

## The Distribution and Conservation Status of Colobus Monkeys in Tanzania

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**ABSTRACT.** Some problems of the subspecific taxonomy of both the black and white and the red colobus are discussed. New distribution data are given which effectively close the gap between *C. angolensis sharpei* and *C. angolensis palliatus* ranges. The distribution of *C. badius gordonorum* is described. Brief details of the conservation status of 54 populations of colobus are given and a call made for the increased protection of *C. a. adolfi-friederici*, *C. a. palliatus* (s.l.) and *C. b. gordonorum* populations.

### INTRODUCTION

Several recent publications have discussed the problem of the specific and subspecific taxonomy of the African Colobinae (DANDELOT, 1968; RAHM, 1970; THORINGTON & GROVES, 1970; KINGDON, 1971; DANDELOT & GROVES, pers. comm.). Colobus are restricted in East Africa to relatively isolated areas of montane, lowland, coastal and riverine forest. There is considerable evidence that these forest areas have been joined and separated several times during periods of climatic changes in the mid and late Pleistocene, the last period of major forest spread being from 12,000 to 4,000 years B. P. (HAMILTON in LIND & MORRISON, 1974). These repeated geographical isolations have allowed subspeciation within both species of the black and white colobus and in the red colobus. Present literature delimits subspecies on geographical distribution as well as on pelage and colour characters. Many authors stress that the lack of study specimens and the incomplete knowledge of distribution patterns make most subspecific taxonomy extremely tentative. At the present time extensive forest clearing for timber and cultivation and varied degrees of hunting for skins and meat are further fragmenting distribution patterns and eliminating colobus population.

This paper adds to the previously published knowledge of the distribution of both the lowland or Angola black and white colobus (*C. angolensis*) and the Iringa red colobus (*C. badius gordonorum*). Brief notes on population status, locality and habitat are given for 46 populations of black and white colobus and 8 populations of red colobus.

### METHODS AND RESULTS

This study was prompted by my observation of *C. angolensis* in *Hyphaene* palm forest on the banks of the Rufiji River in South-eastern Tanzania (38° 10' E, 7° 50' S). This sighting, which is outside the published range (KINGDON, 1971 although mentioned in SCHWARZ, 1929) led to my sending questionnaires to District Forest and Wildlife Officers throughout Tanzania asking for details of colobus distribution. Information received was followed up by further questionnaires and sites were visited both by myself and by staff of the Miombo Research Centre of the Tanzania Wildlife Division with whom I was working until late 1976.

Data from questionnaires and sites visited were added to published information and rec-

