYLOR E. H. 1968. — *The Caecilians of the world: A taxonomic review*. University of Kansas Press, Lawrence, 848 p.

TILLACK F., DE RUITER R. & RÖDEL M.-O. 2021. — A type catalogue of the reed frogs (Amphibia, Anura, Hyperoliidae) in the collection of the Museum für Naturkunde Berlin (ZMB) with comments on historical collectors and expeditions. *Zoosystematics and Evolution* 97 (2): 407-450. https://doi.org/10.3897/zse.97.68000

VEITH M., KOSUCH J., OHLER A. & DUBOIS A. 2001. — Systematics of *Fejervarya limnocharis* (Gravenhorst, 1829) (Amphibia, Anura, Ranidae) and related species. 2. Morphological and molecular variation in frogs from the Greater Sunda Islands (Sumatra, Java, Burneo) with the definition of two species. *Alytes* 19 (1): 5-28.

VENCES M., KOSUCH J., RÖDEL M.-O., LÖTTERS S., CHANNING A., GLAW F. & BÖHME W. 2004. — Phylogeography of *Ptychadena mascareniensis* suggests transoceanic dispersal in a widespread African-Malagasy frog lineage. *Journal of Biogeography* 31 (4): 593-601. https://doi.org/10.1046/j.1365-2699.2003.01031.x

WAKE D. B. 1991. — Declining Amphibian populations. *Sciences* 253 (5022): 860. https://doi.org/10.1126/science.253.5022.860

WERNER F. 1898. — Ueber Reptilien und Batrachier aus Togoland, Kamerun und Tunis aus dem kgl. Museum für Naturkunde in Berlin. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 47: 395-408, 1 pl. https://doi.org/10.5962/bhl.part.11464

WERNER F. 1902. — Über westafrikanische Reptilien. *Verhandlungen der Zoologischen Botanischen Gesellschaft in Wien* 52: 332-348.

ZEISSET I. & BEEBEE T. J. C. 2008. — Amphibian phylogeography: a model for understanding historical aspects of species distributions. *Heredity* 101 (2): 109-119. https://doi.org/10.1038/hdy.2008.30

ZIMKUS B. M., LAWSON L. P., BAREJ M. F., BARRATT C. D., CHANNING A., DASH K. M., DEHLING J. M., DU PREEZ L., GEHRING P.-S., GREENBAUM E., GVOŽDÍK V., HARVEY J., KIELGAST J., KUSAMBA C., NAGY Z. T., PABIJAN M., PENNER J., RÖDEL M.-O., VENCES M. & LÖTTERS S. 2017. — Leapfrogging into new territory: how Mascarene ridged frogs diversified across Africa and Madagascar to maintain their ecological niche. *Molecular Phylogenetics and Evolution* 106: 254-269. https://doi.org/10.1016/j.ympev.2016.09.018

ZIMKUS B. M., RÖDEL M.-O. & HILLERS A. 2010. — Complex patterns of continental speciation: molecular phylogenetics and biogeography of sub-Saharan puddle frogs (*Phrynobatrachus*). *Molecular Phylogenetics and Evolution* 55 (3): 883-900. https://doi.org/10.1016/j.ympev.2009.12.012

Submitted on 16 August 2023;
accepted on 19 February 2024;
published on 8 October 2024.

APPENDIX

Appendix 1. — Description of the holophoront (holotype) of *Hyperolius laticeps* Ahl, 1931.

Hyperolius laticeps Ahl, 1931

Type material. — **Holophoront** (holotype) • ZMB 46529, juvenile collected by Leopold Fritz Wilhelm Conradt on 17.XII.1892 in Togo (Fig. 8).

