

BERENTY RESEARCH PROJECTS 2006, WITH MANAGEMENT RECOMMENDATIONS

PUBLICATIONS

BOOK: RINGTAILED LEMUR BIOLOGY, *LEMUR CATT*A IN MADAGASCAR, New York, A. Jolly, R.W. Sussman, N. Koyama, and H. Rasamimanana, eds. Springer, 2006. 12 of 20 articles based on research at Berenty.

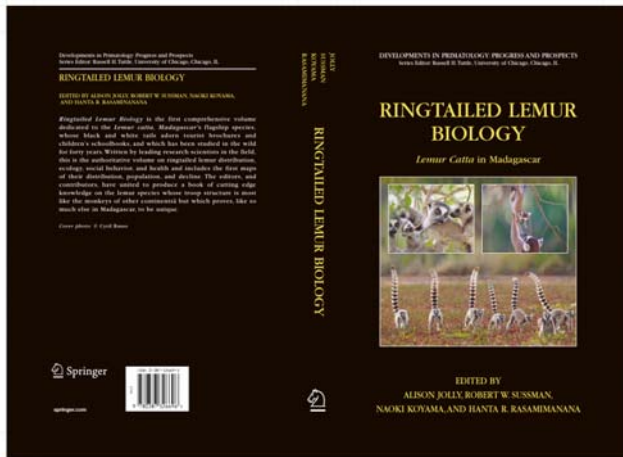
PRESENTATIONS at the International Congress of Primatology, Entebbe, Uganda by Hanta RASAMIMANA, by Haja RAMBELOARIVONY and by Graham CRAWFORD

ARTICLES:

Ichino, S. 2006 Troop fission in wild ring-tailed lemurs (*Lemur catta*) at Berenty, Madagascar. Amer. J. Primatol. 168: 97-102.

WEB SITE Created by Chris Klimowicz, Dep't Psychology, Winchester University.

<http://www.winchester.ac.uk/?page=5969>



12 of 20 articles based on Berenty Research



Haja presents leucaena study, IPS, Entebbe, Uganda

FOREST DYNAMICS

BLUMENFELD-JONES, Kathryn. School of Human Evolution and Social Change, Arizona State University, Tempe, AZ 85281, USA

Recensus of tree samples established in 1972, 1998, and 2000. Approximately 400 trees on trails and 50 in sample plots in the forest interior. DBH, assessment of general tree condition and health, canopy continuity on 4 sides of each tree, and canopy maintenance or opening. Calculation of growth rates, maximum size, size classes of trees which die. New trees which reached 10 cm DBH added to sample, to analyse replacement of species and in different regions. Preliminary result: most death is in the largest trees of all species, so probably due to senescence, aside from 1999 storm damage.

Supported in part by a grant from the National Geographic Society Research and Exploration Committee.

Action: Establish permanent numbering system to aid other scientists and managers.



Kathryn, Haja et Anne with marked young tamarinds.

BLUMENFELD-JONES, Kathryn.
School of Human Evolution and Social
Change, Arizona State University,
Tempe, AZ 85281, USA (October)

Census of tamarind seedlings and
saplings along trails. There were many
in 2000 and 2004. In 2006 seedlings are
absent. No young tamarinds of 2 m
height added to the sample. Young trees
are vulnerable to drought below 5 cm
DBH but above that the can resist
drought.

Supported in part by the National
Geographic Society Research and
Exploration Committee.

ACTION: Plant young tamarinds in
partially shaded spots, preferably under
Neotina or *Pithecelobium*, NOT
UNDER TAMARINDS. In a low
rainfall year, water young tamarinds.

MERTL-MILLHOLLEN, A., Department of Anthropology, University of Oregon,
Eugene, OR 97401, USA. (October)

RASAMIMANANA, H. Department de la Formation Initiale Scientifique, et
Département de la Formation des Encadreurs de l'Éducation, École Normale Supérieure,
BP 881, Antananarivo 101, Madagascar.

STUDENTS: RAHARISON, Sahoby, TSARAMANANA, Donald.

Dispersion and regeneration of tamarind seeds. Location of seeds defecated by
ringtails, whether under tamarinds, other trees, or in open areas. Location of forest areas
with young tamarinds of 10 cm or more. Follow-up of their growth and survival.
Germination experiments of seeds from faeces, from food trees, and from non-utilized
tamarinds.

