

# Introduction to the taxonomy of the amphibians of Kaieteur National Park, Guyana

Philippe J. R. Kok  
Michelle Kalamandeen



# Abc Taxa

a Series of Manuals  
Dedicated to Capacity Building  
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Collection Management



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# Introduction to the taxonomy of the amphibians of Kaieteur National Park, Guyana



by

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**Cover illustrations:** background photo, Kaieteur Falls; clockwise from top left, *Hypsiboas sibleszi* (Rivero), *Anomaloglossus beebei* (Noble), *Hypsiboas liliae* Kok, *Anomaloglossus kaiei* (Kok et al.). This page, *Stefania evansi* (Boulenger), a female carrying 30 juveniles. (Photos by P. J. R. Kok).

"To be a Naturalist is better than to be a King"  
*William Beebe*, 1893, cited by Gould (2004)

## **Preface by His Excellency Patrick Gomes, Ambassador of Guyana in Brussels**

The people of Guyana, our ancestors as well as the present generation, have always cherished the spectacular beauty of the Kaieteur Falls, known to most, however, mainly by the remarkable photography of that world-famous sight of a crystal clear sheet of 226 metres of water that sprays a mist of several million litres.

Accompanied by a thunderous roar, that is said to be enchanting and mysterious to the would-be visitor, Kaieteur Falls is truly the jewel and wondrous gift that our country shares with the world through its Kaieteur National Park, an area of more than 60,000 hectares, richly endowed by a biological diversity, little documented by scientists.

Now, this remarkable achievement of two young scientists, one Guyanese and the other Belgian, provides a seminal scientific account to serve as a manual with both theoretical and practical guidelines for other scientists, students and the reading public. All readers interested in learning more of the amphibians that make their habitat in the locale of the Kaieteur National Park within the wider region of the Guiana Shield, will benefit from the discussion and detailed descriptions provided by this Manual.

Beyond the readership and practitioners, whose knowledge and skills will be enriched by the study and use of this Manual, the publication will serve also as a significant step towards the designation by the United Nations Education and Scientific Organisation (UNESCO) of the Kaieteur National Park as a World Heritage Site.

Guyana is truly proud of the work of Philippe Kok and Michelle Kalamandeen.

Brussels, November 2008

## Foreword by the authors

Original idea of writing this manual occurred in 2004 while working with amphibians in Kaieteur National Park in the context of a “training through research” program generously funded by the Directorate-General for Development Cooperation (DGDC) through the Belgian Focal Point to the Global Taxonomy Initiative.

We strongly believe that the science of taxonomy should be communicated to researchers, ecologists, and environmentalists - both beginners and experts - as it often shapes the survival of species in key ecosystems. Species are key in biodiversity conservation and estimation of biodiversity. Therefore it is important to properly identify the species in a given area. This is where taxonomy comes in.

There are numerous texts on amphibian taxonomy, but relatively few are dedicated to teaching the methods and techniques used in *performing* taxonomy. Concurrently, field guides dealing with amphibians of the Guiana Shield are surprisingly scarce. This manual will hopefully give extensive insight into the world of taxonomy of amphibians, using our knowledge from Kaieteur National Park.

We wrote the manual as a “frogs for dummies”, bearing in mind the kind of information that would have been most useful to us at the beginning of our own herpetological activities. Keeping it under the maximum number of pages allowed by the editors was quite challenging and sometimes frustrating. We expect this volume will stimulate the interest of Guyanese teachers, students and researchers that would like to specialize in amphibians, specifically given the increasing rate of disappearance of these vital bellwethers of the environment.

The manual is written to captivate undergraduate and graduate students with an interest in amphibian taxonomy, but can also be used to stimulate the interest of tourists and nature lovers. Professional herpetologists will enjoy the informative sections, which are easy to access and in a convenient format.

Studying and working with amphibians is not always glamorous, but it can be fulfilling and interesting working with these wonderful and complex animals. We trust we succeeded in synthesizing the most important information in this handy book.

