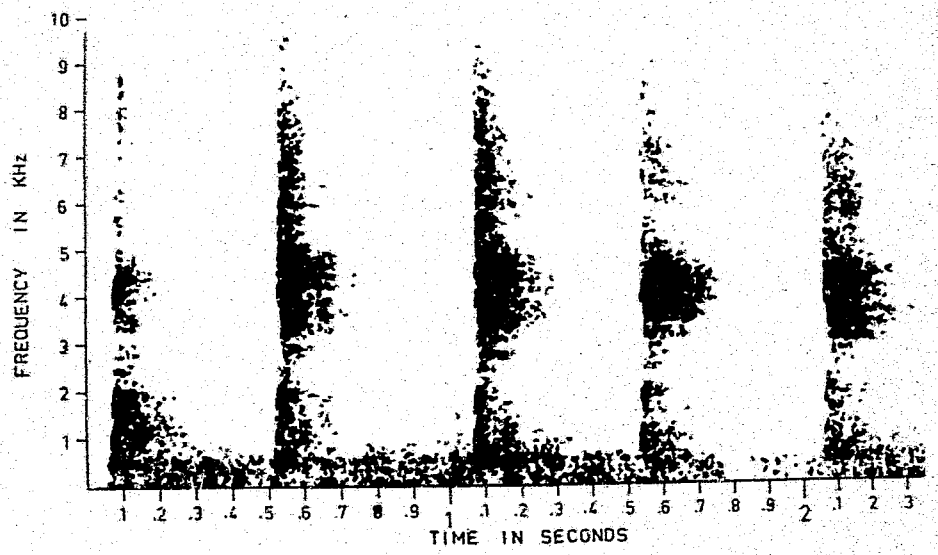
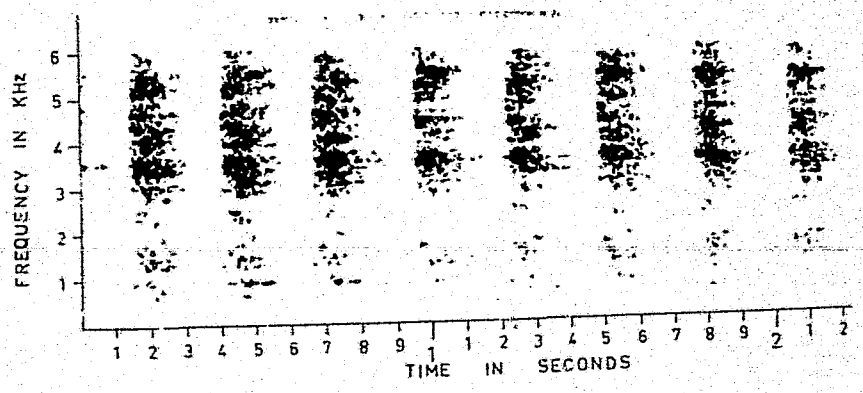
During agonistic encounters the Yap is given by the inferior and may be mixed with units of other calls in very rapidly changing sound sequences. The subordinate animal, in the presence of a strange and dominant animal, tends to spend most or all of the time during the encounter on the floor of the cage frequently giving the Yap. An increase in tempo is heard if the dominant animal approaches or if the subordinate starts to approach an indifferent superior. Yap units may be mixed with units of several other calls such as the Explosive Cough, various whistle-like calls, defensive Grunts and Spit-Grunts during imminent or actual contact with the superior. After chasing bouts the Yap occurs more often in lengthy bouts with only an occasional Whistle or Cough. A male has been heard to utter these calls when chasing an aggressive female in oëstrus and in one case continued to Yap for the first minute of the five-minute mounting session that followed.

The Yap has been given in response to a strange and apparently frightening novel object which the animals will not approach and in response to the presence of a cat and a snake. Animals in other cages may initially flee to nest boxes but may later resume activities. Once aroused these calls are very persistent and the caller may resume Yapping again for no apparent reason even after a very lengthy bout when the voice of the caller has become markedly 'tired.'



a. Loud Yap.



b. Rapid metallic Yap.

PLATE XXX. YAP.

6.5.7 Plaintive Yap and Yap Alarms

This call is similar (to the human ear) to the Yap but has a distinctive plaintive or sobbing quality and is spectrographically distinct from the Yap as the units are mixed showing a basic non-tonal vertical structure but having distinctive horizontal tonal elements. (See Plate XXXI)

Units of this call may be given in a lengthy series but more often occur in short bursts and single units may be given by the inferior mixed with units of the Yap, Cough and Whistle calls.

