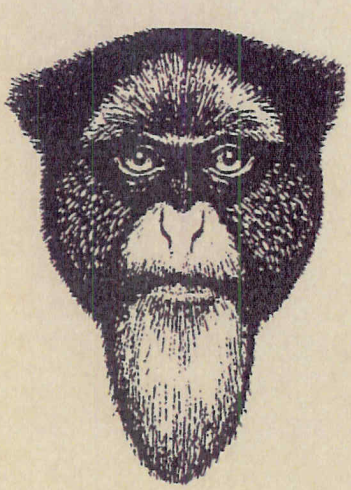

AFRICAN PRIMATES

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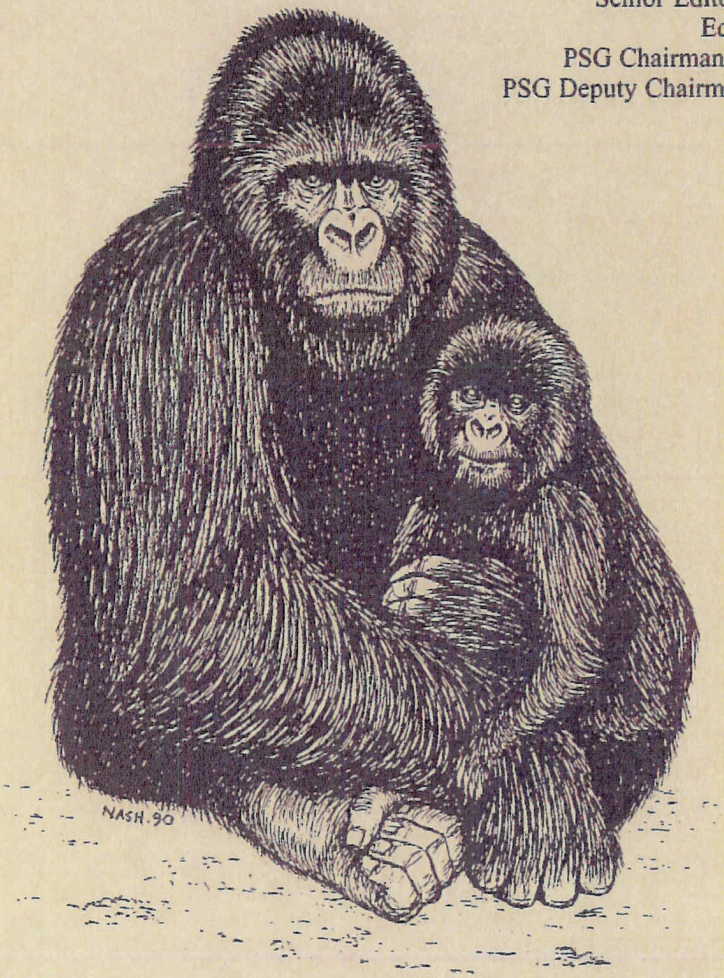
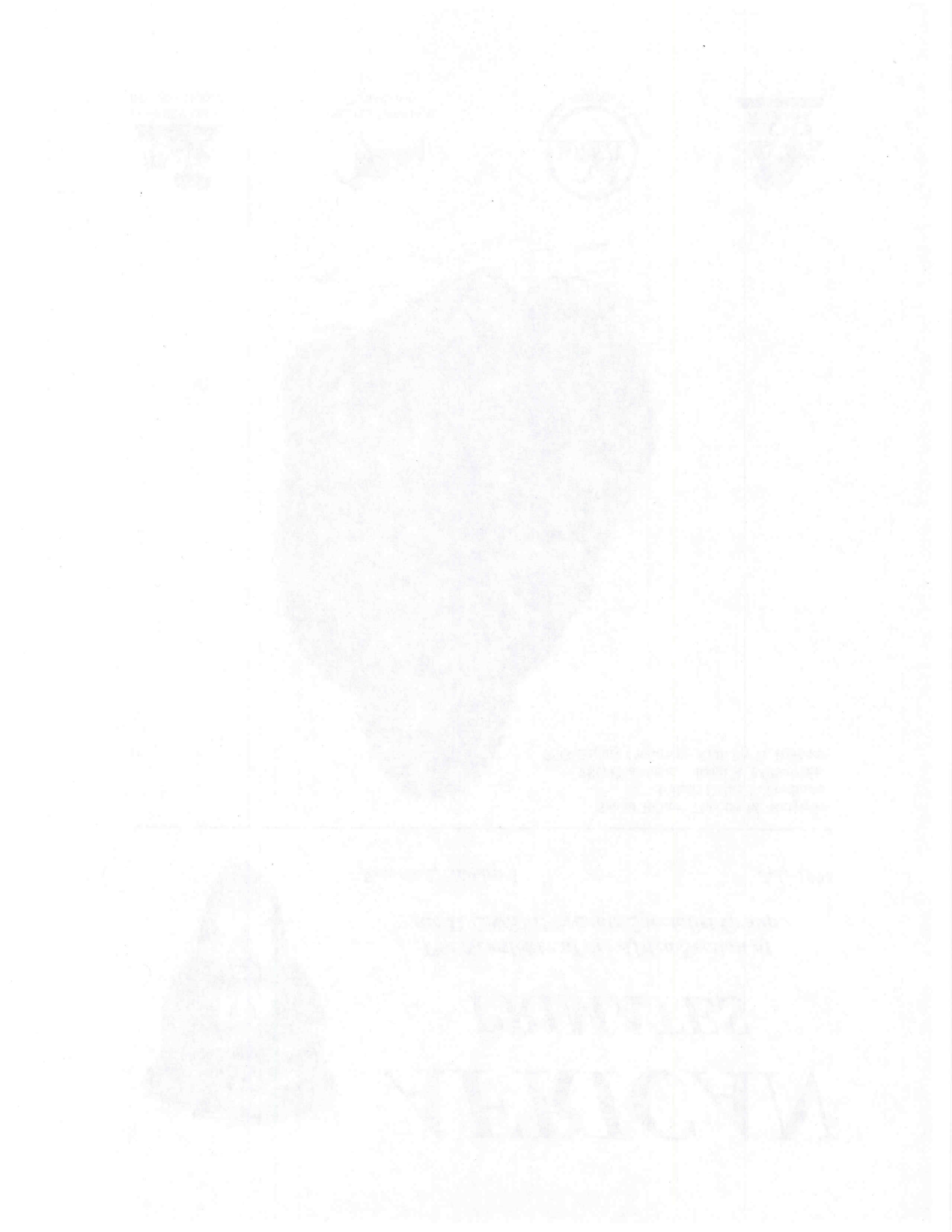


CONSERVATION INTERNATIONAL

SPECIES SURVIVAL COMMISION

NATIONAL MUSEUMS OF KENYA

ZOO ATLANTA



EDITORIAL

LETTER FROM THE EDITOR

I organised a symposium for the IPS/ASP meetings this August, and would like to condense my remarks to that forum here. The symposium, "Primate Research *In*-and *Ex-Situ*: Making the Connection," brought together a handful of people who have studied primates both in captivity and in nature. The purpose of the symposium was to encourage the development of research programs in more than one setting, thereby giving students broader training, and promoting collaborative studies of the same species or problem in different arenas. Each of the symposium participants illustrated these approaches: 1) Rob Horwich, of Community Conservation Consultants, spoke on "Primate Conservation: a Field/Captive Synthesis"; 2) Joe Erwin, of Diagnon Corporation, talked about "Coordination of Career Commitments to Primate Conservation and Care"; 3) Kathy Rasmussen, from the National Institutes of Health Laboratory of Comparative Ethology, addressed "Laboratory and Field Studies of Nonhuman Primates: Complementary Approaches to Understanding a Species' Adaptive Range"; 4) Sam Wasser from the Center for Wildlife Conservation, Woodland Park Zoo and the University of Washington, explained "The Application of Non-invasive Faecal Hormone and DNA Analyses to Wildlife Conservation"; and 5) Don Lindburg, of the Zoological Society of San Diego's Center for the Reproduction of Endangered Species, described "Experimental Reintroductions as a Conservation Strategy".

We discussed our work on both sides of the invisible barrier that sometimes polarises primatologists into members of the "field conservation" and "captive conservation" camps. Each speaker showed how connections between work in the field and in man-made environments can increase the effectiveness of research and conservation programs. When we integrate our understanding of how a species "is" in nature and how it "can be" in human-altered environments, we will improve our ability to make informed decisions and find creative solutions to the conservation problems, such as humane wildlife management, which face us now and will continue to face us well into the next century. In a future issue of "African Primates", I plan to discuss this subject more in an article on applied conditioned taste aversion.

