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Kapany lemurs project

Preliminary report

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I. Schedule of the fieldwork

The fieldwork in the Sahamalaza-Iles Radama National Park took place between the 3rd of May and the 10th of July 2010.

Before processing to any catching, an observation period was necessary. During this time we choosed the best way to catch animals (traps, blowpipe, airgun), in which forest and we determinated their repartition area.

In first hand, we worked on the intermediate population, in the North of Maromandia (from the Ankitsika forest S14°05.063' E048°03.861' to the Ankiririka forest S14°11.725' E048°05.487'). We caught 27 intermediate individuals between the 17th of May and the 20th of June 2010.

The camp was moved in a lot of different place to explore a maximum of forest.

On the other hand, in order to complete the genetic database, we caught 13 *Eulemur flavifrons* in the Analafady-Ambodimanga forest S14°14.302' E048°02.252' between the 5th and the 10th of July 2010.

II. Protocol of catches

28 forest fragments were investigated to find the intermediate lemurs (cf table n°1 in the part V. Preliminary results). 8 of them were selected to process to the catches. (cf table n°1 in the part V. Preliminary results). Choice criteria were, in importance order, presence of intermediate lemurs, communication between the fragment and the Kapany forest and the accessibility of the forest (existence of “fady”= forbidden, taboo, sacred , the prince Didi retracted himself forbidden me to work on the Kapany forest, density of injuries plant not allow the following of a darted animal, etc). Moreover, GPS data of the perimeter of those fragments were collected to evaluate the repartition area of the studying population. Some ecological data were noted as the primary or secondary status of the fragment, the density of tree, the average height of tree, human presence, (cf table n°2 in the part V. Preliminary results).

After several unsuccessful tries to catch animals using a trap (intermediate lemurs never entered in the funnel-trap and the rats eat bananas) or with blowpipe, we decided to use an airgun. In fact, the deviation of the dart (by leaves, branches or wind) is less important with an airgun than a blowpipe. Moreover, the animals were wilder, shyer with humans than expected, so the distance of approach before the escape of the individual was too important to use the blowpipe.

Two anaesthetic products were used by two different teams: kétamine 10% (10mg/kg) by Mr Boromé Ramaromilanto (biologist in the zoological park of Tsimbazaza, Antananarivo)

and Telazol® (tilétamine and zolazépam, 12,5mg/kg) by a team of the "Madagascar Biodiversity Biogeography Project" of Pr Edward Louis.

Each group was followed to identify the individuals that appear to be the fittest for anesthetizing (apparent health condition). The team follow it in silence since the animal take a good position to allow the gunman to dart the thigh. When the individual is darted, he run on several dozen of meters, it is very important to follow it and never loose the visual contact with him. After three to ten minutes, depending of individuals, the anaesthetic product starts to produce its effect. A net is put under the animal to avoid any injuries in case he falls down. If the lemurs stay on the tree, a member of the team climbs the tree to bring the animal on the ground on security.

The caught animal is bringing in shadow. Vital parameters are checked at regular intervals (cardiac and respiratory frequencies, corporal temperature, capillary re-colouring time). Potential superficial injuries are disinfected with Betadine®. We take pictures of all the lemurs on a whole body in profile, ventral and dorsal view then some portrait on profile, frontal and cranio-caudal views (see pictures 1 to 4).

The skin biopsy is realised at the auricle. The chosen area is shaved and disinfected with alcohol 90°. The sampling is around 0.2*0.3mm big. It is removed with a scalpel blade (sterilised and single-use blade) and a pair of pliers. The haemostasis is secured by digital compression and checked during morphometric measures. The samplings are stored in NuncND tubes full of 90° alcohol.

Each animal is weighed and measured in accordance with tablen°3a, 3b, 3b, 4a, 4b and 4c (cf part V. Preliminary results). Choice of criteria is motivate by reading Baden *et al.* 2008 and de Craul *et al.* 2008.

7mL of physiological serum are injected by subcutaneous way to contend dehydration and help for the elimination of the anaesthetic product.

In order to not catching two times the same animals, a marking is realized before the release: two rings of hair are cut short.

The waking up of each animal is monitoring. The individual is put in a bag hung up to a branch, only when the lemur is able to keep a sterna position and to walk some steps.

A full waking up, allowing the release, take at least 3 or 4 hours, depending of each individual. If the lemur is not totally woke up before the night, it stay to the camp in a bag hung up to a branch, sheltered from rain, wind and potential predator.

