Field Guide to Mahale

Studies on the social structure and ecology of wild chimpanzees have been going on in the Mahale Mountains for 15 years. Research on the natural environment has also been conducted in order to gain better understanding of their way of life. At present, findings are still far from complete; even the questions about their social structure are still left unanswered, awaiting new findings that will result from more long-term observations.

The studies must also be done on the all fauna and flora in the area, which will have to be carried on in a systematic manner by teams of specialists. The following chapter will discuss chimpanzee behavior in general, while details on other vertebrate fauna in the area will be summarized in the second chapter and findings up to the present on the environment, in the third.

This report will be a preliminary guide for various people having an interest in the soon to-be established national park; it will help them get a better understanding of the natural environment in the area and will provide a convenient general introduction for present and future Mahale researchers as well.

Even at present we can point out several important characteristics of the Mahale area in biogeographical terms. The greater part of Tanzania is consisting of dry land, one notable exception of which is the slopes on the western side of the Mahale Mountains, where the terrain is moist and provides good environmental conditions for forest-living animals.

In this area, feature of the West-African tropical rain forest can clearly be observed, interlaced with stretches of savanna; as a matter of fact, Mahale is the ecotone of forest and savanna. Biogeographical components of eastern, western, and southern Africa are present in Mahale.

Such diversified natural elements are indicative of the past history of the African continent; west African components must have advanced and receded to and from the area several times during successive pluvial and interpluvial periods dating back at least to the Pleistocene age, each time leaving some elements behind, whether of plants or animals. Chimpanzees of Tanzania might just be one of those elements that stayed behind; the Great Rift Valley traversing the African continent from north to south was often used as a natural corridor by animals. Not only, therefore, can the past history of the continent be observed in the present flora and fauna of the area, but the chimpanzee, in particular, is of great importance in helping to retrace man's past.

Japanese researchers established their first research base for chimpanzees at Kabogo Point, mid-way between Kigoma and Mahale, in 1961. At that time, the area was uninhabited; it was made up of lush and beautiful primary forest and miombo woodland, covering the entire side of the Kabogo Hills. But in this short period of 20 years, the environment has undergone profound changes. Although the area was part of the Nkungwe Bay Forest Reserve, human dwellings have been built around the lake, and land from the lake front to the base of the hills has been completely cultivated.

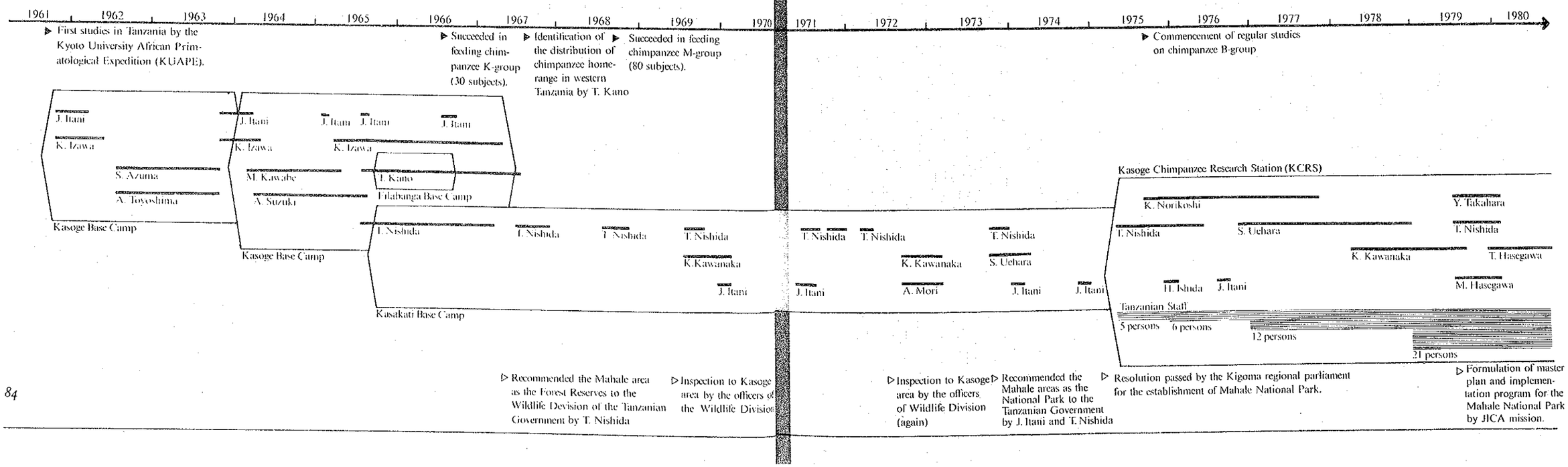
The extensive riverine forests, where new species of butterflies were once discovered, have been cut down for the most part. Chimpanzees who used to live there have ceased to be observed, probably taking refuge deep into the inland area.

That such drastic deterioration of ecosystem could have taken place in such a short period is certainly deplorable. But it is expected that the establishment of a new national park will help protect the nature in Mahale for the benefit of future generations.

This report is based on the data collected up to now by KUAPE and KCRS; it also contains some unpublished data; in a sense, the report can be said to contain in essence the partial history of Mahale National Park. It is but a first step, which should be supplemented by the efforts of all future researches. It is sincerely hoped that this booklet will help stimulate efforts aimed at protecting the environment.

Dr. Junichiro ITANI

History of study on chimpanzees in west Tanzania



1. Chimpanzees

Morphological characteristics of chimpanzees in Mahale

Chimpanzees in Mahale belong to the subspecies, *Pan troglodytes schweinfurthii*. Fig. 10 of Chapter 1 shows the distribution of this subspecies of chimpanzees in the area, which is the most easterly part of the region inhabited by chimpanzee populations. The habitat of Tanzanian chimpanzee occupies the most southeasterly zone where this species can be found.

The subspecies are more commonly known as either long-haired chimpanzees or bald-headed chimpanzees, although these two general terms seem to be contradictory. The term long-haired owes its origin to the fact that their body is covered with long and coarse hair and their cheeks are hairy. The fact that, regardless of sex, some chimpanzees in this subspecies sometimes have a bald forehead explains the origin of the second term. However, each of these characteristics are not always shared by an subjects. Since there are extremely diverse individual differences among each member of a population, whether baldness is manifested or not is an expression of individual genetic make-up. It is not universally shared. Some subjects, on the other hand, have body hair so short that it looks as if it had been closely clipped.

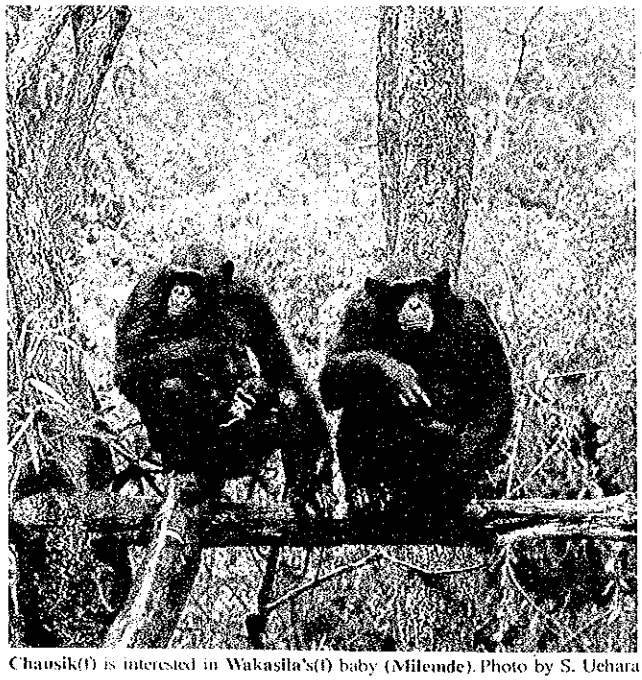
The mean body weight of the chimpanzee is just slightly under 50kg for males and over 40kg for females. Their torso including head measures 80 to 90cm for males and 70 to 80cm for females. As one can gather from these vital statistics, body size is small when compared with humans.

But in the wilderness when one catches a glance of their body, showing ample bulging indicative of powerful muscles hidden under the long hair covering their entire body, the lasting impression one is struck with is the large size of their body almost equal to humans. The body weight relationship between males and females is almost the same as for humans, namely, 100 to 89.

Stages of development

The development of chimpanzees can be divided into 4 phases: 1) Infant, 2) juvenile, 3) subadult, and 4) adult. Since individual differences are significant, the following is only the first approximation. 1) Infants are defined as those in the age class of 0 – 4 years; they are transported by their mothers, 2) juveniles are those in the age class of 5 – 8 years; they can walk about unassisted but rely heavily on their mothers for psychological encouragement and social training, 3) sub-adults are defined as those in the age class of 9 – 12 years; while entirely independent of their mothers and sexually mature, socially they have not reached maturity, and 4) adults include all others. It is possible to sub-divide the above four phases.

Knuckle walking : Gwekulo(f)



Chausik(f) is interested in Wakasila's(f) baby (Mileinde). Photo by S. Uehara

Table-34 Stage of development of chimpanzees

Stage of Development	Infant I	Infant II	Infant III	Juvenile I	Juvenile II	Subadult I	Subadult II	Adult I	Adult II	Adult III
Age	0 - 0.5	0.5 - 2.5	2.5 - 4	5 - 6	7 - 8	(F) 9 - 10 (M) 9 - 12	10 - 12 12 - 15	12 - 20 15 - 25	20 - 40 25 - 40	40 -
Familiality Index to Mother	100				95 - 60	75 - 0		30 - 0		
Nomadic movement	Carried by Mother			(Self-locomotion)		Walking alone				
	On Mother's breast	hips (belly)	Back	Follow mother		(Independent)		Can go roaming alone		
Foods	Only Mother's Milk	Mother's Milk	Solids (Mother's Milk)	(Weaning)		Only solids				
Individual Characteristic Features: Motor pattern		Slow	Fast	Highly, agile, Quick, Nimble		Normal				Slow
Individual Characteristic Features: Baldness**	None	Few				Balding in forehead		Balding to the top of head		
Individual Characteristic Features: Color of Hair	Very black	Black				Black (Few are gray)				Gray-brownish
Individual Characteristic Features: Face color	Red	Pink		Gradually turns black		Black				Gradually turns grayish-white
Individual Characteristic Features: Cheek on Hair	Yes							None		
Individual Characteristic Features: Tufthair	Yes							None		
Sexual Development		Copulatory play with famale subadults				(Sexual Maturity) Female: Swelling of sexual sign Male: Courtship display		Female: First delivey, Enlarged swelling of sexual skin		Decline in number of copulations
Baby Sitting ***	Not selected as an object of baby-sitting	Frequently selected as an object of baby-sitting	Farely selected as an object of baby-sitting	Role of a baby-sitting		Female: Nullipara begin to baby-sit quite frequently				Likes to baby sit very much
						Male: Does not baby-sit often				Rarely baby-sit
Play Patterns	Non-plays by itself	Embracing, Pushing, Jumping, Wrestling	Tag, Wrestling, Tumbling	Violent wrestling, Tag, Tumbling		Female: Wrestling (Nullipara), Tickling each other				
								Male: Rarely engage in play activity especially, females with infants other than their own offsprings		
Social Development	Relationship with mother only	Accepts baby sitting by adults or nullipara, plays with companion	Diminishing tie with adult male and nullipara			Marginal positon		Female: Separation and transfer (More in) Male: Approaches its own kind	(Social Manitary) Female: Congregation with their own kind Male: Bear and rear offsprings	Males hold high position
Manipulation (Ant Picking)	Incapable		Though poorly, can do in latter period			(Skillful)				

** Not every one is balding *** Baby sitting mean talking care or other infant ( ) Merkmal of key This is according to T. Nishida

Habitat

Chimpanzees inhabit most area of this national park area. Up to now, the research has concentrated on habituated populations, namely the two groups which have been provisioned by humans. Information on chimpanzee populations living inland is still not sufficient; nevertheless, a distribution map (Fig.42) has been drawn up, using available data based on direct observation, bed locations, vocal encounters and information from local residents.

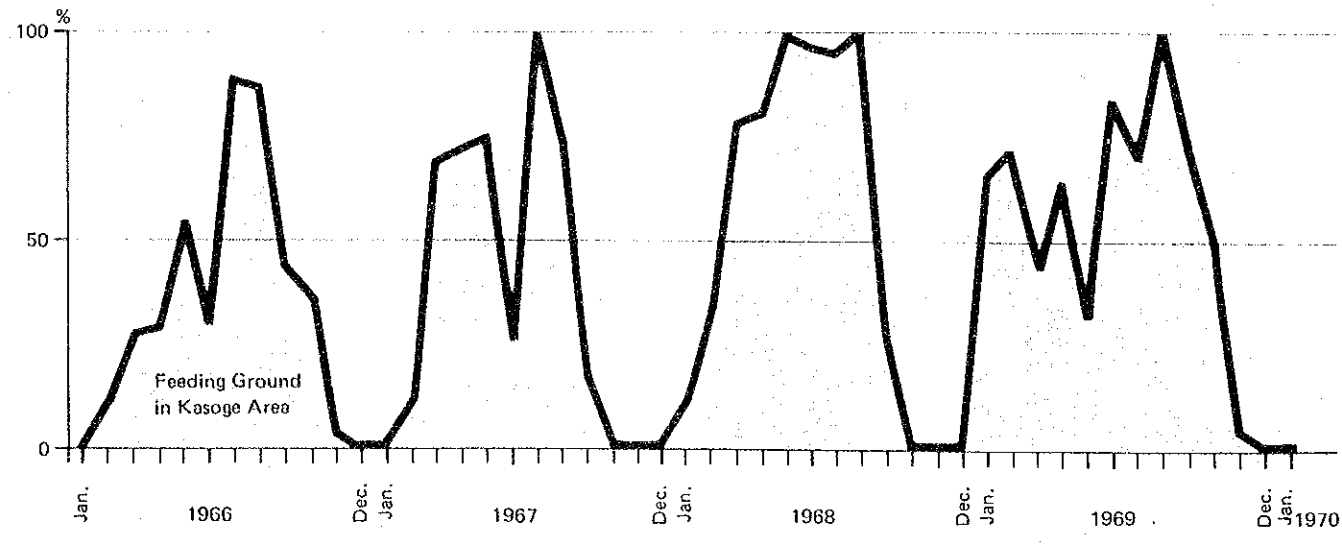
It should be noted that vegetation varies from place to place, as do the topographic features. However, as a look on the map will show, chimpanzees utilize almost all types of vegetation in the entire area. A more detailed discussion on the park's vegetation will be given later on.

The most important source in their subsistence is the vegetation of the lowlands (Riverine Forest). The open forest is the second most important vegetation type for supplying foodstuffs such as leaves of tall trees (mainly leguminous species), beans, fruit, bark, insects; it also serves as a roaming route from one Riverine Forest to the next one and as bed-making sites during the rainy season. In the dry season, *Acacia* Savanna is a relatively important food gathering region. In the rainy season, however, it yields almost no food. It is never used as a sleeping place for the entire year. Other types of vegetation only play a supplementary role in supporting the existence of the chimpanzees.

From the point of view of vertical land use, chimpanzees definitely prefer the lowlands to higher slopes. Their roaming ground, however, includes the main ridge of Mahale Mountains, rising to an altitude of over 2,000m.

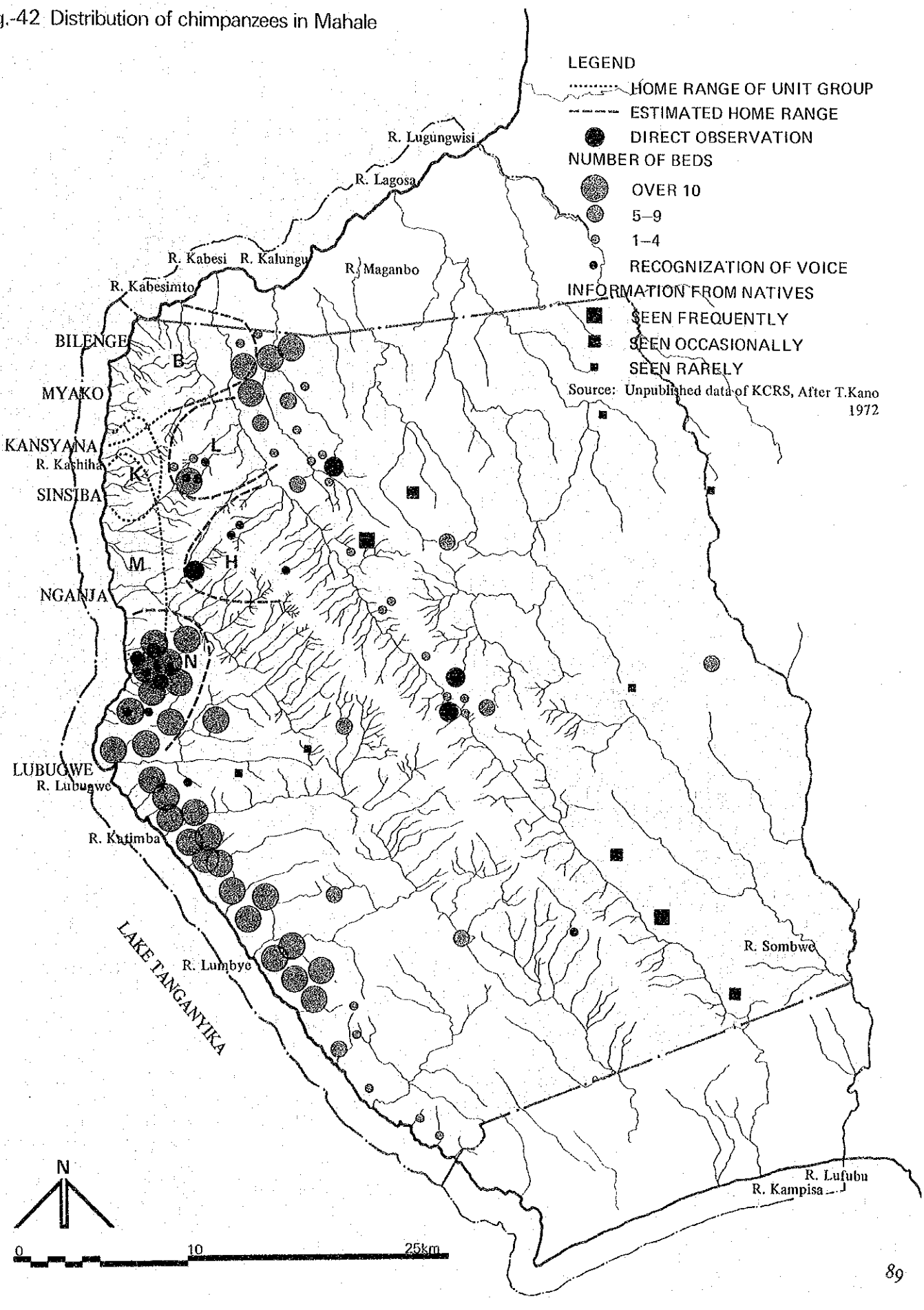
Each unit-group has its own range, and seasonal movements within the range depend on the food supply. Fig.41 shows this seasonal variation for one group; it is based on the attendance rate on the feeding grounds of the chimpanzees. The chimpanzees' cyclic use of their environment can be inferred from it. More detailed information on the flora of the Mahale Mountains will be found in Section 7. At present, it is estimated that there are from 500 – 700 chimpanzees in the Mahale area, divided into about 15 unit-groups, but further study is needed to provide more accurate estimation.

Fig.41 Seasonal variation of attendance rate on feeding ground of K-group



This is according to T. Nishida, 1977.

Fig.-42 Distribution of chimpanzees in Mahale



Inhabiting space and locomotion

Chimpanzees move about both in the trees and on the ground. Since they mainly consume fruits and leaves, however, feeding is almost exclusively carried out in the trees. When they move from one food source to the next, however, they do so on the ground.

The principal mode of locomotion for chimpanzees is the so-called quadrupedal knuckle-walking, the back of the second joint of their fingers coming in to direct contact with the ground. The movement from one food source to the next is inevitably made on the ground using all four limbs in knuckle-walking style. Thus, there are many well-beaten pathways criss-crossing the area where they forage most frequently.

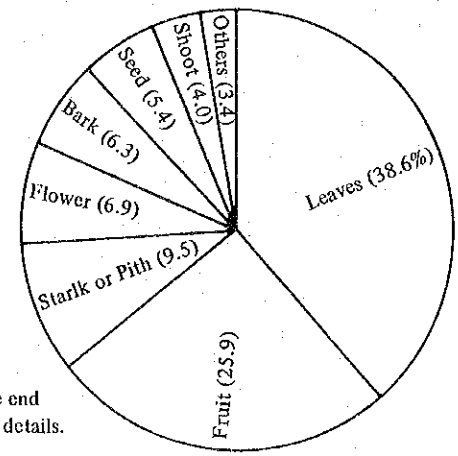
When traveling in or between the trees, two modes of locomotion are mainly used; brachiation with hands firmly grasping the overhead bough and knuckle-walking. When boughs are too thin, they would normally hang their body perpendicularly with hands grasping the bough firmly. By advancing their hands alternately in the desired direction, they can move about in the trees.

When their hands are full of food, they are sometimes seen moving about bipedally. But if they can free one hand, then they would readily use the free one for the transport of the food and walk on three limbs. When they are showing social displays, it would not be unusual to see them shaking a piece of bough or broken stick grasped in one hand and running about bipedally. Bipedal locomotion is, however, limited to a short distance (rarely more than 10m) and they quickly revert to quadrupedal walking.

Chimpanzees have a very supple body and when sitting especially in the trees, they adopt a wide variety of postures. Thanks to their flexible shoulders and long arms, when reaching out for food at the end of a bough, they often hang on to it with one hand while picking up fruit and leaves with the other. Their flexible shoulders make it possible for them to reach out for additional food in many different directions and feed themselves without having to reposition themselves.

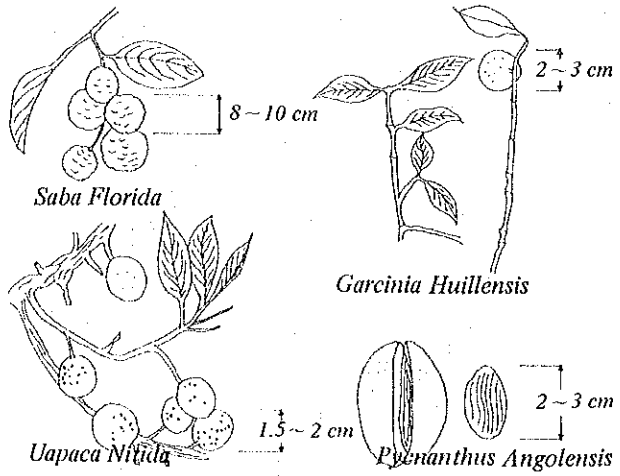
Kamemanfu(m) is traveling between the trees by brachiation Photo by S. Uehara

Fig.-43 Propotion of vegetation used as food



* This is according to T. Nishida. See the list at the end of this report for details.

Fig.-44 Chimpanzees' principal foods



Vegetable foods

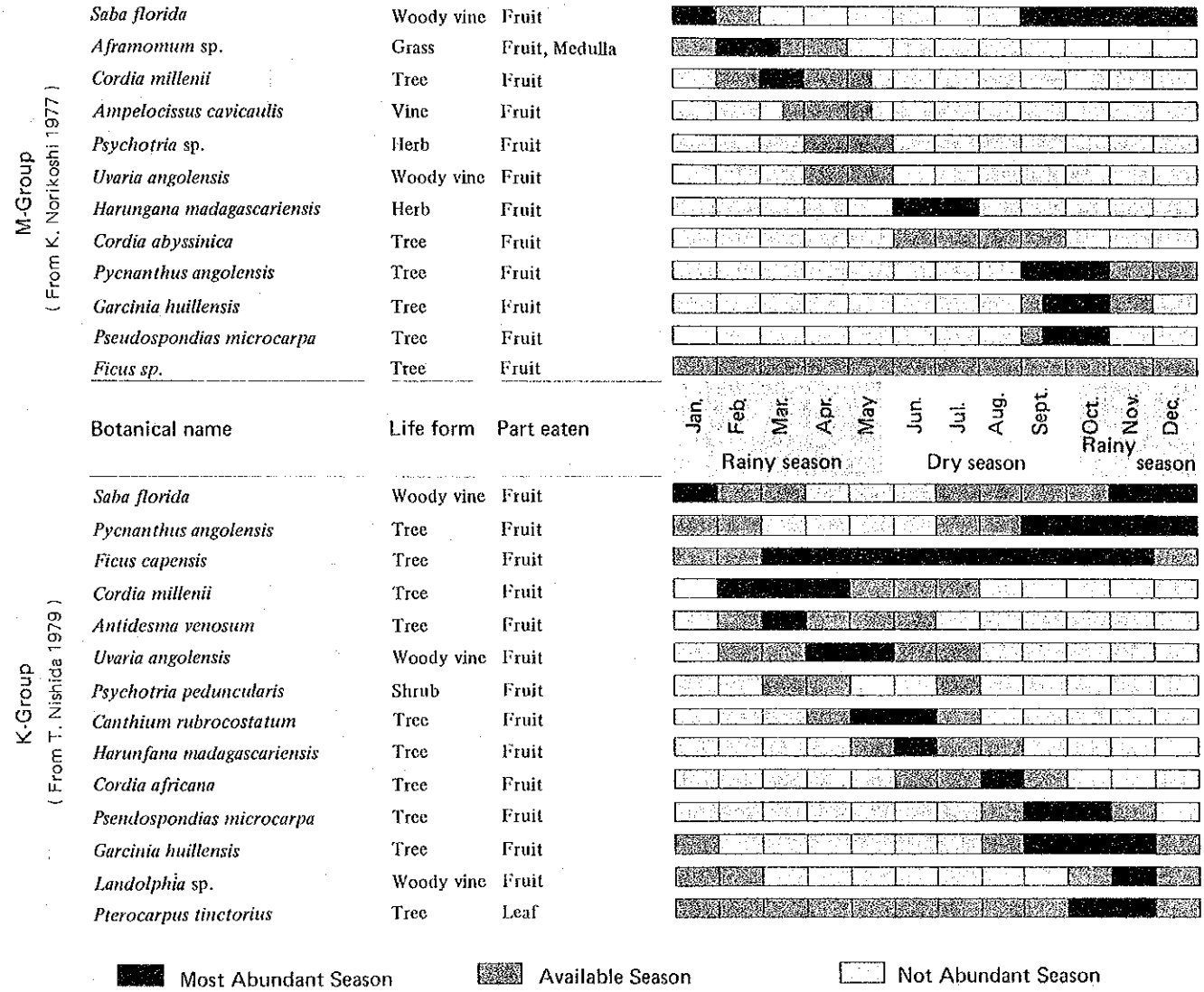
The diet of chimpanzees is basically vegetal with tree leaves and fruit constituting their staple food. In so far as it is now known, plants eaten by chimpanzees belong to at least 219 species from 61 families, plus 5 unidentified species. Among the above, 22 species of Leguminosae, 13 species of Moraceae, 12 of Gramineae, 11 of Euphorbiaceae, 18 Vitaceae, and 8 Convolvulaceae are most conspicuous and represent 34% of the entire plant diet of chimpanzees.

The above indicates how well the chimpanzees utilize their environment. Three quarters of their vegetable diet come from the forest and the rest from the openland, which suggests the importance of the former for their subsistence. The types of vegetable food used as their staple food also varies from season to season, as illustrated in Fig.45.

Chimpanzees know where food can be found and migrate seasonally according to its availability, although what controls the migration pattern is not only the distribution and availability of food; social relationships among groups is also one of the factors influencing their migratory behavior.

* Analyzed by T. Nishida and refer to Appendix-1 in detail.

Fig.-45 Seasonal change of principal foods of chimpanzees



Animal foods (mammals, birds)

Formerly, it was impossible to imagine that chimpanzees have carnivorous propensities. It is only since 1961 that indisputable proof has been made, through direct field observations near Gombe National Park and Mahale, that they do have a strong fancy for flesh. Actual examples of animals eaten by Mahale chimpanzees number 12 species of mammals and 3 species of birds (including chicken). In addition to this, eating the eggs of weavers has been observed (See Table 35). The data suggests that chimpanzees will eat almost any small to medium sized mammal that inhabit their home range.

Cannibalism

Four verified cases of cannibalism i.e., a chimpanzee eating its conspecific have been observed in the field so far. Several points regarding motivation and relationship to social structure remain unanswered, so further research is still needed.

Insect food

The quantity of insects eaten by chimpanzees is quite high. Numerous cases of chimpanzees eating insects have been reported, as shown in Table 36. As a result of the analysis of 903* fecal samples from K-group, at least one species of insect was discovered in 305 fecal samples (33.8%). Most often, these were small ants belonging to *Crematogaster spp.* and *manomorium afrum* (24.8% of the 903 fecal samples). Chimpanzees of the Mahale Mountains show a taste for four different kinds of honey.

* Study begun in 1976 and conducted by S. Uehara over a period of 11 months.

Drinking water and other foodstuffs

Chimpanzees inhabiting Kasoge drink water from either streams or the lake, but those living in Gombe National Park are reported to be afraid of the lake and stay away from it. Avoiding from a body of water is believed to be a peculiar habit of chimpanzees in Gombe Stream.

