UNIVERSITY OF CAPE COAST

FEEDING AND SOCIAL BEHAVIOUR OF COMMON PRIMATES

IN THE KAKUM NATIONAL PARK – CENTRAL REGION OF GHANA
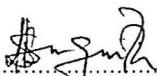
BY

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DEGREE IN ZOOLOGY

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DECLARATION

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.
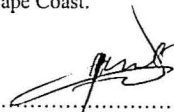
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We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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DR. K.A. MONNEY   DATE
(CO-SUPERVISOR)

DEDICATION

TO

THE MOST IMPORTANT WOMEN IN MY LIFE;

Mrs. Comfort Asiedu Danquah

Mrs. Angela Akonua Dei Danquah

ACKNOWLEDGMENTS

I am grateful to God for His protection when I treaded the forests of the Kakum National Park. Nothing serious happened, and I thank Him for that.

I feel highly indebted to Dr. Samuel Yeboah, my supervisor, whose incomparable direction and guidance has resulted in the completion of this work. A lot of thanks go to Dr. K.A. Monney, my co-supervisor, who helped me straighten this thesis. The help of other lecturers and workers of the Zoology Department in diverse ways is also appreciated and recognized.

Enormous appreciation go to my parents, Mr, and Mrs R.L. Danquah and my brother and sisters who encouraged my all the way through.

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I also thank Mr. Kofi Boakye and Miss Cynthia Ofori for the diverse secretarial assistance in putting this thesis together.

ABSTRACT

This research was carried out from August 1997 to September 1998 in the Kakum National Park in the Central Region of Ghana. It was centred mainly on the feeding and social behaviour of the common primates with emphasis on factors that are currently or potentially threatening or enhancing their existence. The possibility of incorporating the viewing of monkeys in the management of the park to attract tourists was also investigated.

Five species of primates were seen, Mona monkey (*Cercopithecus mona*), Spot-nosed monkey (*C. petaurista*), Green monkey (*C. aethiops*), Black and White colobus monkey (*Colobus polykomos*) and Olive Colobus (*Procolobus versus*). A sixth, the bush baby (*Galago sp*) was not seen but identified by its nocturnal calls. *C. mona, C. Petaurista* and *P. versus* were frequently seen but *C. petaurista* was the commonest. *C. mona, C. Petaurista* and *P. versus* occupied the lower canopy while *Colobus polykomos* stayed in the highest canopies most of the time. *C. aethiops* stayed in the secondary forests outside the park put run back into the park when they sensed danger. *C. diana* which had been declared endangered by the park authorities was never seen.

Three fruit trees, *Musanga cecropioides, Pycnanthus angolensis* and *Raphia hookeri* were the most popular sources of food for the monkeys and existed throughout the forest. Apart from *R. hookeri* fruits which were available all year round all other monkey fruit trees did not bear fruits during the dry season. All the primates encountered ate from the trees found.

Cercopithecus mona, C. Petaurista and *Procolobus versus* formed various combinations of mixed species troops with *C. petaurista* being a member of the species

combinations most times. The white crested hornbill and the black and Maxwell's duikers were found to associate with the monkeys during feeding. No natural predators to monkeys were found. The agility of the monkeys coupled with various alarm-response mechanisms seemed to prevent predators from getting close.

Poaching by the surrounding communities seemed to be a problem in the Kakum National Park and this affected any initiation of monkey viewing as a tourist attraction. Viewing of monkeys as a viable tourist attraction may not be realised because the monkeys were seen to be afraid of humans probably because of the poaching menace. Thus the tourism potentials were very low and depended on human (poaching) influences. *Cercopithecus mona*, *Cercopithecus petaurista* and *Procolobus versus* could be viewed or watched after hiding effectively during times that the monkeys were active.

More research needs to be done in the Kakum National Park especially on the monkeys to add to the compilation of a comprehensive document on rainforest primates.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.0   Primate Definition

Linnaeus named the group of animals to which we ourselves belong as primates, the primary order of mammals. Primates still lack an adequate definition, but can be simply defined as any member of the mammalian order that comprises Man, Apes, monkeys together with the so-called half-monkeys or Prosimians.

