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# A STUDY OF THE BEHAVIOUR OF THE CHACMA BABOON, *PAPIO URSINUS*

by

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(With 13 Figures)

(Rec. 15-III-1958)

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## 1. INTRODUCTION

This study of the Chacma baboon was begun early in 1955 when Prof. R. A. DART and Mr L. K. MARSHALL drew my attention to the surprising superficiality of the available knowledge of these animals. The study has been carried out in two phases: one on two tame baboons, Joe and Jenny, the other on a number of wild troops in the Waterberg, and particularly in the Kruger National Park. The total number of troops observed has been 16.

### A. JOE AND JENNY

Joe and Jenny were presented to me on October 4th, 1955, by the Institute for Poliomyelitis Research, Johannesburg. Joe was at that time four months old, Jenny six months. Both came, as far as is known, from the Skeerpoort, west of Pretoria, and had been taken from their mothers before being weaned. They had been kept together in a small cage in a room in which other monkeys and baboons were also kept. Joe appeared to have been treated roughly, perhaps by employees who cleaned the cage. He was extremely nervous and had adopted Jenny as a mother-substitute. Jenny, on her part seemed very maternal and held him firmly in her arms protecting him. At the time of arrival Joe still had his black fur while Jenny had almost entirely lost this. Both baboons were housed in a small rabbit cage in my home until a proper cage could be built in the garden. Here it was soon revealed that Jenny was

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1) The present study of baboons would probably never have been undertaken if Professor RAYMOND DART at the University of the Witwatersrand had not drawn my attention to some of the problems. I am greatly indebted to him for his support and for the inspiring discussions we have had. I also wish to thank the Institute for Poliomyelitis Research for presenting me with the two baboons used for my observations and the University of the Witwatersrand for its financial support.

Finally my sincere thanks for the assistance granted by the National Parks Board, particularly to the Board's Director, Mr R. KNOBEL; also Col. ROWLAND JONES, Dr DE V. PIENAAR and other members of its staff.

extremely possessive, always keeping Joe away from anybody approaching the two of them.

Concerning food, however, Jenny grasped everything she could lay hands on, leaving for him only what she could not manage. Both baboons refused meat of any sort but greedily ate insects, bread, vegetables and fruit.

On November 13th the baboons were temporarily transferred to a bigger wire cage in the garden, big enough for them to be able to play about and jump between branches placed there. The long imprisonment in too small a cage had, however, made them uncertain in jumping and Joe particularly seemed afraid of making big jumps. After a few days both animals became as sure-footed as any young baboon I have observed in the Zoo.

On December 3rd both baboons were transferred to a large cage in my garden, 9'6" x 6'6". The cage is a strong steel construction with iron grill in front and with roof and sides covered with corrugated iron. The floor is of cement and from floor to roof is a part of a tree top with very thick branches. At the time of transfer to the final cage, Joe had lost all his juvenile black coat except for a little on the crown of his head.

The study of Joe and Jenny has been supplemented with observations on other captive baboons and monkeys, in the Medical School of the University of the Witwatersrand, at the National Zoo in Pretoria, the Zoo in Johannesburg, and on animals kept in captivity elsewhere. Most animals observed, other than Joe and Jenny, have shown very little of interest because they have been too concerned with begging for food or their behaviour has become distorted by the treatment they have received. This, of course, is particularly the case in Zoos where the public are allowed to tease the captives.

Naturally I, too, have found it impossible to avoid influencing the behaviour of my animals; but the peaceful atmosphere under which they are growing up has left them healthy, happy and better balanced and thus, I believe, more capable of showing their innate characters.

## B. THE STUDY OF WILD BABOONS

Most observations on wild baboons were made during visits to the Kruger National Park. Here alone 13 troops have been observed. Thanks to the experience gained from Joe and Jenny, it has been possible to obtain results more quickly from the wild baboons than would otherwise have been expected. It must, however, be stressed that the behaviour of captive baboons often is so distorted that it can be difficult to deduct anything and that the experience gained from them cannot always easily be transferred to wild animals.

The technique employed was as far as possible to write down every observation.

servation however insignificant it might appear, or to record the behaviour on a 16 mm cine film. In both cases the records were carefully examined and analysed afterwards. The cine film proved, in this connection, extremely valuable.

The best observations were made on or near rubbish heaps outside the camps in the Kruger National Park. Here the baboons were so accustomed to the native servants emptying their buckets, that it was possible to come very close to otherwise timid animals. After some time the animals became so confident that they approached almost to within arms-reach, making it possible to take photographs without a teleobjective.

## II. THE STRUCTURE AND THE ACTIVITIES OF A TROOP

A troop of baboons can possess a considerable territory (up to 6 miles in diameter) which may overlap that of a neighbouring troop. Where two troops have overlapping territories the weaker usually withdraws at the approach of the stronger group. Such retreats were observed at Pretoriuskop and Skukuza in the Kruger National Park. From various reports I have received from people with permanent residence in areas inhabited by baboons it seems highly likely that violent fights between the troops occur from time to time.

Each troop is built up of a number of adult males, a considerably greater number of females, and juveniles of all ages. The number of the latter usually amounts to two or three times that of the adults. Unfortunately no exact figures can be given because the troops observed were inhabiting dense bush where counting was impossible and the time spent with each troop was not long enough to make it possible to recognise every individual. The structure of a troop of baboons seems more permanent than that of *Cercopithecus ascanius* Schmidt: (HADDOW, 1952 and BUXTON, 1952) and single males appear to be rare.

All troops observed had a typical patriarchal hierarchy. The hierarchy mainly showed itself in the order in which the animals fed and mated, the stronger animals always having first choice. The extent to which a male would allow the presence of other baboons when eating or allow other weaker males to cover a female, depends on the individual's temper and its gastric or sexual hunger. On one occasion an amiable old superior male allowed the other five mature males of the troop to cover the same female in turn, after he had satisfied himself and subsequently turned to food. I have frequently observed more than one male feed in company with a female in oestrus.

An ideal family life such as described by MARAIS seems not to exist, nor is there any reason to think that the formation of permanent family groups

is a frequent feature. I have, however, on occasions seen small groups of females surrounding the same male for more than an hour. Once a family group consisting of a male, and three females, — one of them in oestrus — was followed and observed for more than two hours. After that all trace of them was lost in the dense bush. Often a male and a female in oestrus could be seen squatting together usually apart from the rest of the troop. When the female got up and walked off the male usually followed close behind her. It will be seen from these observations that there are great individual differences in the sexual associations and that no rules can be given.