The following table shows all other foodstuffs, besides the above, which the chimpanzees were observed eating in the wild. Miscellaneous items eaten by chimpanzees of the Mahale Mountains Table 37.

Ficus urceolaris, it eaten by chimpanzees. Drawing by M. Uehara

Table-35 Mammals and birds eaten

	Abundance (A>B>C)	Frequency of predation (+++>++>+)
Mammals		
Primates		
Carcopithecus ascanius	A	+++
Carcopithecus eathiops	B	+
Carcopithecus mitis	B	+?
Colobus badius	A	++
*Pan troglodytes**	A	++
Galago senegalensis	A	+
Artiodactyla		
Neotragus moschatus	A	+++
Tragelaphus scriptus	A	+++
Potamochoerus porcus	A	+
Carnivora		
Ichneumia albicauda	C	+
Myracoidea		
Heterohyrax brucei	A	+
Rodentia		
Protoxerus stangeri	A	+
Cricetomys eminii	A	+
Birds		
Francolinus squamatus	A	++
Centropus superciliosus	B	+
Melanopteryx nigerrimus (Eggs and fledgelings)	A	++
Domestic fowl (Fledgelings)		+++

* Only infants and juveniles were seen to be eaten.
Unpublished data by S. Uehara, T. Nishida, K. Norikoshi and K. Nakagawa

Table-36 Insects and their products eaten by chimpanzees

	Part eaten	habitat		Arboreal (A) or Terrestrial (T)	Tool use	Source
		Woodland	Forest			
Isoptera						
Pseudacanthotermes spiniger	soldiers, workers, reproductives, and of termite mound	+	+ +	T (A : only for reproductives)	fishing rod dipping rod	Uehara (unpublished)
P. militaris	soldiers, workers, reproductives		?	T (A : only for reproductives)	dipping rod	
Macrotermes sp.	soldiers			T	fishing	Nishida (unpublished)
Hemiptera						
Phytolyma lata (in galled leaves of *Chlorophora excelsa*)	larvae imagines		+ +	A		Uehara & Nishida (unpublished)
Lepidoptera						
Moth (Lisoso)	larvae		?	A		
Moth			?	T		Nishida, 1977
Hymenoptera						
Camponotus maculatus	soldiers, workers	+ +	+	A occasionally T	fishing	(Nishida, 1973)
C. vividus						
C. nipponicus						
C. brutus						
C. sp.						
Crematogaster clariventris	workers	+ +	+	A	expelling stick	(Uehara, unpublished)
C. spp. (other than *clariventris*)	eggs, larvae, pupae, workers, reproductives	+ +	+ +	T occasionally A		(Uehara, unpublished)
Manomorium afrum						(Uehara, unpublished)
Oecophylla longinoda	workers etc.	+ +		A		Nishida (1977)
Apis sp.	honey (workers eaten incidentally)	+ +	+ +	A>T		
Trigona sp. 1	honey	+ +		A T		(Uehara, unpublished)
T. sp. 2	honey		+ +	A T		Nishida,1977
Anthophoridae (unidentified sp.)	larvae, honey	+ +		T	dipping rod	
Coleoptera						
Cerambycidae (unidentified sp.)	larvae		?	T		
?	imagines		?	?		Nishida, 1977
Orthoptera						
Brachytrypes membranaceus	imagines	+ +		T		Nishida, 1973, 1977
Grasshopper	imagines		?	T		Nishida, 1977

Table-37 Miscellaneous foods of chimpanzees

			Type of behavior	Frequency (+++>++>+)
Inorganic items				
Water			Drinking	+++
Sandy soil			Eating	+
Rock			Licking	++
Termite mud	*Pseudacanthotermes spiniger*		Eating	+++
Rotten wood	*Pycnanthus angolensis*	wood	Licking, eating	++
	Ficus capensis	wood	Licking	+
	Sesbania sesban	wood	Licking, eating	++
		bark	Eating	++
Dead leaf	many species		Eating (wadging with meat etc.)	+++
Organic items				
Blood (own) from wounds			Licking	++
Pus (own) from wounds			Licking	+
Faeces (own)			Eating	+
Blood of prey struck to leaves etc.			Licking	+++
Snivel and nose dirt (own)			Eating	++

Unpublished data by S. Uehara, T. Nishida, K. Norikoshi and K. Nakagawa

Tool using behavior

In connection with insect eating, mainly termites and ants, a number of tool-using behaviors have been closely observed. Chimpanzees have been observed to pick out arboreal ants by inserting into a nest of ants a narrow fishing probe that they have made by themselves from branches of a tree, vine, or grass stalk. Ant-picking by this method is most frequently observed during the months of October to December. Sometimes, a chimpanzee will engage in this kind of activity for as long as one and a half hours at a stretch. The number of insertions may easily surpas 500 at a stretch.

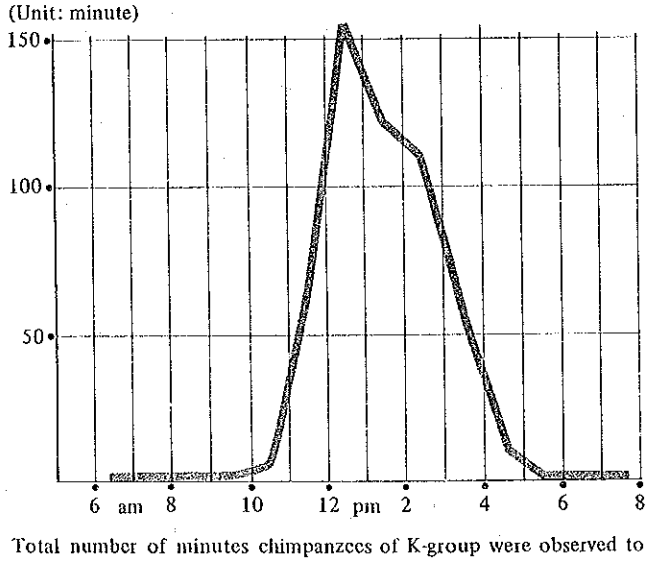
Although the tool is unquestionably crude, it must be remembered that it has been carefully selected from among the available materials in the natural environment. Moreover, the tool clearly satisfies their taste requirement, for it admirably fulfills the function of catching insects efficiently, which otherwise would be impossible. And lastly, it should be noted that tools used and the manner in which they are employed differ according to the kind of insect they are trying to catch.

Tool using to secure insects for eating is concentrated between 11:00 a.m. to 16:00 p.m. This time period happens to fall during their regular rest period, between the most intensive feeding periods, one in the early morning and the other in the late afternoon. It is conceivable that tool using is an important activity contributing to the enrichment of their diet; ant picking can also be considered as a form of luxury activity or perhaps as a sort of leisure.

Fig. 47 shows the changes in methods used throughout the year to pick termites of *Pseudocanthotermes sp.* Table 47 tabulates the actual observed cases of tool using behaviors for insect-collecting and for some other purpose. It includes behaviors useful in communication, toilet, resting, etc.

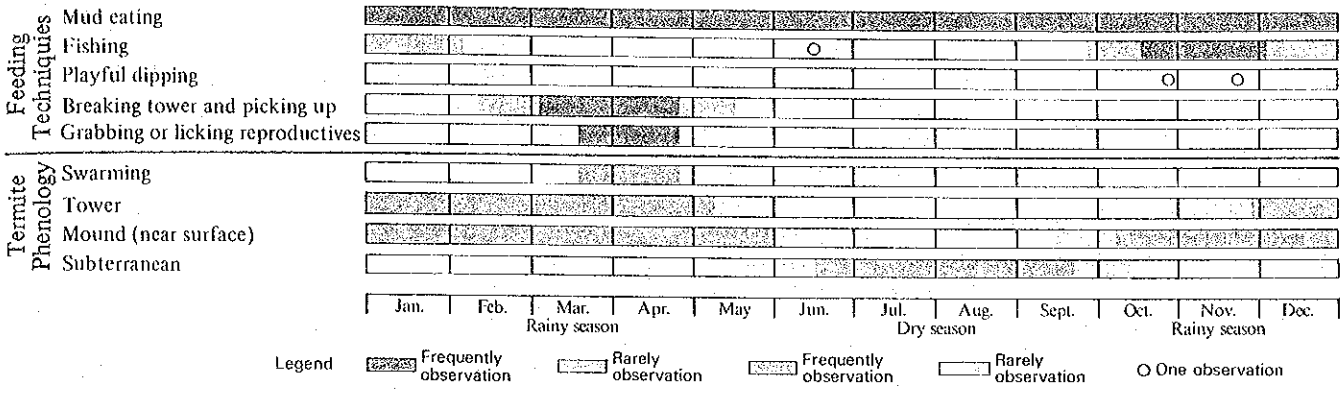
Nkombo(f) picking out wood-boring ants (*Camponotus* spp.) by inserting into a nest of ants a narrow fishing probe. Photo by S. Uehara

Fig.-46 Observed hours of tool using behavior



Total number of minutes chimpanzees of K-group were observed to be completely involved in tool using behavior at different time of the day/matched by total observation. (T. Nishida)

Fig.-47 Seasonal change of chimpanzees feeding techniques upon *Psendacanthotermes* ssp.



Unpublished data by S. Uehara

Table-38 Tool using behavior observed in K-group

Function of behavior	Type of behavior	Description of tool-using behavior
Communication	Threat display	● Throwing boughs broken from tree ● Brandishing bough or stick in one hand, and at times striking hands together ● Throwing sticks or rocks ● Striking ground with stick or rock ● Dragging a large tree branch along the ground
	Courtship display	● Taking the leaves of tree, showing front teeth and throwing leaves one after the other
	Food demanding (for human observers)	● Same as above ● Waving a bough broken from tree like a flag ● Gripping a stick firmly and using it to beat the bough of a tree like a drum
Toilet	Cleaning	● After defecating, wipes its anus with leaves Cleans the mouth, hands, etc. with leaves
	Mat wiping	● After getting wet in the rain, makes a simple bed in the tree lies down in supine position, and rub sholders and back on the bed
	Sheltering	● After the beginning of rainfall, a bough with large leaves are broken from a tree and put up to serve as an umbrella (observed only once)
Rest	Bed making	● For either night or day, they make bed to sleep on
Subsistence	Investigative or olfactory aid	● After inserting either a stick or small bough into withered trees or an dead bough, they smell a tip of them
	Expelling	● Inserting either a poking rod (chimpanzee-made) or long stick into an insect nest, they would shake and ransack it violently to expel the ants
	Fishing	● Inserting and pulling a poking rod into and out of either a forest ant or termites nest, they would lick off the insects that would come attached to the rod
	Dipping	● Dipping and raising a short stick into a ground where termites are found, they would lick the termites climbing up on the stick ● Dipping a short stick into a dead bough where larvae belonging to wasp family are found, they would lick honey stuck on the stick
	Mopping	● By collecting springs, chimpanzees would mop off the ants that would come attached to them.

This data is modified from T. Nishida. 1977.

Routine behavior

The daily routine behavior of a group of chimpanzees includes two concentrated feeding periods, one in the morning and one in the afternoon, with a long rest period sandwiched between them. The behavior described below is typical of the chimpanzees inhabiting Kasoge.

Getting up between 6 and 8 in the morning, they sit up and rest in bed for 5 to 10 minutes, and then get down from the tree. If food happens to be plentiful where they have spent the night, the morning's feeding efforts would take place in the vicinity. But it is more often the case for them to travel at least a few hundred meters to the food sources. By 11 a.m., a number of chimpanzees will be satiated. They often rest directly on the ground during the dry season, or in bed in a tree during the rainy season. Mutual grooming or younger chimpanzees engaged in playing takes places during this resting period, which lasts nearly until 3 o'clock in the afternoon. When members of the group exceed a certain critical size, they often cry in chorus between 3 p.m. and 4 p.m. and soon after the group may go on to another food source, where the second daily feeding period may last from 4 p.m. to 6 p.m.

At night, the chimpanzees sleep in the trees. Except for the babies, each chimpanzee makes his own bed. Bed-making during the rainy season is between 5 p.m. and 6 p.m. In the dry season, it is over half an hour later. Bed-making takes from 2 to 5 minutes. A group of chimpanzees is often heard crying very loudly in chorus, for more than 30 minutes at times, in the middle of the night. This is an indication that they do not, by any means, sleep through the night for 12 uninterrupted hours.

Area covered in a day

To secure food, chimpanzees constantly roam about in the terrain and settle at night in diverse locations. The distance covered by a group in a day in inversely proportional to the availability of food, and also, directly proportional to the size of the group. Moreover, the distribution pattern of food sources strongly influences the daily travel distance of chimpanzee group: Chimpanzees move little in the time of food clumping and move much when food is scattered. Thus, the distance covered in a day is variable from 0.2km to 5km.

Masisa(m) is lying down on day nest.
Photo by S. Uehara

Mutual groming : **Sobongo**(m, left), **Wasulamba**(f, middle upper), **Wantendele**(f, middle below) and **Masudi**(light). Photo by S. Uehara

Seasonal chanses in roaming patterns

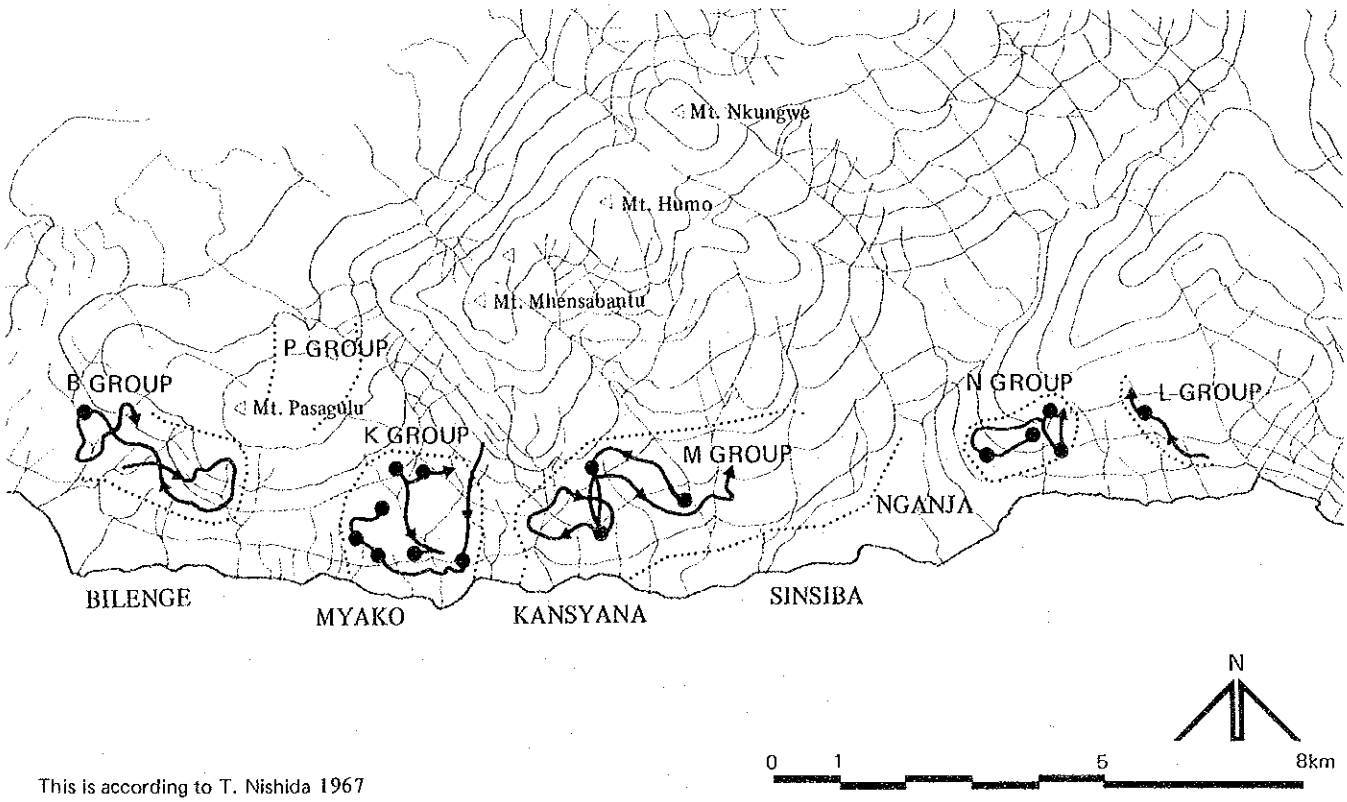
The range of chimpanzees in Kasoge is changed seasonally. When the amount of fruit is stable, and not relatively limited to restricted areas, a group of chimpanzees will repeat its usual traveling routine, staying well within a fixed seasonal roaming range.

When there happens to be a localized unbalance between the food supply and the population of chimpanzees, then the distribution pattern of the unit-group, which had hitherto been stable, is temporarily destroyed. This leads to competitions between groups and results in new spatial arrangements. When observed throughout the year, the home ranges of neighboring unit-groups do overlap extensively. As long as there is an abundance of staple food, each unit-group will remain in its own territory, avoiding the other groups.

Relationship with other animals

There are only two possible predators of chimpanzees at Mahale, that is, panthers (*Panthera pardus*) and crowned-hawk eagles (*Stephanoaetus coronatus*), although there has been no observed evidence of real attack. On the other hand, some species of primates inhabiting Mahale sometimes become victims of the chimpanzees' predation, although monkeys and chimpanzees often have been observed to come in close proximity with each other when feeding. When they do meet, the monkeys usually avoid chimpanzees.

Fig.-48 Spatial living patterns of six groups in *Garciniahuillensis* in season of abundant fruit



This is according to T. Nishida 1967

The unit-groups

Long term observation of Kasoge chimpanzees has shed some light on unit-groups, on group stability, and on the maintenance of an independent ranging behavior for each unit. A unit-group is composed of adult males, females, and younger members of both sexes. The size of units in Mahale may be anywhere from 20 to nearly 100 chimpanzees, with a mean number of 30 to 40. For all individuals of a unit-group to be within view of an observer is a rare occurrence. Usually, groups are sub-divided into a number of temporary functional sub-groups. Chimpanzees of the same group will share ranging ground together, recognizing each other, and forming sub-groups rather casually.

Each unit-group has its own range. In the present time, four such areas have been identified: the area between the Takata and the Kasiha Valley belongs to K-group; the area between the Nkala and the Mutundwe Valley, belongs to M-group; to the north of Takata Valley, the area around Mt. Pasagulu belongs exclusively to B-group, while that covering the upper reaches of the Kasiha Valley and going east over the main ridge to the catchment area of the Kabsesi River belongs to H-group.

Interunit-group transfers

Inter-unit group transfer of members has been observed in the field.* The tendency is strong for sexually receptive females without babies to move from one unit-group to another, but transfers are very rare when females have babies and are sexually dormant. It is believed that males don't transfer, at least mature ones in their prime. They thus provide a considerable measure of stability to the unit-group.

Every unit-group is intimately connected to a particular area, and a core of males in the group provide it with a considerable degree of stability. This very unity and stability of unit-groups results in constraints of movements for neighboring groups. At the same time, chimpanzee populations exchange oestrous females with other populations, hence the importance of a stable core of adult males, on which females and their offspring depend for their very survival.

It has also been speculated that a chimpanzee moving in from a nearby group introduces into the new group patterns of behavior learned in the original one.

* Confirmed by Nishida and Kawanaka, 1972. Continuous research is gradually shedding a new light on the mechanism of inter-unit group transfers.

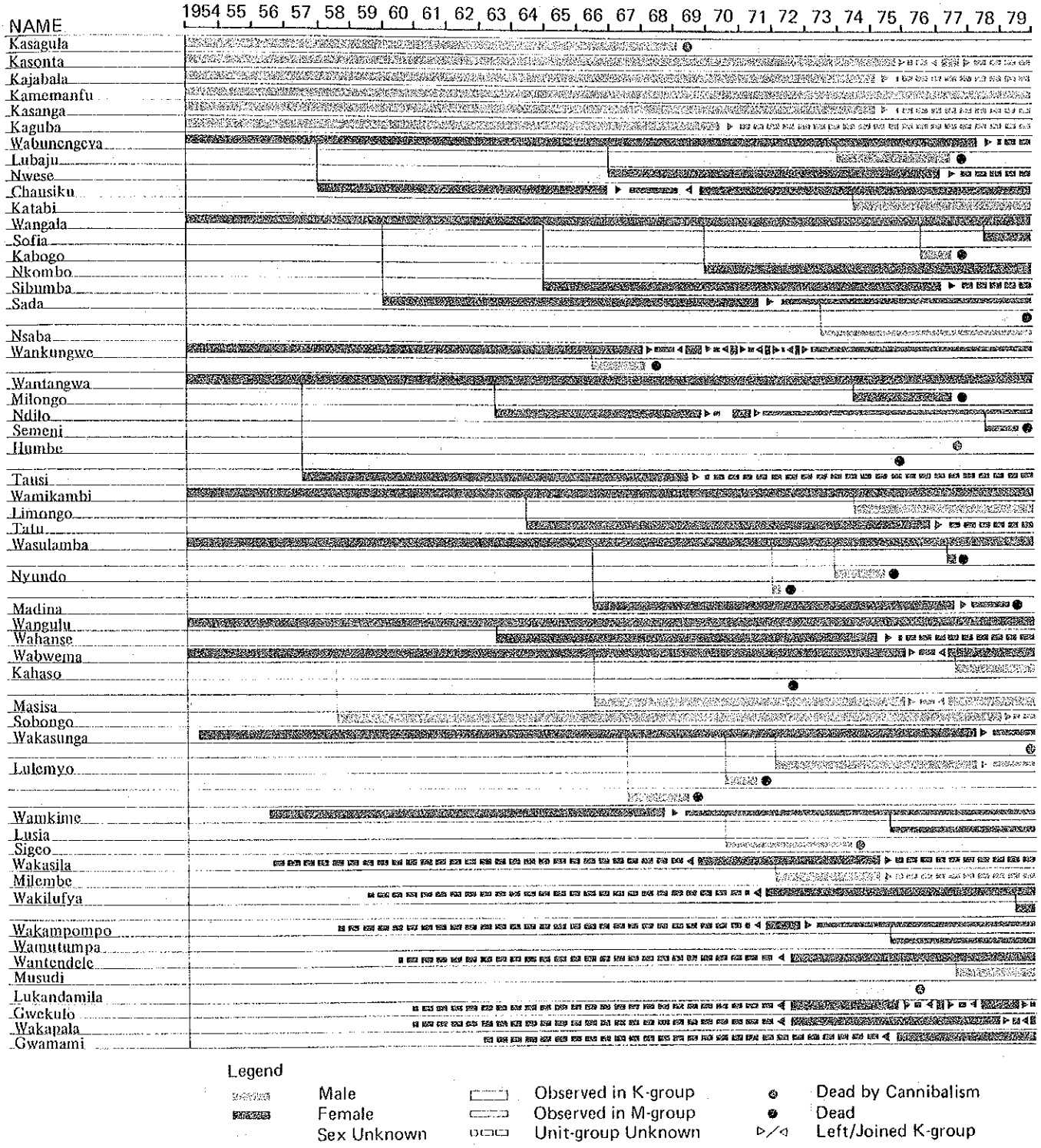
Sub-groups

A unit-group normally splits off into several sub-groups which although they are temporary, do show some semblance of unity as long as they stay together. When a sub-group is frightened by an observer, for example, they all flee in unison. Moreover, not only do members of the sub-group use the same roaming paths, but synchronize daily activity rhythm.

Age and sex composition of sub-groups is quite diverse. The length of time sub-groups stay together is a function of their size, composition, and perhaps season, with smaller sub-groups enjoying longer periods of togetherness in contrast to the larger ones. The size of sub-groups may be anywhere from two to as many as 30 chimpanzees. When food is easily available, however, sub-groups tend to be larger and the converse generally holds true when it is scarce. Thus, the size of a sub-group is a function of food availability.

A unit-group is not necessarily divided into sub-groups of equal size; the "core sub-groups", however, is always made up of a large number of adult males and several regular adult females. Chimpanzees in the core sub-group frequently cry out and move about relatively unrestrained and play a unifying role in the integration of scattered sub-groups.

Fig.-49 Genealogy and residence pattern of chimpanzees of K-group



Legend

	Male		Observed in K-group		Dead by Cannibalism
	Female		Observed in M-group		Dead
	Sex Unknown		Unit-group Unknown		Left/Joined K-group

Unpublished data by T. Nishida, S. Uehara and K. Nakagawa

Ranking and leadership

Although their mode of expression is diverse, dominance relationships are evident in all unit-groups; however, no absolute leader exists that can determine the movement of the entire unit-group.

In any one sub-group, however, one individual exerting a controlling influence can be identified, determining the direction of the movement, regulating speed, and initiating and suspending the movement. It would not be impossible to call him the leader of this particular sub-group. However, since the sub-group is temporary, so it goes without saying that his leadership is temporary as well.

Changes in the composition of the unit-group

Female offspring are nursed and protected by their mother for 5 – 6 years, and gradually come to receive and require less and less protection by age 7 or 8.

From the age of 10 or so, the relationship between mother and daughter can rather be described as in a state of estrangement, for it is around this time that the female offspring separates from her mother's unit-group. On the other hand, males do not experience this drastic separation from the mother. Fig. 49 and Table 49 describe the geneology of individuals comprizing the K-group and the names of those comprizing the M-group respectively.

Those tables reveal the promiscuity of females who, once they reach sexual maturity, move frequently from one unit-group to another. Some observers now assume that the disappearance of some male adults may be the result of deadly fighting between males of different unit-groups.

Fig. 50 List of name of chimpanzees observed in M-group

Adult Males

Kalindimya
Mimikire ○
Sankaku ▷
Mtintimya ▷
Mkoli ▷
Kagimimi
Kidole ▷
Rashidi
Malange ◁▷
Kajugi
Ntologi
Bakali
Nishida ▷
Lubulungu
Hawazi ▷
Musa
Kalunde
Lukaja
Kasulamemba

Adult Females and Their Offsprings

Adija
*Chausiku ◁
Fatuma — ? Apr., '76** + May, '76*** ; Mapinduzi + Apr., '77 + May, '79
Gwamatwi — Asha (f) (inf. III)****
Gwekulo ◁
Gwepala — Zainabu (f) (juv. II) ; ? Jun., '79
Haruko — (f) (inf. III)
Hideko
Hatsuko
Ikocha
*Madina ◁
Maliamu
*Ndilo ◁ — ? May, '75 + Jun., '75 ; Humbe (m) Nov., '76 + Jan., '73 ; Semeni (f) Dec., '77 + Mar., '79
*Sada ◁ — Nsaba (m) Oct., '79 ; ? May, '79 + (Aug. ?), '79
Silafu — Ryo (m) Jul., '79
*Tausi ◁▷
Wabuhansa — Moyo (inf. II)
*Wabunengwa ◁▷
*Wabwema — *Masisa (m)
Wakakumo — ? Jun., '75 + Jul., '75
Wakaluhola — Katolo (m) (inf. II)
*Wakampompo ◁ — Wamutumpa (f) May, '75
Wakanto — ? (inf. II)
*Wakapala ◁▷
*Wakasila ◁▷
*Wakasunga ◁ — *Lulemyo (m) (May - Jun.), '72 ; (m) May, '79 + Jun., '79
Waluhanga — Kimaro (m) (juv. I) ; Shinako (f) (Jun), '78
*Wamkime ◁ (= Wamwelu) — Shigeo (m) '70 + Apr., '74 ; Lusia (f) '75
Wankuma — ? - Kenji (m) (juv. I) ; ? (inf. II)
*Wankungwe
Wansonbo — Tende (m) (inf. III) ; ? Jun., '78
Wantinfu — Muluta (m) (juv. I)
*Wasalamba ◁▷
Wasobongo — Kasangazi (m) (juv. II) ; Toshibo (m) (inf. III)
Watintimya — (f) (inf. III)
Wobake
Zabivu

Legend
Mother — First offspring ; Second offspring

(m): male
(f) : female
○ : dead
◁ : joined M-group
▷ : left M-group
* : see "genealogy of Chimpanzees of K-group

** : birth year and month
*** : death year and month
**** : stage of development (Nishida 1977) at Jun., 1979

Unpublished data by T. Nishida, K. Kawanaka, S. Uehara and K. Norikoshi

Table-39 Change in familiarity index of 12 mother-offspring dyads

Dyad	Birth Year[a]	Offspring's Name	Mother's Name	Age of Offspring 0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
Mother-Daughter	1957[a]	Tausi	Watangwa										61.5	58.8	0,'	0	0	0	0	0	0
	1958[a]	Chausiku	Wabunengwa									73.1	75.0*	25.8	16.3\	30.3	15.3	20.3	32.7	12.9	11.7
	1960[a]	Sada	Wangala							88.2	64.7	0	16.7*	2.2	7.1	16.7,'	0	0	0		
	1963[a]	Wahanse	Wangulu					100	100	95.0	85.5	55.6	12.0	62.5	47.1	42.9,'					
	1963[a]	Ndilo	Watangwa				100	100	100	93.5	87.8	89.3	37.5,'	5.6	0	0					
	1964[a]	Tatu	Wanikambi			100	100	100	98.7	95.0	14.3	83.3*	33.3	—	36.4						
	1965[a]	Sibumba	Wangala		100	100	100	78.6*	80.0	83.3	75.0	33.3	—	70.0							
	1966	Madina	Wasalamba	100	100	100	100	100	100	60.0*†	78.6	76.1	92.5								
	1967	Mwese	Wabunengwa	100	100	100	100	93.8	100	90.9	88.0*	94.9									
	1970	Nkombo	Wangala	100	100	100	100	—	100												
Mother-Son	1958[a]	Sobongo	Wabwema										55.6	94.6	82.2	47.5	9.3*	13.6†	29.3	24.0	37.7
	1966	Masisa	Wabwema	—	100	100	100	100	78.9*	78.9†	100	81.2	98.7								

[a] Presumed
— Not observed through a year
* The birth of infant sibling
† The death of infant sibling
' Moving-out of the unit-group
, Returning to the unit group

This is according to T. Nishida, 1979.

