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Amphibians of Kokolopori: an introduction to the amphibian fauna of the Central Congolian Lowland Forests, Democratic Republic of the Congo

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***Abstract.*—The fauna of the Central Congolian Lowland Forests ecoregion in the Democratic Republic of the Congo is poorly known due to the region's remoteness and limited accessibility. An amphibian survey was conducted in Kokolopori, including the Kokolopori Bonobo Nature Reserve, to fill this gap in our knowledge of its amphibians. All major habitat types were surveyed using visual and acoustic encounter surveys, pitfall and funnel trapping, and active searching during four field sessions, totaling 48 days. A total of 37 species of anuran amphibians were recorded, while caecilians were unknown to the local human population based on the photographs presented. Incidence-based species richness statistics estimated 37–41 amphibian species, indicating that our survey was probably nearly complete, but we assume that some rare species or species with secretive behaviors have probably remained overlooked. Approximately 75–80% of the total number of species were recorded during each of the two-week portions of the fieldwork, suggesting that two weeks of intensive surveys may have good potential for amphibian inventories in Afrotropical forests. The relatively low number of species for this equatorial rainforest is probably a consequence of its climatic history, with the central Congo being at a certain level of drought during the Pleistocene glaciations. The amphibian fauna is mainly represented by forest species that inhabit the lowland forests of Central Africa. Species restricted to intact primary forests or more euryecious species of forested ecozones were recorded. Several representatives of genus *Arthroleptis* could not be assigned to any of the described species, and probably represent species new to science. Representatives of some other genera (*Leptopelis*, *Sclerophrys*) resembled species known from western Central Africa, but morphological differences suggested that they probably also represent new species. The taxonomic status of *Arthroleptis procterae* De Witte, 1921 and *Hyperolius boulengeri* Laurent, 1943 are revised. Range extensions were found for several taxa, including those known only from the original descriptions. The lack of ubiquitous synanthropic toad species of genus *Sclerophrys* can probably be attributed to the well-preserved Kokolopori forests and only narrow corridors of disturbed habitat (small paths) leading into the area. Interestingly, some degree of biofluorescence was recorded in *Hyperolius phantasticus boulengeri*, which to our knowledge is the first documented case in an African anuran. Despite the relatively low species richness, our results suggest that the Central Congolian Lowland Forests ecoregion harbors a unique and partially endemic amphibian fauna that is to some degree differentiated from the anuran fauna to the north, east, and west of the wide arc of the Congo River. Therefore, this survey underscores the need to protect the central Congolian rainforests as a source of unique biodiversity, and the community-based Kokolopori Bonobo Nature Reserve serves as a good example.**

***Résumé.*—La faune de l'écorégion des forêts de basse altitude du Centre du Congo, en République démocratique du Congo, est mal connue en raison de l'éloignement de la région et de son accès difficile. Un inventaire sur les amphibiens a été menée à Kokolopori, y compris dans la Réserve Naturelle de Bonobo de Kokolopori, pour combler cette lacune dans la connaissance des amphibiens. Tous les principaux types d'habitats ont été échantillonnés à l'aide d'enquêtes visuelles et acoustiques, de pièges à fosse et à entonnoir, et de recherches actives au cours de quatre sessions de terrain totalisant 48 jours. Un total de 37 espèces d'amphibiens d'Anoures a été enregistré, tandis que les Gymnophiones (cécilies) étaient inconnus de la population locale sur la base des photographies présentées. Les statistiques sur la richesse en espèces basées sur l'incidence ont estimé que 37–41 espèces d'amphibiens, indiquant que notre inventaire était probablement presque complet, mais nous supposons que certaines espèces rares ou des espèces au comportement secret n'ont pas été récoltées. Nous avons pu enregistrer environ 75–80% du nombre total d'espèces au cours de chacune des deux semaines de travail sur le terrain, ce qui suggère que deux semaines d'inventaire intensifs peuvent avoir un bon potentiel pour les inventaires d'amphibiens dans les forêts afrotropicales. Le nombre relativement faible d'espèces pour la forêt équatoriale humide est probablement une conséquence de l'histoire climatique,**

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le Centre Congo ayant été plus ou moins sec pendant les glaciations du Pléistocène. La faune amphibienne est principalement représentée par des espèces forestières qui habitent les forêts de basse altitude d'Afrique centrale. Des espèces limitées aux forêts primaires intactes ou des espèces plus euryéciques des écozones forestières ont été enregistrées. Plusieurs représentants du genre *Arthroleptis* n'ont pas pu être assignés aux espèces décrites et représentent probablement des espèces nouvelles pour la science. Les représentants de certains autres genres (*Leptopelis*, *Sclerophrys*) ressemblaient à des espèces connues de l'ouest de l'Afrique centrale, mais les différences morphologiques suggéraient qu'ils représentaient probablement aussi de nouvelles espèces. Le statut taxonomique d'*Arthroleptis procterae* De Witte, 1921 et d'*Hyperolius boulengeri* Laurent, 1943 est révisé. Des extensions d'aire de distribution ont été observées pour plusieurs taxons, y compris ceux connus uniquement par les descriptions originales. L'absence d'espèces de crapauds synanthropiques omniprésentes du genre *Sclerophrys* peut probablement être attribuée aux forêts bien préservées de Kokolopori et au fait que seuls d'étroits corridors d'habitats perturbés (petits chemins) mènent à la zone. Il est intéressant de noter qu'un certain degré de biofluorescence a été enregistré chez *Hyperolius phantasticus boulengeri*, ce qui, à notre connaissance, est le premier cas documenté chez un Anoure africain. Malgré la richesse relativement faible en espèces, nos résultats suggèrent que l'écorégion des forêts de basse altitude du Centre du Congo abrite une faune d'amphibiens unique et partiellement endémique, qui se différencie dans une certaine mesure de la faune d'Anoures au nord, à l'est et à l'ouest de l'arc large du fleuve Congo. Nous attirons donc l'attention sur la nécessité de protéger les forêts tropicales humides du Centre du Congo en tant que source de biodiversité unique. La Réserve Naturelle de Bonobo de Kokolopori, une réserve communautaire, peut être un bon exemple.

Keywords. Africa, Anura, biodiversity, checklist, Congo Basin, faunistics, frogs, herpetofauna, rainforest, species richness

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Introduction

The Congo Basin harbors the world's second-largest tropical rainforest, which is divided into several ecoregions. The Central Congolian Lowland Forests ecoregion is distributed south of the wide arc of the Congo River (left bank) to approximately 3–4°S (Burgess et al. 2004; Dinerstein et al. 2017; Van de Perre et al. 2019). The river forms a potential distribution barrier to many species, isolating them along its northern, eastern, and western limits (Flügel et al. 2015). This extensive area of rainforest is deficient in data for the majority of biota, but was predicted as a potential area of high species richness (Burgess et al. 2004). The forests are characterized as tropical moist *terra firma* broadleaf forest with little seasonality and high humidity. Riverine forests along major watercourses are periodically or permanently flooded, and categorized as a separate ecoregion, the Eastern Congolian Swamp Forests (Burgess et al. 2004; Dinerstein et al. 2017).

Kokolopori is a region in the Djolu territory of Tshuapa Province in the Democratic Republic of the Congo (DRC), internationally renowned especially for the Kokolopori Bonobo Nature Reserve (referred to hereafter as "Kokolopori Reserve" for brevity; name in French: Réserve Naturelle de Bonobo de Kokolopori, abbreviated RNBK). The Kokolopori Reserve, covering an area of approximately 4,880 km^2 and consisting mainly of lowland rainforest, was established in 2009 as a community-based nature reserve with the primary aim of protecting the vital population of Bonobos (*Pan paniscus*) (Almquist et al. 2010; Surbeck et al. 2017). Following discussions with local communities, the reserve is presently receiving a new delineation that is targeting mostly areas of primary forests and avoiding rural complexes. However, the new delineation has not yet been formalized (A.L. Lokasola 2020, pers. comm.).

The amphibian fauna of the Kokolopori Reserve is poorly known. Unfortunately, this is a common situation throughout the country, and especially in the remote and difficult-to-access central areas south of the Congo River. The road network in the area is sparse and of poor quality. In addition to the low-quality infrastructure, poor governance, an insufficient understanding of the importance of research by the local population, and difficulties with some local authorities regarding research permissions make field research in central DRC difficult. As a result, only limited zoological research has been carried out in the central Congo Basin in recent decades, mostly focusing on iconic large mammals and birds such as Bonobo, Okapi (*Okapia johnstoni*), or the Congo Peafowl (*Afropavo congensis*) (e.g., Mulotwa et al. 2010; Stanton et al. 2016; Van Krunkelsven et al. 2010). Even a large cercopithecine monkey, the Lesula (*Cercopithecus lomamiensis*), was only recently discovered and described from the central Congo Basin

(Hart et al. 2012), indicating the remoteness of the region and limited knowledge of its biodiversity. Very few studies have focused on the herpetofauna, with the (central) Congo Basin being referred to as a 'blind spot in herpetology' (Kielgast and Lötters 2011). Similarly, Tolley et al. (2016) and Greenbaum (2017) pointed out the lack of data on herpetofauna across large parts of the Congo Basin.

Some fieldwork providing data for taxonomic, faunistic, or conservation studies has targeted amphibians and reptiles in various localities that are relatively distant from the study area of this article. These include areas from the Sankuru region (Laurent 1973, 1976a, 1979), the vicinity of Salonga National Park (Schick et al. 2010), and other areas in the central Congo Basin (e.g., Chifundera Kusamba 2019; Chifundera Kusamba et al. 2014; Greenbaum et al. 2014; Gvozdik and Chifundera Kusamba 2014; Hirschfeld et al. 2015; Kielgast et al. 2014). Two herpetological surveys have been reported from the Lokutu area on the southern bank of the Congo River, relatively near (approximately 120 km) our study area. The first recorded 21 species of amphibians and 16 species of reptiles (Penner and Rödel 2007), while the other resulted mainly in lists of expected species (only two species of amphibians and three species of reptiles were recorded during the week-long survey), but was marked by apparent errors—including species that are not expected in the Lokutu area (O'Connor 2015). The Kokolopori Reserve was first surveyed for amphibians by herpetologist Arne Schiøtz in 2005. However, this specialist focused mainly on the genus *Hyperolius* (Schiøtz 2006) and his time-limited survey targeted only disturbed habitats at forest edges and farmbush around villages. A second herpetological survey of this large reserve focusing on the lizard fauna recorded 20 lizard species in the wider reserve area, the Maringa-Lopori-Wamba landscape (Lokasola et al. 2017). Recently, a case of predation on the reed frog *Hyperolius phantasticus* by a spider of the genus *Nilus* was reported from the reserve (Badjedjea et al. 2019). However, an overview of the amphibians of the Kokolopori Reserve is not yet available.

In this study, we report on the amphibians found during four herpetological surveys conducted in the Kokolopori Bonobo Nature Reserve and adjacent areas in different seasons during 2018–2020, thus providing a basis for further studies of the amphibian fauna of the Central Congolian Lowland Forests.

Materials and Methods

Study Site

Kokolopori (Fig. 1) is a community region in the source area of two large rivers, Lopori in the north and Luo (= Maringa) in the south, located in the northeastern part of the Tshuapa Province, DRC. Kokolopori means 'source of Lopori' in the local Longando language. It is a hilly area with an elevation of approximately 400–500 m (with the highest hills around 580 m), with many small streams, often in valleys with steep slopes. The region is largely covered by lowland rainforest of the central Congolian type (Burgess et al. 2004; Dinerstein et al. 2017). A substantial proportion of the forest is primary dense moist forest, with areas around rural complexes characterized as old or young secondary forests (Vancutsem et al. 2009). A large area is designated as the Kokolopori Bonobo Nature Reserve and, together with two other neighboring reserves (Luo Scientific Reserve, Iyondji Bonobo Community Reserve), most of the regional forests are formally protected. However, agricultural and hunting pressures persist from the local human population. The region is characterized by a relatively constant humid tropical climate (rainfall present year-round), with some oscillations in the dry (December–February and June–August) and wet (March–May and September–November) seasons.

The numerous sites sampled throughout the survey period can be grouped into four broader areas (Fig. 1), which are named after the villages where staff of the reserve established base camps: Yetee (0.40°N, 22.93°E, span ~20 km), Yotemankele (0.30°N, 22.96°E, span ~7 km), Yalokole (0.22°N, 22.89°E, span ~25 km), and after the camp site in the forest at Bechuchuu (0.48°N, 23.13°E, span ~4 km). Yalokole is located near the Luo River, Bechuchuu is near the Lopori River (border with Tshopo Province), and Yetee and Yotemankele are in between the two rivers. Many small villages are present in Kokolopori, but only the names of these four areas are used for simplicity. All four areas are characterized by a variety of habitats; however, primary rainforests were surveyed mainly in Yalokole and Bechuchuu near the Luo and Lopori rivers, respectively. The habitats surveyed (Fig. 2) included pristine primary forests with dense canopy cover, old and young secondary forests, small and medium-sized streams in both forested and rural areas, banks and flooded forests of the Luo and Lopori rivers, and swamps and farmbush in open rural areas. We noted the presence of small-scale gold mining (without the use of mercury) in all four areas surveyed, with the densest being in Bechuchuu. The pools created by mining activities were also surveyed, as they represent an important breeding habitat for some frogs.

Data Acquisition and Processing

Field surveys were conducted in four missions in both the wet (May 2018, November 2018) and dry (August 2019, July 2020) seasons. Most of the field surveys were centered around Yalokole. The last survey (July 2020) focused only on Bechuchuu, the site which had been surveyed only marginally during the previous three missions. Surveys were conducted for 15 days

Fig. 1. Map of the study site. **(A)** Democratic Republic of the Congo (DRC), Congo Basin (red line) with the Congo River (blue line), and Kokolopori (yellow rectangle). Vegetation types follow Vancutsem et al. (2009): greenish tones correspond to forests, brownish tones to open areas; within Kokolopori (inset in left corner), dark green corresponds to primary dense moist forests, lighter green to old and young secondary forests, and yellow-white to rural and agricultural complexes. **(B)** Kokolopori Bonobo Nature Reserve (yellow line) as delineated in 2009 on a satellite map corresponding to 2005–2010 (FACET 2010), with collecting sites (red dots). White stars denote four sampling areas (base camps). Kokolopori is a spring area of two large rivers, Lopori and Luo (= Maringa).

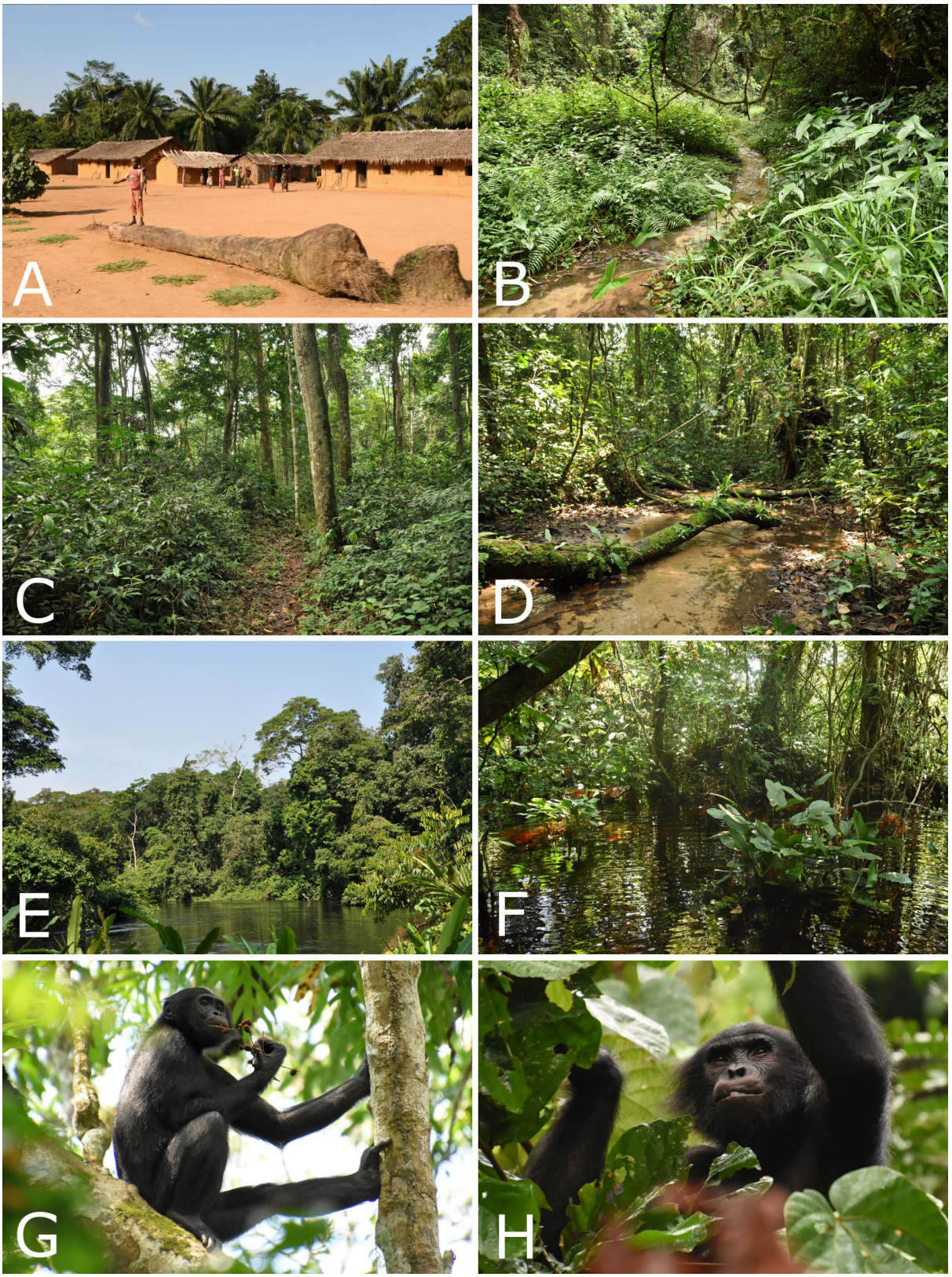

Fig. 2. Habitats of Kokolopori. **(A)** Rural complexes are common along pathways (e.g., habitat of *Ptychadena* sp. aff. *mascareniensis* when puddles are formed after rains). **(B)** Herbaceous habitat and shrubs along a small stream in disturbed forest (e.g., *Hyperolius phantasticus boulengeri*, *Congolius robustus*, *Leptopelis ocellatus schiotzi*, and *Ptychadena perreti*). **(C)** Disturbed primary forest (e.g., *Arthroleptis phrynoides*, and *A. tuberosus procterae*). **(D)** Small stream in primary dense moist forest (e.g., *Ptychadena aequiplicata*, *Sclerophrys* cf. *funerea*, and *S.* sp. aff. *camerunensis* 2). **(E)** Primary forest along the Luo (= Maringa) River. **(F)** Flooded forest near the Luo River (e.g., *Aubria masako*, *Hymenochirus* cf. *boettgeri*, and *Xenopus pygmaeus*). **(G–H)** Bonobo (*Pan paniscus*), the umbrella species of the Kokolopori Bonobo Nature Reserve facilitating the conservation of the whole ecosystem.