Fig. 1. Sentry behind branches.

Among the females a hierarchial order is less obvious. Females in oestrus are, however, often of a quicker temper than those in anoestrus and are therefore often avoided on the feeding ground by the other females. The result is that the females in oestrus have a first choice of food among the females.

There are great individual differences in the attitude towards juveniles, but the females usually take greater interest in the juveniles than do the males.

Young baboons are very playful and their parental instinct is developed amazingly early. It is a common sight to see very young individuals carry babies either on their backs or hanging under their bodies.

Idle males usually squat on the ground or on rocks, tree trunks or other elevated points, preferably behind a bush (Fig. 1), a stone, or some other

object (Fig. 2). Regular scratching and yawning can be observed. Males squatting in this fashion act as sentinels and warn the troop by their loud barks when danger approaches. These sentinels have been described by FITZSIMONS (1919, 1924). When the troop is on the move there seems to be a tendency for some of the males to form a rear guard although no definite marching order has ever been observed. In one troop at Lower Sabie the supreme male was always seen to walk behind the troop when crossing a narrow bridge. He looked back alternately over right and left shoulder. Various attempts by my native helper to drive troops through the bush while I watched from the distance, seemed to confirm the observations that there

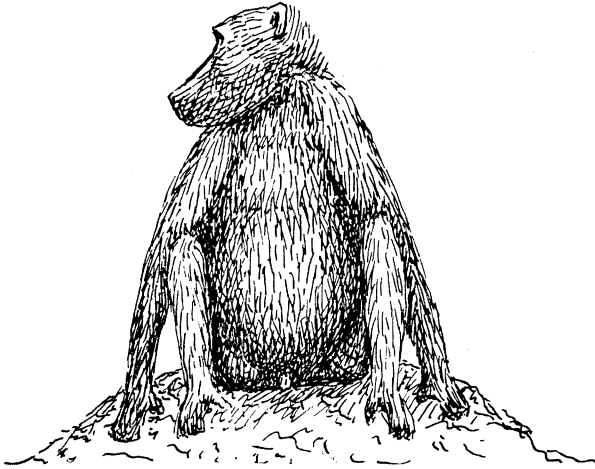


Fig. 2. Sentry on termite hill.

is a tendency for one or more males to drop behind the troop. No clear picture was, however, formed of this behaviour.

Grooming is a common feature when the troop is resting. Females groom juveniles, other females or males. Males groom very rarely.

Although the baboons have no fixed sleeping quarters, they have certain places they prefer, — usually tall trees or steep rocks.

The daily routine is more or less fixed, starting with eating in the morning, resting in the afternoon and eating again for a short while in the evening, before the troop retires to its sleeping quarters.

### III. TYPES OF BEHAVIOUR

The various types of behaviour were studied in detail partly on Joe and Jenny, partly on wild baboons, and attempts were made to analyse them thereby hoping to arrive at a deeper understanding of their activities and the ways in which the animals make themselves understood.

## A. SOUNDS

Any sound uttered by a baboon expresses emotion.

a. *G r u n t s*. Deep grunts can be uttered rhythmically, the faster the rhythm the greater the state of agitation. When at their quickest they are uttered not only during the expiration, but also during the intake of air, sometimes finally merging into a roar or growling shriek. Judging from observations in the Kruger National Park, the grunt may have the biological function of notifying other baboons of an individual's presence and whereabouts. It succeeds in holding the family and the troop together and warning off other individuals whose presence is undesired. Thus it may attain a function analogous to bird song.

b. *B a r k s*. A male baboon, seeing something at a safe distance but which it considers to be frightening, emits a bark similar to that of a dog. Its voice, however, carries much further than that of a dog and the bark serves as a threat to the intruder as well as a warning to the troop. Two days after the arrival of my baboons, the four month old male, Joe, uttered this warning bark at the sight of my dog (Airedale crossbreed).

c. *S c r e e c h*. This sound signifies that the animal is highly agitated. The type of agitation is not indicated. When screeching, the teeth are bared, the mouth is half open.

d. *Growling screech*. In the Kruger National Park the adult males were often heard uttering this screech when fighting or chasing one another.

e. *Coughing shout or screech*. This expression of joy and delight varies according to the excitement behind it. Its range extends from a quick grunt or an intermittent, almost coughing sound, to a loud intermittent shout. It never attains quite the same shrillness as an angry or frightened screech. The mouth is relaxed and wide open, the teeth are bared, and the eyebrows usually lifted. More often than not the animal is very active. This is the most expressive and varied type of sound emitted, and together with the accompanying facial mimic it informs the experienced keeper of the mood of the animal, whether simply amused or full of joy over the keeper's presence. In wild animals the accompanying mime is far less developed than in captive baboons, and in the Kruger National Park I have witnessed what signifies cordial laughter on very few occasions while, in the case of my two captive baboons, the female, Jenny, has the most expressive "laughter". (Fig. 3).

f. Deep soft oo-oo. This sound is usually uttered with rounded lips or at least with a somewhat contracted *musculus orbicularis oris*, so that the teeth are covered. The face is otherwise relaxed and the ears may be standing out from the head. I have observed Joe produce this sound on a few occasions when he has been separated from Jenny, and in the Kruger National Park I often watched juveniles producing it while anxiously awaiting their



Fig. 3. Laughter.

turn to eat. The sound indicates fretting and the facial expression is similar to that of fretting chimpanzees as described by DARWIN (1872).

#### B. AGGRESSIVE BEHAVIOUR

a. Threat (Fig. 4 & 5). The animal usually starts by looking straight at its opponent. Its ears may be slightly forward and its fur is raised, particularly on its neck, shoulders and back. Usually the animal stands on all four legs. Its arms become rigid and straight, its hind legs are firmly planted on the ground, and its head is lifted. The whole posture gives an impression of self assurance. If the animal moves, it does so in a rigid way, often in sudden jerks. It may stamp the ground with one hand, usually the right, similarly to the obstinately defiant stamps made by a buck with its front legs when disturbed. This stamping may merge into a jerky rubbing of the ground. In this case the hands are usually thrust forward, slightly from the side towards the midline, often in a grasping manner as if the animal literally wished to "rub the floor" with its opponent. In some cases of threat, the males retract the upper lip, slightly baring their canines into a snarl. This attitude I have never observed in the less aggressive females.



DARWIN (1872) thought that snarling did not occur in monkeys. Due to the relatively large size of the canine muscle in baboons, snarling is possible in these animals. This is, for example, in contrast to *Cercopithecus aethiops*, the



Fig. 4. Threat.