Beyond data, however, we need dialogue, particularly given the diversity of our profession. For example, in the industrialised world, while some advocate rights for great apes, others are dismayed that their laboratory research makes them vulnerable to litigation and, in some cases, vandalism. Meanwhile, far outnumbering these are the millions in the developing world who do not enjoy our level of socio-economic buffering from the environment, and often view animals as meat, and forest as firewood or foreign exchange.

How do we promote conservation between such disparate views of reality? The best way I know is to have some personal understanding of each. This reduces identification with a single perspective. It should also demonstrate the fallacy that environmental conservation and misanthropy are compatible. Unless we attend to the needs of those who have inherited most of the remaining biodiversity on this planet—the citizens of the developing world—wildlife conservation will fail.

Those who control financial and animal resources are encouraging us to adopt a different conservation ethic, specifically one that favours 1) collaborative proposals, 2) project initiation by scientists in the species' range country, 3) education of in-country scientists, and their assumption of projects within a finite period of time, and 4) programs tailored to the socio-economic and political conditions of the region. These guidelines, which discourage solitary, unidimensional research, in my view, are a step forward.

In one of the talks during the Congress, conservation was defined as the combined tasks of education, management and protection. Some of the tools listed for accomplishing these three tasks were coordination, education and communication. At some point, those three tools are reduced to communication. I think this newsletter and its counterparts are excellent vehicles towards improved communication.

Debra L. Forthman

ARTICLES

LE COMMERCE DE LA VIANDE DE CHASSE AU SUD-EST DU CAMEROUN DANS LA REGION TRINATIONALE

Abstract: *Since the early 1990s, the development of a trinational protected area in southeastern Cameroon, north eastern Congo and southwestern Central African Republic has made good progress. These 5,000 km² of forest are threatened primarily by commercial logging, mining, commercial safari hunting, poaching and subsistence use by local communities. Commercial logging has led to the most extensive destruction, both directly and*

indirectly. Especially along the roads, illegal and commercial hunting is having disastrous effects. Most hunting is done by snares. Primary targets are duikers, antelope, porcupines, red forest hog and monkeys. The Wildlife Conservation Society is conducting research in the Lobéké, Cameroon, area and is initiating and developing programmes of community involvement in conservation.

Les grandes forêts tropicales humides qui recouvrent le sud-est du Cameroun, le nord-est du Congo et le sud-ouest de la RCA possèdent une richesse biologique extraordinaire, surtout en ce qui concerne les grands mammifères. Au début des années 90, la Wildlife Conservation Society (WCS) et le Worldwide Fund for Nature (WWF) ont proposé la mise en place dans cette zone d'un projet de conservation trinational. Suite à cette initiative, le gouvernement de la RCA a créé la Réserve de Dzanga-Sangha/Parc National de Dzanga-Ndoki en 1990; le gouvernement Congolais de son côté a créé le Parc National Nouabalé-Ndoki in 1993, et très récemment la Réserve de Lobéké a été provisoirement délimitée par le Cameroun (Fig. 1). Tous ces efforts ont permis de réunir près de 5,000 km^2 de forêts protégées dans l'écosystème trinational. En outre, 5,000 km^2 autour de ces réserves ont été réservés dans le souci de laisser en place les ressources de base pour une exploitation soutenable tout en protégeant la diversité biologique de la zone.

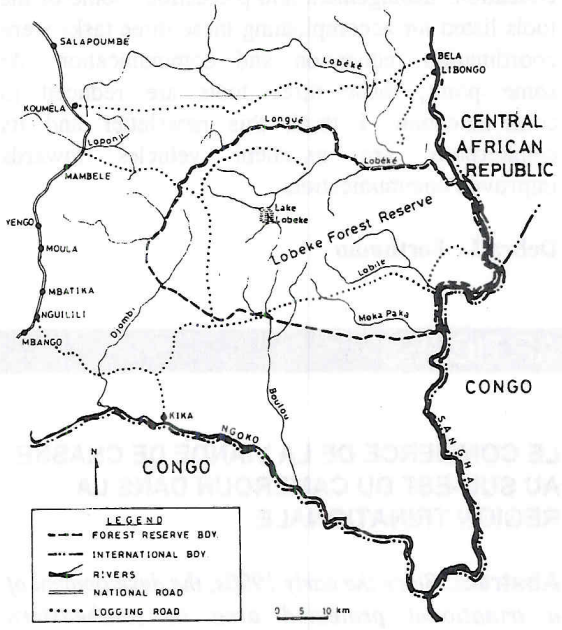


Figure 1. Carte de la Reserve de Lobéké, Cameroon.

Les forêts de la région trinationale ne font pas seulement l'objet d'initiatives de conservation, mais subissent aussi des pressions du fait de l'exploitation forestière et minière, de la chasse safari, du braconnage, de la capture d'animaux vivants (particulièrement les chimpanzés, les gorilles et les perroquets gris), et des besoins économiques et de subsistance des communautés locales. Les activités des entreprises forestières dans la région ont une grande importance pour plusieurs raisons:

- Ces entreprises favorisent souvent l'immigration des familles en quête d'emploi, ce qui augmente la pression sur les ressources forestières;
- La plupart de ces gens, souvent sans aucune sécurité d'emploi, restent dans la région et se prêtent aux activités illégales telles que le braconnage;
- De nouvelles routes et pistes de débardage sont ouvertes à la recherche des essences exploitables, facilitant ainsi l'accès à des zones préalablement inaccessibles;
- Les employés des entreprises forestières participent eux-mêmes aux activités de braconnage, que ce soit en plaçant des pièges aux alentours des camps et des chantiers, en fournissant des armes et des munitions aux chasseurs, ou en transportant la viande de chasse vers les centres commerciaux.

Au sud-est du Cameroun, près de 85% de la viande de chasse abattue dans les campements des braconniers sont évacués par des véhicules des entreprises forestières en direction soit des chantiers, soit, dans la plupart des cas, des centres urbains où la demande pour la viande est insatiable. Les chauffeurs qui transportent les grumes de la SNBS (Kabo, Congo), de la CIB (Pokola, Congo) et de la SIBAF (Kika, Cameroun) jouent les rôles les plus importants dans ce commerce.

Tout récemment, des efforts ont été déployés pour collecter des informations précises sur le commerce en viande de chasse, de ses impacts sur les populations de faune dans la région trinationale, et les façons éventuelles de le contrôler.

Le projet Nouabalé-Ndoki de WCS suit depuis plusieurs années le commerce en viande de chasse le long de la rivière Sangha au nord de Ouesso. Malgré ces efforts, le traffic aérien de viande entre Ouesso et Brazzaville continue et Ouesso reste encore un centre important pour le commerce du gibier. Dans la Réserve de Dzanga-Sangha, l'équipe du WWF suit l'impact des communautés locales sur les ressources forestières, avec un accent particulier sur le commerce du gibier. Elle a constaté qu'une grande proportion des immigrés dans la zone de Bayanga, arrivés à l'origine pour chercher du travail lié à l'exploitation forestière, se sont tournés vers la chasse comme source de revenus alternative.

Dans la région de la Lobéké, au sud-est du Cameroun, les chercheurs de WCS ont constaté que les chantiers forestiers situés à Béla et Libongo sur la rivière Shagha et à Kika et Mouloundou sur la rivière Ngoko constituent des centres importants

pour des opérations de capture et transport de viande de chasse. A Béla, où les activités d'exploitation forestière sont interrompues depuis 1992, une bonne partie des travailleurs est demeurée sur place à cause des rumeurs concernant la reprise des activités. En l'absence d'emploi, la majorité de ces personnes se sont lancée dans le braconnage pour avoir un moyen de subsistance, évacuant la viande par la rivière Shangha vers la RCA, par voie terrestre à travers le Cameroun, ou encore vers Ouesso. Les campements de braconniers sont très fréquents le long des routes principales vers Libongo et Kika. Parfois, ils ravitaillent les chantiers, mais plus souvent la viande est transportée à bord des grumiers en direction des grands centres de population au Cameroun.