The Yap alarm call consists of units of Plaintive Yaps that are grouped together in pairs and given in a rapid sequence giving a dedáh dedáh effect (See Plate XXXII) which clearly serves as an alarm call. Animals are completely still during the calling, although towards the end the caller himself may jump around in a nervous manner.

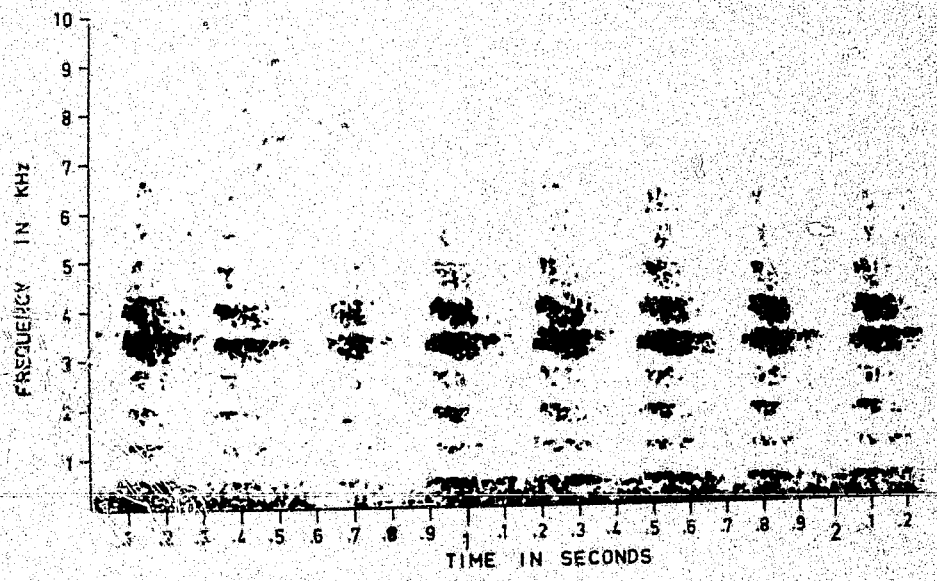
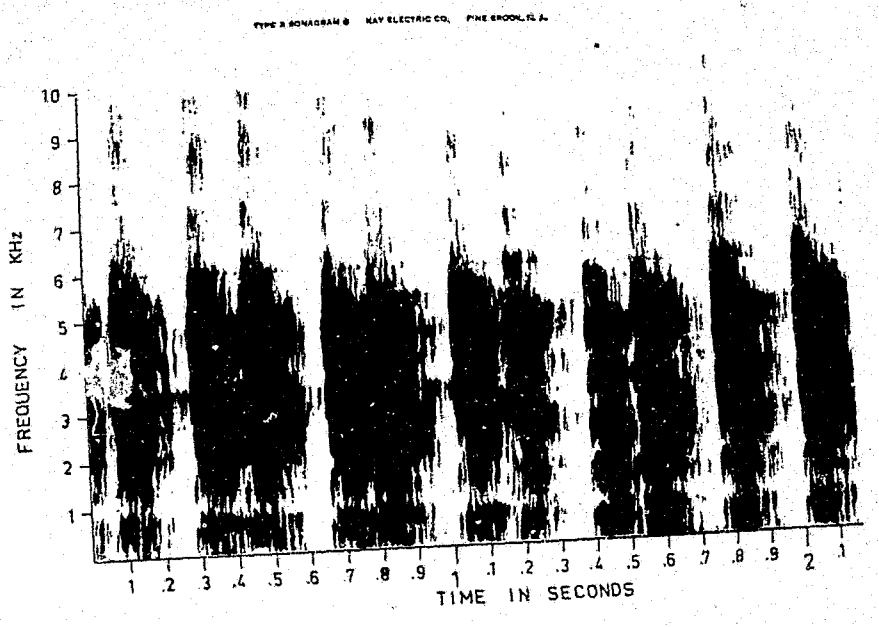
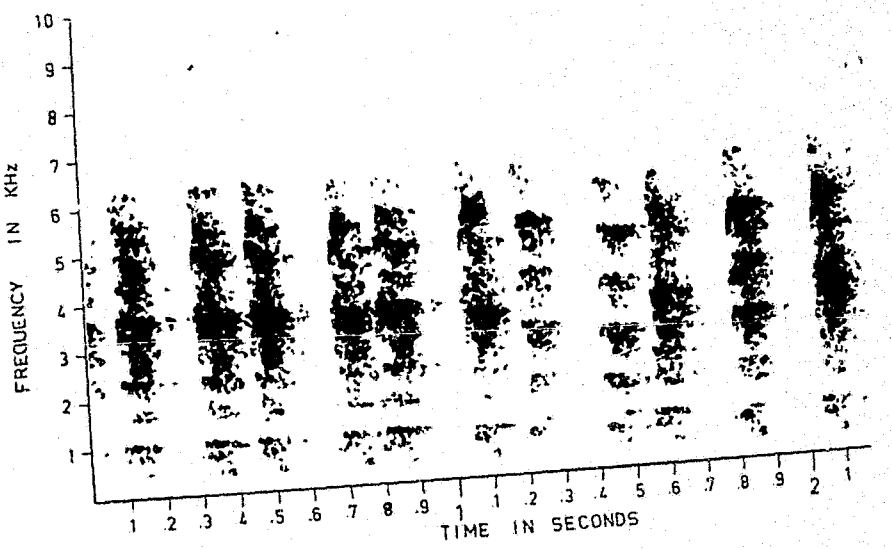