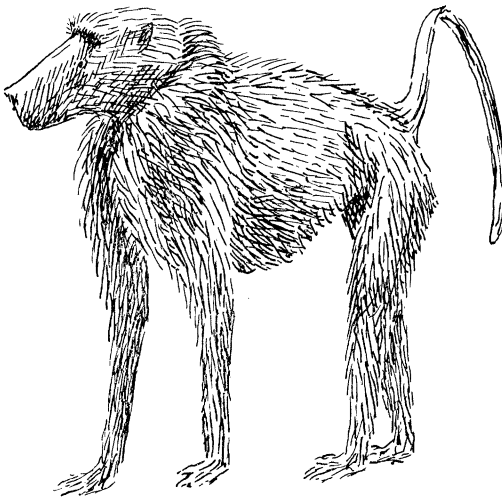


Fig. 5. Threat.

South African blue monkey, in which the canine muscle is so weak that snarling may be impossible or difficult to recognise. Joe has, on occasions when threatening me, retracted his upper lip more than his lower one, the wrinkles on his nose indicating a contraction of the canine and malaris

muscles. A young male baboon in the Kruger National Park once threatened me by baring only the canine on the side of its mouth that was facing me.

b. *Attack*. The animal suddenly darts forwards making great use of its arms in setting off. Its pace is swift and smooth, but its movements give an impression of being deliberate and well calculated. The head is lifted, ears and hair raised, as during the preceding threat.

Usually the opponent flees and escapes, but if overtaken the back of its head and its shoulders are tortured by the attacker. In cases where the at-



Fig. 6. Angry male, "rubbing the ground" with a youngster.

tacked animal is much smaller than the attacker, it is often tackled differently. The attacker grasps its opponent with one hand, (usually the right) and quickly rubs it against the ground (Fig. 6). These movements much resemble those performed during threat, and have undoubtedly given rise to them.

### C. FIGHTING

A remarkable feature is the way in which baboons join in fights once they have begun. Group fighting always starts with a quarrel between two baboons. In the following battle one of the baboons is defeated and screams vociferously. This screaming is the signal for a sympathetic baboon nearby to join in. In nature this is usually a mature male. ZUCKERMAN (1932) has admirably described what now happens among captive baboons. The newcomer always takes the part of the defeated baboon and soon the winner becomes defeated. This is the signal for more baboons to join in but this time on the opposite

side. Thus the battle increases with baboons alternately joining one or the other side depending on the momentary luck of the battle.

In nature a battle such as that described by ZUCKERMAN seems to be very rare. What usually happens is that the interfering male chases the victorious party. Both baboons soon get tired, and part, and nothing further happens. Fights always draw the attention of other baboons who watch them with the greatest interest.

The habit of coming to the rescue of a defeated individual seems biologically important, because the interference usually prevents the victor from doing serious harm to the defeated party.

Joe and Jenny, in spite of their youth, had this instinct for coming to the rescue highly developed at the time I got them. When, a few days after their arrival, I wanted to put a strap on Joe, he screamed with terror and struggled all he could. This upset Jenny who broke out of her cage, and soon I was struggling with two screaming, biting, baboons. Some time later, when I had to rescue Jenny who had tried to escape from her cage, and had got stuck, it was Joe who attacked. Luckily it is a comparatively rare event for me to be attacked by Joe and Jenny together, but if one of the baboons takes fright at something and screams, it may lead to attack by the other baboon. For a long time the scuffle often began with one baboon pinching the other from behind in play or out of jealousy. The hurt baboon then thought I was the culprit and screamed with fear and anger. The actual culprit, seeing the frightened companion looking straight at me, would then turn its attention to me and attack, preferably from behind. The best thing to do in such circumstances is to ignore both animals and continue one's work, preferably with one's back to the wall! Under no circumstances can one afford to give the impression of being the cause of the commotion.

Very interesting were two occasions when Joe attacked due to a minor misunderstanding and Jenny came to my rescue. A similarly interesting case is described by FELCE (1948). On that occasion an escaped chimpanzee came to the "rescue" of a young zoo-keeper who screamed with fright when he met the animal in a passage behind the cages.

#### D. AUTHORITY

Respect for authority is undoubtedly one of the main factors that holds a troop together. Association with an individual having greater strength and therefore authority leads to a feeling of security even if the authority should prove to be that of a tyrant. All that is necessary is for the weaker individual within the troop to keep out of the tyrant's way and there is no feeling of danger from outside; in cases of danger the tyrant offers protection. This also is probably the reason why the old and weak hang on to the troop.

My experience with Joe and Jenny is that, should they attack, the only thing to do is to counter attack and if necessary give them a good beating or at least a good fright. The latter is usually sufficient. Jenny, who previously was prone to aggressiveness, became much more attached to me after I had once, in course of such an argument, dealt her a severe blow. She has been very devoted to me ever since, but from time to time I still have to assert my authority.

#### E. RETREATING BEHAVIOUR (Fig. 7 & 8)

The retreating behaviour is in its emotional motivation directly opposed

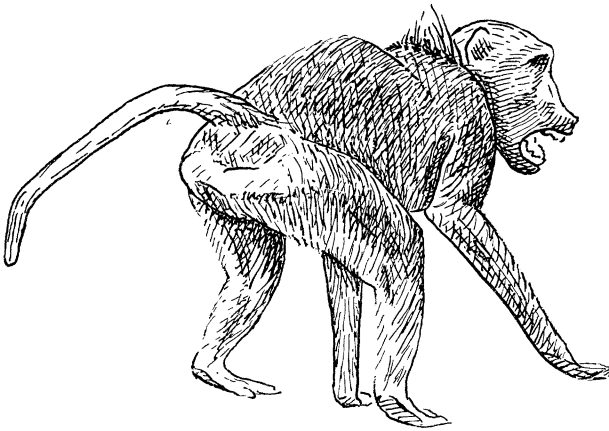


Fig. 7. Submissive posture expressing horror.

to the aggressive behaviour and shows consequently the directly opposite reactions. The animal usually turns its side towards its opponent, presenting its hindquarters and watching its superior with evasive glances towards the side. It never looks straight at its opponent. Head and shoulders are lowered, eyebrows lifted, ears laid back and hair kept smooth. This behaviour, which may end with the animal taking flight, or crouching on the ground if escape is impossible, gives the impression of its attempting to reduce its own size and make itself invisible. While crouching the hindquarters are often held higher than head and shoulders and turned towards the opponent.