Vocalization

The social behavior of chimpanzees is relatively complex. Communication is made through either vocalization or gestures. Vocalization is rather well developed. Eight basic patterns can be differentiated, of which examples are given below:

(1) Bark: Barking is associated with some provocative intention; it is a relatively loud utterance, somewhat sounding life "ga, ga".

(2) Scream: A chimpanzee screams when he or she is attacked or threatened by a dominant one. Screaming is accompanied by facial grin.

(3) Pant-bark: This is an announcement of the arrival of a chimpanzee at a food source which has already been occupied by more dominant animals and functions as an appeasement call.

(4) Pant-grunt: This is a low-pitched murmur, usually uttered by a subordinate, but in a relatively calm manner.

(5) Nomadic grunt: Calm grunting made when a group of chimpanzees progress in a row in the bush.

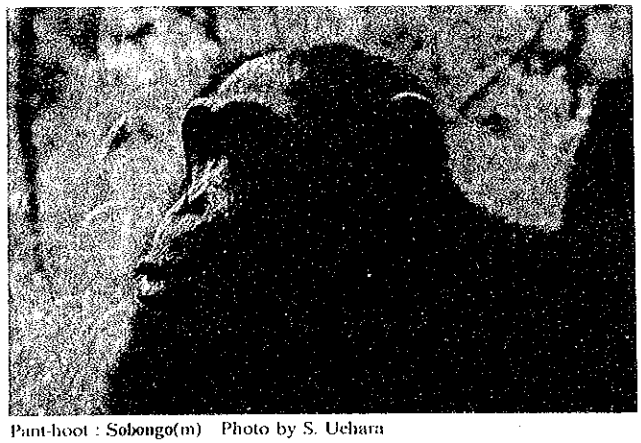
(6) Pant-hoot: Loud hooting, made frequently in a chorus-like manner by many chimpanzees of a group when starting on a travel, when arriving at a new spot, or else when another unit-group comes within close range.

(7) Hoot: Hooting is emitted by an individual of a group and basically a warning signal against a detected enemy.

(8) "Waa" call: This is a loud and threatening call, made in chorus and uttered in a frenzied state.

Many patterns of chimpanzee vocalization are continuous and not discreet, so it is often difficult to discriminate between different but similar sounds.

Pant-grount : **Chaushik(f)** Photo by S. Uehara



Pant-hoot : **Sobongo(m)** Photo by S. Uehara

Social behavior

The commonest social behavior patterns observed are those that are connected with a dominant *vs.* subordinate relationship. Patterns of social behavior include facial expressions, and gestures such as chasing or biting another chimpanzee, or even brandishing a stick and hitting him with it. So-called appeasement behavior patterns on the part of a subordinate are also many in kind; he may run to a dominant and hug him from behind, or extend his hand and touch the other on the chin. Table. 40 and 41 respectively show the frequency of aggressive and appeasement behavior patterns, according to age/sex class.

Appeasement behavior is directed towards a dominant or a highly excited chimpanzee that seems to have gone wild. However, it is interesting to note that both the subordinate and the dominant sometimes walk towards each other, as if to greet, with no trace of overt dominance relationship, when they meet. This so-called greeting behavior comprises ritualized patterns, such as mutually biting the other on the bodily part in a gentle manner, licking the other on the face, touching each other on the head, face, or chest, kissing, shaking hands, etc. The frequency of such greeting patterns, broken down by sex and age group, is shown in Table.

Table-40 Frequency of attacking behavior observed in the K-group

attacker \ attacker	adult males	adult females	young males	young females	juveniles	infants	total
adult males	22	3	0	0	0	0	25
adult females	19	8	0	0	0	0	27
young males	8	1	0	0	0	0	9
young females	15	4	0	1	0	0	20
juveniles	15	2	2	0	0	0	19
infants	2	0	0	0	0	0	2
total	81	18	2	1	0	0	102

This is according to T. Nishida, 1977.

Table-41 Frequency of appeasement behavior observed in the K-group

appeaser \ appeased	adult males	adult females	young males	young females	juveniles	total
adult males	8	0	0	0	0	8
adult females	26	1	0	0	0	27
young males	2	0	0	0	0	2
young females	6	1	0	0	0	7
juveniles	8	2	0	0	0	10
total	50	4	0	0	0	54

This is according to T. Nishida, 1977.

Table-42 Frequency of greeting behavior observed in the K-group

greeter \ greeted	adult males	adult females	young males	young females	juveniles	total
adult males	17	2	0	0	0	19
adult females	6	1	0	0	0	7
young males	1	0	0	0	0	1
young females	3	5	0	0	0	8
juveniles	3	5	0	0	0	8
total	27	9	0	0	0	36

This is according to T. Nishida, 1977.

The frequency of mutual grooming within each age/sex category indicates the degree of affinitive relationships between members of each class. Table 43 shows the total of grooming relationships among members of K-group, which was observed during a period of 3 months from late 1973 to early 1974. It can be seen that 65% of participants involved adult males, and that grooming among adult males represented nearly 50% of the whole. This contrast with only 10% for females. This indicates that mutual social interaction among females is not so strong as among males. This also implies that adult males must socially adjust themselves to each other and that they constitute the core of the integration of the unit-group. Recent research is gradually making it clear that male bonds function in protection against neighboring groups.

Begging and sharing food are two of the most remarkable aspects of the chimpanzees' social behavior. The food items for which adult chimpanzees often beg are mainly mammal meat and prized plant food such as sugar cane and bananas. On the other hand, infant chimpanzees beg their mothers for almost everything that they themselves cannot obtain or process easily. Begging gesture is a positive means by which a subdominant animal obtains food from a dominant animal; the subordinate may extend his hand, with palm up, towards the possessor; or, standing on all four limbs, he may bring his face near the other's or near the food itself, stand still and tough the other chimpanzee on the leg or arm lightly, or even bite him gently on the upper part of his arm The dominant, if he is willing to share, may either offer part of his food to the other, or else he will simply let him take some.

Table 44 shows data on food transfers according to dominant/subordinate relationships in K-groups. There are also other types of behavior patterns whose meaning is not yet understood. Such is the case of the "rain dance", or "carnival", when a male chimpanzee will suddenly start to run, hitting the ground with one hand or pounding at the root of a tree or buttress with both hands. He may then climb up a tree, break a branch, or roll stones over, or run around, all the while dragging dead tree bough.

This behavior may entice others in the group to follow suit, creating an uproar, with some chimpanzees also seemingly going wild while others simply run away or try to elbow their way around amid the confusion. The "rain dance" may be some sort of mechanism permitting the integration of a unit-group, or of adult males of the unit-group. What is considered certain at present is that it functions in some sort of demonstration of power on the part of a given group towards another, at least in same cases.

Table-43 Grooming relationship among chimpanzees observed in the K-group

groomer \ groomee	adult males	adult or subadult females	juveniles or infants	total
adult males	218	96	6	320
adult or subadult females	91	49	13	153
juveniles or infants	1	3	0	4
total	310	148	19	477

This is according to T. Nishida, 1977.

Table-44 Begging behavior among chimpanzees observed in the K-group

→ shared
↛ not shared

Begged		Begger	Frequency	Parcentage
subordinate	→	dominant	44	33.6
dominant	→	subordinate	45	34.4
subordinate	↛	dominant	13	9.9
dominant	↛	suboidinate	29	22.1
total			131	100.0%

This is according to T. Nishida, 1977.

Sexual behavior

Sexual skin swelling first occurs around the ages of 7 to 9 in females, but maximal swelling, which is a sign of sexual receptivity, only occurs at 10 or 11 years of age; before that time, therefore, there is no actual copulation. This explains the minimal three-year lapse between the appearance of skin swelling and first pregnancy.

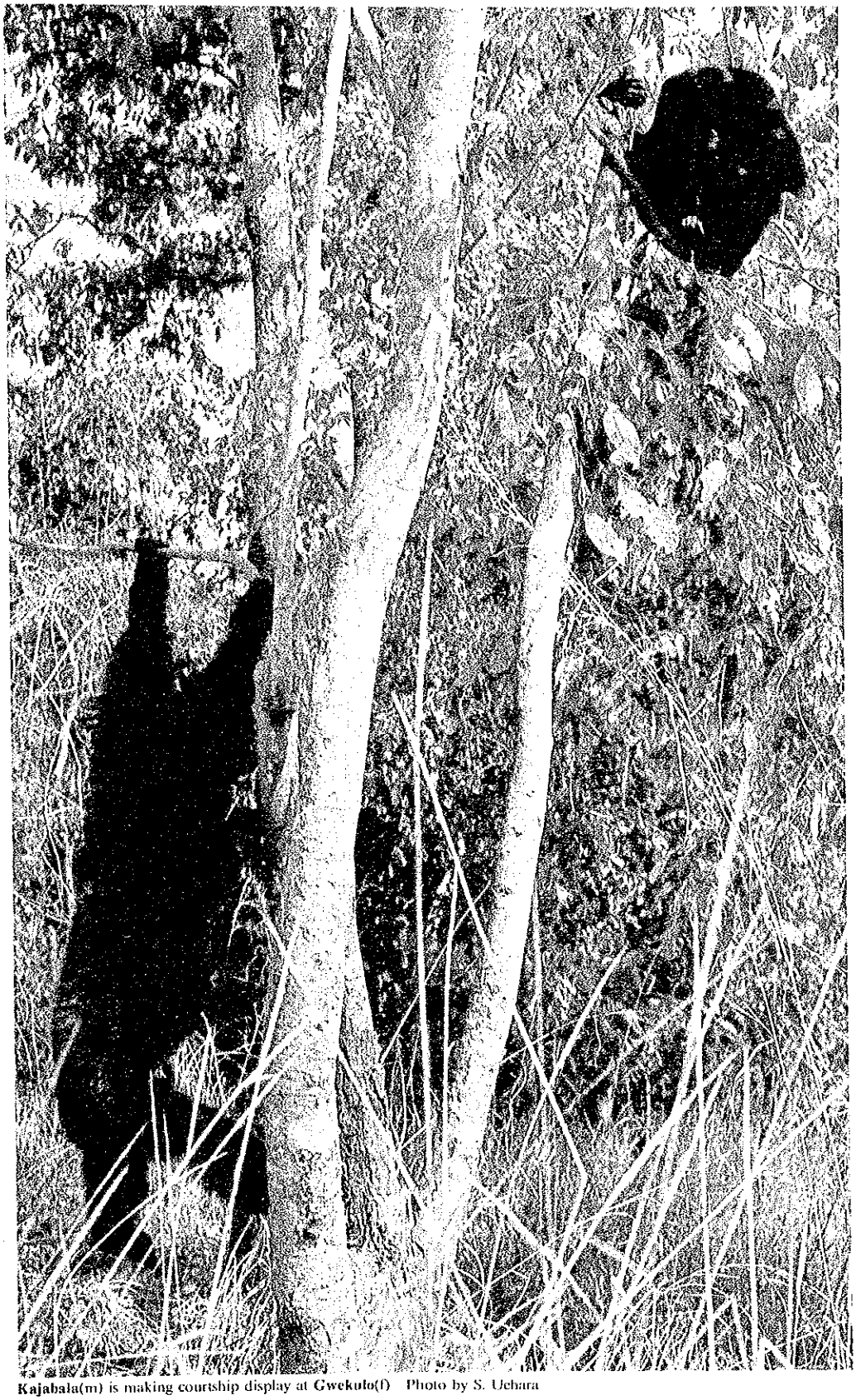
There are wide differences in individual oestrous cycles in females, which may last from 20 to 40 days; within that period, maximal sexual swelling may last from 7 to 14 days. It also seems worthy of notice that when sexually active females remain together, a synchronization of their oestrous cycle sometimes occurs. Nursing females do not mate. The interruption of the oestrous cycle may last for several years after delivery; periods of 3, 4, and even 5 years have been recorded. This explains the wide difference in the ages of each female's offspring, with average spacing between deliveries being nearly 5 years. However, the oestrous cycle resumes sooner when the offspring of a nursing female dies.

Copulation is usually done in the ventro-dorsal position, with the male nearly squatting, legs wide apart, and holding the female's hips with both hands, then bending over her until ejaculation. Copulation is short, taking place in an average of 8 seconds. At the time of maximal skin swelling, the female may copulate with several males in turn; a particular female has been observed to mate at least eight times with five different males within a period of 8.5 hours.

Oestrous females often become members of a core sub-groups in a unit-group, along with several males. This core will often be the most active in the group, while females with offspring will often form an "asexual" sub-group. There is a positive relationship between the frequency of copulation of males and their rank within the group; furthermore, sexually active females often move from group to group. Results of a one-year observation on mating habits in K-group have shown that out of 54 matings, 72.4% were done by the first and the second ranking males.

The study also revealed examples of consort relationships in which a particular dyad of a male and a female maintains an exclusive sexual relationship with each other for a long period of time (up to 3 months). Usually, a unit-group can be divided into two general groups: a sexually active one, made up of males and the oestrous females, and an asexual group, comprising the nursing females.

Wakasila is begging a food of **Kajabala(m)**. Photo by S. Uehara

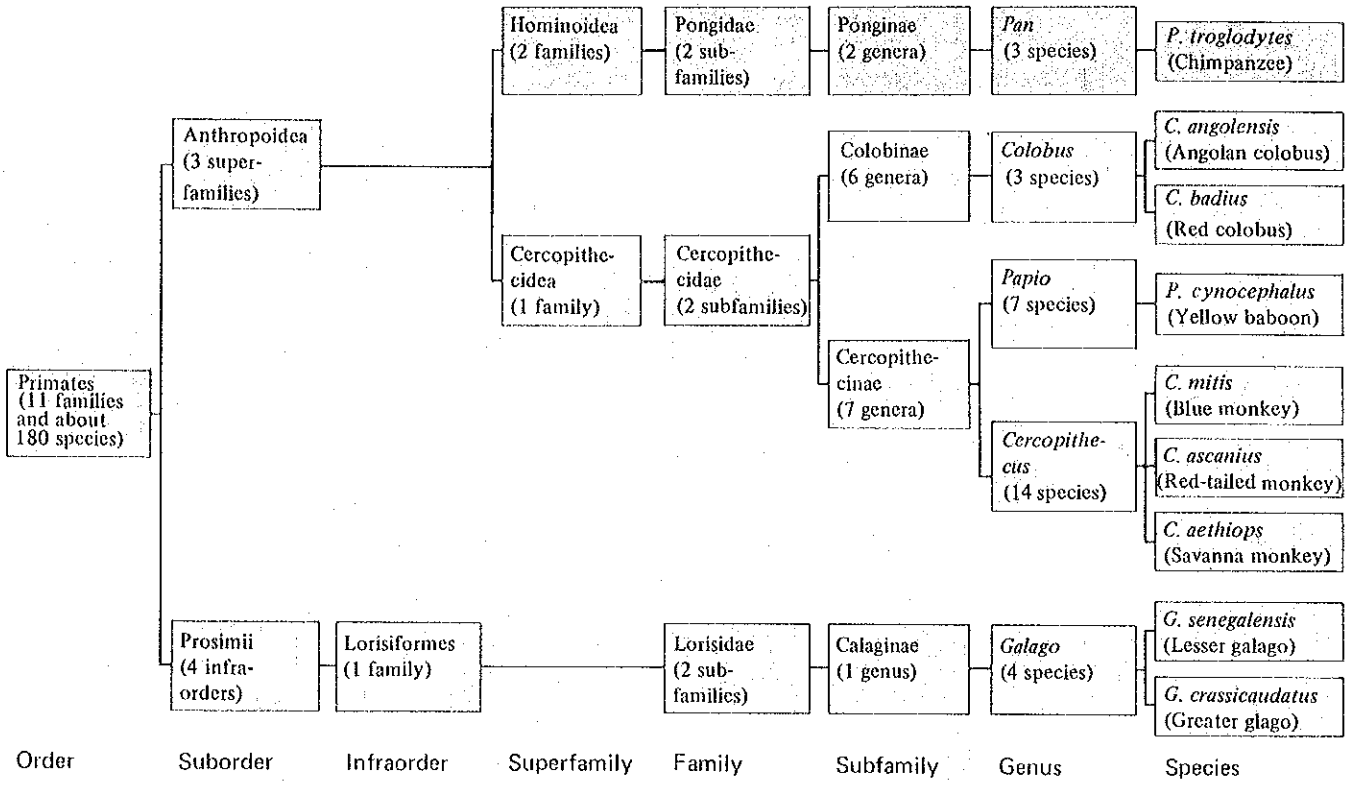


Kajabala(m) is making courtship display at **Gwekuto**(f) Photo by S. Uehara

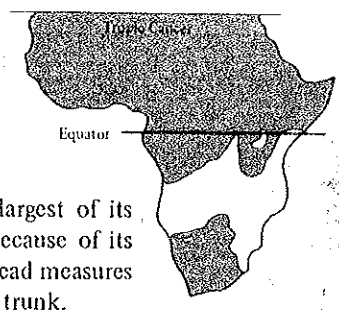
Non-human primates other than chimpanzees

Mahale is the home ground of nine species of non-human primates. With the exception of the Angolan colobus, which inhabits only in the Mahales' main ridge area, all can be found roaming in the vicinity of the Kasoge area. In the following pages, ecologically distinguishing features, areas of distribution, habitat, and mode of life of the non-human primates other than chimpanzees will be briefly introduced.

Fig.-51 Classification diagram of primates inhabiting in Mahale



greater galago
(Galago crassicaudatus)



Among the *Galaginae*, this is one of the largest of its kind: it is also known as thick-tailed galago because of its thick and fleecy tail. The trunk including the head measures 30 to 35cm with the tail slightly longer than the trunk.

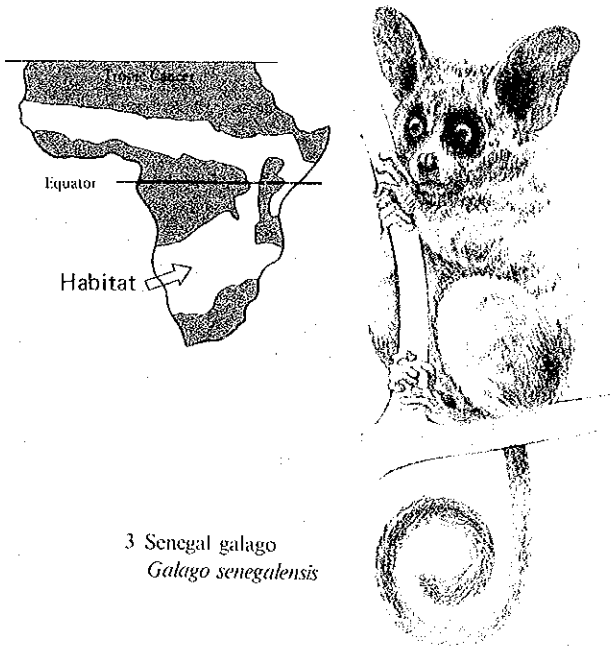
The greater galago is widely distributed in sub-Saharan, tropical Africa avoiding the deep forests, preferring to inhabit savannas and secondary forests. It is a nocturnal species, sleeping during the day in the cavity of a tree with its tail wrapped around the body and ears covered. It is an omnivorous animal with a preference for insects.

2 greater galago
Galago crassicaudatus

Senegal galago
(Galago senegalensis)

The Senegal galago is also known as bush-baby with flat, large ears, and round large eyes like a squirrel. The trunk including the head measures between 15 and 20cm with a long tail of 20 to 25cm.

It is distributed throughout Africa with the exception of the Sahara Desert and the primary forests of the Congo Basin. It inhabits savannas with some dense tree growth, as well as shrubbery areas and secondary forests, but avoiding dense forests. It is thoroughly nocturnal, spending the daylight hours in sleeping. It is an omnivorous mammal eating insects, small animals, bird eggs and fruit.



3 Senegal galago
Galago senegalensis

red-tailed monkey
(Cercopithecus ascanius)

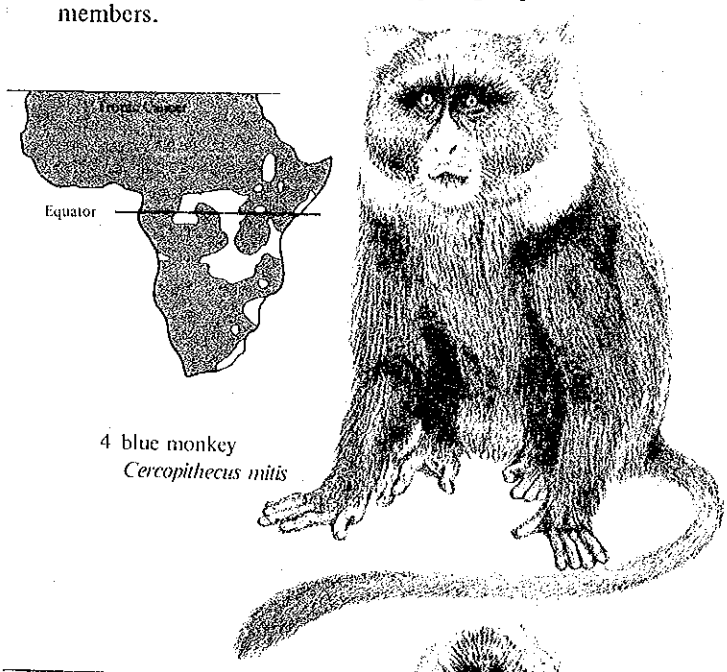
The red-tailed monkey wears a facetious countenance with its bluish-colored face and top of its nose spotted with white heart-shaped marks. In spite of its name, its tail is actually red-brownish or almost brownish in color.

They inhabit around the great forests of the Zaire in the central part of Africa, northern parts of Angola, Uganda, and part of Kenya. They usually inhabit the periphery of the forest. Many, moreover, are found living in secondary forests and marshlands. They live in a group possessing a fixed home range. Their main food consists of leaves, sprouts, flowers, fruits, etc.

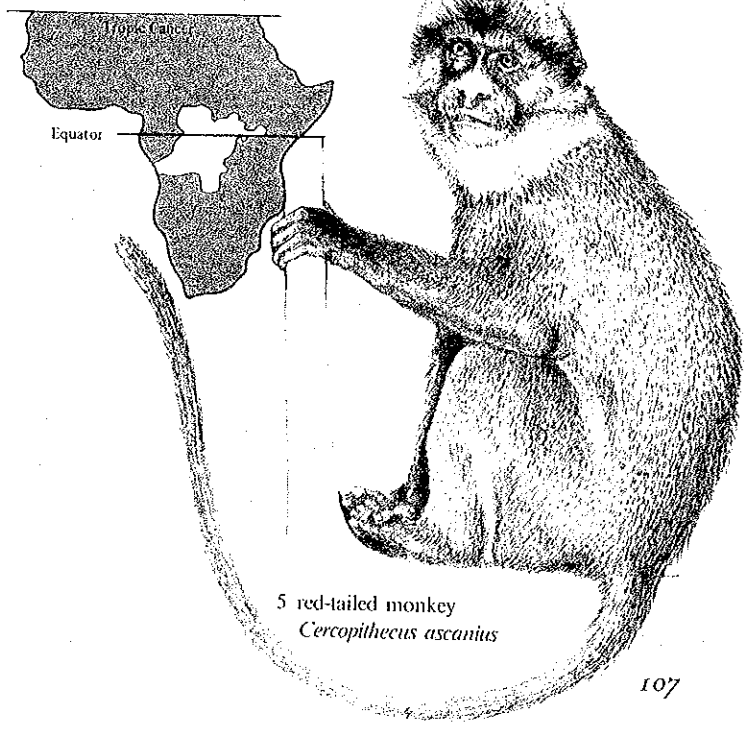
blue monkey
(Cercopithecus mitis)

Excluding the narrow part around the eyes, nose and mouth, its face is entirely covered with long hair which gives it a characteristically plump expression around the cheeks. The blue monkey is relatively large-sized with a trunk including the head measuring between 50 and 60cm.

This monkey inhabits the areas surrounded by the Kasai and Ubangi Rivers in the southern lower reaches of the Congo River, and from Uganda to the Katanga Region of Zaire. They are often seen living in groups of 10 to 30 members.



4 blue monkey
Cercopithecus mitis

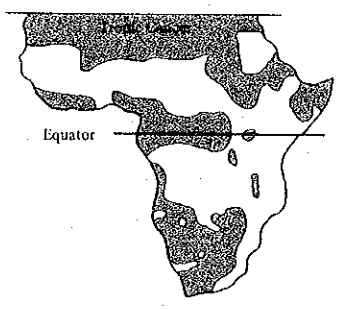


5 red-tailed monkey
Cercopithecus ascanius

savannah monkey
(Cercopithecus aethiops)

The savanna monkey belongs to a guenon group that generally inhabits the forest, but it is the most unique one of its kind for having advanced to inhabit the savanna. Normally, body color is characterized by a quiet base color of yellow with streaks of gray in the head, shoulders, tail, and back of hands and feet, but ventrally from throat to base of thighs, it is covered with white hair.

They are widely distributed in the savanna belt stretching from Senegal to Ethiopia and the savanna regions from East to South Africa. They prefer densely wooded savannas to other habitats and especially like the riverine forest. They live in groups of 10 to 50 monkeys, their staple food is fruits, but they have been observed to consume seeds of true grasses growing in the savanna, as well as insects and small animals.

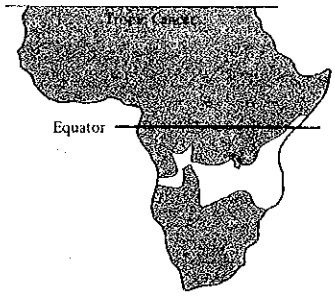


6 savanna monkey
Cercopithecus aethiops

yellow baboon
(Papio cynochephalus)

General body appearance is slender and delicate with soft and long yellowish hair whose color assumes a slightly lighter shade around the cheeks.

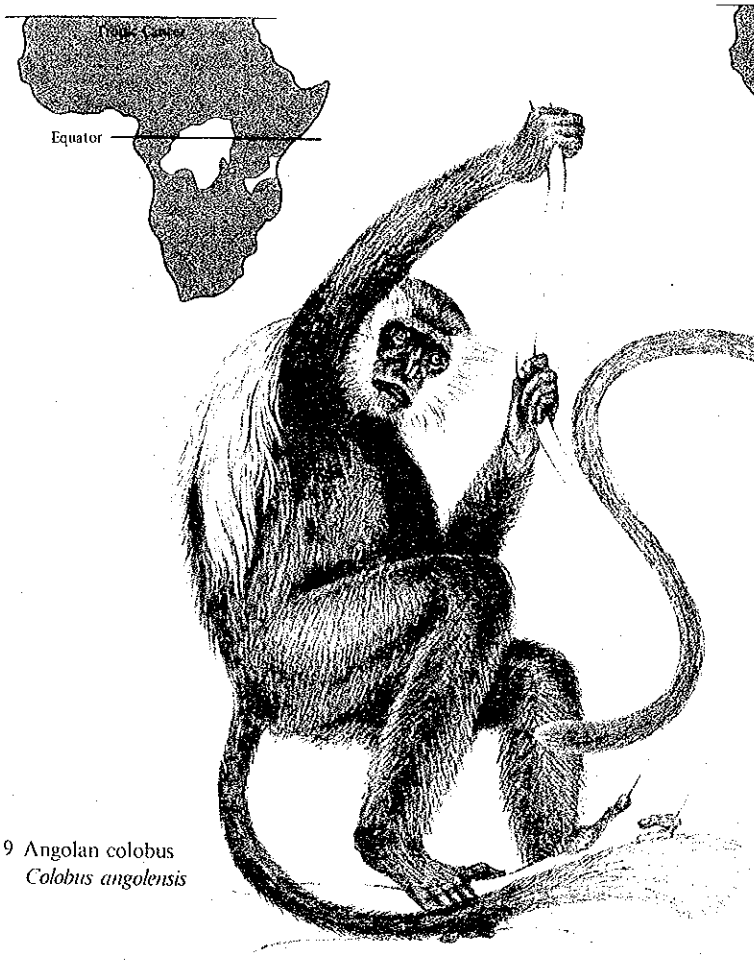
They are widely distributed over regions from Angola to Monzanbique, Zaire, and Uganda, inhabiting mostly woodlands and forests.



