

**A STUDY OF THE BASIC REPRODUCTIVE
BIOLOGY OF TROPICAL FOREST MAMMALS TO
AID SUSTAINABLE HUNTING**

**Progress Report I
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1. INTRODUCTION

The present document gives an update of activities undertaken within the project “**A Study of the Basic Reproductive Biology of Tropical Forest Mammals to Aid Sustainable Hunting**”. This project started on February 2013.

2. START-UP AND CHANGES

The project started by training a student from the Equatorial Guinea National University (UNGE) (Pastor Cham Sopole), and a field assistant (Ambrosio Ondo Obiang). Both team members were trained on how to gather reproduction data on four of the most hunted mammal species in the Island: two ungulates, Ogilbyi's duiker (*Cephalophus ogilbyi*), blue duiker (*Philantomba monticola*), and two large rodents, brush-tailed porcupine (*Atherurus africanus*), giant pouched rat (*Cricetomys emini*). These four mammals contribute a very large proportion of the bushmeat consumed in Bioko.

Mr. Kouassi Messan Ague MSc. (a Togo vet attached to the UNGE), Dr. Miguel Ángel Farfán Aguilar (researcher, Universidad de Málaga) and I, supervised and further trained the UNGE student and the field assistant for 1 week, 2 weeks and 2 months, respectively. Though not included when we wrote the proposal, Mr. Messan Ague and Dr. Farfán Aguilar were added to the project team. The integration of these two project members was a fortuitous event which has allowed us to strength our expertise on the ground. Mr. Messan Ague, teaches at UNGE, and has extensive knowledge of veterinary science, and has had first-hand experience of the study species and their anatomy. Likewise, we were delighted to welcome Dr. Miguel Ángel Farfán to the team. I met Dr. Farfán a few months before the start of the project, during a study period I undertook at the Universidad de Málaga (Spain). Dr. Farfan has worked on mammalian reproductive cycles, especially on population parameters and reproductive biology of the Iberian hare *Lepus granatensis* in southern Iberia (Farfán et al 2004). In Malaga, Dr. Farfán and I worked on other subjects during y study period there. When Dr. Farfán was made aware of our project, he became most interested in working with us. Since Mr. Bruno Carpinetti (originally expected to work with us) was unable to participate due to other commitments, Dr. Farfán was most willing to step in and assist in the project start-up. Dr. Farfán was then able to join us in Bioko, for which he covered his own travel expenses.

More recently, we have been able to integrate another member to our team, Ms. Paloma Ferrer, a Spanish biologist currently living in Malabo. Ms. Ferrer had been looking for a job in conservation and contacted us (through our website). Although she is currently hired by the Environmental and Fisheries Ministry to update the country's objectives in the Convention of Biological Diversity, Ms. Ferrer has accepted to work with us in our project as a volunteer, helping our student and field assistants. Ms. Ferrer, together with Dr. Farfán and Mr. Messen three new participants have been invaluable additions to the project.

Although we had originally planned to work on animals to study their reproduction in one village only, we were able to extend our data collection to animals hunted in Basilé Bubi. This was decided after the second month of data collection, because there were fewer specimens of giant pouched rats appearing in Basilé Fang. This species is commonly trapped in Basilé Bubi. We bought extra equipment and other materials, and trained our assistant, Mr. Justo Sabana, in Basilé Bubi (who is already collecting extraction data) to gather data on reproductive cycles also. Mr. Sabana started collecting data from May 2013.

In expanding the project team and expertise, we have been able to collect other types of information in support of our original aims. Data on parameters gathered for the project are listed below.

3. REPRODUCTIVE CYCLES' DATA

During the first 4 months of the project we were able to gather information on a total of 74 individual specimens of the 4 study species (Table 1).

Table 1: Data collected in the first three months.

2013	Num. of Individuals studied				
	Blue Duiker	Red Duiker	Rat	Porcupine	TOTAL
February	20	2	5	4	31
March	18	2	1	1	22
April	9	1	2	9	21
May	16	2	12	4	34
TOTAL	63	7	20	18	108

Parameters collected for all specimens included the following:

1. Body weight: all individuals were weighed using a dynamometer (10 g precision).
2. Body measurements: using callipers or tape measure

Rodents

Head (H): Straight-line distance from the tip of the nose to the end of the head (bending the neck to see the end of the head clearly).

Head and body length (HB): Straight-line distance from the tip of the nose to the end of the body.

Tail length (T): distance from the junction to the body to the fleshy tip.

Ear Length (E): distance from the base of the notch of the lower part of the ear to the uppermost margin of the ear.

Hind foot (Hf): distance from the end of the heel bone (calcaneum) to the end of the longest toe (without measuring the claw).

Figure 1 in the Annex illustrates how these measurements were taken.

Ungulates

H, HB, T and E as above.

Hind foot (Hf): distance from the end of the heel bone (calcaneum) to the tip of the hoof.

Hoof length (H)

Height at shoulder length (HS)

Horn length: Straight-line distance from the base of the horn to the tip.

Figure 2 in the Annex illustrates how these measurements were taken.