So many questions are left unanswered and many things remain to be done!

Brussels, Belgium  
Georgetown, Guyana  
October 2008

## **Abstract**

Kaieteur National Park is a protected area covering ca. 63,000 ha located at the eastern edge of the Pakaraima Mountains, in a largely unexplored region of west-central Guyana. Next to providing description of the area, its vegetation and climate, an overview of the equipment and appropriate techniques needed to study amphibian taxonomy, this manual also provides a brief summary of our current knowledge of the amphibian systematics in the region, key features useful to identify amphibians, and the very first field guide dealing with the amphibian fauna of Guyana, notably with the amphibians of Kaieteur National Park. A total of 48 species (46 anurans and 2 caecilians) are treated and illustrated in colour. Field keys, field identifications, brief information on natural history, calls, tadpoles and distribution within and outside the Park are also included. This work also reports the microhylid *Synapturanus salseri* Pyburn, 1975 for the first time from Guyana.

**Keywords** – advertisement calls; Allophrynidae, amphibian taxonomy; Aromobatidae; Bufonidae; Caeciliidae; Centrolenidae; collecting methods; descriptions; Eleutherodactylidae; field keys; Guiana Shield; Guyana; Hemiphractidae; Hylidae; Kaieteur National Park; Leptodactylidae; local communities; Microhylidae; Pipidae; preservation techniques; Rhinatrematidae; South America; Strabomantidae; tadpoles.

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## 1. Introduction to Kaieteur National Park, jewel of Guyana

Kaieteur National Park is located in west-central Guyana, South America, at the eastern edge of the Pakaraima Mountains (also known as Sierra Pacaraima).

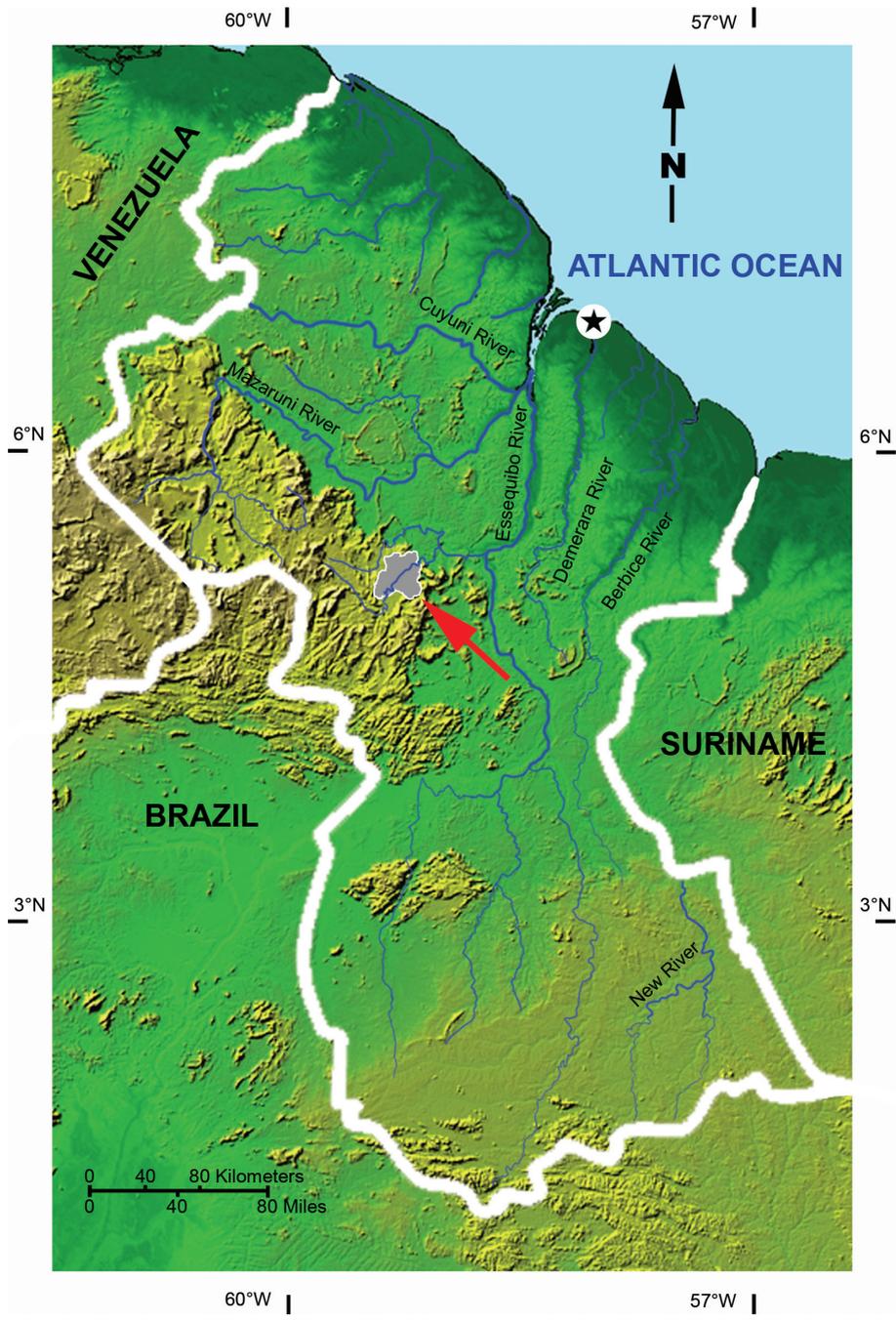
The Cooperative Republic of Guyana (Guyana) is one of the six countries covering the geologically and biologically distinct unit called the Guiana Shield (Fig. 1), which contains one of the largest remaining tracts of untouched rainforest in the world and is well known for its high species richness and endemism.