A general definition however remains adequate for general purposes, except for those workers who wish to embrace the tree shrews within the order; "an anguiculate, claviculate, placental mammal with orbits encircled by bone; three kinds of teeth at least at one time of life; brain always with posterior lobe on a calcarine fissure; the innermost digits of at least one pair of extremities opposable; hallux with a flat nail or none; a well marked caecum; penis pendulous, testes scrotal; always two pectoral mammae".

1:1 PRIMATE CLASSIFICATION

Recent work, reviewed by Shwart et al (1978) shows that only a few characters can be used to distinguish primates from all other mammals; the detailed structure of the ear bones, the perforations in the base of the

skull through which arteries carry blood to the brain, and the shape of the molar teeth.

Despite all these identifying characteristics the basic framework of classification remains the same. The two main divisions recognized today are the same as before: the Prosimii and Anthropoides. The Prosimians (before monkeys) which are the early primate forms and their extant relatives live in Africa and South East Asia. The suborder Prosimii includes the families of Lemuridae, Indriidae, Lorisidae and Daubentoniidae. The other group of primates are the Anthropoid (man-like) species .At the centre of this distinction is the fact that the majority of Prosimians are nocturnal, whereas with one exception of the South American night monkey (*Autus trivorgatus*) anthropoid species are diurnal.

The suborder Anthropoidea is divided into two infra orders: Platyrrhini from South and Central America and Catarrhini from Africa and Asia.

Within the distinction between Prosimians and Anthropoids there is a third infra order, the Tarsioidea that shares several anatomical characters with both main groups. They are most times classified with the Prosimians.

Martin (1990) has drawn a compromise between recent and more traditional evolutionary approaches to primate

classification. Conroy (1990) has a classification that
is very similar to Martin's.

1:1:1   Classification   of   the   Order   Primates
(Martin, 1990)

Order: Primates (primates)

  Suborder: Prosimii (Prosimians)

    Infraorder: Liemuriformes (lemuroids)

      Superfamily: Liemuroidea (Malagasy Lemurs)

        Family: Cheirogaleidae (Mouse and dwarf

                                 Lemurs)

                 Lemuridae (true lemurs and sportive

                            Lemurs)

                 Indriidae (indri group)

                 Daubentoniidae (aye-aye)

    Infraorder: Lorisiformes (lorisoids)

      Superfamily: Lorisoidea

        Family: Lorisidae (loris group)

          Subfamily: Lorisinae (loris subgroup)

                     Galaginae (bushbabies)

    Infraorder: Tarsiiformes (tarsioids)

      Superfamily: Tarsioidea

        Family: Tarsiidae (tarsiers)

  Suborder: Anthropoidea (simians)

    Infraorder: Platyrrhini (New World simians)

      Superfamily: Ceboidea (New World Monkeys)

Family: Lebidae (true New World Monkeys)

Subfamily: Cebinae (capuchin and squirrel

monkeys)

Aotinae (owl and titi monkeys)

Atelinae (spider and wooly

monkeys)

Alouattinae (howler monkeys)

Pithecinae (sakis)

Callimiconinae   (Goeldis   monkey)

Family: Callitrichidae (Marmosets and tamarins)

Infraorder: Catarrhini (Old World simians)

Superfamily: Cercopithecidea

Family: Cercopithecoidae (old world monkeys)

Subfamily: Cercopithecinae (guenon group)

Colobinae (leaf monkeys)

Superfamily: Hominoidea (apes and human beings)

Family: Hylobatidae (lesser apes)

Subfamily: Hylobatinae (gibbons)

Family: Pongidae (great apes)

Subfamily: (Ponginae (modern great apes)

Family: Hominidae (hominids)

Subfamily: Homininae (human beings)

1:2 HABITATS AND WORLD DISTRIBUTION OF PRIMATES

Africa is the home of prosimians, Old World monkeys

of the two cercopithecial subfamilies, Colobines and

Cercopithecines, and two of the genera of the great apes, the gorilla and chimpanzee. Madagascar is the only home of lemurs. The lorises are divided into two distinct groups, the sprightly galagos or bush babies which are limited to Africa and the slow-moving pottos. The primate resources of India and Southeast Asia comprise the same families as those of Africa.