3. Genital weight

The left testicle, with the epididymis removed, of all males of all species was excised and weighed using a digital balance. Ovaries were not weighed.

2. Genitals measurements

Testicles and ovaries of all specimens were measured using a calliper.

4. Reproductive activity

Testicles were cut along the midline, smeared over a microscope slide, and dyed using the Diff – Quick technique (Gosalbez et al. 1979). Males were considered reproductively active if they showed at least one descended testicle and sperm present.

To assess whether females were reproductively active we noted whether lactating or pregnant. Embryos, if present, were counted, weighed and measured (see Figure 3 in the Annex). Ovaries were measured and stored in 4% formalin for further analysis.

5. Kidney fat index

The left kidney of all individuals and its surrounding fat were weighed on a digital balance to assess body condition.

4. SPECIES EXTRACTION RATES AND HUNTING EFFORT DATA

Our two assistants, one in the commercial hunters' village, Basilé Fang (Ambrosio Ondo) and the other one in the subsistence hunter's village, Basilé Bubi (Justo Sabana), continue to record hunting data: species hunted in each village, name of the hunter, the name of the intermediary if sold, selling price, area hunted, final destination, hunting method, condition (whether smoked or fresh), duration of hunting trip, time spent in the forest (from departure from the village to their return, even if no animals were hunted).

5. UNFORESEEN DIFFICULTIES

Our assistant in Basilé Fang, Ambrosio Ondo was sick with malaria and has not been able to work since the end of March 2013. However, his sister, Karina, was glad to collaborate with us. Karina has been trained by me and she is now substituting Ambrosio. When Ambrosio returns, she will continue helping him and the UNGE student.

6. OTHER FUNDING APPLIED

We were not successful in securing funding from other sources in 2012. However, we have applied for a grant from Barcelona Zoo this year. We will find out whether our proposal has been successful by the end of July 2013. If successful, the Barcelona grant may be able to cover the shortfall of £8,386, as indicated in our original proposal to Rufford.

7. BIBLIOGRAPHY

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ANNEXE

Fig. 1. How rodents' measurements are taken.

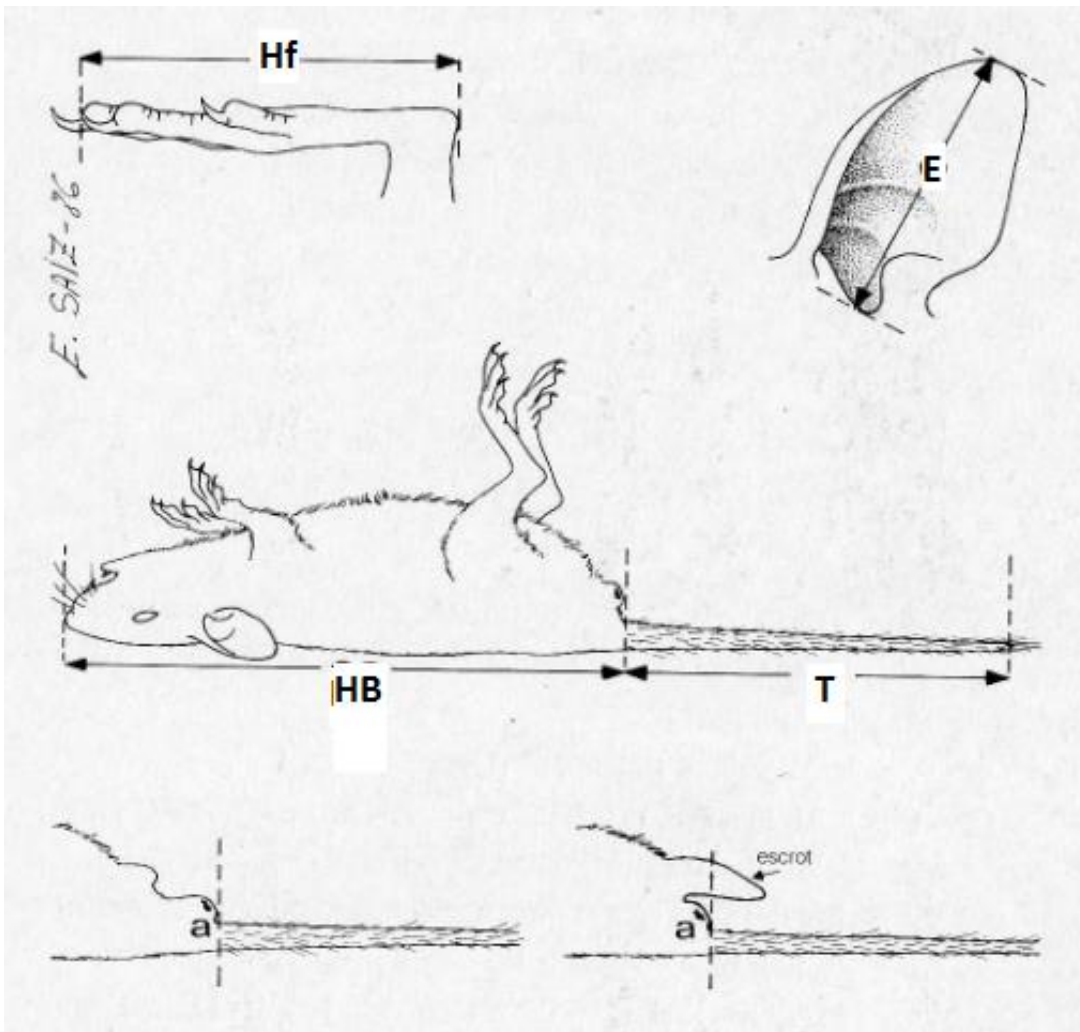


Fig. 2. How Duikers' measurements are taken (From Wilson 2001): HB (A-C), T (C-D), Hf (G-H), H (I-H).

