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Study of Small Mammals Captured by Locality and Biotope in Kindia Prefecture, Republic of Guinea

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Abstract

Background: It was conducted between January 1, 2016, and October 10, 2017. **Aim:** The objective of this study is to document the diversity of small mammals captured across different localities and biotopes in the prefecture of Kindia, Republic of Guinea. **Methods:** Identification was based on the GIABR reference collection, Rosevear DR, Hayman RW, and Bergmans W. **Result:** A total of 406 bats were captured using fishing nets or Japanese nets and were identified as belonging to seven species across five families. The most common species were *Scotophilus leucogaster* 235 (53.76%), and the least common were *Hipposideros ruber* 73 (34.40%), *Mops thersites* (*Tadarida*) 44 (0.53%), *Rousettus aegyptiacus* 20 (4.30%), *Eidolon helvum* 14 (6.36%), *Hipposideros jonesi* 13 (6.98%) and *Nycteris hispida* 7 (1.72%). **Conclusion:** These species constituted the bat fauna recorded in certain localities and biotopes of Kindia Prefecture.

Keywords

Study, Small Mammals, Bats, Localities, Biotopes, Kindia Prefecture

1. Introduction

Sustainable wildlife management requires the consideration of ecological data. Indeed, this data is essential for defining and implementing conservation strategies [1] [2]. Chiroptera are of systematic, pharmacological, health, economic, ecological, and conservation interest [3] [4]. Despite these interests, little bioecological

data is available on them due to their nocturnal activities [5] [6]. Bats are increasingly suspected of being reservoirs for dangerous viruses (COVID-19, EBOLA, RABIES) that can be transmitted to other wild or domestic animals, and even to humans [7].

The Republic of Guinea, with its rich and varied ecosystem, is home to countless plant and animal species, including a wide variety of mammals. Bats, with more than 1200 species, are one of the most diverse groups of vertebrates [8]. They constitute the order of mammals adapted to flight [9], the most important animal group after rodents [10] [11]. Chiroptera are divided into two suborders: Microchiroptera and Megachiroptera [12]. However, these Megachiroptera (frugivores) play important ecological roles by contributing to flower pollination and the restoration of forest ecosystems through the dispersal and germination of seeds from the fruit they consume [13] [14].

However, Microchiroptera (insectivores) play a role in regulating insect populations, including mosquitoes [13] and certain crop pests [15] [16]. There is no doubt that microbats play a role in a rational strategy to reduce pesticide use in agriculture in many countries. Constant pressure on natural resources due to land use is one of the major causes of habitat fragmentation and loss [17].

In fact, bats' ability to coexist with viruses (without becoming ill) is probably linked to their immune system, which appears to be different from that of other mammals and linked to the development of modified mitochondrial genomes. This control of pathogens in bats may have promoted ancient events of coevolution or parallel evolution between bats and viruses. In terms of behavior and ecology, it seems that one of the major factors explaining this viral richness is the social and sympatric behavior of bats (several species sharing the same habitat), which facilitates transmission between individuals and between species [18]. Small litters, high body mass, longevity, and the number of litters per year are also favorable factors [19]. The work specifically aims to conduct a study on small mammals (Chiroptera) captured in Kindia Prefecture, Republic of Guinea.

With regard to the prefecture of Kindia, a coastal plain region, there is little data available on the distribution of small mammals apart from that published (missions, reports, articles, master's theses, or doctoral dissertations) by the Guinean Institute of Applied Biological Research (GIABR).

The objective of this study was to document the diversity of the small mammals (chiroptera) captured across different localities and habitats in Kindia Prefecture.

2. Materials and Methods

2.1. Study Environment

The prefecture of Kindia is located at an altitude of 458.13 m in western Guinea. Agriculture and, above all, small-scale livestock farming are the main activities [20]. The hydrography and relief make Kindia a true transition between Lower Guinea and Middle Guinea. It lies between 10˚03' north latitude and 12˚52' west longitude [21]. The population is estimated at 438,315 inhabitants (2014 census)

[21] with a population growth rate of 34% per year. Its density is 48 inhabitants per square kilometer and it covers an area of 9115 square kilometers [22]. It is bordered to the west by the prefecture of Coyah, to the northwest by the prefecture of Dubréka, to the north by the prefecture of Fria, to the northeast by the prefecture of Télimélé, to the east by the prefecture of Mamou, to the south by Sierra Leone, and to the southwest by the prefecture of Forécariah [22]. Today, it is a veritable mosaic of ethnic groups, with a large Soussou majority. Other ethnic groups include the Peuhls, Malinkés, Djalonkés, and Djakankés, who are farmers, herders, traders, and civil servants [22]. Peri-urban trade is generally unsanitary [22] [23] (**Figure 1**).

