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A SURVEY OF THE ANURAN FAUNA OF MONTAGNE BELVÉDÈRE, COUNTY OF SAÜL, FRENCH GUIANA: FIELD LIST WITH COMMENTS ON TAXONOMY AND ECOLOGY

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ABSTRACT

Systematic surveys of the anuran fauna of Montagne Belvédère (county of Saül, French Guiana), conducted during 3 short missions, revealed the presence of about 41 species of frogs. 6 Bufonidae, 1 Centrolenidae, 6 Dendrobatidae, 13 Hylidae, 14 Leptodactylidae and 1 Microhylidae were recorded from this small site located in central French Guiana. 15 of these species were unknown from the county of Saül before this survey. *Hyla minuscula* and Osteocephalus cf. cabrerai are reported for the first time from French Guiana. Two probably new species of Adenomera were collected.

INTRODUCTION AND STUDY SITE

The anuran fauna of French Guiana is relatively well known, mainly thanks to the work of Lescure who published the first checklist in the seventies (1976). Few additional new species were described these last years like *Colostethus baeobatrachus* (Boistel & de Massary, 1999) and increased the number of species present in the country. Some species like *Ctenophryne geayi* (de Massary & Lescure, 1998; Kok, 1998) or *Pipa aspera* (Lescure et al., 1998) were only recently found in French Guiana and are known by very few French Guianan specimens in museum collections.

Some systematic herpetofaunal surveys on regions like the Trois Sauits area (Lescure, 1987), the Petit Saut area (Hoogmoed & Avila Pires, 1991) and the biological research station "Les Nouragues" (Born, 1996) were undertaken and results were published. Until today, it was not the case for the area surrounding the small village of Saül although of special interest since some species like *Atelopus spumarius barbotini* Lescure, 1981 could be endemic to it. However, it must be noted that Lescure and botanists like de Granville collected material in the area surrounding Saül but no specific publication followed. It must be emphasized that this area is of special interest for ecotourism and is dedicated to be part of a national park (see Mori, 1999).

In order to facilitate our work, we chose a very limited area to survey (ca 400 ha). Observations and collections of specimens were strictly restricted to this site, called here study site (SS). The SS is situated in the county of Saül in central French Guiana. The small village of Saül houses more or less 80 inhabitants and is located at about 170 km southwest of Cayenne in the geographic centre of the country (N 3° 37', W 53° 12'). Montagne Belvédère (fig. 1) is a small hill (highest point at ca 330 m) located at about 7 km southwest of the village (base camp at the foot of the hill, between the "Crique



Fig. 1 Map of Saül and surroundings showing the location of Montagne Belvédère (1)

Popote" and the Carbet Maïs trail: N 3° 36', W 53° 10'). Several habitats are represented: streams (called "criques") and ripicolous forest, permanent ponds, semi permanent ponds, swamps, artificial clearings (called "abattis") at the foot of the hill and terra firme primary forest on the hillsides and on the summit. The accessibility is facilitated by marked trails.

MATERIAL AND METHOD

Collections and observations of the anuran fauna were undertaken during three short missions (of about three weeks each) in November-December 1996, June 1998 and April-May 1999. Due to the strict French regulation concerning collection of specimens of amphibians in French Guiana, we collected only a few specimens as voucher specimens.

The specimens collected were encountered on the forest floor, under the leaf litter, fallen trees, decaying wood, on rocks, in creeks and in the vegetation. Higher vegetation and the canopy were also investigated using caving equipment. Voucher specimens were collected by hand at various times of day and night. Habitat, microhabitat and other data like reproduction, atmospheric conditions or peculiar activity were recorded for each specimen collected (see Heyer et al., 1994). Pictures (colour slides) were taken in vivo from almost each voucher specimen. A Global Positioning System (GPS)) Garmin® 50 was used to record the exact position of the base camp. The few collected frogs were anesthetized by Xylocaïne® prior to fixation in a 10% formalin solution. All the material was deposited in the herpetological collections of the Institut royal des Sciences naturelles de Belgique (Brussels, Belgium).

Specific names follow the most recent revision (Duellman, 1993). Museum abbreviations follow standardized usage (Leviton et al., 1985). Sex was determined by dissection.

SPECIES ACCOUNT

BUFONIDAE Genus Atelopus flavescens group Atelopus spumarius barbotini Lescure, 1981

Voucher specimen(s): IRSNB 12724, IRSNB 12890, IRSNB 12896, IRSNB 12931, IRSNB 12933-34, IRSNB 12963-69.

The systematic status of this subspecies is unclear. During the survey, we collected specimens representing different forms of *Atelopus* clearly belonging to the *flavescens* group (sensu Lescure "1972" [1983]).