Morphological description

Specimen in mediocre condition, flattened; of very small size (SVL 14.2 mm), rather robust. Head of large size, narrower (HW 5.9 mm) than long (HL 6.7 mm; MN 5.31 mm; MFE 4.34 mm; MBE 2.59 mm), flat. Snout rounded, protruding, its length (SL 2.27 mm) shorter than horizontal diameter of eye (EL 2.72 mm). Canthus rostralis rounded, loreal region concave, at an obtuse angle to upper head. Interorbital space flat, about same width (IUE 1.75 mm) than upper eyelid (UEW 1.81 mm) but wider than internarial distance (IN 1.56 mm); distance between front of eyes (IFE 3.50 mm) about two third of distance between back of eyes (IBE 5.31 mm). Nostrils about as close to tip of snout (NS 1.04 mm) as to eye (EN 1.17 mm). Pupil oval. Tympanum indistinct, its diameter (TYD 0.65 mm) about two times its distance from eye (TYE 0.26 mm). Pineal ocellus absent. Vomerine ridges absent. Tongue large, oval, emarginate; median lingual process absent. Tooth-like bony projections on maxilla absent.

Forearm short, moderately thick (FLL 2.85 mm), shorter than length of hand (HAL 3.69 mm), not enlarged. Fingers I and II short, strong, fingers III and IV long (TFL 2.07 mm), strong. Relative length of fingers, shortest to longest: I < II < IV < III. Tips of toes rounded, enlarged, with circumventral grooves (WAI 0.37 mm; PAI 0.47 mm; WAII 0.40 mm; PAII 0.56 mm; WAIII 0.53 mm; PAIII 0.72 mm; WAIV 0.44 mm; PAIV 0.56 mm). Fingers I-IV with moderate webbing: I 2 – 2 II 1 ½ – 2 III 2 – 1 ⅔ IV. Subarticular tubercles prominent, rounded, single, all present. Prepollex indistinct; palmar tubercles indistinct; supernumerary tubercles absent.

Shank three times longer (TL 5.9 mm) than their maximum width (TW 2.2 mm), shorter than thigh (7.3 mm) but longer than distance from base of internal metatarsal tubercle to tip of toe IV (FOL 5.57 mm). Toes short, strong; toe IV (FTL 3.31 mm) about third of distance from base of tarsus to tip of toe IV (TFOL 8.8 mm). Relative length of toes, shortest to longest: I < II < III < V < IV. Tips of toes rounded, enlarged with circumventral grooves (WPI 0.31 mm; PPI 0.34 mm; WPII 0.31 mm; PPII 0.40 mm; WPIII 0.40 mm; PPIII 0.50 mm; WPIV 0.40 mm; PPIV 0.40 mm; WPV 0.44 mm; PPV 0.62 mm). Webbing moderate: I 1 ½ – 2 II 1 ½ – 2 III 2 – 2 ½ IV 2 ½ – 0 V (MTTF 3.24 mm; MTFF 3.37 mm; TFTF 2.07 mm; FFTF 2.27 mm). Dermal ridge along toe V present, from tip of toe to its proximal end. Subarticular tubercles rounded, simple, all present. Inner metatarsal tubercle flat, short, oval; its length (IMT 0.40 mm) three times in length of toe I (ITL 1.18 mm). Tarsal ridge, outer metatarsal, supernumerary and tarsal tubercles absent.

Skin of dorsal parts of body: snout, between eyes, side of head smooth; supratympanic fold absent; co-ossified skin on head absent; back and flanks smooth. Dorsolateral folds absent. Dorsal parts of limbs smooth. Skin of ventral parts of body and thigh: throat and chest smooth; belly and thigh with regularly set glandular warts (“treefrog belly skin”). No macroglands.

Colouration in alcohol

Dorsal and lateral parts of head and body: dorsum light brown with slightly darker indistinct transverse bands; upper part of flanks light brown; lower flank ivory white; loreal region whitish; tympanic region and tympanum light brown; upper lip whitish. Dorsal parts of limbs: forelimb, dorsal part of hind legs light brown; posterior part of thigh whitish. Ventral parts: throat and margin of throat whitish with indistinct light brown spots; chest, belly and thigh light brown. Webbing: light yellowish.

Sex identification

Not checked.