

Human Journals

Research Article

April 2021 Vol.:18, Issue:2

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New Record of Four Snakes in Taï National Park (South-West, Côte D'Ivoire)



IJSRM

INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY

An Official Publication of Human Journals



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Submitted: 20 March 2021

Accepted: 27 March 2021

Published: 30 April 2021



HUMAN JOURNALS

www.ijssrm.humanjournals.com

Keywords: Ophidians, Primary forests, Secondary forests, Taï National Park and Ivory Coast

ABSTRACT

The objective of this study is to confirm the presence of four (4) Ophidian species (*Atractaspis aterrina*, *Hapsidrophys smaragdina*, *Leptotyphlops albiventer*, and *Lycophidion irroratum*) in the Taï National Park and to collect additional data on their morphological characteristics and habitats. The habitats prospected are secondary forests, characterized by the presence of herbaceous plants, shrubs and dwellings, and primary forests, marked by the presence of large trees with a canopy more than 80% closed and a ground covered with more than 90% dead leaves. Ophidian sampling in the park took place throughout twenty-five (25) days (May 15 to October 25, 2018). The presence of these species in the primary and secondary forests of Taï National Park would be related to their ecological plasticity.

INTRODUCTION

Atractaspis aterrima, *Hapsidrophys smaragdinus*, *Lycophidion irroratum* and *Myriopholis albiventer* are Ophidian species belonging respectively to the families Atractaspidae, Colubridae, Lamprophidae and Leptotyphlopidae. They have a wide distribution and are found in West Africa, Central Africa, South Africa and East Africa [1]. According to the IUCN Red List of Threatened Species, these species are of minor concern [2]. These species are diurnal and terrestrial (litter or burrowing). They are found in savannah, forest [1-2] and anthropized environments [3]. In Côte d'Ivoire, previous studies carried out by [3] reported the presence of *Hapsidrophys smaragdinus*, *Lycophidion irroratum* and *Myriopholis albiventer* in urban areas in the north, center and south of the country. On the other hand, *Atractaspis aterrima* has only been observed in the North and Center of Côte d'Ivoire [3]. The Northern, Central, and Southern zones of Côte d'Ivoire belong respectively to the phytogeographical zones of the Sudanese savannah, the Guineo-Congolese transitional zone and the Guineo-Congolese transitional zone. On the other hand, no studies have revealed the presence of these four Ophidian species in the tropical rainforests of southwestern Côte d'Ivoire, particularly those of the Taï National Park [4-5-6]. Thus, the present publication aims to confirm *Atractaspis aterrima*, *Hapsidrophys smaragdinus*, *Lycophidion irroratum* and *Myriopholis albiventer* in the Taï National Park. Then to collect additional data on the abundance, habitat and morphology of the species.

MATERIALS AND METHODS

Study area

The Taï National Park (TNP) is located in southwestern Côte d'Ivoire, between latitudes 5° 10' and 6° 20' North and longitudes 4° 20' and 6° 20' West (Figure 1). This protected geographical area is part of the Guinean-Congolese floristic region of dense humid evergreen forests [12]. It covers an area of 536,000 hectares, between the rivers Cavally and Sassandra, around the towns of Guiglo, Buyo, San Pedro and Tabou [7]. The TNP is subject to a sub-equatorial climate. The average annual temperature in this area varies between 25 and 27°C with an annual amplitude of about 3°C. Air humidity is high and varies between 85% during the day and 100% at night [9]. Annual rainfall is between 1700 and 2200 millimeters from northeast to the southwest [10]. In the western part of the Taï National Park, rainfall is abundant with a lower duration of insolation than in the eastern part. On the other hand, the eastern part of the park is characterized by greater evapotranspiration with more harmattan [11]. The Taï National Park is

characterized by two climatic seasons. One dry season extends from December to January and the other rainy season covering the period from February to November [12]. The flora of TNP includes 1350 species of plants, including 80 endemic species and 26 species on the IUCN Red List [13]. The park has about 145 species of mammals, representing 93% of the mammalian species in the Western Guinean forest zone [14]. This national heritage is also home to 234 species of birds, 60 species of fish, 56 species of amphibians, and 42 species of snakes [4-5-6].