La route qui bifurque à l'angle du sud-est du Cameroun (vers Ouesso) est particulièrement importante. En 1993-94, période pendant laquelle la route était fermée à la circulation, la pression de la chasse illicite fut considérablement réduite dans la zone. Mais en 1994 la route a été réouverte afin de faciliter l'évacuation du bois des entreprises forestières travaillant au nord-Congo. Les villages de Socambo et Makwanda sont devenus des centres d'activité importants grâce au passage régulier de bois, de passagers et de viande de chasse qui sortent du Congo par bac sur la Sangha. Mongokélé est un centre de braconnage depuis longtemps, servant de point de transit pour la viande qui descend la rivière Ngoko jusqu'à Ouesso. La réouverture de la nouvelle route a fourni encore une option aux commerçants de viande. Notre étude a détecté le long de la route la présence de nombreux campements de braconniers qui n'existaient pas en 1993. Le cas de Djembé, campement situé sur la Sangha à l'endroit où le bois congolais en provenance de Kabo transite à destination de Douala par la route, est plus ou moins identique. Bien que le niveau de braconnage apparaisse être moins intense qu'à Mongokélé, la proximité de l'aire protégée proposée de Lobéké est inquiétante.

Pour mieux comprendre la dynamique du commerce du gibier dans la zone, l'équipe de WCS a recensé les campements de braconniers. Environ 95% des chasseurs sont des Camerounais originaires d'autres régions du pays. La majorité (75%) sont d'anciens travailleurs d'entreprises forestières opérant dans la région. Il viennent dans la zone de Lobéké à la recherche d'opportunités économiques qui ne sont plus disponibles chez eux. Au sud-est du pays, ils retrouvent une forêt riche en ressources naturelles où la faible mise en vigueur de la loi crée un climat très propice à l'exploitation incontrôlée. Beaucoup de chasseurs ont adopté un système saisonnier par lequel ils se déplacent au sud-est après avoir planté leurs cultures dans leur village d'origine. On constate aussi une augmentation marquée du nombre de campements de braconniers pendant la fermeture de la saison de chasse safari à partir du mois de juin (les chasseurs safari tolérant les braconniers dans leurs zones d'activité).

La chasse au piège constitue la technique principale utilisée par les chasseurs de la région, qui détiennent entre 50 et 300 pièges chacun. Cette pratique entraîne souvent des pertes, puisque plus de 10% des animaux capturés pourrissent avant d'être récupérés par les chasseurs (une étude menée par ECOFAC au Dja indique que ce chiffre peut atteindre 30%). La chasse est très destructive: elle n'est pas du tout sélective en termes d'âge, de sexe ou d'espèces chassées. Les résultats initiaux de notre étude démontrent que les espèces les plus communément tuées par les chasseurs sont, par ordre d'abondance:

- Les céphalophes tels *Cephalophus callipygus* (75% d'animaux capturés), *Cephalophus dorsalis* et *Cephalophus monticola*;
- le porc-épic (*Atherus* sp.);
- le potamochère (*Potamocherus porcus*);
- les singes tels que *Cercocebus albigena*, *Cercocebus galeritus* et *Colobus guereza*.

Suivant l'initiative des équipes de gestion de Dzanga-Sangha et de Nouabalé-Ndoki, l'équipe du WCS à Lobéké continuera à quantifier la chasse de gibier dans le sud-est du Cameroun. Il est toutefois évident que certaines actions devront être menées dans un proche avenir pour limiter la chasse dans la zone. Sinon, il existe un fort risque de dégradation à long terme des ressources de base. En abordant ce problème, le personnel de chacune des aires protégées et des ONG partenaires doivent faire des efforts concertés pour coordonner leurs recherches et leurs activités de surveillance, pour favoriser dans la mesure du possible la mise en application des lois sur la faune, et pour chercher une nouvelle stratégie pour décourager la chasse illégale. Pour sa part, le personnel du site de Lobéké a programmé des visites à Dzanga-Sangha et à Nouabalé-Ndoki dans un proche avenir dans l'espoir de renforcer la collaboration entre ses efforts et ceux introduits dans le sud-est du Cameroun. Selon toute probabilité, un conservateur du MINEF sera installé à Lobéké dans les prochains mois à venir.

L'équipe de Lobéké va au-delà des mesures classiques pour aider à la conservation de l'écosystème forestier du sud-est. Elle a initié un programme actif de collaboration avec la population locale basée sur la conservation des ressources de la région. Les communautés de la zone dépendent entièrement des ressources forestières pour leur subsistance et pour leurs activités économiques. Le niveau de chasse abusif par des individus et des organismes extérieurs à la région met en cause leur

avenir. C'est ainsi que la WCS a trouvé en partenaire tout à fait concerné pour l'assister dans la conservation à long terme des ressources naturelles de la région.

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[from *Canopée*, No. 7]

INTERNATIONAL TRADE IN CITES APPENDIX II AFRICAN PRIMATES

Abstract

Each year, from 1989–1993, 3,800–6,700 wild caught primates were legally exported from Africa and reported to CITES. Cercopithecus aethiops *and* Papio *spp. were, by far, the most frequently exported African primates. Kenya was the largest exporter, followed by Tanzania, Ethiopia and Senegal. Based on the data available, it appears that the present levels of legal international trade do not have much impact on the survival of the primate taxa involved. What is not known, however, is the level and impact of illegal trade in African primates. Further, our inadequate understanding of the taxonomy of African primates is a serious problem in assessing the impact of trade on survival. Two species and 10 subspecies of African primates not listed under CITES* Appendix I *are now considered by IUCN to be highly threatened taxa. It is important that international legal trade in these 12 taxa be reassessed to determine whether up-grading to* Appendix I *is required.*

Introduction

All but five of the countries which comprise continental Africa are signatories to the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With the exception of Angola, the countries which have not ratified CITES (*i.e.*, Lesotho, Libya, Swaziland and Western Sahara) are of little importance with respect to primate conservation (Wolfheim, 1983; Oates, 1986, 1996; Lee *et al.*, 1988).

CITES *Appendix I* lists those species and subspecies of African primates which are believed to be threatened by international trade. International trade in these species/subspecies or their products is subject to strict regulation by ratifying nations, and their trade for primarily commercial purposes is banned. The following 10 African primates are presently listed under *Appendix I*:

Cercocebus galeritus galeritus—Tana River mangabey (endangered)
Mandrillus sphinx—mandrill (lower risk)
Mandrillus leucophaeus—drill (endangered)
Cercopithecus diana—Diana monkey (vulnerable)
Procolobus badius gordonorum— Iringa (Uhehe) red colobus (endangered)
Procolobus badius rufomitratus—Tana River red colobus (endangered)
Procolobus verus—olive colobus (lower risk)
Pan troglodytes—chimpanzee (endangered)
Pan paniscus—pygmy chimpanzee (bonobo) (endangered)
Gorilla gorilla—gorilla (endangered)

All other African primates are listed in CITES *Appendix II*. *Appendix II* species are those that could become threatened with extinction if trade is not controlled. Trade in *Appendix II* species, or their products, is subject to regulation and to monitoring of its effects.

In late 1995, the IUCN/SSC Trade Programme, TRAFFIC and World Conservation Monitoring Centre (WCMC) conducted the third biennial review of trade in those African primates listed in CITES *Appendix II*. The objective of the review was to assess the impact of legal international trade in wild caught African primates from 1989 through 1993 so that any species or subspecies thought to be adversely affected by this activity, at either the national or global level, could be brought to the attention of the CITES Animals Committee. Once possible adverse levels of trade are identified for a species, CITES conducts a more detailed review. If the review concludes that detrimental levels of international trade are indeed occurring, the Animals Committee then identifies remedial measures which individual CITES member states may undertake to ensure that the trade is no longer detrimental. The review also assists the IUCN/SSC Primate Specialist Group to plan conservation action.

For the 1995 review, CITES provided each participant with listings, by year, of the total number of each *Appendix II* primate species known to have originated from the wild and exported from each member country, and reported to the CITES data base, for the years 1989 through 1993. What follows here is an overview of the more important African primate conservation information revealed by these trade data. The scientific names used in this paper follow Oates (1996).

Overview and Discussion

From 1989–1993, the most traded African primate

Table 1. The most frequently traded African primates, as reported to CITES, for the period 1989–1993, inclusive. The figures represent the mean annual number of live animals and trophies traded. The reported origin of all specimens was either wild caught or unrecorded. Thus, trade of captive bred specimens is not included here. Data provided by CITES (August 1995).

Species	Form	Mean no. traded/yr
Galago senegalensis	live	127
Cercopithecus petaurista	live	172
Cercopithecus aethiops	live	*3,661
Erythrocebus patas	live	215
Papio anubis	live	**1,081
Papio papio	live	131
Papio ursinus	live	187
Papio ursinus	trophies	356

* A mean 810 *C. aethiops* originated each year from wild populations in non-African locations, particularly from Barbados and St. Kitts/Nevis. They are included in this value.

** 850 wild caught *P. anubis* reexported from the United Kingdom in 1990 are included in this mean value.

was the green (vervet) monkey *Cercopithecus aethiops* (mean=3,661 live animals/year), followed by olive (anubis) baboon *Papio anubis*, chacma baboon *Papio ursinus*, and patas monkey *Erythrocebus patas* (Table 1). For the seven most traded African primates, the mean total number of live individuals traded each year was reported as 5,574.