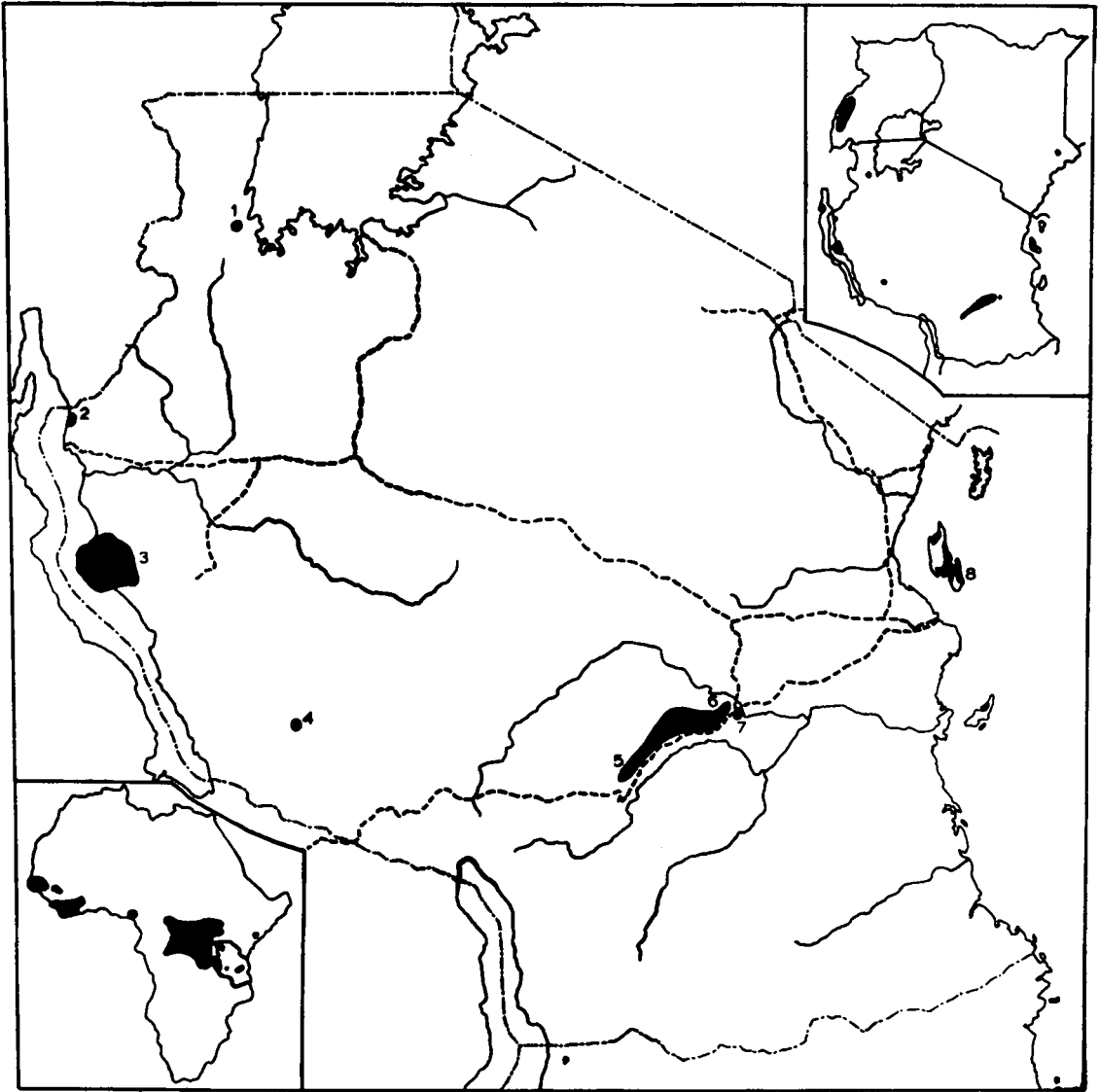


Fig. 1. The distribution of red colobus, *Colobus badius* in Tanzania. The numbers refer to populations listed in Table 3. 1, 2, 3, 4: *C. b. tephrosceles*; 5, 6, 7: *C. b. gordonorum*; 8: *C. b. kirkii*.

ords from Wildlife and Forest Division reports and files. Distribution patterns are shown in Figure 1 for the red colobus and Figure 2 for the black and white colobus. Numbers on the maps refer to populations described in Tables 1, 2 and 3.

#### CLASSIFICATION

The classification of the African colobines is still uncertain, especially as regards the red