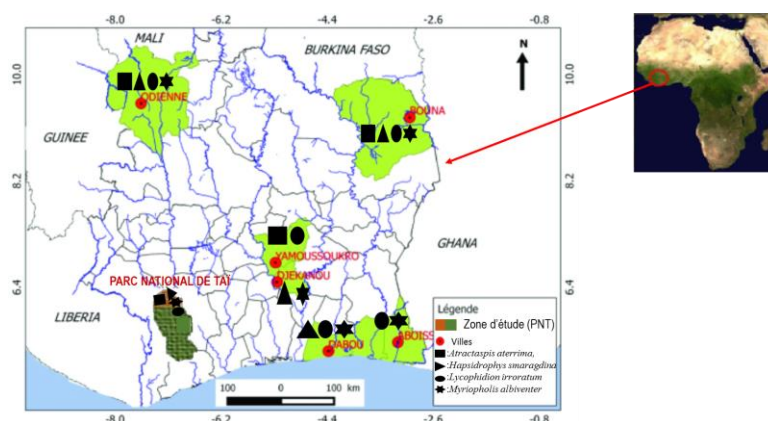


Figure 1: Geographical position of known localities of four Ophidian species in Côte d'Ivoire [3]. The geometric figures indicate the position of the Ophidian species in Côte d'Ivoire, *Atractaspis aterrima* (square), *Hapsidrophrys smaragdinus* (triangle), *Lycophidion irroratum* (round) and *Myriopholis albiventer* (star).

Sampling and analysis of Ophidian diversity

During this study, Ophidian sampling was conducted during the rainy season from May 15 to October 25, 2018. The collection time for the Ophidians during the 25 days is 175 person-hours. The Ophidians were collected during the day, mainly in good weather, which was favorable to the activity of these ectotherms [15]. It consisted of visiting sites favorable to the detection of Ophidians in a slow and silent walk punctuated by frequent stops. Ophidians were detected visually at the edges of paths, trails, edges, water points, riparian vegetation and exposure plots. Also, places of refuge were excavated by lifting stones, dead trunks, dead leaves. Also, the interior of roadside vegetation was visited. In situ sampling of the Ophidians was carried out between 9 and 16 o'clock in the morning. The identification of the specimens required approaching and capturing a fearful animal to capture its distinctive morphological characteristics, take pictures, and then release it [16]. In the laboratory, photographs of different specimens are used to identify individuals down to the species [16]. Captured individuals are kept in labeled jars containing 70% ethyl alcohol and then identified down to

the species under the binocular magnifying glass at 40x magnification. The identification of specimens is carried out with the help of appropriate books, including that of Chippaux [1]. Subsequently, their habitats were described.