#### F. YAWNING AND SCRATCHING (Fig. 9 & 10)

These types of behaviour were often observed in males in the wild state when sitting on guard or watching other baboons. Curiously enough I have never seen Joe and Jenny yawn.

DARWIN (1872) and ZUCKERMAN (1932) consider yawning as a threat. When in the Kruger National Park I was sitting on the ground surrounded by scores of baboons, I often tried yawning to see its effect. Frequently this



Fig. 8. Submissive posture while stealing.



Fig. 9. Yawning.

action caused the nearest baboons to move further away. In spite of this, however, I cannot fully subscribe to the views of DARWIN and ZUCKERMAN. Yawning and scratching are primary displacement activities expressing anxiety. This anxiety is naturally understood by other baboons and no doubt

the exposure of the magnificent dentures of a superior male appears frightening to an inferior individual! It is therefore correct to say that it may act as a warning but certainly not as a deliberate threat.

#### G. RUBBING OF FOOD

Rubbing of food against the ground or against the forearm before stuffing it into the mouth, is a type of behaviour frequently displayed by eating baboons. The reason for this behaviour is obscure. It looks as if the animal



Fig. 10. Displacement scratching.

tries to clean the food. The reaction can sometimes be excited in Joe and Jenny, by bringing strangers or other animals to their cage at feeding time, or by giving them plenty of articles of attractive food, so that sudden choosing is imposed upon them. In the latter case they may pick up one bit of food after the other, rub it and put it down again. It is possible that this behaviour indicates, or at least can indicate anxiety.

#### H. SEXUAL BEHAVIOUR

a. *The female in oestrus.* During the period of oestrus the females often become somewhat short tempered and the males pay them greater attention. This naturally places them higher in the hierarchy. Often males allow such females to eat in their company before they permit any other females or youngsters to approach.

The relationship between males and a female in oestrus vary greatly. If there is a shortage of females in oestrus, a male may take full possession of such a female and follow her wherever she goes. The female too, may be attracted to a certain male and I have on very few occasions observed a female in oestrus follow a certain male over a period of up to a couple of hours. Sometimes, however, there is no bond developed between a male and a female in oestrus and the female can then be passed on from male to male, each of which covers her in turn. A similar communal sexual relationship exists in howler monkeys (CARPENTER, 1934).

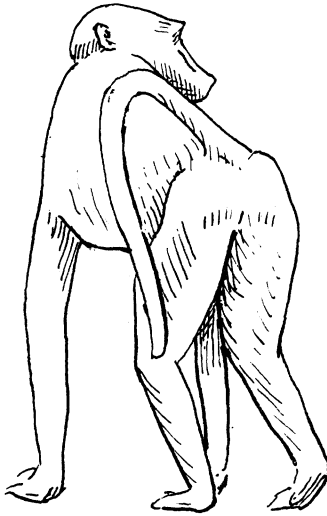


Fig. 11. Presenting.

The red swollen genitalia of a female in oestrus usually attracts the attention of other females and youngsters who may examine her genitalia with fingers, nose and tongue.

As is also the case in other mammals, the female in oestrus may occasionally exhibit male behaviour and mount another female in male fashion. The behaviour is similar to that of a mounting male.

b. *Mating behaviour.* Mating is always initiated by the female stopping in front of a male, usually after he has been following close behind her for some time. The female usually lifts her tail slightly and bends it to one side, thereby making her anal-genital region more visible and accessible to the male. While presenting this way she looks over her shoulder towards the male and smacks her lips (Fig. 11).



The male now approaches the female while smacking his lips vigorously. He then stands half upright on his hindlegs, grips the pelvic region of the female with both hands and mounts. If the female is so tall that he cannot reach, he will climb her calves and stand there during the act of copulation. While the act lasts, the lipsmacking becomes more and more vigorous until the teeth become completely bared and slightly parted. At this stage the animals grunt quickly with increasing strength. After parting the female's grunts usually merge into a short intermittent roar. Often she becomes greatly agitated and circles on the spot as if in great pain.

c. *Masturbation*. Males without females are often seen seeking sexual satisfaction by playing with their erected peni. An old sexually starved male was seen in the Kruger National Park to perform onanism. The ejaculation was subsequently picked up and the fingers licked.

d. *Inverse sexual behaviour and homosexuality*. These types of behaviour are very common among both captive and wild baboons. At an age of eleven months Jenny, who was playing with a Pekingese puppy, who she loved and mothered, once showed the reaction of mounting the puppy in male fashion, performing rhythmic movements of the pelvis.

To what extent Joe's presenting is to be regarded as pseudo-female behaviour is uncertain, but homosexual behaviour among juvenile and young male and female baboons is seen also in the wild stage. ZUCKERMAN (1932) has given an elaborate description of this phenomenon in baboons.

Also females in oestrus may exhibit inverse sexual behaviour.

e. *Presenting*. This action has been described in detail under mating behaviour. It can be exhibited by males as well as by females, but in nature it is a comparatively rare action by males. Usually females present when passing in front of a male. It may or may not be accompanied by lipsmacking. Sometimes the male stretches out a hand and touches the female's hind-quarters. Presenting to young ones even when on their mother's lap, has been noticed on some occasions. It also forms part of the posture of an animal when frightened or threatened by a superior individual.

f. *Lip smacking*. Lipsmacking is a complicated type of action during which the lips are moved, rapidly exposing and covering the teeth in a quick succession, while the tongue is moved in and out. These movements produce an audible smacking sound. It is also known from other old-world monkeys. In all monkeys it is a friendly gesture, probably with a sexual background. It preceeds copulation and lasts throughout the act. Joe and Jenny have displayed this behaviour from their infancy when I approach their cage. As



Jenny's presenting to me decreased, almost disappearing before the age of two, lipsmacking also decreased to a corresponding degree. It is, however, maintained when she grooms me. Joe, on the other hand, has increased his presenting and lipsmacking when he sees me.

On visiting other captive baboons and monkeys I have tried to imitate this lipsmacking and have frequently succeeded in persuading the animals to present to me. Most convincing was the instance when I came across a young mature blue vervet monkey (*Cercopithecus aethiops*), at the Medical School. On my arrival the monkey, who was in solitary confinement, was in a rage. The African keepers were unable to approach it without its screaming and threatening them. When I performed my version of lipsmacking it suddenly changed its attitude, and approached the wire separating us, in a state of great excitement. It grasped my fingers and hand with all its force and made efforts to rub its erected highly-coloured penis against my arm. Soon it also began to lick and groom my hand. A similar but less pronounced friendly attitude was demonstrated by two monkeys of the same type in a neighbouring cage. Other monkeys in the collection merely calmed down in response to my lipsmacking approach.