Many species of primates exhibit behavioural flexibility that enables them to exploit more that one habitat, or to exploit one habitat in more than one manner depending on season and circumstances. Distribution of primate species and the general ecology of primate life in various biomes have been rather thoroughly detailed in a number of works (Jolly, 1985 and Richard, 1985).

Primates are found in about four major types of vegetational communities (Richard 1985). In the Tropics, the biomes inhabited by primates are the Rainforest, Seasonal or Monsoon forest, Woodland Thornwood, and Shrubland, Savannah and Savannah mosaic and Desert and Semi-desert Scrub. In the Temperates, primates occupy the Rainforests, Woodland, Grasslands, Desert and Semi-desert scrub. In the Alpine and Subalpine zones primate species may be found in Elfinwood and Shrubland and Meadow. Finally in the Arctic and Subarctic zones, the Taiga and Tundras harbour the primates.

Within these biomes the primates can be categorized as to the space occupied, be it species types, ages, sexes etc. Utilization of space depends on locomotor substrates; earth and humus, rock outcrops, tree trunks, branches, lianes, vines and so on are the structured members that delimit space within habitats. In the evolution of any species there are close and obvious connections between **1.** Size and morphology of individuals, **2.** Preferred foods, and **3.** Substrates utilized. A comparison across species of these relations provides a rough measure of niche separation; differences allow coexistence and packing of related species within a single habitat (Hladik et al., 1980; Dacey, 1973; Hagerstrand, 1973 and Quiatt et al 1981). How space is perceived, and what substrates are utilized in effecting a sequence of behavioural action must depend on the nature and distribution of habitat resources, broadly defined to include Food, water, sleeping trees, mating grounds, nest or infant parking sites etc.

1:3 MAN'S COUSINS

Monkeys, which have the greatest degree of general morphology in similarity to man, or which show convergences, when studied from the view point of behaviour or social relations are likely to yield data most useful in understanding and interpreting problems of

human behaviour. In fact, coming to terms with the fact that monkeys are man's closest relatives and sometimes called "cousins" has been recorded by various socio-ecological primatologists. There is no way in which a simple set of rules can deal with each and every situation in an intelligent species such as a primate. One very strong dividing line between us (humans) and our "cousins" is speech difference.

In order to make sense of social behaviour and organization, we have to discover regularities, and the first priority is an effective method of description. This has to some extent been achieved by the separation into levels of interactions, relationships and social organizations (Hinde, 1976). The distinctions are as follows: interaction are patterns of behaviour that are seen when individuals are in interaction with each other; relationships are kinds of long term associations between individuals; and the social structure is the network of relationships constituting the group as a whole.

Other proofs of linkage between man and other primates have been recorded. For example the nurturing of grievances by chimpanzees, leading to aggressive revenge at long time intervals from casual events indicates a powerful sense of self and in the context of kin alliances, allows a link up with the human institution of feud. The analysis of cases of that which appears to be

deception (Whiten and Byrne, 1988) has shown that primates act as if they were working with a high degree of intentionality. As Kummer et al (1990) have pointed out, further work of a more experimental kind may shed more light on such cases. In other cases too, pigmy chimpanzees have shown an extraordinary capacity to learn the meaning of human words and sentences, including recognition of syntax. On the rural scene, dwellers report of instances of monkeys spanking their young during misbehaviour. No such high similarity to man has so far been found in any other group of animals than primates, thus any scheme to study and protect them will in the long term save man and allow him understand himself.

In an attempt therefore to construct life of man as it is shaped through the ages; many studies of primate behaviour are now underway in the laboratory and in the field. As the contrasts and similarities between the behaviour of primates and man especially pre-agricultural, become clearer, they should give useful insights into kinds of social behaviours (Southwick, 1963).