**Fig. 1.** Map of northern South America showing the boundaries of the Guiana Shield (red line). (Map elaborated by P. J. R. Kok after a radar image of South America by NASA/JPL/NIMA available at <http://photojournal.jpl.nasa.gov/catalog/PIA03388> and the Guiana Shield map provided by Señaris & MacCulloch, 2005).

Guyana is bordered on the northwest by Venezuela, on the east by Suriname, on the south and southwest by Brazil, and on the north by the Atlantic Ocean, and is dissected by several major drainages (Fig. 2). More than 70% of the country is still covered with pristine tropical forest, making Guyana a biologically rich country, and an invaluable and attractive experience for scientists and any visitor captivated by nature.

Kaieteur National Park is probably one of the most neglected national parks in South America and its herpetofauna was hitherto never properly studied, although specimens were sporadically collected in the area since the beginning of the 20<sup>th</sup> century. The first and only published list of the reptile and amphibian species occurring in Kaieteur National Park is Kelloff's (2003) short compilation of 29 species, which unfortunately includes several obvious errors and dubious records.



**Fig. 2.** Map of Guyana showing major drainages and the location of Kaieteur National Park (in grey, pointed by a red arrow); black star = Georgetown, capital city. (Map elaborated by P. J. R. Kok after a radar image of South America by NASA/JPL/NIMA available at <http://photojournal.jpl.nasa.gov/catalog/PIA03388>).

The British explorer and geologist Charles Barrington Brown was probably the first non-native to see the spectacular Kaieteur Falls in 1870.

Several decades later, in 1929, Kaieteur National Park (Fig. 3, located between ca. 5°08' to 5°19'N and ca. 59°22' to 59°38'W) was established by the British Commonwealth as one of the very first national parks in South America. Historically the boundaries of the original Park were drastically reduced from 11,400 ha to 1,940 ha in 1961, before being expanded in 1999 by President Cheddi Jagan (Kelloff, 2003).