Supported in part by a grant from the National Geographic Society Research and
Exploration Committee, and by Wildlife Trust's Malagasy Students' Field Work Fund.

ACTION: Forest Manager to consult with students on the best conditions for
reforestation. Students to follow young kilys, both planted and naturally disseminated.



Donald marking a young tamarind



Sahoby with germination trials

RASAMIMANANA, H. École Normale Supérieure, Antananarivo 101, Madagascar.
 BLUMENFELD-JONES, Kathryn. School of Human Evolution and Social Change,
 Arizona State University, Tempe, AZ 85281, USA

Recensus of trees damaged in the tornado of October 2nd, 1999. Tree sample originally established in October 1998, before the storm. Initial recensus of damage, Dec. 1999, published in Lemur News 2000. Present census preliminary results: *Acacia* and tamarinds regrow in the canopy. However some damaged *Neotina* and *Celtis bifida* have died. Therefore the forest has become more open, which permits invasive species like *Cissus quadrangularis* to grow instead.

Supported in part by the National Geographic Society Research and Exploration Committee.

ACTION: Remove young sisal and cissus as quickly as possible. Replace them with appropriate forest species.

SIMMEN, Bruno, HLADIK, A., GENIN, F.

Muséum National d'Histoire Naturelle et CNRS, Brunoy, France.

RASAMIMANANA, H., École Normale Supérieure (ENS), Antananarivo 101, Madagascar.

Étudiants: CHARRIER, Alexandre (Université Paris XIII), RABESON, Eden (ENS), RAKOTOMAMONJY, Andrianantoanina (ENS).

Identification, abundance and phenology of the plant species of the spiny forest (with >1000 tagged plants above 70cm height and additional census). Phenology from December 2005 to April 2006 on 479 individual plants.

Supported by BQR (Muséum National d'Histoire Naturelle).

SOMA, Takayo. Center for African Area Studies, Kyoto University, Kyoto, Japan.

Tamarind fruit abundance: census repeated each birth season since 2000. Over 400 trees censused two times each month. Some trees consistently give more fruit than others, year after year.

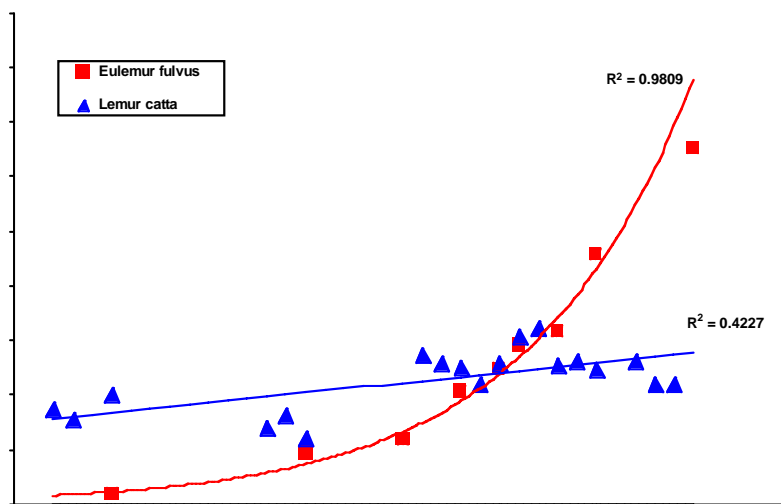
Supported in part by Oxford Scientific Films.

LEMUR POPULATION AND DEMOGRAPHY

JOLLY, Alison. Dept of Ecology and Environmental Science, University of Sussex, Brighton, UK

Annual census of groups and individuals of ringtailed lemurs in four forest regions: Ankoba, Tourist Front, Gallery, and Scrub/Spiny Forest, while distinguishing between groups with and without *Leucaena*. Preliminary result: there seems to be a lack of juveniles in gallery forest troops in comparison with any other area. Does this reflect the exponential growth of *E. fulvus*, and the direct competition between *E. fulvus* and *L. catta* in gallery forest?