per mission, with the exception of the last survey (three days), by two experienced herpetologists (G.B. and either F.M.M. or V.G.) plus two to four local guides. Amphibians were detected during nocturnal and, to a limited extent, diurnal visual and acoustic encounter surveys, as well as active searches under logs and stones, or in holes, and in both natural and artificial pools. All specimens were hand-captured, except for the tadpoles and pipid frogs which were collected either by dip netting and dredging in pools and streams, or by funnel traps. In May 2018, three lines of pitfall traps were installed in the primary and secondary forests around Yalokole. The pitfall traps were deployed on 100 m long transects consisting of 20 traps placed at 5 m intervals (Nicolas et al. 2003). Plastic buckets (10 L) were buried in the ground, with their upper edges divided in half by a drift-fence barrier (consisting of side-by-side pieces of tarpaulin, cut evenly to a height of 50 cm) passing through their center. At each end of the line, there was a 2.5 m extension of the fence from each end bucket. The pitfall traps were left in place for 15 days and were checked three times per day. Photographs of African caecilians were presented to the local people to ascertain whether they might be present. At night, we also investigated the possible fluorescence emission of anurans using a handheld UV-flashlight (LED, Esco Lite 51 UV Black Light) with a peak wavelength range of 395–400 nm.

All geographic locations were recorded with a handheld GPS device. Individuals were photographed either *in situ*, or later arranged usually on leaves, and in standard positions with a scale and tag. Vouchered specimens were fixed in 4–10% formalin or 96% ethanol, and later stored in 70–75% ethanol. Tissue samples were preserved in 96% ethanol. Specimens are deposited in the herpetological collections of the Biodiversity Monitoring Center (Centre de Surveillance de la Biodiversité; CSB:Herp); University of Kisangani, DRC (field series RNBK); National Museum, Department of Zoology, Prague, Czech Republic (NMP-P6V); and the Institute of Vertebrate Biology of the Czech Academy of Sciences (IVB-H), Research Facility Studenec, Brno, Czech Republic (field series CD–and this material will later be transferred to NMP-P6V).

There is currently no key to species identification for the central Congolian herpetofauna. Therefore, species identifications were based on comparisons to other reference specimens from DRC and other Central African countries (Cameroon, Central African Republic, Congo Republic, and Gabon), and to type specimens deposited in the Royal Museum for Central Africa, Tervuren (Belgium, RMCA); National Museum of Natural History, Paris (France, MNHN); American Museum of Natural History, New York (USA, AMNH); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (USA, MCZ); Natural History Museum, Berlin (Germany, ZMB); and Natural History Museum, London (UK, BMNH). The first taxonomic orientation was based on the key for Gabon and Mbini (Frétey et al. 2011) and two treefrog books (Amiet 2012; Schiøtz 1999), and the identification of *Hyperolius* was critically compared with Schiøtz (2006). Where the available literature suggests that a particular taxon represents a species complex or the taxonomy is unclear, we use the term *confer* (cf.) in our identifications. Similarly, where we assume that the taxon under discussion is likely to represent a previously undescribed species similar to a known one, we use the term *species affinis* (sp. aff.). Where appropriate, we also assign subspecies identifications to assess morphological and genetic (unpublished data) differences. Genetic data will be published in separate taxonomic studies in the future. We anticipate that where subspecies identifications are applied, these taxa may later be elevated to full species after targeted taxonomic revisions. For now, however, we prefer to remain conservative and use subspecies names in accordance with recent recommendations by Hillis (2019, 2020) and de Queiroz (2020). Those authors have concluded that the subspecies category is useful for distinguishing geographic races and naming geographic variations whenever such distinctions are important or practical. Since the amphibian fauna of the central Congo Basin shows some differences from the fauna of the rest of Central Africa, we consider it practical to distinguish these taxa at least at the subspecies level in this article.

Species richness was assessed as species accumulation curves based on the cumulative number of species observed and using incidence-based statistical estimates with 100 randomizations in EstimateS software (Colwell 2013; Colwell and Elsensohn 2014). Analyses were conducted for each of three 15-day missions, i.e., two surveys during the wet season (May 2018, November 2018) and one during the dry season (August 2019), and for a cumulative survey covering a total of 48 days. The values of several estimators were compared (Table 1): first-order Jackknife (Jackknife 1; Burnham and Overton 1978, 1979), Chao 2 with bias correction (Chao 1987), Incidence Coverage-based Estimator (ICE; Chao et al. 1992; Chazdon et al. 1998), and Bootstrap richness estimator (Smith and van Belle 1984). Two estimators were plotted, Jackknife 1 and Chao 2, and they have been rated as generally performing well (e.g., Basualdo 2011; Williams et al. 2007) (Fig. 3).

Results

A total of 37 species of anuran amphibians from nine families and 16 genera were recorded (Table 2). According to the photographs presented to the local inhabitants, they did not recognize caecilians, suggesting that this group of amphibians is absent from Kokolopori. The most frequently encountered taxa were the scansorial (arboreal) *Leptopelis ocellatus schiotzi* (Arthroleptidae; encountered on 33 of 48 survey days), *Amnirana* cf. *albolabris* (Ranidae; 31), *Congolius robustus* (Hyperoliidae; 28),

Table 1. Species richness of amphibians in Kokolopori, observed and estimated using four statistical estimators: first-order Jackknife, Chao 2 with bias correction, Incidence Coverage-based Estimator (ICE), and Bootstrap richness estimator. Means, standard deviations, and 95% confidence intervals (Chao 2) are reported. Cumulative results are in bold.

Field session	Days	Number of species observed	Number of species estimated			
			Jackknife 1	Chao 2	ICE	Bootstrap
Wet season 1	15	31	42.2 ± 2.8	39.8 ± 6.8 (33.3–64.7)	46.2 ± 3.1	36.1 ± 1.0
Wet season 2	15	30	38.4 ± 3.0	36.7 ± 6.1 (31.5–60.4)	37.0 ± 2.4	33.9 ± 1.2
Dry season	15	27	32.6 ± 1.9	29.3 ± 2.7 (27.4–41.4)	30.5 ± 1.4	29.8 ± 0.7
Cumulative	**48**	**37**	**39.0 ± 2.0**	**37.2 ± 0.6 (37.0–41.0)**	**37.6 ± 0.6**	**38.5 ± 0.6**

and *Hyperolius phantasticus* (Hyperoliidae, 24). In terms of abundance, the most abundant species on average was *H. phantasticus*, which was commonly found in the wet season. However, its abundance was not so evident in the dry season. The overall composition of the most frequently encountered taxa during the wet and dry seasons was the same, except that *Leptopelis christyi* (Arthroleptidae) was more commonly encountered during the dry season (8 out of 18 days) than during the wet season (4/30 days), and the aforementioned *H. phantasticus* was less visible during the dry season (5/18 days in the dry season vs. 19/30 days in the wet season). Within primary forest, the leaf-litter frog *Phrynobatrachus* cf. *giorgii* was one of the most commonly encountered species, while within degraded habitats, particularly farmbush, *Amnirana* cf. *albolabris* was the most common. Along small watercourses, hyperoliid treefrogs were most common. The four surveyed areas did not appear to differ in species composition, while some differences could be observed among habitats. Biofluorescence upon illumination with a UV-light of wavelength of 395–400 nm was observed and documented in one species, *H. phantasticus* (see Species Accounts), while the approximately 15 other species that were tested (mostly hyperoliids) did not exhibit obvious fluorescence.

Species Richness

During each of the 15-day field sessions, 73–84% of the total number of species were recorded (observed and estimated). The numbers of species observed during these three missions were 31 (wet season), 30 (wet), and 27 (dry). Species richness estimates were similar for the two wet season missions and the cumulative survey (Table 1, Fig. 3A–B,D), but standard deviations and 95% confidence intervals were much higher/wider for the 15-day sessions than for the cumulative 48-day survey. A lower number of species was estimated based on the dry season mission (Table 1, Fig. 3C). In the case of the cumulative survey, the numbers of species observed and statistically estimated converged (Fig. 3D), with estimates of 37–41 species (Chao 2, 95% confidence interval).

Species Accounts

Amphibia: Anura
Arthroleptidae

Arthroleptis Smith, 1849

Five species of *Arthroleptis* were found, one of a large size, one medium-sized, and three rather small-sized (as described below). The latter three correspond morphologically to the presently invalid genus *Schoutedenella* De Witte, 1921. The phylogenetic diversity of *Arthroleptis* from the central Congo Basin is the subject of a separate study (V. Gvoždík et al., in prep.).

Arthroleptis tuberosus Andersson, 1905

Arthroleptis tuberosus procterae De Witte, 1921 (new status)
Fig. 4C.
Area: All.
Season/survey: Wet (May, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 031, 056, 076, 085, 125, 216, 545, 585, 706, 719, 734; IVB-H-CD 18241, 18242, 18265, 18266, 18267.
Comments: *Arthroleptis tuberosus* is a medium-sized and little-known species, but it is supposedly widespread from Cameroon (or eastern Nigeria; Nneji et al. 2019) to eastern DRC (IUCN SSC Amphibian Specialist Group 2017). Given that Amiet and Goutte (2017) recently proposed that this species consists of multiple subspecies (*A. t. tuberosus*, *A. t. adelphus* Perret 1966), and given the type localities of the available names, the central and eastern Congolian population should bear the nomen *A. tuberosus procterae* De Witte, 1921 (new status), type locality: "Beni (Kivu)." However, the status of this taxon, particularly whether it eventually merits full species status, requires further research. *Arthroleptis tuberosus* is abundant in forested regions in central, northern, and eastern DRC (G. Badjedjea, unpub. obs.). In Kokolopori, *A. tuberosus* was mostly found in forests, both primary and disturbed, and usually at night. Some specimens were caught in the early

Table 2. Species diversity of amphibians found in Kokolopori (2018–2020).

Family	Taxon	Notes
Arthroleptidae	*Arthroleptis tuberosus procterae*	Possibly a separate species
	Arthroleptis sp. aff. *variabilis*	Probably an undescribed species
	Arthroleptis phrynoides	
	Arthroleptis sp. aff. *phrynoides*	Probably an undescribed species
	Arthroleptis sp. aff. *xenochirus*	Probably an undescribed species
	Cardioglossa congolia	
	Leptopelis calcaratus meridionalis	Possibly a separate species
	Leptopelis christyi	
	Leptopelis ocellatus schiotzi	Possibly a separate species
Bufonidae	*Sclerophrys* cf. *funerea*	
	Sclerophrys sp. aff. *camerunensis* 1	Probably an undescribed species
	Sclerophrys sp. aff. *camerunensis* 2	Probably an undescribed species
Hyperoliidae	*Afrixalus equatorialis*	
	Afrixalus osorioi	
	Afrixalus cf. *quadrivittatus*	
	Congolius robustus	
	Cryptothylax greshoffii	
	Hyperolius cf. *cinnamomeoventris*	
	Hyperolius cf. *langi*	
	Hyperolius cf. *platyceps*	
	Hyperolius ocellatus purpurescens	Possibly a separate species
	Hyperolius phantasticus boulengeri	Possibly a separate species
	Hylambates verrucosus	
Phrynobatrachidae	*Phrynobatrachus* cf. *auritus*	
	Phrynobatrachus cf. *giorgii*	
	Phrynobatrachus sp. aff. *auritus*	Probably an undescribed species
Pipidae	*Hymenochirus* cf. *boettgeri*	
	Hymenochirus cf. *boulengeri*	
	Xenopus pygmaeus	
Ptychadenidae	*Ptychadena aequiplicata*	
	Ptychadena christyi	
	Ptychadena perreti	
	Ptychadena sp. aff. *mascareniensis*	Probably an undescribed species
Pyxicephalidae	*Aubria masako*	
Ranidae	*Amnirana* cf. *albolabris*	
	Amnirana lepus	
Rhacophoridae	*Chiromantis* cf. *rufescens*	

morning. This species usually sits on low vegetation at around 0.5–1 m high, and it is occasionally found in leaf-litter. It was often found after rain.

Arthroleptis* sp. aff. *variabilis

Fig. 4E.

Area: Yalokole, Yetee, Yotemankele.

Season/survey: Wet (May, Nov 2018), dry (Aug 2019).

Material: CSB:Herp:RNBK 022, 023, 025, 087, 547; IVB-H-CD 18371–18375.

Comments: A large *Arthroleptis* that is widespread in the central and northeastern DRC, although specimens from Kokolopori seem to be larger than those from other regions. It resembles *A. variabilis* Matschie, 1893 (type locality in southwestern Cameroon) but is stouter, and superficially similar to *A. stenodactylus* Pfeffer, 1893

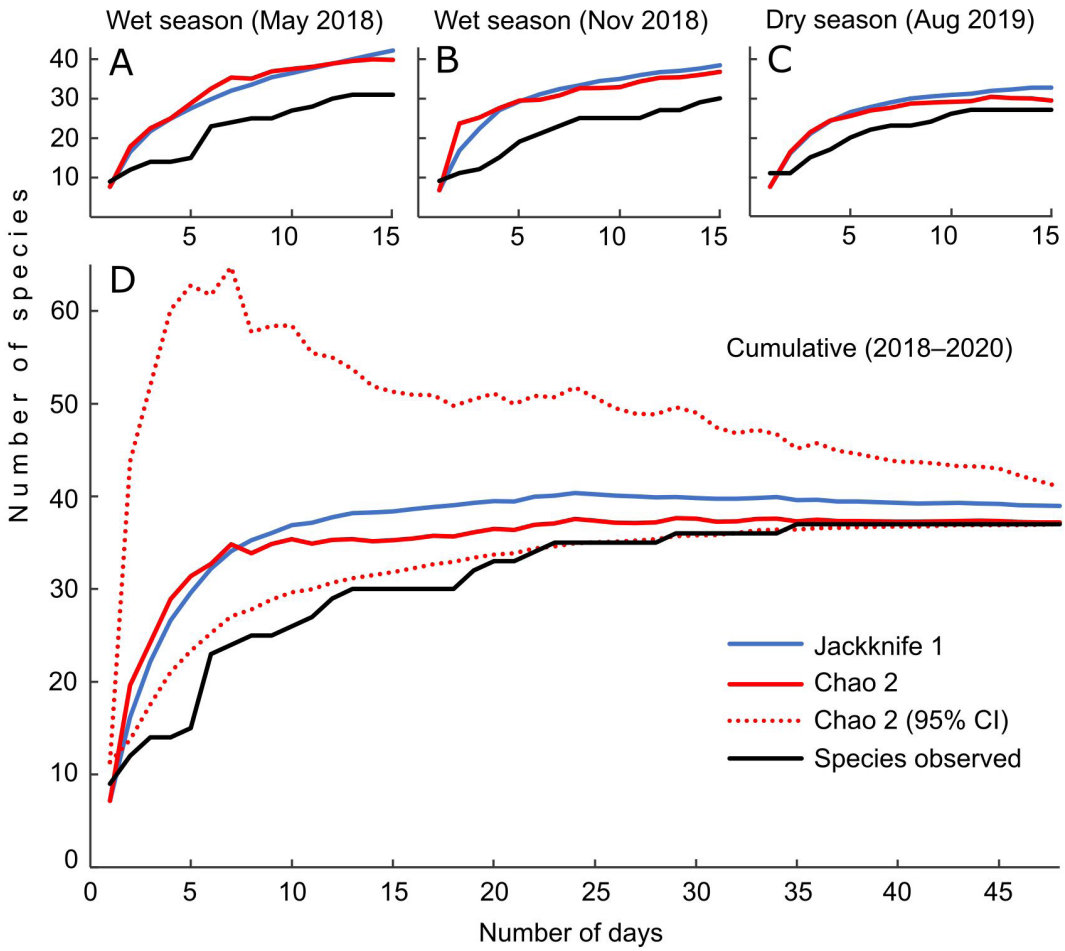

Fig. 3. Species richness of amphibians in Kokolopori (species accumulation curves) as based on the number of species observed (black) and statistically estimated using the Jackknife 1 (blue) and Chao 2 (red) methods. **(A)** Wet season, May 2018. **(B)** Wet season, November 2018. **(C)** Dry season, August 2019. **(D)** Cumulative data from the entire period, 2018–2020 (48 days). Red dotted lines show the 95% confidence interval for Chao 2.

from the savannas of the southeast. It seems to be mostly terrestrial, typically found jumping on the ground during the morning hours. Individuals of this species were mainly collected in the primary forest habitat. The individuals exhibited variable coloration from light to dark brown. A phylogeographic study of the *A. variabilis* complex will shed more light on the evolutionary history and taxonomy of these Squeaker Frogs (D.C. Blackburn et al., in prep.).