Some of our specimens fitted well with the description of Atelopus spumarius barbotini Lescure, 1981 (see Lescure, 1981a) (black to blackish brown with pale red markings on the dorsum, see Plate 2), others appeared to be Atelopus flavescens Duméril & Bibron, 1841 (brownish with or without yellowish brown vermiculations, see Plates 3 and 4). These last specimens were mainly identical to the vermiculatus form A. flavescens described as a separate species by McDiarmid (1973) and synonymized with A. flavescens by Lescure (1976). We found also many specimens intermediate between these two taxa (see Plate 5) and we collected a male of "Atelopus spumarius barbotini" in amplexus with a female of Atelopus flavescens (see Plate 6). It must be noted that some of the "intermediate" specimens collected were gravid females. All of our specimens had a pinkish or violet ventral coloration. These field observations seriously questioned the validity of *Atelopus spumarius barbotini*. In the laboratory, further examination of the material collected on Montagne Belvédère corroborated that *Atelopus spumarius barbotini* could be a synonym of *Atelopus flavescens* and a morph of this polymorphic species. We will discuss this case in detail in another paper.

This common toad was encountered during the day, usually near streams, but some specimens were observed far from water on the hillsides of the mountains. Males call from low (0.1 - 1.5 m) vegetation along streams. However, specimens were observed as high as 2 m from the ground, especially early in the morning. Males have slightly more powerful anterior members.

IRSNB 12724 (male, 24.9 mm SVL) was calling during the day, 0.18 m high on a leaf of a small bush, 2 m from a stream in primary forest in November. IRSNB 12890 (male, 27.1 mm SVL) was collected during a rainy day, on the floor, 3 m from a stream in primary forest in June. IRSNB 128966 (male, 26.1 mm SVL) was calling during the day, 0.05 m high on a leaf of a small bush, 4 m from a stream in primary forest in June. IRSNB 12931 (male, 25.7 mm SVL) was calling during the day, 0.8 m high on a limb, 2 m from a stream, after a short rain in primary forest in April. IRSNB 12933 (female containing small unpigmented ovarian eggs, 39.2 mm SVL) was collected far from water, on the floor, during the day in primary forest in April. IRSNB 12934 (male, 27 mm SVL) was collected during the day, on the floor, 10 m from a stream in primary forest in April. IRSNB 12963 (female containing small unpigmented ovarian eggs, 32.9 mm SVL) was collected during the day, on the floor, along a trail in primary forest in November. IRSNB 12964 (female containing small unpigmented ovarian eggs, 38.6 mm SVL) was found during the day in amplexus with IRSNB 12965 (23.8 mm SVL), on the floor, along a trail in primary forest in November. IRSNB 12966 (male, 28 mm SVL) was collected during the day, on the floor, along a stream in primary forest in June. IRSNB 12967 (male 26.7 mm SVL) was found on the floor, during the day, 6 m from a stream in primary forest in June. IRSNB 12968 (Male, 28 mm SVL) was calling during the day, 0.8 m high on an horizontal tree trunk, 3 m from a stream in primary forest in June. IRSNB 12969 (male, 27 mm SVL) was collected during the day, on a root, 0.05 m from the ground in primary forest in June.

Genus Bufo guttatus group Bufo guttatus Schneider, 1799

Voucher specimen(s): IRSNB 12697, IRSNB 12944.

This toad was observed in late afternoon and at night on the floor, exclusively along streams in primary forest. Males begin to call just before the night. IRSNB 12967 (male, 133.6 mm SVL) was calling at night, on the floor, 3 m from a stream in primary forest in November. IRSNB 12944 (male, 140 mm SVL) was collected at night, on the floor, 5 m from a stream in primary forest in April.

marinus group Bufo marinus (Linnaeus, 1758)

Voucher specimen(s): IRSNB 12900, IRSNB 12980.

This very common species was encountered at night, in the base camp but also in primary forest where the biggest specimens occur. IRSNB 12900 (juvenile, 46.6 mm

SVL) was collected in late afternoon on an horizontal tree trunk (0.6 m from the ground) in the base camp in June. IRSNB 12980 (juvenile, 14.9 mm) was collected during the day on the floor, 4 m from a stream in primary forest in June.

typhonius group Bufo margaritifera (Laurenti, 1758)

Voucher specimen(s): IRSNB 12718, IRSNB 12761-63.

This common diurnal toad was encountered on the floor in primary forest. We observed several males calling along a stream during the day in May 1999. IRSNB 12718 (female, 51.3 mm SVL) was collected during the day on the forest floor in November. IRSNB 12761 (juvenile, 27.8 mm SVL) was collected during the day on the forest floor, near a small stream in November. IRSNB 12762 (juvenile, 21.7 mm SVL) was collected during the day on the forest floor in November. IRSNB 12763 (female, 50.5 mm SVL) was collected during the day. 5 m from a stream on the forest floor in November.

Bufo species (typhonius complex)

This complex of species (minimum 2 different species were observed on the SS) is under study by M.S. Hoogmoed (RMNH). We encountered these diurnal toads along streams, but far from water too (on the hillsides). We shortly discuss here each taxon under numerical designation.

Bufo species 1 This species is characterized by hypertrophied supratympanic crests and bronze iris.

Voucher specimen(s): IRSNB 12893-94, IRSNB 12955-56.

IRSNB 12893 (male, 38.2 mm SVL) and IRSNB 12894 (male, 38.7 mm SVL) were collected during the day, on the floor in primary forest in June. IRSNB 12955 (female, 46.8 mm SVL, containing small pigmented ovarian eggs) was collected during the day, on the floor, along a small stream in primary forest in April. IRSNB 12956 (female, 35.9 mm SVL, containing small pigmented ovarian eggs) was collected during the day, on the floor, along a trail in primary forest in April.