The release is always realized at the same place than the catching and the animal is followed to check if it returns to its group. I never observed any problems after the release.

As regards to the anaesthesia, the therapeutic index (the distance between the efficient dose and the toxic dose) is comparable between the kétamine 10% and the Telazol®. But I noted with Telazol®, animals had a quicker sleep, a deeper sleep and a quicker waking up.

III. Preliminary results

Dr Jean-Luc Fausser accepted to collaborate in carrying out the genetic analysis at the "Institut de Médicine Légale de Strasbourg" (Legal Medicine Institute of Strasbourg). He will analyse these samplings with same methodology than for his other article (Fausser, in prep). He will sequence the mitochondrial DNA and will analyse the D-loop and the cytochrome b. The results are waiting for October or November 2010.

A map showing the repartition area of the intermediate population will be created. The analyses of morphometric measures, the genetics results and their interpretation will be explained in the next report.

I introduce here the raw data as ecological observation (incomplete because of the wild attitude of lemurs) and morphometric measures.

Table 1 : Alphabetical classification of investigating forest fragments with GPS coordinates, observation of lemurs and practice of catches.

Forest name	Code	Altitude (m)	GPS coordinates	Lemurs presence	Count					Catches practice
					Total	F ad	M ad	F sub	M sub	
Ambatomadosobe	MADOBE	81	S14°06.917' E048°03.281'	Observed	2F 2M	1	1	1	1	No
Ambatomadosohely	DOSOBE	72	S14°07.391' E048°03.290'	Vocalizations	-					No
Ambodimadrirofo	DRIRO	0	S14°06.355' E048°02.747'	No	-					No
Ambodivanio-Ankaramihely	AMBOKARA	17	S14°06.481' E048°02;855'	No	-					No
Ambodivanio-Bevoey	AMBEVO	56	S14°10.496' E048°04.584'	Observed	2F 2M	1	1	-	-	Yes
Amparikely	AMPRI	50	S14°11.122' E048°03.991'	No	2-3 *E.flavifrons*					No
Analabetsigny	ALABET	161	S14°05.782' E048°04.121'	Observed	3F 3M 2F 3M 4 à 6 individuals					Yes
Analafady-Ambodimanga	AFADY	4	S14°14.302' E048°02.252'	Observed	3F 3M 3F 4M 1M observed					Yes
Analafaly	FALY	33	S14°07.610' E048°03.047'	Observed	12	4	1	2	5	Yes
Analalavahely	LALAVA	78	S14°14.174' E048°03.000'	Observed	2F observed					No
Analamisakana	SAKANA	3	S14°05.373' E048°02.184'	No	-					No
Analamora	MORA	112	S14°05.673' E048°03.884'	No	-					No
Andebinirakoto	RAKOTO	65	S14°06.180' E048°03.232'	No	-					No
Andengilava	ANGIL	72	S14°12.088' E048°04.100'	No	-					No
Andilatany	LATANY	57	S14°06.307' E048°03;017'	No	-					No
Andohaniankaramihely 1	ANDO 1	82	S14°05.979' E048°03.810'	Observed	1F 3M					Yes
Andohaniankaramihely 2	ANDO 2	171	S14°05.927' E048°04.131'	Observed	6 à 7 individuals					Yes
Andohaniankaramihely 3	ANDO 3	78	S14°06.035' E048°03.493'	No	-					No
Andohaniankaramihely 4	ANDO 4	91	S14°05.863' E048°03.717'	No	-					No
Andohaniankaramihely 5	ANDO 5	150	S14°06.000' E048°04.041'	No	-					No
Andoloambo	ANLOBO	77	S14°11.680' E048°04;453'	No	-					No
Ankaramihely	ANKARA	20	S14°06.540' E048°03.062'	Observed	3F 3M					Yes
Ankiririka	KIRIR	88	S14°11.725' E048°05.487'	No	-					No
Ankitsika	ANKI	44	S14°05.063' E048°03.861'	Observed	4 à 6 individuals					No
Antandrarafa	DRAFA	74	S14°09.431' E048°04.012'	No	-					No
Beteimbengny	BETEI	144	S14°06.149' E048°03.857'	No	-					No
Kapany	KAPY	110	S14°06.856' E048°03.719'	Observed	-					No
Mangrove face à AFADY	Mang-AFADY	16	S14°14.392' E048°01.905'	Observed	1M observed					Yes

Presence of *E.flavifrons*

- : no data

Table 2 : Ecological data (primary or secondary statutes, qualitative density, average tree height) of the investigating forests fragments, according the order from table 1.