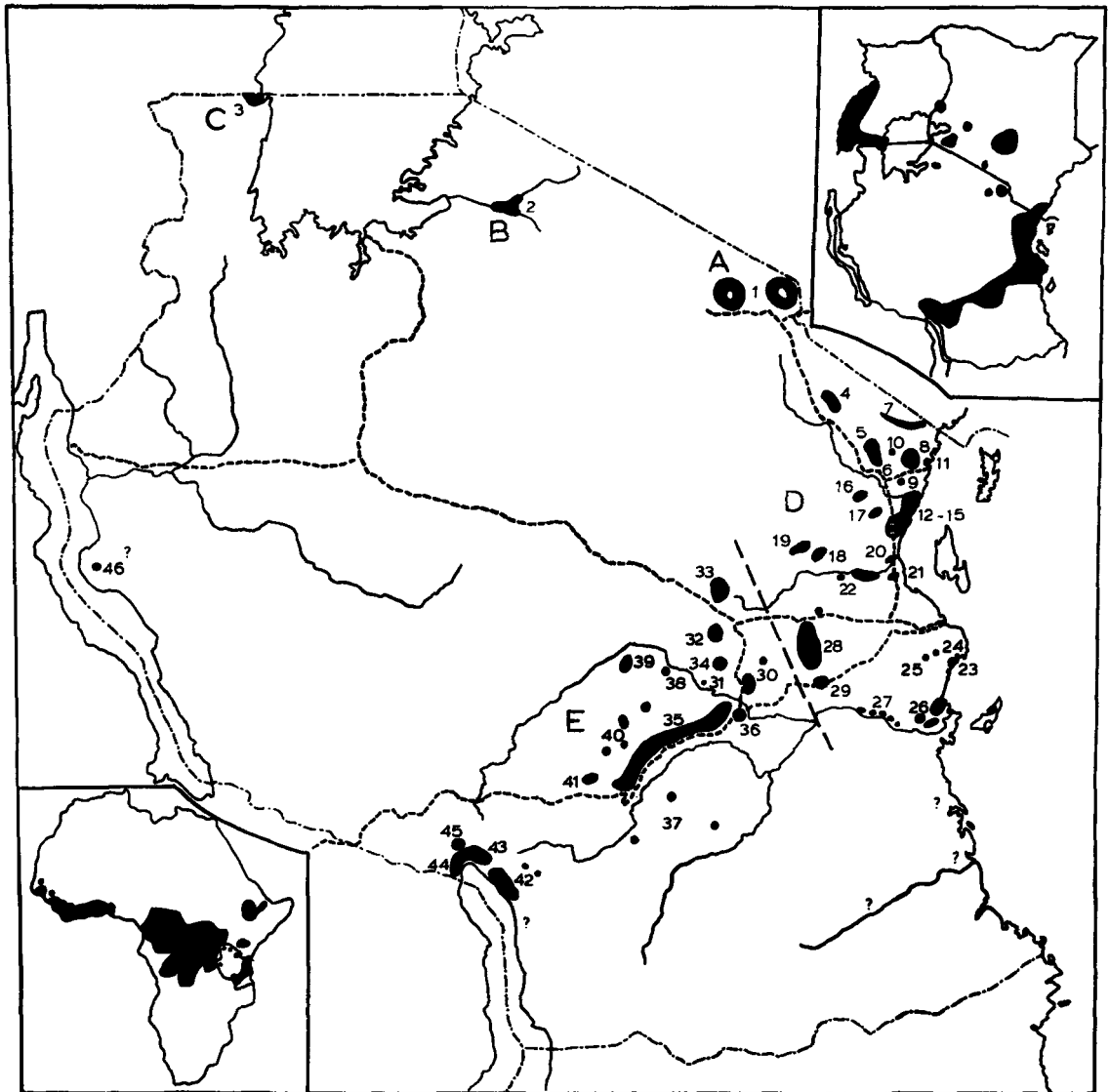


Fig. 2. The distribution of black and white colobus, *Colobus angolensis* and *C. guereza* in Tanzania. The numbers refer to populations listed in Tables 1 and 2. A: *C. guereza caudatus*; B: *C. g. matschei*; C: *C. angolensis adolfi-friederici*; D: *C. a. palliatus*. The heavy dashed line indicates the boundary between *palliatus* and *sharpei* races.

colobus (STRUHSAKER, 1975). The classification used in this paper follows DANDELLOT (1968) for the black and white colobus; and RAHM (1970) and STRUHSAKER (1975) for the red colobus, in which *C. badius* is used as the specific name for mainland animals and not *C. rufomitratu*s as in DANDELLOT (1968). *C. b. kirkii* is maintained as a subspecies as recent observations by STRUHSAKER (1977b; pers. comm.) show the close relationships between these populations and those of *C. b. gordonorum*.

Genus: *Colobus* ILLIGER 1811, colobus monkeys

Subgenus: *Colobus* ILLIGER 1811, black and white colobus

*C. guereza* RUPPELL 1835 (syn. *C. abyssinicus* OKEN 1816)

*C. g. caudatus* THOMAS 1855, Kilimanjaro colobus

*C. g. matschei* NEUMANN 1899, Kavirondo colobus

*C. angolensis* SCLATER 1860 (syn. *C. polykomos* ZIMMERMAN 1870)

*C. a. adolfi-friederici* MATSCHIE 1914, Sango Bay colobus

*C. a. palliatus* PETERS 1868, lowland colobus (including *C. a. sharpei* THOMAS 1902)

Subgenus: *Piliocolobus* ROCHEBRUNE 1886, red colobus

*C. badius* KERR 1792 (syn. *C. pennantii* WATERHOUSE 1958)

*C. b. tephrosceles* ELLIOT 1907, western red colobus

*C. b. gordonorum* MATSCHIE 1900, Iringa red colobus

*C. b. kirkii* GRAY 1868, Zanzibar red colobus

## DISCUSSION

### *C. g. caudatus*

Within Tanzania, this subspecies is entirely restricted to the mountain forests of Kilimanjaro and Meru. Recorded populations to the south of Kilimanjaro (MATSCHE, 1895) are now extinct. There are no records of colobus in the extensive montane forests of Monduli, Oldeani, Ngorongoro or Hanang to the west of Mt. Meru. Despite its restricted locality, the extensive habitat, of which much is within national parks and reserves, means the conservation status of this subspecies is relatively secure.

### *C. g. matschei*

This subspecies is restricted to a small area of riverine forest in Serengeti National Park and the present population size is unlikely to be in excess of 200 individuals. The past range was considerably larger (KITTENBERGER, 1929) and the subspecies still exists in Western Kenya. The population is protected in regard to hunting pressure but habitat loss due to fire is still a potential threat.

### *C. a. adolfi-friederici*

This subspecies in Tanzania is found only within the Minziro forest of extreme northwestern Bukoba District, but has a wider range in Uganda, Burundi and Ruanda. There are no recent reports of the status of the subspecies in Minziro, but the recent invasion of Ugandan troops into Minziro and the subsequent fighting must have further depleted the population. This subspecies is the most threatened in Tanzania and to safeguard its existence translocation may be necessary. If such a step is considered necessary then Rubondo Island National Park in Lake Victoria may prove a suitable sanctuary.

### *C. a. palliatus* and *C. a. sharpei*

Data presented in this paper serve to close the gap between previous distribution patterns

of these two subspecies. RAHM (1970) justifies the retention of *C. a. sharpei* on the grounds of its geographical separation and on slight differences in tail pelage. As the two races are now shown not to be isolated, the view of DANDELLOT (1968) in combining the two forms into one subspecies would appear to be correct.

The discovery of *C. angolensis* in the upper regions of the Mahale mountains (KANO, 1971; NISHIDA, 1972; pers. comm. in 1976) considerably extends the range of this species in Tanzania and serves to reinforce RAHM's (1970) and KINGDON's (1971) view of *C. angolensis* entering Eastern Africa via the southwest from the montane forests of the Central African rift valley. ANSELL (1959) examined the reports of colobus presence in Northern Zambia and concluded that such records were due to and incorrectly cited type locality and that the colobus does not occur in Zambia.