Bufo species 2 This species is characterized by hypertrophied supratympanic crests and green iris.

Voucher specimen(s): IRSNB 12760, IRSNB 12764-65, IRSNB 12898, IRSNB 12911-12, IRSNB 12919.

IRSNB 12760 (female, 45.5 mm SVL, containing small pigmented ovarian eggs) was collected during the day, on the floor, in primary forest in November. IRSNB 12764 (juvenile, 27.9 mm SVL) was collected during the day, on the floor, 4 m from a stream in primary forest in November. IRSNB 12765 (female, 48.1 mm SVL, containing small pigmented ovarian eggs) was collected during the day, on the floor, along a trail in primary forest in November. IRSNB 12898 (male, 37.9 mm SVL) was collected during the day, on the floor, along a trail in primary forest in November. IRSNB 12898 (male, 37.9 mm SVL) was collected during the day, on the floor, 10 m from a stream in primary forest in June. IRSNB 12911 (juvenile, 15 mm SVL) and IRSNB 12912 (juvenile, 10.7 mm) were collected during the day, on the floor, 5 m from a stream in primary forest in June. IRSNB 12919 (male, 38.4 mm) was collected during the day, on the floor, along a trail in primary forest in June.

CENTROLENIDAE Genus Hyalinobatrachium fleischmanni group Hyalinobatrachium taylori (Goin, 1968)

Voucher specimen(s): not collected

We recorded the call (an easily recognisable trill) of this species at night, along a small stream, in primary forest in April.

First record for the region of Saül.

DENDROBATIDAE Genus Colostethus Colostethus baeobatrachus Boistel & de Massary, 1999

Voucher specimen(s): IRSNB 12976-79, IRSNB 12753-57, IRSNB 12970.

This small diurnal species was found on the floor in primary forest, usually near trails. Males call just after rain showers. IRSNB 12976 (female, 17.6 mm SVL) was collected during the day on the floor in primary forest in April; IRSNB 12977 (male, 16.9 mm SVL with third finger distinctly swollen), IRSNB 12978 (female, 18.6 mm SVL) and IRSNB 12979 (male 17.9 mm SVL with third finger distinctly swollen) were collected during the day on the floor along a trail in primary forest in June; IRSNB 12753 (female 13.7 mm SVL), IRSNB 12754 (female, 14.8 mm SVL) and IRSNB 12755 (female, 16.5 mm SVL) were collected during the day, on the floor along a trail in primary forest in June; IRSNB 12755 (female, 16.5 mm SVL) were collected during the day, on the floor along a trail in primary forest in June; IRSNB 12970 (female, 13.5 mm SVL) was collected during the day, on the floor, 5 m from as stream in primary forest in June.

The case of *Colostethus baeobatrachus* is particularly interesting. First proposed by Edwards in his Ph. D. Thesis (1974) (which does not consist of a valid description following the International Code of Nomenclature [Anonymous, 1985]), the name of *Colostethus baeobatrachus* was recently used by Boistel & de Massary (1999) who proposed a picture of the animal and a very short description. They did not mention the thesis of Edwards (1974) nor of a collected specimen that could be used as a reference specimen.

As Boistel & de Massary did not designate holotype or syntypes we consider the animal represented on the picture given by them as the holotype. In order to clarify the situation, we propose here a complete redescription of the species on the basis of our material coming from Montagne Belvédère and from material previously collected in the county of Roura. We follow the characters used for the diagnosis of the *Colostethus* of Ecuador given by Coloma (1995).

Diagnosis – (1) SVL males, 16.9 - 17.9 (x = 17.4; n = 2), females, 13.5 - 18.6 (x = 16.1; n = 10); (2) disc on third finger expanded; (3) first finger generally longer than second; (4) fringe absent on second finger; (5) disc of fourth toe expanded; (6) fringe generally present on fourth toe; (7) presence of an internal tarsal fold and presence of an external metatarsal fold; (8) vestigial web on toes; (9) dorsolateral stripe absent; (10) oblique lateral stripe present, sometimes irregular, extending to eye; (11) ventrolateral stripe absent; (12) markings absent on the chest-gular region; (13) abdomen white, greyish or yellow never spotted; (14) third finger distinctly swollen in males; (15)) testes small and white.

C. baeobatrachus is easily distinguished from the two other Colostethus found in French Guiana (C. beebei (Noble 1923) and C. degranvillei Lescure, 1975). The ventral face of C. baeobatrachus is white or yellow, never spotted, while grey, brownish or even black with white spots in C. degranvillei. Furthermore, C. degranvillei has no clear oblique lateral stripe. C. beebei has an unspotted yellow or white ventral face but its general aspect is slender and the oblique lateral stripe is missing.

