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Preliminary study of Djambala herpetofauna (Plateaux Department), Congo Brazzaville

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Abstract

The present study was carried out in Djambala in the Plateaux Department (Republic of Congo). The objective was to know the specific diversity of the herpetofauna of Djambala and its surroundings. Data collection was done in two phases: in 2010 (for Ophidia) and from November 21 to 22, 2018 (for Anura and Lacertilia). Sampling of the specimens was done using the active method. This method made it possible to inventory 15 species of Amphibians and 23 species of Reptiles. Amphibians have been divided into 5 families, 7 genus and 11 species. The Bufonidae family has the greatest specific richness (7 species), followed by Hyperoliidae (3 species). The Reptiles were divided into 10 families, 16 genus and 23 species. The Colubridae family is the most representative (10 species), followed by the Lamprophiidae (5 species). These results revealed the existence of a remarkable richness and diversity of the amphibian and reptilian populations of Djambala.

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Introduction

Amphibians and Reptiles represent a wide variety of species widely distributed around the world (Valencia *et al.*, 2013). Being predators and prey, they have a crucial role in ecosystems (Bossy, 2013) and contribute to ecosystem services (Valencia *et al.*, 2013; Hocking and Babbitt, 2014; Cortéz-Gómez *et al.*, 2015). In ecosystems, these two groups play a key role in the flow of energy and the nutrient cycle in aquatic and terrestrial environments, in addition to contributing to the control of populations of harmful organisms and, possibly, pollinators and seed dispersers (Valencia *et al.*, 2013; Cortéz-Gómez *et al.*, 2015).

Trape *et al.* (2012) claim that Reptiles are a major component of African wildlife. The number of works devoted to them in Central Africa is nevertheless very low, as evidenced by an ancient synthesis on Congo snakes (Trape and Roux-Estève, 1995) and several recent syntheses on reptiles from Cameroon (Chirio and Lebreton, 2007), the Central African Republic (Chirio and Ineich, 2006) and Gabon (Pauwels and Vande Weeghe, 2008). Due in particular to the sampling weakness in the majority of Central Africa forests, the composition of the stands according to natural or anthropized environments is only the object of very fragmentary knowledge, the biogeography of many species remains very poor known and the ecology data are particularly limited. In terms of biodiversity, many species remain to be described (Trape and Diffo, 2013). The same is true for Amphibians, studies number devoted to them is also low. It must be admitted that the biodiversity and ecosystems of Central Africa are probably among the least known in the world and that knowledge or observation sites, very poorly distributed in space, hardly lend themselves to an integrated vision of territories and to a comprehensive understanding of fundamental ecological processes. The means, particularly human, of investigation are very limited, even if we can hope to see them develop (IRD, 2013). The Congo herpetofauna, like that of most central african countries, is not well enough studied, certainly because of the popular view of these animals.

Indeed, if the Amphibians benefit from a moderate sympathy of the public, it is not the same for the Reptiles still victims of many prejudices and all too often ignored or despised. In addition, there is the problem of lack of herpetology specialists as noted by Akuboy Bodongola *et al.* (2016) in the DRC because most herpetological studies have been carried out by non-natives a few times with the participation of natives. In Congo Brazzaville, 1.720 species of Amphibians and Reptiles known to date (MEFDD, 2015) have been collected in a few localities in the north and the south of the country. However, Plateaux Department has never been the subject of a herpetological study. The conservation and preservation of biodiversity is a major concern for scientists and public authorities, it is therefore undeniable that the sustainable management of a given biological resource always begins with its identification. We can only keep what we know, hence the need for this study which allows to know the specific diversity of the herpetofauna of Djambala and its surroundings.

Materials and methods

Sampling site

Djambala and its surroundings (Fig. 1) are part of a vast natural region, which extends over Brazzaville and which takes part of Gabon, commonly called Batéké plateaux which constitutes a vast structural group covering an area of several thousand km². The hydrographic network subdivides this set into 4 units. From South to North succeeds: The Mbé plateau; The Nsa plateau between the Léfini River and the Nkéni River; the Koukouya plateau and the Djambala plateau between the Mpama River and the Nkéni River. Djambala (Fig. 1) is located at 2 ° 32 'South latitude and 14 ° 45' East longitude. It is limited to the North by Mbon, to the South by Vindza and Kindamba; to the east by Ngo and Mayama and to the west by Zanaga and Lékana.