The Rufiji River would appear to be the present day southern extremity of *C. angolensis* distribution. Several populations are known on the north bank, none on the south bank. However, black and white colobus were known from several areas in Southeastern Tanzania earlier this century, where they are known as "Ngoromela" (Kingindo) (D. MADOGO, District Natural Resources Officer, Liwale, pers. comm.).

Reports suggest colobus were commonly seen before the advent of European rule, but that vegetation clearing and hunting for skins destroyed most populations. Specific localities for past occurrence are: Rondo Forest, Lindi; Mbwekuru River, Liwungu Forest, Lindi; and Ngarama and Miandi Forests, Kilwa. If one assumes these reports to be correct then the past southern limit of their distribution would have been the Ruvuma River.

Despite the wide range of *C. a. palliatus* in Tanzania only one viable population is contained within a national park or a game reserve (see Population No. 30 in Mikumi Park). Many populations are within Forest Reserves but their conservation status remains in doubt until formal status and recognition is given to Forest Division's inviolate catchment forests. Populations in the Usambara, Uluguru, Uzungwa and Mbeya-Poroto mountains should be so protected. Magombera Forest (see Population Nos. 36 and 7) with six primate species including the rare Iringa red colobus should be incorporated into the adjacent Selous Game Reserve (RODGERS, HOMEWOOD & HALL, 1979) (Appendix 1).

### *C. badius*

This species distribution is extremely fragmented and several populations appear to have become extinct within the last 25 years, e.g., those of Moyowosi and Mtambo quoted by SWYNNERTON and HAYMAN (1951). No new information on *C. b. tephrosceles* has become available apart from confirmation of the continuation of the Biharamulo and Sumbawanga populations. The Sumbawanga population, being the most isolated and contained within one small discrete forest stand, is in need of more detailed documentation (Appendix 2).

SWYNNERTON and HAYMAN (1951) record the distribution of Iringa red colobus (*C. b. gordonorum*) as Dabaga and Uzungwa Mts., Iringa District. KINGSTON (1972) however was unable to locate this subspecies in a four-day survey of New Dabaga Forest Reserve and environs. RODGERS and HOMEWOOD (1979) discuss the distribution of the red colobus in the Uzungwas and report no past or present records from the west and north of Dabaga (i.e., Mufindi and Image Forests) and that there have been no records from Dabaga since at least 1950. *C. b. gordonorum* was reported from Mbongolo, Kilanzi and Uzungwa Scarp Forests to the south and east of Dabaga. Higher densities occur in the forest of the eastern Uzungwa escarpment, e.g., Mang'ula and Mwanihana, and possibly the largest population exists in

Table 1. Conservation status *Colobus guereza*.

Population No. <sup>1</sup>	Extension <sup>2</sup>	Visited <sup>3</sup>	District <sup>4</sup>	Locality <sup>5</sup>	Status <sup>6</sup>	Area (km <sup>2</sup> ) <sup>7</sup>	Population size <sup>8</sup>	Group size <sup>9</sup>	Habitat	Threat <sup>10</sup>			Outlook <sup>11</sup>	Notes
										H	C	L		
<i>C. g. caudatus</i>														
1.	-	+	Arumeru Kilimanjaro	Mt. Kilimanjaro Mt. Meru	PFG	400	2000 +	2-20	Dry and wet montane forest	1	1	1	1	CHILD (1974); ULLRICH (1961), less common at higher altitudes.
<i>C. g. matschei</i>														
2.	-	+	Musoma	Grumeti-Orangi R., Serengeti N.P.	P	20	200?	10?	Riverine forest in patches				1	KITTENBERGER (1929) recorded population as numerous Serengeti and Mara River areas.

1) Refer to number on maps; 2) + indicates population record is outside the range given by KINGDON (1971); - indicates not an extension; 3) + indicates area visited by myself or colleagues; - indicates not visited by me or colleagues; 4) Tanzania Administrative District names; 5) names of forests (F. or F. R.), game reserves (G. R.), mountain ranges (Mts.), national parks (N.P.), rivers (R.) or villages; 6) F: forest reserve; G: game reserve; O: open area; P: park; (P): park due to be gazetted; 7) estimated size of forest area(s) in square kilometers, or length of riverline; 8) estimate of population size. VS: very small; S: small; L: large; ? : no records; 9) estimate of group size, usually given as a range of sizes. ? : no records; 10) H: hunting; C: clearing; L: logging. Blank: none; 1: slight; 2: moderate; 3: heavy; 11) 1: no threat; 2: threatened, can survive with further conservation action; 3: soon to be eliminated.

Table 2. Conservation status *Colobus angolensis*. (For reference numbers see the end of the table.)