Description of IRSNB 12976 Plate 7): Adult female, 17.6 mm SVL; body moderately slender; head slightly longer than wide; head length 33% SVL; head width 31.3% SVL; snout truncate in dorsal view and slightly projecting in profile; loreal region slightly concave; nostrils slightly protuberant laterally; eye-nostril distance about two thirds of the diameter of eye; supratympanic fold and tympanum little visible; tympanum diameter 47% diameter of eye. Forelimbs moderately long; first finger slightly longer than second; fingers unwebbed, lacking lateral fringes; terminal discs expanded; subarticular tubercles large and protuberant, rather ovoid; external plamar tubercle large, round and protuberant; internal palmar tubercle clearly smaller than external, ovoid and protuberant. Hind limbs long, moderately robust; tibia length 44.9% SVL; foot length 40.3% SVL; outer tarsal fold absent; inner tarsal fold present on distal half of tarsus; outer metatarsal tubercle round, about half size of elliptical inner metatarsal tubercle; vestigial web between finger II and III and IV; absence of lateral fringes on the toes; terminal discs expanded; subarticular tubercles absent.

Skin of dorsum, flanks and venter smooth, slightly granulated on the limbs; anal opening directed posteroventrally at quart level of thighs; anal sheath short; tongue elongately elliptical, distinctly widest posteriorly and free posteriorly for about two thirds of its length.

Measurements (in mm): SVL 17.6, tibia length 7.9, foot length 7.1, head length 5.8, head width 5.5, eye diameter 2.5, eye-nostril distance 1.6, tympanum diameter 1.2.

Color in preservative: Dorsal color brown; white oblique lateral stripe; black stripe on the flanks; upper lip white; dorsal surface of arms greyish with brown flecks; dorsal surface of legs greyish with brown longitudinal stripes; two white anal stripes slightly continuous on the posterior face of brownish thighs, surface between the two stripes dark brown; brown transversal stripe on the inner face of thighs; dorsal surface of fingers and toes greyish with brown flecks; throat, chest and belly white; plantar and palmar surfaces brownish.

Color in life: Dorsum brownish to dark brown, generally uniform; dorsal surface of head generally light brown; canthus and flanks dark brown to black usually with numerous small white or light blue dots; upper lip cream or greyish, usually with white or light blue dots; oblique lateral stripe constituted of numerous white or light blue dots which give it sometimes an irregular aspect; arms brownish to dark brown, sometimes with white or light blue dots; small orange spot at the base of upper arm; legs dark brown, with black, and sometimes irregular, longitudinal stripes (usually with white or light blue dots); two orange anal stripes slightly continuous on the posterior face of thighs; surface between these two stripes dark brown to black; belly white or yellow, sometimes greyish; iris bronze to greyish; tips of fingers and toes light blue.

Colostethus beebei (Noble, 1923) (Plate 8)

Voucher specimen(s): IRSNB 127566-58, IRSNB 12892, IRSNB 12906, IRSNB 12946.

This small diurnal dendrobatid was observed during the day on the forest floor, usually along trails and sometimes near streams. IRSNB 12756 (sex undefined, 12.6 mm SVL), IRSNB 12757 (sex undefined, 14.7 mm SVL) and IRSNB 12758 (male, 15.8 mm SVL) were collected during the day, on the floor along a trail in primary forest in November. IRSNB 12892 (male, 15.6 mm SVL) was collected during the day, on the floor, 15 m from a stream in primary forest in June; IRSNB 12906 (male, 19.9 mm SVL with 18 back-riding tadpoles) was found on the floor in primary forest in June; IRSNB 12946 (female containing pigmented ovarian eggs, 17.7 mm SVL) was collected during the day, on the floor, 5 m from a stream along a trail in primary forest in April. Third finger not distinctly swollen by males.

First record for the region of Saül.

Colostethus degranvillei Lescure, 1975

Voucher specimen(s): IRSNB 12951-53.

This small species was observed on the floor, exclusively along small sandy streams, in primary forest where males were actively calling. All the voucher specimens are males (15.5 mm, 14.3 mm, 14.2 mm and 16.1 mm SVL respectively) and were collected calling during the day, along a small stream in primary forest in April.

Genus Allobates Allobates femoralis (Boulenger, 1884 "1883")

Voucher specimen(s): IRSNB 12910, IRSNB 12930.

This species, very common near the village of Saül, was only observed twice on the SS. The two specimens collected are juveniles. IRSNB 12910 (8.6 mm SVL) was collected during the day, on the floor, in a clearing in primary forest in June and IRSNB 12930 (13.7 mm SVL) was collected during the day, on the floor, 10 m from a semi permanent pool in primary forest in April.

Genus Epipedobates Epipedobates hahneli (Boulenger, 1883) (Plate 9)

Voucher specimen(s): IRSNB 12853-54.

Only two specimens were collected. One of them (IRSNB 12853, male, 19.8 mm SVL with 9 back-riding tadpoles) was found during the day, on the floor in a primary forest swamp in June. The other (IRSNB 12854, female, 20.1 mm SL) was collected on the same day on the hillside of the mountain, on the floor, at the foot of a big granitic rock in primary forest.

We follow Haddad & Martins (1994) in recognizing this species distinct from E. pictus.

First record for French Guiana.

Genus Dendrobates Dendrobates ventrimaculatus Shreve, 1935 (Plate 10)

Voucher specimen(s): not collected.

Only one specimen (sex undertermined) of this species was observed during the day on an horizontal tree trunk in a clearing in primary forest. *D. ventrimaculatus* is very rare on Montagne Belvédère, probably due to the lack of suitable bromeliads to breed.

First record for the region of Saül.