Code	Statute	Density	Average tree height	Comments
MADOBE	I, II	very dense to dense	4-12m	Primary forest because of landslide (inaccessible area)
DOSOBE	I, II	very dense to low dense	6-15m	Former house, stubble-burning, zebu pen
DRIRO	I	dense	10m	Mangrove swamp
AMBOKARA	II	low dense	5-10m	-
AMBEVO	II	very dense	15m	On the edge of Bevoey-Maromandia dirt track
AMPRI	I	dense	15-20m	Very narrow fragment, down to cliff, hunt
ALABET	I	very dense	15-20m	Fady (=taboo, sacred)
AFADY	I	dense	10-15m	Fady, (a)
FALY	I	very dense	15-20m	-
LALAVA	II	dense	5-10m	Very difficult access (cliff, sharp plant)
SAKANA	II	dense	5-10m	Presence of lemurs in March (mango)
MORA	II	low dense	-	-
RAKOTO	II	low dense	7-10m	Banana plantation
ANGIL	II	dense	5m	Coffee cultivation
LATANY	II	dense	-	Prince Didi banning
ANDO 1	II	low dense	10-12m	-
ANDO 2	II	low dense	10m	-
ANDO 3	II	dense	5m	-
ANDO 4	II	low dense	5m	-
ANDO 5	II	dense	7-12m	-
ANLOBO	II	dense	7-10m	Culture café
ANKARA	II	low dense	3-10m	Culture café
KIRIR	II, I central	low dense	2-3m à 10-12m	On edge of national road number 6
ANKI	I	very dense	15-20m	Hunt (presence of traps)
DRAFA	II, I central	very dense	5-10m à 15-20m	On edge of Bevoey-Maromandia dirt tracks
BETEI	II	low dense	5-7m	-
KAPY	-	-	-	Prince Didi banning
Mang-AFADY	II	dense	5-10m	Mangrove swamp (a)
				Presence of *E. flavifrons*

I: primary forest fragment

II: secondary forest fragment

I, II: forest fragment showing a primary statute in the centre surrounding by secondary forest, surfaces of the two parts are comparable.

II, I central: forest fragment showing a primary statute in the centre, very small, surrounding by secondary forest with a much bigger surface.

(a): Several groups live in Mang-AFADY and cross paddy field to join AFADY.

Table 3a : Morphometric data of 27 intermediate individuals

Number	Localisation	Dose	Sex	Weight	Inter-orbit dist	Ear lg	Ear with hair lg	Beard lg	Canine ht
1	Ando2	2,00	F ad	2,125	2,50	3,10	7,20	5,00	0,90
2	Ando2	0,60	F sub	1,200	2,10	3,10	5,80	3,40	0,40
3	Ando1	0,50	M sub	1,625	2,25	3,30	7,00	5,30	0,60
4	Ando1	0,50	M ad	2,200	2,80	3,40	7,90	6,40	1,00
5	Ando2	0,70	F ad	2,100	2,30	3,00	7,00	3,50	0,90
6	Ando2	0,50	M ad	2,375	2,70	3,55	7,90	6,15	0,80
7	Alabet	0,70	F ad	1,650	2,10	2,80	5,80	3,80	0,75
8	Faly	0,25	F ad	2,000	2,80	3,10	8,20	4,10	0,95
9	Faly	0,25	M sub	1,600	2,70	3,20	7,90	3,90	0,95
10	Faly	0,25	F sub	1,625	2,40	3,00	7,60	3,40	0,80
11	Faly	0,25	M sub	1,850	2,60	3,65	6,65	3,60	0,70
12	Faly	0,25	F ad	1,725	2,45	3,35	7,35	3,50	0,70
13	Faly	0,25	M sub	1,550	2,65	3,05	6,85	3,35	0,90
14	Faly	0,45	F ad	1,925	2,50	3,50	6,80	4,05	0,85
15	Faly	0,25	M ad	1,900	2,25	3,35	5,70	3,50	1,10
16	Faly	0,25	M sub	1,650	2,50	3,40	8,20	4,20	1,00
17	Faly	0,25	F ad	1,925	2,55	3,60	8,75	4,10	0,90
18	Faly	0,25	M sub	1,600	2,60	3,70	9,20	4,05	0,80
19	Ambevo	0,45	F ad	2,225	2,40	3,90	8,35	3,90	0,80
20	Ambevo	0,25	M ad	2,350	2,70	3,65	8,66	4,65	1,10
21	Alabet	0,25	M sub	1,475	2,45	3,55	6,00	3,85	0,90
22	Alabet	0,25	M ad	2,025	2,65	3,35	7,65	4,70	1,05
23	Alabet	0,25	F ad	2,200	2,70	3,30	5,80	4,40	0,95
24	Ankara	0,25	F sub	1,500	2,35	3,20	8,20	3,70	broken
25	Ankara	0,25	M sub	1,850	2,90	3,80	8,00	4,00	0,90
26	Ankara	0,25	F ad	2,400	2,50	3,45	7,80	4,50	0,95
27	Ankara	0,25	F ad	2,425	2,70	3,75	7,05	3,50	0,95