The four most traded species (Table 1) are widespread and generally common over much of their range (Dorst & Dandelot, 1970; Wolfheim, 1983; Oates, 1986, 1996). Two species, the spot-nosed monkey *Cercopithecus petaurista* and the Guinea baboon *Papio papio*, while often fairly numerous where they occur, have relatively small distributional ranges (Dorst & Dandelot, 1970; Wolfheim, 1983; Oates, 1986, 1988). For these two species, the removal of individuals from the wild might be having a negative impact on some local and national populations, particularly as these two species are also hunted (*C. petaurista* primarily for meat and *P. papio* mostly as a crop pest), and habitat loss continues to be a serious problem, especially for the forest-dependent *C. petaurista* (Wolfheim, 1983; Davies, 1987).

The largest exporter of African primates was Kenya, which shipped an average of 1,405 *C. aethiops* and 567 *P. anubis* each year from 1989–1993 (Table 2). Kenya was followed by Tanzania, Ethiopia and Senegal. The main trade species in these countries, *C. aethiops* and *Papio* spp., are also serious crop pests over large areas. As such, many times more individuals of these species are probably destroyed as "vermin" each year in all source countries than are exported. On the surface at least, it appears that the present levels of legal trade for these common species are probably not having much impact on their survival, except perhaps on local populations.

According to CITES records, the total numbers

Table 2. Listing of the African countries which most frequently traded certain species of wild-caught primates during the period 1989–1993, inclusive. The figures represent the mean annual number of individuals traded. Trade was in the form of live animals, skins and trophies. Data provided by CITES (August 1995).

Species	Country	Form	Mean no. traded/yr
Galago senegalensis	Togo	live	116
Cercopithecus petaurista	Ghana	live	130
Cercopithecus aethiops	Kenya	live	1,405
	Tanzania	live	1,198
	Ethiopia	live	95
Erythrocebus patas	Ghana	live	61
	Senegal	live	126
Papio anubis	Ethiopia	live	223
	Kenya	live	567
	Tanzania	live	97
Papio papio	Senegal	live	118
Papio ursinus	Zambia	live	185
	Zambia	trophies	70
	Zimbabwe	trophies	199

of primates legally exported each year from African countries during the period 1985 through 1994 varied from 3,785 to 6,682 animals (Table 3). Although there is no clear trend in the overall numbers of primates exported annually during this 10 year period, there is an obvious shift from the export of *C. aethiops* to the export of *Papio* spp.

Virtually no information is available on how many individuals of each species of primate are captured and die prior to export, how many are exported illegally, how many are exported from non-CITES countries, or what impact the domestic trade might be having.

Another concern is related to our inadequate understanding of African primate taxonomy (Oates, 1986, 1996; Lee *et al.*, 1988; Mittermeier, 1995; Bearder *et al.*, 1996). Primate conservation in Africa, including the enforcement activities of CITES, is currently hindered by an inadequate understanding of the taxonomy of several groups, particularly of the vervet, baboon, red colobus and galago groups. How many species are there really, what is the distribution and conservation status of each, and what are the threats? Some "species" which are now viewed as Africa's most common and widespread, and on which basis considerable trade is permitted, may really be comprised of several species. For example, *C. aethiops* is one of the most frequently traded primates in Africa largely because it is generally believed to be Africa's most common and widespread primate. It, however, has a complex taxonomy. Some authorities believe that *C. aethiops* is really comprised of four species (*aethiops*, *pygerythrus*, *sabaeus*, *tantalus*) and 21 or so subspecies, some of them very distinctive (Dandelot, 1971; Lernould, 1988). A closer look at the trade in this group might reveal some detrimental impact on one or more of the rarer, more localised "subspecies".

Table 3. Total exports of wild caught primates from Africa for the period 1985–1994, inclusive, as reported to CITES. Trade was in the form of live animals, skins and trophies. Data provided by CITES (March 1996).

Year	All primates	*C. aethiops*	*Papio* spp.
1985	6,495	4,043	768
1986	5,590	4,269	622
1987	4,910	3,351	413
1988	6,388	4,486	949
1989	3,960	2,103	1,129
1990	4,438	2,640	937
1991	4,554	2,843	1,163
1992	4,299	1,942	1,651
1993	3,785	1,735	1,399
1994	6,682	1,755	3,543
Total	51,101	29,167	12,574

Until we have adequate answers to our present taxonomic questions, we should give particular attention to trade in the more unique, distinctive, African primate "subspecies", many of which are poorly known, and/or have very small distributional ranges and populations. For example, the djam-djam *C. aethiops djamdjamensis* is a particularly distinctive and little known form endemic to Ethiopia (Carpaneto & Gippoliti, 1990), the third leading country in *C. aethiops* exports. If it is *C.a. djamdjamensis* that is being exported, CITES might recommend a ban until the taxonomic position and conservation status of this animal are better understood. In 1994 the CITES Animals Committee contracted a detailed desk study on *C. aethiops*. As a result of this review, it was concluded that exports from Ethiopia need further clarification.

During 1975–1992, some of Africa's more threatened primates were exported under *Appendix II*, albeit all in low numbers. These included five sun-tailed monkeys *Cercopithecus solatus*, 22 red-eared monkeys *Cercopithecus erythrotis* and 21 white-throated monkeys *Cercopithecus erythrogaster* (J. Caldwell pers. comm.). These are three out of eight species and 13 subspecies of African primates that are not listed in *Appendix I* but which are now considered to be threatened (IUCN, in press) (Table 4).

Appendix I is apparently closely equivalent to IUCN's "critically endangered" and "endangered" threat categories. As such, there may be a case for moving the two species and 10 subspecies listed in Table 4 as "critically endangered" and "endangered", to CITES *Appendix I*. According to the new CITES criteria (Resolution Conf. 9.24), to list species or subspecies in *Appendix I* you need to show that they may be in international trade. However, the intention of CITES listing is to protect species and subspecies from detrimental international trade; not to list them merely to draw attention to their worsening conservation status. The rationale is that if CITES appendices are overloaded with species and subspecies not clearly threatened by international trade then the whole system might become unwieldy and ineffective. Thus, it must be clear whether international trade is affecting survival.

A species or subspecies classified as "vulnerable" (Table 4) is unlikely to qualify for *Appendix I* listing but should be closely monitored under *Appendix II* and the level of legal international trade assessed to determine whether such trade may be threatening its survival.

It should be noted that one of the 10 species of African primates now under *Appendix I* is presently listed by IUCN (in press) as "vulnerable" (*C. diana*), and that two species are listed as "lower risk" (*M. sphinx* & *P. verus*). This may warrant the re-examination of these three species to determine

Table 4. List of the CITES *Appendix II* species and subspecies of African primates that should be considered for up-grading to CITES *Appendix I*. All of these species and subspecies are now listed as "critically endangered", "endangered" or "vulnerable" in the *1996 IUCN Red List of Threatened Animals* (IUCN, in press).

Species	Common name	Status
Macaca sylvanus	Barbary macaque	vulnerable
Cercopithecus erythrogaster	white-throated monkey	vulnerable
Cercopithecus erythrotis	red-eared monkey	vulnerable
Cercopithecus preussi	Preuss's monkey	endangered
Cercopithecus sclateri	Sclater's monkey	endangered
Cercopithecus solatus	sun-tailed monkey	vulnerable
Colobus satanas	black colobus	vulnerable
Colobus vellerosus	white-thighed black-and-white colobus	vulnerable
Subspecies	**Common name**	**Status**
Cercocebus atys lunulatus	white-collared mangabey	endangered
Cercocebus galeritus "sanjei"	Sanje mangabey	endangered
Cercopithecus hamlyni kahuziensis	Kahuzi owl-faced monkey	vulnerable
Cercopithecus mitis kandti	golden monkey	endangered
Cercopithecus pogonias pogonias	Fernando Poo crowned monkey	vulnerable
Colobus angolensis ruwenzorii	Rwenzori black-and-white colobus	vulnerable
Procolobus badius bouvieri	Bouvier's red colobus	endangered
Procolobus badius epieni	Niger Delta red colobus	endangered
Procolobus badius kirkii	Zanzibar red colobus	endangered
Procolobus badius pennantii	Pennant's red colobus	endangered
Procolobus badius preussi	Preuss's red colobus	endangered
Procolobus badius temminckii	Temminck's red colobus	endangered
Procolobus badius waldroni	Miss Waldron's bay colobus	critically endangered

whether there is sufficient threat from international trade to justify their continued listing in *Appendix I*.

