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Extinction Faces Ghana's Red Colobus Monkey and Other Locally Endemic Subspecies

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Introduction

Three subspecies of forest primate are known only from southwestern Ghana and parts of neighboring Côte d'Ivoire to the east. These are the white-naped mangabey (*Cercocebus atys lunulatus*), the Roloway guenon (*Cercopithecus diana roloway*), and Miss Waldron's red colobus (*Procolobus badius waldroni*) (Fig. 1). The rainforest area where these endemic primates occur has undergone very rapid development since World War II. Logging activity has been more intense than in almost any other part of tropical Africa, and many people have moved into the region to cultivate the land as it has been opened up. Logging, farming and human population growth in the region have been accompanied by the increased hunting of wild mammals and larger birds for meat, much of which has been traded out of the immediate area for sale in towns (Martin 1991).

The threats posed to Ghana's forest primates by hunting and habitat modification have long been apparent. In 1956, Angus Booth noted that the extinction of the red colobus "must be regarded as a probability, unless effective legislation to protect both the animal and its environment is forthcoming" (Booth 1956). Writing from her home in western Ghana in 1970, Sonia Jeffrey observed that logging roads had encouraged farming on a large scale, and noted that hunting was rife, even in Forest Reserves; echoing the views expressed in an IUCN report by Kai Curry-Lindahl (1969), she called for a forest area to be protected against hunting (Jeffrey 1970).

In response to these concerns, Emmanuel Asibey of the Ghana Game and Wildlife Department oversaw plans that led to the establishment of the 306 km² Bia National Park in 1974 (Asibey and Owusu 1982). One reason why Bia was selected as a park was that it still contained a population of red colobus monkeys, which had by then been hunted out of most other forests (Rucks 1976). But under pressure from logging interests, 228 km² were excised from the National Park in 1977 and made into a "Game Production Reserve" where logging was permitted and where it was thought that animals might eventually be harvested. Partly in response to the pressures on Bia, another forest area was sought for wildlife protection; this lead to the creation of the Nini-Suhien National Park and the Ankasa Game Production Reserve from the 524² km Ankasa River Forest Reserve in 1976 (Martin 1976).

In the mid-1970s, an IUCN/WWF project devoted resources to the development of the Bia and Ankasa wildlife conservation areas, and a group of American scientists studied primates at Bia (Martin 1991; Olson 1986). These projects ended in 1978, at a time when the Ghanaian economy was in crisis; from then on the two conservation areas and Ghana's forest wildlife in general were neglected by the outside world. Stephen Gartlan visited Ghana briefly in 1981, and in his subsequent report he called for more research on the primates of Bia, for the Ankasa and Nini-Suhien reserves to be consolidated into one park, and for more conservation education efforts in Ghana as a whole (Gartlan 1982). Gartlan did not make a careful assessment of the primate population in Bia and Ankasa, and he and others assumed that both forests supported populations of Ghana's 10 forest primates. In addition to the Roloway guenon, mangabey and red colobus, these are the white-thighed black-and-white colobus (*Colobus vellerosus*), the olive colobus (*Procolobus verus*), Campbell's guenon (*Cercopithecus campbelli*), the spot-nosed guenon (*C. petaurista*), the chimpanzee (*Pan troglodytes*), the potto (*Perodicticus potto*) and Demidoff's bushbaby (*Galagoides demidoff*).

Following Gartlan's visit, virtually no further attention was given to Ghana's forest primates for more than a decade. Some disturbing information appeared in 1990, in a report of the findings of an ornithological survey of Ankasa and Nini-Suhien by a group of Cambridge University students in 1988. During a month in the forest, the group saw Roloways only twice and black-and-white colobus once; they did not see red colobus, mangabeys or chimpanzees. Unfortunately, their report (Dutson and Branscombe 1990) was not widely read by primatologists.