7 yellow baboon
Papio cynocephalus

Angolan colobus
(Colobus angolensis)

The Angolan colobus is a beautiful two-tone black and white monkey. This species is classified into several subspecies; their habitat centers around the Congo forest. In Mahale, they inhabit only montane forest at elevations higher than 2,000m. They live in groups of 20 to 30, sometimes forming a mixed group with the red colobus. Their staple food consists of leaves, which explains their other name of "leaf eater".

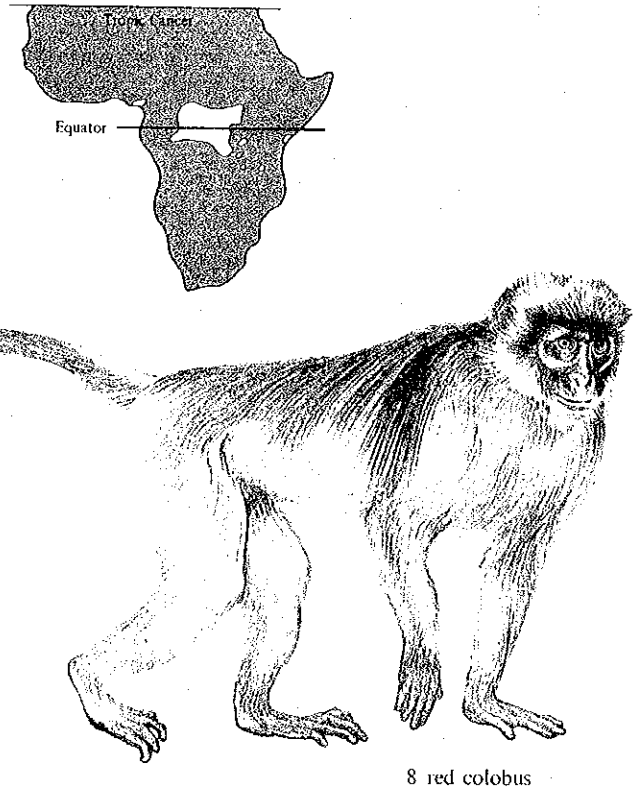


9 Angolan colobus
Colobus angolensis

* In the survey conducted in 1979, Angolan colobus was observed inhabiting the main ridge of Mahale. It was recognized that it closely resembles *Colobus angolensis cordieri* which is distributed in the eastern part of Zaire and has a number of distinguishing features. In contract to *C. d. cordieri*, which does not have a tufted tail, the ones in Mahale do have tufted tails. Colobus monkeys with tufted tails are distributed over regions from Angola to the Livingstone Mts. in southern Tanzania. *C. a. sharpei*, are white-tailed, but the ones inhabiting Mahale are gray-tailed, a common feature shared with *C. a. sharpei*. The colobus in Mahale, therefore, shows characteristics intermediate between the subspecies prevalent in eastern Zaire and the ones inhabiting in southern Tanzania. At this stage of our knowledge, it is impossible to classify Mahale population into either group. For the identification of this species further research and investigation are required.

red colobus
(Colobus badius)

The red colobus is widely distributed in the lush forests of Africa from Gambia to Zanzibar Island. They have been observed travelling in groups of about 50 to 60. Their food repertoire mainly consists of leaves, but they also eat fruits.

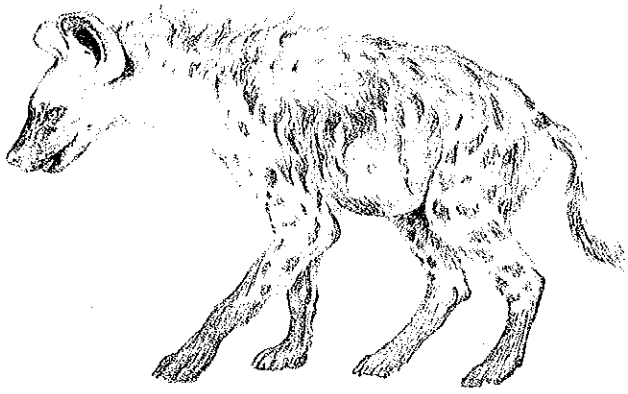


8 red colobus
Colobus badius

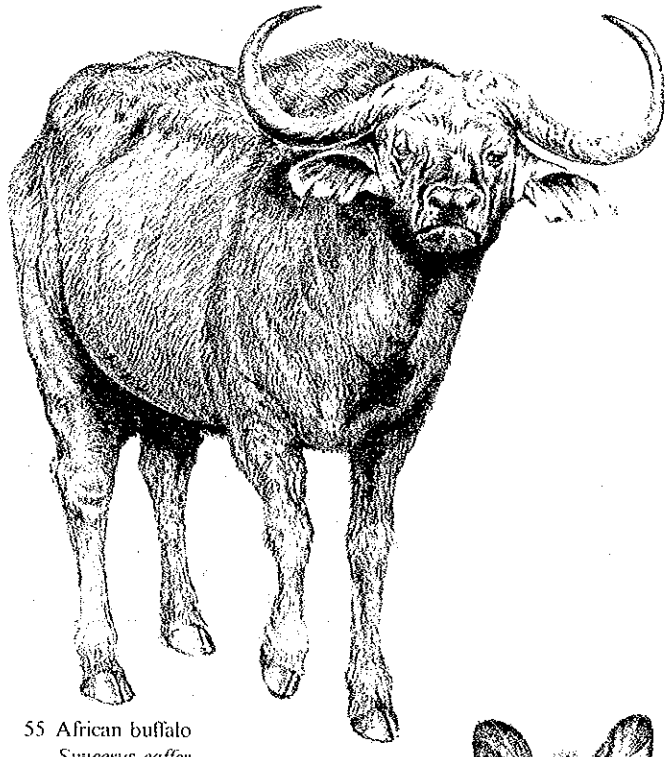
3. Mammals Other Than Primates

Mammals in the miombo woodland

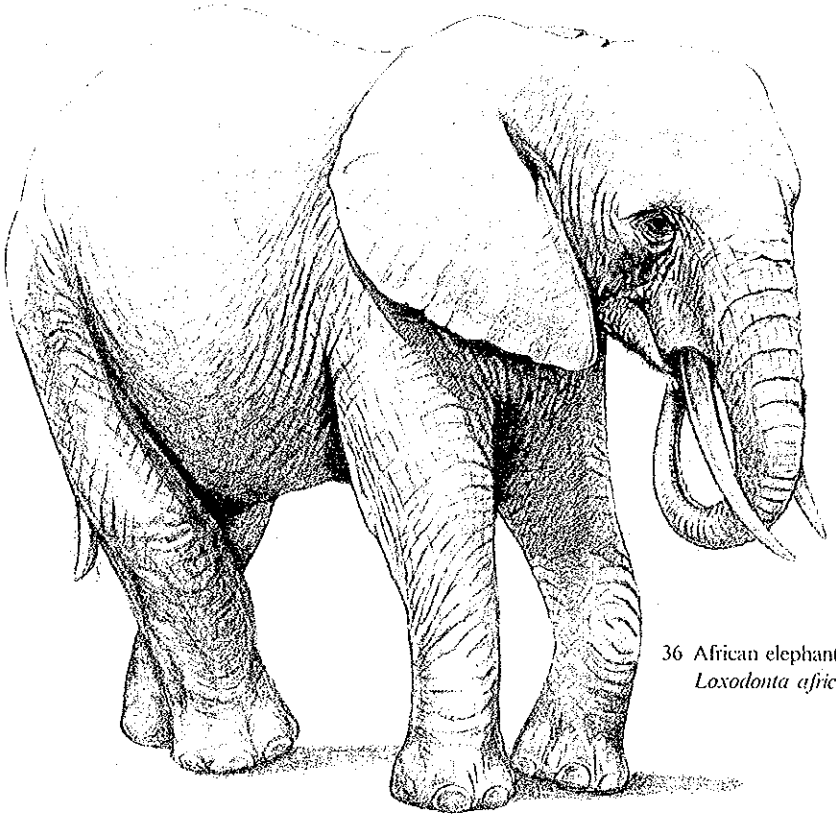
Most of the giant unguletes (hoofed animals) can only be observed in the eastern part of Mahale where the ground is covered with Miombo. In the vicinity of Masaba forming the eastern limit of the park, giraffes are widely distributed. Many zebras and larger antelopes are also found co-inhabiting in this area. It has been reported that roan antelopes inhabit the Miombo woodland in both the northern and southern parts of the Mahale Mountains. Although elephants are seen around the Kabesi River to the east of Mahale's main ridge, where the stream flows in a northerly direction, they have never been seen to the west of the main ridge. There are many buffaloes found in the catchment area of Kabesi River and on a plateau in the southwest part of the Mahales' main ridge. There are also a large number of lions and wild dogs roaming in this area.



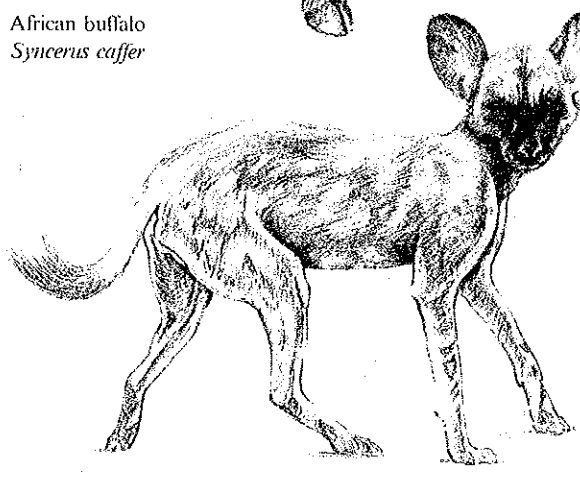
31 spotted hyaena
Crocuta crocuta



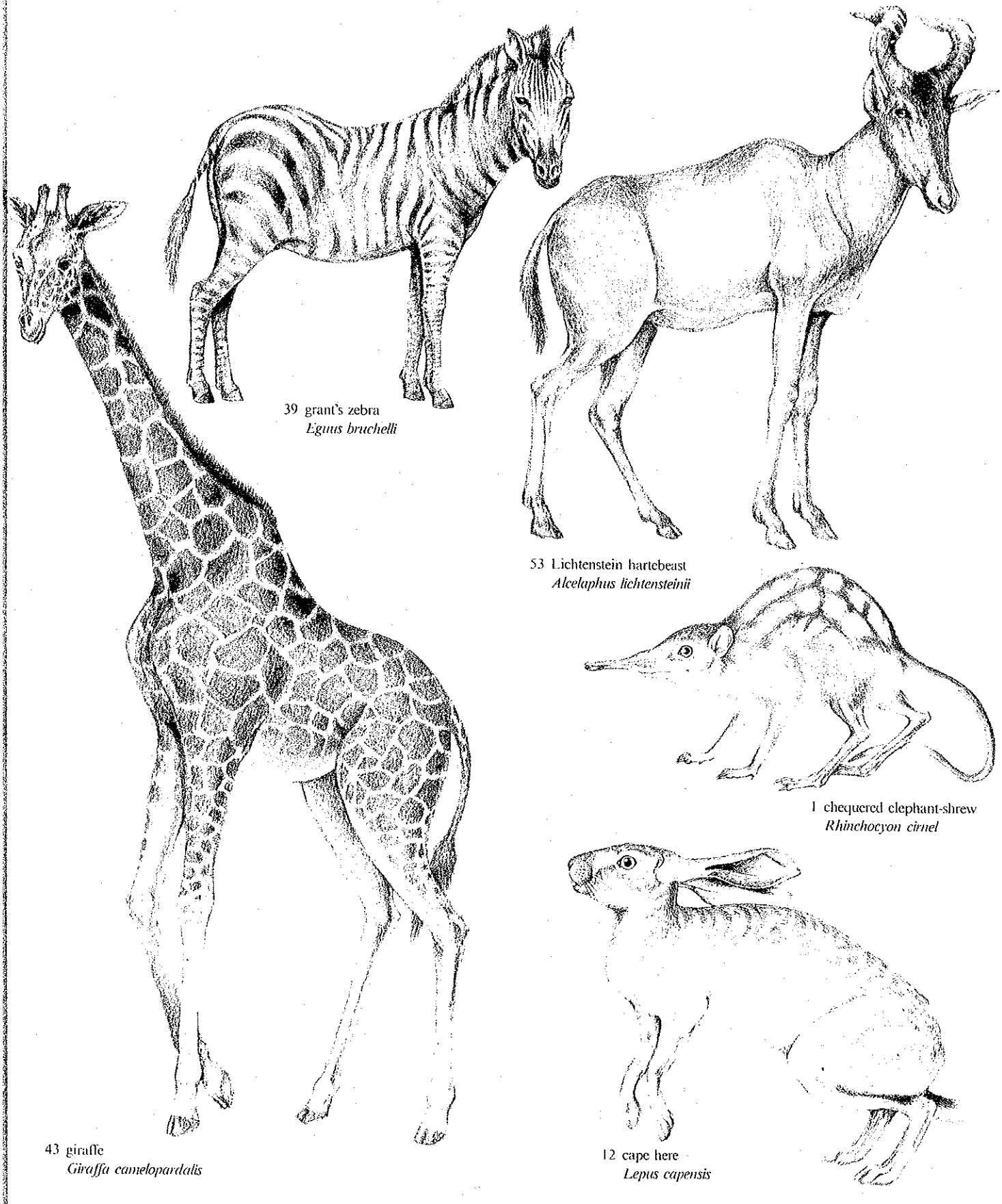
55 African buffalo
Syncerus caffer



36 African elephant
Loxodonta africana



20 wild dog
Lyicaon pictus



39 grant's zebra
Equus bruchelli

53 Lichtenstein hartebeast
Alcelaphus lichtensteinii

1 chequered elephant-shrew
Rhinchocyon cirnei

43 giraffe
Giraffa camelopardalis

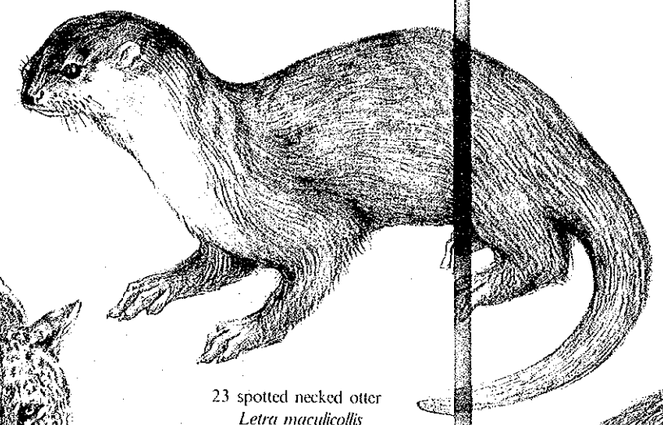
12 cape here
Lepus capensis

Mammals in the montane forest

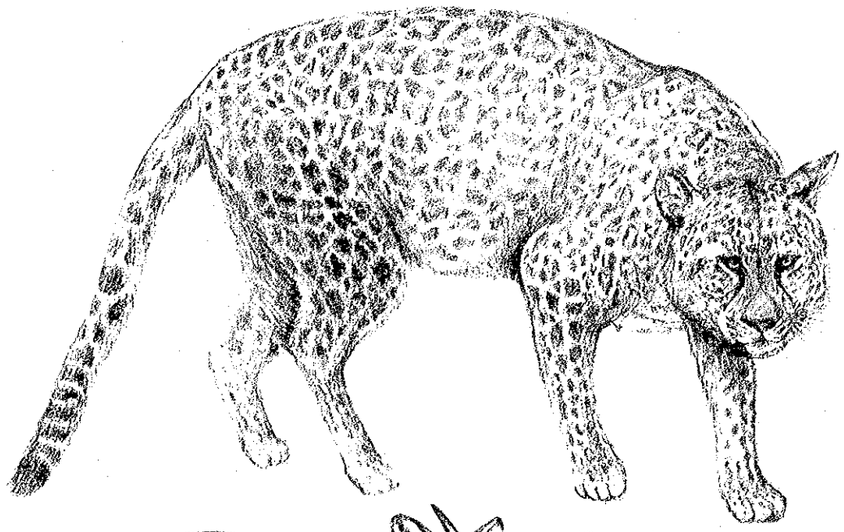
Angolan colobus inhabits an extremely limited region of the montane forest covering an area from Mt. Pasagulu in the Mahale's main ridge to Mt. Mhensabantu, in the vicinity of its highest peak, Mt. Nkungwe, and the montane forest of Ujamba. While complete knowledge of the mammals inhabiting the montane forest belt is still lacking, leopard population is presumed to be quite high. Although essentially west African in nature, the blue duiker is suspected to exist in the montane forest.

Aquatic mammals

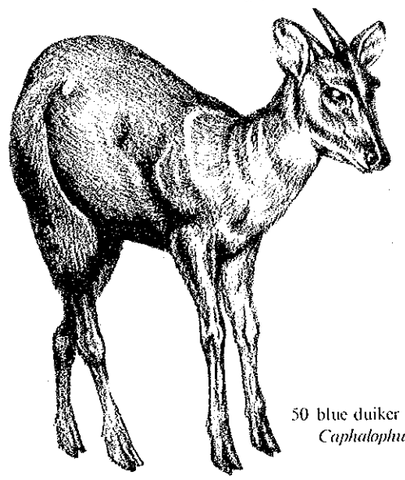
Aquatic mammals of the area including the hippopotamus can be found at Myako, Sinsiba, and Nganja, also cape clawless otters in various places along the lake shore, and spotted-necked otters in mountain streams rich in river crabs.



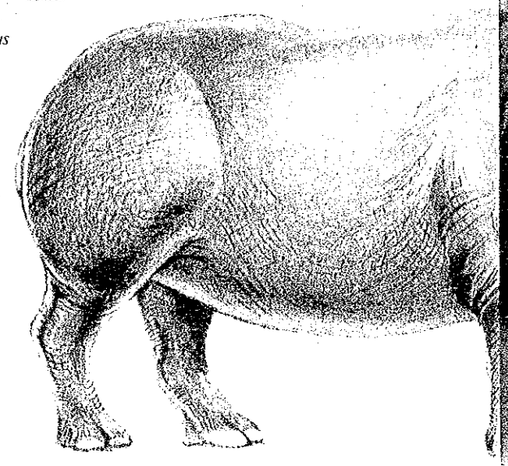
23 spotted necked otter
Letra maculicollis



33 leopard
Panthera pardus



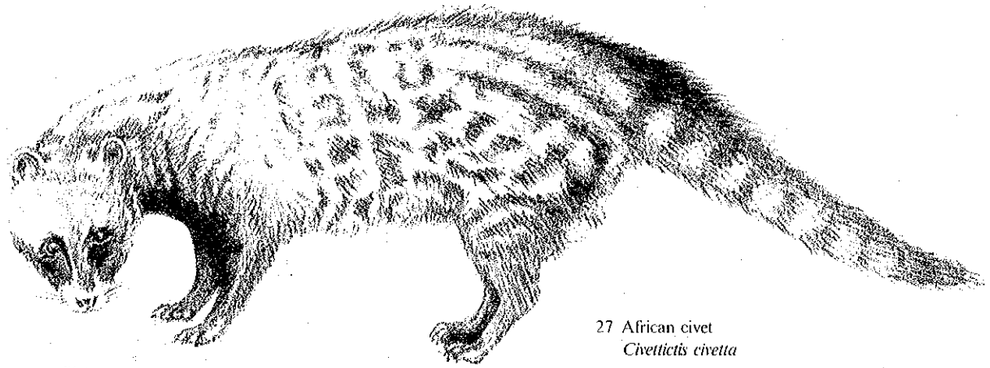
50 blue duiker
Caphalophus monticola



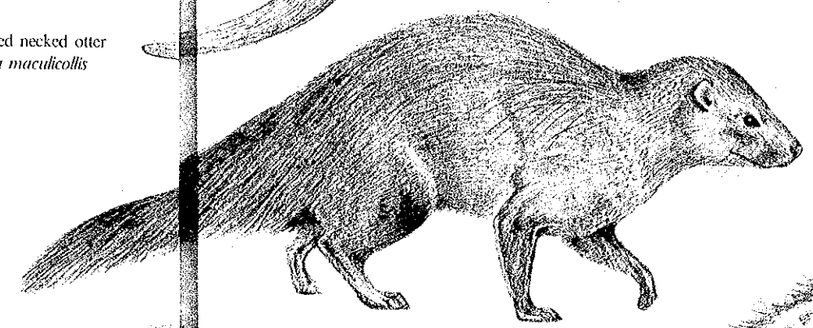
42 hippopotamus
Hippopotamus amphibius

Nocturnal mammals

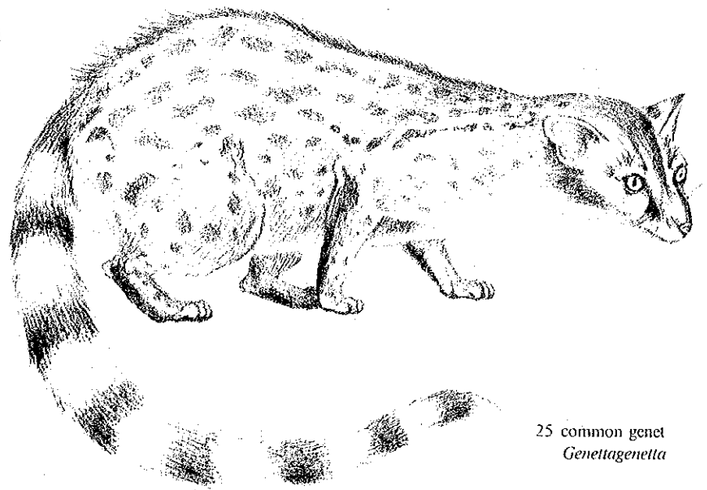
Several species of nocturnal mammals can be observed relatively easily. Some of these species are: 1 the greater galago at Kansyana camp, 2 the bushy-tailed mongoose, common genet, and African civet at Myako camp, and 3 the bushpig at Kasiha. These mammals have grown accustomed to humans, which can make close range observation.



27 African civet
Civettictis civetta



22 cape clawless otter
Aonyx capensis



25 common genet
Genettagenetta

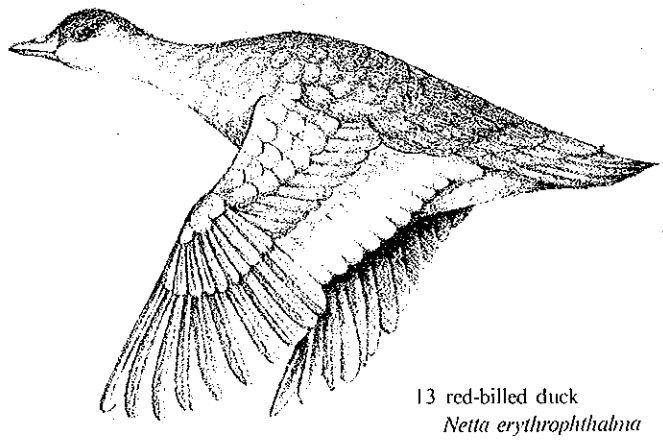
4. Birds

Wild birds on and near the lake

Near the lake shore, one species each of gull and tern and one species each of darter and cormorant can be found. These are migratory birds, paying a seasonal visit to the lake. Although it is estimated that there are considerably large numbers of birds in transit that make the lake their temporary living site before going on to their final destination, only ducks, geese, sandpipers, etc. have been so far recorded.

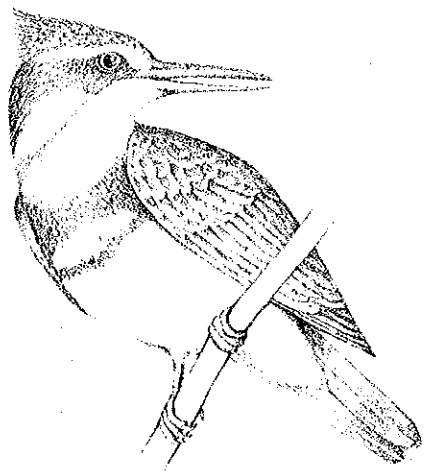
Near the periphery of the lake, breeding pairs of pied king fisher and giant kingfisher are commonly seen. In reed bushes, many herons, crakes, and moorhens have been observed. In the tall trees surrounding the lake, African fish eagle are seen perched on a top of the trees. It is quite a sight to catch a glance of one of these eagles making a sweeping dive for fish in the lake and flying away with its prey clasped in its powerful beak.

7 little egret
Egretta gazetta



13 red-billed duck
Netta erythrophthalma

5 goliath heron
Ardea goliath

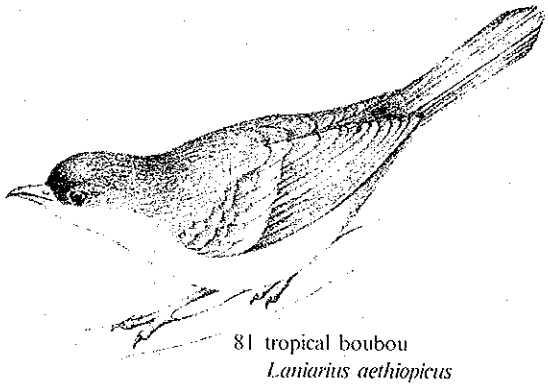


58 pied-kingfisher
Ceryle rudis

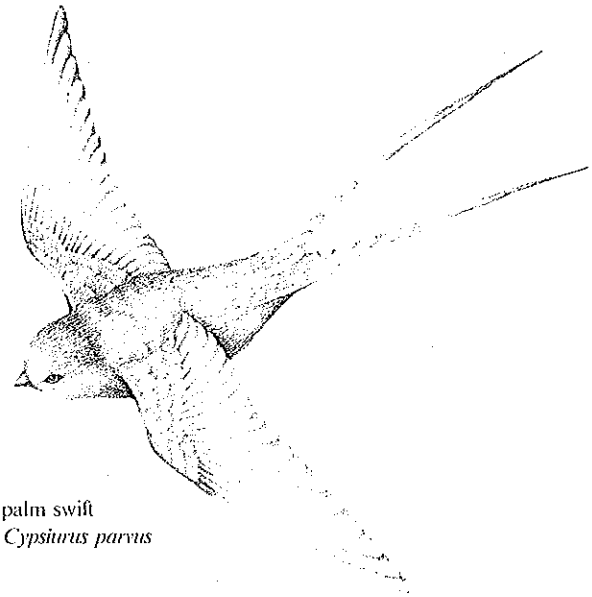
Wild birds in habiting secondary vegetation areas near former village sites

Abandoned farmlands near the lake have turned into secondary vegetations and grasslands where, at the present time, one can observe numerous species of weavers, sparrows, canaries, widow-birds, etc., feeding and breeding. One can also enjoy the conspicuous chirping of birds, such as the white-browed coucal, emerald spotted wood dove, and tropical boubou, all residents of this region. Both in the morning and evening, it is possible to hear the soothing, mellow warble and twitter of the white-browed robin chat. The region is also the home of a number of species of bee eaters and palm swifts, all of which display graceful soaring patterns.

In *Acacia* trees, one might catch glimpse of green wood hoopoes perched on boughs and if one happens to be in the right place at the right time, he might be able to observe gruesome attacks on monkeys by a crowned hawk eagle.