Table 4 lists seven subspecies of red colobus, a group with a confusing taxonomy (Oates, 1996) and for which two subspecies are already listed in *Appendix I*. Given the many endangered subspecies in this taxa, and the practical problems of determining, *ex situ*, which subspecies a specimen belongs to, it would make good sense to up-grade *Procolobus badius* to an *Appendix I* species.

Based on the trade data reported to CITES for African primates, together with what we know concerning the status of each species/subspecies in the wild, it seems reasonable to conclude that legal international trade in African primates is probably not presently having much adverse impact on any *Appendix 2* primate species/subspecies. In all cases, legal trade is probably small relative to the size of the total wild population. Few African primatologists would disagree with the statement that habitat loss, habitat degradation and bushmeat hunting (Wilke & Boundzanga, 1992; WRI, 1994; WSPA, 1995; Meder, 1996) are far more important threats to Africa's primates at this time than is the current level of trade. None the less, all species of African primates currently listed as "critically endangered" and "endangered" by IUCN (in press) should now be re-evaluated to determine whether listing in CITES *Appendix I* is necessary. This would help eliminate any danger that future trade might pose.

One of the main obstacles that CITES faces is insufficient quantitative information on the conservation status of wild populations and subpopulations of African primate species and subspecies. What is the size, distribution and main threats to those species and subspecies of African primates suspected to be in most danger of extinction? Such information is vital to assessing conservation status and, thus, to prioritising conservation action. Many of us in the field are in a position to undertake population surveys on primates in the regions where we work. We can also make more of an effort to get this critical information to CITES. If you have such information, please send it to: Alison Rosser, SSC Wildlife Trade Programme Officer, World Conservation Monitoring Centre, 219 Huntingdon Road, Cambridge CB3 0DL, UK, E-mail: alison.rosser@wcmc.org.uk

Source country wildlife authorities, CITES, TRAFFIC, IUCN/SSC, WCMC, conservation NGOs, and others, all play important roles in monitoring and controlling the impact of both illegal and legal trade on Africa's primates. They should be congratulated on a job well done and further encouraged to expand efforts to evaluate, reduce, and eventually eliminate, the illegal trade in African primates.

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SURVEY OF *CERCOPITHECUS ERYTHROGASTER* POPULATIONS IN THE DAHOMEY GAP

Abstract

Surveys were conducted in the southern regions of Bénin and Togo in 1994 and 1995, searching for populations of the red-bellied guenon, Cercopithecus erythrogaster. *The guenon was found only in the Lama Forest of Benin, where less than 20 km² of natural dry forest remains. All the* C. erythrogaster *observed in the Lama Forest had red bellies, like the type specimen, whereas Nigerian* C. erythrogaster *have grey bellies. The Lama monkeys are threatened both by the small and fragmented nature of their habitat and by hunting. Stronger protection and a management plan are needed.*

Introduction

In January 1994 and July-August 1995, I made surveys in southern Bénin and in Togo to look for populations of red-bellied guenons *Cercopithecus erythrogaster.* The type specimen of this species and some other old museum skins have rust-red bellies, but all the wild monkeys I had seen in Nigerian forests had grey bellies. The aim of the new surveys was to locate populations resembling the type form and to establish their conservation status.

C. *erythrogaster* was named from a young female monkey with a red belly and chest that reached London Zoo from West Africa in 1866. Very few specimens of this monkey came into museum collections during the next 70 years, and no

wild population was described until 1940, when the monkey was observed in forests near Bénin City, Nigeria (Mason, 1940). Wolfheim (1983) found less information on *C. erythrogaster* than on any other species in her exhaustive review of the status of all living primates and she noted a report from J.S. Gartlan that the monkey might be extinct.

I began to investigate the status of this species in 1981 and, with P.A. Anadu and J.L. Werre, discovered that it still survived in several parts of south-west Nigeria, from the Omo Forest Reserve in Ogun State in the west, to the proposed Taylor Creek Forest Reserve on the eastern edge of the Niger Delta in Rivers State. These surveys led to the creation of the Okomu Wildlife Sanctuary in Edo State, following our suggestion that Okomu offered the best prospects for the conservation of *C. erythrogaster* (Oates & Anadu, 1992).

While these Nigerian surveys were in progress, Sayer & Green (1984) reported that they had seen a captive *C. erythrogaster* in Cotonou in the Republic of Bénin. This individual was said to have come from a forested area near the Nigerian border.

Although the type specimen of *C. erythrogaster* had a rusty-red belly, the name "white-throated guenon" seems to be the most appropriate name for the Nigerian animals, as all the animals we observed in the wild in Nigeria had grey bellies. After the initial Nigerian surveys, I concluded that the red-bellied trait had either become very rare since the first specimens were collected, or was characteristic of a localised population that had not yet been seen in the wild (Oates, 1985). Then in 1987, a red-bellied animal reached Mulhouse Zoo in France (J.-M. Lernould, *in litt.*, October 1987) and this was followed by several more in subsequent years. An animal dealer informed Lernould that the monkeys had originated in Togo.

Survey Area

Very little natural forest remains in southern Bénin or Togo. Although this part of West Africa is often regarded as a savannah area (the "Dahomey Gap") interposed between the forests of Ghana and Nigeria, the natural vegetation was probably once tropical dry forest (Ern, 1988). The forest has been destroyed and modified by centuries of agricultural activity. Most of the remnant Dahomey Gap forest occurs as tiny patches in sacred groves near villages. The only relatively large area of natural forest that survives is in the Forêt Classée de Lama in southern Bénin (Fig. 1).

Assisted by I. Faucher, I surveyed the following sites in Bénin, in addition to the Lama Forest: sacred forests at Akwezoun, Hozin, Lonkli, Sakété and Yévéouetou; small areas of natural forest in the Forêts Classées of Aggoua, Djigbe and Pahou; and a small research forest at the Pobé oil-palm research station. In Togo only a few tiny patches of

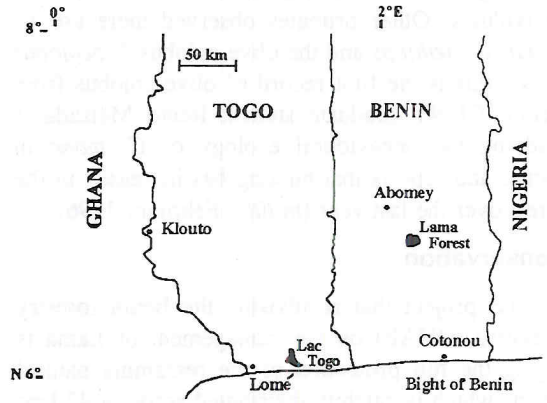

Figure 1. Map of the survey area, showing location of the Mt. Lama Forest and some other sites mentioned in the text.

sacred forest could be located, of which the largest was at Amédé Houévé on the southern edge of Lac Togo. In Togo we also investigated remnants of moist forest in the vicinity of Mt. Klouto close to the Ghana border.

Results

In our surveys, *C. erythrogaster* was seen only in the Lama Forest; we received no convincing reports of its presence in any other location. In several of the other forest remnants, *Cercopithecus aethiops* or *Cercopithecus mona* were seen or reported. A group of spot-nosed monkeys *Cercopithecus petaurista* was seen by Faucher in the forest near Mt. Klouto, and a captive *C. petaurista* was also found there.

On my first visit to the Lama Forest, in January 1994, I thought that I saw both grey-bellied and red-bellied *C. erythrogaster*. During more careful observations in the Lama in 1995, only red-bellied monkeys were seen. This suggests that there may be a genetic discontinuity between the Bénin population and the grey-bellied populations in Nigeria. Jean-Marc Lernould (*in litt.*, 1988) has suggested that this might justify the recognition of two subspecies of *C. erythrogaster*.

The origin of the red-bellied zoo animals remains a mystery, as we have been unable to locate any wild population in Togo. It seems likely that the animals originated in Bénin, perhaps from the Lama Forest. However, the existence of other small populations of red-bellied monkeys cannot yet be ruled out.

In the 163 km^2 of the Lama Forest, less than 20 km^2 of natural forest remains. *Afzelia africana*, *Ceiba pentandra* and *Dialium guineense* are among the common trees in this forest. The rest of the reserve is largely covered by teak plantations and

farms of cassava and other crops. We very tentatively estimate the population size of *C. erythrogaster* in the Lama Forest as 400-800 individuals. Other primates observed there are *C. mona*, *C. aethiops* and the olive colobus *Procolobus verus*; this is the first record of olive colobus from Bénin. CUNY graduate student Reiko Matsuda is studying the behavioural ecology of *C. mona* in Lama, and reports that hunting has increased in the forest over the last year (*in litt.*, February 1996).