1:4 PRIMATE STUDY

The ecologist is a significant member of the board of environmental scientists who have an important role to

play in the long-term strategy of maintaining environmental stability and promoting the economic productivity of various ecosystems. The primate ecologist is already identifying the ecological and behavioural needs of a wide variety of primates, which are central to the establishment of protected areas with adequate resources, and to the management of disturbed areas.

Behaviour, including social behaviour is characterized by variability, and this variability is the material on which selection works during evolution (Quiatt and Reynolds, 1995). There are two sources of variability in primate social behaviour and social organization; the first is the product of what can be called ultimate causes and is the outcome of selection at the genetic level. The second is the product of what can be called proximate constraints and is the outcome of interaction between individuals and their socio-ecological circumstances.

Habitat diversity has led to different solutions to the problems of finding enough food in different primate species. The differing ways of ordering the relations between groups and the space they occupy can be done not only according to the distribution of preferred foods but also to seasonal factors and the presence of other groups nearby. Studies on primate social behaviour at the present time focus on the nature of dyadic interactions

of competition and cooperation between individuals, the effects of these on the social organization of groups, and of how individuals in social groups come to adopt particular strategies for mating and obtaining food.

In many ways primate biology is in the cataloguing and collecting phase by primatologists. This must be regarded as an essential stock taking exercise during which language and methodology develop and the bricks and mortar of the subject - the basic facts of primate taxonomy, morphology and behaviour are collected and disseminated. Without these facts and without, at least, an awareness of the gaps in our knowledge, the subject cannot hope to fulfil its great promise.

Carpenter (1934,1940) was among the pioneers of primate ecology for about the past sixty years and this study has only been developed in the last thirty years since the 1960s. The attention was on ecological aspects of primate behaviour (Crook and Gartlan 1966), (Eisienbierg, et al 1972). It then became apparent that social behaviour was influenced by habitat, producing differences even between populations of the same species.

The relationship, therefore between primates and their habitats need further elucidation by primate ecologists, along with a clearer understanding of the organization of groups, and of how individuals in social

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The relationship, therefore between primates and their habitats need further elucidation by primate ecologists, along with a clearer understanding of the inter-relationships between primate species in the same habitat, and between primates and other animals, particularly those occupying similar ecological niches. In studying the feeding and social behaviour of monkeys,

the biologist would be laying the foundations for a very valuable environmental conservation scheme because of his involvement in:

a. The protection of the diversity of natural ecosystems;

b. The management of disturbed habitats for sustained yields of plants and animal products, which require that resident species (including monkeys) flourish, and;

c. The rescue of primates (and other animals) made homeless by habitat clearance for agriculture, for translocation and or capture breeding for research or nutrition and reproduction as well as tourism reasons.

1:5 WORLD STATUS OF PRIMATES

There have been serious declines in the wild populations of most primate species over the past two decades. The world's approximately 200 primate species face a critical threat to their survival. There are three categories of major threats to primate populations in the wild; habitat destruction; hunting for food and aesthetic purposes; and live capture for export trade. In different regions and among different species one or more of these effects may exist.

1:5:1 Habitat Destruction

The tropical rainforest is the most threatened primate habitat because of its importance economically. Because most primates are arboreal they form excellent indicators of the health of the forest concerned.

Primate conservation unfortunately is facing a lot of the problems common to wildlife conservation on the whole. These include excessive demand for farmland, fuel wood and hard wood timber. The main catalyst of this devastation is the growth of the timber industry (Pearce & Amman, 1995; Amman 1996b). Deforestation alone probably makes primate extinction rates in Cameroon and Nigeria the highest in the African forest belt countries (Cowlishaw, 1999). As a consequence there is extensive habitat destruction. The absence of conservation ethics among the populace and weak enforcement and inadequacies of existing wildlife laws, an acute shortage of financial resources and also the popularity of "bush meat" all contribute to the problems. It is difficult to separate the effects of logging from those of hunting, as hunting pressure usually increases following logging (Struhsaker 1997).