In 1993, TTS and JFO visited Ghana at the invitation of Conservation International to assess the status of primates in the Kakum conservation area. As part of a tourism-development project in the Central Region of Ghana supported by USAID and UNDP, the 212 km² Kakum Forest Reserve was converted into a National Park in 1991, and the adjacent 154 km² Assin Attandanso Forest Reserve became a Game Production Reserve (in 1995 all Ghana's Game Production Reserves were renamed Resource Reserves). From

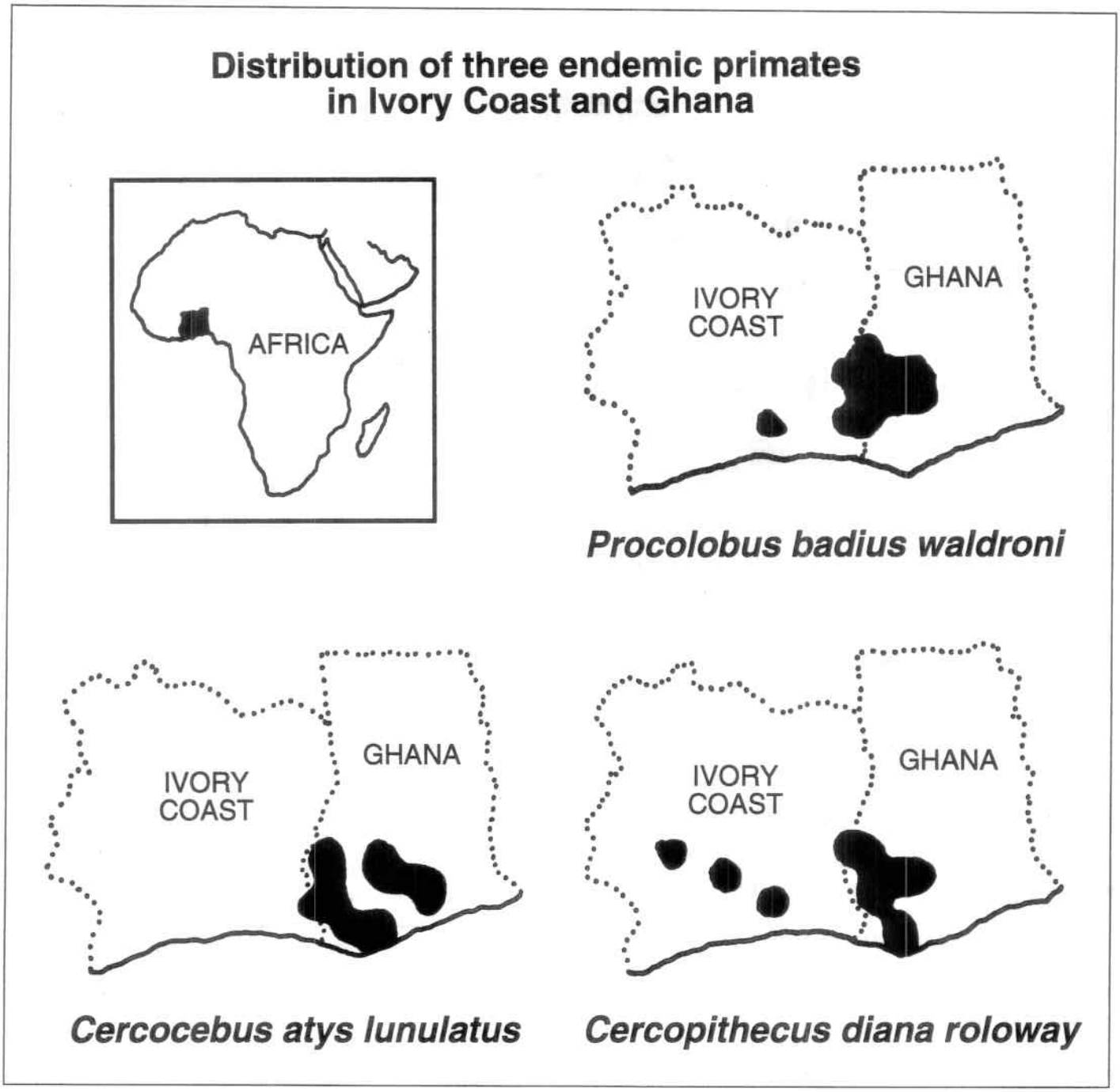

Figure 1. Distribution of three endemic primate subspecies in Ghana and Côte d'Ivoire.