Population No. 12	Extension 23	Visited 23	District 23	Locality 23	Status 23	Area (km <sup>2</sup> ) 23	Population size 23	Group size 23	Habitat	Threat 10			Outlook 13	Notes
										H	L	C		
<i>C. a. adolfi-friederici</i>														
3.	—	—	Bukoba	Minziro F. along Uganda border	F	100	?	?	Lowland <i>Podocarpus</i> swamp forest	3	1	3	2	Only population in Tanzania. Numbers reduced by 1979 war with Uganda. See Population No. 46.
<i>C. a. palliatus</i>														
4.	+	—	Same	S. Pare Mts., Chome, Kiranga	F	15	200+	12	Dry montane forest steep slopes	1	1		1	No records from North Pare Mts.
5.	—	+	Lushoto	W. Usambara Mts., Shume	F	200	L	S	Montane forest steep slopes	1	2	2	1	GROVES (1974).
6.	—	+	Lushoto	S. Usambara Mts., Dindira, Mazumbai	FOE	25	L	S	Montane and lowland forest patches	1	1		1	Includes Mazumbai Nature Reserve. GROVES (1974).
7.	—	—	Lushoto Tanga	Umba, Mwaki-jembe, Mkota, Shagein	GO	5	S	S	Riverine forest degraded, patchy	2	2	3	3	Note (a) below.
8.	—	+	Muheza	E. Usambara Mts., Amiani and environs	FOE	300	L	5-10	Lowland rain forest	2	2	1	1	Hunted for food. GROVES (1974).
9.	—	+	Muheza	Mikembe F., Mapojoni	O	5	S	S	Woodland, forest patches	2		3	3	Hunted by sisal estate staff.
10.	—	+	Muheza	Mzimbazi R., Maramba	O	5	S	S	Woodland, forest patches	2		3	3	Area used for ranching.
11.	—	+	Tanga	Sigi R., Mzima, Kibatini, Amboni	O	3	S	S	Cultivation, forest patches	1		3	3	Colobus reported eating maize shoots.
12.	—	+	Pangani	Mkaramo, F., Kwamisi F., Ngulwe	FR	20	L	10-20	Coastal forest patches in woodland	1	1		1	Rumours of red colobus present 10 years ago.
13.	—	+	Pangani	Mkoko F., Sakura	O	5	S	6	Isolated forest patches	1		3	3	
14.	—	+	Pangani	Mkwaja Ranch	E	5	S	10-20	Isolated forest patches				1	Note (b) below.
15.	—	+	Pangani	Mzibugwe F., Bweni	FO	15	L	10	Riverine, coastal forest	1	1	1	2	Close to Pangani town.

(continued)

Table 2. (continued)

Population No. <sup>1</sup>	Extension <sup>2</sup>	Visited <sup>3</sup>	District <sup>4</sup>	Locality <sup>5</sup>	Status <sup>6</sup>	Area (km <sup>2</sup> ) <sup>7</sup>	Population size <sup>8</sup>	Group size <sup>9</sup>	Habitat	Threat <sup>10</sup>			Outlook <sup>11</sup>	Notes
										H	L	C		
16.	+	+	Handeni	Madebe F., Mbuzini F., Mkunguru F., Magambazi F.	FO	30	200?	10	Forest patches in woodland	1	1	1	1	
17.	+	+	Handeni	Mazingara areas, Mkata R., Kwamawe, Kwangubiri and Kwasewa Forests	FO	20	L	10-20	Forest patches in woodland	1	1	1	1	Rumours of past red colobus presence at Kwasewa.
18.	+	+	Handeni	Japa F., Mgera R.	O	5	S	?	Scattered forest patches	1	1	1	2	
19.	-	-	Morogoro Handeni	Ngoru Mts., S. Ngoru F.	FO	30	L	?	Montane forest	1	1	1	1	Exact distribution limits to west of Ngorus not clear.
20.	+	-	Bagamoyo	Uzigua, Kwamduma	F	20	L	?	Lowland forest patches in woodland	1			1	Few questionnaires were returned from Bagamoyo.
21.	+	-	Bagamoyo	Saratinge F., Congo, Mihuga, Matipwili	O	5	S	?	Riverine and coastal forest	2	2	3	3	It is probable colobus are more widespread than shown.
22.	+	+	Bagamoyo	Warmi scarp F., Pongwe F., Msungwe, Mkok	FO	20	S	?	Lowland and riverine forest	1	2	2	2	
23.	+	+	Kiserawe	Kisiju	O	5	S	?	Coastal forest on shoreline	1	1	3	3	Dense <i>Trachylobium</i> forest.
24.	+	-	Kiserawe	Mpera,	O	5	S	?	Coastal and riverine forest	1	1	3	3	Note (c) below.
25.	+	-	Kiserawe	Mkuranga Nyamoto, Mkamba	O	5	S	?	Coastal and riverine forest	1	1	3	3	
26.	+	+	Rufiji	Kikale, Northern delta forests, Ruhoi, Kibiti	O	10	S	5-10	Coastal forest and thicket, ground water forest	1	1	2	2	Note (d) below.
27.	+	+	Rufiji	Mroka, Kipugira	O	5	S	5	Isolated forest patches along Rufiji River	2	1	3	3	Note (e) below.