Small-sized "*Schoutedenella*"
***Arthroleptis phrynoides* (Laurent, 1976)**
Fig. 4A–B.
Area: Yalokole.
Season/survey: Wet (May 2018).
Material: CSB:Herp:RNBK 058, 124.
Comments: Originally described in the genus *Schoutedenella* (Laurent 1976a). Only two probably adult females were found during the whole study, suggesting that this species is probably very cryptic or rare. This also corresponds to the relatively late discovery and description of this species, which was based only on one male and one female (Laurent 1976a). The external morphology is concordant to the type material. Both specimens were found in primary forest near a stream (two different streams) sitting on vegetation about 0.5 m high in May 2018. The name *phrynoides* refers to the resemblance to the bufonid arboreal genus *Nectophryne* (Laurent 1976a). The similar morphology could point to an arboreal life history of this *Arthroleptis*, possibly also explaining its rarity. The species has a conspicuous verrucosity, the throat is black in both females, and the anterior part of the venter is black with diffused white spots. The tips of the toes and fingers are enlarged into distinct discs, an obvious adaptation to scansorial life. Our record is probably the first finding of this species since its description, extending its known range approximately 250 km northward from the type locality in Sankuru Province. The two localities are similar in terms of vegetation and climate, because they occur within a continuous forest block.

Arthroleptis* sp. aff. *phrynoides
Fig. 4D.
Area: Bechuchuu, Yalokole.

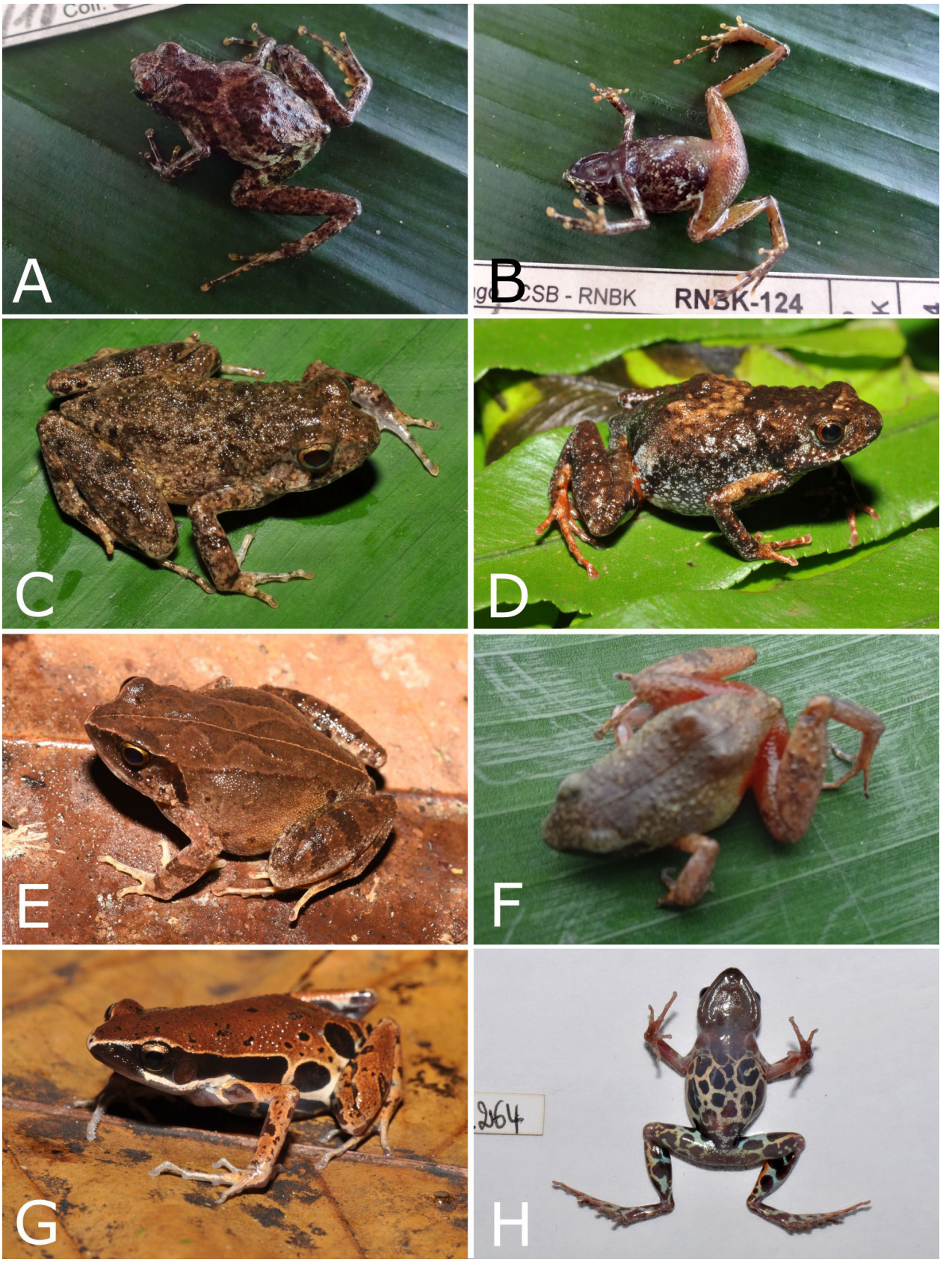

Fig. 4. Arthroleptids, *Arthroleptis* and *Cardioglossa*. **(A)** *Arthroleptis phrynoides* (female). **(B)** *A. phrynoides*, ventral view (same specimen as in A). **(C)** *A. tuberosus procterae* (female). **(D)** *A.* sp. aff. *phrynoides* (female). **(E)** *A.* sp. aff. *variabilis* (male). **(F)** *A.* sp. aff. *xenochirus* (male). **(G)** *Cardioglossa congolia* (male). **(H)** *C. congolia*, ventral view (same specimen as in G).

Season/survey: Wet (Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 704; IVB-H-CD 18145, 18240.
Comments: This is another species that is either rare or has cryptic ecology, because only two females and one juvenile were found. It resembles *A. phrynoides*, which is syntopic, but has substantial differences in both morphological features and color pattern. Conspicuous markings in the form of white-black marbling are present on the ventrum and contrast with the reddish underside of the hind limbs. Discs on toes and fingers are not as distinct as they are in *A. phrynoides*, suggesting a less scansorial ecology. The two specimens were found on low herbaceous vegetation about 0.5 m high in disturbed habitat at the forest margin, while one specimen was hopping on the ground in primary forest at night after almost a full day of rain. The morphology does not conform to any of the known described species. A formal description of this new species will be given elsewhere (V. Gvoždík et al., in prep.).

Arthroleptis* sp. aff. *xenochirus
Fig. 4F.
Area: Yalokole.
Season/survey: Wet (May 2018).
Material: CSB:Herp:RNBK 054, 140.
Comments: Another small *Arthroleptis* from the "*Schoutedenella*" group, like *A. phrynoides* and *A.* sp. aff. *phrynoides*, although this one rather resembles *A. xenochirus* from wooded savanna uplands of southern DRC and surrounding countries (Bittencourt-Silva 2019; Ernst et al. 2020). The vegetation and climate in central Congo are very different from the southern part of the country (Vancutsem et al. 2009), suggesting that this *Arthroleptis* is probably another yet-undescribed species deserving more attention.

***Cardioglossa* Boulenger, 1900**

This genus is related to *Arthroleptis* and was recently synonymized with it within a large phylogenetic meta-analysis of recent amphibians (Dubois et al. 2021; given obviously in error as a synonym of *Astylosternus* in the text, while as a synonym of *Arthroleptis* in the phylogenetic trees). However, we follow the last focused study on these genera (Blackburn 2008) and continue to recognize them here as two separate genera, as do Blackburn et al. (2021) in the note at the end of the article on the phylogeny of *Cardioglossa* and Frost (2021) in his database.

***Cardioglossa congolia* Hirschfeld, Blackburn, Greenbaum, and Rödel, 2015**
Fig. 4G–H.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 143, 240, 717, 854; IVB-H-CD 18193, 18194, 18264.
Comments: A little-known *Cardioglossa* from the Central Congolian forests, closely related and morphologically similar to *C. gratiosa* from northwestern Central Africa (Blackburn et al. 2021). This species is known only from males so far (Hirschfeld et al. 2015). We also found only males, calling from leaf-litter near small streams in primary forest. This species has obviously cryptic ecology, and it is not easy to locate even calling males, while females remain unknown to science. Our new records from Kokolopori are located between the only two known distribution sites of this species in western Mai-Ndombe Province and western Tshopo Province (Hirschfeld et al. 2015).

***Leptopelis* Günther, 1859**

Three species of *Leptopelis* were recorded here. Two of them are identifiable to taxa described at the subspecies level. However, considering their morphological distinctions and geographic distance from the type localities of the nominotypical subspecies, they may represent full species.

***Leptopelis calcaratus* (Boulenger, 1906)**
Leptopelis calcaratus meridionalis Laurent, 1973
Fig. 5A–B.
Area: Yalokole, Yotemankele.
Season/survey: Wet (May 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 144, 541, 542.
Comments: This taxon has not been reported since its description. Here, three males were found in primary forest on tree branches (4 m high in one case) several meters from streams. Two color morphs were recorded, two males were brown (Fig. 5A) and one was contrasting orange-black (Fig. 5B). It is worth noting that a similar orange morph was documented by Amiet (2012) as a rare coloration in *L. calcaratus* from Cameroon. These treefrogs were identified based on a comparison with the type material of *L. calcaratus meridionalis*. This subspecies was described as distributed south of the wide Congo River arc, while the populations to the east, north, and west were identified as belonging to the nominotypical subspecies (Laurent 1973). This taxon morphologically differs in several features, most importantly by a less developed spur on the heel and more extensive foot webbing. The level of distinction of this central Congolian taxon needs to be further investigated as it may represent a full species.

***Leptopelis christyi* (Boulenger, 1912)**
Fig. 5C–E.
Area: Bechuchuu, Yalokole, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 171, 183, 227, 242, 243,

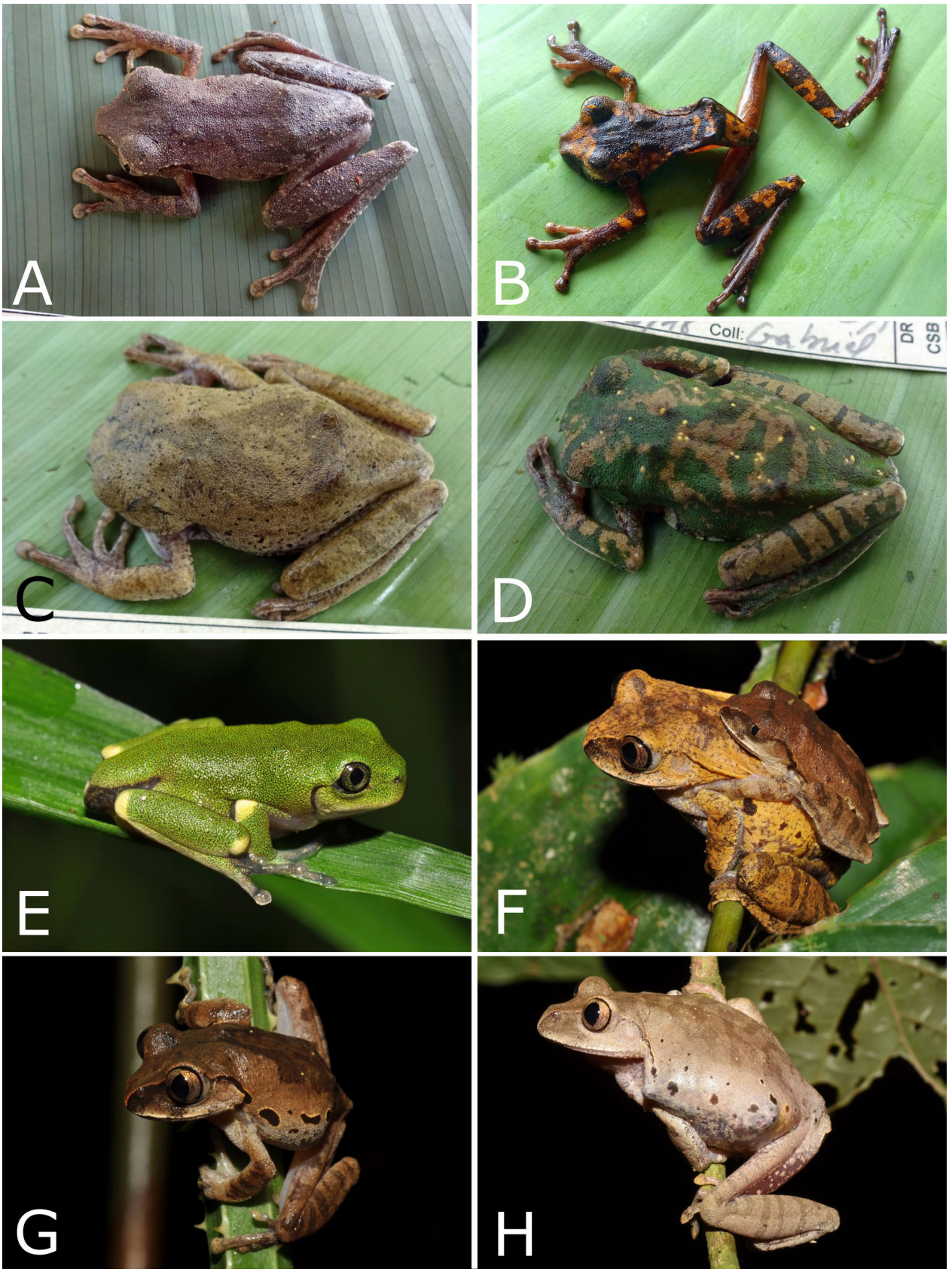

Fig. 5. Arthroleptids, *Leptopelis*. **(A)** *L. calcaratus meridionalis*, brown morph (male). **(B)** *L. calcaratus meridionalis*, orange-black morph (male). **(C)** *L. christyi*, brown morph (male). **(D)** *L. christyi*, green morph (male). **(E)** *L. christyi* (juvenile). **(F)** *L. ocellatus schiotzi* (amplectant pair). **(G)** *L. ocellatus schiotzi* (male). **(H)** *L. ocellatus schiotzi* (female).

250, 252, 270, 271, 293, 586, 622, 638, 644, 763, 800–802, 808, 809, 812, 813; IVB-H-CD 18341.
Comments: This treefrog is locally common (e.g., found in flooded forest) but missing or difficult to detect in other places. Two color morphs were recorded: the more common brown morph (Fig. 5C), and the brown-green morph (with a green dorsal triangle, stripes on limbs, and other smaller markings) which is rarely almost completely green (Fig. 5D). Juveniles are bright green with yellowish joints on the limbs (Fig. 5E). Interestingly, only a single specimen (metamorph) was found during the survey in November, when no adults were found. The metamorph was perched about 1 m high on herbaceous vegetation along a larger stream, together with tens of metamorphs of *L. ocellatus schiotzi*. This species was described from a forested region in Uganda and has been considered to be an eastern Central African element (e.g., Channing and Rödel 2019; Schiøtz 1999). However, based on accumulating evidence (e.g., Amiet 2012; Dewynter and Frétey 2019; V. Gvoždík, unpub. obs.), it seems that this treefrog is widespread in Central Africa from Cameroon and Gabon across the forested zone of the Congo Basin, and marginally to East Africa. Its presence in Angola is also possible.