Table 1. Ghana forest sites surveyed for primates, with survey dates and names of surveyors (N.P. = National Park; R.R. = Resource Reserve; F.R. = Forest Reserve; TS = T. Struhsaker; JO = J. Oates; EO = E. Owusu; GW = G. Whitesides; ML = M. Abedi-Lartey; BD = B. Dickinson).

Site	Survey dates	Surveyors
Kakum N.P.& Assin Attandanso R.R.	26 March-9 April 1993	TS, JO & EO
	11-12 & 18-24 August 1993	JO & EO
	17-22 November 1993	TS & EO
Pra Suhien F.R.	6 April 1993	JO & EO
Ankasa R.R. & Nini-Suhien N.P.	13-16 August 1993	JO
	3-7 August 1995	GW & ML
	22 December 1995-4 January 1996	JO & ML
Bia N.P. & Bia R.R.	11-15 November 1993	TS & EO
	23 July 1993	JO & GW
Ayum F.R. & Subim F.R.	17-19 July 1995	JO, GW & BD
Krokosua Hills F.R.	21-22 July 1995	JO, GW & BD
Yoyo F.R.	29-30 July 1995	GW, ML
Boin River F.R.	31 July 1995	GW, ML

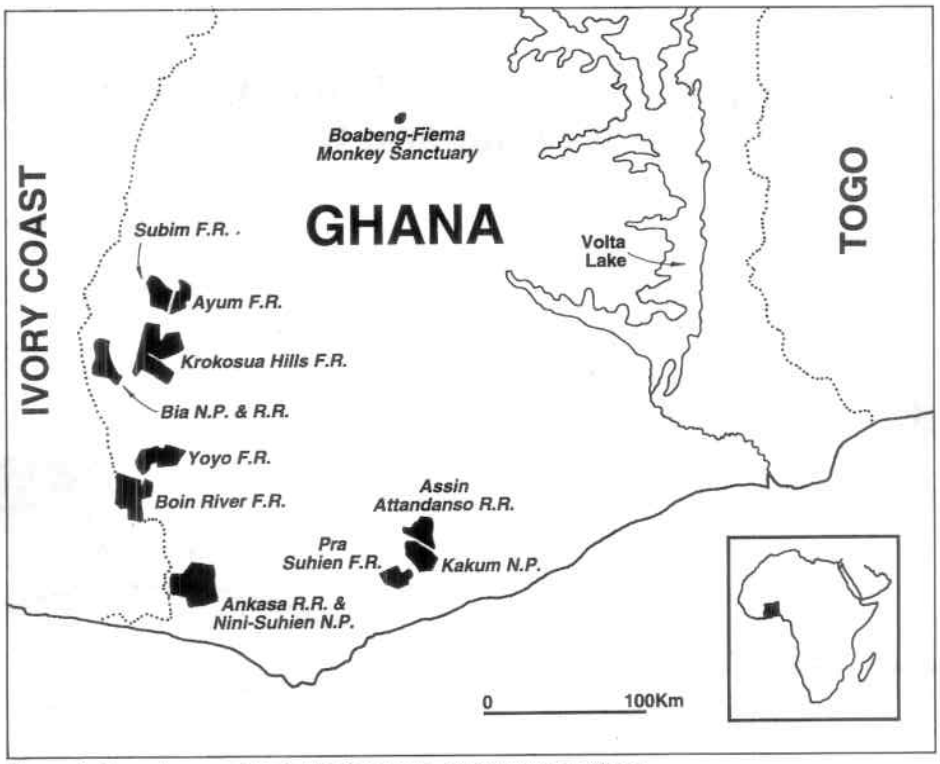

Figure 2. Map of survey sites in the forest zone of southwestern Ghana.

project-planning documents that we had read before making our survey, we were lead to believe that the Kakum forest contained all the primates reported from Bia and Ankasa, with the possible exception of chimpanzees.