ACTION: Urgent studies of *E. fulvus* population and effect on the habitat. Stop providing water points, a limiting resource for *E. fulvus*, which apparently allows their continuing expansion into dryer habitat.



Growth of E. fulvus and L. catta populations in Berenty natural forest (Gallery and Scrub) Susan PINKUS, John WALKER & Josia RAZAFINDRAMANANA, 2005

SOMA T. Center for African Area Studies, Kyoto University, Kyoto, Japan

ICHINO, S. Graduate School of Science, Kyoto University, Kyoto, Japan

Full record of births, mortality, immigration/emigration, troop fission and dominance hierarchies in seven groups in the south of Ankoba. Study begun in 1989 by Prof. N. KOYAMA. This population has grown from 63 to 115 animals since 1989. the growth reflects the influence of introduced trees: *Leucaena*, neem, and eucalyptus, as well as tourism. The high rate of evictions during September may result from high population density, as well as the frequency of inter-group confrontations.

Supported by the Japanese Society for the Promotion of Science.

ACTION: Eradicate *Leucaena* in the café area, but no other action except continuation of this important long-term data base.

ICHINO, Shinichiro. Graduate School of Science, Kyoto University, Kyoto, Japan
SOMA, Takayo. Center for African Area Studies, Kyoto University, Kyoto, Japan
SATO, Hiroki. Graduate School of Science, Kyoto University, Kyoto, Japan
TANAKA, Chiriko. Coopération Japonaise: Park Botanique et Zoologique de
Tsimbazaza, Antananarivo 101 Madagascar.

Analysis of paternity in a population of *L. catta* studied since 1989 by Professor N. KOYAMA and students. Maternal genealogies of this population are known in detail, as well as immigration and emigration of males. This year 80 animals were captured, with physical examination and buccal, blood and faecal samples taken, for DNA analysis. No animal was harmed during capture.

Supported by the Japanese Society for the Promotion of Science.

NORSCIA, Ivan (PhD). Museo di Storia Naturale e del Territorio, Università di Pisa, Italia.

PALAGI, Elisabetta (PhD, curator vertebrate section). Museo di Storia Naturale e del Territorio, Università di Pisa, Italia.

ANTONACCI, Daniela (Student). Università di Pisa, Italia.

KABURU, Stefano (Student). Università di Firenze, Italia.

Projects: S.M.E.L.L. (Scent Marking Eco-ethology in Lemur Language) and L.E.A.V.E.S (Lemur Eco-ethology Applied to Viability And Ex Situ).

Census of the population of *Propithecus verreauxi* in Ankoba and Malaza

Supported by Giardino Zoologico di Pistoia, Parco Zoo di Falconara e Parco Punta Verde Lignano Sabbiadoro (Italia).

RAZAFINDRAMANANA, Josia (student), ESSA, Université d'Antananarivo with RAHARISON, Sahoby, TSARAMANANA, Donald, RAKOTOMALALA, Nirina, and RAZAFIMAHATRATRA, Aingafaniry ENS, Université d'Antananarivo
Census of the population of *Eulemur fulvus* in Ankoba and Malaza.

Supported by the Tropical Biology Association.

LEMUR NUTRITION, METABOLISM, AND FOREST USE.

MERTL-MILLHOLLEN, A., Department of Anthropology, University of Oregon, Eugene, OR 97401, USA.

RASAMIMANANA, H. Department de la Formation Initiale Scientifique, et Département de la Formation des Encadreurs de l'Éducation, École Normale Supérieure, BP 881, Antananarivo 101, Madagascar.

STUDENTS: RAHARISON, Sahoby, TSARAMANANA, Donald.

Nutrition, ranging and territoriality in two groups of ringtails in gallery forest: DIA, which has been studied since 1975, and Peg Ear, in an area of tamarind regeneration near the Cattle Drove. All tamarinds in their home ranges mapped, whether or not fed on by the lemurs, with GPS position, DBH, canopy diameter, and fruit abundance. Ten full-day follows per troop, noting trees used, and thus the relation of

territorial defence to available resources. Fruit and leaf samples of individual trees will be analysed for protein, sugar, and fibre.

Supported in part by the National Geographic Society Research and Exploration Committee, and by Wildlife Trust's Malagasy Student Field Work Fund.