***Leptopelis ocellatus* (Mocquard, 1902)**
Leptopelis ocellatus schiotzi Laurent, 1973
Fig. 5F–H.
Area: Yalokole, Yetee, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 007, 012, 018, 028, 035, 037, 041, 071, 078, 089, 121, 126, 138, 144, 158, 239, 268, 285, 294, 380, 415, 417, 418, 420, 421, 423, 442, 506, 521; IVB-H-CD 18085, 18086, 18146, 18161, 18168, 18169, 18252, 18258–18262, 18295, 18296, 18334–18337, 18340, 18388, 18389.
Comments: Like *L. calcaratus meridionalis*, this taxon has not been reported since its description. It is supposedly endemic to the Central Congolian forests. In comparison to the nominotypical subspecies, which occurs in western Central Africa, *L. ocellatus schiotzi* is more robust and has a relatively shorter and wider head (Laurent 1973). The degree of differentiation of these two taxa needs to be thoroughly investigated to determine whether the central Congolian taxon may represent a separate species. The sexual size dimorphism is conspicuous, with females much larger than males (Fig. 5F). This treefrog seems to be one of the most common species, occurring in a wide range of habitats, most often in disturbed habitats or ecotones between forest and open areas near streams. Males often call from high positions.

Bufonidae

***Sclerophrys* Tschudi, 1838**

This genus was formerly known as *Bufo* or *Amietophrynus*, but it is now named *Sclerophrys* (Ohler and Dubois 2016). We were unable to identify any of the three species of *Sclerophrys* toads to a described species with certainty, and probably at least two of them represent undescribed species. All three seem to be confined to forested habitats. Interestingly, none of the typical and usually common (semi-) synanthropic species of the Congo (*S. gutturalis*, *S. pusilla*, *S. regularis*) was recorded in this survey. *Sclerophrys* toads from the forests of Central Africa form a clade containing *S. camerunensis*, *S. funerea*, *S. gracilipes*, *S. kisoloensis*, *S. villiersi,* and several undescribed species (Liedtke et al. 2016, 2017), which for simplicity we tentatively name as the *S. camerunensis-gracilipes* group, and are in need of taxonomic revision (E. Greenbaum et al., in prep.).

***Sclerophrys* cf. *funerea* (Bocage, 1866)**
Fig. 6A–C.
Area: Bechuchuu, Yalokole, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 116, 188, 204, 211, 276, 540, 570, 690, 711, 721, 832; IVB-H-CD 18313.
Comments: This species was usually found in or near forest streams in several sites during all surveys. However, it was rather uncommon. Calling was heard in the early morning. Its coloration was usually dark to blackish in males, brownish in females, and often with some reddish patches in both sexes. Parotoid glands are rather indistinct. Verrucosity is relatively strong, especially on limbs and the posterior part of the dorsum. However, the dorsum of males is smoother with flattened warts during the mating period (Fig. 6A). *Sclerophrys funerea* is a little-known species despite its presumed large distribution range covering most of the Congo Basin, countries of the Albertine Rift, and most of Angola where the type locality is in the north of the country (Marques et al. 2018). It is probably absent from Cameroon (J.-L. Perret *sensu* Joger 1982) and Equatorial Guinea (Sánchez-Vialas et al. 2020), and is not reliably documented (at least from published photographs) from Gabon (Dewynter and Frétey 2019; Pauwels and Rödel 2007), and probably not even from the Republic of the Congo, as *S. gracilipes* has probably been confused with this species. Our specimens from Kokolopori correspond morphologically to specimens at RMCA identified as *Bufo funereus funereus* by J. Hulselmans, who described *Bufo funereus djohongensis* from Cameroon (Hulselmans 1977), which was later elevated to full species (Joger 1982), although it is possibly a junior synonym of *S. villiersi* (Frétey et al. 2011; Channing and Rödel 2019). Since the holotype of *S. funerea* was most likely destroyed in a 1978 fire, the photograph in Perret (1976a) is probably the only visual information on the holotype (and the quality of the specimen was rather

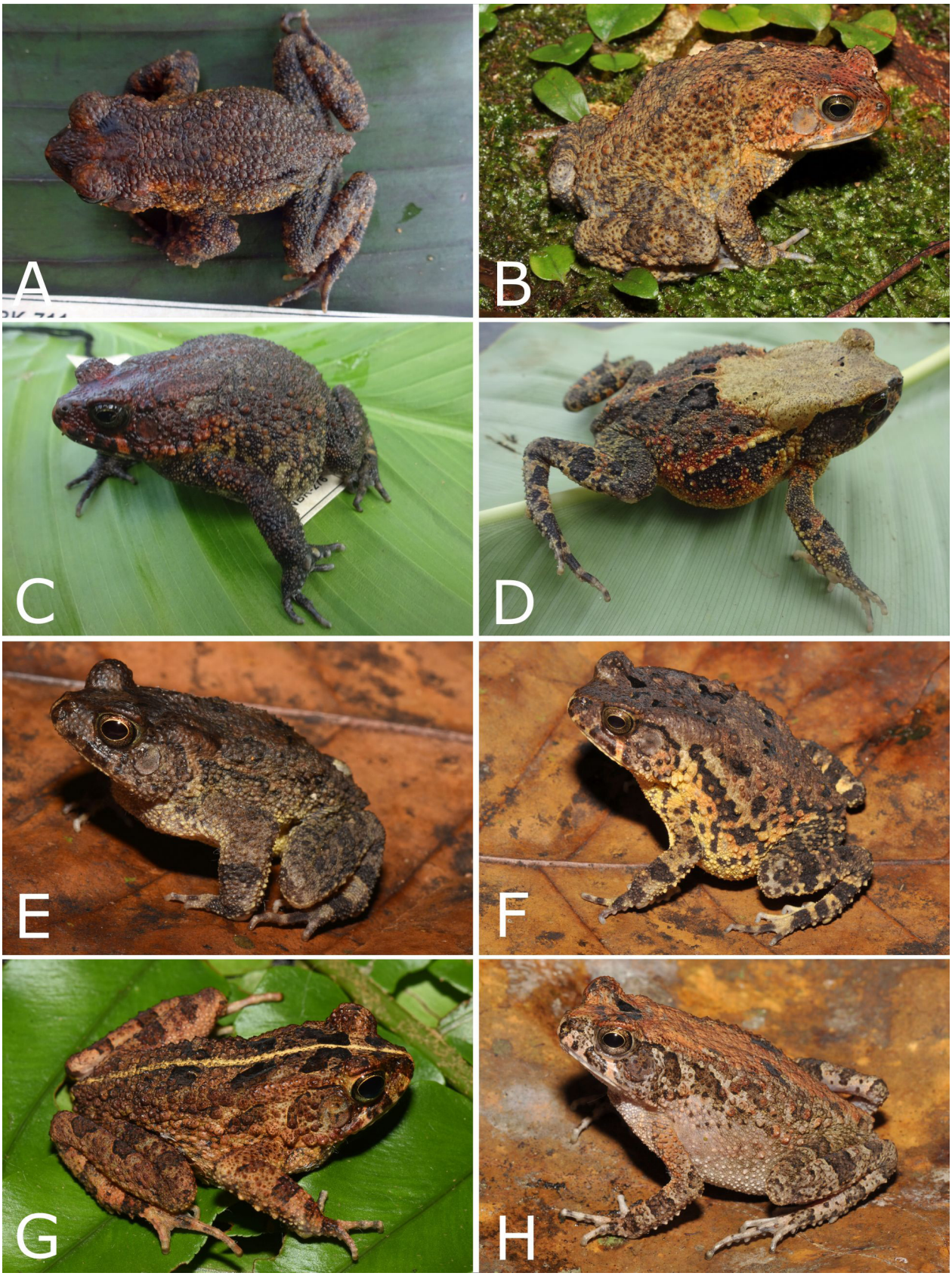

Fig. 6. Bufonids, *Sclerophrys*. **(A)** *S.* cf. *funerea*, dorsal view (male in breeding condition, with smoother dorsal skin). **(B)** *S.* cf. *funerea*, brown morph (female). **(C)** *S.* cf. *funerea*, black morph (male). **(D)** *S.* sp. aff. *camerunensis* 1, with distinct coloration (subadult). **(E)** *S.* sp. aff. *camerunensis* 1 (male). **(F)** *S.* sp. aff. *camerunensis* 1 (female). **(G)** *S.* sp. aff. *camerunensis* 2 (male). **(H)** *S.* sp. aff. *camerunensis* 2 (female).

poor). There are other names available (*Bufo benguelensis* Boulenger, 1882; *Bufo buchneri* Peters, 1882; *Bufo decorsei* Mocquard, 1903; *Bufo berghei* Laurent, 1950; *Bufo latifrons mayombensis* Hulselmans, 1977) that may or may not be synonyms of *S. funerea* (Tandy and Keith 1972). Comparing our material from Kokolopori with the holotype of *S. buchneri*, for which the type locality is also in northeastern Angola (about 500 km from the type locality of *S. funerea*), we found no significant differences. This is further indirect evidence that *S. buchneri* may represent a junior synonym of *S. funerea*, as already suggested by Tandy and Keith (1972). However, a thorough revision of the *S. camerunensis-gracilipes* group is needed, and a designation of a neotype of *S. funerea* will probably be necessary to stabilize the taxonomy of Central African forest toads. In view of the above uncertainties, and given the distance of about 1,300 km from the type locality (which is located in a different ecoregion), we refer to our population as *S.* cf. *funerea* for now.

***Sclerophrys* sp. aff. *camerunensis* 1**
Fig. 6D–F.
Area: Bechuchuu, Yalokole, Yetee.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 019, 114, 139, 232, 244, 246, 247, 249, 258, 432, 522, 523, 527, 528, 705, 707, 740, 866–868; IVB-H-CD 18176, 18177, 18244, 18253, 18254, 18268, 18327–18333, 18377.
Comments: This and the following species have a very similar general morphology. However, they differ consistently in the size of the tympanum (see below) and probably other morphological features. Both species belong to the *S. camerunensis-gracilipes* group, with males being slender and rather resembling *S. gracilipes*, while the more robust and colorful females resemble *S. camerunensis*. This species, which we provisionally name "aff. *camerunensis* 1," appears to be more common, usually occurring near streams. Male coloration varies from yellowish to dark brown, with females usually having a more contrasting dorsal color pattern and yellow-reddish body sides. The dorsal stripe may be visible but sometimes it is not present. Breeding was recorded in a small shallow river where males were hiding among aquatic plants. A similar, possibly undescribed species was reported from northern Angola (Ernst et al. 2020). A thorough revision of the *S. camerunensis-gracilipes* group is in preparation. The size of the tympanum in this species is approximately half the size of the eye.

***Sclerophrys* sp. aff. *camerunensis* 2**
Fig. 6G–H.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 195, 738, 739, 741–744; IVB-H-CD 18165, 18282, 18310–18312.
Comments: This species is similar to the previous one, but seems to be rarer. It was found in swampy forests near the Luo and Lopori rivers. There seems to be some differences in the structure of verrucosity compared to the previous species, which may indicate some ecological differences. All our specimens have a more or less visible light yellowish dorsal stripe. The size of the tympanum is larger in this species, being approximately the size of the eye. However, the margin of the tympanum (tympanic annulus) is not very distinct.

Hyperoliidae

***Afrixalus* Laurent, 1944**

The systematics of Central African *Afrixalus* has been turbulent (e.g., Laurent 1982; Perret 1976b), and remains unsettled. We found three species in Kokolopori, none of which were ubiquitous or rare. Frogs of this genus commonly have distinctly different color tones during the day and night.

***Afrixalus equatorialis* (Laurent, 1941)**
Fig. 7A–B.
Area: All.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 016, 043, 095, 193, 272, 275, 280, 282, 296, 300, 342, 344, 346, 360, 392, 395, 437, 439, 457, 505, 509, 524, 537, 628, 654–657, 736, 757, 758, 804, 811; IVB-H-CD 18138, 18141, 18269, 18338, 18339; NMP-P6V 76073/1–4.
Comments: A relatively little-known *Afrixalus* distributed only in rainforests of the northwestern to central Congo Basin. This species was found along streams in both disturbed and intact forest habitats. No specimens were observed calling. One couple was found in amplexus on the bank of the Lopori River. Dorsal coloration is brown at night, but gray to whitish during the day.

***Afrixalus osorioi* (Ferreira, 1906)**
Fig. 7C.
Area: Yalokole, Yetee, Yotemankele.
Season/survey: Wet (May 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 093, 098, 135, 136, 150, 151, 153, 162, 165, 167, 174, 200, 338, 354, 381, 388, 398, 408, 435, 438, 454, 467, 508, 517, 593, 672, 674.
Comments: This species was described from west-central Angola and is known to occur throughout much of the Congo Basin, in Uganda, and in western Kenya. The subspecies *A. osorioi congicus* (Laurent 1941) was described from northern DRC, with the presumed distribution in northern and eastern DRC (Laurent 1972). Later, Laurent (1982) noted that specimens of *A. osorioi* from central Congo (Sankuru) were found to be intermediate between the nominotypical subspecies

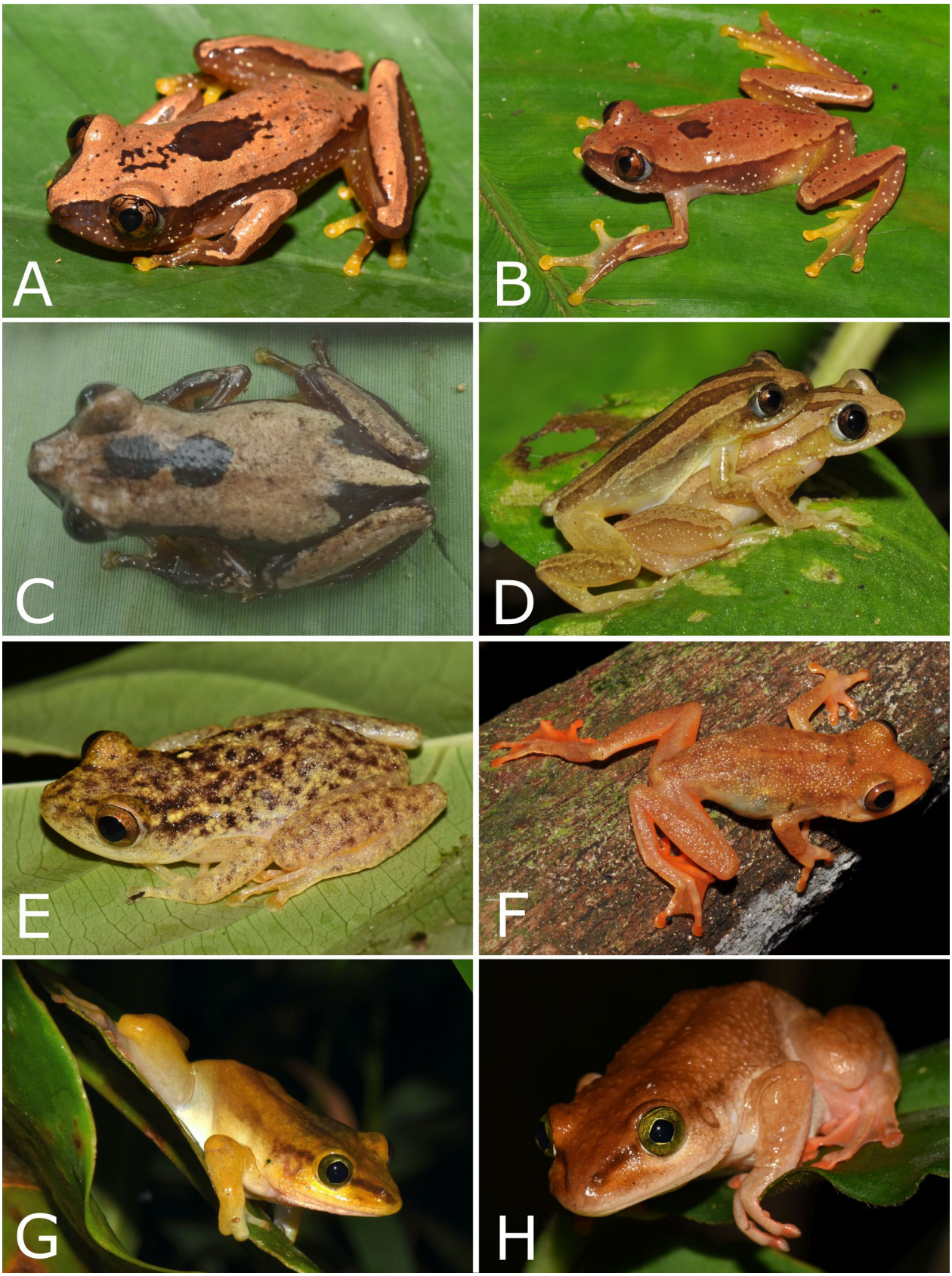

Fig. 7. Hyperoliids, *Afrixalus*, *Congolius*, and *Cryptothylax*. **(A)** *Afrixalus equatorialis* (male, nocturnal coloration). **(B)** *A. equatorialis* (female, nocturnal coloration). **(C)** *A. osorioi* (male). **(D)** *A.* cf. *quadrivittatus* (amplectant pair). **(E)** *Congolius robustus* (male). **(F)** *C. robustus* (female). **(G)** *Cryptothylax greshoffii* (male). **(H)** *C. greshoffii* (female).

and ssp. *congicus* and explained this pattern as a clinal variation. Laurent agreed with other earlier authors (e.g., Perret 1976b) to synonymize ssp. *congicus* with the nominotypical subspecies. However, a detailed investigation of the geographic morphological variation and molecular phylogeography of the species may reveal a more complex pattern in the future and possibly resurrect the *congicus* taxon. This name could also be applicable for the central Congolian population. In Kokolopori, *A. osorioi* was found in ponds or along streams usually in open habitats, but it was also recorded in disturbed flooded forest together with *A.* cf. *quadrivittatus*. Most males were found calling, hidden in higher herbaceous vegetation, and some were found in amplexus. Based on a comparison of three similar Congolian forest species (*A. equatorialis*, *A. leucostictus* Laurent, 1950, and *A. osorioi*), Laurent (1982) mentioned that *A. leucostictus* can turn its coloration into dark brown, almost without pattern, a condition which rarely happens in *A. osorioi*. However, some of the Kokolopori specimens of *A. osorioi* were dark brown, with their dorsal pattern barely visible.