HYLIDAE Subfamily Hylinae Genus Hyla albopunctata group: Hyla multifasciata Günther, 1859 "1858"

Voucher specimen(s): IRSNB 12701-02, IRSNB 12920.

This species was exclusively observed in secondary vegetation in artificial clearings, usually not far from water. Males were actively calling from low bushes (0-0.7 m) in December and May. IRSNB 12701 (male 55.2 mm SVL with small prepollical spine) was calling at night, 5 m from a quiet moving stream, in a small bush (0.5 m from the ground), in an artificial clearing in November. IRSNB 12702 (male, 51.5 mm SVL with small prepollical spine) was calling the same night at the same locality 0.3 m from the stream in a small bush (0.15 m from the ground). IRSNB 12920 (male, 57.2 mm SVL with small prepollical spine) was calling 6 m from a quiet moving stream in secondary vegetation (0.05 m from the ground) in June.

boans group Hyla boans (Linnaeus, 1758)

Voucher specimen(s): IRSNB 12698, IRSNB 12901.

This big nocturnal species was found at night, along rocky and sandy streams, where males were calling from the ground or in vegetation (0.5 - 3 m). Fights between males were often observed in December and May. Eggs and tadpoles were found in small cavities along the streams in May, June and December. IRSNB 12698 (male, 106.6 mm SVL with curved prepollical spine) was calling at night on a banana tree (2 m from the ground) along a cascading stream in an artificial clearing in November. IRSNB 12901 (male, 124.2 mm SVL with curved prepollical spine) was collected at night on a rock along a cascading stream in primary forest in June.

geographica group Hyla calcarata Troschel, 1848

Voucher specimen(s): IRSNB 12940-41.

Two males (42.9 and 44.3 mm SVL respectively, with nuptial excressences on the thumbs) were collected at night in a bush (1 - 1.5 m) above a small semi permanent pond in primary forest in April. Hyla fasciata (Günther, 1859 "1858" Plate 11)

Voucher specimen(s): IRSNB 12960.

Only one female (IRSNB 12960, 51.7 mm SVL) containing pigmented ovarian eggs was found in April in low vegetation (1.5 m) between a stream and a semi permanent pool in primary forest.

First record for the region of Saül. Hyla geographica Spix, 1824

Voucher specimen(s): IRSNB 12699, IRSNB 12700, IRSNB 12902.

Specimens of this species were found on low vegetation along a small, quiet moving stream in a clearing in primary forest. Tadpoles were observed in December and May. IRSNB 12699 (male, 48.4 mm SVL) was collected at night in a bush (0.4 m from the ground) along a quiet moving stream in a clearing in primary forest in November. IRSNB 12700 (male, 46.4 mm SVL) was collected during the same night at the same locality but on a vertical tree trunk (0.8 m from the ground). IRSNB 12902 (male, 49.2 mm SVL) was collected at night in a bush (1.3 m from the ground) along a quiet moving stream in a clearing in primary forest in June.

First record for the region of Saül.

microcephala group *Hyla minuscula* Rivero, 1971 (Plate 12)

Voucher specimen(s): IRSNB 12959.

We collected only one calling male (19.1 mm SVL) of this small species along a semi permanent pool, at night, in primary forest. The specimen fits relatively well with the original description of Rivero (1968) and with the description given by Duellman (1997) from specimens from southern Venezuela. Duellman examined our specimen and identified it without doubt as H. minuscula (Duellman, pers. com.). This consists of the first record of this species for French Guiana.

Genus Osteocephalus: Osteocephalus cf. cabrerai (Cochran & Goin, 1970) (Plate 13)

Voucher specimen(s): IRSNB 12939, IRSNB 12962.

One male (IRSNB 12939, 39.4 mm SVL) with keratinized excressences on the thumbs was collected along a semi permanent pool in primary forest (1.6 m high in a bush) in April. Two females (one of them collected, IRSNB 12962, 51 mm SVL, containing pigmented ovarian eggs) were observed perfectly homochromes on leaves of small plam trees (*Astrocaryum sp*) far from water in May. We follow Duellman & Mendelson (1995) in recognizing this species as distinct from *O. buckleyi* (formerly synonymizied by Trueb & Duellman, 1971). Our specimens fit well with the original description of Cochran & Goin (1970) and with the color plate and description given by Duellman & Mendelson (1995). The only difference we noted is a light blue coloration on the flanks of IRSNB 12962 (female).

First record for French Guiana.

Osteocephalus taurinus Steindachner, 1862

Voucher specimen(s): IRSNB 12708-09, IRSNB 12905.

This very common frog was observed at night in primary forest. Usually observed between 0.5 m and 3 m high from the ground, some specimens were seen 15 m high in trees, during

the day, *O. taurinus* takes refuge in tree holes. IRSNB 12708 (female, 93.9 mm SVL, containing pigmented ovarian eggs) was collected at night on a small bush (0.6 m from the ground) in primary forest in late November. IRSNB 12709 (female, 87.8 mm) was collected at night on a tree trunk (0.8 m from the ground) in primary forest in November and IRSNB 12905 (male, 77.1 mm SVL) was collected at night on the forest floor in primary forest in June.

First record for the region of Saül.

Genus Phrynohyas Phrynohyas resinifictrix (Goeldi, 1907)

Voucher specimen(s): not collected.