Localisation: relating to the table 1

Dose: in mL, quantity of product anesthetic injected to the animal. The kétamine 10% was used for catches 1 to 7, other animal were anesthetized with Telazol®

Sex: F=female, M=male, ad=adult, sub=subadulte

Weight: in kilogramme

Inter-orbit dist: in cm, distance inter-orbital between medial corner of eyes

Ear lg: in cm, measure vertical of height of auricle of the ear

Ear with hair lg: in cm, measure vertical from the basis of auricle of the ear to the extremity of ear tufts

Beard lg: in cm, measure vertical from the temporo-mandible to the extremity of the beard

Canine ht: in cm, measure of the midline of the canine from the maxillary gumline to the tip of the canine crown

Table 3b : Morphometric data of 27 intermediate individuals

Number	2nd PM ht	Muzzle lg	Head circ	Head lg	Body lg	Tail lg	Brac lg	Ante brac lg	Hand lg
1	0,40	4,40	22,00	No data	30,00	55,00	10,50	11,00	6,40
2	0,30	4,05	20,10	No data	24,60	47,10	6,20	8,15	5,60
3	0,40	3,95	21,20	No data	29,50	48,60	8,35	9,50	6,80
4	0,40	4,20	23,30	No data	2,60	54,20	9,00	11,60	7,10
5	0,50	4,50	22,00	No data	31,00	55,00	10,00	11,00	7,20
6	0,35	3,90	22,80	No data	31,60	54,20	9,70	11,00	7,20
7	0,50	3,90	25,10	No data	28,00	49,10	8,35	10,30	6,65
8	0,40	4,10	26,10	No data	31,30	47,20	9,45	10,50	6,60
9	0,40	3,95	23,80	No data	30,20	49,50	9,40	10,75	6,90
10	0,40	3,90	22,50	No data	28,70	49,80	9,25	10,40	6,80
11	0,55	3,80	21,90	No data	33,60	52,90	9,25	10,60	7,05
12	0,50	3,45	21,60	No data	29,80	57,30	9,55	10,70	7,10
13	0,45	3,40	23,80	No data	28,20	45,10	8,75	9,95	6,40
14	0,40	3,70	22,90	No data	31,20	55,40	9,75	10,25	6,55
15	0,45	3,70	23,10	No data	32,80	54,10	9,65	10,65	7,00
16	0,55	3,60	22,70	No data	28,50	49,50	9,50	10,10	6,70
17	0,35	3,55	21,60	No data	31,40	50,40	9,15	10,40	7,05
18	0,45	3,75	19,80	No data	29,60	52,90	9,25	10,65	7,20
19	0,50	4,10	22,80	No data	34,20	57,90	10,60	11,95	7,55
20	0,45	3,55	20,90	No data	29,80	40,80	9,70	11,55	7,70
21	0,50	3,45	21,00	10,00	26,20	51,50	9,40	10,20	6,85
22	0,40	3,90	23,20	10,45	32,20	53,80	9,85	11,05	7,55
23	0,40	3,20	22,90	10,20	31,60	49,30	9,40	11,70	7,15
24	0,40	3,65	21,20	9,20	27,80	51,50	8,90	10,30	7,20
25	0,40	3,70	24,40	10,30	29,10	49,90	9,90	10,80	7,60
26	0,50	4,10	23,80	10,20	29,60	58,30	9,70	11,40	7,10
27	0,50	3,70	21,60	9,80	34,70	58,65	10,00	11,25	7,60