***Afrixalus* cf. *quadrivittatus* (Werner, 1908)**

Fig. 7D.

Area: Yalokole, Yetee, Yotemankele.

Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).

Material: CSB:Herp:RNBK 156, 172, 173, 175, 185, 196, 208, 231, 233, 402, 405, 424, 436, 510, 511, 658–663, 673; IVB-H-CD 18094, 18135–18137, 18360–18363, 18391–18395.

Comments: The striped *Afrixalus* from Central Africa usually known as *A. fulvovittatus* (Cope, 1861) and/or *A. quadrivittatus* seemingly represent more than two species and form a species complex together with *A. dorsalis* (Peters, 1875), which probably also represents more than one species (Portik et al. 2019). Moreover, the latter is also known to have a striped morph, which further complicates morphological identifications (Schiøtz 1999). These striped *Afrixalus* have been known under several names either as subspecies or full species depending on the taxonomic authority as *A.* (*fulvovittatus*) *brevipalmatus* (Ahl, 1931), *A.* (*fulvovittatus*) *leptosomus* (Peters, 1877), *A.* (*fulvovittatus*) *quadrivittatus,* or *A.* "*quadrivittatus*" Pickersgill, 2007 (Amiet 2012; Amiet and Goutte 2017; Frétey et al. 2011; Laurent 1982; Pickersgill 2007; Schiøtz 1999). The nomen *leptosomus* is now considered a synonym of *A. dorsalis* (Amiet 2012; Frétey et al. 2011) in line with the opinion of earlier authors (Perret 1976b; Schiøtz 1999). *Afrixalus fulvovittatus* is the oldest available name for this frog group. The type locality is in Liberia, and the species is now believed to be distributed only in West Africa (Channing and Rödel 2019). *Afrixalus quadrivittatus* has the type locality in South Sudan and is believed to be distributed in East Africa with unclear limits westward in Central Africa (Channing and Rödel 2019). Frétey et al. (2011) hypothesized that this species is widespread throughout Central Africa, similar to the hypothesis of Laurent (1982; as subspecies *A. f. quadrivittatus*). The taxonomic situation is obviously complex (Portik et al. 2019) and a molecular phylogeographic approach is needed to resolve it. *Afrixalus* (*fulvovittatus*) *brevipalmatus* is the available name applicable to the Cameroonian and Equatorial Guinean populations (type locality: Sangmelima, Cameroon; Amiet 2012; Amiet and Goutte 2017; Sánchez-Vialas et al. 2020). For the Kokolopori population we follow Laurent (1982), a respected Congo herpetology expert, who hypothesized that *A. quadrivittatus* is widespread from East Africa to the Congo. However, in respect to the distance to the type locality, we refer to this species as *A.* cf. *quadrivittatus*, pending a thorough taxonomic revision. In Kokolopori, we found this species mostly in open areas on higher herbaceous vegetation, usually along streams, and commonly together with *A. osorioi*.

***Congolius* Nečas, Badjedjea, and Gvoždík, 2021**

This genus was recently established based on evidence that "*Hyperolius*" *robustus* is phylogenetically placed outside the genus *Hyperolius* (Nečas et al. 2021). The Congo frog forms a common clade with West African *Morerella* and Central African *Cryptothylax*. This new and monotypic genus is probably endemic to the Central Congolian forests.

***Congolius robustus* (Laurent, 1979)**

Fig. 7E–F.

Area: All.

Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).

Material: CSB:Herp:RNBK 002, 009, 040, 050, 057, 061, 062, 067, 075, 081, 082, 096, 105, 111, 130, 137, 157, 215, 257, 414, 434, 445, 446, 466, 514, 519, 520, 532, 533, 543, 549, 550–552, 584, 606, 629, 679, 680, 698–700, 722, 730, 839–841; IVB-H-CD 18095, 18117–18121, 18143, 18255, 18256, 18299, 18301–18305, 18364; NMP-P6V 76086/1–9, 76087/1–3.

Comments: This is a little-known species, but it is quite common in Kokolopori. It is abundant in flooded primary forests or along streams, and also in disturbed semi-open habitats. It was commonly found in communities with *Hyperolius phantasticus* and *H.* cf. *cinnamomeoventris*, and/or *H.* cf. *platyceps*, especially in farmbush along streams at forest edges. Most specimens were found perched on vegetation 1.5–2 m high, but some specimens were observed higher up on shrubs or trees. Most males were found during calling activity, although they were easily disturbed and stopped calling. The Robust Congo Frog is sexually dichromatic with males in yellowish to brown tones and usually dark marbling, whereas females are reddish-brown with orange distal and ventral parts of the limbs (especially tips of digits and webbings).

This species was already reported from Kokolopori by Schiøtz (2006).

***Cryptothylax* Laurent and Combaz, 1950**

A large hyperoliid distributed in the western Congo Basin, with one widespread species (*C. greshoffii*) and one species of a smaller size (*C. minutus*) with questionable validity (Schiøtz 1999) and known only from its type locality near Lake Tumba, western-central DRC (Laurent 1976b).

***Cryptothylax greshoffii* (Schilthuis, 1889)**
Fig. 7G–H.
Area: Yalokole, Yetee.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 073, 146, 207, 256, 269, 248, 595; IVB-H-CD 18109, 18122–18127, 18232; NMP-P6V 76077/1–10, 76078/1–3.
Comments: All observed adult specimens of *Cryptothylax* were of large size, identified as *C. greshoffii*, and thus did not fit the description of the enigmatic *C. minutus* (Laurent 1976b). This species occurs in open areas along streams or near swamps with rich high herbaceous vegetation. *Cryptothylax* only rarely enters the margins of forests. This sexually dichromatic species has yellowish to brown males and whitish to pinkish females with orange discs on the toes, which is a state of color dichromatism similar to that of the genus *Congolius*. Metamorphs of this species are relatively large and quite tuberculous with beige to pinkish lateral stripes and a brown dorsum, a pattern sometimes visible in adult males but less conspicuous. We encountered this species only relatively rarely, which is probably due to the presence of predominantly forested habitats in Kokolopori.

***Hyperolius* Rapp, 1842**

Our surveys recorded five species of this genus which belong to two divergent clades (Portik et al. 2019): (i) *H.* cf. *cinnamomeoventris*, *H.* cf. *langi*, *H.* cf. *platyceps* with high color pattern variation but rather indistinct sexual dichromatism; and (ii) *H. ocellatus*, *H. phantasticus* with a relatively stable color pattern but distinct sexual dichromatism. Three of the five species are identified to nominal species with some caveats as discussed below.

***Hyperolius* Clade 2 (*sensu* Portik et al. 2019)**

***Hyperolius* cf. *cinnamomeoventris* Bocage, 1866**
Fig. 8A–E.
Area: All.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 091, 099, 109, 110, 113, 117, 128, 177, 206, 260, 274, 309, 334, 336, 348, 361, 364, 387, 390, 412, 441, 447, 448, 450, 455, 460–465, 473, 512, 514–516, 604, 615, 665–667, 669–671, 759, 760, 843; IVB-H-CD 18092, 18093, 18107, 18108, 18128–18134, 18225, 18309, 18351, 18353–18359.
Comments: An abundant species in Kokolopori, found in all habitat types but mostly in open areas along streams, at forest edges, or in clearings. Phylogeographic studies of this species suggested a more complex pattern of genetic variation (Bell et al. 2015, 2017), and given the relatively remote type locality in northern Angola, the conspecificity of the central Congolian population with the type-locality population is uncertain. The Kokolopori population of this species possesses a high level of color polymorphism, higher than presently known for the species (cf. Amiet 2012; Channing and Rödel 2019; Schiøtz 1999). Generally, males are yellowish to brown and females have a dominant green color, which corresponds to the usual coloration (Amiet 2012; Schiøtz 1999). However, one relatively atypical feature is that light dorsolateral stripes are also present in females (not only males), resembling *H. veithi* Schick, Kielgast, Rödder, Muchai, Burger, and Lötters, 2010, but less conspicuous (Fig. 8B; see also the photo of a pair in amplexus in Nečas et al. 2021). This feature is a sign of transition to secondary monochromatism, which is known to occur in the *H. cinnamomeoventris* complex (Portik et al. 2019). Another as yet undescribed color pattern is an hourglass dorsal pattern present in some specimens of both sexes (Fig. 8C–E). Schiøtz (2006) observed both color morphs of *H.* cf. *cinnamomeoventris* in Kokolopori but identified them as "light" color morphs of *H. platyceps* (Schiøtz's morphs C and D). In our opinion, *H. platyceps* in Kokolopori always has a "dark" color morph (see below). However, the dorsal brown coloration may be relatively light under some conditions, which can cause confusion in identification (cf. Figs. 8E and 9C). Genetic testing could clarify whether the hourglass morph (Schiøtz's morph C) represents a hybrid between *H.* cf. *cinnamomeoventris* and *H.* cf. *platyceps*, as the hourglass pattern is commonly present in *H. platyceps* (Amiet 2012; Schiøtz 1999). The taxonomic status of certain taxa that are presumably conspecific or possibly conspecific must be also verified, as some of these nomina might be applicable for the central Congolian populations of *H.* cf. *cinnamomeoventris*, particularly *H. ituriensis* Laurent, 1943 described from Djalasinda near Lake Albert (Ituri Province), *H. polli* Laurent, 1943 described from Tshimbulu (Kasaï-Central Province), and *H.* (*cinnamomeoventris*) *wittei* Laurent, 1943 described from Kulu near Mwanza, north of the Upemba National Park (Haut-Lomami Province; Laurent 1957).

***Hyperolius* cf. *langi* Noble, 1924**
Fig. 8F.
Area: Yalokole, Yetee.
Season/survey: Wet (May 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 159, 587–592, 610, 614.

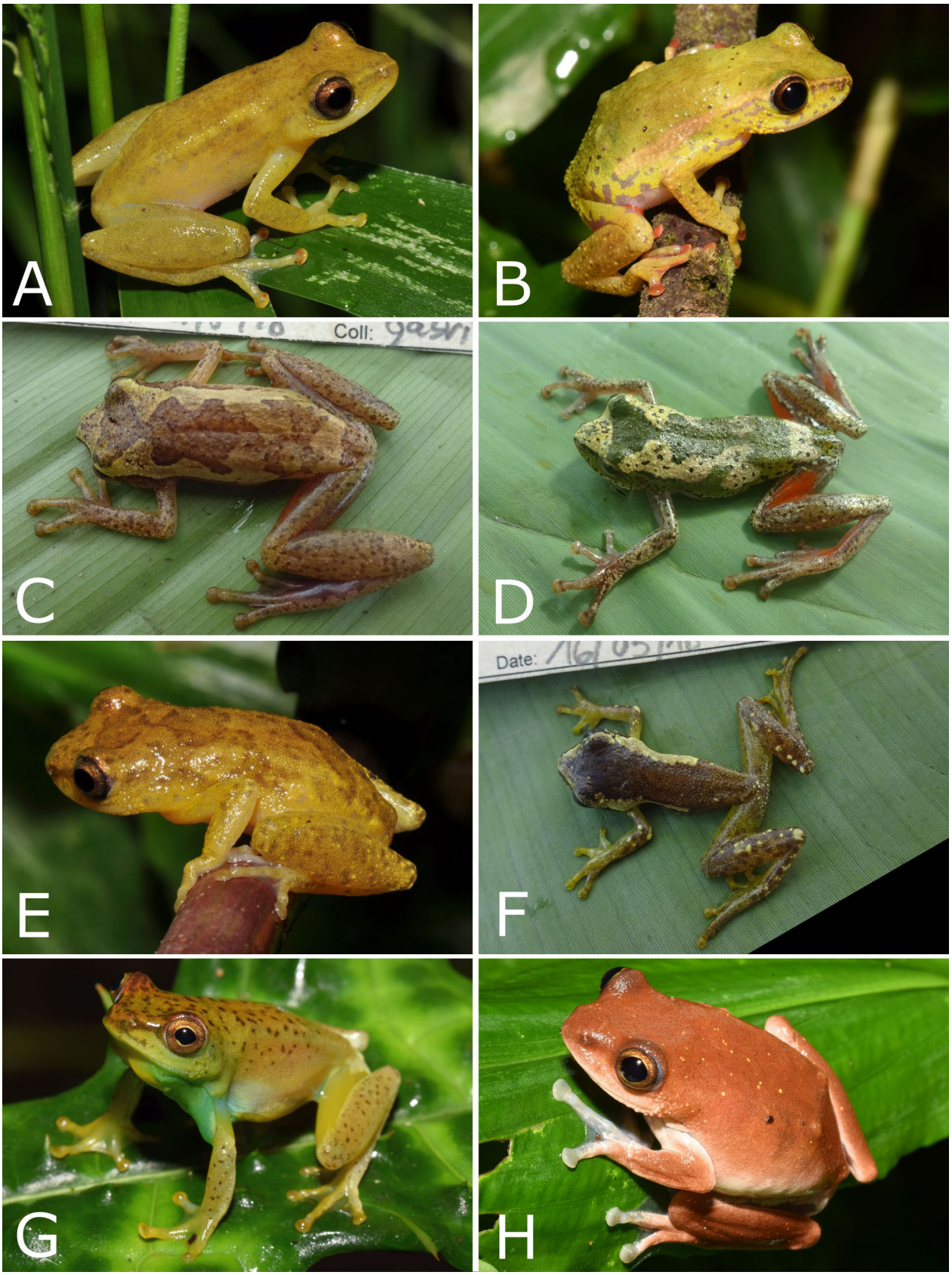

Fig. 8. Hyperoliids, *Hyperolius*. **(A)** *H.* cf. *cinnamomeoventris*, striped morph (male). **(B)** *H.* cf. *cinnamomeoventris*, striped morph (female). **(C)** *H.* cf. *cinnamomeoventris*, hourglass morph (male). **(D)** *H.* cf. *cinnamomeoventris*, hourglass morph (female); note the species-specific red coloration of the inner thighs in both sexes in (C) and (D). **(E)** *H.* cf. *cinnamomeoventris*, hourglass morph (male). **(F)** *H.* cf. *langi*, striped morph, "forma *albomarginata*" (male). **(G)** *H. phantasticus boulengeri* (male, Phase J). **(H)** *H. phantasticus boulengeri* (female).

Comments: This species seems to be relatively rare in Kokolopori. Individuals were found calling and well hidden in the dense herbaceous vegetation that overgrew a small stream in farmbush at the edge of secondary forest. This species has two distinct color morphs. One has a camouflage-like pattern corresponding to the "facies *kuligae*" (Laurent 1950), while the second has light canthal and dorsolateral stripes extending halfway down the body. We refer to the latter as the "forma *albomarginata*" (Fig. 8F) following the name of the phenotypically corresponding nominal taxon *Hyperolius albomarginatus* Laurent, 1940, synonymized with *H. langi* (Laurent 1950). There has been a long-standing debate regarding the taxonomic distinction and distributions of *H. langi* (type locality in Bas-Uele, NE DRC) and *H. kuligae* (type locality on Mt. Cameroon), e.g., Schiøtz (1999). As the color pattern variation in *H. langi* from northeastern DRC (unpub. data) basically corresponds to the variation of *H. kuligae* in Cameroon (cf. Amiet 2012), this suggests that the two species share these phenotypic characteristics. We follow Köhler et al. (2005), who studied advertisement calls, with the opinion that the two species represent vicariants with *H. kuligae* in western and *H. langi* in eastern Central Africa. The relatively deep genomic divergence also supports the species status of both taxa (Portik et al. 2019). However, the exact distributional limits of the two species are unknown. As the Kokolopori population is relatively distant from the type locality (located north of the Congo River), and also considering some differences in coloration details, we refer to this population as *H.* cf. *langi*. Interestingly, Bittencourt-Silva (2019) reported a finding of the little-known *H. major* from a forest patch in northwestern Zambia, supposedly genetically close to *H. langi* and *H. kuligae*. However, the photographed male differs in coloration from the Kokolopori specimens. Individuals with the camouflage-like pattern may be confused with *H.* cf. *platyceps* and the hourglass specimens of *H.* cf. *cinnamomeoventris*, as all three species have similar color pattern variations. The photographed specimen of "*H. kuligae*" from Boteka (western Équateur Province) reported by Schiøtz (2006) could be conspecific with *H.* cf. *langi*.

***Hyperolius* cf. *platyceps* (Boulenger, 1900)**

Fig. 9C–E.

Area: All.

Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).