RESULTS AND DISCUSSION

Distribution of the four species of Ophidians in the TNP

Figure 1 show the distribution of the four Ophidian species in Côte d' Ivoire. *Atractaspis aterrima*, *Hapsidrophrys smaragdinus*, and *Myriopholis albiventer* were collected from anthropized habitats in the northeast of the TNP (06°11'41.1"N - 07°05'33.9"W). These species inhabit habitats dominated by herbaceous plants, where the canopy is open and the soil is less than 10% covered by dead leaves. As for *Lycophidion irroratum*, it was observed in a non-humanized environment in the northeast of the Taï National Park (05°54'25.1"N - 06°53'38.2"W). This species is characteristic of habitat with a canopy closed to more than 80% and a ground covered with more than 90% plant litter. The presence of *Atractaspis aterrima*, *Hapsidrophrys smaragdinus*, *Myriopholis albiventer*, and *Lycophidion irroratum* has already been observed by [3] in the northeast (Odienné) and northwest (Bouna) of Côte d'Ivoire. However, these authors in the course of their work in Côte d'Ivoire did not note the presence of *Hapsidrophrys smaragdinus* and *Myriopholis albiventer* in the central part of the country in the city of Yamoussoukro, and that of *Atractaspis aterrima* and *Lycophidion irroratum* in the city of Djékanou. On the other hand, in the Southeast of Côte d'Ivoire *Atractaspis aterrima* has not been inventoried in the cities of Dabou, Aboisso and *Hapsidrophrys smaragdinus* in the city of Dabou. The presence of these four Ophidian species in our samples would be related to the prospected area. Indeed, the Taï National Park is located in the humid tropical zone of the Guinea-Congolese domain. On the other hand, the absence of *Atractaspis aterrima* in the cities of Dabou and Aboisso and *Hapsidrophrys smaragdinus* in the city of Aboisso, although located in the humid tropical zone of the Guinea-Congolese domain during the work of [3], is explained by the fact that this study was carried out in urban areas. Moreover, the presence of *Atractaspis aterrima*, *Hapsidrophrys smaragdina*, *Lycophidion irroratum*, and *Myriopholis albiventer* in the TNP is also due to the biology and ecology of these species. According to [1], they frequent both savannah and forest environments.

Distribution of the four Ophidian species according to habitats

The distribution of species according to the habitats surveyed (figure 2) indicates that *Atractaspis aterrima* and *Lycophidion irroratum* live hidden under the dead leaf litter located respectively in secondary and primary forest. Also, *Lycophidion irroratum* is characteristic of habitats with more than 80% closed canopy and soils more than 90% covered by plant litter with a few exposure plots. This observation is qualified by that of [3]. These authors observed this species in urban areas in the North, Center, and South of Côte d'Ivoire. *Myriopholis albiventer* has as biotope the bare soils of a residential area located in the secondary forest of the park. It has been observed after rainfall. This observation would be due to the ecology of the species [1]. Indeed, for this author, the burrowing organism flees its water-filled living environment. *Hapsidrophrys smaragdinus* colonizes shrubs in search of sunny sites and prey in the secondary forest of the northeast of the park.

The abundance of the four species of Ophidians in TNP

Analysis of Ophidian abundance by species shows that a total of 9 individuals were collected in the park: *Atractaspis aterrima* (2 individuals), *Hapsidrophrys smaragdinus* (2 individuals), *Lycophidion irroratum* (3 individuals) and *Myriopholis albiventer* (2 individuals). These abundances would indicate that these species have colonized these two types of habitats. With the exception of these 4 species, other Ophidian species have been inventoried in the park. These are *Causus maculatus* and *Crotaphopeltis hotamboeia* observed in the anthropized environments of the park's secondary forests. And *Atheris chlorechis* and *Hapsidrophrys lineatus* are found in the primary forests of the park. In the secondary park forests, the species populate the areas of dwellings with an open canopy dominated by herbaceous plants, where the ground is covered with less than 10% dead leaves. Similar habitats have been reported in the urban areas of northern and central Côte d'Ivoire by [3], where *Atractaspis aterrima*, *Hapsidrophrys smaragdinus* and *Myriopholis albiventer* have been observed in residential areas.



Figure 2: Partial view of the habitats of the four Ophidian species collected in the Taï National Park between 15 May and 25 October 2018. A: Sampling site of *Atractaspis aterrima*, *Hapsidrophrys smaragdinus* and *Myriopholis albiventer*; B: Sampling site of *Lycophidion irroratum*.

Morphological description of the four Ophidian species of the TNP

- Specimens of *Atractaspis aterrima* collected in the TNP have a small head in the extension of the body. The eye is small, with a round pupil. The nose is divided. The dorsal scales are smooth, straight and arranged in 20 rows in the middle of the body. The vertebral row is not distinct from the others. The anal scale is whole. The subcaudal scales are simple. The body is uniformly black with dark blue reflections. The edge of the subcaudal scales is white and the ventral side of the caudal end is white (figure 3).