PLATE XXXI. PLAINTIVE YAP.



a. Wide Band.



b. Narrow Band.

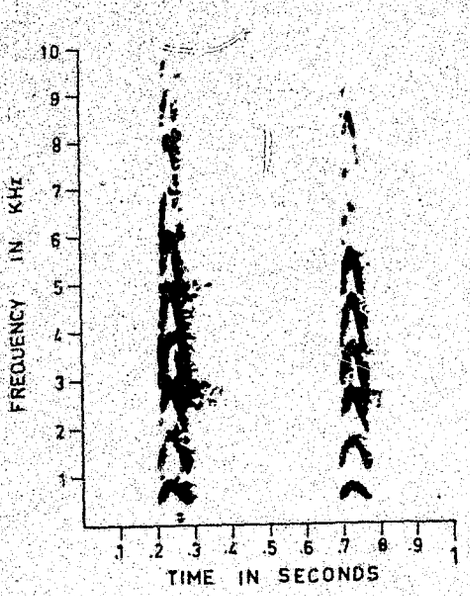
PLATE XXXII. YAP ALARM.

6.5.8 Wuff

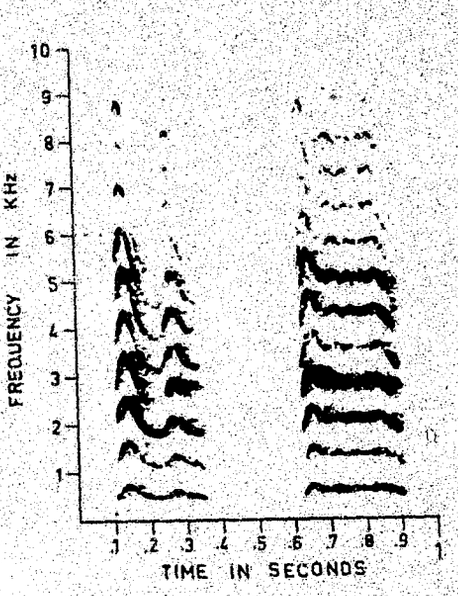
Units of this tonal call have a chevron shaped fundamental and horizontal non-tonal prolongations and energy reaching from 1 - 8 KHz. (See Plate XXXIII fig. a)

Units are generally given singly or in a short series of three or four with a varying time interval between them. Occasionally they may be given so rapidly that two units become fused into a double unit. (See Plate XXXIII fig. b.)

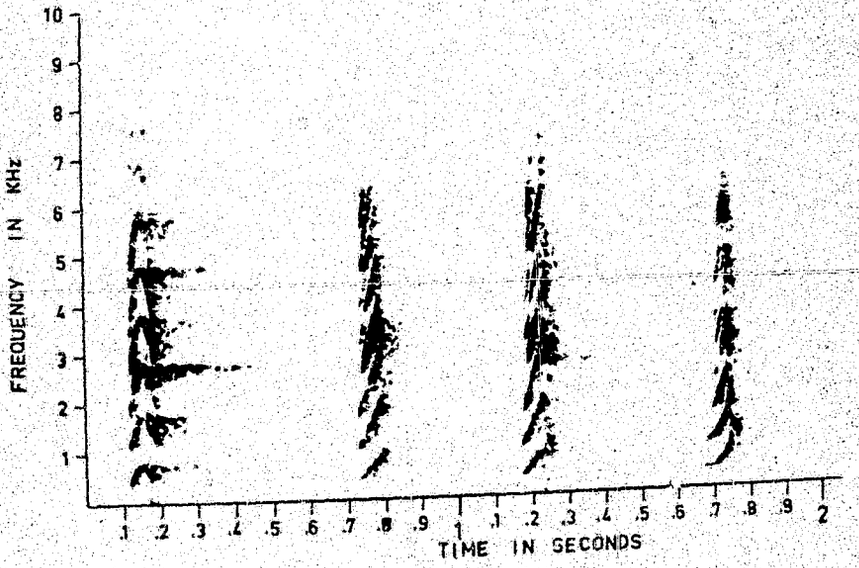
Units of this call may be heard mixed with units of Wails and Yaps and have been heard on two occasions in a lengthy series accompanying another animal which was uttering Wails. Units of this call are also frequently associated with units of a variant that shows an ascending limb only. (See Plate XXXIII fig. c) Wuffs are given in alarm situations and have a warning function.