Material: CSB:Herp:RNBK 169, 170, 190, 192, 197, 214, 222, 236, 259, 261, 279, 291, 302, 318, 327, 333, 353, 365, 367, 376, 384–386, 413, 416, 433, 507, 651–653, 668, 731–733, 805, 842; IVB-H-CD 18142, 18347–18350, 18352, 18386, 18387.

Comments: A common, but often relatively well-hidden, species in Kokolopori occurring in disturbed habitats or at the edge of primary forest. This species is considered a Congolian faunal element (Amiet 2012), although we have never encountered it in northeastern DRC. The species is widespread in the western and central Congo Basin, Gabon, and northern Angola (Frétey et al. 2011; Dewynter and Frétey 2019; Marques et al. 2018), and possibly as far as southeastern DRC (Laurent 1952). This species has been the source of much taxonomic confusion in the past (Marques et al. 2018; Schiøtz 1999) and is not yet well understood. As mentioned above for *H.* cf. *cinnamomeoventris*, Schiøtz (2006) described four color morphs from Kokolopori: two dark and two light. However, based on our close observations in the field and in the laboratory, we are of the opinion that the "light morphs" represent *H.* cf. *cinnamomeoventris* (with the possibility of a hybrid origin of the light hourglass morph, Schiøtz's morph C, which remains to be genetically tested; Fig. 8C–E). All the specimens which we identified as *H.* cf. *platyceps* belonged to the two dark morphs, one with the hourglass dorsal pattern (Fig. 9C) and the second one a rarer striped morph corresponding to the "forma *pleurotaenia*" (cf. Amiet 2012; Fig. 9D). As noted by Schiøtz (2006), individuals from Kokolopori have some peculiarities in coloration that are not known in the western populations. In particular, conspicuous white and/or yellow spots are present on the flanks and part of the ventrum in both sexes (spots of both colors may be combined; see Fig. 9E for ventral view).

Several subspecies were described, including two from southeastern DRC: *H. platyceps lomamiensis* Laurent, 1943 (type locality in W Upemba NP, Haut-Lomami) and *H. p. olbrechtsi* Laurent, 1952 (type locality W of Kalemie, Tanganika). *Hyperolius langi* and *H. major* Laurent, 1957 (type locality in E Upemba NP, Haut-Katanga) were also treated as subspecies of *H. platyceps* at one time (e.g., Laurent 1952, 1957). However, Schiøtz (1999) stated: "Much confusion has surrounded this species, partly because of its variation, partly because several quite different species have been treated as subspecies of *H. platyceps*. Amiet (1978) [Note: Amiet 1979 "1978"] has clarified the matter and we follow him in regarding the forms in the "*platyceps*-complex" as full species (*platyceps*, *langi*, *major*), but did not address the taxa *lomamiensis* and *olbrechtsi*. Both are presently treated as synonyms (however, they may be valid subspecies) of *H. platyceps* (Frost 2021). From the above, it is clear that a thorough revision is needed to clarify the status of these taxa and their relationships to *H. langi* and *H. major*. It is also necessary to verify whether *H. p. lomamiensis* is an older available name for *H. major* as the type localities of the two taxa are only about 70 km apart. Similarly, some other little-known taxa may be related to *H. platyceps* (cf. Laurent 1941, 1943, 1952, 1957), in particular *H. atrigularis* Laurent, 1941 described from highlands of the Marungu Plateau (Tanganika Province), *H. polli* Laurent, 1943 known from the type locality in Kasaï-Central and adjacent northeastern Angola (Marques et al. 2018), and possibly

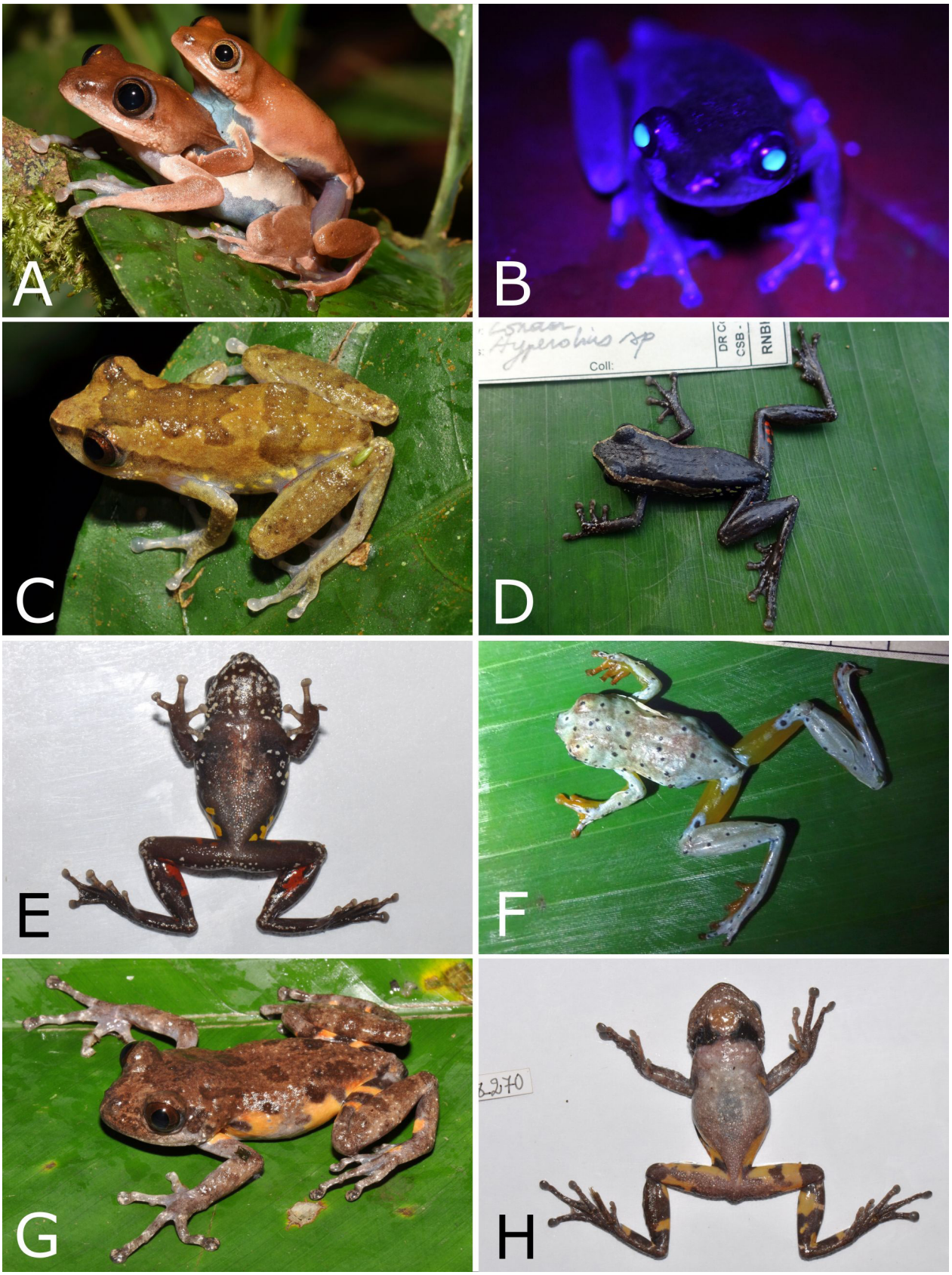

Fig. 9. Hyperoliids, *Hyperolius* and *Hylambates*. **(A)** *Hyperolius phantasticus boulengeri* (amplectant pair, both sexes in Phase F). **(B)** *H. phantasticus boulengeri* under UV light (male, Phase J). **(C)** *H.* cf. *platyceps*, hourglass morph (male). **(D)** *H.* cf. *platyceps*, striped morph, "forma *pleurotaenia*" (male). **(E)** *H.* cf. *platyceps*, hourglass morph, ventral view (female). **(F)** *H. ocellatus purpurescens* (female). **(G)** *Hylambates verrucosus* (male). **(H)** *H. verrucosus*, ventral view (same specimen as in G).

Hyperolius kibarae Laurent, 1957 described from the eastern Upemba NP (Haut-Katanga Province).

***Hyperolius* Clade 1 (*sensu* Portik et al. 2019)**

***Hyperolius ocellatus* Günther, 1858**
Hyperolius ocellatus purpurescens Laurent, 1943
Fig. 9F.
Area: Yetee.
Season/survey: Dry (Aug 2019).
Material: CSB:Herp:RNBK 611, 612, 694, 695–697.
Comments: This species was recorded only once near Yalokenge village in pristine forest, in a partially open swampy zone at the edge of a stream. Five males were found sitting on vegetation, and not calling. The only female was discovered well hidden in vegetation, far from the place where the males aggregated. Schiøtz (2006) also recorded "only few specimens" in small forest swamps in Kokolopori, and described their coloration. This is a sexually dichromatic species (Portik et al. 2019) with green males that have a silvery white triangle on the snout and white dorsolateral stripes. The female (Fig. 9F) has the color pattern corresponding to the subspecies *H. o. purpurescens* originally described from the southeast of Kisangani (Laurent 1943) [type locality of the nominotypical subspecies was restricted to Bioko Island, Equatorial Guinea]. A phylogeographic study suggested a complex pattern of genetic variation with the eastern Congolian populations differentiated to some level (samples from Kokolopori were not included; Bell et al. 2017). *Hyperolius hildebrandti* Ahl, 1931 (type locality "Kamerun;" Ahl 1931) may be an older available name for populations from the Congolian forests. Whether this taxon deserves full species status remains to be evaluated.

***Hyperolius phantasticus* (Boulenger, 1899)**
Hyperolius phantasticus boulengeri Laurent, 1943 (new status)
Figs. 8G–H, 9A–B.
Area: Yalokole, Yetee, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 001, 003, 010, 013, 021, 033, 164, 168, 176, 187, 189, 199, 202, 205, 213, 217, 223, 238, 301, 303–305, 307, 308, 330, 337, 356, 357, 359, 363, 368–370, 374, 382, 383, 393, 394, 399, 403, 406, 409, 410, 431, 440, 449, 459, 468–472, 474, 475, 479, 480, 571, 579, 580, 605, 616, 701; IVB-H-CD 18087–18091, 18096–18099, 18110–18116, 18162–18164, 18191, 18192, 18202, 18203, 18294, 18342–18346, 18492, 18493, 18508, 18518, 18519, 18523, 18526, 18528.
Comments: *Hyperolius phantasticus* is distributed from southern Cameroon to western Congo/DRC and to central DRC (Channing and Rödel 2019), and was described from the present-day continental Equatorial Guinea (Sánchez-Vialas et al. 2020). It is one of the most abundant anuran species in Kokolopori, usually present along streams and rivers in open or semi-open areas, perching on high herbaceous vegetation and shrubs. Many pairs were found in amplexus during the wet seasons, while no amplectant pairs were found during the dry season. In this region, this species occurs in two color phases as already described by Schiøtz (2006): Phase J (Fig. 8G; juveniles/males; Schiøtz 1967) with the predominately light, translucent green dorsal color, unspotted or sprinkled with tiny dark spots, canthal stripes (light or dark) in most specimens, in some individuals continuing behind the eye halfway down the body, venter mostly yellow-green with some blue patches; and Phase F (Figs. 8H, 9A; females/female-like males) with the maroon to beige dorsal color, sometimes with small yellow dots, ventral side mostly ink-black suffused with bluish and pinkish tones in dispersed light patches (sometimes concentrated in the center while circum-marginal areas are black). The inflated throat of males is mostly of the blue-green color in both color phases, with the gular disc yellow in Phase J and showing the dorsal maroon color in Phase F. The coloration differs significantly from the holotype of *H. phantasticus* (female; Boulenger 1899) and the populations of Cameroon and northern Gabon (cf. Amiet 2012; Amiet and Goutte 2017; Dewynter and Frétey 2019), which are characterized by yellow dorsal coloration without spots, only with dark canthal stripes, and the ventral side is ink-black only in the posterior parts (Amiet 2012; Boulenger 1899). These geographic differences in coloration have already been discussed (Amiet 2012; Köhler et al. 2005). We therefore propose to resurrect *Hyperolius boulengeri* Laurent, 1943 [type locality "Flandria (Tshuapa)," DRC; Laurent 1943] at the subspecies level as *H. phantasticus boulengeri* (new status) to account for geographic variation with the consistent color differentiation and genetic divergence (unpub. data; genetic data to be published elsewhere) of the central Congolian populations. It is possible that this taxon occurs as far west as southern Gabon and southwestern Republic of the Congo as the coloration of *H. phantasticus* in these regions (cf. Jongsma et al. 2017; Largen and Dowsett-Lemaire 1991) roughly corresponds to individuals from central DRC. However, a phylogeographic study is needed to clarify the distribution range of this taxon and whether it deserves full species status. We have observed that this species is preyed upon by fishing spiders (*Nilus*, Pisauridae), with a male of Phase F found as a prey item in May 2018 (Badjedjea et al. 2019), and a male of Phase J as a second case in the dry season of August 2019. Interestingly, we observed a certain level of the fluorescent emissions in adult males of Phase J (Fig. 9B) upon illumination with a UV light (λ_{max} 395–400 nm), which agrees with the hypothesis of the existence of fluorescence in anurans with greenish-translucent skin (Taboada et al. 2017a,b). Fluorescence was not observed in males of Phase F.

***Hylambates* Duméril, 1853**

This genus of the subfamily Kassininae (while the previous genera are representatives of the subfamily Hyperoliinae) was known as *Phlyctimantis* from the 1950s until recently, when Dubois et al. (2021) pointed out the nomenclatural priority of the nomen *Hylambates*. These treefrogs have only rarely been encountered in Kokolopori.

***Hylambates verrucosus* Boulenger, 1912**
Fig. 9G–H.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (Nov 2018), dry (July 2020).
Material: CSB:Herp:RNBK 810, 819, 820, 827; NMP-P6V 76085/1–2.
Comments: Individuals of this species were found in forest swamps dominated by plants of the genus *Lasimorpha* (formerly known as *Cyrtosperma*). This semiaquatic plant is spiny and may provide some protection from the predators of these frogs. Three anuran species were abundant in this swampy environment, *Aubria masako* and *Chiromantis* cf. *rufescens* in addition to *H. verrucosus*. In our field experience in central and northeastern DRC, *Hylambates* is often syntopic with *Chiromantis*.

Phrynobatrachidae

***Phrynobatrachus* Günther, 1862**

The systematics of Congolian *Phrynobatrachus* is poorly known. We have identified three morphologically similar species in our Kokolopori material, all belonging to the *P. auritus* species complex. The identification of these frogs is complicated by the high level of color polymorphism and variation in their color patterns. For example, light stripes may be missing or may occur medially or laterally, sometimes bright spots (e.g., green) are distributed in different places, etc. This species complex is currently in taxonomic revision (V. Gvoždík et al., in prep.).

***Phrynobatrachus* cf. *auritus* Boulenger, 1900**
Fig. 10C.
Area: Yalokole.
Season/survey: Wet (May 2018).
Material: CSB:Herp:RNBK 066, 101.
Comments: The type locality of this species is far from the study site, in Equatorial Guinea (Sánchez-Vialas et al. 2020), thus this identification still needs to be tested by molecular methods. Individuals corresponding to this species were found only near the Eho stream, in the neighborhood of the Bandjangi swamp (used by local people to macerate cassava) at the edge of disturbed forest and farmbush, near Yalokole village. This record could indicate a higher level of tolerance to disturbed habitats, as the other two species were found only in primary forest. The general coloration of this species appears to be rather lighter, with a mostly pale, whitish venter.

***Phrynobatrachus* cf. *giorgii* De Witte, 1921**
Fig. 10B.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 254, 718, 737, 761, 762, 855, 856, 857, 858, 859, 860, 861; IVB-H-CD 18190, 18237, 18238, 18283, 18284, 18297, 18298, 18300; possible hybrids: IVB-H-CD 18186, 18188.
Comments: Individuals of this species morphologically correspond to the type material of *P. giorgii*. However, the type locality (Yambata) is north of the Congo River and therefore the identification must still be tested genetically. This species was found at several sites, always in primary forest and usually near small streams or swampy places in flooded forest. Some males were found calling from moist leaf-litter. Depending on the physiological conditions, this species may have smooth skin, but quite often has slightly warty skin. It is very variable in color tones (and patterns), but often has a lighter background (reddish to brown) suffused with black. One specimen (adult female) was very dark, almost black, on the dorsum and darkly marbled on a white venter. Adult males have black throats. This relatively small-sized species was found in syntopy with another *Phrynobatrachus*, a slightly larger and generally lighter species resembling *P. auritus* (*P.* sp. aff. *auritus*, see below). As some individuals had intergrading traits, it is possible that the two species hybridize, but this needs to be confirmed genetically.

Phrynobatrachus* sp. aff. *auritus
Fig. 10A.
Area: Yalokole.
Season/survey: Wet (May 2018, Nov 2018).
Material: CSB:Herp:RNBK 107; IVB-H-CD 18185, 18187, 18189, 18239.
Comments: Only a few specimens of this presumably new species resembling *P. auritus* were recorded. All were found in primary forest, most of them syntopically with *P.* cf. *giorgii* in a swampy place surrounded by flooded forest on the bank of the Luo River. One specimen was found nearby, near the Bikongo stream in *terra firma* forest. The general coloration of this species seems to be lighter than in *P.* cf. *giorgii*, the venter is white, and the throat in adult males is gray or brownish but not deep black.