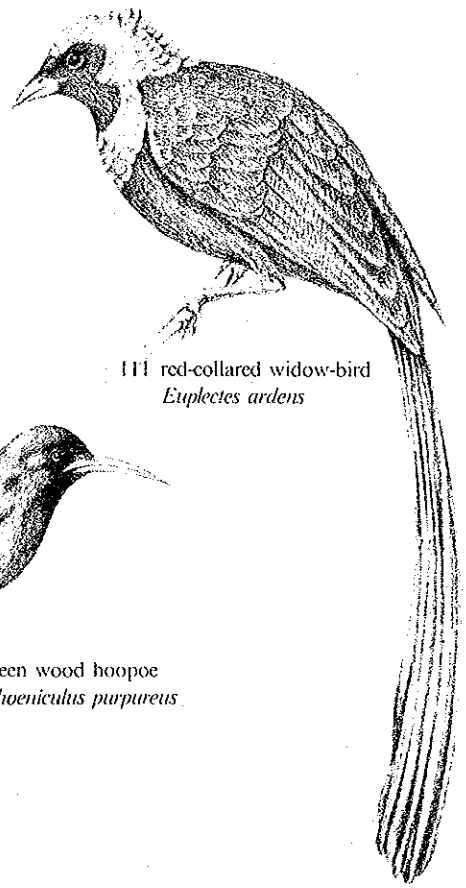


81 tropical boubou
Laniarius aethiopicus

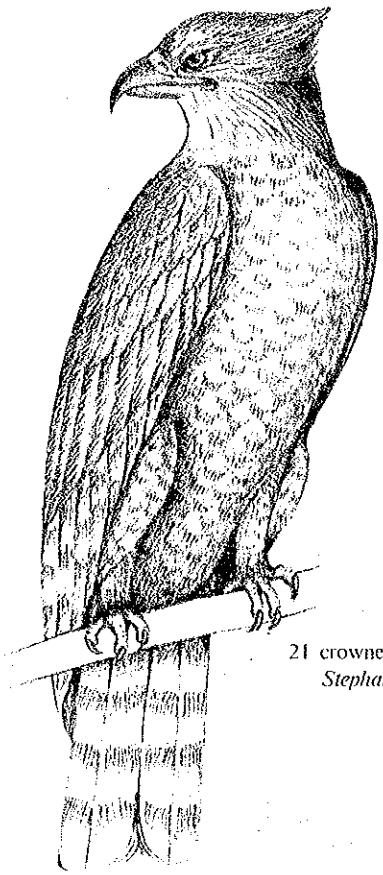


54 palm swift
Cypsiurus parvus

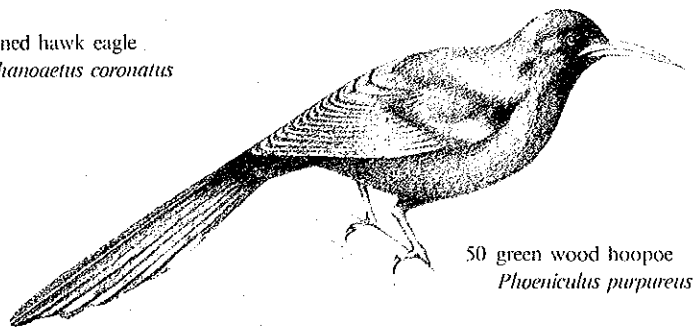
114 grosbeak weaver
Amblyospiza albifrons



111 red-collared widow-bird
Euplectes ardens



21 crowned hawk eagle
Stephanoaetus coronatus



50 green wood hoopoe
Phoeniculus purpureus

Wild birds observed near the Kasoge forest

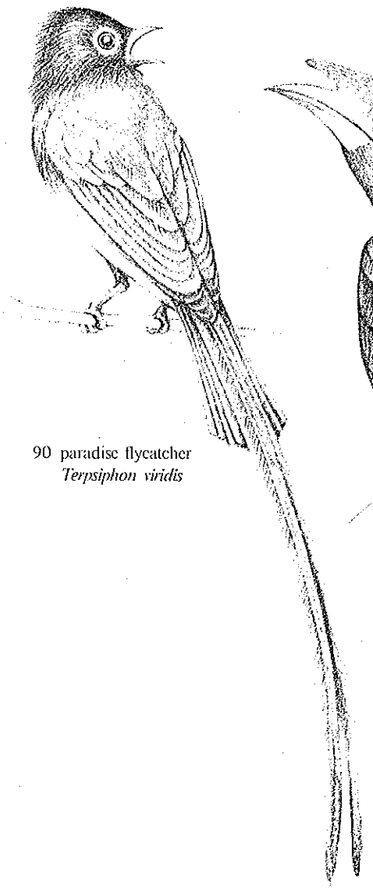
When approaching the edge of the Kasoge forest, moreover, an observer would most likely come upon the pleasing sights and songs of wild birds such as the dark-headed bulbul, speckled mousebird, paradise flycatcher, Ross's turaco, trumpeter hornbill, crowned hornbill, etc., chirping and soaring in the sky. Along the mountains near the periphery of the forest, one can, if lucky enough, enjoy the sights of many species of sunbirds happily sucking floral nectar out of trees. In the morning and evening, one's attention may be drawn to the piercing and clamorous sounds of scaly flanco-lins which make this region their breeding ground.

Wild birds in the Kasoge forest

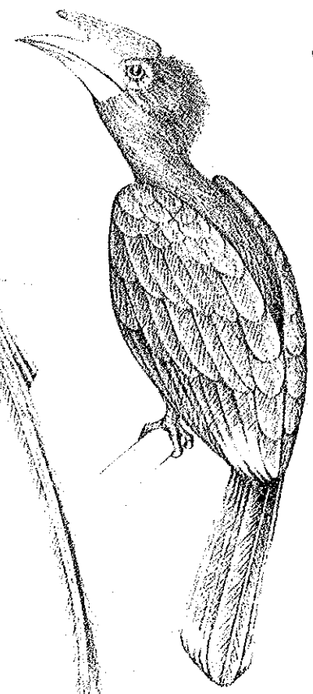
Although there must undoubtedly be innumerable species of forest birds, a thorough investigation of the region for identifying those wild birds has not been so far carried out.

Three different species of cuckoos feathered in metallic green are frequently observed perching on small twigs. When one's ears become trained to pick them up, he will then be able to recognize their characteristic chirping sounds filling the air. Sometimes, a flock of vividly scarlet and black crested malimbes flying between the trees into the blue sky would catch one's eyes.

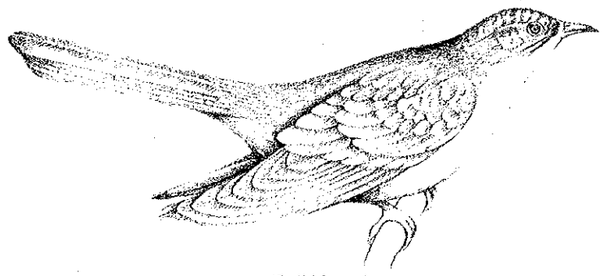
In Kasiha Valley, where rapids run through steef cliffs, beautiful scenes of mountain wagtails can be seen soaring over one's head. Still another wild bird, such as the rough-winged swallows, can sometimes be observed soaring over precipitous cliffs along a river.



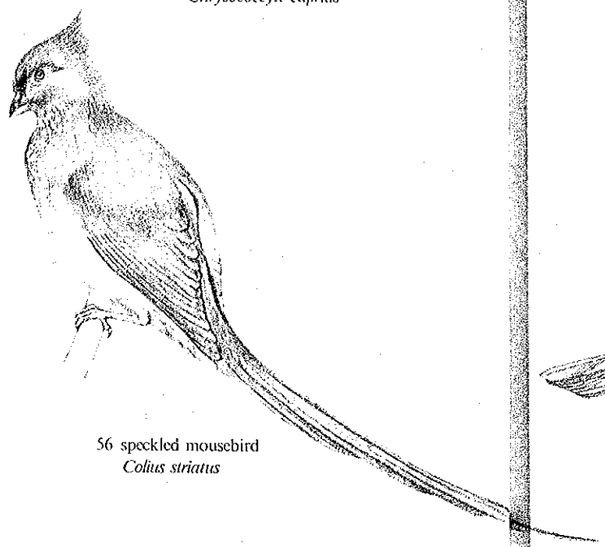
90 paradise flycatcher
Terpsiphon viridis



68 trumpeter hornbill
Bycanistes bucinator



47 didric cuckoo
Chrysococcyx caprius



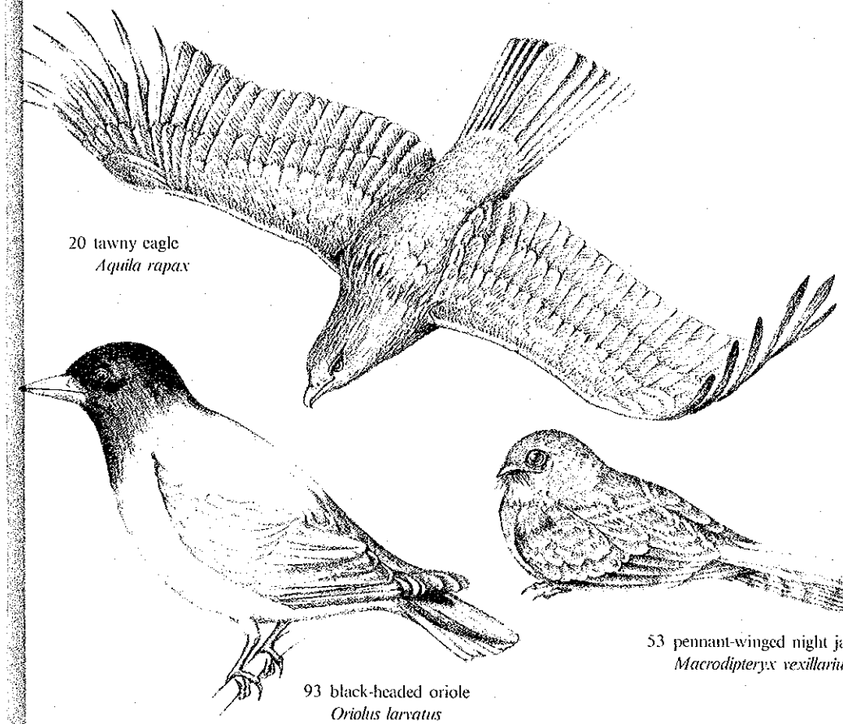
56 speckled mousebird
Colius striatus

Wild birds near the Mahale main ridge

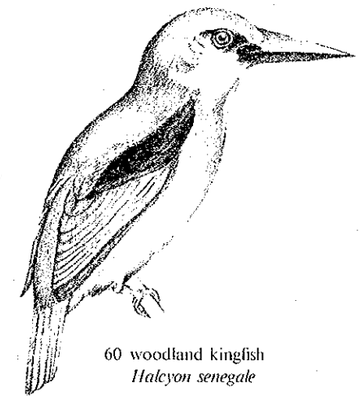
When we climb up to the montane forest of the main ridge, we can observe the olive pigeon, a species of wild bird not seen in the lowland. The birds most often encountered are the red-winged starling, violet-backed starling, black-headed oriol, etc. Tawny eagles and white-naped ravens are sometimes seen, dancing in the air high above the ridge.

Wild birds of the miombo woodlands

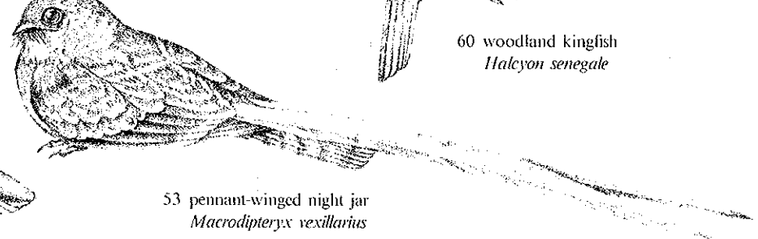
In the miombo woodlands which spread out across the eastern slopes of the Mahale main ridge, one can encounter yet other wild birds hitherto unseen. It would not be totally unexpected in the midst of the dry season that one happened to catch a glimpse of a pennant-winged nightjar with its long white decorative tail in full display. The sight of straight-crested helmet shrikes soaring in flocks from bough to bough in the woodlands is also a representative of this area. The drongo and woodland kingfisher are two more birds often observed in the area.



20 tawny eagle
Aquila rapax

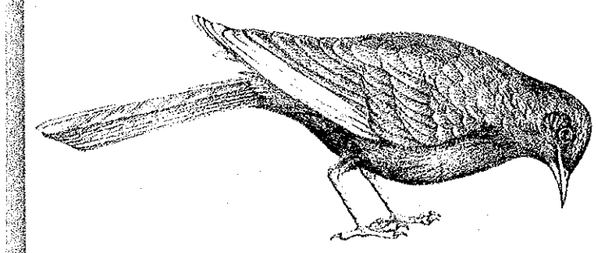


60 woodland kingfish
Halcyon senegale

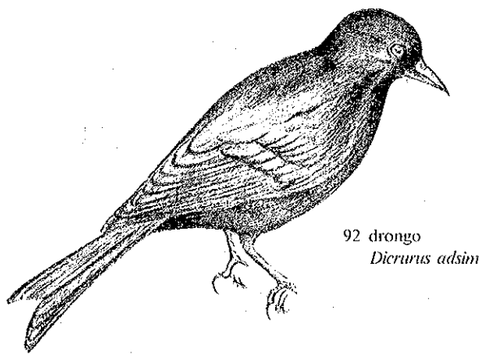


53 pennant-winged night jar
Macrodipteryx vexillarius

93 black-headed oriole
Oriolus larvatus



95 red-winged starling
Onychognathus morio



92 drongo
Dicrurus adsimilis

5. Other Fauna

Fishes

Lake Tanganyika, the world's third deepest lake (1,470m below sea level) with a surface area of about 34,000km^2 and completely isolated from all other water systems for an extremely long period of 6 million years, was created nearly 10 million years ago. The piscifauna in the lake includes a large number of endemic species and genera, not a few of which poses some significant academic problems. At least 193*different fish species have been identified and classified up to the present time.

* Pall, M. (1953) Poisson non Cichlidae. Poll, M. (1956) Poisson Cichlidae.

Surprisingly, out of the entire 193 species, nearly 90%, are endemic. When Cichlids are singled out, moreover, all of them, namely 126 species, are endemic species. At the genus level of classification, 40 out of the total of 66 genera, a surprisingly high ratio, are endemic. Only some fishes with distinguishing features shall be introduced in the following pages.

Living in the lake are two species, *Protopterus* (lung-fish) and *Polypterus*, both of which are said to be the living fossils from the Triassic and Jurassic periods, respectively. Several species of mormyrids (elephant-snout fish) have been identified, but, perhaps because of their preference for the muddy bottom of the lake, they are not very numerous in the vicinity of the Mahale area where the bottom is sandy.

Clupeidae family is mostly made up of sea water fish; however, schools of *Stlothrissa tanganyikae* and *Limnotrissa miodon* which belong to Clupeidae family can be observed in great numbers even in the lake near Mahale. These fishes are more commonly called "dagaa", closely resembling smaller-sized sardines, and are most actively sought by the native fishers. Although closely related to Clupeidae but much larger, *Hydrocyon* (tiger fish) and many species of *Alestes* are sharp-toothed and carnivorous fish. Cyprinids and Bagrids are also represented by a great number of species. Relatives of *Barbus* (carp) are often observed to make an arduous ordeal, i.e., swimming upstream from the lake. *Dinotopterus cunningtoni* of Clariids, a cat fish sometimes exceeding one meter or more in length, is commonly called "nsinga". *Malapterurus electricus* (electric cat fish) is well-known for its electricity producing capacity. So-called "spiny eel", *Mastacembelus sp.*, is frequently spotted in the lake near Mahale.

Centropomids is a family which includes the Nile perch. *Lates marie* is known as Lake Tanganyika Nile perch which the natives refer to as nsangala, and larger individuals of this species grow up as long as 1.5m. Besides these, *Luciolates stapersii*, another species of the family generally known by the name mgebaka, is an important market fish of the lake.

Out of all the fishes which live in Lake Tanganyika, endemic Cichlids, consisting of 126 different species are the most mysterious family from the point of view of behavior and ecology. They have successfully accomplished an adaptive radiation. Each species possesses unique features with regard to its size, shape, color, food habits, habitat, etc. The largest species of this group known as yellow belly (*Boulengerochromis microlepis*) measures nearly 50cm in length, but on the other hand small species of less than 10cm are not few. The number of species with peculiarities such as a fish with lump on its forehead (*Cyphotilapia frontosa*), and with thick-lipped mouth (*Lobochilotes labiatus*) are rather numerous. There are many unique species appropriately known as mouth breeders whose females hatch the eggs in their mouths. Among these, ngege (*Tilapia tanganyikae*) and nkungula (*Limnotilapila dardennei*) are not only delicious, but are also very valuable catches for the fishing industry

Even though Tanganyika is a fresh water lake, a puffer (*Tetraodon mbu*) has been found in it. Besides these various fish species, Lake Tanganyika serves as a breeding bed for a great number of shell-fish. Fresh water jelly-fish (*Limnocnida tanganyikae*) is often found floating in the water.

Reptiles

It would be uncommon to come across a single snake even after trekking through the national park for several days. The typical African poisonous snakes such as the black mamba, boomslang, black cobra, spitting cobra, paff addar, and green vipier which characteristically inhabit the forest, however, are all distributed in the area. African rock pythons are not unusual either. There are numerous Nile moniters in the neighboring area surrounding the lake. The Lake Tanganyika water cobra, which lives on fishes of the lake, is a unique species endemic to the lake. It can be identified by the brown and black bands on its nearly 2 meter-long body and is deadly venomous.

Two species of crocodiles are found in the confines of the national park area: the Nile crocodile and the small-sized broad-fronted crocodile. The population of both species, however, is rapidly decreasing.

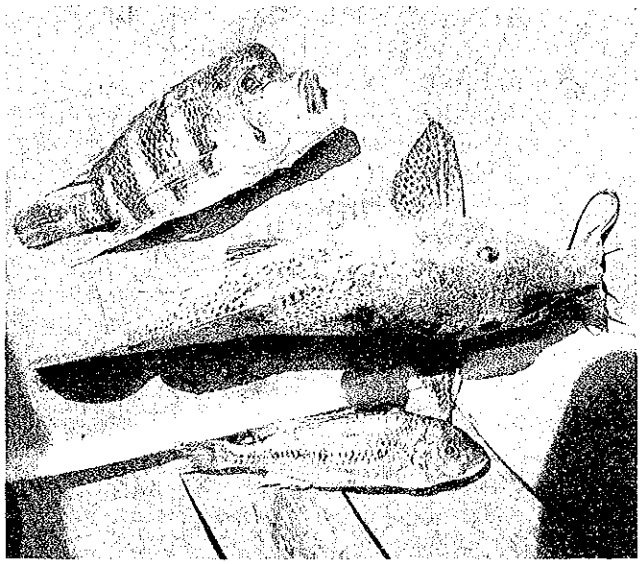
Insects

While many insects hide out during the dry season, butterflies gradually emerge to transform the area into a veritable multicolored paradise especially from the lake shore to the periphery of the Kasoge forest.

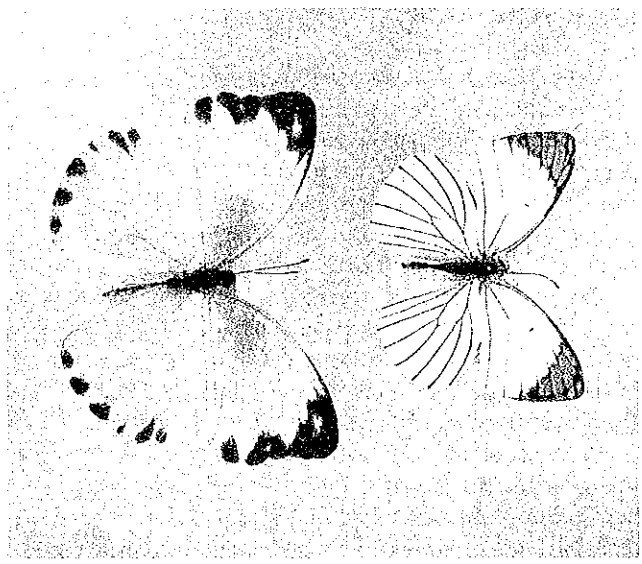
According to R.H. Carcasson, an entomologist who was formerly responsible for the identification and classification of the butterflies collected by KUAPE in the Kabogo Point, there is an extremely intricate mixture of biogeographical elements in the composition of Rhopalo cera (butterflies) fauna prevalent in the area. He mentioned 7 elements that constituted this complex combination. They are: 1) Miombo woodland fauna, 2) eastern arid fauna, 3) pan-African arid-type fauna, 4) western lowland fauna, 5) eastern lowland forest fauna, 6) Kivu-Ruwenzori highland forest fauna, and 7) Tanganyika-Nyasa highland forest fauna. It is believed that such intricate interactions among various faunas could be operating in the national park area itself.

As of this writing, although a systematic analysis of all the observed raw data has not been carried out, it is likely that nearly all the species are similar to those found in the Kabogo Point. Because the montane forest and the montane grassland are blessed with yet other elements not shared by the Kabogo Point, it is entirely possible that butterfly fauna of Mahale would be even more diverse and intricate than in the Kabogo area. While there is a recent report by J. Kielland of the discovery of several new butterfly species in Mahale, the area can safely be described as one of most promising places still left dormant with many more new species to be discovered in due time, only waiting for future studies.

Of course there are many other insects in the area, regrettably, however, investigation of insect fauna as a whole is scarcely moving ahead with the exception of some species eaten by chimpanzees.



Fishes of Lake Tanganyika Photo by T. Nishida



Butterflies of Kabogo Point.

6. Physical Features

Topography

The area of proposed national park can be divided into two major topographical sections; the Mahale's main ridge, an area parallel to the lakefront and running in an almost straight line from NNW to SSE, and a hilly country extending behind the main ridge to an easterly direction. Following the western part of the Rift Valley, the Mahale Mountains rise partly to the east of the valley. In the western part of Tanzania, this area forms one of the largest mountains. Besides Mt. Nkungwe which rises to a peak height of 2,462m, six peaks higher than 2,000m above sea level can be seen. A series of almost parallel dendritic valleys which contain rapid streams wear the western slopes and mostly flow westward to the lake. Many of these streams have running water even during the dry season.

The hilly country consists of areas below 1,700m above sea level with watersheds found near the central area. The river flows from there both in a southery and northerly direction, parallel to the Mahale Mountains, eventually discharging into the lake.

Although the geologic formation of the whole national park area is formed during the Archaeozoic era, a stratum of Mesozoic era is evident in the southern part and in a limited portion of the central area, as for soil condition and sandy loam, while a good drainage system covers the entire park area.

Climate

The climate alternates between two seasons: the dry season and the rainy season. Although there are slight differences on the time of the change in season from year to year, generally speaking, the dry season, which lasts approximately five months, begins at the end of May and ends towards the beginning of October. The rainy season consists of the rest of the year, namely, seven months. The beginning of the rainy season is heralded by a heavy concentration of precipitation. Grass in the savanna woodland starts shooting new buds by this time. During the rainy season, especially in the forest area, humidity will be extremely high. January to the middle of March is a period marked by relatively slight amounts of rainfall, although these months happen to be in the rainy season. It would not be unusual to have a week or more with no trace of rain during this period. If such a dry spell followed the end of the rainy season, there would again be many days of drizzly rain. The grass reaches its maximum height during the rainy season, with valleys all over the area abounding in flowing water. On the other hand, generally, there is not even a drop of rain during the dry season. With a few exceptions, almost all of the valleys dry up, leaving only small pools of dormant water here and there. The indication of the beginning of the dry season is the complete lack of any precipitation.with continued days of fair weather Grass starts to wither and almost all of the trees in the woodland and in certain parts of the forest begin shedding their leaves; however, water can still be seen flowing in many of the valleys. But by September or October, most of these valleys finally begin to dry up and grass in the woodlands will be completely dessicated and withered down. Already by this time, trees will have entirely shedded then leaves and it would not be surprising to see some trees with new buds springing up. Cloudy days are frequent around this time of the year, however.

According to the distance from the lake, the topography and influences of the neighboring forests, total annual precipitation shows great variations between the different localities. Based on the mean annual rainfall of Tanzania in maps, Mahale is classified as a region with precipitations of 801mm to 1,000mm per year. Rainfall is higher than this on the western slope of the main ridge, and some localities of Kasoge have recorded high amounts of rainfall, which can compare favorably with those in the Tukuyu region lying off the northernshore of Lake Malawi. At Kansyana, approximately 0.7km from the lakeshore, in the Kasoge forest, annual rainfall of higher than 2,000mm has been recorded. In Myako, which is on the lakeshore 4km north of Kansyana and surrounded by woodland, annual rainfall of between 1,700 – 1,900mm has been recorded. This is to be contrasted with rainfall of about 1,300mm at Bilenge, situated further north along the lake.

Affected by nearby forests, significant variations in atmospheric temperature and humidity are observed from one locality to another. At Kansyana, temperature is relatively low, while humidity is quite high. However, in contrast with climatic conditions prevalent at Kansyana, high temperature and low humidity prevail at Bilenge and Myako which situated on the lakeshore.

Furthermore, the range of daily temperature fluctuation is smaller at Kansyana than at the latter two places.

Fig.-52 River water system in Mahale

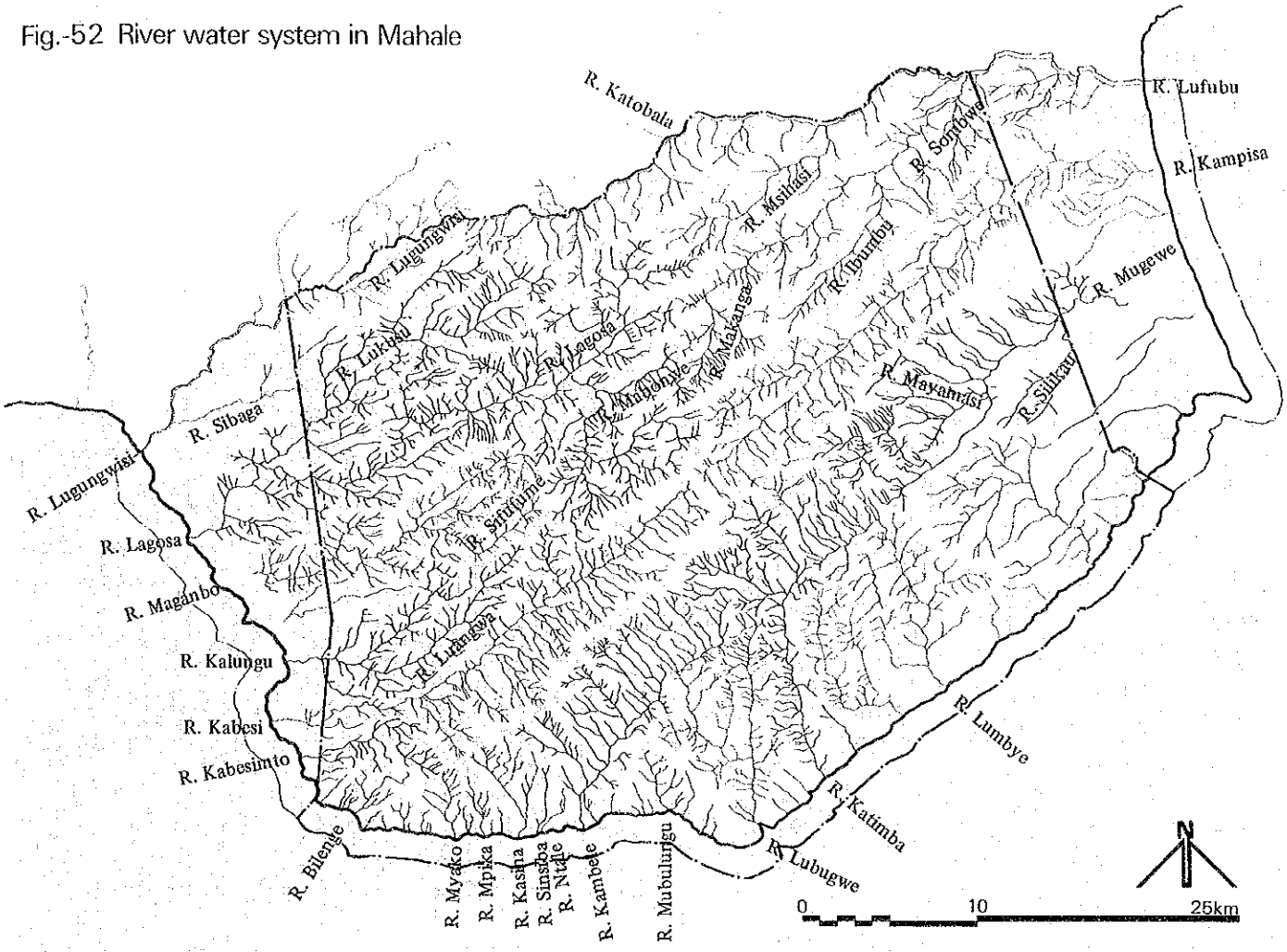
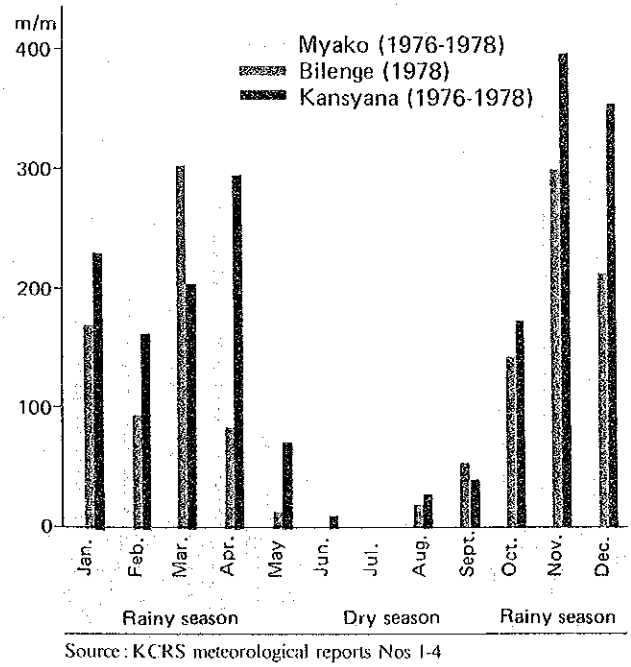
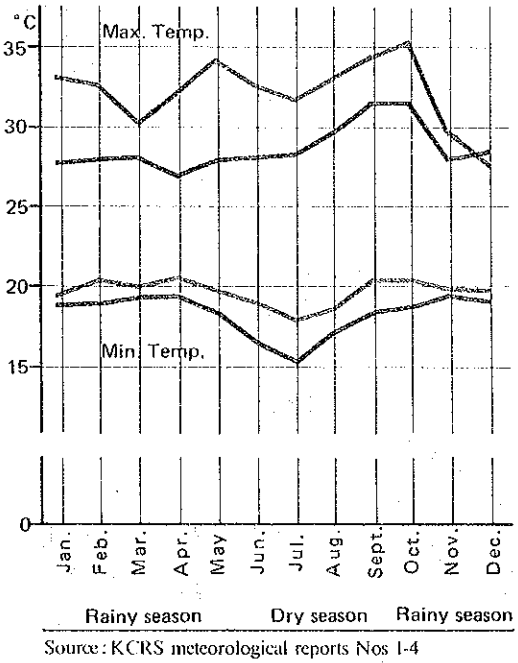


Fig.-53 Monthly rainfall; 1976—'78



Source: KCRS meteorological reports Nos 1-4

Fig.-54 Temperature; 1976—'78

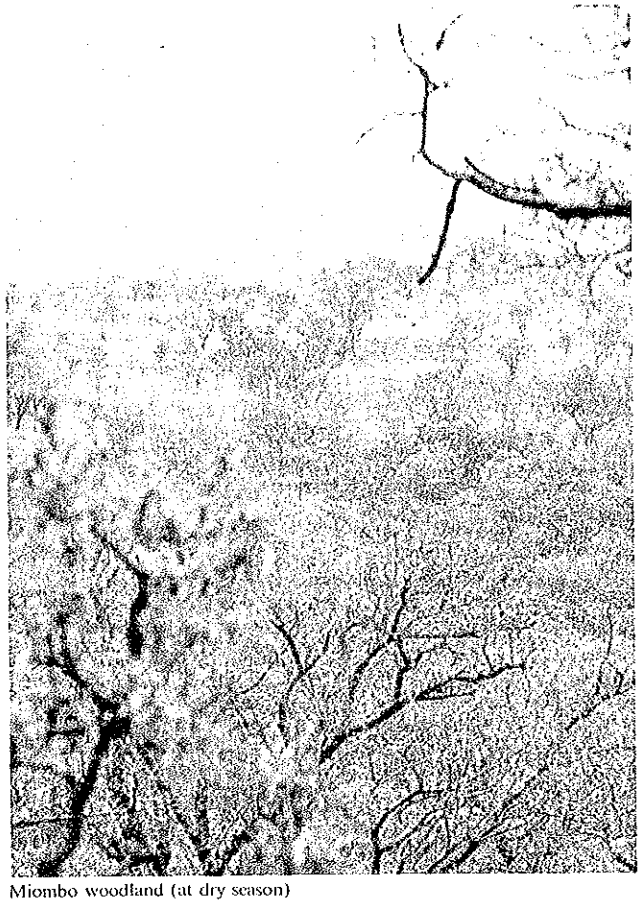


Source: KCRS meteorological reports Nos 1-4

7. Vegetation

Vegetation in the proposed national park can be divided into three major types. The dry woodland generally referred to as the Miombo forest cover up to 3/4 of the whole park area. In this region, forests along river banks run in net work formation and *Oxytenanthera* bamboo bushes are evident in some places. The highland of the Mahale Mountains are covered with a mosaic pattern made up of montane forest, grassland, and Alpine bamboos, all of which are characteristically found in Central African mountainous areas. And in the lowlands, the forest referred to here as the Kasoge forest is unique, in that it is the only place where this type of vegetation can be found. The topographically distinct conditions prevalent around Lake Tanganyika and the Mahale Mountains are responsible for creating this peculiar vegetation.