a. Wuff.



b. Double Wuff unit.



c. Wuff and Wuff variant.

PLATE XXXIII. WUFF.

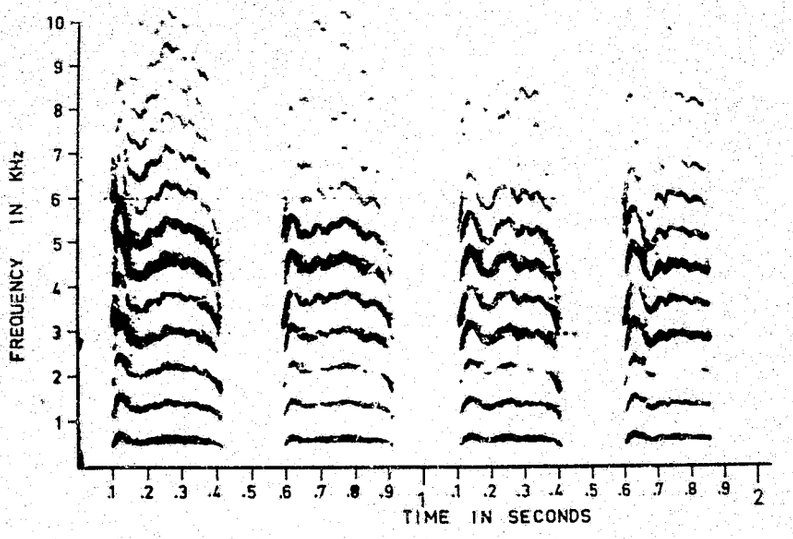
6.5.9 Wail

This call consists of units that start with a 'wuff' element which continues horizontally showing small rapid undulations in pitch and dropping in pitch as the unit ends. The main formants lie between 3 and 6 KHz and harmonics may range up to 11 KHz. (See Plate XXXIV). This call may be given in relatively slow bouts where the individual units may last up to 0.4 sec. in length having a time interval of 0.2 - 0.4 sec. duration. On the other hand they may be given in a very rapid series where the Wuff element is not well defined and the units may blur together. (Sound spectrographs show a great deal of masking non-tonal elements but due to the conditions under which they were obtained it remains uncertain whether this is normally part of the call, or whether this is an artefact introduced by echo.) The rapid bouts of Wails may be preceded by three or four notes rising in pitch. (See Plate XXXIV fig. c)

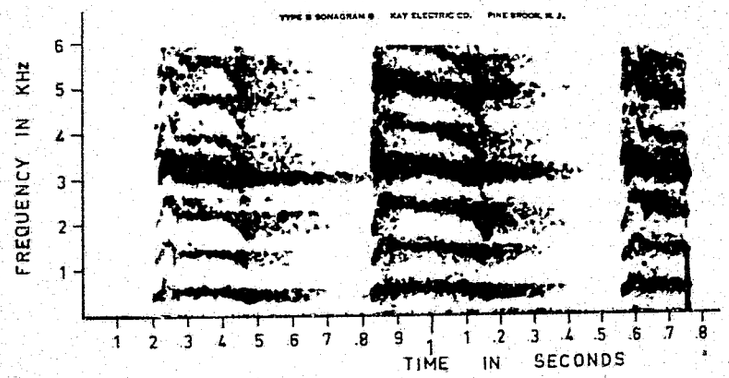
These calls are given during high intensity alarm situations and are rarely heard under laboratory conditions. They are, together with Caws, the loudest in the repertoire and have a very penetrating quality. All other animals, on hearing the start of this call, either freeze on the branches in a crouched posture or if they are close to the nest box quickly jump into it and remain motionless, with the exception of infants who always return to the nest box. The caller holds his body very tensely and may

move the head and front of the body rapidly and jerkily. The ears are held fully extended, the cymba facing forward. The mouth is open during calling. The call may last 5 - 10 mins and occasionally even longer. Units of the Plaintive Yap alarm may occur towards the end of the calling as the intensity of the situation lessens.