SIMMEN, Bruno, PASQUET, P, BAYART, F., HLADIK, C.M., GENIN, F.
Muséum National d'Histoire Naturelle et CNRS, Brunoy, France.

RASAMIMANANA, H., Department de la Formation Initiale Scientifique, et
Département de la Formation des Encadreurs de l'Éducation, École Normale Supérieure
(ENS), BP 881, Antananarivo 101, Madagascar. RATOSONIRINA Parc Botanique et
Zoologique de Tsimbazaza, Antananarivo 101, Madagascar.

STUDENTS: CHARRIER, Alexandre (Université Paris XIII), RABESON, Eden, (ENS),
RAKOTOMAMONJY, Andrianantoanina (ENS).

General title: Lemur feeding ecology, energetic and forest dynamics.

Use of plant species, gum, and insects by *Microcebus griseorufus* in spiny forest. Mouse lemurs were trapped and equipped with radio-collars. Focal animals were followed and their ranging and associative patterns were monitored. The study was conducted from December 2005 to March 2006.

Feeding strategy of *Propithecus verreauxi* in spiny forest including male and female differences in food intake from dawn to dusk from December 2005 to April 2006. 2 focal contiguous groups were studied and opportunistic observations were made on additional groups. Plant samples were collected to be analyzed for secondary metabolite contents and nutritional properties of diet. The chemistry of plants selected as foods will be contrasted with uneaten plants and a representative sample of plants available according to our results on forest composition, plant relative abundance and phenology (as measured from >1000 individuals from various plots).

Energy output of male and female *Lemur catta* and *Eulemur fulvus rufus* x *collaris* in gallery forest in March by means of doubly-labelled water. Ring-tailed lemurs: Troops D1A (studied since 1963) and G3 (studied since 1987), and in secondary forest (Naturaliste troop). Brown lemurs: sympatric groups. The study was carried out to assess possible relationships between daily energy output and social status and gender. Some animals were equipped with a radio-collar so that they (or their group) could be rapidly located according to the experimental design. Blood samples are currently being analyzed to evaluate isotopic variation.

Supported by BQR (Muséum National d'Histoire Naturelle).

NORSCIA, Ivan (PhD). and PALAGI, Elisabetta (PhD, curator vertebrate section).
Museo di Storia Naturale e del Territorio, Università di Pisa, Italia.

ANTONACCI, Daniela (Student). Università di Pisa, Italia.

KABURU, Stefano (Student). Università di Firenze, Italia.

Projects: S.M.E.L.L. (Scent Marking Eco-ethology in Lemur Language) and
L.E.A.V.E.S (Lemur Eco-ethology Applied to Viability And Ex Situ).

Feeding eco-ethology and ranging behavior of two groups of *Propithecus verreauxi* with overlapping home ranges.

Supported by Giardino Zoologico di Pistoia, Parco Zoo di Falconara e Parco
Punta Verde Lignano Sabbiadoro (Italia).



Ainga takes feeding data in spiny forest

GOULD, Lisa, Dept of Anthropology,
University of Victoria, Victoria BC
V8W 3P5, Canada (August-October)

STUDENTS: Nick ELLWANGER
Aingafaniry RAZAFIMAHATRATRA
ASSIS'T: Haja RAMBELOARIVONY

Nutritional ecology of *L. catta* in
spiny and transitional forest. Two
groups followed for 7 weeks during the
birth season. Data on each food item,
including number of bites taken and
feeding time. Samples of each food item
taken. Wet and dry weights compared,
and they will be analyzed for protein,
calcium, phosphorous, condensed
tannins, and fibre. All results will be
keyed to consumption by individual
animals.

Supported by the Canadian
Scientific Research Council.

LEMUR PSYCHOLOGY

DOLINS, Francine. Dept. of Psychology, Winchester University, Winchester, UK.
Student: RAZOLYHARISOA, Voahirana (Zoly)

Decision making in ranging behavior of a group of *L. catta* and a group of *P. verreauxi*. Where and when does a lemur troop move? Which individuals make the decisions, and are these the same ones which take the lead during movement? Do they have a "map" in their heads, or simply preferred routes between landmarks?

Supported by Winchester University Research Fund.