Conservation

A GTZ project that is advising the Bénin forestry authority (ONAB) on the management of Lama is urging the full protection of the remaining natural forest, which is patchily distributed across a 47 km^2 "noyau" area that has not been cultivated or planted. It is vital that the noyau be protected against tree-cutting, cultivation, fire and hunting, for the forest is not only the largest single remnant of Dahomey Gap dry forest, it is the only known home of the type form of *C. erythrogaster*.

Acknowledgements

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ASSESSING GALAGO DIVERSITY—A CALL FOR HELP

Abstract: *The continuing discovery of new mammal species creates some difficulties for current concepts of biodiversity and throws new light on conservation priorities. This paper examines distinctions between 'cryptic' primates (galagos and lorises), including four previously unrecognised galagos in Tanzania, and calls for help to characterise populations throughout Africa as a prelude to measuring their genetic relatedness.*

It is generally accepted that there are up to 230 species of primates alive today. However, the recent discovery of a number of cryptic species has cast doubt on this number, and it may be helpful to admit that we cannot yet be confident about how many primate species exist. Among galagos (bushbabies), for example, the number of species recognised by specialists has risen from six in 1975, to 11 in 1985 and 17 in 1995, with no indication that this rate of increase is likely to slow (Fig. 1). Therefore, the chances of discovering an unrecognised species of galago are still very good. This paper provides an explanation of why this is so, and asks people who get a chance to visit African forests and savannahs to collaborate with our research programme—with the possibility that they too may discover a 'new' species (see Table 1).

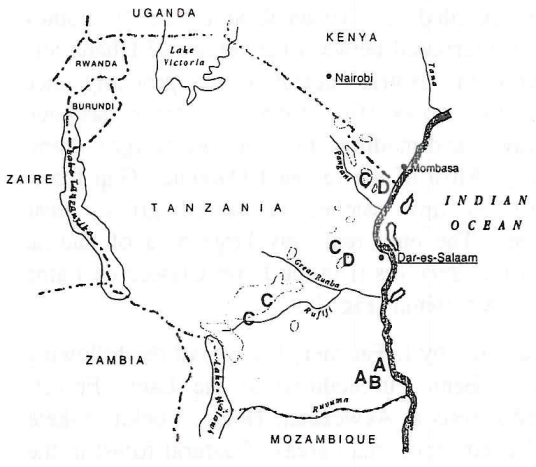

Figure 1. Map of Tanzania showing sites at which

the newly recognised galago species have been studied: A. Grant's galago; B. Rondo galago; C. Matundu galago; D. mountain galago.

Why is it that galagos and other species have been overlooked? Is there simply a trend towards splitting? And how do the newly-recognised species differ from subspecies? We will attempt to answer these questions through a brief consideration of how species arise in the first place and why they diversify. Our arguments are based on research on galagos, but they apply to other secretive species which require much finer analysis if true levels of speciation are to be appreciated.

The theory of allopatric speciation holds that any physical barrier to mating between two or more populations will set in motion a process that may lead to new species. This is because as long as the physical barrier prevents migration of individuals between the populations, any genetic changes arising in one area cannot pass to another. Different mutations, together with non-identical selection pressures, will mean that the separate gene pools will start to diverge. In addition, particularly if the isolated populations are small, their genetic variability will be altered by random genetic drift (because chance events have a disproportionately large effect on small numbers). Nevertheless, it does not necessarily follow that new species will emerge; this will depend on whether or not there is a breakdown in sexual compatibility.

It is helpful to think of two kinds of selection pressure, namely natural selection and sexual selection, although the two are interrelated in subtle ways. Natural selection (or artificial selection in domestic animals) can lead to local variation within a species which may be quite extreme (as in domestic dogs or distinct subspecies in the wild), but inter-sexual selection (the influence of one sex on the other) ensures that the males and females continue to recognise one another. The importance of a shared system of attraction is underlined by the reformulated concept of species, put forward by Hugh Paterson in 1978, called the "Recognition Concept" (see also Paterson, 1985). Interestingly, this work was first published in South Africa and it passed largely unnoticed for several years. Paterson emphasises that each animal species can be characterised by possession of a unique fertilisation system, including sexual attraction between males and females which he calls a Specific-Mate Recognition System (SMRS). This may involve visual or chemical signals, sound, or touch in variable combinations depending on the species. For example, frogs and crickets use mainly sound, moths and domestic dogs use scent, and many monkeys and birds rely, to a large extent, on vision. Whatever system is used, selection on that particular set of characteristics (sexually attractive transmitters and receivers) will ensure that they remain mutually tuned between the sexes, whereas other aspects of the animal's biology are not under such constraints. The result is well illustrated in the case of the artificial selection of dogs, and other domestic animals, which can be bred in many forms to suit the interests of their owners providing that the SMRS (scent in the case of dogs) remains intact.

Table 1. List of galago species in Africa (March 1996).

Species group	Common name (Latin name)
1) ELEGANT GROUP:	1. Southern elegant (*elegantulus*)
	2. Northern elegant (*pallidus*)
2) ALLEN'S GROUP:	3. Makokou Allen's (*gabonensis*, status unclear)
	4. Makande Allen's (status unclear)
	5. Cameroon Allen's (*alleni*)
3) GREATER GROUP:	6. Small-eared, Garnett's (*gamettii*)
	7. Large-eared (*crassicaudatus*)
	8. Pygmy large-eared (status unclear)
	9. Black bushbaby (status unclear)
4) LESSER GROUP:	10. Lesser needle-claw (*matschiei*)
	11. Senegal (*senegalensis*)
	12. Southern African (*moholi*)
	13. Somali (*gallarum*)
5) SOUTHERN DWARF GROUP:	14. Rondo (sp. nov. A*))
	15. Matundu (sp. nov. B*)
	16. Amani/mountain (*orinus*)
6) ZANZIBAR GROUP:	17. Zanzibar (*zanzibaricus*)
	18. Grant's (*granti*)
	19. Kalwe small (status unclear)
7) NORTHERN DWARF GROUP:	
THOMAS'S SUBGROUP:	20. Thomas's (*thomasi*—possibly other species)
DEMIDOFF'S SUBGROUP:	21. Demidoff's (*demidoff*—possibly other species)

* Note: These species are currently being described.

It follows that they are all members of the same species, despite the variability.

There are a number of advantages to the Recognition Concept of species over the better known Isolation Concept, which defines species by their inability to interbreed and produce fertile offspring (Mayr, 1970). First, it focuses on a set of characteristics that provide practical means of discriminating between closely-related species; second, it is compatible with the fact that different species can sometimes produce fertile hybrids; and third, it provides a more rigorous perspective on how new species might emerge. Thus, when applied to the process of speciation in the wild, it is clear that new species will form as, and when, there is a change in the Specific-Mate Recognition System of a population, for example, a change of sexual preference for a new smell, a different call or a novel visual display. Such changes are most likely to become fixed in isolated populations, particularly if they are small, since the choice of potential mates is limited and chance effects more prominent. Whatever the precise mechanisms of change, once it becomes the norm, the members of that population will no longer be attracted to individuals of the parent species, even if they come back into contact. This model fits well with what is known about the distribution of animal species in general; groups of closely-related species tend to be found on island archipelagos (as in the Galapagos) or where there are effective physical barriers to interbreeding between populations, but not where physical isolation is impossible.

We now have an explanation for why some species are relatively easy for human beings to recognise, whilst others are much harder. Our own SMRS is largely dominated by vision (although sound, touch and 'chemistry' undoubtedly play an important supplementary role). Consequently, we find it simple to separate animals that also rely on vision. Fortunately, vision is such an informative sense, and is so widely distributed among animals, that it has proved very useful in the naming of species. However, it can seriously fail to separate those animals that attract their mates primarily by sound and scent, especially if they use other senses that we do not possess (for example, ultrasound or electric impulses). In reality, such 'cryptic' species are no less valid than any other, but we are easily misled into thinking of them as being much more similar than would be the case if we had their kind of sensitivity. This is well illustrated by the difficulty in separating species in many groups of nocturnal animals including insects, frogs, owls, bats, rodents and prosimian primates.