We recorded the distinctive call of this species high in the trees, at night, in primary forest in June.

Phrynohyas sp

Voucher specimen(s): not collected.

This still undescribed species is under study by French and German colleagues. We recorded calling males (the call of this species is peculiar and well known) from holes high in the trees, at night, primary forest in May.

Subfamily Phyllomedusinae Genus Phyllomedusa Phyllomedusa bicolor (Boddaert, 1772)

Voucher specimen(s): IRSNB 12938.

This species was observed at night, along a semi permanent pool, in primary forest. Males were calling from 1.5 to ca. 15m in trees surrounding the pool in May. Tadpoles were found in the pool. IRSNB 12938 (male, 111.2 mm SVL) was collected 1.5 m high on a bush along a semi permanent pool in primary forest in May. *Phyllomedusa tomopterna* (Cope, 1868)

Voucher specimen(s): IRSNB 12961.

Only one female (IRSNB 129661, 53.4 mm SVL) containing unpigmented ovarian eggs was collected at night on low vegetation (1.1 m) near a semi permanent pool in primary forest in May.

Phyllomedusa vaillanti Boulenger, 1882 (See front cover)

Voucher specimen(s): IRSNB 12915, IRSNB 12917.

Several males of this common species were observed calling at night from low vegetation (0.2 - 1.3 m) near a semi permanent pool in primary forest. Typical nests were observed along the pool within which tadpoles occurred numerously. The voucher specimens are two males having 50.8 and 51.1 mm SVL respectively. They were collected at night, on the floor, near a semi permanent pool in primary forest in June.



Plate 2: "Atelopus spumarius barbotini", typical morph.



Plate 3: Atelopus flavescens, typical morph.



Plate 4: "Atelopus flavescens, vermiculatus morph.



Plate 5: Intermediate specimen between :Atelopus spumarius barbotini" and Atelopus flavescens.



Plate 6: "Atelopus spumarius barbotini" and Atelopus flavesens in amplexus.



Plate 7: Colostethus baeobatrachus



Plate 8: Colostethus beehei



Plate 9: Epipedobates hahneli



Plate 10: Dendrobates ventrimaculatus



Plate 11: Hyla fasciata



Plate 12: Hyla minuscula



Plate 13: Osteocephalus cf. cabrerai



Plate 14: Adenomera species 2



Plate 15: Leptodactylus leptodactyloides



Plate 16: Physalaemus petersi



Plate 17: Otophryne robusta

Voucher specimen(s): IRSNB 12907.

Only one female (IRSNB 12907, 110 mm SVL) containing pigmented ovarian eggs was collected at night, far from water, on the floor in primary forest in June.

First record for the region of Saül.

Subfamily Leptodactylinae Genus Adenomera

We collected at least three distinct species of *Adenomera* on the SS. One of them was easily identified as *Adenomera andreae*, but the two others could not be determined at specific level. We briefly discuss here these two species under numerical designation. We will treat these species in details in another paper.

Adenomera andreae Müller, 1923

Voucher specimen(s): IRSNB 12752, IRSNB 12891, IRSNB 12981-84, IRSNB 12897, IRSNB 12903, IRSNB 12937.

Many specimens were observed during the day, on the floor, in primary forest during the three missions.

IRSNB 12752 (female, 20.1 mm SVL containing small unpigmented ovarian eggs) was collected during the day, on the floor, between a trail and a stream in primary forest in November. IRSNB 12891 (sex undetermined, 15.7 mm SVL) was collected during the day, on the floor, 6 m from a semi permanent pond in primary forest in June. IRSNB 12981 (female, 21.1 mm SVL) was collected during the day, on the floor, 10 m from a semi permanent pond in primary forest in June. IRSNB 12981 (female, 21.1 mm SVL) was collected during the day, on the floor, 10 m from a semi permanent pond in primary forest in June. IRSNB 12897 (male, 16.5 mm SVL) was collected during the day, on the floor, along a stream in primary forest in June. IRSNB 12982 (sex undetermined, 13.7 mm SVL) was found during the day, on the floor, along a trail in primary forest in June. IRSNB 12982 (sex undetermined, 18.7 mm SVL) was collected during the day, on the floor, 10 m from a stream in primary forest in June. IRSNB 12983 (male, 18.6 mm SVL), IRSNB 12984 (female, 23 mm SVL) were collected during the day, on the floor, in primary forest in June. 23 mm SVL) was collected during the day, on the floor, in primary forest in June.

Adenomera species 1

Voucher specimen(s): IRSNB 12985.

This species is bigger than A. andreae, has a different coloration and a different call.

IRSNB 12985 (male, 25.3 mm SVL) was found during the day, on the floor, at the foot of an *Astrocaryum paramaca* in primary forest in June.

Adenomera species 2 (Plate 14)

Voucher specimen(s): IRSNB 12986-87.

This species is slightly bigger than A. andreae and has a different coloration.

IRSNB 12986 (female, 20.6 mm SVL) was collected during the day, on the floor, 0.3 m from a semi permanent pond in primary forest in June. IRSNB 12987 (male, 20.2 mm SVL) was found during the day, on the floor, in primary forest in June.