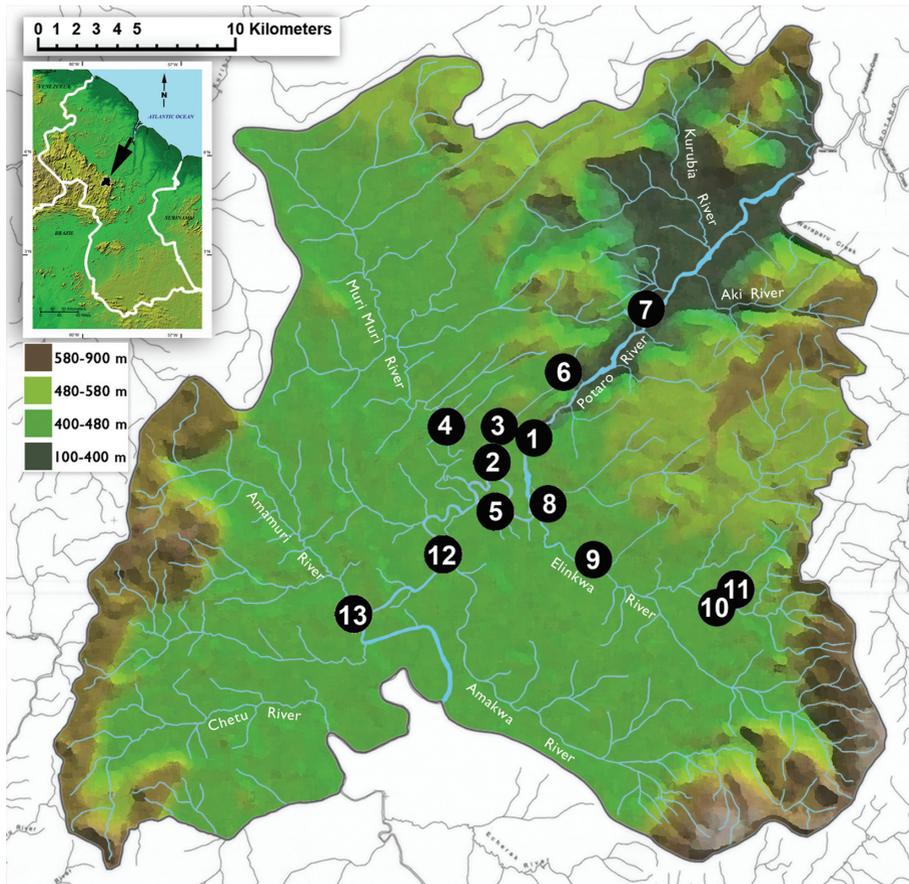
At present the Park encompasses an area of 62,680 ha and lies in the Potaro-Siparuni District (formerly called Mazaruni-Potaro District).

### **1.1. Physiography and hydrography**

Although Kaieteur National Park lacks the extensive mountainous topography and spectacular landscapes made from impressive plateaus (table-top mountains, locally called tepuis) that dominate the rest of the Pakaraima Mountains, its geological and biological diversity is significant.

Kaieteur National Park lies on Precambrian sandstone - one of the oldest exposed rock formations on earth - at the eastern edge of the Pakaraima Mountains, approximately 200 km airline SW of Georgetown, the capital city of Guyana. Formed about 300 millions years ago, the Pakaraima Mountains are located in the highlands of the Guiana Shield along the border between Venezuela, Brazil and Guyana, extending west to east for over 800 km. That region is also referred to as the phytogeographic province of Pantepui, which includes all upper slopes and summits of the Guiana Shield highlands. Mount Roraima (2,810 m above sea level) lies at the conjunction of the three countries and is the highest peak in the area.