Our surveys found firm evidence for only four monkey species and the two prosimians in Kakum. We therefore arranged a series of further surveys, which encompassed Ankasa, Bia, Nini-Suhien and several Forest Reserves in south-western Ghana. These surveys were designed to assess the status of anthropoid primates as a whole, but with special attention to Miss Waldron's red colobus which had long been regarded as Ghana's most threatened primate, and which we now feared might be on the brink of extinction. This paper summarizes the results of our surveys, which have found Ghana's forest anthropoids, and especially the locally endemic subspecies, to be even more seriously threatened than we had suspected.

Methods, Survey Sites and Personnel

We gathered information on the condition of different forests and on the presence and abundance of anthropoid primates both from foot surveys and from questioning people living near and/or working within the forests (e.g., hunters, farmers, and forestry and wildlife personnel). We regarded information obtained from interviews as a source of clues to the status of the primates; our final conclusions on their status relied most heavily on evidence from our own foot surveys.

Foot surveys were of two types. When making initial visits to forests we generally used existing paths (often hunters' trails), boundary lines, or logging roads. We walked these slowly and quietly, looking and listening for sounds of primates, often in the company of a local guide. In two areas, the Kakum and Nini-Suhien National Parks, we also cut 4-km transect lines through the forest understorey, and made repeated walks along these lines at speeds of 1-1.5 km/hr; on these transects, one of us was the primary, lead observer, while a second observer followed quietly at a distance of 25-50 m. If primates were detected, we stopped and noted evidence on whether detection was from calls or sightings, the species and number of individuals present, their distance from the survey route, and their height in the forest canopy (see Whitesides *et al.* 1988).

The sites we surveyed, and our itinerary, are listed in Table 1, and the locations of the reserves visited are shown in Figure 2.

In addition to local guides, participants in our surveys were Erasmus Owusu (Ghana Wildlife Department; Kakum and Bia), Bryan Dickinson (Ghana Association for the Conservation of Nature; Subim, Ayum and Krokosua Hills), and Michael Abedi-Lartey (Ghana Wildife Department; Yoyo, Boin River, Ankasa and Nini-Suhien).

Findings

Habitat Disturbance and Hunting

With the exception of the Bia and Nini-Suhien National Parks, every forest we visited had been subject to varying intensities of selective logging, and some were being logged at the time of our visits. Although no records exist of logging in Bia N. P. or Nini-Suhien N. P. (Hawthorne and Juam Musah 1993), the forest in Bia had a very broken canopy with few large trees and much low, dense vegetation, probably as a result of past cultivation; the poor condition of the forest is the reason why it retained National Park status when the protection status of the remainder of Bia was downgraded to a Game Production Reserve (J. Wong pers. comm.).

In every forest we visited, we found evidence of recent hunting. Hunters were encountered, or shots were heard inside the forest, at Ankasa, Bia, Boin River, Kakum, Nini-Suhien, Subim,

Table 2. Anthropoid primate species seen or heard at different survey sites.

Site	Species Detected
Ayum F.R.	*Cercopithecus campbelli, C. petaurista, Procolobus verus*
Bia N.P. & Bia R.R.	*Cercopithecus campbelli, C. petaurista, Pan troglodytes*
Boin River F.R.	*Cercopithecus campbelli*
Kakum N.P. & Assin Attandanso R.R.	*Cercopithecus campbelli, C. petaurista, Colobus vellerosus, Procolobus verus*
Krokosua Hills F.R.	No anthropoids detected
Nini-Suhien N.P. & Ankasa R.R.	*Cercopithecus campbelli, C. petaurista, C. diana*
Pra Suhien F.R	No anthropoids detected
Subim F.R.	*Cercopithecus campbelli, C. petaurista*
Yoyo F.R.	*Cercopithecus* sp., *Colobus vellerosus*