2nd PM ht: in cm, measure from the midline of the second premolar from the mandibular gumline to the tip of the crown

Muzzle lg: in cm, measure from the glabella to the extremity distal of the muzzle

Head circ: in cm, circumference horizontal to the midpoint of the superior nuchal line

Head lg: in cm, measure from the extremity distal of the muzzle to the midpoint of the superior nuchal line

Body lg: in cm, measure from the midpoint of the superior nuchal line to the base of the tail at the junction with the perianal region

Tail lg: in cm, measure dorsally from the base of the tail to the distal tip of the last caudal vertebra with tail extended straight out behind the animal

Brac lg: in cm, measure laterally from the proximal tip of the greater tuberosity to the distal tip of the lateral humeral epicondyle

Ante brac lg: in cm, measure laterally from the olecranon process to the tip of the ulnar styloid process

Hand lg: in cm, measured palmarly at the midline the radio-carpal joint to the distal tip of the longest digit, excluding the nail

Tableau 3c : Morphometric data of 27 intermediate individuals

Number	Thumb lg	3rd finger lg	Waist circ	Thigh lg	Leg lg	Foot lg	Hallux lg	3rd toe lg
1	2,70	3,40	27,40	14,90	14,80	11,60	3,00	2,60
2	2,25	3,00	12,20	10,50	12,90	8,80	2,45	2,60
3	2,60	3,70	15,00	12,30	14,10	9,90	3,20	4,25
4	2,75	4,45	23,80	13,60	14,60	10,20	3,20	4,10
5	2,60	3,50	25,00	14,20	14,10	10,80	3,00	2,50
6	2,80	4,45	21,00	13,35	14,90	10,15	3,45	4,50
7	2,15	3,10	18,70	13,25	15,30	10,50	3,25	4,65
8	2,70	4,45	21,40	14,00	14,80	10,30	3,40	4,40
9	2,30	3,85	19,20	13,25	14,60	9,65	3,40	4,60
10	2,40	4,35	18,60	12,40	13,90	9,40	3,05	4,15
11	2,50	4,35	20,00	12,95	14,90	9,70	3,35	4,25
12	2,45	4,35	20,60	12,90	14,35	10,25	3,10	4,05
13	2,30	3,90	20,70	12,00	13,10	8,85	3,05	3,85
14	2,60	4,50	19,60	12,50	14,80	10,20	3,20	4,55
15	2,45	4,35	21,70	13,20	14,20	9,85	3,50	4,35
16	2,40	4,05	18,80	13,00	14,20	9,75	3,10	3,90
17	2,15	4,35	21,00	12,20	13,90	9,95	3,40	4,20
18	2,55	4,40	18,50	13,10	14,10	9,75	3,45	4,30
19	2,75	4,85	22,10	15,20	16,40	9,40	3,70	4,55
20	2,70	4,50	21,20	13,80	15,05	10,30	3,55	4,50
21	2,30	4,15	18,20	13,10	14,00	9,75	3,35	4,15
22	2,60	4,35	20,60	14,40	15,20	10,60	3,60	4,65
23	2,50	4,45	24,60	14,05	14,60	10,40	3,45	4,30
24	2,45	4,45	19,30	12,30	13,90	10,45	3,75	4,65
25	2,90	4,55	18,80	13,70	13,50	10,40	3,70	4,70
26	2,90	4,95	22,40	13,20	15,25	10,80	3,75	4,90
27	2,90	4,70	23,30	13,50	14,80	10,75	3,55	4,70

Thumb lg: in cm, measure palmarly from the first metacarpal–phalangeal joint to the distal tip of the thumb, excluding the nail

3rd finger lg: in cm, measure palmarly from the third metacarpal–phalangeal joint to the distal tip of the third digit, excluding the nail

Waist circ: in cm, waist circumference, measure passing on the last lumbar vertebra

Thigh lg: in cm, measure laterally with the knee at a 90° angle from the tip of the greater trochanter to the most distal point on the lateral femoral condyle

Leg lg: in cm, measure laterally from the proximal edge of the lateral tibial condyle to the lateral fibular malleolus

Foot lg: in cm, measure plantarly from the proximal tip of the heel to the distal tip of the longest digit, excluding the nail