This largely unexplored area is known for its relatively unspoiled habitat and highly endemic flora and fauna, however, as mentioned above, the herpetofauna of the region remains essentially undocumented. Elevation in the Park extends approximately 100–900 m (from the gorge to highest point on the plateau, see Fig. 3). The highest areas of the Park are located in the southwestern and southeastern parts, which remain largely unexplored. The centrepiece of the Park is the well-known 226 m high Kaieteur Falls situated where the Pakaraima Mountains give way to the interior lowlands (Figs 4, 5, 6A-B). This superlative phenomenon expels millions of litres of water as mist. The surrounding mist and prevailing winds partially influence the densities of some species in the vicinity of the fall. Many rivers and streams, including fast moving cascading streams with smaller waterfalls (Fig. 6C), are found throughout the Park. The largest river running through the Park is the Potaro River, which is 225km long, travelling approximately 32km through the deep Kaieteur gorge (Figs 6D, 7) and eventually into the Essequibo River, Guyana's largest waterway. The origin of the Potaro River is located in Mount Ayanganna (5°23'N, 59°59'W). Other major drainages running in the Park are Kurubia River, Aki River, Muri Muri River, Elinkwa River, Amamuri River, Amakwa River, and Chetu River (see Fig. 3).



**Fig. 3.** Map of Kaieteur National Park with major drainages and main sampling localities (= localities where sampling efforts were concentrated): (1) Kaieteur Falls; (2) Menzies Landing trail; (3) Kaieteur airstrip; (4) Muri Muri trail; (5) Right bank Potaro River, opposite Menzies Landing; (6) Tukeit trail; (7) Tukeit Landing; (8) Elinkwa River mouth; (9) Elinkwa River; (10) Elinkwa camp #1; (11) Elinkwa camp #2; (12) Amakwa River mouth; (13) Amamuri River mouth. Insert map indicates the location of Kaieteur National Park in Guyana. (Maps elaborated by P. J. R. Kok after the Natural Resources Management Project, Topographic Map of Kaieteur National Park, Guyana and a radar image of South America by NASA/JPL/NIMA available at <http://photojournal.jpl.nasa.gov/catalog/PIA03388>).



**Fig. 4.** Scenic view of Kaieteur Falls from its base. (Photo by P. J. R. Kok).



**Fig. 5.** Kaieteur Falls splashing into the Kaieteur gorge. (Photo by P. J. R. Kok).



**Fig. 6.** Rivers and waterfalls. A. Kaieteur Falls flows at a rate of 660,000 litres per second during the wettest months; B. The physiognomy of Kaieteur Falls drastically changes during the driest months; C. Many smaller waterfalls like this one are found throughout the Park; D. The Potaro River running in the Kaieteur gorge. (Photos by P. J. R. Kok).



**Fig. 7.** Strong rapids on the Potaro River, below the Falls. (Photo by P. J. R. Kok).

## **1.2. Local communities**

A small permanent settlement, called Menzies Landing (Fig. 8), is located inside the Park, less than 2 km SW by foot from the fall (Fig. 9). Menzies Landing is considered the gateway to the gold and diamond mining fields - some of them located within the Park - for “porkknockers” (local, low tech, freelance miners). These miners have built small wooden houses (Fig. 10) in which they live and rest when coming back from the “backdam” (mining field). In 2007, two small stores sold food and other basic supplies to miners and nearby Amerindian communities, but also bought diamonds and gold, which continue to be sent to Georgetown by plane from the Kaieteur airstrip. These human activities caused habitat destruction and pollution and are a serious threat to the biota of certain parts of the Park (Fig. 11).

The nearest community outside Kaieteur National Park is the Amerindian village of Chenapou (also spelled Chenapau or Chenapowu), located along the Potaro River, about 54 km SW of Kaieteur Falls by boat.