In contrast with these observations are those made in the Kruger National Park. On no occasion did I elicit any friendly response to my lipsmacking.

#### I. GROOMING

Grooming is a behaviour that is difficult to explain. It is a definite female behaviour. Out of 80 cases of grooming noted it was found that in 27 cases a female groomed a female, in 33 cases a female groomed a male and in only 7 cases did a male groom a female. In 6 of the cases in which a male groomed a female, it was done briefly in an absentminded way. Of the remaining 13 cases of grooming, 5 were females grooming youngsters, 4 youngsters grooming females, and 3 youngsters grooming youngsters and 1 female grooming herself. There seemed to be a tendency for younger females to groom the older females longer and more frequently than the other way round.

Grooming is often initiated by the one individual presenting to the other. Particularly evolved and rigid is the ceremony linked with the grooming of an adult male. This ceremony is initiated by the female which presents. Often the presenting is accompanied by lipsmacking by either or both parties. The male stretches out his hand towards the female's hindquarters, thereby indicating the wish for a closer contact. Then he strokes her sacral and genital regions. Usually he does not groom properly, rather caresses the area around her tail and her genitalia in a manner that appears absentminded.

The caressing never lasts for more than a minute or so, after which he indicates by his movements that he wants her to groom him and the place he wishes her to groom. At intervals of 15 to 20 minutes he takes over for a very short while but he seems to concentrate very little on what he is doing. The whole process may last for about an hour.

Grooming is well known from all monkeys but there are only few records of grooming among wild species of *Cercopithecus* (HADDOW, 1952 and BUXTON, 1952). I have once observed a chimpanzee male grooming its owner. The work has performed in the same absentminded way in which Joe grooms me. A pair of ringtailed lemurs (*Lemur catta*) I have at my home hardly ever groom one another, although the mother grooms and handles her baby exactly in the same manner as a monkey would do.

### J. ELEMENTS OF EXPRESSION

The various types of behaviour described contain in them elements of which the underlying motivation is understood by other baboons. Thus they act as a mimical, and to some extent audible means of communicating emotions and intentions. The types of behaviour described have been straightforward and the various postural elements to which the attention has already been drawn in the descriptions are the following: —

#### a. Aggressive behaviour.

Stiff, abrupt movements (threat with intention of jumping at opponent).

Glance directed steadily towards opponent (threat).

Head high and body lifted high on stretched arms (threat, defiance).

Rubbing ground or stamping with hands (threat with intention of grasping opponent and rubbing him against the ground).

Snarling (threat with the intention of biting).

Barking (threat to distant enemy).

Growling and roaring during fight (anger with threat of biting).

Hairs on shoulder and back raised (anger without threat of definite action).

#### b. Expression of emotion without impulse to action.

Grunting (anxiety).

Yawning, scratching (anxiety in males — displacement action).

Coughing shout or coughing screech (happy anxiety and anticipation, laughter).

Sharp screech (great anxiety, fear).

c. Submissive behaviour (Fig. 12).

Smooth sideways evasive movements (fear).

Lowering of body and head, limbs bent (fear).

Hair and ears back, eyebrows lifted (fear, anxiety or friendliness).

Teeth bared (fear, anxiety or friendliness).

Glance evasive, shifting (fear and anxiety).

Presenting (friendly, inviting, offering service to the other in form of mating and grooming. — It is of sexual origin).

Lipsmacking (friendly, inviting).

Screech (fear).



Fig. 12. Young male; happy, submissive, emitting quick grunts and making movements of lips approaching lipsmacking.

#### K. EXPRESSION OF CONFLICTING IMPULSES AND EMOTIONS

More often than not the behaviour shows signs of antagonistic impulses. On such occasions the elements listed can be combined in various ways thus expressing the conflicting emotions. A few examples will be sufficient to illustrate this.

Example 1. Joe one day became upset and began to screech. As I took no notice he walked past me, stopped with his side half turned towards me and presented. His ears were laid back, his eyebrows lifted, and his arms slightly bent so that his anterior part was lowered. He looked at me over his shoulder rather evasively. All these reactions were submissive, showing fear and asking for peace (the presenting) but his canines were bared into snarling which was a threat. Translated into English it means: "I am scared and ask for peace, but if you touch me I will bite".

Example 2. An aggressive female came to the rubbish heap to eat where other females were eating. They all got up and ran away. One female, however, hesitated. She stopped for a moment with her side towards her opponent and looked at her evasively. These

features were signs of fear, but the hairs on her shoulders were raised showing anger. In English it means: "I am scared but furious". The raised hair, however, can hardly be considered a proper threat and as always happens in cases like this, the inferior female ran away.

Example 3. A young baboon gets upset by something done by another youngster. It screeches with all teeth bared and eyebrows lifted, its fore-quarters are lowered. All this is sign of fear. However, it faces its opponent and looks straight at him and rubs the ground jerkingly, with the outstretched hands. These actions are aggressive. In English it means — "I am scared but may attack. I would like to rub the ground with you".

#### L. PARENTAL BEHAVIOUR

Unfortunately I have never seen baboons giving birth, but the various descriptions I have had from natives have agreed very well with one another. According to these the birth usually takes place under a bush while other baboons sit around watching with interest. A similar behaviour by howler monkeys is described by CARPENTER (1934).

The female baboon is very much concerned with her baby, until it is weaned, which is at an age of about 6-8 weeks. She grooms it, examines its genitalia and carries it with her wherever she goes. Early on it hangs under her body, but at the time it begins to walk it ventures up on her back, usually riding behind her hips supported by its mother's tail.

At the beginning the mother does not allow her child to stray very far from her. If the mother wants to walk away she grasps her young one with her hand and holds it against her body so that it can sense and grip her fur. Several observers have emphasized to me the way in which a mother baboon sometimes punishes her child by smacking it when it misbehaves. I have only once observed this behaviour, but on that occasion it was an old male who had adopted a ca. 2 month old baby, and not a female, who did the smacking. The youngster was approaching an unusually disagreeable supreme male when its foster-father grabbed it with his left hand and holding it under its body, he dealt it a gentle blow with his right hand. The baby, however, did not seem to understand the reason for the punishment and proceeded once more towards the supreme male. This caused the foster-father to pick up the baby and carry it away behind a bush some twenty feet away.