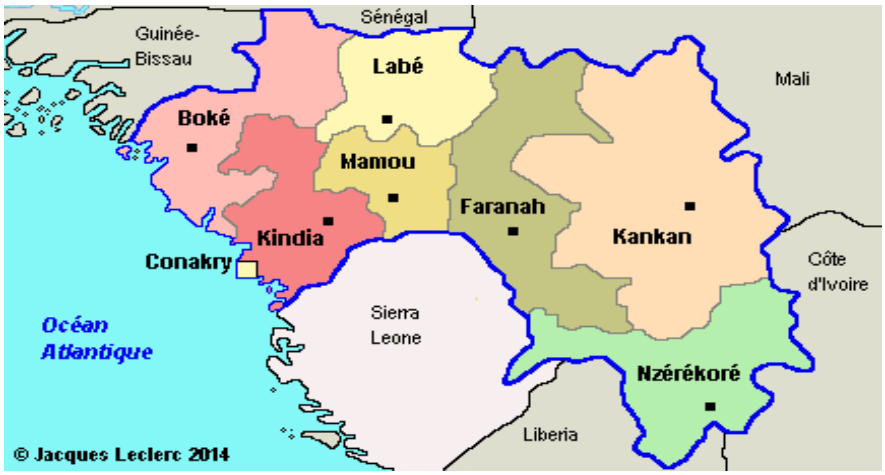

Figure 1. Administrative regions of the Republic of Guinea [23].

2.2. Materials

The following equipment was used to carry out this work: 75% alcohol was used for disinfection; a mayonnaise jar was used to collect and/or deposit bats; a container was also used to transport dead bats; a lab coat, bibs, gloves, and aprons were used for protection; a medical box was used for handling; nets were used to capture bats.

2.3. Methods

2.3.1. Selection of Capture Locations, Periods and Biotopes

Our study was conducted between January 1, 2016, and October 10, 2017, the localities and biotopes were surveyed using a standardized quantitative method. Capture depended on edaphic and climatic conditions, and nets were set between 10 a.m. and 12 p.m. universal time.

2.3.2. Collection of Biological Material

Sampling focused on bats encountered and captured in various locations and habitats in the Kindia Prefecture.

2.3.3. Collection and Identification of Bats

Our sample size was 406 bats captured and divided into 7 species (*Mops thersites*,

Nycteris hispida, *Scotophilus leucogaster*, *Eidolon helvum*, *Rousettus aegyptiacus*, *Hipposideros ruber*, *and Hipposideros jonesi*) and 5 families (*Molossidae*, *Nycteridae*, *Vespertilionidae*, *Pteropodidae*, *and Hipposideridae*).

The bats were captured in houses, rooms, bushes, mountains, mango trees, and caves using fishing nets, Japanese nets (R. Volwinkel, Velbert, Germany), and/or by hand. For the study, empty mayonnaise jars were used to store and ship the captured bats to the laboratory of the Guinea Institute for Applied Biology Research before being returned to the Russo-Guinean Research Center for Epidemiology and Prevention of Infectious Diseases (CRRGEPMI). The nets were opened from 10 a.m. to 12 p.m. Species identification was based on the GIABR reference collection [24] [25], and compilation [26], and the data were subjected to direct quantitative analysis.

3. Results

Sampling focused on bats encountered and captured according to locality and biotope. A total of 406 small mammals were captured between January 1, 2016, and October 10, 2017, using nets. Table 1 shows that *Scotophilus leucogaster* were the most commonly captured and abundant species (235, or 53.76%), while the least commonly captured species were: *Hipposideros ruber* (73, or 34.40%), *Mops thersites* (*Tadarida*) (44, or 0.53%), *Rousettus aegyptiacus* 20 (4.30%), *Eidolon helvum* 14 (6.36%), *Hipposideros jonesi* 13 (6.98%), and *Nycteris hispida* 7 (1.72%).

Table 1. Composition of bat species captured per year.

		Number	Percentage	Number	Percentage	Total
N⁰	Species	2016	(%)	2017	(%)	
1	*Mops thersites* (*Tadarida*) (Thomas, 1903)	43	19.54	1	0.53	44
2	*Nycteris hispida* (Schreber, 1775)	7	3.18	-	-	7
3	*Scotophilus leucogaster* (Cretzschmar, 1826)	135	61.36	100	53.76	235
4	*Eidolon helvum* (Rafinesque, 1815)	14	6.36	-	-	14
5	*Rousettus aegyptiacus* (Geoffroy, 1810)	12	5.45	8	4.30	20
6	*Hipposideros ruber* (Noack, 1893)	9	4.09	64	34.40	73
7	*Hipposideros jonesi* (Hayman, 1947)	-	-	13	6.98	13
	Total	220	99.99	186	99.97	406

Table 2 shows the composition of bat species captured, their frequency, and those that were highly dominant (such as *Scotophilus leucogaster*) with 235 (57.88%) compared to those that were less dominant with 7 (1.72%).