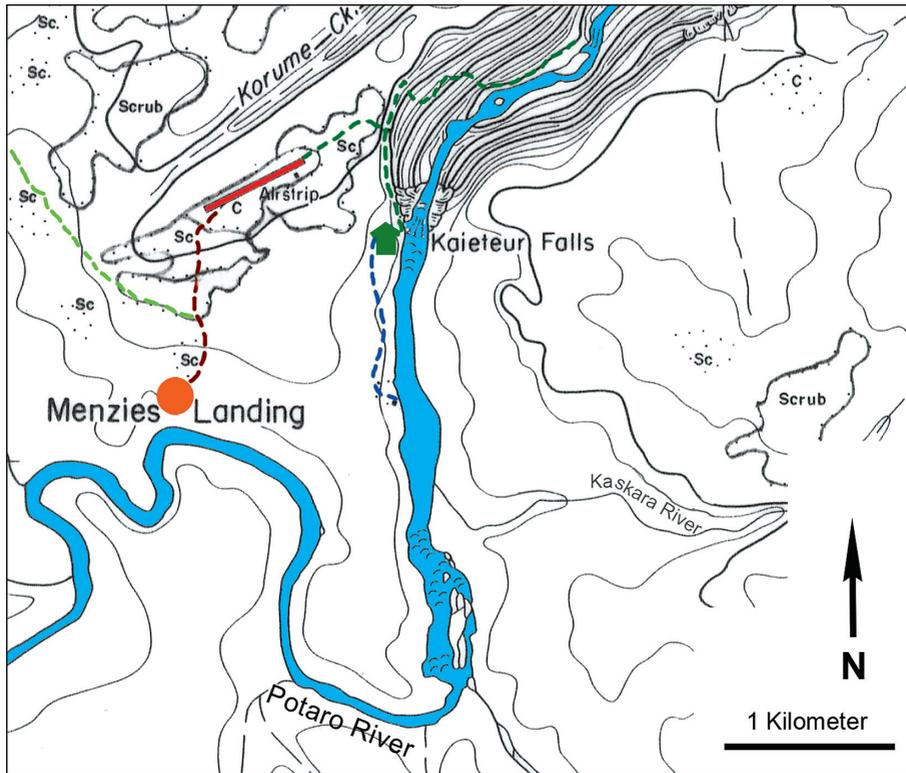
The Park encompasses ancestral lands and is an important traditional site for hunting and fishing for local indigenous communities. These local communities opposed the extension of the Park as it was made without their knowledge and without meaningful consultations. In the late nineties there were no regulations defining the rights of indigenous peoples to hunt, fish and conduct other traditional activities in the area, but by gazetting the 2006 Amerindian Act, traditional Amerindian practices are now officially allowed in the Park.

Consistent with the National Development Strategy (Anonymous, 2000), the community at Menzies Landing and all mining operations within the Park needed be closed down in order to rehabilitate and restore the area. Additionally, mining operations outside the Park were to be monitored so as to prevent damage to the Park's environment or, where this is not possible, terminated.

According to the National Parks Commission (NPC), the agency responsible for the management of Kaieteur National Park, effective monitoring and enforcement is currently unachievable due to the lack of financial and human resources. At present, four wardens control the Park, with two persons from the village of Chenapou currently involved in park ranger training by the joint Iwokrama-EPA-GFA programme. The NPC is considering hiring these trainees as full-time wardens to assist in the monitoring of the Park (N. Roopnarine, pers. comm. 2008).



**Fig. 8.** Menzies Landing along the Potaro River. (Photo by P. J. R. Kok).



**Fig. 9.** Area map of Menzies Landing (orange dot) and surroundings. Brown dashed lines = Menzies trail; light green dashed lines = Muri Muri trail; dark green dashed lines = Tukeit trail; blue dashed lines = Water gauge trail; green house = Kaieteur guesthouse. (Map elaborated by P. J. R. Kok after "Kaieteur Sheet 43 SW" published by the Survey Department of Guyana, 1972).



**Fig. 10.** A. Small store at Menzies Landing, centre of diamond and gold business; B. Typical wooden house at Menzies Landing. (Photos by P. J. R. Kok).