Females are often very interested in each others' babies and like to finger them and play gently with them. Usually, however, the mother refuses to allow other females to pick up the baby until it can walk. Often the babies are greeted with lipsmacking and sometimes even with presenting. Young baboons show a similar interest in the babies and as soon as the mother allows it they like to carry the baby about under their body or riding on their

back. How far there is a difference in the behaviour of young males and females on this point, is difficult to decide owing to the difficulty in determining the sex of the animals when observed from the distance. When Joe and Jenny were given to me it was interesting to see how the six months old Jenny had completely taken the role of Joe's mother. She carried him under her body when let out of the cage, and never allowed me to touch him. When I attempted to do so, she grasped and held him in her arm with her back towards me. He was never allowed to stray far from her and she always tried to intervene between us, usually pushing him away from me. On the other hand, she did not share her food with him, and he ate only what she could not lay hands on. Towards kittens and puppies Jenny showed a similar behaviour as towards Joe. She would hold them in her arms, nurse them and groom them.

The attitude of the males varies considerably. Some males are completely intolerant towards youngsters, others show them the greatest interest. One old supreme male permitted a five to six months old youngster to worry his tail. When he could suffer it no longer, he got up and walked a few steps away. Another supreme male near Skukusa was always surrounded by playing youngsters and sometimes he played gently with them, using one hand only. In two troops I observed, there was an old male — the second in the hierarchy in both cases — who had adopted a 2 and 4 month old baby respectively, mothered and protected it very efficiently although perhaps clumsily, thereby frequently causing the baby to scream. On the other hand in case of danger, both babies sought immediate protection from their respective foster-fathers. This resembles the behaviour of howler monkeys observed by CARPENTER (1934).

ZUCKERMAN (1932) mentions that males and females greet youngsters with lipsmacking. In the Kruger National Park lipsmacking was performed by any baboon making a friendly approach to another baboon, whether baby or adult, but it seemed more pronounced when the approach was to a baby on its mother's lap.

#### M. THE YOUNG BABOON'S ATTITUDE TO ITS GUARDIAN

ZUCKERMAN (1932) mentions that very young baboons have the inborn instinct to cling to a soft and particularly a hairy object. On various occasions I have seen private people or keepers carry very young baboons attached to their clothes in a similar way. If a very young baboon on its wanderings gets frightened, it immediately seeks protection from its guardian to whom it clings. It was astounding to see how Joe always sought protection from the

two months older Jenny; it was almost impossible to separate them. This attitude lasted for a long time but gradually diminished. A reminiscence of it still remains at the time this is written. At the age of more than  $2\frac{1}{2}$  years, every night Joe and Jenny huddle together in the corner of their cage where they sleep. Joe always holds his arms under Jenny's armpits, as he did when a baby. She holds her arms around him in the old protecting manner. Embracing one another in this fashion they spend the night on the cement floor without ever catching cold. Now at an age of  $2\frac{1}{2}$  years Joe sometimes comes to me for protection.

Huddling is an attitude often seen in nature as well as in zoos. Apparently the young animals find comfort in the company of the other and give warmth to one another.

#### N. PLAY

Play, as in all animals, is predominantly displayed by the young. It consists of pulling each other's fur or tail, chasing one another, biting, threatening, handstands, somersaults, falling, rolling over, jumping, *etc.* All these actions are performed with numerous variations and combinations and, to the onlooker, are a most entertaining spectacle.

##### a. Biting (Fig. 13).

As in dogs and cats, fighting and biting is an important feature at the play.

Joe and Jenny, particularly Joe, have displayed various types of bite, varying according to mood.

i. Sucking bite — has much in common with the babies playing with the teat. The tongue plays simultaneously with the object. It apparently signifies affection. This type of bite disappeared after the age of fifteen months was reached, although it probably remains as a component of bites during play.

ii. Investigating bite is firmer and has the aim of testing an object.

iii. Breaking bite, tearing or chewing. The teeth are used here as definite tools.

iv. Aggressive bites aim at hurting and intimidating an opponent.

In play bites of all these types occur. Usually these variants are balanced and checked by the animal itself; but, when playing with a baboon, the shifting predominance of the variants, depending on the resistance offered and the mood of the animal, can be noticed.

##### b. Teasing.

A special type of play consists of teasing with the intention of irritating

the other party. This other party may be another baboon or another animal altogether. Thus I have seen wild baboons amusing themselves by teasing both lions and kudu.

c. Juvenile play-copulation and pseudo-copulation.

The behaviour displayed by the adult during copulation is exhibited by juveniles in exactly the same form. Joe copulated with Jenny at the age of



Fig. 13. Play bite.

nine months. This observation confirms that of ZUCKERMAN who points out the amazing fact that the whole sexual behaviour pattern is completely developed years before it is required for purpose of propagation.

Pseudo-copulation is frequently displayed by Joe and was first noticed when Joe was five and a half months old. It consists in his rubbing his erect penis against my hand. Often he grasps my hand and draws it onto his penis. Play copulation under various forms is sometimes observed. On rare occasions I have seen Jenny on her back while Joe was standing over her in inverse position performing the rhythmical copulatory movements with his pelvis over her face. Both animals held on to the hindquarters of the other.



## O. POSSESSIVE BEHAVIOUR

Any object can be of value to a baboon. It may be a stone, a piece of paper, a kitten or a young baboon. The value depends upon the interest the object creates among other baboons. If another baboon attempts in any way to deprive the possessor of the object, it is defended with vigour; if possession is not disputed the object will soon be dropped and forgotten. Much of the apparent parental behaviour shown by young male and female baboons may be possessive rather than parental behaviour.

Jealousy is a type of possessive behaviour. A baboon can fly into a rage if the attention of a beloved comrade, female, human or other animal is distracted by another individual. Joe and Jenny can scream with anger if I pay too much attention to *e.g.* a dog; and it is always the dog, not myself that they threaten.

## P. FOOD

Baboons are predominantly vegetarian. They eat all sorts of fruit, fresh green leaves and roots. They also eat birds' eggs, insects and other anthropoda.

For many years farmers and rangers have claimed that baboons could turn carnivorous but it is not until during the last few years that this behaviour has been recorded by various amateur photographers (DART 1957). I am informed by Professor RAYMOND DART, that in one film several baboons can be seen participating in the eating of a buck.

I have, however, found that Joe and Jenny refuse to eat meat. The damage caused by baboons can be considerable, particularly because of their wasteful way of eating. If food is plentiful they never finish eating one thing before starting another. In a mealie (maize) field or in an orchard, this naturally leads to crop damage out of proportion to what is actually eaten.