(continued)



Table 2. (continued)

	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
	-	+	-	+	-	+	-	+	-	+	+	+	-
	Morogoro	Morogoro	Morogoro Kilosa	Kilosa	Kilosa	Kilosa	Kilosa	Kilombero	Kilombero	Ulanga	Iringa	Iringa	Iringa
	Uluguru Mts., Ruvu, Kiroka, Mahembe, Kinole, Mwaya and Bunduki	Kisaki, Mgeta and Matambwe	Mikumi N.P., Lomanga, Luhembe	Ukwira F., Malolo	Kizi Mwachigulu F., Kidete, Nongire F.	Ukaguru Mts., Mamiwa Kisara F.	Pala Ulanga F.	Uzungwa Mts., Mwanithana, Ikwambi Chita, Ihange F. etc.	Magombera F.	Mahenge Mts., Igamba, Sali, Muhulu and Ruhudji F.	Udekwa F. Image F.	Uzungwa Scarp, Dabaga, Ukwega F.	
	F	O	P	O	OF	FO	FO	FO	F	FO	FO	FO	FO
	250	5	10	10	10	100	40	200+L	12	100	5	75	50
	L	S	200	?	?	L	L	L	L	L	S	L	L
	5-10	S	5-10	?	?	?	5-10	5-10	5-12	?	?	?	?
	Montane forest	Riverine forest	Riverine, lowland forest	Dry montane forest	Dry montane forest	Dry montane forest	Montane forest	Montane and riverine forest	Lowland forest	Lowland and montane forest	Dry riverine forest	Dense montane forest	Montane forest
	2	2	1	1	2	2	1	2	2	1	2	1	2
	1	1	1	1	2	1	1	1	1	1	2	1	1
	1	2	1	2	2	1	1	1	1	1	2	1	1
	Lowland population to east at Mikese still exist although threatened.	Note (d) below.	Only population in a national park.		Rumours of red colobus in 1950s.		Rumours of red colobus. STRUHSACKER (1977).	See Table 3.	RODGERS, HOMEWOOD and HALL (1979). See Table 3.	Few records from a large poorly known forested area.	RODGERS and HOMEWOOD (1979).	RODGERS and HOMEWOOD (1979).	

(continued)

Table 2. (continued)

Population No. 1	Extension <sup>2</sup>	Visited <sup>3</sup>	District <sup>4</sup>	Locality <sup>5</sup>	Status <sup>6</sup>	Area (km <sup>2</sup> ) <sup>7</sup>	Population size <sup>8</sup>	Group size <sup>9</sup>	Habitat	Threat <sup>10</sup>			Outlook <sup>11</sup>	Notes
										H	L	C		
41.	-	+	Mufindi	Mufindi Scarp F.	F	35	S	S	Scattered forest patches	2	2	2	2	RODGERS and HOMEWOOD (1979).
42.	+	-	Njombe	Njirikuru F., Lu-ponde, Silupati F., Livingstone Mts.	FO	150	?	?	Montane dry forest	1	1	1	1	Colobus absent from Mbinga District to south.
43.	-	-	Rungwe	Mporoto Mts.	FO	90	L	?	Montane forest	1	1	1	1	Recorded in district book as causing crop damage.
44.	-	-	Kyela	Kabulo F., Masukulo	F	20	L	?	Montane forest	1	1	1	1	Abundant (District Forest Officer, pers. comm.).
45.	-	-	Mbeya	Mbeya and Rungwe Mts.	FO	400	L	?	Montane forest	1	1	1	1	
46.	-	-	Kigoma	Mahale Mts.	FO	50	S	?	Montane forest types				1	Note (g) below.

1)-11): See the footnotes to Table 1. Notes: a) PARKER (pers. comm.) confirmed presence of the black and white colobus in Mkomazi in 1968, although judged absent by HARRIS (1967). The black and white colobus is present from Kenya-Tanzania border upstream along Umba River to 50 km above Mwakijembe (ANSTEY, pers. comm.). Forest was then 150 m wide (1955). In late 1950s Masai pastoralists entered the area and most forest disappeared by 1963; b) Rumours of the red colobus from Koemi River forest in Kilimwango Sisal Estate near Mkwaja within last ten years; c) Pugu Hills used to carry the black and white colobus in 1950s. MATSCHIE (1893) quotes the black and white colobus in "Dar es Salaam and Uzaramo areas"; d) The black and white colobus and more frequently *Cercopithecus mitis* (blue monkey) utilize mangrove forest along delta banks; e) Mroka population in *Hyphaene-Sterculia* open palm forest on edge of Selous Game Reserve; f) Matambwe River populations are on boundary of Selous Game Reserve. I have one record of a single male black and white colobus from Tagalalla spring forest 25 km south of Matambwe in the reserve (SPEED, pers. comm. in 1978); g) KANO (1971) and NISHIDA (1972) discuss presence of *C. angolensis*. Unknown if *C. a. palliatus* or more likely *C. a. adolfi-friederici*.