Pipidae

***Hymenochirus* Boulenger, 1896**

This genus is well known from aquaria (Kunz 2007; Rabb

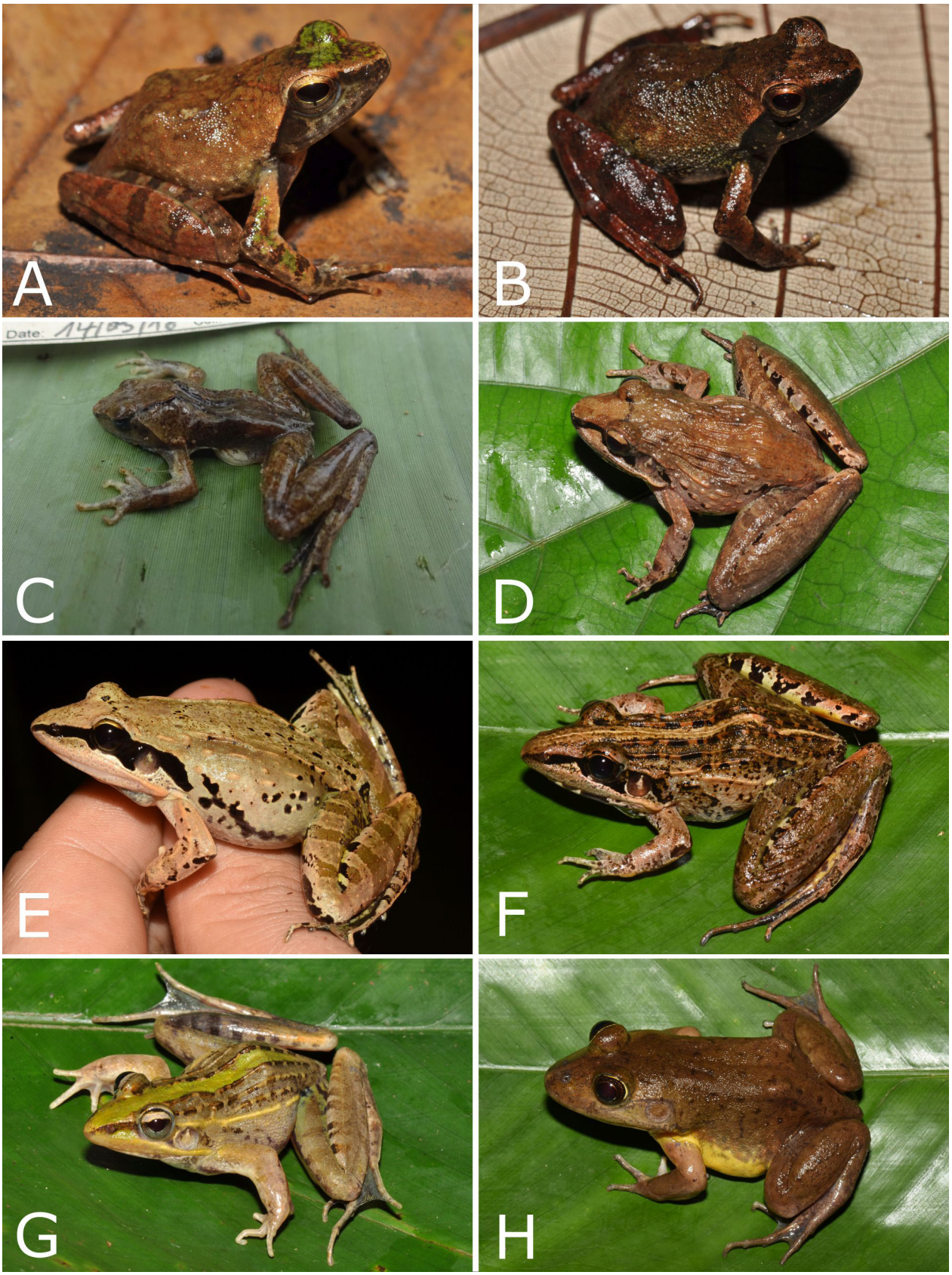

Fig. 10. Phrynobatrachids (*Phrynobatrachus*), ptychadenids (*Ptychadena*), and a pyxicephalid (*Aubria*). **(A)** *Phrynobatrachus* sp. aff. *auritus* (male). **(B)** *Ph.* cf. *giorgii* (male). **(C)** *Ph.* cf. *auritus* (male). **(D)** *Ptychadena aequiplicata* (female). **(E)** *Pt. christyi* (male), extralimital specimen from Mosite (0.956°N, 23.560°E). **(F)** *Pt. perreti* (male). **(G)** *Pt.* sp. aff. *mascareniensis* (male). **(H)** *Aubria masako* (male).

and Rabb 1963), but wild populations are poorly known. Similarly, knowledge of the taxonomy of this genus is poor, with only four species currently listed (Frost 2021). The distribution of this genus is concentrated around the forested zone of Central Africa, from southern Nigeria to eastern DRC, and possibly westernmost Uganda.

***Hymenochirus* cf. *boettgeri* (Tornier, 1896)**
Fig. 11A.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (Nov 2018), dry (July 2020).
Material: CSB:Herp:RNBK 831; IVB-H-CD 18216–18220, 18308, 18397–18401, 18402–18406, 18410–18424, 18456–18465, 18480–18488, 18529, 18551.
Comments: This species is common in Kokolopori, usually found in syntopy with *Xenopus pygmaeus* in stagnant water in forests, typically in pools at the periphery of flooded forest. The general appearance resembles the type of *H. boettgeri* (ZMB 11521), which was described from the Ituri Forest, northeastern DRC. Given the relatively distant type locality in a different ecoregion, we assume that this population may represent a distinct taxon.

***Hymenochirus* cf. *boulengeri* De Witte, 1930**
Fig. 11B.
Area: Yalokole.
Season/survey: Wet (Nov 2018).
Material: IVB-H-CD 18376, 18396, 18578–18580.
Comments: Another species of *Hymenochirus*, but apparently much rarer, was found in shallow slow-flowing parts of a stream located at the edge of forest and farmbush. It was found in syntopy with the previous species, but this species was never found deeper in the forest. Similar to *H.* cf. *boettgeri*, the overall morphology of the Kokolopori individuals corresponds to the type material of *H. boulengeri* described from the forest-savanna mosaic in northern DRC (De Witte 1930). However, with respect to the relatively distant type locality, we refrain from making a definite identification of the species until further material has been examined.

***Xenopus* Wagler, 1827**

Based on current knowledge, this species-rich genus of pipid frogs appears to be surprisingly represented by only a single species in the central Congo. However, the morphology of species of the *X. amieti* group, to which this single species belongs, is relatively uniform (Evans et al. 2015, 2019) so other overlooked species may be present.

***Xenopus pygmaeus* Loumont, 1986**
Fig. 11C–D.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May 2018, Nov 2018), dry (Jul 2020).
Material: CSB:Herp:RNBK 118, 160, 163, 219, 224, 265, 316, 319–321, 325, 340, 341, 351, 352, 358, 371, 372, 379, 401, 422, 821, 828–830, 845–853; IVB-H-CD 18204–18215, 18314–18322, 18407–18409, 18479.
Comments: This species is common in stagnant water, usually in swampy areas in forests. It is harvested as food to a limited extent, mostly by children and young people. We did not find tadpoles in the wild, but this species has been bred in captivity and a tadpole is shown in Fig. 11D. The general morphology corresponds to the typical *Xenopus* tadpole morphology (Channing et al. 2012; Vigny 1979). Tadpoles reached a total length of 49 mm (stage 42; Gosner 1960), with the tail (33 mm) approximately twice as long as the body (16 mm), and metamorphosed in 6–8 weeks.

Ptychadenidae

***Ptychadena* Boulenger, 1917**

Representatives of this genus are not very abundant in Kokolopori. Four species were recorded, mostly in and around villages in open habitats and/or farmbush and secondary forest. Only *P. aequiplicata* was mostly found in primary forest. Records of all four species represent significant geographic range extensions. Taxonomically, there is a great deal of confusion around the Congolian species as discussed below.

***Ptychadena aequiplicata* (Werner, 1898)**
Fig. 10D.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 123, 735, 752, 803, 806, 833, 834; IVB-H-CD 18293.
Comments: *Ptychadena aequiplicata* is characterized by extended dark (blackish) webbing and numerous shorter irregular dorsal glandular ridges/folds (Frétey et al. 2011; Channing and Rödel 2019). This species has been reported from West Africa (with taxonomic uncertainty, possibly representing an undescribed species) to western Central Africa, and only from the westernmost margin of DRC (Channing and Rödel 2019; IUCN SSC Amphibian Specialist Group 2019). However, *P. aequiplicata* is relatively widespread in western to central DRC (unpub. data), and our records from Kokolopori represent a substantial geographic range extension eastward to the Central Congolian forests. We have also recorded this species further east, around Kisangani. It is possible that this species is even more widespread, distributed throughout the Congo Basin and entering Uganda. This is indicated by the published record from "Ituri: Madié" [= Medje, Haut-Uélé] (Boulenger 1919), if the identification was correct, and by photographs showing "*P. christyi*" (Channing and Rödel 2019: p. 341) from Budongo, Uganda (T.M. Doherty-Bone, pers. comm.),

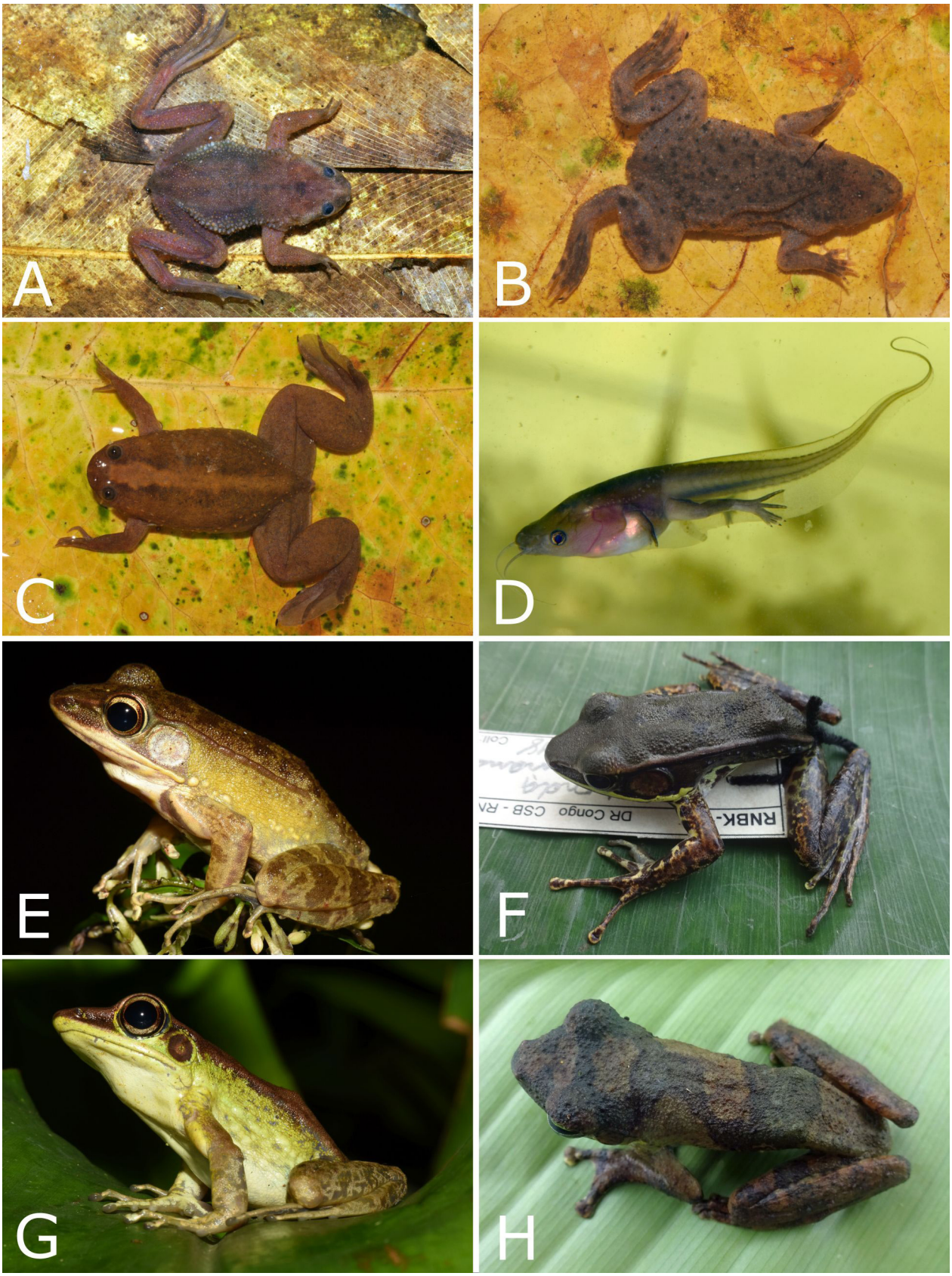

Fig. 11. Pipids (*Hymenochirus*, *Xenopus*), ranids (*Amnirana*), and a rhacophorid (*Chiromantis*). **(A)** *Hymenochirus* cf. *boettgeri* (male). **(B)** *H.* cf. *boulengeri* (male). **(C)** *Xenopus pygmaeus* (female). **(D)** *X. pygmaeus*, tadpole. **(E)** *Amnirana* cf. *albolabris* (male). **(F)** *Amnirana* cf. *albolabris*, dark morph with contrasting color pattern (male). **(G)** *A. lepus* (male). **(H)** *Chiromantis* cf. *rufescens* (male).

but morphologically corresponding to *P. aequiplicata*. This hypothesis needs to be further tested, but it is already evident that the species is distributed at least to central and northeastern DRC. *Ptychadena aequiplicata* is probably the most strongly associated with forest habitats of all the representatives of this genus. It appears to be relatively rare in Kokolopori, and it was only found in primary forest.

***Ptychadena christyi* (Boulenger, 1919)**
Fig. 10E.
Area: Bechuchuu, Yalokole, Yetee.
Season/survey: Wet (Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 636, 637, 664, 720; IVB-H-CD 18306.
Comments: This species is very poorly known and is somewhat enigmatic because some other species of *Ptychadena* have been misidentified as *P. christyi*. Here, we probably show the first published photograph of this species, as the photographed frog published by Noble (1924) does not conform to the morphology of the types of *P. christyi*. The frog in that figure (Noble 1924) resembles *P. longirostris* (Peters, 1870) from West Africa, which can indicate either a substantial range extension of this species or that a similar species has remained overlooked in northeastern DRC. *Ptychadena christyi* was described from "Madié (Ituri)" [= Medje, Haut-Uélé] based on three males and one female (Boulenger 1919). One male syntype is located in BMNH (1947.2.2.59; formerly 1919.8.16.20); and two male and one female syntypes, together with one juvenile also marked as a type (although not listed in the original publication), are stored in RMCA (B.324–326: adults; B.311 juvenile). This species is characterized by its pronounced dorsolateral glandular ridges/folds and usually smooth dorsum, in contrast to most other *Ptychadena* species which have numerous distinct longitudinal dorsal folds. Some individuals bear additional short irregular dorsal and lateral folds, which are less conspicuous than the two dorsolateral ones. This is probably why *P. christyi* has sometimes been considered a close relative of, if not conspecific to, *P. aequiplicata* (Noble 1924). However, these two species are clearly different at first glance (cf. Figs. 10D–E). Zimkus and Larson (2013) suggested that *P. christyi* may be conspecific with *P. perreti*. However, this assumption was based on *P. perreti* from Uganda which was misidentified as "*P. christyi*" (per our own review of the data). Based on the material stored in RMCA and our own field observations, *P. christyi* is known only from the forested regions of northeastern DRC. The Kokolopori material thus demonstrates a geographic range extension to the south. It is not clear if the species has been reliably recorded from Uganda, despite reports of it from the country. Based on the available data, it seems that many if not all reports of *P. christyi* from Uganda were misidentifications (see above and accounts for *P. aequiplicata* and *P. perreti*). In Kokolopori, we found *P. christyi* in puddles or pools on muddy roads formed after heavy rains, where they lay eggs. If the pools were near a bush, the frogs jumped out of the pools to hide in the bushes when disturbed. Some individuals were found in the primary forest at Bechuchuu, in a pirogue (dugout canoe) filled with water.