and Yoyo; at all sites surveyed, we saw spent shotgun shells, piles of spent calcium carbide from acetylene headlamps, traps and/or recently-used hunters' camps. The few monkeys we did encounter fled rapidly on detecting us, a strong indication of hunting pressure. At most villages we visited we easily found hunters who could be interviewed about animals they knew in the forest, and as we traveled around the country we often passed armed hunters walking along the roads.

The links between logging and hunting are clear and obvious. Logging roads make access to the interior of forests easier, and logging crews often employ a hunter to obtain meat for them. But even without logging or logging roads, hunting pressure can be intense, as we witnessed inside the Nini-Suhien N. P.

Wildlife Protection Efforts

Outside the national parks and resource reserves, we encountered no evidence of any measures to protect wildlife. While certain rare mammals are strictly protected under Ghanaian law wherever they occur, little or no effort is made to enforce the law. Several months of the year are a closed season for hunting, but we still saw hunters on the road with guns at these times, and "bushmeat" being sold along the roadside. When asked about this, wildlife staff responded that the hunters can always claim to be shooting crop pests on their farms, which is permitted.

Within the Bia and Ankasa conservation areas we found evidence of rampant hunting, despite the presence of Wildlife Department protection staff. We found the staff in these places to be poorly paid, poorly housed and equipped, and generally poorly motivated. Patrols were said to be made into the forest, but our impression was that these efforts were superficial.

The best protected area we visited was Kakum, where protection efforts had been bolstered through the presence of the CI/USAID conservation project, which had improved the equipment, pay, and motivation of the staff. Although we had evidence of active poaching in the center of Kakum (e.g., shots heard in November 1993, and recent hunting camps seen), more patrolling was occurring and poachers were arrested occasionally.

Presence or Absence of Species

Table 2 shows which anthropoid primates were detected at each of our survey sites. Two small guenons, Campbell's and spot-nosed, were detected at most sites; the olive colobus and black-and-white colobus were each detected at two sites; the Diana guenon was detected at only one site (Ankasa/Nini-Suhien); and the chimpanzee was also detected at only one site (one distant vocalization heard at Bia). No direct evidence for the presence of mangabeys or red colobus was obtained at any site.

With the exception of the Diana guenon and chimpanzee, all the species we detected are relatively resilient to both logging and hunting; they do well in secondary growth, and often hide from hunters in thick undergrowth or vine tangles (Martin 1991).

Abundance of Species

Table 3 presents data on the rates at which monkeys were encountered within 50 m of a census route in the three forest conservation areas nominally under the protection of the Wildlife Department; these data are from slow censuses where the distance traveled was measured or closely estimated. Our data are compared with similar information collected in the 1970s at Bia and Ankasa (Martin 1976; Martin and Asibey 1979). The data are roughly but not exactly comparable; our data include monkeys distinctly heard near the census path, but not seen; the data of Martin (1976) and Martin and Asibey (1979) refer only to monkeys seen, with the exception of red colobus in Ankasa (reported

Table 3. Encounter rates with anthropoid primates (number of groups detected for each km censused) in three Ghanaian conservation areas, Kakum, Ankasa and Bia. Our data from 1993-96 are compared with similar information collected at Ankasa in 1976 (Martin 1976) and at Bia in 1977-78 (Martin and Asibey 1979). Figures do not include sounds of possible monkeys jumping in the canopy, or distant vocalizations.