Capture of specimens

Of two main methods (active and passive) described by several authors (Frétey and Dewynter, 1998; Burger *et al.*, 2006; Chirio and Ineich, 2006;

Pauwels *et al.*, 2006; Jackson *et al.*, 2007; Pauwels; Vande Weghe, 2008; Jackson and Blackburn, 2010; Serre Collet, 2013), the active method is the only one chosen to carry out this work. This method consists in excavating the habitats that can host Reptiles (dead wood stumps, hollow trees, bark of dry trees, stone) then search on the ground, in the litter of dead leaves, on trunks and branches, along wetlands, around houses. The night catches were made with a headlamp and torches to search mainly for Amphibians in the vegetation near water points and gutters. Samples were collected randomly in the city and in the fields, without defining the sampling sites. Amphibians were captured directly by hand. The location was done by sight, using the headlamp or by their song. The Reptiles encountered were directly captured by hand; the captured specimens were then tagged and placed in the plastic jars for later identification.

Samples identification

The collected amphibians were identified using several available keys proposed by Guibé and Lamotte (1958); Lamotte and Xavier (1981) and Channing (2001). Reptiles were identified using the keys proposed by different authors: Meirte (1992); Trape and Roux-Esteve (1995); Chippaux (2006); Chirio and Lebreton (2007); Pauwels and Vande Weghe (2008); Trape *et al.* (2012).

Statistical data processing

The results obtained were entered and processed using Microsoft Excel 2013 software.

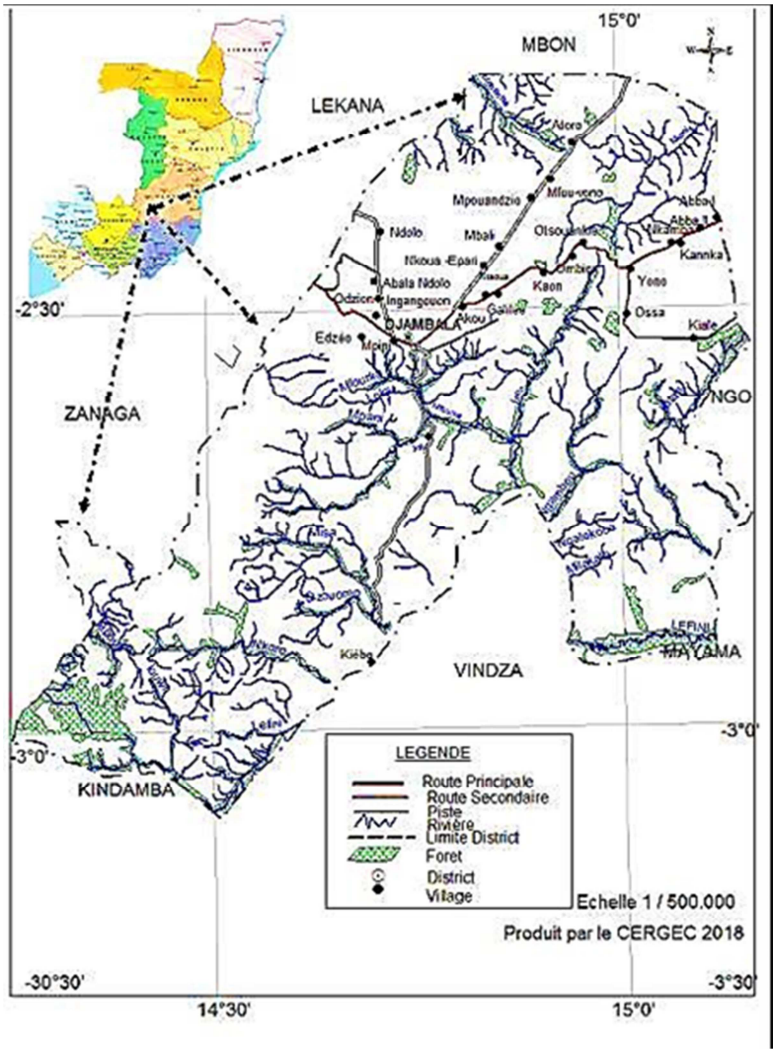


Fig. 1. Study area

Results and discussion

Specific composition of Djambala herpetofauna

We sampled 51 specimens of Amphibians and Reptiles. These specimens were grouped into 2 orders, 14 families, 25 genus and 39 species. The analysis of Fig. 2 shows that this collection is dominated by the Squamates order which represent 67% against 33% for Amphibian Anurans.

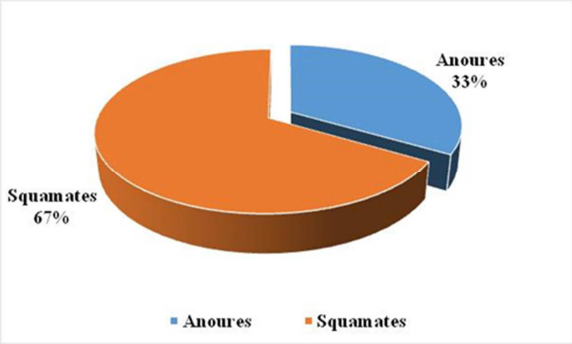


Fig. 2. Proportional distribution of the herpetofauna orders of Djambala

Amphibian population

Amphibians collected include 26 specimens divided into 5 families, 7 genus and 15 species (Table 1).