***Ptychadena perreti* Guibé and Lamotte, 1958**
Fig. 10F.
Area: Yalokole, Yetee.
Season/survey: Wet (May 2018, Nov 2018).
Material: CSB:Herp:RNBK 008, 029, 032, 051, 059, 115, 127, 133, 134, 145, 148, 161, 180, 228, 396, 444, 526, 640, 646; IVB-H-CD 18069, 18166, 18167.
Comments: *Ptychadena perreti* was described from southern Cameroon (Guibé and Lamotte 1958), and is believed to be distributed in western Central Africa and north of the Congo River to northeastern DRC (Channing and Rödel 2019; IUCN SSC Amphibian Specialist Group 2020). Our Kokolopori material provides evidence for a geographic range extension into the Central Congolian forests. Based on the publicly available genetic data (our own review of data), "*P. christyi*" from Uganda (Bundibugyo; GenBank No. GQ183595) represents misidentified *P. perreti*, proving evidence for the presence of this species also in western Uganda. Similarly, "*P. bibroni*" (or *P.* aff. *bibroni*) from Gabon (GenBank AY517604; Vences et al. 2004) and "*P.* cf. *aequiplicata*" from Cameroon (Mt. Kupe; GenBank KX671789; Portik et al. 2016) both represent misidentified *P. perreti*, as well as "*Ptychadena* sp. B" from the Republic of the Congo (Deichmann et al. 2017). In the past, this species was probably at least partially misidentified as "*P. oxyrhynchus*" (originally in the genus *Rana*) in the Congo, as the photograph published by Noble (1924) with this name most probably depicts *P. perreti*. All these past misidentifications have caused further confusion in the identification of this species. *Ptychadena perreti* is a widespread inhabitant of the forested zone of Central Africa. However, it is usually found in degraded forests, shrubs, and farmbush. In Kokolopori, we found it in swampy places along streams, usually in disturbed forest.

Ptychadena* sp. aff. *mascareniensis
Fig. 10G.
Area: Yalokole, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 069, 080, 120, 149, 184, 531, 641, 642, 643, 677, 678; IVB-H-CD 18221, 18226–18229, 18231, 18233–18235, 18272–18274.
Comments: This species was usually found directly in villages, or nearby in periodical muddy pools formed after heavy rains. This species does not enter pristine forest, but can be found along streams in swampy places at forest edges. It may be syntopic with other *Ptychadena* species, e.g., *P. perreti*. The *P. mascareniensis* species

complex is distributed throughout sub-Saharan Africa, usually in open habitats, including human settlements and agricultural sites (Rödel 2000). It enters forested regions along roads. Twelve evolutionary lineages were identified in a recent study (Zimkus et al. 2017), with only three of them named. In addition to *P. mascareniensis* comprising at least three evolutionary lineages from Réunion, Mauritius, Seychelles, and Madagascar, *P. nilotica* is known from southern to northeastern Africa, including eastern Africa, and *P. newtoni* is endemic to São Tomé Island in the Gulf of Guinea. The remaining lineages have remained unresolved taxonomically (usually named *P.* cf. *mascareniensis* or *P.* "*mascareniensis*"; Frost 2021), treated as operational taxonomic units (OTUs). In DRC, *P. nilotica* and three OTUs (6, 8, 9) have been recorded, of which two have been found in forested lowlands (OTU 6 and OTU 8). From available data, it seems that OTU 8 is confined to the central and eastern Congolian forests (Zimkus et al. 2017). There is probably no name available for OTU 8. If it proves to be distinct, it needs to be described formally as a new species.

Pyxicephalidae

***Aubria* Boulenger, 1917**

This genus contains two species, but only one of them is distributed in the Congo Basin.

***Aubria masako* Ohler and Kazadi, 1990**
Fig. 10H.
Area: Bechuchuu, Yalokole.
Season/survey: Wet (May 2018, Nov 2018), dry (Jul 2020).
Material: CSB:Herp:RNBK 253, 818, 822–826, 837; IVB-H-CD 18170, 18230, 18365, 18366.
Comments: This species was described from the Masako Forest Reserve, near Kisangani, DRC (Ohler and Kazadi 1990). It seems to be confined to swampy rainforests of the Congo Basin (Channing and Rödel 2019). There is an ontogenetic shift in the coloration of the venter, with juveniles having a black venter with white spots, later changing into gray with yellow spots, and finally to a mostly yellow venter. This robust frog occupies swamps, often in flooded forests, but sometimes in places where cassava is macerated by villagers. The local people of Kokolopori occasionally collect these frogs as bushmeat, especially children and women, but the collection is not intensive. Males were well hidden when calling, sitting in burrows under tree roots or even underwater. Their advertisement call resembles the sound of a pig.

Ranidae

***Amnirana* Dubois, 1992**

Two species of this genus were found in Kokolopori, one present mostly in disturbed habitats, while the second was found only in forest.

***Amnirana* cf. *albolabris* (Hallowell, 1856)**
Fig. 11E–F.
Area: All.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).
Material: CSB:Herp:RNBK 004–006, 011, 014, 015, 017, 024, 026, 030, 039, 042, 046–049, 053, 055, 060, 077, 079, 090, 097, 100, 102, 104, 106, 112, 166, 191, 425, 427–430, 476–478, 502–504, 525, 529, 553–560, 565, 566, 576, 607, 608, 650, 685, 708–710, 723–726, 745–747, 753–755, 835, 836, 838, 862–865; IVB-H-CD 18066–18068, 18083, 18084, 18171–18175, 18390.
Comments: This species belongs to the taxonomically unresolved *A. albolabris* species complex (Jongsma et al. 2018), distributed mostly in Central Africa from Nigeria to Uganda (Channing and Rödel 2019). The Kokolopori population probably belongs to the central Congolian evolutionary lineage. Some individuals have contrasting coloration with a dark dorsum, bright lips and spots on the flanks, and a distinctly marbled venter (Fig. 11F), a color pattern not known to us from other parts of Central Africa. However, most individuals are lighter and not as contrasting (Fig. 11E). This species was commonly found in most habitats, but especially in disturbed places near human settlements and along streams. This species does not seem to enter deeper primary forests. The tadpoles are contrastingly colored with black spots on a red background. The skin glands of tadpoles produce a poisonous secretion, making them unpalatable to most vertebrate predators (Channing et al. 2012).

***Amnirana lepus* (Andersson, 1903)**
Fig. 11G.
Area: Yalokole, Yetee, Yotemankele.
Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019).
Material: CSB:Herp:RNBK 131, 155, 179, 209, 210, 230, 419, 561–564, 567–569, 575, 609, 682–684, 686–689, 692, 693; IVB-H-CD 18052, 18064, 18065.
Comments: This species is known from Cameroon to DRC, but has also recently been recorded in northern Angola (Jongsma et al. 2018; Ernst et al. 2020). Compared to *A.* cf. *albolabris*, it has been encountered relatively rarely in Kokolopori. It is more confined to forested habitats than the previous species. Females are much larger than males.

Rhacophoridae

***Chiromantis* Peters, 1854**

The only species of this genus, *C. rufescens,* is known from Central Africa. However, a recent phylogeographic study has shown that the north-central and eastern

Congolian population is relatively divergent (the estimated origin is dated to the Pliocene/Pleistocene boundary) and may represent a distinct species (Leaché et al. 2019). Representatives of this genus deposit eggs into foam nests attached usually to branches above water (Channing and Rödel 2019). The foam is produced from a secretion during oviposition by beating the secretion by both females and males, sometimes including multiple males.

***Chiromantis* cf. *rufescens* (Günther, 1869)**

Fig. 11H.

Area: Bechuchuu, Yalokole, Yotemankele.

Season/survey: Wet (May 2018, Nov 2018), dry (Aug 2019, Jul 2020).

Material: CSB:Herp:RNBK 218, 235, 255, 283, 538, 539, 814–817; IVB-H-CD 18236.

Comments: A relatively rarely encountered species in Kokolopori. Foam nests with adults sitting nearby were observed on vegetation in secondary forest during both the wet and dry seasons (May 2018, Jul 2020). Some foam nests were found almost on the ground near a swamp. It is not known how far into the Central Congolian forests this species is distributed, however some specimens in the RMCA are also from the more western province of Équateur.

Discussion

The fauna of the Central Congolian Lowland Forests ecoregion is one of the least-known faunas of terrestrial ecosystems in the world (Burgess et al. 2004). For example, a long-standing mystery is the alleged absence of caecilians (Nussbaum and Pfrender 1998). Whether caecilians are present remains unclear, but the amphibians of the Central Congo have never been studied in detail. The main reason for the lack of research is the ongoing recent socio-political instability, including civil wars, and the limited accessibility which persists to the present day (Anthony et al. 2015; Greenbaum 2017).

Here we present the results of the first targeted, relatively long-term amphibian survey of the Central Congolian forests carried out in Kokolopori. The species identifications were based on careful examinations of new and available comparative material, including types. The surveys for amphibians used a variety of techniques, and the occurrence of caecilians was surveyed, but not confirmed, among local residents based on photographs of various African caecilians. During four field sessions lasting a total of 48 days in both the wet and dry seasons, 37 anuran species were detected (Figs. 4–11, Table 2). The amphibian fauna of Kokolopori is mainly represented by forest species, which are more widely distributed in the lowland rainforests of Central Africa. However, precise species identification was not always possible and indicates the likely presence of hitherto undescribed species, and thus some degree of endemism. No caecilians were found, nor did the local people claim to know of them. The local people mostly confused them with blind snakes or limbless skinks, which may indeed indicate the absence of caecilians in the Central Congolian forests.

The species richness statistics estimated a total of 37–41 species (Fig. 3, Table 1), suggesting that our survey could be nearly complete. However, we assume that some rare or hard-to-detect species with cryptic ecology have probably been overlooked, e.g., Schiøtz (2006) recorded one species not found in our surveys, *H. brachiofasciatus* (see below). Interestingly, approximately 75–80% of the species were recorded during each of the two-week surveys, suggesting that even just a single two-week intensive survey may have good potential for amphibian inventories in Afrotropical forests. On the other hand, the two-week surveys provided relatively poor data for statistical estimates of species richness, with large standard deviations and wide confidence intervals. However, the means converged to similar values, especially in the wet season analyses. The dry season analysis estimated a slightly lower number of species because the number of species observed was also slightly lower (27 species observed in the dry season compared to 30–31 during the wet-season sessions). The difference between the number of species observed in the dry and wet seasons is not large, but bear in mind that the dry season in Kokolopori is also relatively wet with occasional rains. In regions with a highly seasonal climate, the number of species observed and/or estimated in the dry season may be much lower than in the wet season. The relatively low number of species observed and estimated compared to some other Central African regions, such as the coastal forests around the southern Cameroon Volcanic Line (Herrmann et al. 2005; Nneji et al. 2021), can probably be attributed to the climatic history of the central Congo, which was subjected to severe droughts during the cyclic glacial periods of the Pleistocene (Maley 1987, 1991, 1996; Plana 2004). On the other hand, some degree of endemism must result from the persistence of riverine forest refugia in the region (Colyn et al. 1991; Leaché et al. 2019; Maley 1996; Plana 2004).

Most species recorded in Kokolopori were typical forest specialists, although habitat generalists also occurred to some extent. Among the most frequently encountered species were the scansorial *Leptopelis ocellatus*, *Congolius robustus,* and *Hyperolius phantasticus* typically found on the forest edges or in forests, and *Amnirana* cf. *albolabris* frequently found in degraded habitats. The most abundant species on average was *H. phantasticus* (typically along streams at the forest edges), but its abundance was not so evident in the dry season. During the wet season, suitable breeding sites for amphibians, such as swamps, flooded forests, forest ponds, and temporary puddles, formed after rainfall around the rural complexes, and appeared

everywhere. The species compositions found in the wet and dry seasons were similar, but *Leptopelis christyi* was surprisingly found mainly in the dry season. This can be attributed to its ecological preference and adaptation to drier habitats (Amiet 2012). Some frogs were particularly abundant in primary forests with flooded terrain or swamps (e.g., *Aubria masako*, *Hylambates verrucosus*, *Phrynobatrachus* cf. *giorgii*, and pipids*)*, while others were more commonly found in forests with high canopy cover and numerous streams (e.g., *Arthroleptis*, *Cardioglossa*, *Leptopelis*, *Sclerophrys*, and *Ptychadena aequiplicata*). Hyperoliids and *Amnirana lepus* were found mainly along streams at forest edges. Relatively few species were encountered within rural complexes (typically *Ptychadena* sp. aff. *mascareniensis*, and to a lesser extent *P. christyi* and *P. perreti*, but the latter were more commonly found in forests). Other species could be found in peripheral farmbush (e.g., *Afrixalus* cf. *quadrivittatus* and *Amnirana* cf. *albolabris*). Somewhat surprisingly, no typical synanthropic bufonids were found, although they are present almost everywhere in the Congo (e.g., *Sclerophrys gutturalis*, *S. pusilla*, and *S. regularis*). This is probably attributable to the well-preserved forests of Kokolopori and only small roads/paths leading into the area. In line with this finding, the three *Sclerophrys* species recorded were obviously restricted to forest habitats. Two of them could not be identified to described species. In addition to the two *Sclerophrys* toads, some other anurans, especially some squeakers (*Arthroleptis*), also could not be identified to species (Table 2). Some other taxa deserve taxonomic revision and elevations from subspecies to species status may be expected (e.g., *Leptopelis* and *Hyperolius*; Table 2). Our records of some species from Kokolopori represent geographic range extensions (see **Species Accounts**). Most importantly, *Arthroleptis phrynoides*, *Leptopelis calcaratus meridionalis,* and *L. ocellatus schiotzi* are reported here for the first time since their descriptions (Laurent 1973, 1976a). Other interesting observations worth mentioning include the biofluorescence observed in male *Hyperolius phantasticus boulengeri* with Phase J, which is consistent with the previous observations on the presence of fluorescence in frogs with greenish-translucent skin (Taboada et al. 2017a,b). To our knowledge, this is the first documented case in an African anuran.

Comparing our survey results with those of other published surveys of the Central Congolian Forests ecoregion (Penner and Rödel 2007: Lokutu; Schiøtz 2006: Kokolopori, *Hyperolius* only), our survey recorded almost twice as many amphibian species as in Lokutu and two more species of *Hyperolius* (although we did not find one other species, see below). Penner and Rödel (2007) recorded 21 species during 13 days and 14 nights in the wet season (October/November) in Lokutu, which is only about 120 km north of Kokolopori. In our two survey sessions in the wet season, we recorded 30 and 31 species respectively over 15 days (Table 1). The lower number of species observed in Lokutu may be attributable to various factors, but most probably to the more degraded habitats there. After re-evaluation of the taxonomy, the species diversities recorded in the Lokutu region and Kokolopori were similar. They differed mainly in that several predominantly forest genera (*Arthroleptis*, *Aubria*, *Chiromantis*, *Congolius*, *Hylambates*, *Hymenochirus*, and *Xenopus*) were not recorded in Lokutu, but on the other hand some taxa known to occur commonly in disturbed areas were recorded (e.g., synanthropic *Sclerophrys* toads, *Amnirana galamensis*, *Hoplobatrachus occipitalis*, and *Ptychadena* cf. *taenioscelis*). Penner and Rödel (2007) also found a surprisingly low number of *Hyperolius* species, with "*H.* cf. *lateralis*" (occurring in eastern DRC and East Africa; Channing and Rödel 2019) being a likely misidentification. *Hyperolius* in Kokolopori was studied by Schiøtz (2006). He did not record *H.* cf. *langi* (although he probably discussed this taxon as *H. kuligae*, from elsewhere in the central Congo), which was found to be rare in our survey, and he misidentified *H.* cf. *cinnamomeoventris* as light morphs of *H. platyceps* (for more details, see **Species Accounts**). On the contrary, he found one additional species, a single female of *H. brachiofasciatus* Ahl, 1931 collected in farmbush in syntopy with two other *Hyperolius* species. Since Schiøtz found only the single individual and we did not record this species, it seems likely that *H. brachiofasciatus* is rare in Kokolopori. This taxon is very poorly known, with few reports apart from its description (Ahl 1931; Jackson and Blackburn 2007; Kielgast and Lötters 2011; Masudi et al. 2019; Schiøtz 2006). However, its morphology is strikingly reminiscent of the *H. tuberculatus* complex, to which it likely belongs, and may even represent an older synonym of later described taxa such as *H. ghesquieri* Laurent, 1943 or *H. hutsebauti* Laurent, 1956. This hypothesis will require further verification.

Future descriptions and taxonomic revisions of the above listed and discussed candidate species (potentially new species to science; Table 2) will make an important contribution to our understanding of the amphibian fauna of Central Africa, and will further highlight the biodiversity and biogeographic importance of the central Congo. Despite the relatively low species richness, our results suggest that the Central Congolian Lowland Forests ecoregion harbors a unique and partially endemic amphibian fauna that is distinct, to some extent, from the anuran fauna to the north, east, and west of the wide arc of the Congo River.

The Central Congolian forests are relatively well preserved (Laporte et al. 2007; Mayaux et al. 2013), which is a consequence of the region's remoteness, limited accessibility, and low human population. Kokolopori is not directly connected by roads or rivers to large timber markets such as those in Kisangani, Mbandaka, or Kinshasa (pers. obs.), which supports the good condition

of the Kokolopori forests. However, some disturbances from small-scale human activities are present in the reserve, especially subsistence agriculture, including slash-and-burn farming, and the presence of human camps associated with poaching. To strike a balance between the needs of the human population and nature conservation, a new reserve delineation is currently being prepared which focuses mainly on the primary forest (A.L. Lokasola 2020, pers. comm.). Our results can serve as a basis for future monitoring of amphibians, assessment of their population status, and conservation management planning and strategies in the Kokolopori Bonobo Nature Reserve and surrounding regions. The community-based conservation in Kokolopori may provide a good example for other areas in the Central Congolian forests and throughout the Democratic Republic of the Congo.

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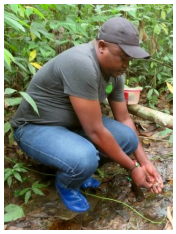

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