MERTL-MILLHOLLEN, A., Department of Anthropology, University of Oregon,
Eugene, OR 97401, USA. (October)

Do ringtailed lemur feces communicate territoriality? Experiments with drinking water in pots with or without feces of distant groups placed beside the pots. No effect: ringtails do not communicate by faecal odor.

Genital and wrist marking does, however, convey territoriality. Repeat study of scent marking by Troop D1A, using the same methods and location as a prior study of this troop in 1975.

Supported in part by the National Geographic Society Research and Exploration Committee.

CUSTANCE, Deborah. Dept. Psychology Goldsmith's College, London SE14 6NW, UK
Student: RAKOTOMALALA, Nirina. ENS

Social learning in *L. catta* and *E. fulvus*. Troops of each species are presented with puzzle boxes. Each box may be opened by two different methods. The first group of ringtails all preferred to open boxes by flipping up the cover. For a second group, the flipping mechanism is locked, so the first animals to learn must use the method of swivelling the lid. When a few "demonstrator" individuals learn this method, do "observers" who have a choice of method then follow the example of their troop-mates? Comparison with brown lemurs elucidates the influence of two very different social structures on possibilities for social learning.

Supported by the British Academy.



*If a puzzle can be opened in two different ways, do you follow the example of others?
Nirina films puzzled lemurs*

PALAGI, Elisabetta (PhD, curator vertebrate section). Museo di Storia Naturale e del Territorio, Università di Pisa, Italia.

NORSCIA, Ivan (PhD). Museo di Storia Naturale e del Territorio, Università di Pisa.

ANTONACCI, Daniela (Student). Università di Pisa, Italia.

KABURU, Stefano (Student). Università di Firenze, Italia.

Projects S.M.E.L.L. (Scent Marking Eco-ethology in Lemur Language) and L.E.A.V.E.S. (Lemur Eco-Ethology Implied to Viability Ex Situ).

1) Social dynamics of *Lemur catta* and *Propithecus verreauxi*: investigation of reconciliation mechanisms and of the presence and function of play behaviour.

2) Odor communication in *Lemur catta* and *Propithecus verreauxi*: investigation of scent marking, particularly the use of urine in olfactory communication.

Supported by Giardino Zoologico di Pistoia, Parco Zoo di Falconara, e Parco Puntaverde Lignano Sabbiadoro (Italia).

ELLWANGER, Nick. (Student). Dept of Anthropology, University of Victoria, Canada.

Social structure of *L. catta* in Ankoba secondary forest and in spiny forest.

Supported by the Canadian Scientific Research Council

BROSTER, Mary. (Student). Roehampton University, Roehampton, UK.

Measures of personality in *L. catta*.

LANE, Lisa. (Student). Dept of Psychology, Portsmouth University, Portsmouth UK.
Attention Structure in *L. catta*.
Supported by the British Academy

RAZAFIMAHATRATRA, Aingafaniry. (Student) ENS
Predator-sensitive foraging in *L. catta*, in secondary forest and spiny forest.
Supported by Canadian Scientific Research Council.

TOURIST INTERACTIONS

SINCLAIR, Felicia. (student). Dep't of Psychology, Winchester University, UK.
Interactions between tourists and Café Troop (YF).
Supported by Winchester University Research Grant.

EDUCATION

RASAMIMANANA, H. École Normale Supérieure, Antananarivo 101, Madagascar.
CLARKE, Helen. Department of Education, Winchester University, Winchester, UK.
DOLINS, Francine, Department of Psychology, Winchester University, Winchester, UK.
STUDENT: RAZOLYHARISOA, Voahirana (Zoly). ENS, Antananarivo.

Pilot negotiations on collaboration in conservation education between the Ecole Normale Supérieure and Winchester University. Pilot workshop in Berenty School.



VETERINARY STUDIES AND *LEUCAENA* EFFECTS

CRAWFORD, G. Wildlife Health Watch, Sonoma, CA 95476, USA.
OSTAPAK, S, Veterinary Dept, San Francisco Zoo, San Francisco CA 94132, USA.
BAKER, T., University of California, School of Veterinary Medicine, Davis, CA, USA.
DAVIDSON, A., Univ. of California School of Veterinary Medicine, Davis, CA, USA.