Table 2. Composition of bat species captured and their frequency.

N⁰	Species	Number of bats captured	Frequency (%)
1	*Mops thersites* (*Tadarida*) (Thomas, 1903)	44	10.83
2	*Nycteris hispida* (Schreber, 1775)	7	1.72
3	*Scotophilus leucogaster* (Cretzschmar, 1826)	235	57.88
4	*Eidolon helvum* (Rafinesque, 1815)	14	3.44
5	*Rousettus aegyptiacus* (Geoffroy, 1810)	20	4.92
6	*Hipposideros ruber* (Noack, 1893)	73	17.98
7	*Hipposideros jonesi* (Hayman, 1947)	13	3.20
Total		406	99.97

Analysis of Table 3 indicates that the density of bats captured by locality followed a descending order: 117 (28.81%) in Tonokhouré (Ségueya-Sonkoly) compared to 1 (0.24%) in Douraya (Kindia), Férréfou II-Dornéya, and Allah layiya (Kindia).

Table 3. Composition of bats captured by location.

N⁰	Localities	Number of bats captured	Percentage (%)
1	Pastoria-Koniadi II	5	1.23
2	GIABR	44	10.83
3	Bamba	113	27.83
4	Koba-pastoria	52	12.80
5	Douraya (Kindia)	1	0.24
6	Férréfou II-Dornéya	1	0.24
7	Samionkhouré (Madina-oula)	72	17.73
8	Tonokhouré (Ségueya-Sonkoly)	117	28.81
9	Allah layiya (Kindia)	1	0.24
Total		406	99.95

GIABR: Guinean Institute of Applied Biological Research.

Table 4 shows that the largest catch was made in Tonokhouré Cave (Ségueya-Sonkoly) 117 (28.81%), compared to 1 (0.24%) in Douraya Cave (Kindia).

Table 4. Composition of bats captured by biotope.

N⁰	Biotope	Number of bats captured	Percentage (%)
1	Houses	24	5.91
2	Rooms-GIABR	3	0.73
3	Bushes	97	23.89
4	Mount Gangan	22	5.41

Continued

5	**Mango trees**	16	3.94
6	**Caves pastoria (Fomédé)**	54	13.30
7	**Caves Douraya (Kindia)**	1	0.24
8	**Caves samionkhouré (Madina-oula)**	72	17.73
9	**Caves Tonokhouré (Ségueya-Sonkoly)**	117	28.81
Total		406	99.96

4. Discussion

The bats captured during this study represented the majority of the fauna encountered in the various locations and habitats surveyed in Kindia Prefecture. A total of 406 bats were captured, divided into 7 species. (*Mops thersites*, *Nycteris hispida*, *Scotophilus leucogaster*, *Eidolon helvum*, *Rousettus aegyptiacus*, *Hipposideros ruber*, and *Hipposideros jonesi*) and five families (*Molossidae*, *Nycteridae*, *Vespertilionidae*, *Pteropodidae*, and *Hipposideridae*). It is important to note that Kindia Prefecture has fewer species than the national average. And, when comparing our results with certain countries in the sub-region, it appears that: 1.639 specimens examined in Burkina Faso, 45 species have been identified. Of these 45 species, 15 have been described based on initial observations. Furthermore, the total number of bat species found in Burkina Faso is 51, but this 2012 document lists 45 species and 9 families.

The diversity of bats in Burkina Faso is still low and could mean that some bat species are likely to be discovered during a new expedition. In countries such as Côte d'Ivoire, 87 species have been reported [27] and 86 in Ghana [28]. These countries are home to vast forest habitats and also have different types of forest-savanna mosaic habitats known to attract diverse bat communities [29]. The size of the country also contributes to the increase in the number of species. This is demonstrated by countries such as Gambia, which has 31 bat species [30], and Benin, which has 53 species [31]. Although located in the Guinean zone, these countries have a high diversity of species compared to Guinea.

5. Conclusion

This study focuses on the diversity of small mammals (Chiroptera) captured across localities and biotopes in Kindia Prefecture, Republic of Guinea, where legally protected areas are rare. Generally, to reduce the negative impacts of humans on these animals, a series of educational and awareness-raising measures must be implemented to mitigate these impacts and allow some of these animals to survive. Restrictive regulations and educational efforts can reduce contact between human populations and bat populations in order to reduce the risk of developing zoonotic diseases in the intertropical region. Finally, these results show us that some of them proliferate more than others.

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Conflicts of Interest

The authors declare no conflict of interest.

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