Hallux lg: in cm, measure plantarly with the hallux from the first metatarsal–phalangeal joint to the distal tip of the toe, excluding the nail

3rd toe lg: in cm, measured plantarly from the third metatarsal–phalangeal joint to the distal tip of the third digit, excluding the nail

Table 4a : Morphometric data of 13 *Eulemur flavifrons*

Number	Localisation	Dose	Sex	Weight	Inter-orbit dist	Ear lg	Canine ht	2nd PM ht	Muzzle lg
28	Afady	0,25	M ad	1,525	2,40	2,90	0,90	0,40	3,60
29	Afady	0,25	M sub	1,375	2,35	3,20	0,60	0,35	3,15
30	Afady	0,25	M ad	1,850	2,70	2,85	1,10	0,50	3,20
31	Afady	0,25	F sub	1,125	2,20	3,05	0,45	0,40	3,00
32	Afady	0,25	M ad	1,625	2,60	3,25	1,15	0,50	3,85
33	Afady	0,25	M ad	2,025	2,70	3,20	1,40	0,55	3,70
34	Afady	0,25	F ad	1,975	2,50	2,95	1,10	0,45	3,75
35	Afady	0,25	M ad	1,750	2,80	3,20	1,20	0,55	3,30
36	Afady	0,25	F ad	1,925	2,50	3,25	1,00	0,50	3,60
37	Afady	0,25	M ad	1,825	2,55	2,80	1,20	0,40	3,90
38	Afady	0,25	M ad	1,750	2,55	3,00	0,90	0,35	3,15
39	Afady	0,50	F ad	2,225	2,45	3,35	1,00	0,45	3,45
40	Mang-Afady	0,25	M ad	2,025	2,45	3,20	1,20	0,45	3,50

Localisation: relating to the table 1

Dose: in mL, quantity of product anesthetic injected to the animal. The kétamine 10% was used for catches 1 to 7, other animal were anesthetized with Telazol®

Sex: F=female, M=male, ad=adult, sub=subadulte

Weight: in kilogramme

Inter-orbit dist: in cm, distance inter-orbital between medial corner of eyes

Canine ht: in cm, measure of the midline of the canine from the maxillary gumline to the tip of the canine crown

2nd PM ht: in cm, measure from the midline of the second premolar from the mandibular gumline to the tip of the crown

Muzzle lg: in cm, measure from the glabella to the extremity distal of the muzzle

Table 4b : Morphometric data of 13 *Eulemur flavifrons*

Number	Head circ	Head lg	Body lg	Tail lg	Brac lg	Ante brac lg	Hand lg	Thumb lg	3rd finger lg
28	19,40	9,80	29,20	48,90	9,15	10,20	6,55	2,30	4,00
29	18,55	9,70	28,80	47,60	9,40	10,30	6,80	2,90	3,95
30	22,10	10,40	28,30	51,20	9,70	11,10	7,25	2,70	4,40
31	17,85	9,20	26,90	43,20	8,15	9,45	6,20	2,30	3,80
32	21,60	9,75	30,10	51,80	9,60	11,10	7,25	2,70	4,40
33	23,20	10,30	32,90	50,60	10,00	11,55	7,35	2,45	4,50
34	22,60	10,40	33,60	54,80	10,15	11,55	7,05	2,40	4,15
35	22,80	10,10	30,60	47,90	9,40	10,55	6,80	2,70	4,25
36	20,80	9,60	31,80	50,60	9,45	11,20	7,35	2,65	4,30
37	22,50	10,50	32,30	49,80	9,30	10,60	7,20	2,70	4,35
38	22,40	10,40	28,30	39,20	9,80	10,80	6,90	2,65	4,25
39	21,60	10,10	35,20	52,30	9,50	10,95	7,50	2,70	4,50
40	19,90	10,20	32,40	52,90	10,00	11,10	6,90	2,70	3,85

Head circ: in cm, circumference horizontal to the midpoint of the superior nuchal line

Head lg: in cm, measure from the extremity distal of the muzzle to the midpoint of the superior nuchal line

Body lg: in cm, measure from the midpoint of the superior nuchal line to the base of the tail at the junction with the perianal region

Tail lg: in cm, measure dorsally from the base of the tail to the distal tip of the last caudal vertebra with tail extended straight out behind the animal

Brac lg: in cm, measure laterally from the proximal tip of the greater tuberosity to the distal tip of the lateral humeral epicondyle