Fig. 55 is a diagram of vegetation distribution prepared after a careful consideration of the vertical distribution of vegetation types in the park area.



Miombo woodland (at dry season)

Fig.-55 Vertical distribution of typical vegetation

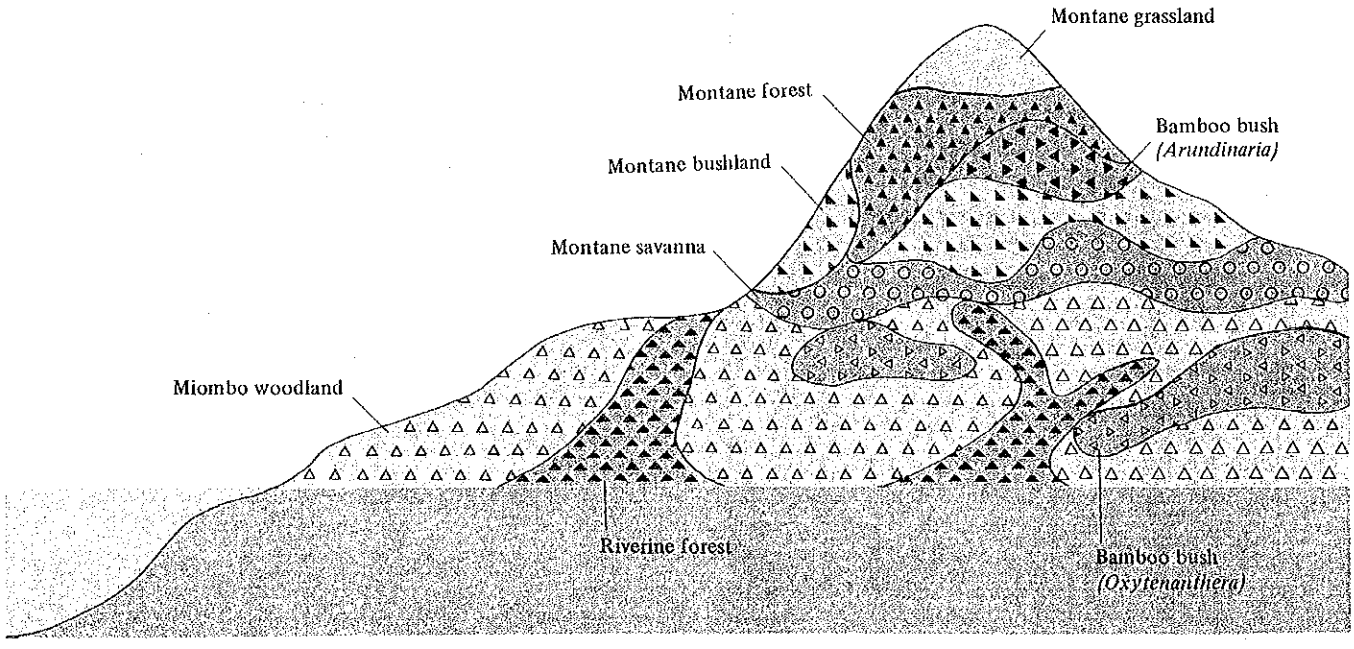
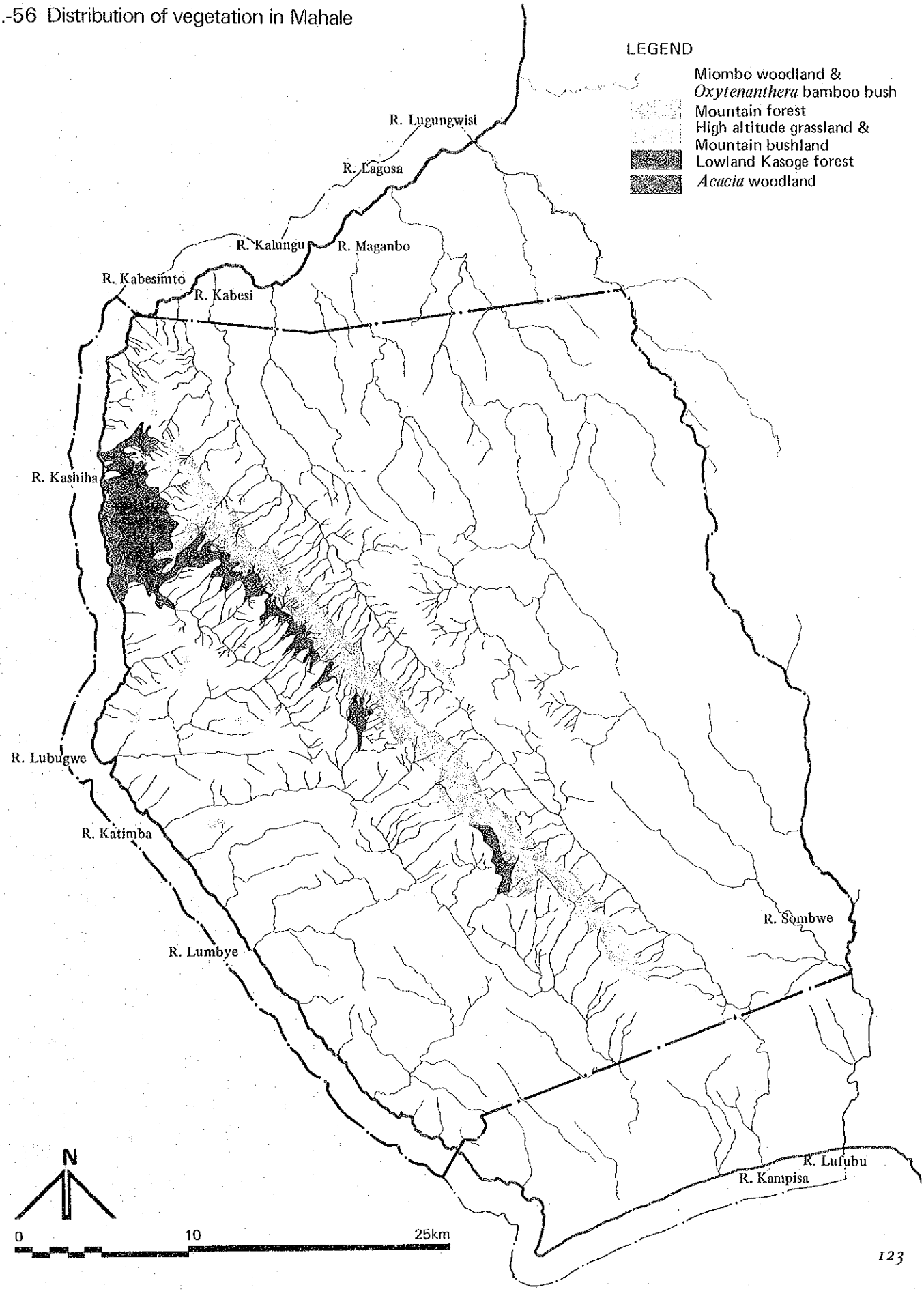


Fig.-56 Distribution of vegetation in Mahale



The Kasoge forest

The lowland forest is well developed on the western slope of the Mahale Mountains and along the lakeshore, stretching for 7km from the Myako Valley to the Lubulungu River. The altitude of the forest ranges from 780m at the lake level to 1,300m above sea level. It does not only cover the valleys, but also the ridge.

It is believed that the development of this forest is due to the presence of sufficient humidity throughout the year. Such favorable climatic conditions are a result of a humid mass of air over the lake colliding with a cold mass of moving air blowing down from the Mahale Mountains as high as 2,400m above sea level. The forest is an enclave of the Congo forest, of the tropical semi-deciduous type. Tall trees belonging to *Canarium, Albizia, Cynometra, Khaya, Xylopia, Pseudospondias, Ficus, Pycnanthus,* and *Garcinia* genera form the canopy of the forest, evergreen vines belonging to *Saba* and *Landolphia* genera are entwined around these tall trees.

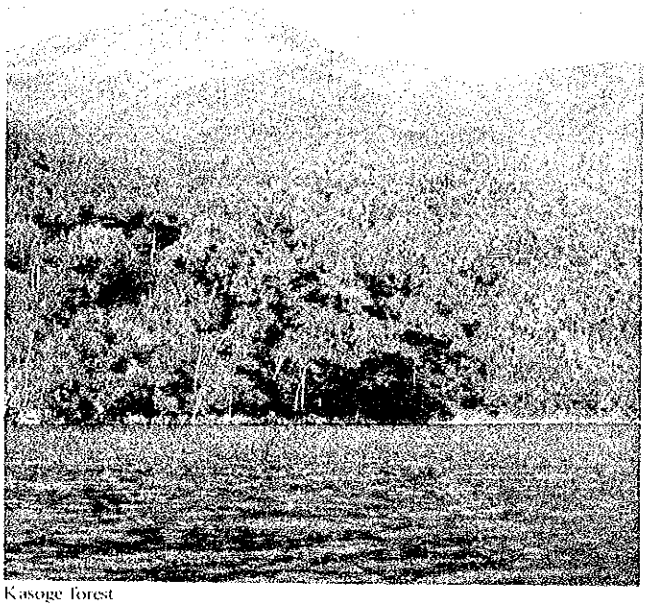
Highland of the Mahale Mountains

Vegetation in the Mahale Mountains from 1,500m to 2,400m above sea level is made up of a wet and more verdant forest than lowland Kasoge forest. It is especially dense and luxuriant along the valleys of the highland and near the steep slopes of the main ridge.

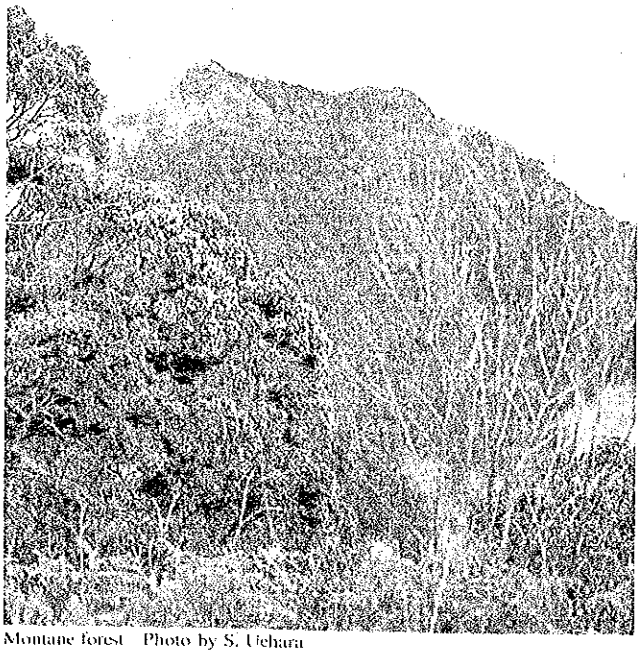
Along the ridge grow the flowered *Hypericum sp.* which is ubiquitously present in the subalpine zones of Africa, and *Philippia benguelensis*, possessing leaves closely resembling acicular trees (*Ericaceae*). *Parinari excelsa* of (Rosaceae) with a bold crown, *Croton megalocarpus* of (Euphorbiaceae), *Anthonotha noldeae* of (Legminosae), *Podocarpus sp.* of (Podocarpaceae), one of the only few conifers in Africa and *Ficalhoa laurifolia* of (*Ericaceae*) can all be found standing straight up piercing through a milky mist that rushes in and dissipates quietly in the mountainside. All of these families of trees are luxuriously enveloped around the trunk and tree top by lichens of *Usnea gonioides*.

Adjoining this mountain forest, there are two different vegetation belts, their patchy patterns covering the mountain ridge of Mahale. One of these belts is a bamboo bush of *Arundinalia alpina*, while the other one is a high altitude grassland.

The bamboo bush mainly covers a ravine near the mountain ridge. *Arundinalia alpina* stands straight; it is deeply green, and possesses solid and sturdy hollow spaces inside. They grow luxuriantly and beautifully, forming pure stands. The high altitude grassland almost entirely covers the long main ridge of Mahale. It is luxuriantly overlain with short grass with sporadic growths of trees of low to medium height. This area turns into a veritable garden of wild flowers toward the end of the rainy season until the beginning of the dry season.



Kasoge forest



Montane forest Photo by S. Uehara

The miombo forest

Most of entire eastern slopes of the Mahale Mountains and the areas to the north and the south of the Kasoge forest are generally known as the miombo forest.

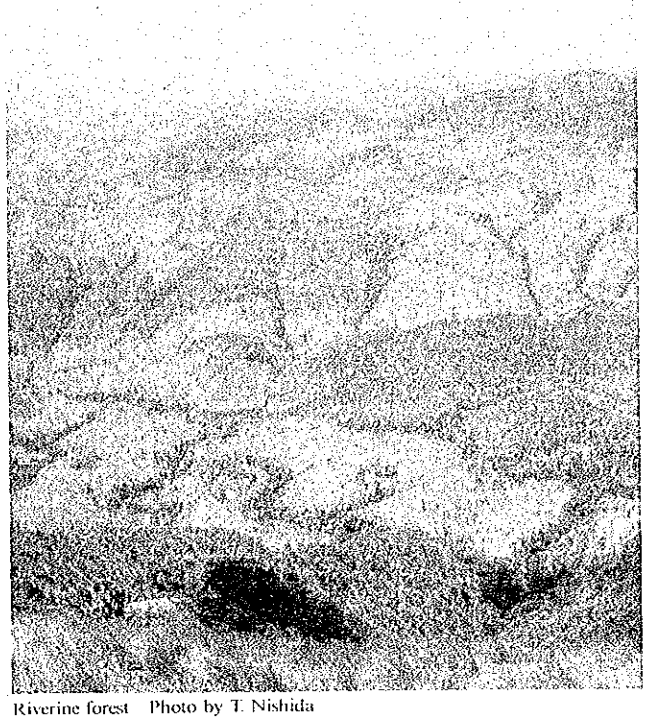
This region is characterized by openland vegetation covered by dry woodland or lowland bamboo bush. In some parts of the region, several kinds of limited forest patches can be seen.

The miombo forest is consisting of tall trees mainly of *Brachystegia*, *Isoberlinia*, and *Julbernardia* belonging to *Caesalpinioidea*. The floor of the forest is covered with grass. From November to April, during the rainy season, all trees abound in gree leaves and grass grows to height of over 1m; however, during the dry season, from May to October, trees begin to shed their leaves and grass turns yellow, withers, and finally dies. On the western slopes of the Mahale Mountains, the bamboo forest is rather exceptional, but in certain places of hinterland, to the east of the main ridge, this kind of vegetation is common and extends as far as the eye can see. This is the case especially for the catchment area of the Lufubu and Lugonezi River around the altitude of 1,000m, in the southern-most part of the national park. The northern portion of the miombo forest turns into bamboo bush at this point. This lowland bush presents a bright and beautiful scene. *Oxytenanthera abyssinica* bamboo is peculiar in that its stalk has no hollow spaces and it does not extend straight as does the tall Alpine bamboo. It is presumed to be a secondary vegetation that has grown after miombo forest having been destroyed for a long time by fire started by people engaged in agriculture.

These woodlands are criscrossed by number of waterways, alongside which grow luxuriant evergreen trees in a long but narrow belt. This vegetation is called either gallery forest or the Riverine forest. Viewed from a high vantage point, the combination of woodland and gallery forest creates a beautiful mosaic pattern of deep green shades contrasted against the background of the light colored open forest. The riverine forest develops at the periphery of the Congo's tropical rain forest; it is a semi-deciduous forest of medium humidity and its composition is almost identical to that of the Kasoge forest in plant composition. Although there are some stretches of land where gigantic trees rise higher than 40m above the ground, the width of such a belt of tall trees rarely exceeds 200m. The fruit-bearing lianas entwined around the trees gives the forest an appearance of luxuriant growth.

The fruit is an important food source not only for chimpanzees but also for a great number of arboreal animals. The above is but a brief summary of the distribution of vegetation types in the national park. For the reader's convenience, a more systematic explanation is given in Table 45.

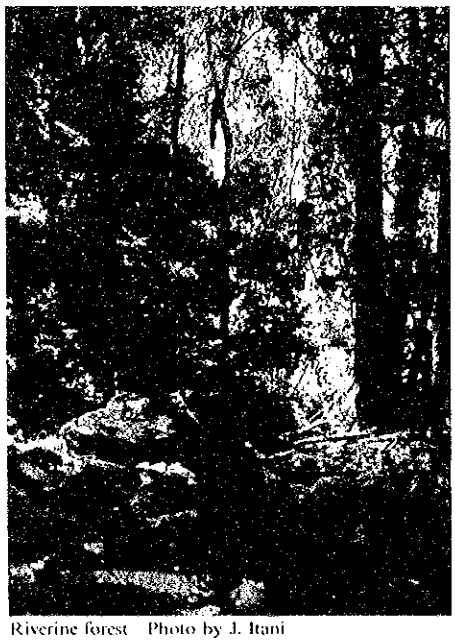
Fig. 57 is a diagram of the vertical distribution of the major vegetation types recorded in Mt. Nkungwe, the highest peak of the Mahale Mountains; the diagram is based on a KCRS survey conducted in 1976 and 1979.



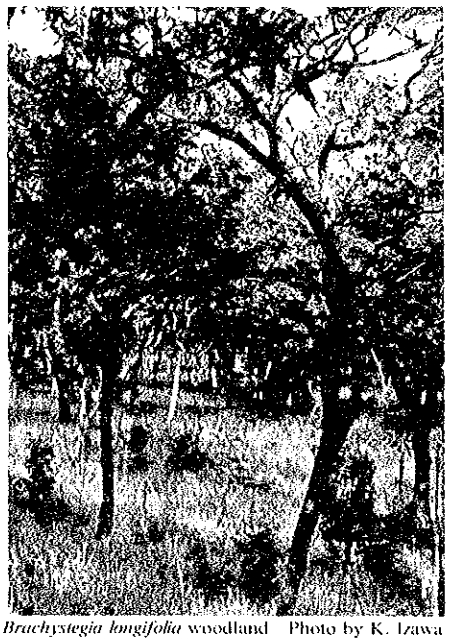
Riverine forest Photo by T. Nishida

Table-45 List of vegetation in Mahale

Type of Vegetation		Dominant Species	Characteristic Features and their Locations
Forest	Lowland Forest	*Albizia glaberrima, Pycnanthus angolensis, Xylopia parviflora, Pseudaspondias microcarps, Parkia, filicoidea, Cynometra* sp. *Julbernardia* sp., *Ficus vallis-choudae, Garcinia huillensis, Chlorophora excelsa*	This is a semi-deciduous tropical forest with its breadth being 780m at the lake front and 1,300m elsewhere. Naturally, from the shape of the forest, it can be divided into two forms. Although differences in their composition are not readily discernible, one contains permanent water and riverine forest is well developed in belt-like pattern along each river. The other is Kasoge forest singularly unique, covering expansively the western slope of Mahale Mountains. Various trees of complicated composition are entwined with *Saba florida* and *Landolphia* spp. In certain places, the floor of a forest is completely covered with growth of *Aframomum* spp.
	Montane Forest	*Parinari excelsa, Podocarpus* sp., *Eicalhoa laurifolia, Croton megalocarpus, Anthonotha nordeae, Polyscias fulva, Rapanea pulchra, Nuxia congesta*	Although complicated changes can be observed in the composition depending on the plateau and topography, it is basically a deeply green forest consisting of various kinds of arbor with a mixture of wooden pteridophyte *Cyathea dregei*. *Usnea* sp. is found growing attached on the boughs of tree.
Woodland	*Brachystegia* Woodland	*Brachystegia spiciformis, B. bussei B. boehmii, B. microphilla, B. stibulata, B. longifolia*	Although it is a dominant vegetation occupying the most expansive region in the park area, it has a tendency to form pure stand, and therefore can be divided into a number of sub-types according to species. Most commonly seen vegetation in this region is *Brachystegia spiciformis* woodland and especially almost all of the slope facing the lake is covered with it. This vegetation is also found covering Lukandamila Range running east of Mahale main ridge. Aside from this, because of high topography, woodland composed of *B. bussei, B. boehmii, B. microphilla,* and *B. stibulata* are found either in patchy patterns or in layers. Moreover, low trees belonging to *B. longifolia* are seen in the flat lowland and trees constitute a view midway between savannah.
	Isoberlinia Woodland	*Isoberlina angolensis*	It is quite broad in the flat lowland. The eastern boundary region of the national park district is a beautiful woodland containing tall trees.
	Combretum Woodland	*Combretum molle*	This vegetation frequently contains mixed woodland composed of *Brachystegia, Uapaca, Pericopsis* and *Monotes* in addition to *Combretum molle.*
	Uapaca Woodland	*Uapaca kirkiana, U. sansibarica, U. nitida*	Pure forest of *Uapaca kirkiana* can be seen on top of a slightly elevated ridged composed of much sand and rocks and also on plateau of higher than 1,000m above sea level. Although not as abundant as *U. kirkiana,* other vegetation such as *U. sansibarica* can be sometimes seen in small patiches. *U. nitida* is seen growing strongly on top of a low ridge, forming a thicket.
	Acacia Woodland	*Acacia sieberiana, A. albida, A. polyacantha*	It is believed that these are outer edges of riverine forest , source of inundation, and traces of secondary vegetation of agricultural land. In the park area, this kind of vegetation growth is only evident in limited localities, not occupying a very extensive area.



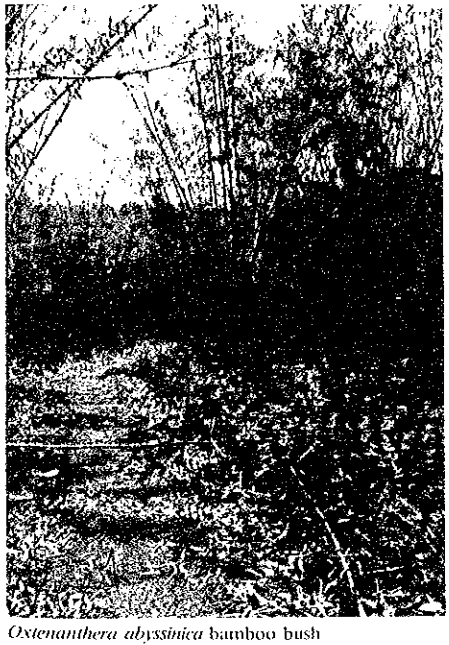
Riverine forest Photo by J. Itani



Brachystegia longifolia woodland Photo by K. Izawa

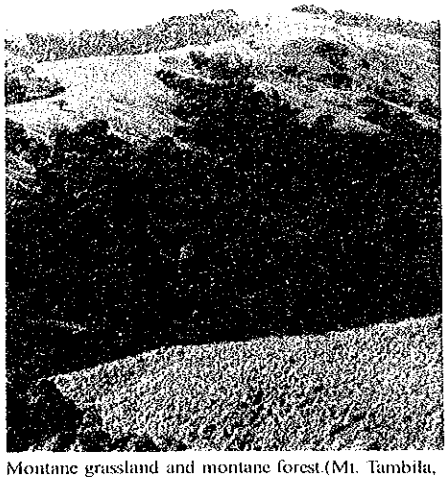
Pericopsis angolensis woodland Photo by J. Itani

Type of Vegetation		Dominant Species	Characteristic Features and their Locations
Savannah	Lowland Savanna	*Combretum binderanum*, *Diplorhynchus condylocarpon*	Among the vegetation seen in the flatland, there are places where tall trees belonging to *Pericopsis angolensis* are found mixed with the others. In the eastern half of the national park district, combination of *Brachystegia* woodland and this vegetation can be seen frequently in mosaic patterns.
	Highland Savanna	*Protea gaguedi*, *Hypericum quartiniarum*, *Philippa benguelensis*, *Dodonea viscos*, *Ricinodendron tomentellum*, *Erythrina abyssinica*	This vegetation can be seen especially along Mahale main ridge at elevation higher than 1,500m above sea level and presents a vegetation appearance of savannah or bush formations. The ground surface is predominantly covered with grass of *Hyparrhenia cymbaria*, but various herbs belonging to *Helichrysum* spp. are found mixed in it. When these grass and herbs are in season, they bloom to turn this area into a spectacular and wild flower garden.
Bamboo Bush	Lowland *Oxytenanthera* Bush	*Oxytenanthera abyssinica*	This kind of vegetation can be seen in patches in the woodland of *Brachystegia* in the hilly country in southeastern part. Especially in the vicinity of border, this vegetation predominates over quite an extensive area. It is presumed that this is a secondary vegetation created as a result of woodland having been affected by grass fire or agricultural activities of men.
	Highland *Arudinaria* Bush	*Arundinaria alpina*	This kind of vegetation appears in mosaic patterns interspersed in mountain forest and high attitude grassland. Although it is not evident in the northern half of Mahale main ridge, it is considered to be predominant vegetation, even if it is apparent only in patches from Mt. Sisaga to Mt. Tambila. Spectacular pure stand of bamboo bush can be seen especially over the area extending from the source of a river to the saddle of Mahale main ridge just south of Mt. Sisaga.
Grassland	Low Altitude Grassland	*Hyparrhenia variabilis*, *Imperata cylindrica*, *Pennisetum purpneum*	This kind of vegetation is evident along a river in low flatland, lake front, and in traces of agricultural land. The vegetation in traces of agricultural land has undergone transition from *Imperata* to *Hyparrhenia* which is gradually changing over to bush. Preferring even more humid soil environment than *Hyparrhenia*, *Pennisetum* eventually comes to form the so-called bush of elephant grass over a relatively long period. Around the lake, there are numerous places whre ditch reed of *Phraqmites mauritianus* are growing strongly.
	High Altitude Grassland	*Hyparrhenia cymbarica*, *Digitaria diagonalis*, *Themeda triandra*	This kind of vegetation appears in patches in Mahale main ridge. It is a grassy plateau covered with grass shorter than that which is found prevalent in low altitude grassland. Many herbs belonging to *Helichrysum* spp., *Aloe* spp. etc., are found mixed in it.