The analysis in Table 1 shows that the specific richness is dominated by Bufonidae (7 species; 47%), followed by Hyperoliidae (3 species; 20%), Ptychadenidae and Ranidae (2 species; 13%) and Pipidae family (one species; 7%) (Fig. 3).

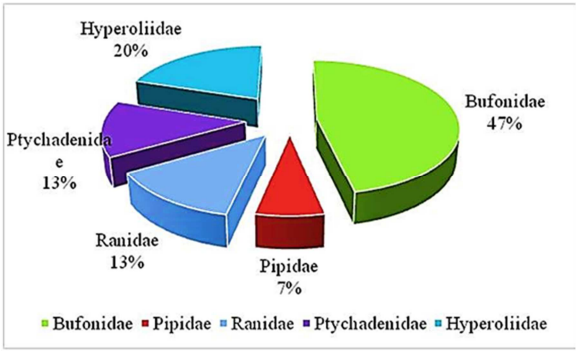
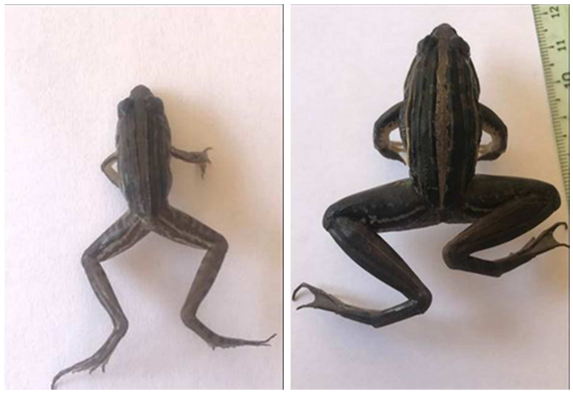


Fig. 3. Proportional distribution of the family specific richness of Amphibians

Djambala herpetological profile is similar to that of Brazzaville (Zassi-Boulou, 2009b). However, our results differ from those of Guibé (1946); Jackson and Blackburn (2007) in Sangha; Largen and Dowsett-Lemaire (1991); Jackson and Blackburn (2010) in Kouilou; Jackson *et al.* (2007) in Likouala. For these authors, the amphibian fauna is dominated by the family of Hyperoliidae followed by Bufonidae. This could be explained by edaphic factors, but also by the type of vegetation, the investigations duration and the environments visited. Fig. 4 illustrates some species of Amphibians sampled in Djambala.



Ptychadena sp. *Ptychadena mascariensis*

Hoplobatrachus occipitalis *Amietophrynus cf funereus*

Hyperolius sp. *Afrixalus dorsalis*

Fig. 4. Amphibians species in Djambala

Table 1. Specific composition of the amphibian stand

Order	Family	Genus	Species
Anura	Bufonidae	Amietophrynus	*Amietophrynus camerunensis*
			Amietophrynus cf funereus
			Amietophrynus regularis
			Amietophrynus maculatus
			Amietophrynus sp.1
			Amietophrynus sp.2
			Amietophrynus sp. 3
	Pipidae	Xenopus	*Xenopus epitropicalus*
	Ranidae	Hoplobatrachus	*Hoplobatrachus occipitalis*
		Phrynobatrachus	*Phrynobatrachus* sp.
	Ptychadenidae	Ptychadena	*Ptychadena mascariensis*
			Ptychadena sp.
	Hyperoliidae	Afrixalus	*Afrixalus dorsalis*
			Afrixalus sp.
		Hyperolius	*Hyperolius* sp.
Total	5 families	7 genus et 15 species	

Table 2. Specific composition of the reptilian population

Order	Sub-order	Family	Genus	Species
Squamata	Lacertilia	Agamidae	Agama	*Agama* sp.
		Gekkonidae	Hemidactylus	*Hemidactylus mabouia*
				Hemidactylus sp.2
		Lygosomidae	Lygosoma	*Lygosoma fernandi* *
		Scincidae	Trachylepis	*Trachylepis* sp.*
		Varanidae	Varanus	*Varanus ornatus*
	Sous-total 1	4 families	5 genus et 6 species	
	Ophidia	Pythonidae	Python	*Python sebae*
		Colubridae	Crotaphopeltis	*Crotaphopeltis degeni*
				Crotaphopeltis hotamboia
			Dasypeltis	*Dasypeltis confusa*
			Hapsidophrys	*Hapsidophrys smaragdina*
			Philothamnus	*Philothamnus carinatus*
				Philothamnus dorsalis
				Philothamnus heterolepidotus
				Philothamnus heterodermus
				Philothamnus hughesi
			Rhamnophis	*Rhamnophis a. aethiopissa*
		Elapidae	Dendroaspis	*Dendroaspis j. jamesoni*
		Lamprophidae	Bothrolycus	*Bothrolycus ater*
			Lamprophis	*Lamprophis fulginosus*
			Mehelya	*Mehelya capensis*
				Mehelya poensis
			Psammophis	*Psammophis phillipii*
		Viperidae	Bitis	*Bitis gabonica*
	Sous-total 2	5 families	12 genus et 18 species	
Total	2 Sub-orders	9 families	17 genus et 24 species	