Site (surveyor)	Distance censused (km)	Species and encounter rate (see key)								
		C. cam	*C. pet*	*C. dia*	*C. sp*	*Cb.atys*	*Co. vel*	*P. bad*	*P. ver*	Total
Kakum, Antikwaa (JO)	12	0.50	0.42	0	0.17	0	0	0	0.17	1.26
Kakum, Obuo River (JO)	16	0.25	0.31	0	0.25	0	0	0	0.19	1.00
Kakum, Obuo River (TS)	16	0.19	0.50	0	-	0	0	0	0.06	0.75
Bia N.P. + R.R (TS)	22	0.07	0.14	0	0.05	0	0	0	0	0.26
Bia N.P. (Martin & staff)	123	-	-	0.18	0.39	0.02	0.29	0.01	0.06	1.04
Bia G.P.R. (Martin & staff)	662*	-	-	0.14	0.35	0.02	0.16	0.02	0.07	0.76
Ankasa + Nini-Suhien (JO)	24	0.04	0.04	0.04	-	0	0	0	0	0.12
Ankasa (Martin)	35**	0.09	0.03	0.20	-	0.06	0.09	0.03	0	0.50

Key: *C. cam., Cercopithecus campbelli*; *C. pet., Cercopithecus petaurista; C. dia, Cercopithecus diana*; *C.* sp., small *Cercopithecus* species, almost certainly *C. campbelli* or *C. petaurista* - reported by Martin & Asibey (1979) as "mona and/or spot nosed monkey"; *Cb. atys, Cercocebus atys; Co. vel., Colobus vellerosus; P. bad., Procolobus badius; P. ver., Procolobus verus.*

* The figures reported here are the average rates from three different transects in Bia Game Production Reserve.

** Martin reported encounters as "frequency of observation per hour" from 14.5 hours of surveys; those data have been converted to encounters per km using the average walking speed of 2.4 km/hr reported in Martin & Asibey (1979). Encounter rates would obviously be higher if the walking speed was slower.

on the basis of vocalizations); and the census speed used by Martin and Asibey was faster than ours (reported as 2.4 km/hr by Martin and Asibey 1979).

These data on encounter frequencies highlight a number of points. We encountered monkeys in Bia and Ankasa at about 25% of the frequency with which they were encountered in the 1970s. We encountered monkeys more frequently at Kakum than in other Ghanaian forests (although the number of species was low, and the monkeys present were secondary forest species). Monkey densities at Kakum seem similar to those in Bia in the late 1970s, but Bia then had a full complement of forest species. In the late 1970s, Bia was the best protected forest area in Ghana, but at the time of our surveys Kakum was the only area receiving a serious protection effort. Despite the relatively high rates of encounter at Kakum (0.75-1.26 monkey groups/km) compared with other Ghanaian sites, these rates are still lower than in several other well-protected sites at which we have worked in Africa. In the Kibale Forest of Uganda, TTS sighted 2.08 monkey groups/km in mature unlogged forest, and 2.01 groups/km in heavily logged forest (Struhsaker 1975); at Tiwai Island in Sierra Leone, GHW sighted 2.08 groups/km in a mosaic habitat that was predominantly old secondary forest (Whitesides *et al.* 1988). The encounter rate with small guenons in Kakum is comparable to that in other forests (Tiwai: *Cercopithecus campbelli* + *C. petaurista*, 0.68 groups/km; Kibale logged forest: *Cercopithecus ascanius* + *C. mitis*, 0.66 groups/km); the total encounter rate is lower at Kakum because of the scarcity or absence of other species.

We detected very few monkeys in the six Forest Reserves we surveyed, and on several censuses in these forests we detected no monkeys of any kind.

Conclusions

With the exception of the spot-nosed and Campbell's guenon, and possibly the olive colobus, the forest monkeys of Ghana and the chimpanzee are under very serious threat. We will briefly discuss the status of each of the threatened species, based on our findings.

The white-thighed black-and-white colobus monkey (*Colobus vellerosus*) is hanging on in small numbers in a few forests. Its large size and attractive coat make it an obvious target for hunters, and the loud call of adult males can reveal the position of a group. However, this species is tolerant of habitat disturbance, and small groups can hide quite well in vine tangles. Kakum could support a viable population of this species if protection continues to be effective. The black-and-white colobus is also present at the Boabeng-Fiema Monkey Sanctuary, north of the forest zone, where this species and Campbell's guenon are traditionally protected (Fargey 1992); however, the Boabeng-Fiema sanctuary is small and totally isolated.