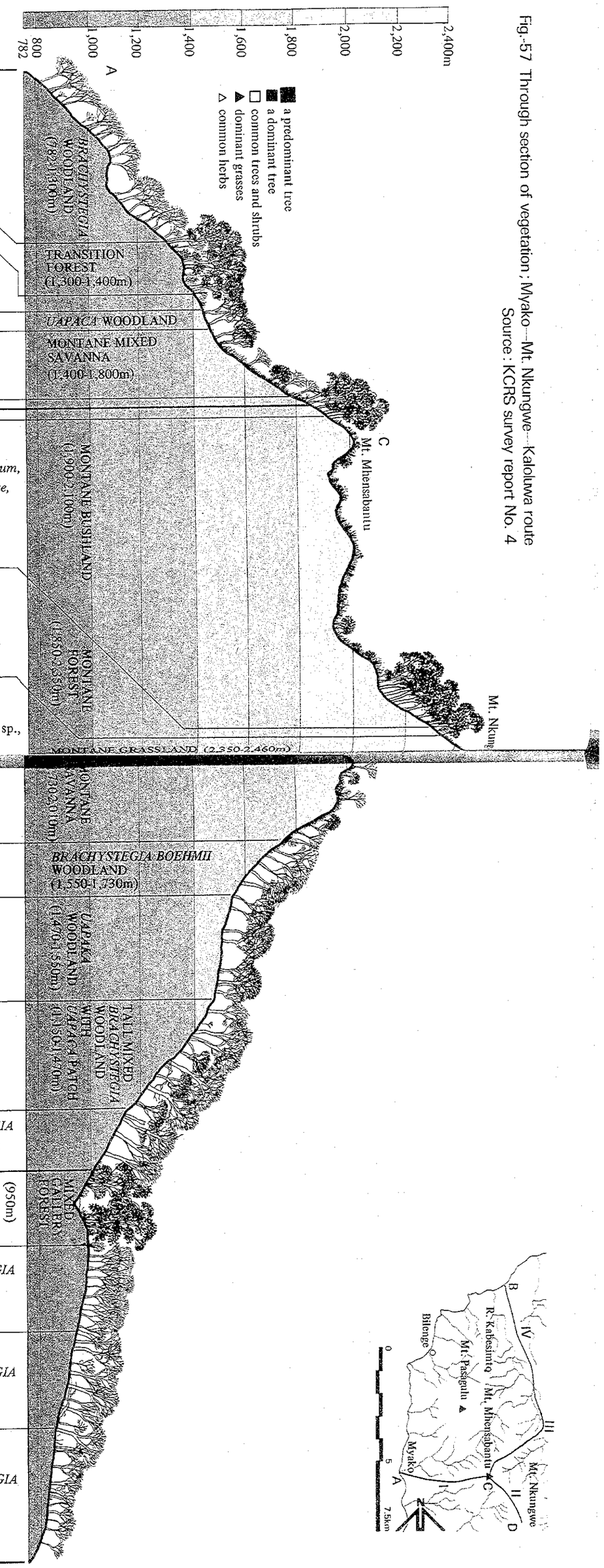
Oxtenanthera abyssinica bamboo bush
Photo by J. Itani

Arundinaria alpina bush Photo by J. Itani



Montane grassland and montane forest (Mt. Tambila, and Mahale main ridge) Photo by J. Itani

Fig.-57 Through section of vegetation ; Myako—Mt. Nkungwe—Kalolwa route
Source : KCRS survey report No. 4



■ *Monotes elegans* *Brachystegia spiciformis*
■ *Brachystegia bussei*

■ *Bridelia micrantha*
□ *Anthocleista schweinfurthii, Stereospermum kunthianum,*
□ *Maesa lanceolata, Afrosersalisia cerasifera.*

■ *Protea gaguedi, Acacia hockii, Heteromorpha trifoliata,*
■ *Hymenocardia lucida, Canthium crassum, Vitex doniana.*
□ *Combretum molle, Stereospermum kunthianum, Parinari curatellifolia,*
□ *Harungana madagascariensis, Erythrina abyssinica, Ficus congensis.*
▷ *Pteridium aquilinum.*

■ *U. kirkiana.* □ *Annona senegalensis.* (1,420-1,450m)
▶ *Imperata cylindrica.*

(I) WESTERN RIDGE OF Mt. MHENSABANTU.

■ *Pycnostachyus* sp. *Acacia hockii* □ *Doryalis* sp.
▶ *Pennisetum purpureum Hyparrhenia cymbaria.*
▷ *Brachycorythis kabreyeri Sonchus schweinfurthii; Pteridium aquilinum,*
▷ *Periploca Linearifolia, Clematopsis scabiosifolia. Eulophia shupangae,*
▷ *Aeschynomene cristata, Conyza aegyptiaca Senecio ruenzoriensis*
▷ *Helichrusum* sp., *Cyperus diffusus, Gladiolus* sp., *Blumea* sp.,
▷ *Aloe* sp., *Vigna ambacensis,*

■ *Parinari excelsa.* ■ *Polyscias fulva, Ficalhoa laurifolia, Tricalysis* sp.
■ *Macaranga kilimandscharica, Anthonotha noldeae.*
□ *Croton megalocarpus, Dracaena afromontana, Cyathea dregei,*
□ *Bersama abyssinica, Canthium captum, Ficus thonningii, Schrebera alata,*
□ *Hypericum quartinianum, Psychotria mahonii Phoenix reclinata.*

▶ *Hyparrhenia cymbaria.*
■ *Protea* sp. □ *Myrica salicifolia, Rapanea melanophloes.*
▷ *Hebenstretia dentata, Blaeria kiwuensis, Buchnera usuiensis, Helichrysum* sp.,
▷ *Lightfootia glomerata, Sapubia trifida Pteridium aquilinum.*

(II) THE MAIN RIDGE OF THE MAHALE MASSIF.

■ *Phillipia benguelensis, Protea gaguedi, Ricinodendron tomentellum.*
▷ *Hyparrhenia cymbaria*

■ *B. boehmii*
■ *U.kirkiana*

■ *Uapaca kirkiana.*

□ *Uapaca nitida* *Brachystegia boehmii*

■ *B. microphylla.*
■ *B.* sp.(Kapepe).
□ *B. spiciformis, Uapaca kirkiana, Indigofera* sp.
□ *Stereospermum kunthianum.*

■ *Brachystegia* sp. (Kapepe) TALL MIXED *BRACHYSTEGIA*
□ *Brachystegia microphylla. B. bussei.* WOODLAND (1,000-1,150m)

(III) EASTERN RIDGE OF Mt.MHENSABANTU.

■ *Albizia glaberrima, Pseudospondias microcarpa, Newtonia buchanani,*
□ *Ficus vallis-choudae.*
□ *Chlorophora excelsa, Euphorbia* sp. *Cordia millenii.*

■ *B. bussei.*
□ *B.* sp. (Kapepe), *Oxytenanthera abyssinica.* *BRACHYSTEGIA BUSSEI* WOODLAND (950-1,000m)

■ *Brachystegia stipulata,*
□ *Terminalia mollis* *Brachystegia* sp.(Kapepe), *Monotes elegans, Brachystegia spiciformis.* TALL MIXED *BRACHYSTEGIA* WOODLAND (850-950m)

■ *Brachystegia longifolia* *BRACHYSTEGIA* WOODLAND (782-850m)

(IV) THE NORTH-EASTERN FOOTHILL OF THE MAHALE MOUNTAINS.

Appendix-1 ; List of chimpanzee's vegetable food

Vegetation form
F : Lowland Forest
MF : Montane Forest
W : Wood land
Sav : Savannah
SF : Secondary Forest
DF : Dry Forest
C : Cultivated species
B : Bush

Part of eaten by chimpanzees
L : Leaf
P : Pith
Bl : Blossom
Fr. : Fruit
Sh : Shoot
B : Bark

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
Acanthaceae			
1 *Asystasia gangetica*	Herb	SF, R, B	L : Jan-Apr, Aug
2 *Blepharis buchneri*	Herb	B	L : Dec-Jul P : Jan
3 *Dyschoriste trichocalyx*	Tree	F	L : Dec
4 *Thunbergia* sp.	Vine	B	L : Jan
5 *Whitfieldia* sp.	Vine	F	L : Oct
Adiantaceae			
6 *Adiantum thalictroides*	Bracke	F, W	L : Feb
Agavaceae			
7 *Dracaena usambarensis*	Tree	F	Bl : Aug L : Jul, Jan Fr : Feb
Anacardiaceae			
8 *Lannea schimperi*	Tree	W	Fr : Oct/Jan L : Oct-Jan Sh : Nov
9 *Pseudospondias microcarpa*	Tree	F	Fr : Sept-Nov/Jul L : (inc. petiole) Dec-Apr/Aug B : Apr
Annonaceae			
10 *Annona senegalensis*	Tree	W, F	Fr : Dec-Feb, Oct B : Sept, Jan L : Oct-Mar
11 *Manantholaxis buchananii*	W. Vine		Fr : Apr
12 *Monanthotaxis poggei*	W. Vine	F	Fr :
13 *Uvaria angolensis*	W. Vine	FE	Fr : Feb L : Nov-Apr Bl : Dec B : Jun
14 ? *Uvaria welwitschii*	W. Vine	MF	Fr :
15 *Xylopia parviflora*	Tree	F	Fr :
16 ?	W. Vine	F	Fr : Apr
Apocynaceae			
17 *Diplorhynchus condylocarpon*	Tree	W	Seed : Jan-Sept L : Oct-Feb B : Jan Bl : Oct-Nov
18 *Landolphia* sp.	W. Vine	F	Fr : Sept-Jan, Mar P : Mar-Sept, Dec L : Nov-Jan B : Apr
19 *Oncinotis inandensis*	W. Vine	F	Fr : Oct-Dec L : Jun
20 *Saba florida*	W. Vine	F	Fr : Aug-Mar P : Mar-Aug L : Dec-Jan May-Aug
21 *Tabernaemontana holstii*	Tree	F	Fr : Mar-Apr
22 *Voacanga lutescens*	Tree	F	Fr : May-Sept
Araceae			
23 *Culcasia scandens*	Vine	F	Petiole : May
Asclepiadaceae			
24 *Cynanchum* sp.	Vine	FE	L : Dec-May, Sept
25 *Gomphonema* sp.	Vine	W	L : Dec, Jan, Jul
26 *Mondia whitei*	Vine	DF	Fr : Feb
27 *Tylophora* sp.	Vine	F, DF, W	L : Nov-May/Jul
Bignoniaceae			
28 *Markhamia hildebrandtii*	Tree	F	L : Jan, Feb, Aug

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
29 *Spathodea nilotica*	Tree	F	Seed : Aug
30 *Stereospermum kunthianum*	Tree	DF, W	L : Jan Bl : Oct Wood (lick) : Jul
Boraginaceae			
31 *Cordia abyssinica*	Tree	SF	Fr : Jul-Aug
32 *Cordia millenii*	Tree	F	Fr : Feb-Jun L : Apr, Oct P : Apr Petiole : Apr
Caesalpiniaceae			
33 *Afzelia africana*	Tree	W, DF	L : Oct Seed : Mar B : Dec
34 *Bauhinia petersiana*	Tree	W	L : Oct-Apr Bl : Apr Seed : Apr
35 *Brachystegia bussei*	Tree	W	B : Nov-Apr L : Oct-Jan Sh : Dec, Jun Seed : Jun-Sept Resin : Jul-Aug
36 *Brachystegia spiciformis*	Tree	W	B : Jan L : Oct-Nov Sh : Jan Seed : Dec, Feb
37 *Cynometra* sp.	Tree	F	Seed : Nev L : Dec-Jan
38 *Piliostigma thonningii*	Tree	W	Seed : Jul-Sept, Apr L : Mar
Celastraceae			
39 *Maytenus senegalensis*	Tree	W	B : Aug
40 *Salacia* sp.	W. Vine	F	L : Jan-Jul Fr : Oct
Combretaceae			
41 *Combretum ? binderanum*	Tree	W	L : Dec
42 *Combretum molle*	Tree	W, DF	L : Oct-Feb Resin : Sept
43 *Combretum paniculatum*	Vine		L :
44 *Terminalia mollis*	Tree	W, Sav	Fr :
Commelinaceae			
45 *Commelina imberbis*			L :
Compositae			
46 *Aspilia rudis*	Herb	B	L : Nov-Jun
47 *Bidens grantii*	Herb	B	L : Jan, May Fl : May
48 *Crassocephalum bojeri*	Vine	B	L : Jan-May
49 *Mikania* sp.		B	L : Jan-Mar Sh :
50 *Sonchus schweinfurthii*	Herb	B	L : Jan-Feb
51 *Vernonia colorata*	Tree	SF	P : Nov-May, Aug-Sept L : Nov-Apr, Aug-Sept
52 *Vernonia subuligera*	Tree	SF	L : Aug P : Jan-Mar
Convolvulaceae			
53 *Hewittia sublobata*	Vine	B, R	L : Jan, Feb, Jun
54 *Ipomoea cairica*	Vine	B, R	L : Jan, Apr, May, Sept
55 *Ipomoea muricata*	Vine	SF	L :
56 *Ipomoea ochracea*			L : Jun
57 *Ipomoea rubens*	Vine	R	L : Jan
58 *Ipomoea* sp.	Vine	W, F	L : Jan, Apr

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
59 *Lepistemon owariensis*			
60 *Merremia pterygocaulos*	Vine		L : Jun
Cyperaceae			
61 *Cyperus papyrus*	Sedge	R	P :
62 *Cyperus* sp.	Sedge	R	P :
63 *Mariscus macrocarpus*	Sedge	SF	P : Dec
Dilleniaceae			
64 *Tetracera potatoria*	W. Vine	F	L : Fr : Dec
Dioscoreaceae			
65 *Dioscorea ? odoratissima*	Vine	F	Seed : Mar-Apr L : Mar
66 *Dioscorea schimperiana*	Vine	F	L : Nov-Mar Seed : Apr Sh : Nov-Jan
Dipterocarpaceae			
67 *Monotes elegans*	Tree	W	L : Jan B : Bl : Jan Resin : Aug
Ebenacea			
68 *Diospyros kirkii*	Tree	Sav	
Euphorbiaceae			
69 *Acalypha chirindica*	Shrub	B	L : Jan
70 *Acalypha* sp.	Shrub	DF	L : Oct-Feb
71 *Antidesma venosum*	Tree	W, F	Fr : Feb-Apr
72 *Croton macrostachys*	Tree	F	Fr : Apr L : Apr, Aug, Nov
73 *Margaritaria discoidea*	Tree	R, DF, W	L : Dec-Jan Fr : Jan-Apr
74 *Phyllanthus muellerianus*	W. Vine	F	Fr : Jun
75 *Ricinodendron tomentellum*	Tree	Sav, W	L : Oct Bl : Nov
76 *Sapium ellipticum*	Tree	F	L :
77 *Uapaca kirkiana*	Tree	W	Fr :
78 *Uapaca nitida*	Tree	W	Fr : Sept-Nov/Apr L : Sept Bl : Mar
79 *Uapaca sansibarica*	Tree	W	B : Oct L : Oct
Flacourtiaceae			
80 *Flacourtia indica*	Shrub	W	Fr : Jan, Feb, Jul
Gramineae			
81 *Beckeropsis uniseta*	Grass	SF	Seed : Aug L : Mar P : Nov
82 *Brachiaria brizantha*	Grass	SF	Seed : Apr
83 *Hyparrhenia variabilis*	Grass	W	L : Dec
84 *Olyra latifolia*	Bamboo	F	B.Sh : May Seed : Apr, May, Aug
85 *Oxytenanthera abyssinica*	Bamboo	W	B.Sh : Oct-Nov
86 *Panicum maximum*	Grass	SF	Seed : Aug
87 *Pennisetum purpureum*	Grass	B	P : All year

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
88 *Phragmites mauritianus*	Reed	R	P : Sep-Jan Sh : Jan, Sept
89 *Saccharum officinarum*	Grass	C	P : All year
90 *Sorghum bicolor*	Grass	C	P : Apr
91 *Vossia cuspidata*	Grass	R	P : All year
92 *Zea mays*	Grass	C	P : Dec-Feb
Guttiferae			
93 *Garcinia huillensis*	Tree	DF	Fr : Aug-Jan
Hypericaceae			
94 *Harungana madagascariensis*	Tree	SF, DF	Fr : Jun-Aug
Liliaceae			
95 *Aloe* sp.	Herb	Sav	Bl : Jul
Loganiaceae			
96 *Anthocleista schweinfurthii*	Tree	F, SF	Fr : Nov
97 *Strychnos cocculoides*	Tree	W	Fr : Bl :
98 *Strychnos innocua*	Tree	W	Fr : Mar, Apr, Nov L : Jan
Malvaceae			
99 *Azanza garckeana*	Tree	F	Fr : Apr-Sept, Jan Bl : Jan-Mar L : Jan B :
100 *Hibiscus aponeurus*	Shrub		L : Feb-Apr
101 *Hibiscus cannabinus*	Shrub	W	L :
102 *Hibiscus rostellatus*	Shrub	R	L : May-Jun
103 *Hibiscus shirensis*	Herb	B	L : Jan
104 *Hibiscus* sp.		SF	L : Jul-Aug
Marantaceae			
105 ? *Haumania* sp.	Herb	F	P : Sept
Meliaceae			
106 *Trichilia* sp.	Tree	F	L : Apr-Aug Fr : Jan
Menispermaceae			
107 *Dioscoreophyllum volkensii*	Vine	F	L : Sept
108 *Tinospora caffra*	Vine	F	L : Nov-Aug P : Mar
Mimosaceae			
109 *Acacia hockii*	Shrub or S. Tree	B	Seed : Sept
110 *Acacia sieberiana*	Tree	Sav	Seed : Jul-Sept
111 *Albizia glaberrima*	Tree	F	L : Dec-Jan Bl : Seed :
112 *Entada* sp.			
113 *Parkia filicoidea*	Tree	F	Fr : Oct-Dec L : Nov
Moraceae			
114 *Chlorophora excelsa*	Tree	F	Bl : Aug L :

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
115 *Ficus capensis*	Tree	F	Fr : All year L : Oct, Feb-Mar B : Aug
116 *Ficus congensis*	Tree	F	Fr : Apr, Jul, Nov Petiole : Apr-May L : Dec
117 *Ficus cyathistipula*	Tree	F	Fr : Mar
118 *Ficus exasperata*	Tree	F	Fr : Oct-Feb, Jul L : All year
119 *Ficus glumosa*	Tree	W	Fr : Feb
120 *Ficus ingens*	Tree	F	Fr : Sept L : Dec
121 *Ficus sonderi*	Tree	W	Fr : Jul
122 *Ficus sycomorus*	Tree	F	Fr :
123 *Ficus urceolaris*	Shrub	F	L : Dec-Sept Fr : All year
124 *Ficus vallis-choudae*	Tree	F	Fr : All year L : Dec, Feb-May, Aug Wood : Apr Sh : Oct, Jun
125 *Ficus* sp.	Tree	W	Fr : Jul-Aug
126 *Myrianthus holstii*	Tree	F	Fr : Oct-Nov/Apr P : May-Jun L : Dec-Sept P : May
Musaceae			
127 *Ensete edule*	Tree	F	P : Oct
128 *Musa* sp.	Tree	C	P : Dec-Aug Fr : All year
Myristicaceae			
129 *Pycnanthus angolensis*	Tree	F	Fr : Aug-Feb/Jun Wood : Mar, Jun Bl : Mar B : Dec, Mar, Jun *L : Dec
Myrtaceae			
130 *Syzigium guineense*	Tree	F	L : Sept
Oleaceae			
131 *Jasminum* sp.			L : prob. Nov-Dec
132 *Screbera alata*	Tree	DF	L : Oct
133 *Ximenia americana*	Tree	W	Fr : Oct, Nov
Papilionaceae			
134 *Baphia capparidifolia*	W. Vine	F	L : Jan-Sept Bl : Aug-Sept
135 *Crotalaria* sp.	Shrub	DF, B	L : Feb-Apr
136 *Crotalaria* sp.		F	L : Apr-Jun
137 *Dalbergia boehmii* (? *nitidula*)	Tree	W	Bl : Aug
138 *Dalbergia malangensis*	W. Vine	F	L : Jul, Dec
139 *Erythrina abyssinica*	Tree	DF, W	L : Sept-Apr B : Jul Fr : Sept Bl : Sept
140 *Erythrina excelsa*	Tree		L : Feb
141 *Glycine* sp.	Vine	W, B	L : All year
142 *Indigofera* sp.	Shrub	W	Bl : Mar
143 *Millettia angustidentata*	Vine	F, W	L : Aug
144 *Mucuna pruriens*	Vine	B	L : Jan, Jun
145 *Mucuna coriacea*			
146 *Mucuna gigantea*	Vine	F, R	L : Jan

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
147 *Neorautanenia mitis*			Fr : Jan
148 *Pseudarthria hookeri*	Shrub	R	L : Jan Sh : Jan
149 *Psophocarpus scandens*	Vine	B	L : Jan Sh :
150 *Pterocarpus tinctorius*	Tree	W, DF	L : Aug-May/Jul Seed : Apr-Jul Bl : Feb-Mar
151 ? *Rhynchosia* sp.	Vine	W, F	L : Nov-Jan
152 *Sesbania sesban*	Tree	B	Wood : Sept B : Jan, Apr, Sept
153 *Vigna ambacensis*	Vine	B	Seed : Jun-Jul L : Jun-Jul Bl : Jun-Jul
154 *Vigna* sp.	Vine	B	L : Dec-Jan
155 *Vigna* sp.	Vine	W	L : Feb
Passifloraceae			
156 *Adenia reticulata*	Vine	F	L : Feb
157 *Adenia rumicifolia*	Vine	F	L : Nov-Mar, Aug Fr : Apr
Piperaceae			
158 *Piper umbellatum*	Herb	SF	Fr : Jun-Jul L : Dec P : May
Pteridaceae			
159 *Pteridium aquilinum*	Bracken	B	P : May L : Jan, Jul
Rafflesiaceae			
160 ? *Pilostyles* sp.	Epi-phyte	W	Fr : Jul
Ranunculaceae			
161 *Clematopsis scabiosifolia*			Fr : Jul
Rhamnaceae			
162 *Ziziphus mucronata*	Tree	W	Fr : Jul
Phizophoraceae			
163 *Anisophyllea boehmii*	Tree	W	Fr :
Rosaceae			
164 *Parinari curatellifolia*	Tree	W, DF	Fr : Mar-May, Jul-Aug L : Oct-Mar
165 *Rubus pinnatus*	Shrub	SF	Fr : Jun-Jul
Rubiaceae			
166 *Canthium crassum*	Tree	W	Fr : Jul-Sept
167 *Canthium hispidum*	W. Vine	F	Fr : Apr, Sept, Oct, Dec B : Jan L : Jan
168 *Canthium rubrocostatum*	Tree	W	Fr : Apr-Aug Bl : Jun
169 *Chassalia cristata*	W. Vine	SF	L : Jun-Jul
170 *Mussaenda arcuata*	W. Vine	W, F	L : Mar-Apr P : Mar B : Jan Fr : Oct
171 *Oxyanthus* sp.	Shrub	F	B : Sept
172 *Pavetta* sp.	Tree	F	Fr : Jun, Jul, Oct L : Wood
173 *Rothmania manganjae*	Tree	F	L : Jan, Mar
174 *Rytigynia* sp.	Shurb	F	L : Jan Sh : Jan Fr : Jan

Scientific name	Life form	Vegetation form	Part of eaten by chimpanzees
175 *Uragoga cyanocarpa*	Shrub	F	Fr : Mar-Jul Bl : Dec
Rutaceae			
176 *Teclea nobilis*	Tree	F	Fr :
177 *Toddalia asiatica*	Shrub	F	Fr : May-Sept
Sapindaceae			
178 *Allophylus congolanus*	S. Tree	F, W	L : Feb Bl : May Fr : May
179 *Haplocoelum foliolosum*			
180 *Lecaniodiscus fraxinifolius*	Tree	W	L : Jan
181 *Paullinia pinnata*	W. Vine	F, W	L : Jun-Aug Fr : Sept Sh : Jun
182 *Zanha golungensis*	Tree	F	L : Sept
Sapotaceae			
183 *Afrosersalisia cerasifera*	Tree	DF	Fr : Feb, Apr, Jun-Jul L : Sept
184 *Bequaertiodendron megalismontanum*	Tree	F	Fr : Nov
185 *Pericopsis angolensis*	Tree	F	Fr : L : Oct-Dec
Smilacaceae			
186 *Smilax kraussiana*	Vine	SF	L : Dec-Apr/Sept Sh :
Sterculiaceae			
187 *Dombeya rotundifolia*	Tree	W	L : Nov-Dec
188 *Pterygota macrocarpa*	Tree	F	L : Sept
189 *Sterculia quinqueloba*	Tree	W	L : Jul-Oct B : Mar Fr : Bl :
190 *Sterculia tragacantha*	Tree	DF	L : Aug-May (Jun, Jul) Fr : Mar-Jul Bl : Jul-Aug B : Jan
Theaceae			
191 *Ficalhoa laurifolia*	Tree	MF	Fr :
Tiliaceae			
192 *Grewia mollis*			Fr : Mar
193 *Grewia platyclada*	Shrub	F	Fr : Jan, Sept L : Jul Bl : Mar
Ulmaceae			
194 *Trema orientalis*	Tree	SF	L : Nov-Dec
Verbenaceae			
195 *Clerodendron schweinfurthii*	Vine	F	L : Aug, Nov
196 *Vitex doniana*	Tree	SF	Fr : Jun L : Oct
Vitaceae			
197 *Ampelocissus africana*	Vine		Fr : Apr
198 *Ampelocissus cavicaulis*	Vine	SF	Fr : Feb-Apr Sh : Dec-Jan L : Feb
199 *Cayratia gracilis*	Vine	F	Fr : Jan L : Jan
200 *Cissus petiolata (? oliveri)*	W. Vine		L : Jan
201 *Cissus rubiginosa*			Fr : Feb

Scientific name	Life form	Vgetation form	Part of eaten by chimpanzees
202 *Cyphostemma* sp.	Herb	W	Fr : Nov P : Nov
203 *Leea guineensis*	Shrub	F	Fr : Jun-Aug P : May-Jun L : May, Jan
204 *Rhoicissus* sp.	Vine	SF	L : Jul P : Jul
Zingiberaceae			
205 *Aframomum* sp.	Herb	W	P : Nov-Apr
206 *Aframomum* sp.	Herb	F	Fr : Jan-Jun, Oct P : All year
207 *Costus afer*	Herb	F	P : Mar-Nov
208 *Costus spectabilis*	Herb	Sav	P : Feb
209 *Renealmia engleri*	Herb	F	P : Mar-Aug
Unidentified		SF	
210		SF	L : May
Unidentified			
211	Tree	F	Fr :
Unidentified			
212			Fl : Fr : L :
Unidentified			
213			Fr :
Unidentified			
214	Vine	F	L : Feb

Source : Unpublished data by T. Nishida and S. Uehara, 1979.

Appendix-2 ; List of Mammals in Mahale

★ National game of the Wildlife Conservation Act,1974.
★(f) Only female is national game.
* Observed in the backland, but have not been confirmed in the national park district proper. Tabulation here is based on information from natives.