1:5:2 Hunting

In Africa hunting is the main adverse effect on the existence of primates. Except for a few parks, hunters

continue to shoot monkeys but hardly ever get prosecuted. The insatiable demand for monkey meat in the villages and the popular bush restaurants (chop bars) has increased the menace. Across the forest region of West and Central Africa a conflux of factors are making commercial hunting a leading threat to the survival of many primates, including the great apes. Primate hunting is reported in 27 of the 44 primate study and conservation projects described in International Union for the Conservation of Nature's recent status on African Primates (Oates, 1996b). In these areas, many unique and never-studied primate populations are being annihilated (Oates, 1996a; Rose, 1996e; Browen-Jones, 1998).

1:6 STUDY RATIONALE

A study of the life activities of primates in their natural habitat away from simulated laboratory situations is growing more and more important. A look at the foraging and social behaviours of the monkey species in their naturally existing habitats will be contributing immensely to the National as well as International Conservation effort. Any such scheme will be contributing to the action plans being developed for Africa by the Primates Specialists Groups of the Species Survival Commission of the International Union for the Conservation of Nature (IUCN).

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The Kakum National Park in the Central Region of Ghana, which also falls in the Tropical rain-forest zone, harbours about six (6) species of primates (Mensah-Ntiamoah, 1991). Mensah-Ntiamoah(1989)found out that subsistence hunting by villagers around the park accounts for a large percentage of monkeys removed from the park. Some activity of commercial poaching is also present. The use of primates as a source of food, probably, has the greatest effect on the populations than other factors such as logging. Not much research on primates has taken place in the Kakum National Park. One of the most elaborate researches done was concerned with Distribution, Species Composition and Troop sizes (Mensah-Ntiamoah, 1991). There have been other minor studies, but according to the Wildlife staff, "they are just tiny documents".

A research leading to a compilation of information on the natural habitats of primates is an important step towards the conservation of primates. This could be used to estimate the nutritional capacity of a forest for monkeys.

Other behaviours such as troop sizes and composition, dominance by individuals in troops, interaction with other primate and non-primate animals, social order, to mention a few, are all important

elements in determining the survival level of the monkeys.

The National as well as local policy on the development of the Kakum National Park encourages the promotion of tourist-based projects. Any research, like the present one, should be made to serve this interest too.

In conservation research, investigators sometimes tend to look for the problems in the animal's habitat and play down on the influence of humans themselves. This research delves into this usually shelved aspect.

1:7 STUDY OBJECTIVES

The present study takes a critical look at the status of the primates in the park with the objective of gathering information that will serve as a basis for their conservation.

This research focuses on the social and feeding behaviour. It will form the basis for the formulation of an effective conservation and management scheme and promote further detailed study on other aspects of primate life in the KNP.

This research, its findings and recommendations, is hoped to serve as part of the framework for the sustainable conservation of the primates in the Kakum National Park.

The research was designed to yield information on the following:

1. How well the forest produces food for the primate populations, and their feeding habits.

2. Factors that are potentially or currently threatening or enhancing the existence of the primates, and interaction amongst the primate and non-primate species.

3. New primate species that may be identified during the study period.

4. The social behaviour of the primates studied and its relevance to tourist viewing - appropriate times and places where at least two of the most common species of primates in the park can be viewed undisturbed. This may form the basis for recommendation on the creation of permanent tourist viewing points in the park.

CHAPTER TWO

STUDY AREA

2.0 Kakum National Park

The KAKUM NATIONAL PARK, the study area, is part of a big conservation scheme of which the Assin Attandanso Game Production Reserve is also a part. These two conservation zones lie adjacent to each other and comprise a critical watershed protection and wildlife habitat preserve in the near coastal region of south-central Ghana (See Fig 1&2).

The moist semi-deciduous forest vegetation found within these two contiguous reserves protects the headwaters of three large streams, Obuo, Nemini and Kakum, which are the watersheds supplying Cape Coast, the capital of the Central Region of Ghana, and many of the outlying towns and villages.

Together the reserves cover an area of about 363.48Km^2 and fall within the Assin, Twifo Heman/Lower Denkyira and Abura-Asebu Kwamankese Districts in the Central Region of Ghana. They both form an irregular block as part of the Upper Guinean Rainforest of West Africa (Martin, 1990). This area is generally undulating with highlands ranging between 150m - 250m above sea level.