It follows from what has been said that the easiest way for us to distinguish between free-living species is to concentrate on those aspects of the communication system that the animals themselves use to attract partners. This is easier said than done. Among galagos, sound and scent are the principal means of attracting members of the opposite sex but, at present at least, scents are relatively hard to collect and analyse. Fortunately, both sexes use relatively loud 'advertising' calls, and these are diagnostic for each species (Bearder *et al.*, 1995) (Fig. 2). A wealth of specimens available in museums and laboratories provides access to additional characteristics which turn out to be very useful—either because they too are influenced by inter-sexual selection, or because they are the products of adaptation to different ecological niches. Characteristics of the first kind include the detailed structure of reproductive organs which appear to affect successful mating, or the pattern of facial markings which aids in recognition at night. The most useful features of the second kind include subtle, but contrasting, structural details of hairs, limbs and various signals, such as alarm calls. In theory, these are likely to differ in relation to climatic variation and vegetation density in different zones of a forest, or in different habitats.

Using comparative techniques, the Nocturnal Primate Research Group at Oxford Brookes University has unearthed four 'new' species in Tanzania alone: (Grant's galago *Galagoides granti*, Matundu galago *Galagoides udzungwensis*, mountain galago *Galagoides orinus* and Rondo galago *Galagoides rondoensis* (Honess 1996) (Fig. 2). We are also in the process of measuring genetic relatedness between populations and species through direct analysis of DNA sequences, which can now be done from a tiny piece of dried skin from museum specimens.

Given the wide distribution of galagos south of the Sahara, and the many separate collections in Africa, it is clearly impractical for us to visit more than a fraction of the sites. We are, therefore, asking for volunteers who may be in a position to help. Our aim is to extend such detailed biological comparisons to as many populations of galagos and lorises (pottos and angwantibos) as possible. The specimens required cause no harm to the animals and enable existing collections to be utilised more effectively. In the first instance we are interested in:

- hair samples (especially the long guard hairs plucked from between the shoulder blades of pet animals or museum specimens, and hairs from scent glands);
- details of male reproductive anatomy (penis shape, length and degree of spininess);
- measurements of the limb bones (as a guide to style of locomotion);
- photographs or tape recordings of bushbabies in

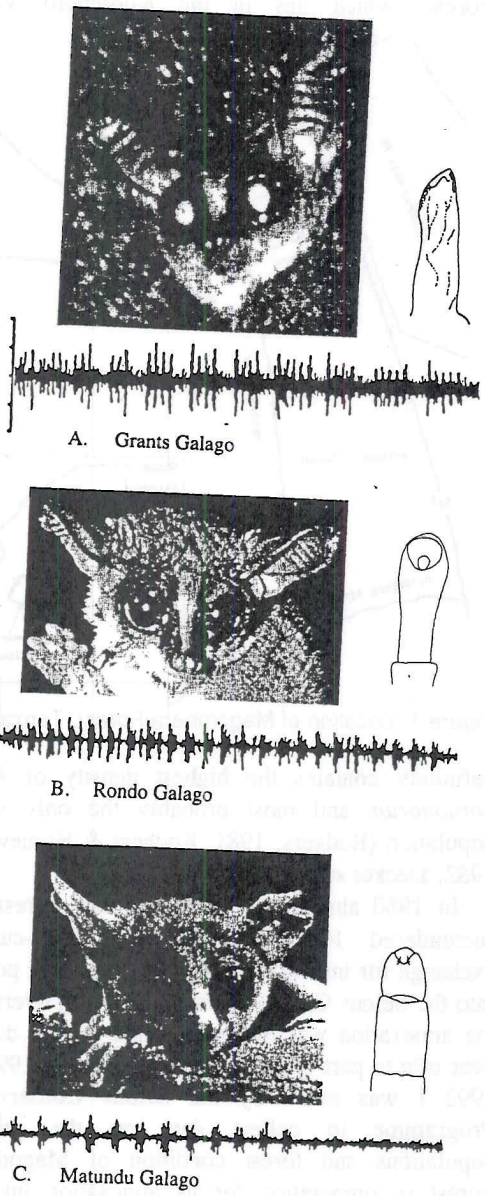

Figure 2. Differences in the face, penile anatomy and advertising call structure for: A) Grant's galago; B) Rondo galago; and C) Matundu galago (photographs: S. Bearder & T. Evans).

the wild, or in captivity. To this end we have prepared a number of specimen tapes giving examples of typical calls and explaining how to recognise and sample the calls which are of most interest.

Tape recording at night is a lot less difficult than you might think. Bushbabies and other mammals can often be seen at night using a simple headband torch (4.5V) which picks out the brilliant reflections from their eyes. Covering the torch with a red filter is sometimes effective if the animals are disturbed by white light and it allows the night vision of the observer to improve over time. Binoculars are also helpful at night by increasing the effective capture of light, leading to useful and enjoyable sightings. Recordings can be made with a cassette tape recorder and directional microphone.

Some populations of particular interest which await further study are:

- Pygmy greater galagos in southeast Tanzania (Lindi and Newala Districts);
- An unidentified small species in the region of Mount Marsabit in northern Kenya;
- Detailed examination of populations allied to Elegant, Allen's, Thomas's and Demidoff's galagos in the central African forest block;
- Follow-up studies of populations in Malawi and southwest Tanzania;
- Lesser galagos related to *Galago senegalensis*, including Senegal, northern Kenya, Somalia, Namibia and Angola;
- Collection of hair, skin, blood and tissue samples, scent gland secretions and measurements/photographs, especially from lorises (which lack loud vocalizations).

If you are in a position to provide information of this kind, or would like further details on study methods, we would be very pleased to hear from you.

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NOTES ON THE BEHAVIOURAL ECOLOGY OF THE IRINGA RED COLOBUS *PROCOLOBUS BADIUS GORDONORUM*

Abstract

The behavioural ecology of Iringa or Uhehe red colobus Procolobus badius gordonorum *is little known. A study was conducted in Magombera Forest near the Udzungwa Mountains in southern Tanzania. Scan samples revealed that their diet included young leaves, leaf buds, petioles and unripe fruits from 15 species of trees and lianas, with* P. badius *feeding in three of four periods of the day.* P. badius *were often seen in polyspecific groupings with black-and-white colobus* Colobus angolensis palliatus *despite the overlap in their diets. Both colobus species also associated with Sykes monkeys* Cercopithecus mitis monoides.

Introduction

The Iringa or Uhehe red colobus *Procolobus badius gordonorum* inhabits forests in the Udzungwa (also Uzungwa) Mountains and Kilombero Valley of southern Tanzania (Fig. 1). It is endangered, listed in Appendix II of CITES and in Class A of the African Convention. *P. badius* has the status of 'Presidential Game' in Tanzania and is therefore protected by law (Lee *et al.*, 1988). However, *P. b. gordonorum* groups in the Udzungwas are subject to severe hunting pressure by the Wahehe people (Rodgers & Homewood, 1982) for whom they are a preferred source of protein (Wasser, pers. comm.). In the Kilombero Valley, adjacent to the eastern escarpment of the Udzungwas, the predominantly Muslim inhabitants do not hunt primates. Many of the *P. badius* in the Udzungwas inhabit forest fragments in forest reserves and unprotected areas which are exploited for timber. Their patchy distribution inhibits transfer of individuals for breeding purposes. The new Udzungwa National Park affords legal protection, but its size and steep slopes render it difficult to effectively patrol. A 1979 survey of a large part of the subspecies' range revealed that Magombero Forest, which lies in the Kilombero Valley,

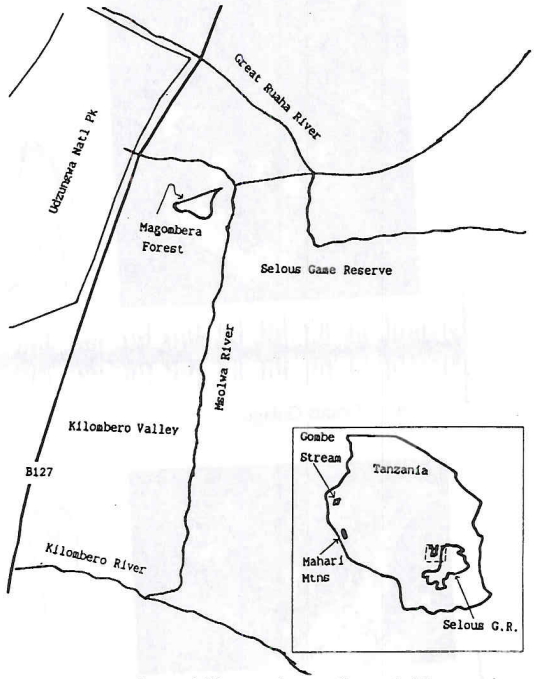

Figure 1. Location of Magombera Forest, Tanzania.

definitely contains the highest density of *P. b. gordonorum* and most probably the only viable population (Rodgers, 1981; Rodgers & Homewood, 1982; Decker *et al.*, 1992).