The Roloway guenon (*Cercopithecus diana roloway*) is only definitely still present in Ankasa/Nini-Suhien, where it is rare and almost certainly heavily hunted. Hunters and wildlife staff reported its presence in many others forests, including Kakum, but we neither saw nor heard this species (which has a very distinctive adult male loud call) anywhere but Ankasa. Under questioning, most hunters who reported the presence of this species said they had not seen it for some months or years. Although the Roloway population density is low in Ankasa, the species was historically relatively abundant here (Martin 1976, and see Table 3); the population would probably rebound to a viable size under effective protection.

We met no signs of white-naped mangabeys (*Cercocebus atys lunulatus*) in the field, but we saw a small captive group in the Kumasi Zoo, and all or most of the members of this group were apparently captured in the wild. These largely terrestrial monkeys are easy to hunt, but they can also use secondary forest and farmland outside reserves (Booth 1956). Based on hunters' reports, our guess is that this species is still present in several areas, but in very low numbers.

The chimpanzee (*Pan troglodytes verus*) is probably in a similar position to the mangabey, with the Bia area perhaps retaining the largest numbers (Bia is the only locality where a chimpanzee call was heard, and here TTS also saw a young captive animal in the possession of wildlife staff, said to have been confiscated from a hunter). We saw no chimpanzee nests at any site.

Miss Waldron's red colobus (*Procolobus badius waldroni*) is possibly now extinct in Ghana. As in other parts of Africa, this species is the easiest forest primate to hunt. The monkeys are large, brightly-colored, and noisy; they typically move in large social groups in the upper canopy and do not hide in the undergrowth or vine tangles. If they are present at a site they are hard to miss, but we found no sign of them anywhere, and no hunter's report of their current presence was convincing (the hunters giving the most accurate descriptions also reported not having seen the animals for a long time). Even in the 1970s, Bia seems to have been the only forest in Ghana where red colobus could be reliably seen, but Bia has had little effective protection from hunting since around 1980. A game guard who escorted JO and GW into Bia National Park in July 1995 reported that the only monkeys he had seen while stationed there for three years was a mixed group of Campbell's and spot-nosed guenons near the Kumkumso ranger station and visitor center.

Recommendations

Further Surveys

Our surveys of Forest Reserves in southwestern Ghana, as opposed to National Parks and Resource Reserves, so far have been superficial. Further surveys are needed to get a clearer picture of the status of the rarer forest primates. These surveys should devote more time to some reserves which as yet we have visited only briefly (such as Boin River), and they should examine some reserves we have not yet visited at all (such as Boi Tano and Cape Three Points). Recommendations for urgent conservation measures should be made if further surveys find any viable populations of the two monkeys that we have not encountered so far, the red colobus and mangabey.

In addition, surveys are needed in central and eastern Côte d'Ivoire, which shares its primate fauna (including the three locally-endemic monkeys) with western Ghana. Forest destruction and hunting appear to have been as intense, or more so, in Côte d'Ivoire as in Ghana, but surveys on the ground are still needed. Such a survey, to be conducted by Scott McGraw, is being planned

as this is written.

Improved Conservation in Existing Parks and Resource Reserves

Of Ghana's three forest conservation areas (Ankasa, Bia and Kakum), the vegetation at Ankasa is the least disturbed, and the only one in which we have so far encountered any of the primate endemics: the Roloway guenon. If given better protection, Ankasa almost certainly would support a viable population of this monkey. Further surveys in Ankasa are also needed, in an effort to locate primates which we did not see, but which hunters have suggested are still present: black-and-white colobus, mangabeys, and chimpanzees. The Bia forest is heavily degraded and being actively logged; even if it were given better protection, it may be too late to save any populations of the endemic monkeys in Bia, but a protection effort focused on chimpanzees might have some value for that species (although the numbers protected would be very small). Kakum now has relatively good protection, and it is an accessible forest where ecotourism is being developed. Although no viable populations of the endemic monkeys appear to survive at Kakum, it might be considered in the long run as a secondary Roloway guenon conservation area, if a reintroduction or translocation program could be implemented.