Investigation of toxic effects of *Leucaena leucocephala* in *L. catta*. 20 controls not exposed to leucaena compared to 30 known to have been exposed and which showed different degrees of alopecia. Complete physical examination with weight, body condition, fur condition, and samples taken of blood, fur, skin, feces and ectoparasites.

Abdominal examination by ultrasound of 40 individuals to measure internal organs, anatomy, and pathology. Liver biopsies taken.

Samples will be evaluated for pathology and histopathology, compared with levels of mimosine, the toxic agent of leucaena.

Funded in part by the National Geographic Society Research and Exploration Committee, by Fort Dodge Animal Health Company and by Victor Medical Supplies.

ACTION: Continue and if possible finish the eradication of leucaena in all areas near the café . Consult with forest manager about the north point of Ankoba, where ringtails lack most other forage.

JOLLY, A. Dept of Ecology and Evolutionary Biology, Univ. of Sussex, Brighton, UK.

Fur condition census of *L. catta* in all forest areas. Preliminary results: quite extensive fur loss in scrub and spiny forest, following the heavy rains and fruit failure of 2005, and the very dry year of 2005-06. Gallery forest ringtails mostly with good fur. Leucaena areas by far the worst, especially with thin or bare tails, a condition not seen in natural forest. Fur condition may turn out to involve time-lags, with growth of tail and body fur only partially correlated. The 2005 campaign to remove leucaena near the café has had little effect, since the ringtails ate heavily from regrowth and from the remaining large trees.

ACTION: Repeat the eradication of leucaena near the café.

RAMBELOARIVONY, Haja, ENS, Antananarivo, Madagascar

ANDRIANOME, Vonjy, ENS, Antananarivo, Madagascar

BERG, Wiebke, University of Hamburg, Germany.

Feeding study of 20 females in 4 *L. catta* groups in Ankoba. 2005 results presented at IPS Uganda: alopecia correlates with leucaena consumption, though with individual variation. Total nutrition, tamarind consumption, social dominance, and reproduction do not correlate with fur loss. Wiebke continues the study through the year.

Supported in part by St. Louis Zoological Society.

CRAWFORD, G. Wildlife Health Watch, Sonoma, CA 95476, USA.

OSTAPAK, S, Veterinary Dept, San Francisco Zoo, San Francisco CA 94132, USA.

Probable cause of unilateral eye disease in one *L. catta* is corneal puncture: trauma from bite or thorn scratch.



*Graham Crawford helps Sato, Tanaka, and Ichino with a capture for DNA analysis.
Creative provision of electricity for veterinary work on Sunday.*



*Susan, Nick, Tom, Autumn, Graham and Wiebke during medical analysis by ultrasound.
The veterinarians bring expertise gained with pandas in China, cheetahs in Namibia, in
Madagascar at Betampona and Berenty, and in US Zoos.*



International collaboration. Haja et Wiebke take blood samples for mimosine analysis. Ichino, Soma, et Sato care for ringtails post-procedure, Animals must be kept warm, and their condition monitored. No animal was harmed.



We hope the result will be a healthy population with splendid tails

TELEVISION



*Takayo Soma, Gail Jenkinson and
Martin Hayward Smith on set.*

OXFORD SCIENTIFIC FILMS will show a ringtail “soap opera” on two ultra-popular channels: ITV’s Channel 5 in the UK and Discovery-Animal Planet in the USA. A first effect will be that some 2 million people will see Berenty ringtails during each week of projection. To judge the eventual benefit for tourism in Madagascar, one may estimate that advertisers pay hundreds of thousands of dollars per *minute* of advertising during these programs, while Madagascar gains 10 half-hours of exposure.

The film crews work closely with scientists. They have chosen to follow two of the lemur troops studied since 1989 by Professor N. Koyama and his students, including S. Ichino and T. Soma. All the lemurs’ individual histories are already known. Takayo Soma is the scientific advisor in the field. Alison Jolly will view edited films to check that even if the stories become somewhat fictionalized, they remain faithful to the behaviour of ringtails. But obviously, the greatest thanks are due to the confidence of Berenty ringtails in the face of all our human eccentricities....



Pegleg (Tripod) of the Graveyard Gang waits for his cue.