Reptilian population

In total, 25 specimens collected, was divided into 9 families, 17 genus and 24 species among which 6 species of Lacertilia and 18 species of Ophidia (Table 2).

The species collected belong to two sub-orders: the Lacertilia sub-order (Fig. 5) and the Ophidia sub-order (Fig. 6). The specific richness is higher in the family of Colubridae (10 species; 44%) followed by the family of Lamprophidae (4 species; 18%); Gekkonidae and Scincidae (2 species; 9%); Agamidae, Varanidae, Gekkonidae, Elapidae and Viperidae (a single species; 4%).

The Lacertilia are dominated by the family of Gekkonidae followed by Agamidae, Scincidae and Varanidae. Our results are different to the various censuses carried out in the northern and southern parts of Congo Brazzaville (Guibé, 1946; Largen, 1991; Jackson and Blackburn, 2007; Jackson *et al.*, 2007;

Zassi-Boulou, 2008; Zassi-Boulou, 2009a and 2009b; Boudzoumou, 2010; Jackson and Blackburn, 2010).

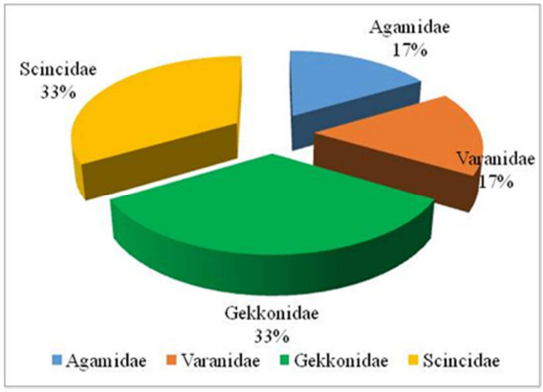


Fig. 5. Proportional repartition of species richness of Lacertilia by family

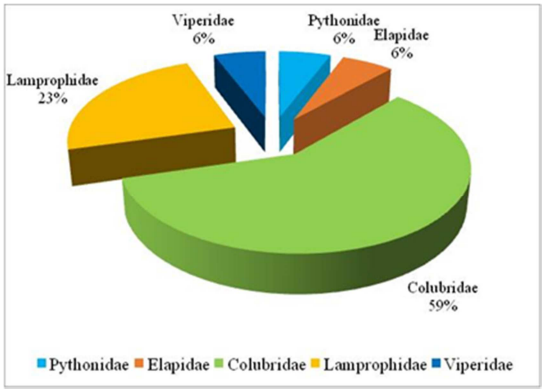


Fig. 6. Proportional repartition of species richness of Ophidia by family

These results would be explained by the method adopted in this study and the duration of their investigations. Indeed, these authors used two methods (active and passive) and for most of these studies, they took place in a period ranging from 2 to 14 weeks while ours took place in less than a week. In this regard, Pauwels *et al.* (2006) have shown that the use of the passive method during a long period makes it possible to specifically sample a certain number of species, notably the skinks. The ophidia fauna is dominated by Colubridae family, followed by Lamprophidae, Pythonidae, Elapidae and Viperidae. The predominance of the Colubridae family has also been obtained by several authors: Trape, 1985; Rasmussen, 1991; Jackson and Blackburn, 2007; Jackson *et al.*, 2007; Zassi-Boulou, 2008; Zassi-Boulou, 2009a; Boudzoumou, 2010; Jackson and Blackburn, 2010; Zassi-Boulou, 2018.

Conclusion

This preliminary study on herpetofauna of Djambala and its surroundings showed a significant diversity. The results of our investigations testify to the existence of a species richness of 39 species: 15 Amphibians and 24 Reptiles. Among Amphibians, the Bufonidae family has the greatest specific richness, followed by Hyperoliidae. In Reptiles, the Lacertilia sub-order is marked by the predominance of Scincidae, Gekkonidae, Agamidae and Varanidae. However, for the Ophidians sub-order, the Colubridae family is the most representative, followed by Lamprophidae. This study should be extended to the entire Department of Plateaux, using passive and active sampling methods, over a longer investigation period. It must be supplemented by bioecological studies in order to best assess herpetological biodiversity in order to better protect and conserve it.

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