Genus Leptodactylus fuscus group Leptodactylus mystaceus (Spix, 1824)

Voucher specimen(s): IRSNB 12936.

Only one juvenile (IRSNB 12936, 25.3 mm SVL) was found during the day, on the floor, 10 m from a stream in primary forest in April.

First record for the region of Saül.

melanonotus group *Leptodactylus leptodactyloides* Andersson, 1945 (Plate 15)

Voucher specimen(s): IRSNB 12729, IRSNB 12916.

Only two specimens of this species were collected. IRSNB 12729 (male, 43.3 mm SVL with two small black spines on each thumb) was collected at night on the floor 2 m from a steam in primary forest in November, IRSNB 12916 (female, 49 mm SVL, containing unpigmented ovarian eggs) was collected at night, on the floor, 1 m from a stream in partially disturbed primary forest in June. The two specimens have yellowish-brown ventrolateral glands and a yellowish longitudinal stripe on the posterior surface of the thighs. Our specimens fit well with the description given by Heyer (1994).

First record for the region of Saül.

pentadactylus group Leptodactylus knudseni Heyner, 1972.

Voucher specimen(s); IRSNB 12949.

Only one juvenile (IRSNB 12949, 47 mm SVL) was found at night, on the floor along a trail in primary forest in April.

First record for the region of Saül.

Leptodactylus pentadactylus (Laurentil, 1768)

Voucher specimen(s): IRSNB 12703-05, IRSNB 12918.

Many specimens were observed at night, on the floor, in primary forest. Males were calling at night along streams in May. IRSNB 12703 (female, 93.3 mm SVL), IRSNB

12704 (female, 109.1 mm SVL) and IRSNB 12705 (male, 146.7 mm SVL) were collected during the same night, on the floor in primary forest in November. IRSNB 12918 (female, 71.1 mm SVL) was collected at night, on the floor, 3 m from a cascading stream in primary forest in June.

Leptodactylus rhodomystax Boulenger, 1884 "1883"

Voucher specimen(s): IRSNB 12706a-c, IRSNB 12707, IRSNB 12908a-b.

Several specimens were observed at night on the floor in primary forest, usually along trails. Three females, IRSNB 12706a (73.5 mm SVL), IRSNB 12706b (75.4 mm SVL) and IRSNB 12706c (79.3 mm SVL) containing unpigmented ovarian eggs were collected during the same night, on the floor, along a trail in primary forest in November. One male (IRSNB 12707, 69.3 mm SVL) with nuptial spines on the prepollex and chest was collected the following night, on the floor, along the same trail. IRSNB 12908a (19.3 mm SVL) and IRSNB 12908b (18.1 mm SVL) were collected at night, on the floor, in a partially dried swamp in primary forest in June.

First record for the region of Saül.

Genus Physalaemus Physalaemus petersi (Jiménez de la Espada, 1872) (Plate 16)

Voucher specimen(s): IRSNB 12932, IRSNB 12942-43, IRSNB 12948.

Males were observed called at night, on the floor, along a semi permanent pool in primary forest. Juveniles were collected during the day under dead leaves. One nest assigned to this species was observed along a semi permanent pool in primary forest. IRSNB 12932 (juvenile, 12.5 mm SVL) was collected during the day under dead leaves, 8 m from a stream in primary forest in April. IRSNB 12942, a calling male (32.3 mm SVL), was collected on the floor, 3 m from a semi permanent pool in primary forest in April. IRSNB 12942, a calling male (32.3 mm SVL), was collected on the floor, 3 m from a semi permanent pool in primary forest in April. IRSNB 12943 (subadult unsexed, 19.6 mm SVL) was collected during the same night under a fallen tree trunk, 10 m from a stream in a clearing in primary forest. IRSNB 12948, a calling male (32 mm SVL), was collected on the floor, 1 m from a semi permanent pool in primary forest.

Subfamily Telmatobiinae Genus Eleutherodactylus Subgenus Eleutherodactylus conspicillatus group Eleutherodactylus chiastonotus Lynch & Hoogmoed, 1977

Voucher specimen(s): IRSNB 12909, IRSNB 12899a-b.

This very common species was observed during the day, on the floor, in primary forest. A lot of juveniles were found during April, May and June especially near rotten tree trunks. IRSNB 12909 (male, 39.2 mm SVL) was collected during the day, on the floor, along a trail, 5 m from a stream in primary forest in June. Two juveniles (IRSNB 12899a, 10.6 mm SVL and IRSNB 12899b, 10.4 mm SVL) were collected on a rotten tree trunk (0.1 m from the ground) in an artificial clearing in primary forest in June.

Eleutherodactylus gutturalis Hoogmoed, Lynch & Lescure, 1977

Voucher specimen(s): IRSNB 12904, IRSNB 12947, IRSNB 12957.

Three specimens of this poorly known species were collected. IRSNB 12904 (sex undetermined 13.2 mm SVL) was collected during the day, on the floor, along a trail in primary forest in June. IRSNB 12947 (male, 15.4 mm SVL) was collected during the day, on the floor, along a trail, 10 m from a stream in primary forest in April and IRSNB 12957 (male, 16.8 mm SVL) was collected during the day, on the floor, along a stream in primary forest during the same month.