P : Pan Africa
S : *Acasia* savanna
W : Miombo woodland
F : Lowland forest
○ : Mammals seen in vicinity of Sinsiba area

Scientific name		English name	Habitat	
INSECTIVORA	Macroscelidae			
	1 *Rhinchocyon cirnei*	Chequered elephant-shrew	F, M	○
PRIMATES	Lorisidae			
	2 *Galago crassicaudatus*	Greater galago	F	○
	3 *Galago senegalensis*	Senegal galago	S, W	
	Cercopithecidae			
	4 *Cercopithecus mitis*	Blue monkey	F	○
	5 **Cercopithecus ascanius*	Red-tailed monkey	W, F	○
	6 *Cercopithecus aethiops*	Savanna monkey	S, W	○
	7 *Papio cynocephalus*	Yellow baboon	S, W	○
	8 *Colobus badius*	Red colobus	F, M	○
	9 **Colobus angolensis*	Angolan colobus	M	○
	Pongidae			
	10 **Pan troglodytes*	Chimpanzee	W, F, M	○
PHOLIDOTA	Manidae			
	11 **Manis temmincki*	Cape pangolin	S, W	○
LAGOMORPHA	Leporidae			
	12 *Lepus capensis*	Cape here		
RODENTIA	Sciuridae			
	13 *Protxerus stangeri*	Giant forest squirrel	F	○
	Cricetidae			
	14 *Cricetomys emini*	Giant rat	P	○
	Thryonomyidae			
	15 *Thryonomys swinderianus*	Cane rat	W, S	○
	Spalacidae			
	16 *Heliophobius* sp.	Sifuko	S, W	○
	Hystricidae			
	17 *Atherurus* sp.	Brush-tailed porcupine	F	○
	18 *Hystrix galeata*	Crested porcupine	P	○
CARNIVORA	Canidae			
	19 *Canis adustus*	Side-striped jackal	W, S	○
	20 **Lycaon pictus*	Wild dog	W, S	
	Mustelidae			
	21 *Ictonyx striatus*	Zorilla	W, S	○
	22 *Aonyx capensis*	Cape clawless otter	(A)	○
	23 *Lutra maculicollis*	Spotted necked otter	F, W, (A)	○
	24 *Mellivora capensis*	Ratel	P	○
	Viverridae			
	25 *Genetta genetta*	Common genet	W, S	○

Scientific name		English name	Habitat	
	26 *Genetta tigrina*	Large-spotted genet	P	○
	27 *Civettictis civetta*	African civet	P	○
	28 *Ichneumia albicauda*	White-tailed mongoose	W, S	○
	29 *Bdeogale crassicauda*	Bushy-tailed mongoose	W	○
	30 *Mungos mungo*	Banded-mongoose	W, S	○
	Hyaenidae			
	31 *Crocuta crocuta*	Spotted hyaena	W, S	
	Falidae			
	32 *Felis sylvestrics*	African wild cat	W, S	○
	33 *Panthera pardus*	Leopard	P	○
	34 *Panthera leo* [★(t)]	Lion	W, S	
TUBULIDENTATA	Orycteropodidae			
	35 *Orycteropus afer* [★]	Aardvark	P	
PROBOSCIDEA	Elephantidae			
	36 *Loxodonta africana* [★]	African elephant	P	
HRACOIDEA	Procaviidae			
	37 *Heterohyrax brucei*	Yellow-spotted dassie	S	○
	38 *Dendrohyrax arboreus*	Tree dassie	F, W	
PERISSODACTYLA	Equidae			
	39 *Equus bruchelli*	Grant's zebra	W, S	
ARTIODACTYLA	Suidae			
	40 *Phacochoerus aethiopicus*	Warthag	W, S	○
	41 *Potamochoerus porcus*	Bush pig	P	○
	Hippopotamidae			
	42 *Hippopotamus amphibius*	Hippopotamus	P (A)	○
	Giraffidae			
	43 *Giraffa camelopardalis* [★]	Giraffe	S	
	Bobidae			
	44 *Tragelaphus scriptus* [★(t)]	Bush buck	P	○
	45 *Sylvicarpa grimmia*	Bush duiker	W, S	○
	＊46 *Taurotragus oryx*	Eland	S	
	47 *Hippotragus equinus*	Roan antelope	W	
	＊48 *Hippotragus niger*	Sable antelope	W	
	49 *Nesotragus moschatus*	Suni	W, S	○
	50 *Caphalophus monticola*	Blue duiker	F, M	○
	51 *Oreotragus oreotragus*	Klipspringer	W	○
	＊52 *Kobus defassa* [★(t)]	Defassa warter buck	W	
	＊53 *Alcelaphus lichtensteinii*	Lichtenstein hartebeast	W	
	＊54 *Damaliscus korrigum*	Topi	S, W	
	55 *Syncerus caffer*	African buffalo	P	

Note: Besides there mentioned, Sitatunga (*Thagelaphus spekei*) and Greater kudu (*Tragelephus strepsiceros*) can be presumed to inhabit here. But not included because of lack of positive field observation record.

Appendix-3 : List of Birds in the Mahale Mountain Area

A : Water-fowls
C : Birds seen near or over the lakes
F : Birds seen in the forests
S : Birds seen in the woodlands and savannahs
M : Birds seen in the higher areas of Mahale Mts.
◯ : Birds seen commonly in the park areas

★National game

Scientific name	English name	Habitat	
Anhingidae			
1 *Anhinga rufa*	African darter	A, C	◯
Pharacrocoracidae			
2 *Pharacrocorax africanus*	Long-tailed cormorant	A, C	◯
Ardeidae			
3 *Ardea purpurea*	Purple heron	C	
4 *Ardea melanocephala*	Black-headed heron	C	
5 *Ardea goliath*	Goliath heron	C	
6 *Ardea cinerea*	Grey heron	C	◯
7 *Egretta gazetta*	Little egret	C	◯
8 *Egretta intermedia*	Yellow-billed egret	C	
9 *Bubulcus ibis*	Cattle egret	C, S	◯
10 *Butorides rufiventris*	Rufous-bellied heron	C	◯
Scopidae			
11 *Scopus umbretta*	Hammerkop	S	◯
Threskionithidae			
12 *Bostrychia hagedash*	Hadada ibis	S, F	◯
Anatidae			
13 *Netta erythrophthalma*	Red-billed duck	C	
14 *Sarkidiornis melanotos*	Knob-billed goose	C	◯
15 *Plectropterus gambensis*	Spur-winged goose	C	
Accipitridae			
16 *Neophron monachus*	White-headed vulture	S	◯
17 *Gypohierax angolensis*	Palmnut vulture	C	◯
18 *Milvus migrans*	Black kite	S, C	◯
19 *Aquila wahlbergi*	Wahlberg's eagle	S, C	◯
20 *Aquila rapax*	Tawny eagle	S, M	◯
21 *Stephanoaetus coronatus*	Crowned hawk eagle	F, S	◯
22 *Lophaetus occipitalis*	Long-crested hawk eagle	S	◯
23 *Polyboroides radiatus*	Harrier hawk	S	◯
24 *Haliaeetus vocifer*	African fish eagle	C	◯
25 *Terathopius ecaudatus*	Bateleur	S	◯
Falconidae			
26 *Falco cuvieri*	African hobby	S, F	
Phasianidae			
27★*Francolinus squamatus*	Scaly francolin	S, F	◯
28 *Coturnix delegorguei*	Harlequin quail	S	
Numididae			
29 *Guttera edouardi*	Crested guinea-fowl	F	◯

Scientific name	English name	Habitat	
Rallidae			
30 *Sarothrura purchra*	White-spotted pygmy crake	F	
31 *Crex egregia*	African crake	C, S	O
32 *Gallinula chloropus*	Moorhen	C	
33 *Porphyrula martinica*	Purple gallinule	C	
Scolopacidae			
34 *Tringa hypoleucos*	Common sandpiper	C	O
35 *Tringa stagnatilis*	Marsh sandpiper	C	
Laridae			
36 *Larus cirrocephalus*	Grey headed-gull	C	O
37 *Sterna nilotica*	Gull-billed tern	C	O
Columbidae			
38 *Columba arquatrix*	Olive pigeon	M, F	
39 *Streptopelia semitorquata*	Red-eyed dove	S, F	O
40 *Turtur chalcospilos*	Emerald-spotted wood dove	S	O
41 *Treron australis*	Green pigeon	S	
Musophagidae			
42 *Tauraco porphyreolophus*	Violet-crested turaco	S, F	
43 *Tauraco schalowi*	Schalow's turaco	S, F	
44 *Musophaga rossae*	Ross's turaco	S, F	O
Cuculidae			
45 *Centropus superciliosus*	White-browed coucal	S	O
46 *Chrysococcyx cupreus*	Emerald cuckoo	F	O
47 *Chrysococcyx caprius*	Didric cuckoo	S, F	O
48 *Chrysococcyx klaas*	Klaa's cuckoo	S, F	O
Upupidae			
49 *Upupa africana*	African hoopoe	S	
Phoeniculidae			
50 *Phoeniculus purpureus*	Green wood hoopoe	S	O
Tytonidae			
51 *Tyto alba*	African barn owl	S, F	O
52 *Bubo africanus*	Spotted eagle owl	S, F	O
Camprimulgidae			
53 *Macrodipteryx vexillarius*	Pennant-winged nightjar	S	O
Apodidae			
54 *Cypsiurus parvus*	Palm swift	S	O
55 *Apus affinis*	Little swift	M, S	O
Coliidae			
56 *Colius striatus*	Speckled mousebird	S, F	O
Coraciidae			
57 *Eurystomus glaucurus*	Broad-billed roller	S, F	
Alcedinidae			
58 *Ceryle rudis*	Pied-kingfisher	C	O
59 *Ceryle maxima*	Giant kingfisher	C	O
60 *Halcyon senegalensis*	Woodland kingfisher	S	O
61 *Ispidina picta*	Pygmy kingfisher	S	

Scientific name	English name	Habitat	
Meropidae			
62 *Merops apiaster*	European bee-eater	S	
63 *Merops nubicus*	Carmine bee-eater	S	
64 *Merops pusillus*	Little bee-eater	S	O
65 *Merops variegatus*	Blue-breasted bee-eater	S	O
66 *Merops persicus*	Blue-cheecked bee-eater	S	O
Bucerotidae			
67 *Tockus alboterminatus*	Crowned hornbill	S, F	O
68 *Bycanistes bucinator*	Trumpeter hornbill	S, F	O
69 *Bucorvus leadbeateri*	Ground hornbill	S	O
Indicatoridae			
70 *Indicator indicator*	Greater honey-guide	S	
Hirundinidae			
71 *Hirundo angolensis*	Angola swallow	S	
72 *Hirundo abyssinica*	Striped swallow	S	O
73 *Hirundo rustica*	European swallow	S	O
74 *Hirundo smithii*	Wire-tailed swallow	S	
75 *Psalidoprocne holomelaena*	Black roughwing swallow	F	O
76 *Psalidoprocne albiceps*	White-headed roughwing swallow	F, M	O
Motacillidae			
77 *Motacilla aguimp*	Pied wagtail	S	O
78 *Motacilla clara*	Mountain wagtail	F, M	O
Pycnonotidae			
79 *Pycnonotus xanthopygos*	Dark-headed bulbul	S, F	O
Laniidae			
80 *Lanius collaris*	Fiscal shrike	S	O
81 *Laniarius aethiopicus*	Tropical boubou	S, F	O
82 *Tchagra minuta*	Blackcap bush shrike	S	
83 *Nilaus nigritemporalis*	Black-browed brubru	S	
Prionopidae			
84 *Prionopus plumata*	Straight-crested helmet shrike	S	O
Muscicapidae			
85 *Cossypha heuglini*	White-browed robin chat	S, F	O
86 *Cossypha natalensis*	Red-capped robin chat	F	
87 *Cercotrichas leucophrys*	Red-backed scrub robin	S	O
88 *Prinia leucopogon*	White-throated prinia	S	O
89 *Cisticola brunnescens*	Pectoral-patch cisticola	S	O
90 *Terpsiphone viridis*	Paradise flycatcher	F	O
91 *Turdoides jardinei*	Arrow-marked babbler	F, S	O
Dicruridae			
92 *Dicrurus adsimilis*	Drongo	S	O
Oriolidae			
93 *Oriolus larvatus*	Black-headed oriole	S, F	
Sturnidae			
94 *Cinnyricinclus leucogaster*	Violet-backed starling	S, F	
95 *Onychognathus morio*	Red-winged starling	S, M	O

Scientific name	English name	Habitat	
Nectarinidae			
96 *Anthreptes collaris*	Collared sunbird	F, S	○
97 *Anthreptes longuemarei*	Violet-backed sunbird	F, S	
98 *Nectarinia amethystina*	Amethyst sunbird	F, S	○
99 *Nectarinia mariquensis*	Mariqua sunbird	S	○
100 *Nectarinia olivacea*	Olive sunbird	F, S	○
101 *Nectarinia senegalensis*	Scarlet-chested sunbird	F, S	○
102 *Nectarinia chlybea*	Southern double-collared sunbird	F, S	○
Emberizidae			
103 *Emberiza tahapisi*	Cinnamon-breasted rock bunting	S	
Fringillidae			
104 *Serinus striolatus*	Streaky seed eater	S	○
105 *Serinus sulphuratus*	Brimstone canary	S	○
Estrildidae			
106 *Estrilda astrild*	Waxbill	S	○
107 *Lagonosticta rubricata*	African fire finch	S	○
108 *Lagonosticta senegala*	Red-billed fire finch	S	○
109 *Lonchura cucullata*	Bronze mannikin	S	○
Proceidae			
110 *Vidua macroura*	Pin-tailed whydah	S	○
111 *Euplectes ardens*	Red-collared widow-bird	S	○
112 *Euplectes hordeaceus*	Black-winged bishop	S	○
113 *Passer griseus*	Grey-headed sparrow	S	○
114 *Amblyospiza albifrons*	Grosbeak weaver	S, F	
115 *Ploceus nigerrimus*	Vieillot's black weaver	S	○
116 *Ploceus cucullatus*	Black-headed weaver	S	○
117 *Ploceus ocularis*	Spectacled weaver	S	○
118 *Ploceus xanthops*	Holub's golden weaver	S	○
119 *Malimbus rubicollis*	Crested malimbe	F	
Corvidae			
120 *Corvus albicollis*	White-naped raven	S, M	○

Note: It is presumed that, as investigation moves forward, a number of species of birds will increase by twofold. Among the waterbowl families of *Falconidae, Muscicapidae, Proceidae,* etc., there remains a great number of unidentified species. Although existence of bustards, parrots, tinkerbirds, woodpeckers, larks, etc. have been field confirmed, they have not be entirely identified.

Appendix-4 ; List of Fishes in the Lake Tanganyika

This table is the list of fishes in Lake Tanganyica coresponds to the "Fishes of Lake Tanganyika" made by Mr. Piere Brichard and published by T. F. H. Publications, Inc.. Futher investigation and study, however, will be required to clarify the species which are living in Mahale area.

* Eendemic species

Scientific name	Habitat
Cichlidae	
1 **Asprotilapia leptura*	rock-sand
2 *Astatoreochromis straeleni*	swamps
3 **Aulonocranus dewindti*	sand
4 **Bathybates fasciatus*	pelagic
5 **Bathybates ferox*	,,
6 **Bathybates graueri*	,,
7 **Bathybates horni*	,,
8 **Bathybates leo*	,,
9 **Bathybates minor*	,,
10 **Bathybates vittatus*	,,
11 **Boulengerochromis microlepis*	,,
12 **Callochromis macrops macrops*	sand
13 **Callochromis m. melanostigma*	,,
14 **Callochromis pleurospilus*	,,
15 **Cardiopharynx schoutedeni*	,,
16 **Chalinochromis brichardi*	rock
17 **Cunningtonia longiventralis*	,,
18 **Cyathopharynx furcifer*	,,
19 **Cyphotilapia frontosa*	,,
20 **Ectodus descampsi*	sand
21 **Eretmodus cyanostictus*	rock
22 **Grammatotria lemairei*	pelagic
23 **Haplochromis benthicola*	benthic
24 *Haplochromis burtoni*	swamps
25 **Haplochromis horei*	coastal
26 **Haplochromis pfefferi*	,,
27 **Haplochromis stappersi*	river/swamps
28 **Haplochromis vanderhorsti*	,,
29 **Haplotaxodon microlepis*	deep rock
30 **Haplotaxodon tricoti*	deep mud
31 **Hemibates stenosoma*	benthic
32 **Julidochromis dickfeldi*	rock
33 **Julidochromis marlieri*	,,
34 **Julidochromis ornatus*	,,
35 **Julidochromis regani*	,,
36 **Julidochromis transcriptus*	,,
37 **Lamprologus attenuatus*	sand
38 **Lamprologus brevis*	sand/shells

Scientific name	Habitat
39 **Lamprologus brichardi*	rock
40 **Lamprologus callipterus*	sand
41 **Lamprologus christyi*	rock
41 **Lamprologus compressiceps*	,,
43 **Lamprologus cunningtoni*	ubiquitous
44 **Lamprologus elongatus*	ubiquitous
45 **Lamprologus fasciatus*	rock/sand
46 **Lamprologus furcifer*	rock
47 **Lamprologus hecqui*	sand/shells
48 **Lamprologus kungweensis*	sand
49 **Lamprologus leleupi leleupi*	rock
50 **Lamprologus leleupi melas*	,,
51 **Lamprologus leloupi*	,,
52 **Lamprologus lemairei*	ubiquitous
53 **Lamprologus meeli*	rock
54 **Lamprologus modestus*	ubiquitous
55 **Lamprologus moorii*	rock
56 **Lamprologus multifasciatus*	rock/shells
57 **Lamprologus niger*	rock
58 **Lamprologus ocellatus*	shells
59 **Lamprologus ornatipinnis*	sand
60 **Lamprologus petricola*	rock
61 **Lamprologus pleuromaculatus*	sand
62 **Lamprologus profundicola*	rock
63 **Lamprologus pulcher*	,,
64 **Lamprologus savoryi*	,,
65 **Lamprologus schreyeni*	,,
66 **Lamprologus sexfasciatus*	,,
67 **Lamprologus signatus*	sand/mud
68 **Lamprologus stappersi*	deep mud
69 **Lamprologus tetracanthus*	sand
70 **Lamprologus toae*	rock
71 **Lamprologus tretocephalus*	,,
72 **Lamprologus wauthioni*	mud/shells
73 **Leptochromis calliurum*	sand/mud
74 **Lestradea perspicax perspicax*	sand
75 **Lestradea perspiax stappersi*	,,
76 **Limnochromis abeelei*	deep soft bottom
77 **Limnochromis auritus*	,,

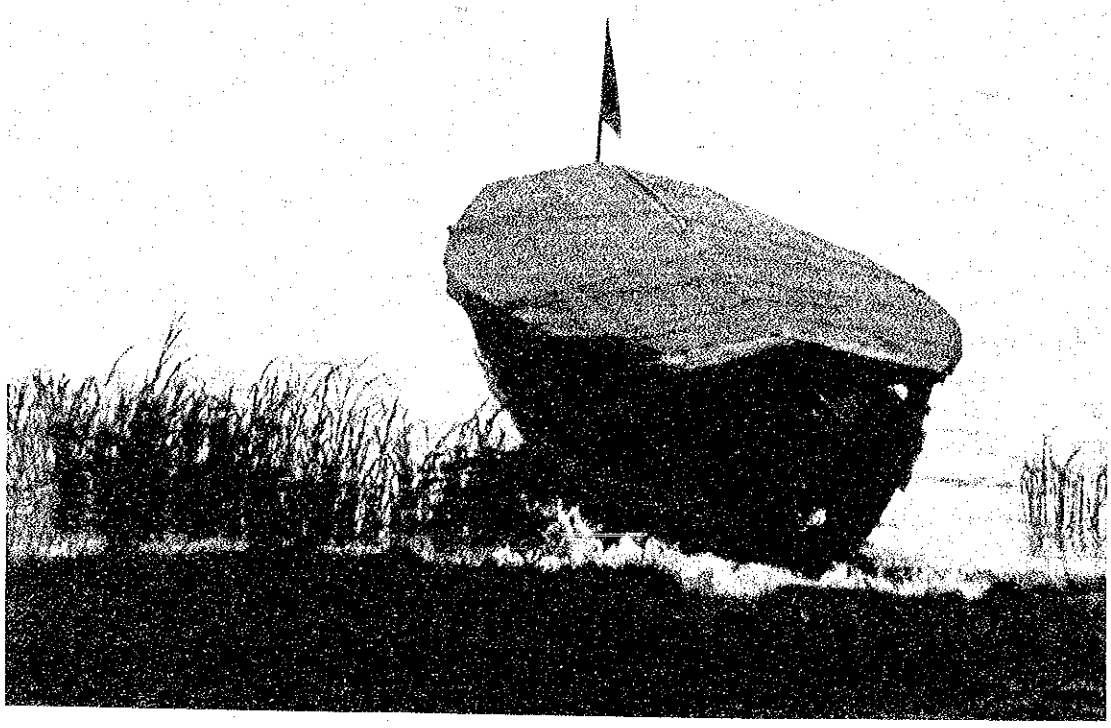
Scientific name	Habitat
78 * *Limnochromis christyi*	deep sand/mud
79 * *Limnochromis dhanisi*	„
80 * *Limnochromis leptosoma*	„
81 * *Limnochromis microlepidotus*	rock
82 * *Limnochromis nigripinnis*	„
83 * *Limnochromis permaxillaris*	deep sand/mud
84 * *Limnochromis staneri*	„
85 * *Limnotilapia dardennei*	ubiquitous
86 * *Limnotilapia loocki*	rock ?
87 * *Limnotilapia trematocephala*	?
88 * *Lobochilotes labiatus*	rock
89 * *Ophthalmochromis ventralis ventralis*	„
90 * *Ophthalmochromis v. heterodontus*	rock
91 * *Ophthalmochromis nasutus*	„
92 * *Ophthalmotilapia boops*	„
93 * *Orthochromis malagaraziensis*	torrents
94 * *Perissodus microlepis*	rock
95 * *Petrochromis famula*	„
96 * *Petrochromis fasciolatus*	„
97 * *Petrochromis orthognathus*	„
98 * *Ptrochromis polyodon*	„
99 * *Petrochromis trewavasae*	„
100 * *Plecodus elaviae*	benthic
101 * *Plecodus multidentatus*	„
102 * *Plecodus paradoxus*	pelagic
103 * *Plecodus straeleni*	rock
104 * *Sarotherodon karomo*	estuary
105 *Sarotherodon nilotica*	swamps
106 * *Sarotherodon tanganicae*	„ /mud/rock
107 * *Simochromis babaulti*	rock
108 * *Simochromis curvifrons*	„
109 * *Simochromis diagramma*	„
110 * *Simochromis marginatus*	„
111 * *Spathodus erythrodon*	„
112 * *Spathodus marlieri*	„
113 * *Tanganicodus irsacae*	„
114 * *Telmatochromis bifrenatus*	„
115 * *Telmatochromis burgeoni*	„
116 * *Telmatochromis caninus*	„
117 * *Telmatochromis temporalis*	„
118 * *Telmatochromis vittatus*	„
119 *Tilapia rendalli*	swamps
120 * *Trematocara caparti*	benthic
121 * *Trematocara kufferathi*	„
122 * *Trematocara macrostoma*	„
123 * *Trematocara marginatum*	„
124 * *Trematocara nigrifrons*	„
125 * *Trematocara stigmaticum*	„
126 * *Trematocara unimaculatum*	„
127 * *Trematocara variabile*	„
128 * *Triglachromis otostigma*	mud
129 * *Tropheus*[5] *brichardi*	rock
130 * *Tropheus*[5] *duboisi*	„
131 * *Tropheus*[5] *moorii*	„
132 * *Tylochromis polylepis*	sand/mud
133 * *Xenochromis hecqui*	benthic
134 * *Xenotilapia boulengeri*	sand
135 * *Xenotilapia caudafasciata*	„
136 * *Xenotilapia longispinnis burtoni*	sand
137 * *Xenotilapia l. longispinis*	„
138 * *Xenotilapia melanogenys*	„
139 * *Xenotilapia nigrolabiata*	„
140 * *Xenotilapia ochrogenys bathyphilus*	„
141 * *Xenotilapia o. ochrogenys*	„
142 * *Xenotilapia ornatipinnis*	„
143 * *Xenotilapia sima*	„
144 * *Xenotilapia spilopterus*	„
145 * *Xenotilapia tenuidentata*	„
Lepidosirenidae	
146 *Protopterus aethiopicus*	estuaries
Polypteridae	
147 *Polypterus endlicheri congicus*	„
148 *Polypterus ornatipinnis*	„
Clupeidae	
149 * *Limnothrissa miodon*	pelagic
150 * *Stolothrissa tanganicae*	„
Mormyridae	
151 *Mormyrops deliciosus*	swamp/river

Scientific name	Habitat
152 *Hippopotamyrus discorhynchus*	swamps/rock
153 *Pollimyrus nigricans*	swamps/river
154 *Gnathonemus longibarbis*	„ „
155 *Marcusenius stanleyanus*	„ „
156 *Mormyrus longirostris*	„ „
Kneriidae	
157 *Kneria wittei*	torrents
Characidae	
158 *Hydrocynus vittatus*	ubiquitous
159 *Hydrocynus goliath*	„
160 *Alestes imberi*	„
161 *Alestes macrophthalmus*	„
162 *Alestes rhodopleura*	„
163 *Bryconaethiops boulengeri*	estuaries
164 **Micralestes stormsi*	Lukuga River
Citharinidae	
165 *Distichodus fasciolatus*	„
166 *Distichodus maculatus*	Malagarazi
167 *Distichodus sexfasciatus*	coastal
168 *Citharinus gibbosus*	estuaries
Cyprinidae	
169 *Barbus altianalis*	river
170 *Barbus aphantogramma*	„
171 *Barbus caudovittatus*	„
172 **Barbus euchilus*	Lufuko River
173 *Barbus eutaenia*	river
174 *Barbus lineomaculatus*	river
175 **Barbus lufukiensis*	Lufuko River
176 *Barbus miolepis*	river
177 *Barbus nicholsi*	Lukuga River
178 **Barbus oligogrammus*	river
179 *Barbus paludinosus*	„
180 *Barbus pellegrini*	„
181 **Barbus pojeri*	Lukuga outlet
182 *Barbus serrifer*	river
183 **Barbus taeniopleura*	„
184 **Barbus tropidolepis*	„
185 **Barbus urostigma*	„
186 **Barbus urundensis*	„

Scientific name	Habitat
187 **Varicorhinus leleupanus*	coastal/river
188 *Varicorhinus ruandae*	river
189 **Varicorhinus stappersi*	coastal/river
190 **Varicorhinus tanganicae*	„ „
191 *Labeo cylindricus*	sand/coastal
192 **Labeo dhonti*	Lukuga outlet
193 *Labeo fuelleborni*	river
194 **Labeo kibimbi*	„
195 *Labeo lineatus*	„
196 *Labeo velifer*	Lukuga outlet
197 *Barilius moorii*	river/estuaries
198 **Barilius neavii*	coastal
199 *Barilius salmolucius*	river estuary
200 **Barilius tanganicae*	coastal
201 *Barilius ubangensis*	river estuary
202 *Engraulicypris congicus*	Lukuga outlet
203 **Engraulicypris minutus*	pelagic
Bagridae	
204 *Bagrus docmac*	estuary
205 **Chrysichthys grandis*	sand/mud
206 **Chrysichthys graueri*	„ „
207 **Chrysichthys brachynema*	„ „
208 **Chrysichthys platycephalus*	?
209 **Chrysichthys sianenna*	sand/mud
210 **Chrysichthys stappersii*	„ „
211 **Lophiobagrus cyclurus*	rock
212 **Phyllonemus filinemus*	„
213 **Phyllonemus typus*	„
214 *Auchenoglanis occidentalis*	ubiquitous
215 *Leptoglanis brevis*	torrents
Mochokidae	
216 **Synodontis dhonti*	rock
217 **Synodontis eurystomus*	„
218 **Synodontis granulosus*	rock
219 **Synodontis lacustricolus*	„
220 **Synodontis melanostictus*	river
221 **Synodontis multipunctatus*	rock
222 **Synodontis petricola*	„
223 *Chiloglanis lukugae*	torrents

Scientific name	Habitat
224 *Chiloglanis pojeri*	„
Amphiliidae	
225 *Amphilius platychir*	„
226 *Amphilius kivuensis*	„
Clariidae	
227 *Heterobranchus longifilis*	sand/mud/rock
228 **Dinotopterus cunningtoni*	rock
229 *Clarias liocephalus*	mud/estuary
230 *Clarias mossambicus*	„ „
231 **Clarias ornatus*	river
232 *Clarias theodorae*	mud/coastal
233 **Tanganikallabes mortiauxi*	rock
Malapteruridae	
234 *Malapterurus electricus*	mud/rock
Cyprinodontidae	
235 *Aplocheilichthys pumilus*	swamps
236 **Lamprichthys tanganicanus*	pelagic
Centropomidae	
237 **Lates angustifrons*	„
238 **Lates mariae*	„
239 **Lates microlepis*	„
240 **Luciolates brevior*	„
241 **Luciolates stappersi*	„
Anabantidae	
242 *Ctenopoma muriei*	swamps
Mastacembelidae	
243 **Mastacembelus albomaculatus*	rock
244 **Mastacembelus cunningtoni*	swamps/sand
245 **Mastacembelus ellipsifer*	rock
246 **Mastacembelus flavidus*	„
247 **Mastacembelus frenatus*	„
248 **Mastacembelus micropectus*	„
249 **Mastacembelus moorii*	„
250 **Mastacembelus ophidium*	„
251 **Mastacembelus plagiostoma*	„
252 **Mastacembelus platysoma*	„
253 **Mastacembelus taeniatus*	„
254 **Mastacembelus tanganicae*	„
255 **Mastacembelus zebratus*	„

Scientific name	Habitat
Tetraodontidae	
256 *Tetraodon mbu*	estuaries



The Mahale Mountains (lat. 6°S, long. 30°E) are located at the largest proturbance on the east shore of Lake Tanganyika. Running in a straight line from north-west by west to south-east by east, they have, besides the main peak Nkungwe (2,462m above sea level), five prominent peaks which are more than 2,000m. Damp air blowing from the lake which causes considerable cloud and mist development supports both extensive montane forests over the altitude of 1,800m and the concentration of gallery forests (Kasoge Forest) at the north-western foot of the mountains. Numerous valleys intersect the mountains, some of which support permanent streams that flow into the lake. On the east side of the mountains flow the River Kabesi and River Kampisa in parallel with the mountains. The area can be regarded as "forest iselberg" in a midst of Miombo woodland which extends in a vast area of Western Tanzania and Eastern Zaire. Since the area is exceedingly isolated and the mountains form an uplifted island between the lowlands of east and west Africa separated from any other mountain mass by several hundred miles, it shows affinities in the animals and plants with west rather than east Africa and demonstrates remnants of older faunas and floras.

An Introduction of the Mahale Mountains,
The Picturesque Massif with Huge Forest and Chimpanzees.

1973
ITANI Junichiro
NISHIDA Toshisada

The National Parks are wilderness areas from which all human rights have been excluded (except, naturally, for Tanzania National Parks staff and visitors). .... *The fundamental purpose of the Tanzania National Parks is within areas so specifically gazetted, " to conserve the scenery, the habitat and the fauna and flora therein and to promote and to provide for the enjoyment of future generations. "*

"PURPOSE AND OBJECTIVES OF THE TANAPA"