In 1980 almost half of the 11 km^2 forest was surrendered for settlement and clear-cut in exchange for incorporation of the remaining portion into the Selous Game Reserve. Due to an oversight, the annexation was never legalised, and a dispute over title to part of the forest land arose in 1991. In 1992 I was asked by the Selous Conservation Programme to collect data on the primate populations and forest condition of Magombera Forest in preparation for its annexation into the Selous Game Reserve (Decker, 1994).

The behavioural ecology of *P. b. gordonorum* has yet to be studied in detail. Prior to this study, the only available information was obtained in 1977 (Struhsaker & Leland, 1980). In order to learn more about the subspecies, I took field notes during the census in Magombera on the behavioural ecology of *P. b. gordonorum* and its interspecific interactions with other sympatric primate species.

Study Site

The 6 km^2 Magombera Forest lies in the Kilombero wetlands, 15-20 km east of the Udzungwa Mountains. The forest has been described in detail by Rodgers *et al.* (1979, 1980) and by Struhsaker and Leland (1980). Rare and endemic flora and fauna have been recorded in Magombera, and its six primate species make it the most diverse primate locality in mainland Tanzania east of the Mahari

(also Mahali, Mahale, Makari) Mountains and Gombe Stream. It contains *P. b. gordonorum*, *Colobus angolensis palliatus*, *Cercopithecus mitis monoides*, and at least one species of *Galago*. *Cercopithecus aethiops* and *Papio cynocephalus* inhabit the forest edge. Magombera is also interesting for its birds, with a number of montane species occurring at an unusually low altitude (S. Stuart, pers. comm.).

At present, Magombera has no formal protection (Decker, 1994), although formal annexation has been recommended repeatedly (Kamara, 1978; Rodgers *et al.*, 1980; Struhsaker & Leland, 1980, Hertel & Baldus, 1992; Kirenga, 1992; Decker, 1994; Hoffman, 1995). In January 1996, yet another survey of the primates and vegetation in Magombera Forest was conducted, reportedly for the purpose of justifying gazettement (Kibonde & Siege, pers. comm.). Hopefully, by the time of publication, it will have been placed under protection in the Selous Game Reserve.

Methods

When a *P. badius* group was located, I observed it for at least 30 min. Some groups were observed on several occasions for a total observation time of 33 h. When the colobus were feeding, a plant sample was taken and later identified. All polyspecific associations and interspecific interactions were recorded. Opportunistic scan samples were taken at 15 min intervals to acquire information on activity budgets. During scan samples, 407 observations were recorded between 0945 h and 1545 h. An activity budget was derived from a composite of all scan samples recorded, regardless of which group was observed.

Results

During the census, conducted from September to November 1992, I located 16 groups of *P. badius* in Magombera (Decker, 1994). The number of individuals in the eight groups for which I obtained complete counts ranged from 26-50 ($\bar{x}$ = 34). Group density was 2.7/km^2. Although 338 *P. badius* were counted, the forest may contain as many as 544 (Decker, 1994).

My field assistants and I also discovered six groups of *P. badius* in previously unreported locations (Decker, 1994). Two groups were seen in riverine forests along a 50 km stretch of the Msolwa River, one group inhabited a forest at the confluence of the Msolwa and Kilombero Rivers, and three groups were found in forest patches to the east of Magombera.

Diet

P. badius were seen feeding from 15 species of trees and lianas (Table 1). They fed on young leaves from 12 species, leaf buds from two, petioles of large, young leaves from one, and unripe fruits from three species.

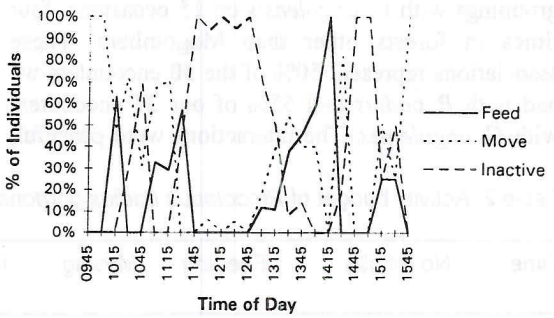

Figure 2. Activity budget of *Procolobus badius gordonorum* in Magombera Forest, Tanzania.

Activity Budget

During scan samples, I found that most individuals moved through the canopy from 0945–

Table 1. Diet of *Procolobus badius gordonorum* in Magombera Forest, Tanzania.

Species	Item	Family
Afzelia quanzensis	young leaves	Caesalpinaceae
Albizia gummifera	young leaves, leaf buds	Mimosaceae
Borassus aethiopum	young leaves	Palmae
Byttreria fruticosa	young leaves	Sterculiaceae
Dialium holtzii	young leaves	Caesalpinaceae
Ficus sp. (strangling)	unripe fruit	Moraceae
Kigelia aethiopica	young leaves	Bignoniaceae
Parkia filicoidea	young leaves	Mimosaceae
Psychotria sp.	petioles of young leaves	Rubiaceae
Saba florida	young leaves, leaf buds	Apocynaceae
Schefflera myriantha (bak) Drake	young leaves	Araliaceae
Tabernaemontana pachysiphon Stapf.(=holstii)	fruit	Apocynaceae
Tetrapleura tetraptera	young leaves	Mimosaceae
Treculia africana	young leaves, fruit	Moraceae

1030 h, possibly having a feeding bout in the early hours before we located a group (Table 2, Fig. 2). At 1045 h most were inactive. From 1100–1130 h individuals fed, rested, groomed and played. Groups were again inactive from 1145–1245 h.

A few individuals began feeding and moving at 1300 h, although most remained inactive. By 1400 h all were moving and eating. From 1430–1500 h almost all were inactive. At 1515 h over half of the individuals were active and feeding. All animals recorded at 1545 h were again inactive.

Observations of play always involved only infants and small juveniles, and were recorded during periods when the adults were active.

Polyspecific Associations

During the census, nine groups of *C. angolensis* were seen in Magombera, ranging in size from 5–9 individuals ($\bar{x}$ = 6) (Decker, 1994). In all, 46 individuals were seen. I observed the groups for a total of 12 h.

P. badius groups were seen in polyspecific groupings with *C. angolensis* on 15 occasions, four times in forests other than Magombera. These associations represent 50% of the 30 encounters we had with *P. badius* and 55% of our 27 encounters with *C. angolensis*. The interactions were peaceful, and two interspecific pairs were seen grooming.

The diet of the two species of colobus monkeys overlapped. I observed *C. angolensis*, as well as *P. badius*, feeding on the young leaves of *Afzelia quanzensis* and *Schefflera myriantha*, and on the large, young leaf petioles of a species of *Psychotria*.

P. badius groups were seen with groups of *C. mitis* six times or 20% of encounters with *P. badius*, once in a forest other than Magombera. On two of these occasions, the polyspecific groupings consisted of *P. badius*, *C. mitis*, and *C. angolensis*. No agonistic interactions were observed among the species. None of the polyspecific associations occurred in masting fruit trees.

One adult *P. badius* male, the only solitary *P. badius* seen during the census, was with a group of *C mitis*. Of four solitary *C. angolensis* sightings, one individual was with a group of *P. badius*.

Anecdotal Observation

During the census, I twice noticed black urine on leaves below *P. badius* groups. Both C. Marsh and I had observed discoloured urine beneath *P .b. rufomitratus* on numerous occasions in the Tana River Primate National Reserve, Kenya (C. Marsh, pers. comm.). No explanation has been

Table 2. Activity budget of *Procolobus badius gordonorum* in Magombera Forest, Tanzania.

Time	No. of obs.	Feeding	Moving	Inactive	Play	Groom	Polyspecific associations
0945	10		10				*C.m.m.*[a]
1000	10		10				
1015	8	5	3				
1030	16		10	4	2		
1045	16		5	11			
1100	13	3		6	4		
1115	17	4		10	2	1	*C.b.p.*[b]
1130	12	4		3	5		
1145	16			16			
1200	15		1	14			*C.b.p.*
1215	20			20			*C.b.p.*
1230	21		1	20			*C.b.p.*
1245	20			20			*C.b.p.*
1300	28	3	5	20			*C.b.p.*
1315	28	3	10	13	2		
1330	26	9	13	2	2		
1345	26	12	10	4			*C.m.m.*
1400	25	15	10				
1415	8	6			2		
1430	7		5	1	1		
1445	5			5			
1500	10			10			
1515	20	5	10	5			
1530	20	5	5	10			*C.b.p.*
1545	10		10				
	407						

a. *Cercopithecus mitis monoides*
b. *Colobus angolensis palliatus*