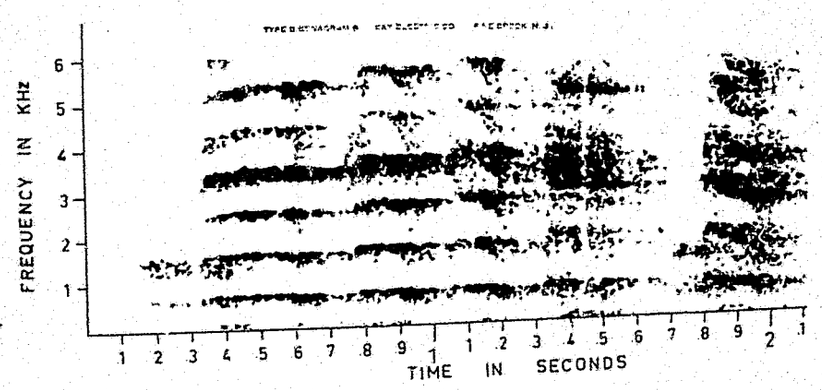
This call is most frequently heard in the laboratory during the breeding season when the males become increasingly nervous and give this call in response to stimuli that do not elicit this call at other times. Females utter Wails very rarely, while juveniles and infants have not given this call and tend to utter the Plaintive Yap alarm in high intensity alarm situations.



a. Wail units in slow series.



b. Wail.

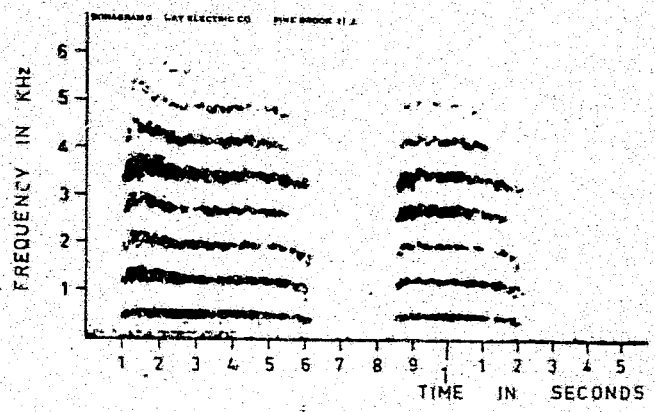


c. Start of Wail (alarm showing 3 notes rising in pitch.

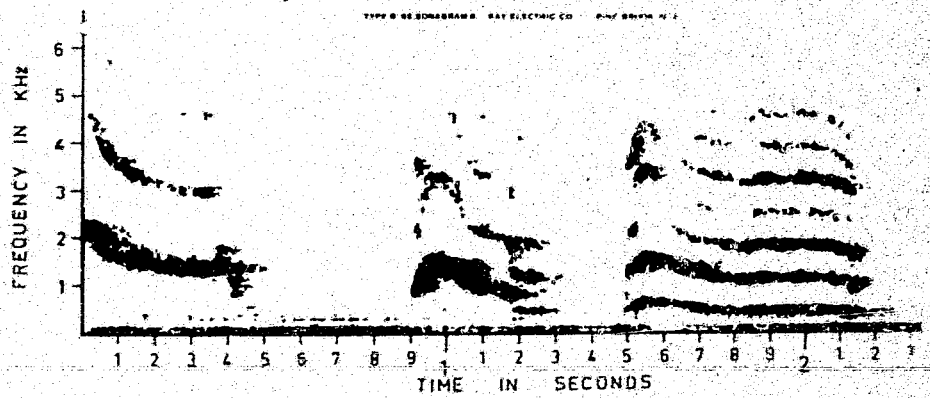
PLATE XXXIV. WAIL.

6.5.10 Caw

Caws are very loud long calls uttered during high intensity alarm situations. They are not often heard under laboratory conditions and have not been recorded from females or juveniles. Caws are given in a slow series with a variable time interval between units which may be mixed with Whistle units. (See Plate XXXV) (All the recorded samples from which spectrographs were made were obtained from one male, J, only, as he utters them the most frequently.)



a. Caw.



b. Caw with Whistle Variants.