Ante brac lg: in cm, measure laterally from the olecranon process to the tip of the ulnar styloid process

Hand lg: in cm, measured palmarly at the midline the radio-carpal joint to the distal tip of the longest digit, excluding the nail

Thumb lg: in cm, measure palmarly from the first metacarpal–phalangeal joint to the distal tip of the thumb, excluding the nail

3rd finger lg: in cm, measure palmarly from the third metacarpal–phalangeal joint to the distal tip of the third digit, excluding the nail

Table 4c : Morphometric data of 13 *Eulemur flavifrons*

Number	Waist circ	Thigh lg	Leg lg	Foot lg	Hallux lg	3rd toe lg
28	18,60	12,80	13,80	9,70	3,35	3,90
29	17,90	13,30	14,10	10,00	3,30	4,10
30	20,40	13,70	14,50	10,10	3,70	4,10
31	17,50	12,45	13,40	9,20	3,10	3,80
32	18,60	13,55	14,00	9,90	3,30	4,35
33	18,60	14,30	15,10	10,55	3,70	4,60
34	22,60	13,70	15,25	10,25	3,45	4,15
35	23,50	13,45	14,10	8,90	3,60	4,35
36	22,90	14,20	14,95	10,30	3,50	4,15
37	20,40	13,10	14,40	10,10	3,40	4,60
38	19,10	13,90	14,55	10,60	3,45	4,20
39	23,15	13,60	15,00	10,25	3,65	4,50
40	20,00	13,90	14,90	10,15	3,50	4,25

Waist circ: in cm, waist circumference, measure passing on the last lumbar vertebra

Thigh lg: in cm, measure laterally with the knee at a 90° angle from the tip of the greater trochanter to the most distal point on the lateral femoral condyle

Leg lg: in cm, measure laterally from the proximal edge of the lateral tibial condyle to the lateral fibular malleolus

Foot lg: in cm, measure plantarly from the proximal tip of the heel to the distal tip of the longest digit, excluding the nail

Hallux lg: in cm, measure plantarly with the hallux from the first metatarsal–phalangeal joint to the distal tip of the toe, excluding the nail

3rd toe lg: in cm, measured plantarly from the third metatarsal–phalangeal joint to the distal tip of the third digit, excluding the nail

Table 5 : Average and standard deviation of morphometric data of 27 intermediate individuals

	Average	Standard deviation
Weight	1,82	0,49
Inter-orbit dist	2,52	0,21
Ear lg	3,37	0,28
Ear with hair lg	7,38	0,98
Beard lg	4,17	0,79
Canine ht	0,87	0,15
2nd PM ht	0,44	0,06
Muzzle lg	3,82	0,3
Head circ	22,52	1,45
Head lg	10,02	0,42
Body lg	29,18	5,79
Tail lg	51,81	4,24
Brac lg	9,35	0,82
Ante brac lg	10,66	0,76
Hand lg	6,99	0,46
Thumb lg	2,54	0,22
3rd finger lg	4,2	0,49
Waist circ	20,51	3,03
Thigh lg	13,22	0,97
Leg lg	14,45	0,73
Foot lg	10,09	0,61
Hallux lg	3,33	0,29
3rd toe lg	4,18	0,64

Table 6 : Average and standard deviation of morphometric data of 13 *Eulemur flavifrons*

	Average	Standard deviation
Weight	1,77	0,3
Inter-orbit dist	2,52	0,16
Ear lg	3,09	0,18
Canine ht	1,02	0,26
2nd PM ht	0,45	0,07
Muzzle lg	3,47	0,29
Head circ	21,18	1,73
Head lg	10,03	0,39
Body lg	30,8	2,45
Tail lg	49,29	4,18
Brac lg	9,51	0,51
Ante brac lg	10,8	0,59
Hand lg	7,01	0,37
Thumb lg	2,6	0,18
3rd finger lg	4,21	0,24
Waist circ	20,25	2,13
Thigh lg	13,53	0,53
Leg lg	14,47	0,56
Foot lg	10	0,49
Hallux lg	3,46	0,18
3rd toe lg	4,23	0,24

Picture 1 : Intermediate female, dorsal view

Picture 2 : Intermediate female, portrait, face view

Picture 3 : Intermediate male, dorsal view

Picture 4 : Intermediate male, portrait, face view

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