To make primate protection more effective and durable in these conservation areas, we recommend staff incentives and trust funds. Following recommendations made after our 1993 surveys, an incentive system was put in place at Kakum under which bonuses were paid to protection staff making arrests leading to convictions. This is said to have further improved protection in this forest (B. Asamoah-Boateng, pers. comm. 1996), although we have not been able to verify this directly. In the wake of our 1995 and 1996 reports to the Wildlife Department, extra staff have also been posted to Ankasa, new patrol bases established, and patrols leading to the arrest of poachers made deep into the conservation area (M. Abedi-Lartey, pers. comm., 1996). However, a bonus system is not yet in place at Ankasa.

Given the reluctance of governments in countries like Ghana to make large financial commitments to conservation, and given the impermanence of foreign-assistance projects, we recommend the establishment of conservation trust funds for sites such as Ankasa and Kakum. These funds would be established by donations from overseas sources, invested internationally, and managed by a board made up both national and foreign members. The trust funds should be sufficiently large that the annual income from the investments would pay for much of the basic protection of the conservation areas, including the payment of staff bonuses. Efforts are already being made by Conservation International to establish such a trust for Kakum, with initial funding from USAID.

Need for a Red Colobus Action Plan

Although some of the further survey work we have planned or suggested may locate a viable population of Miss Waldron's red colobus monkey, on present evidence we are not optimistic that a population will be found. This may be the first documented case of a distinct African primate taxon having becoming extinct in this century. The extinction of this monkey may have occurred less than 60 years after it was originally described (Hayman 1936), based on a type specimen collected by Willoughby P. Lowe in the western Ghana on Christmas Eve 1933 (the subspecies was named after Lowe's companion on his collecting trip).

The plight of this red colobus highlights the threats facing red colobus more generally. Between 14 and 17 allopatric forms of red colobus have been recognized and given at least subspecific status, and some of them should probably be regarded as distinct species (Oates *et al.* 1994). In the recently published revised edition of the *IUCN Conservation Action Plan for African Primates*, most forms of red colobus are listed as of conservation concern, and ten are among the most threatened of African primate subspecies (Oates 1996). In addition to *Procolobus badius waldroni*, these are *P. b. epieni* (a recently-discovered form in the Niger Delta), *P. b. preussi* on the Cameroon-Nigeria border, *P. b. pennantii* of Bioko, *P. b. bouvieri* of the Congo, *P. b. semlikiensis* of eastern Zaire and the Bwamba Forest of Uganda, *P. b. tephrosceles* of western Uganda and western Tanzania, *P. b. rufomitratus* of the Tana River (Kenya), *P. b. gordonorum* of the Udzungwa Mountains (Tanzania), and *P. b. kirkii* of Zanzibar.

In the last ten years, very little attention has been given to the plight of these red colobus (especially in comparison with the African apes), and some now appear to be approaching extinction. Research is badly needed on the genetics and phylogenetics of the red colobus to allow us to make more confident statements on the patterns of diversity in the group. A concerted effort should be launched to protect the populations that remain, before they slide into oblivion. This effort should include the raising of awareness both within and beyond the primatological community about the significant loss of biodiversity that may be occurring. Almost all the endangered forms of red colobus share their habitat with other threatened primates, and action aimed at red colobus conservation will help them too.

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Note Added in Proof

In April 1997, after this paper was written, Michael Abedi-Lartey observed Diana monkeys and white-naped mangabeys in the vicinity of the Draw River Forest Reserve, immediately east of Ankasa (M. Abedi-Lartey, pers. comm.).

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