Table 3. Conservation status *Colobus badius*.

Population No. 1)	Extension 2)	Visited 3)	District 4)	Locality 5)	Status 6)	Area (km <sup>2</sup> ) 7)	Population size 8)	Group size 9)	Habitat	Threat 10)			Outlook 11)	Notes	
										H	C	L			
<i>C. b. tephrosceles</i>															
1.	-	+	Biharamulo	Biharamulo (and Burigi G.R.?)	G	30	S	20	Dry and riverine forest	Fire			1	Area described by RODGERS, LUDANGA and DESUZO (1978). Note (a).	
2.	-	-	Kigoma	Gombe Stream N.P.	N	70	700	30-90	Evergreen forest				1	CLUTTON-BROCK (1975a, b).	
3.	-	-	Kigoma	Mahale Mts.	FO	1000	2000+	30-50	Montane forest types				1	NISHIDA (1972).	
4.	-	-	Sumbawanga	Mbizi F.R.	F	20	100+	30+	Montane forest		1	1	1	Note (b). VESEY-FITZGERALD (1965). Note (c).	
<i>C. b. gordonorum</i>															
5.	-	+	Iringa	Uzungwa Mts. south and east slope forests	FO	100	?	20+	Montane forest		3	2	2	2	RODGERS and HOMEWOOD (1979). Note (d).
6.	-	+	Kilombero	Uzungwa Mts., Kilombero Scarp and Mwanihana F.R.	FO	200	?	20+	Lowland and montane forests		2	2	1	2	STRUHSAKER (1977a).
7.	+	+	Kilombero	Magombera F.R.	F	12	300	17-30	Lowland, ground water forest		2	2	2	2	RODGERS, HOMEWOOD and HALL (1979). Note (d).
<i>C. b. kirkiti</i>															
8.	-	+	Zanzibar	Jozani F.R., Uzi Island, Muyuni	FO	20	1000+	10-40	Coastal and ground water forest		1	2	2	1	SILKILUWASHA (1979); STRUHSAKER (1977b). Note (e).

1)-11) See the footnotes to Table 1. Notes: a) Population at Nyamambuga River (SWYNNERTON & HAYMAN, 1951) now extinct; b) population at Niamanzi River (SWYNNERTON & HAYMAN, 1951) now extinct. Their record of "Moyowosi" with no coordinates is of interest, the only likely habitat near Moyowosi is Murungu Spring or Mwalye Mt. and I can trace no record of colobus at these areas; c) Mbizi was visited by RODGERS, HOMEWOOD and STRUHSAKER in April 1980. The forest is estimated at 26 km<sup>2</sup> but fire and cultivation are causing local decreases. Ten groups of red colobus were encountered in less than 20% of the forest. Group size averaged 25, juveniles being common; d) Magombera Forest Reserve contains the highest density and probably highest population of Iringa red colobus; e) Jozani Forest Reserve has been declared a nature reserve, this forest contains an estimated 430 red colobus.

Magombera Forest Reserve (Population No. 7). Red colobus are subject to severe hunting pressure (being considered a delicacy and preferable to black and white colobus), and forests are becoming increasingly fragmented. RODGERS and HOMEWOOD (1979) and RODGERS, HOMEWOOD and HALL (1979) point out that the present distribution of red colobus is considerably less than that previously recorded and that populations are rapidly decreasing. Magombera Forest Reserve affords the best opportunity for long term effective conservation.

After many years of doubt, the future status of the Zanzibar red colobus is now secure. FRANK SILKILUWASHA (pers. comm. in 1978) and STRUHSAKER (1977b) record the presence of small but viable populations outside Jozani Forest Reserve, and the Jozani population is no longer under threat of hunting and forest clearance. There is every hope that part of Jozani will be afforded full national park status in the coming years. There are plans to translocate Zanzibar red colobus to Rubondo Island National Park (SILKILUWASHA, pers. comm.). If Jozani does become a park then such a move, which is likely to be costly in terms of finance and animal life, is no longer of conservation importance.

Whilst compiling this paper I received reports of the past and present existence of red colobus in areas well outside the published range. These reports from Pala Ulanga (34), Makaramo (12), Pangani Sisal Estates (14) and Kwasewa (17) are in a line between *C. b. gordonorum* and *C. b. kirkii* ranges. Only in the Pala Ulanga case was red colobus reported still to be present, but STRUHSAKER (1977a) was unable to locate them in a two-day visit. Assuming the *gordonorum* and *kirkii* forms to have been in contact in the recent past, it would not be surprising to locate relic colobus populations in suitable pockets of intervening forest. Given the secretive and silent habits of this species, small populations would be difficult to confirm without extensive field work. Attempts are being made to locate skin fragments in the possession of older villagers.

To conclude, this paper shows that our present knowledge of distribution patterns of quite large mammals is still incomplete and that much information can still be obtained by persistent questionnaires and site visits. It is increasingly apparent that the call by THORINGTON and GROVES (1970) for taxonomists to pinpoint the need for greater conservation measures may be too late. Urgent protection must be given now to the Iringa red colobus and the Sango Bay colobus and ecological investigations started into the status of Sumbawanga red colobus and southern mountain block populations of black and white colobus.