Eleutherodactylus zeuctotylus Lynch & Hoogmoed, 1977

Voucher specimen(s): IRSNB 12913, IRSNB 12922, IRSNB 12929, IRSNB 12945.

Several specimens were observed, usually during the day, on the floor or between rocks in primary forest. Four calling males were recorded along a stream in April. IRSNB 12913 (female, 30.2 mm SVL) was collected during the day, on the floor, 5 m from a stream in primary forest in June. IRSNB 12922 (female, 34.5 mm SVL) was collected in early morning in the base camp, on the forest floor in July. IRSNB 12929, (male, 22.2 mm SVL) was collected during the day on the forest floor in secondary vegetation in an artificial clearing in April. IRSNB 12945, a calling male (25.9 mm SVL) was collected at 19h55, on limbs (0.4 m from the ground) 6 m from a stream in a primary forest's disturbed area in April. Three other males were calling at the same place.

unistrigatuss group Eleutherodactylus marmoratus (Boulenger, 1900)

Voucher specimen(s): IRSNB 12921, IRSNB 12935, IRSNB 12958.

Many males were called during the day and night in April and June but located with difficulty due to their minute size. We found this species, usually during the day, on the floor or in low vegetation in primary forest. IRSNB 12921, a calling male (12.2 mm SVL), was collected at night on a leaf 0.1 m from the ground in a swampy area in primary forest in June. IRSNB 12958 (male, 17.4 mm SVL) was collected during the day, on the floor, along a trail in primary forest in April. IRSNB 12935 (male, 14.6 mm SVL) was collected during the day, on the floor, in primary forest after a short rain in April. In life, this last specimen had darker dorsal and ventral coloration (nearly black) and a clear dorsal line; nevertheless, body proportions and other details of coloration agree well with the original description (Boulengere, 1900) and the diagnosis given by Lescure (1981b).

MICROHYLIDAE Subfamily Otophryninae Genus Otophryne Otophryne robutsa Boulenger, 1900 (Plate 17)

Voucher specimen(s): IRSNB 12954.

Only one female (IRSNB 12954, 49.2 mm SVL) containing unpigmented ovarian eggs was collected on leaves, along a small stream in primary forest in April.

First record for the region of Saül.

CONCLUSION

This inventory is probably incomplete because we did not sample long enough to encounter rare and very rare species (like *Ctenophryne geayi* or *Scinax proboscidea*). Some species like *Dendrobates tinctorius*, *Scinax boesemanni*, *Eleutherodactylus inguinalis*, *Adelophryne gutturosa* and *Chiasmocleis shudikarensis* were expected but not found on the study site. It must be noted that the weather during the missions was notably drier than usual (effect of El Ninio).

Attention to vocalization is invaluable for the precision of species survey. Some species are virtually never observed but commonly heard (like *Phrynohyas* species). Once the calls are known, the survey of a site is usually faster and easier.

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ADDENDA TO 'A SURVEY OF THE ANURAN FAUNA OF MONTAGNE BELVÉDERE, COUNTY OF SAÜL, FRENCH GUIANA'

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In a recent paper (Kok, 2000), I mentioned the presence of *Otophryne robusta* on Montagne Belvédère in central French Guiana. In fact, shortly after the submission of my paper, I received a reprint of an article by Campbell & Clarke (1998) in which these authors reviewed the genus *Otophryne*. It appears that the species present in French Guiana is a new species, *Otophryne pyburni* Campbell & Clarke, 1998 and not *Otophryne robusta* Boulenger, 1900. At the time this new information was received my paper was already in press and the modification could not unfortunately be carried out.

I mentioned also the presence of *Colostethus* baeobatrachus Boistel & de Massary, 1999, but Martins (1989), in a poorly known report, described a new species, *Colostethus stepheni*, and mentioned that 'C. baeobatrachus' of Edwards (1974) corresponds to this species. I carefully read the article and the diagnosis of Martins and conclude that the species I called *Colostethus* baeobatrachus Boistel & de Massary is in fact a junior synonym of *Colostethus stepheni* Martins, 1989. This record considerably extends the range of *C. stepheni* which was only known from the region of the type locality (Amazonas, Brazil).

Concerning *Bufo* species 1 and *Bufo* species 2 (page 10), the reader needs to read 'not hypertrophied' instead of 'hypertrophied'.

I would like also to thank Dr. Scott Mori (New York Botanical Garden) for the permission to use the map of Saül and surroundings illustrating the article.

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Editor's note:

The original article referred to here regrettably also contained a number of printing mistakes, for which we apologize; the principal errors that readers should be aware of are listed below.

p. 6, 3rd paragraph; Trois Sauts - and not Trois Sauits.

p. 15, concerning *Hyla minuscula*, line 3; Rivero (1971) - and not Rivero (1968).

p. 18, plate 6; Atelopus flavescens - and not Atelopus flavesens.

p. 18, plate 8; *Colostethus beebei* - and not *Colostethus beehei*.

p. 22, concerning *Leptodactylus pentadactylus* (Laurenti, 1768) - and not (Laurentil, 1768)

p. 23, concerning *Physalaemus petersi*; males were calling - and not 'were called'.

p. 24, concerning *Eleutherodactylus marmoratus*; males were calling - and not 'were called'.