- Specimens of *Hapsidrophrys smaragdinus* have an elongated head that bears a black sidebar from the nasal to the last labials above eye level. The eye is medium-sized with a round pupil. The body is long and cylindrical. The tail is thin. The nose is divided. The dorsal scales are streamlined, arranged obliquely in 15 rows in the middle of the body. The vertebral row is not distinct from the others. The ventrals are streamlined and their number is 159. The anal is divided. The subcaudals are double and streamlined. The back is emerald green with, on the sides some isolated turquoise blue scales. The belly is light green (figure 3).

- Specimens of *Lycophidion irroratum* have a flat head not very distinct from the neck with confluent dotted lines forming a whitish line running from the back of the eye along the upper labiae. The eye is small with a vertical pupil. The body is discreetly compressed. The tail is short. The nose is divided. The dorsal scales are smooth, with three apical dimples and arranged in 17 straight rows. The anal scale is whole. The subcaudal scales are double. The

back is gray with sometimes dark spots on the sides, arranged in two alternating rows. The scales are bordered with white dots on the free edge. The belly is the same color, but each scale is bordered with light (figure 3).

- The specimens of *Myriopholis albiventer*, are small cylindrical snakes covered with identical scales on the whole body and tail. The ventrals are not individualized. The head is indistinguishable from the tail. The eye is vestigial, sometimes barely visible in some individuals. The upper structures of the jaw are devoid of teeth. The jawbone is placed on the edge of the oral cavity, longitudinally. The mandible has teeth. There are 16 rows of scales around the body (figure 3).

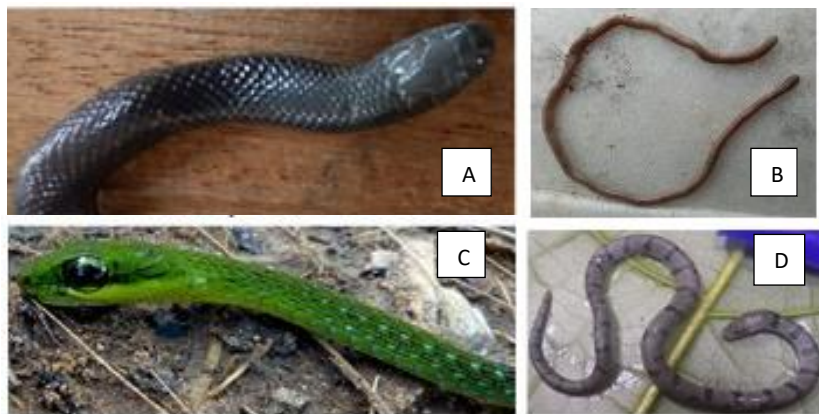


Figure 3: Partial view of a specimen of *Atractaspis aterrima* (A), *Myriopholis albiventer* (B), *Hapsidrophrys smaragdinus* (C) and *Lycophidion irroratum* (D) in the Taï National Park between May 15 and October 25, 2018.

CONCLUSION

This study has enabled the acquisition of new data concerning four new species of Ophidian recorded for the first time in the TNP *albiventer*. Moreover, the data collected during our work show that these species are capable of colonizing both the primary and secondary forests of the park. Given that the park serves as a refuge area for many Ophidian species. It is therefore important to insist on the protection and conservation of the TNP for the preservation of Ophidian biodiversity.

ACKNOWLEDGEMENTS

We are very grateful to the Ivorian authorities, in particular the Ministry of Health, Environment and Sustainable Development and the Ivorian Office of Parks and Reserves

(OIPR), for allowing us to conduct this research. We also thank the authorities of the Université Jean Lorougnon Guédé for their support during this study.

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