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## REFERENCES

- ANSELL, W. F. H., 1959. The type localities of *C. angolensis sharpei* and *C. angolensis sandbergi*. *Rev. Zool. Bot. Afr.*, 60: 168-171.
- CHILD, G. S., 1974. Some notes on the mammals of Kilimanjaro. *Tanganyika Notes & Rec.*, 64: 77-83.
- CLUTTON-BROCK, T. H., 1975a. Feeding behaviour of *Colobus badius* and *Colobus guereza* in East Africa. *Folia Primatol.*, 23: 165-207.

- , 1975b. Ranging behaviour of red colobus in Gombe National Park, Tanzania. *Anim. Behav.*, 23(3): 165–207.
- DANDELOT, P., 1968. *The Primates. Preliminary Identification Manual for African Mammals*. Smithsonian Institution, Washington, D. C.
- GROVES, C. P., 1974. Notes on the ecology and behaviour of the Angola colobus in Northeast Tanzania. *Folia Primatol.*, 20: 12–26.
- HARRIS, L., 1970. Some structural and functional attributes of semi-arid East African ecosystem. Ph. D. Thesis, Michigan State Univ., Michigan.
- KANO, T., 1971. Distribution of the primates on the eastern shore of Lake Tanganyika. *Primates*, 12: 281–304.
- KINGDON, J., 1971. *East African Mammals. Vol. 1*. Academic Press, London.
- KINGSTON, T. J., 1972. The Oxford expedition to Zanzibar. *Bull. Oxford Exped. Soc.*, 7(4): 157–188.
- KITTENBERGER, K., 1929. *Big Game Hunting and Collecting in East Africa*. Arnold, London.
- LIND, E. M. & M. MORRISON, 1974. *East African Vegetation*. Longmans, London.
- MATSCHIE, P., 1895. *Die Säugetiere Deutsch-Ost-Afrikas*. Reimer, Berlin.
- NISHIDA, T., 1972. A note on the ecology of the red colobus monkeys living in the Mahari Mountains. *Primates*, 13: 57–64.
- PROCTOR, J., 1959. *Notes on Image Forest Reserve*. Tanzania Forest Division Files.
- RAHM, U. H., 1970. Ecology, zoogeography and systematics of some East African forest monkeys. In: *Old World Monkeys*, T. H. NAPIER & P. H. NAPIER (eds.), Academic Press, London, pp. 589–626.
- RODGERS, W. A. & K. M. HOMEWOOD, 1979. Preliminary report on the distribution and conservation status of red colobus in the Uzungwa Mountains, Tanzania. Univ. of Dar es Salaam. (Mimeo)
- , & J. B. HALL, 1979. An ecological survey of Magombera Forest Reserve, Tanzania. Univ. of Dar es Salaam. (Mimeo)
- , R. I. LUDANGA & H. P. DESUZO, 1978. An ecological survey of Biharamulo, Burigi and Rubondo Island Game Reserves. *Tanzania Notes & Rec.*, 81: 99–124.
- SCHWARZ, E., 1929. On the local races and distribution of the black and white colobus monkeys. *Proc. Zool. Soc. London*, 1929: 585–594.
- SILKILUWASHA, F., 1980. The distribution of Zanzibar red colobus. *Afr. J. Ecol.*
- STRUHSAKER, T. T., 1975. *The Red Colobus Monkey*. Univ. of Chicago Press, Chicago.
- , 1977a. Report on a survey of red colobus monkeys in the Magombera Forest Reserve, Tanzania. (Typescript)
- , 1977b. Report on a survey of the Zanzibar red colobus monkeys. (Typescript)
- SWYNNERTON, G. E. & A. HAYMAN, 1951. The mammals of Tanganyika territory and Zanzibar protectorate. *J. E. Afr. Nat. Hist. Soc.*, 53: 274–393.
- THORINGTON, R. W. & C. P. GROVES, 1970. An annotated classification of the Cercopithecoidea. In: *Old World Monkeys*, T. H. NAPIER & P. H. NAPIER (eds.), Academic Press, London, pp. 629–647.
- ULLRICH, VON W., 1961. Zoobiologie und soziologie der *Colobus* affen. *Der Zool. Gart. Bund.*, 25-Heft 6: 305–368.
- VESEY-FITZGERALD, D., 1965. The utilization of natural pastures by wild animals in the Rukwa Valley, Tanganyika. *E. Afr. Wildl.*, 3: 38–49.
- , 1966. Mammals of the Rukwa Valley. *Tanganyika Notes & Rec.*, 62: 61–72.

### Appendix

- 1) The southern half of Magombera forest was incorporated into the Selous Game Reserve in September 1980.
- 2) Sumbawanga colobus were surveyed in April 1980 by RODGERS and STRUHSAKER. The population is relatively secure (see Table 3).

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