The damage to birds' nests caused by baboons is said to be considerable. Col. ROWLAND JONES, Senior Ranger in Kruger National Park, has given me his opinion that the bird life in the Reserve has been reduced as a result of the activities of the baboons.

It is a general belief that baboons eat scorpions. I have on several occasions given small scorpions to my baboons. They grasp them in the same way as insects with their whole hand and stuff them into their mouths. It all happens so quickly that the scorpion has only a small chance of stinging. I have never seen Joe or Jenny remove the sting from the scorpion before eating it — as farmers often allege that wild baboons do. If wild baboons remove the sting, it is an acquired and not an innate action.



## Q. TURNING OF STONES

Among wild baboons the turning of stones in search of insects is a common activity. Joe and Jenny did the same when they were free in the garden two months after they had been given to me. Since they were both captured early in life it seems probable that the search for food under stones is an innate activity.

## R. RELATIONSHIP TO OTHER ANIMALS

It has already been mentioned that baboons eat insects, scorpions, birds and birds' eggs and that they occasionally become predaceous. There are, however, other aspects deserving mention, for instance, their reactions to other creatures, *e.g.* snakes, and their tendency to tease smaller or bigger animals.

## a. S n a k e s.

Baboons have an instinctive horror of snakes or anything that moves or wriggles like a snake. Ever since I got them Joe and Jenny have had a horror of large millipedes and live snakes. Even dead snakes are treated with suspicion. As it is almost out of the question that Joe and Jenny have had any experience with snakes in the wild, one is justified in concluding that the fear of snakes is innate — SCHILLER (1952) found a similar innate fear in the chimpanzee which seemed to increase with the age of the animal. It seems to be the oblong cylindrical body combined with bending wriggling movements which frightens them.

## b. Relationship to other animals outside and inside the troop.

Baboons and in particular young baboons, are extremely mischievous and seem to take great pleasure in irritating others. When on rare occasions, they are out in the garden, Joe and Jenny love frightening the chickens and they tease the dogs by pulling their tails and jumping on their backs. When younger they could ride on our bigger dog, which did not object.

In nature it is comparatively rare to see baboons taking much notice of animals which do not normally serve as food. In the Kruger National Park it was a common feature that guinea fowls, impala, bushbok, blue duiker and baboons fed together without taking any notice of one another. On a few occasions, however, I have seen baboons tease bigger animals — on one a young female kudu, and on two others, lions. In the case of the kudu, a bush obstructed my view but, as far as I could see only young baboons participated. The game only consisted in lashing out with the hands at the kudu's legs, the result being that the poor animal which was completely surrounded, performed the most peculiar jumps on the spot, unable to escape either in one direction or another.

When I watched lions being teased there was a great commotion on each occasion, but in one case only was it possible to follow the procedure in detail. As no notes were made on the spot the following description is based on my recollection of what took place in September 1953 when I visited the Park in the company of Mr D. DAVIS and Dr N. TINBERGEN.

The setting for the spectacle was the northern slope of the Manung hill near Pretoriuskop in the Kruger National Park. On this side of the hill is a great area of bare granite without vegetation. As there are very few cracks or ledges in the rock it can only be frequented by the most sure-footed animals. Thanks to the rather low, although dense bush, that surrounds this slope, it is possible to get a perfect view of any animal that may settle on it.

This particular evening the baboons had arrived at their usual sleeping-quarters and found them occupied by a pride of seven lions — an old black-maned male, his two lionesses and four young but almost fully grown lions. The old male and his females rested near the top of the hill on soft ground while the younger lions were climbing the rocky face below them. On our arrival the scene was already one of disturbance. The lions were surrounded by screaming baboons on all sides. The old lions apparently accustomed to the baboons, took no notice of their sham attacks. The younger lions, however, were upset and nervy. I concentrated my attention particularly on a fine young lion standing on a narrow ledge with baboons above and below. I saw him bare his teeth and threaten each time a baboon came too close. What most of all amused our party was the way in which the baboons repeatedly crept up from behind threatening (but without ever doing so) to pull the lions' tails. The young two to three year old baboons especially were very aggressive but it was apparent that their activities were checked by the older baboons. Each time a young baboon came too close to a lion, it was chased away by one of a group of older ones whose activities resembled nothing so much as that of the police checking the younger and more irresponsible elements. Unfortunately, we never saw the end of the game as the setting sun made it necessary for us to return to the camp.

The outstanding aspect of this spectacle was that a number of older baboons kept the younger baboons out of danger. One older male in particular was active in this respect. This observation seems to contradict ZUCKERMAN (1932) who denies the altruistic feeling among monkeys which according to him — “have no real apprehension of the social situations of which they themselves form a part”. He suggests that baboons do not apprehend other individuals as something alive or dead; the rescue response has, in his opinion, the character of a reflex. Among the howler monkeys CARPENTER (1934) has described a similar cooperative intervention when juveniles are in danger.

## SUMMARY

i. In this paper an attempt has been made to describe the behaviour of the Chacma, and to make an analysis thereof. The observations were made on two young captive baboons, Joe and Jenny, as well as on wild ones.

ii. There is a hierarchical organisation of the troop which mainly shows itself in feeding and mating. Among the females the hierarchical order is less obvious than among the males. It seems as if females in oestrus are of higher rank than those in anoestrus. The male-female association is often very casual and the formation of permanent family groups are rather the exception than the rule. Idle males act as sentinels.

iii. A. All sounds emitted express emotion. Various sounds and their emotional motivations are described.

B. In the typical threat posture the animal stands facing the opponent with lifted head, stiff arms and hairs on shoulder and back raised. It looks straight at the opponent. Often it snarls and its movements are rigid and jerking. It may rub the ground with its hand or stamp with it. It then suddenly darts forward in attack.

C. The opponent is pursued and, if caught up with, is bitten, usually in backhead and shoulder, or, if smaller rubbed against the ground. Other baboons come to the rescue of the defeated individual. In nature this leads to a wild chase. In captivity it may end up in some mass fighting.

D. Baboons have great respect for authority.

E. In the retreating submissive behaviour the animal crouches and moves with its side or tail towards the aggressor. The teeth may be bared in horror and the aggressor is watched evasively over the shoulder while the retreating animal presents its hind-quarters.

F. Yawning and scratching are commonly noticed in sentinels. They are considered as displacement activities, signifying nervous tension.

G. When eating the baboons frequently rub their food against their fore-arm. It may signify nervous tension.

H. Sexual behaviour has given rise to many other activities.

a. Great interest is often shown in females in oestrus, the genitalia of whom are often examined by other females and juveniles.

b. Mating is initiated by lipsmacking and presenting from the female.

c. Masturbation and onanism is common in inferior males without a female.

d. Inverse and homosexual behaviour is common in captivity.

e. Presenting is a friendly and inviting gesture with a sexual origin.

f. Lipsmacking is a very much used friendly and inviting gesture, probably with a sexual origin.