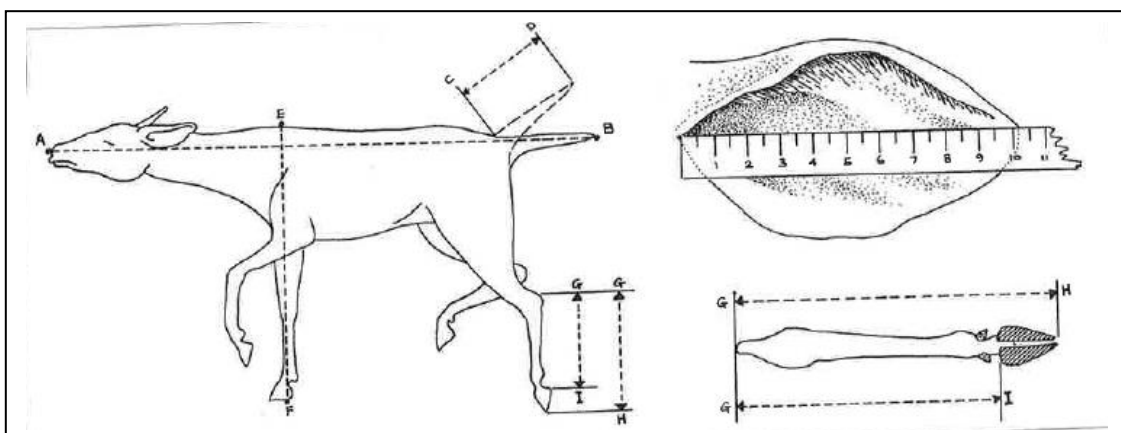

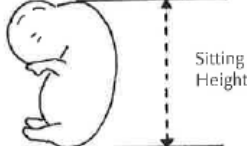
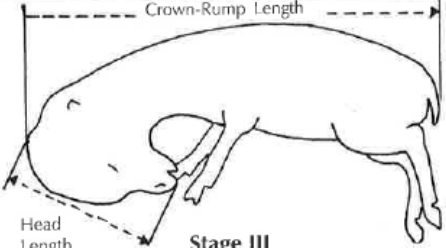
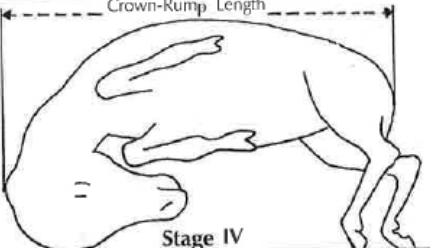
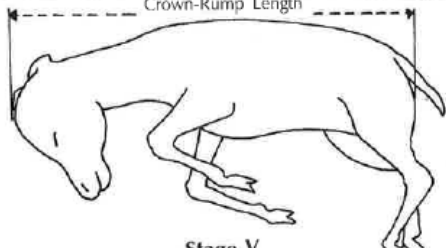



Fig. 3. Classification of duiker foetal stages (From Wilson 2001: adapted from Ansell, 1965a)

 <p>Stage I</p>	<p>Just visible to the naked eye, up to when the limbs are traceable. Body C-shaped. (If possible measure the sitting height).</p>
 <p>Stage II</p>	<p>Body not so much C-shaped. Head, neck and body distinctly differentiated. Digits beginning to form on limbs. Snout formed, mouth open, eyelids beginning to form. (Measure sitting height).</p>
 <p>Stage III</p>	<p>"Fish-hook" shape. Digits shaped as hooves. Mouth, nostrils and gum line distinct. Eyelids complete (closed). Forehead distinctly protruding as a sort of hump. Measure C-R (crown-rump) and head length.</p>
 <p>Stage IV</p>	<p>No longer "fish-hook" shape. Skin thick and rubbery. Hair starting to appear on eyebrows and muzzle. (Measure this and all subsequent stages same as Stage III).</p>
 <p>Stage V</p>	<p>Shaped very much as the adult. Tail covered with short hairs. Top of head fully haired and hair starting to appear over parts of the body.</p>
 <p>Stage VI & VII</p>	<p>Stage VI Body well haired but skin pigment still showing through and hairs often short and adpressed.</p> <p>Stage VII Entire body fully haired, skin pigment no longer apparent.</p>
<p>FULL TERM Stage VIII</p>	<p>Full term. To be born within a week. (Not easy to distinguish from later Stage VII).</p>