I. Grooming is a typical female activity. It is impossible to explain its significance. The concentration with which the act is performed seems to indicate some physiological background.

J. The various types of behaviour have been analysed and their elements and significance listed.

K. In cases of opposing emotional motivations the elements of behaviour are combined in characteristic ways which are interpreted by the onlooking baboons.

L. Female baboons are usually fond of very young individuals. The mothers usually look very well after their babies during their first few weeks, but the interest gradually fades after the young ones have been weaned and begin to stray about. They show great interest in each others' babies.

The maternal instinct is developed already at an age of six months or less.

The attitude of the male towards the young varies from complete intolerance to great affection. Two cases of males acting as mother substitute are described.

M. The young individual always knows its guardian and seeks its protection in case of danger.

N. In play, the young baboon includes almost all the activities of the adult. Fighting, biting and mating are some of the main features. The various types of bites are described. The play copulation includes the full ritual exhibited by adults during their mating. It is surprising to find that the innate ritual is fully developed in youngsters only a few months of age.

O. Any object can be of value to a baboon. Its value depends on the interest shown in it by other individuals.

P. Baboons are primarily vegetarians, but they love in addition to their diet of insects and probably birds' eggs. Occasionally they turn carnivorous.

Q. Much food is dug up from the ground or collected under stones. The turning of stones is an innate behaviour which is performed at a very young age.

R. Baboons seem to have an innate fear of snakes or other cylindrical bodies which can bend and wriggle.

Towards other animals which do not serve as food they normally show indifference. On occasions however, the juveniles take pleasure in teasing other animals. Cases where kudu and lions were teased are described. In the latter case the mature males attempted to maintain order among the juveniles trying to prevent them from approaching too close. This action seems to indicate that the rescue responses can not be explained as a simple reflectory response.

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## ZUSAMMENFASSUNG

Die Arbeit beschreibt auf Grund von Gefangenschafts- und Freilandbeobachtungen das Verhalten des Chacma-Pavians.

Bei der Nahrungssuche und im Gefangenschaftsverhalten offenbart sich eine Rangordnung, besonders unter den Männchen. Weibchen in Oestrus steigen im Rang. Die Paare sind locker, und Familiengruppen bilden sich selten. Nicht beschäftigte Männchen halten Wache.

Die den Lautäußerungen zugrundeliegenden Erregungen werden analysiert, die verschiedenen Drohhaltungen beschrieben und die ihnen entsprechenden Stimmungslagen analysiert. In der häufigsten Drohhaltung ist der Kopf gehoben, die Armen sind steif und die Schulter- und Rückenhaare gesträubt, während das Tier den Gegner fixiert.

Es knurrt, und seine Bewegungen sind steif und eckig. Es reibt eine Hand über den Boden oder schlägt sie auf den Boden; schliesslich greift es an. Grosse Gegner werden in Kopf- oder Schultergegend gebissen, kleinere am Boden gerieben. Andere Tiere kommen dem besiegteten Tier zu Hilfe. Im Freiland kann das zu einer wilden Jagd führen; in Gefangenschaft kann ein Massenkampf entstehen.

Paviane haben grossen Respekt vor Autorität.

Ein untergeordnetes Tier bewegt sich kriechend, wendet dem Angreifer die Seite oder das Hinterende zu, zeigt die Zähne und schaut über die Schulter zurück.

Die Schildwachen gähnen häufig und recken sich; nahrungssuchende Tiere reiben die Nahrung oft gegen den Vorderarm. Alle diese Bewegungen werden als Übersprungshandlungen gedeutet, die von nervöser Spannung hervorgerufen werden.

Weibchen und Jungtiere interessieren sich lebhaft für paarungsbereite Weibchen, deren Geschlechtsteile sie oft beschnuppern. Die Begattung wird mit Lippenschmatzen eingeleitet; das Weibchen „präsentiert“. Untergeordnete unverpaarte Männchen masturbieren häufig. In Gefangenschaft können Weibchen andere Tiere besteigen; auch homosexuelles Verhalten ist nicht selten. Soziales „Präsentieren“ — eine freundliche Geste — hat einen sexuellen Ursprung. Lippenschmatzen, gleichfalls als ursprünglich sexuell gedeutet, dient oft auch als freundliche soziale Gebärde.

Die Pelzpflege ist eine typische weibliche Betätigung; ihre Bedeutung ist unklar.

Ausdrucksbewegungen können sich verschiedenen Stimmungskombinationen entsprechend verschränken und werden von den Gruppenmitgliedern verstanden.

Alle Weibchen werden gewöhnlich von sehr jungen Tieren angezogen. Sie betreuen die eigenen Jungen am Anfang mit grösster Sorgfalt; diese lässt jedoch bald nach der Entwöhnung nach, wenn die Jungen mehr umherzustreifen beginnen. Mütter interessieren sich lebhaft für fremde Kinder. Schon sechs Monate alte Weibchen zeigen intensive Betreuungsneigungen.

Die Einstellung der Männchen Jungtieren gegenüber variiert von völliger Unduldsamkeit zu väterlicher Liebe. In zwei Fällen betreuten Männchen Kinder wie Mütter. Die Jungtiere kennen ihre Mutter bzw. Stiefmutter persönlich.

Das Spiel der Jungtiere enthält beinahe alle Handlungen der Erwachsenen: Kampf, Beissen, Begattung sind die Hauptbestandteile. Erst einige Monate alte Junge zeigen schon das vollständige Begattungsverhalten.

Der Besitz irgend eines Objektes kann einem Pavian sehr wichtig sein; der Wert hängt vom Interesse der anderen Tiere ab.

Paviane sind vor allem Vegetarier, obwohl sie gerne Insekten und wahrscheinlich Vögeleier hinzunehmen. Manchmal werden sie zu Karnivoren. Nahrung wird ausgegraben oder (angeborenemassen) durch Umdrehen von Steinen gefunden.

Angst vor Schlangen oder anderen zylindrischen und sich schlängelnden Gegenständen scheint angeboren zu sein.

An Tiere ohne Nahrungswert sind sie nicht interessiert; manchmal aber „neckern“ die Jungtiere andere Tiere wie Kudus und Löwen. Im letzteren Fall vertrieben alte Männchen die Jungtiere von den Löwen.