PLATE XXXV. CAW.

6.5.11 Discussion

The range of bushbaby alarm calls shows a close correlation with the degree of intensity of the threatening situation. The alarm calls can be arranged on an ascending scale, corresponding to the increase in intensity of the situation as follows:-

Sneezes
Gerwhit/Gewok
Shivering-Stutter
Whistles
Yap
Plaintive Yap
Alarm Yap
Wuffs and Wails
Caws

The Shivering-Stutter is given at higher intensities than those evoking Sneezes and lower than those evoking Whistles, but is difficult to place more accurately as, contrary to the other calls, it is more often heard on its own than mixed with units of other calls. The entire series (starting with Sneezes and rising to Wails but excluding Shivering-Stutter and Caws has been given on a single occasion by a young mature female. This animal was temporarily housed in a mesh cage in a strange room while alterations to the main cages were being made. The lighting source in this room was not directly above the cage but lower and to one

side. Although it was not clear what the frightening stimulus was, it is thought to have been the shadows of animals cast on the opposite wall.

Wuffs, Wails and Caws are not often uttered under laboratory conditions and are generally only heard during the breeding season. In the laboratory, the male becomes very nervous, agitated and highly vocal when a female cage companion comes into oestrus. High intensity calls are easily elicited during these periods by stimuli which do not evoke such high intensity calls during other periods.

Andrew (1963) notes that two types of alarm calls may be found in primates. The first type is very directional and used during mobbing. In the Lesser Bushbaby this call is the Yap. The second type is difficult to locate and is the highest intensity alarm call. The bushbaby apparently gives Wails and Caws under these circumstances.

Struhsaker (1967) has found that the vervet monkey utters different types of calls to indicate different types of potential predators. An attempt to study the reaction of the laboratory animals to potential predators (viz. a cat and a small snake) was unsuccessful and this point remains to be clarified by field observations. (The cat elicited a loud chorus of Whits, Clucks, Whistles and Yaps but a similar reaction was subsequently found to be elicited in naive animals by the mere presence of the glass container in which the cat was presented.)

6.6 CALLS UTTERED BY INFANTS

6.6.1 Click and Crackle (See Plate XXXVI fig. a)

The Click consists of non-tonal units of narrow vertically orientated lines of sound which may occur singly or, in the case of the Crackle, in a series of very rapid clicks. A distinctive facial expression, the Grin, is associated with this call. (See Plate XI fig. b) The abdominal muscles contract sharply as the Click is uttered.

Clicks occur when the infant has lost contact with the mother. They are also uttered when the infant starts losing its grip on a branch and also if it falls to the ground. Clicks and Crackles may also be elicited by strange objects or by the smell of a strange fellow and occasionally may be given prior to jumping.

Clicks are given frequently by the very young infant, but as it gains confidence in climbing and jumping and becomes more independent of its mother, these calls become less common. Juveniles may utter Clicks and Crackles on being placed in a new environment. Adults have not been heard to utter infant-type Clicks and Crackles. (Good sound spectrographs of Clicks and Crackles were difficult to obtain due to bad background noise interference. The narrow columns of sound seen clearly between 6 and 10 KHz represent the Crackle in the Plate XXXVI fig. a.)

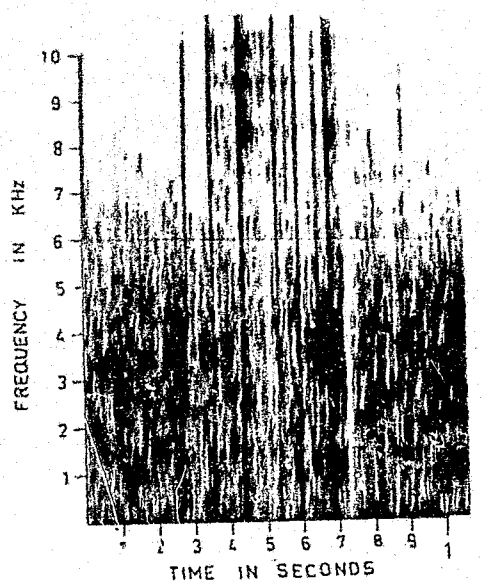
6.6.2 Spit and Spit-Grunt

The infant utters these calls under similar circumstances to those eliciting these calls in adults. One infant uttered Spits 45 minutes after birth when the observer's hand advanced towards it, to pick it up for weighing purposes. The Spit was also accompanied by a small forward jump.

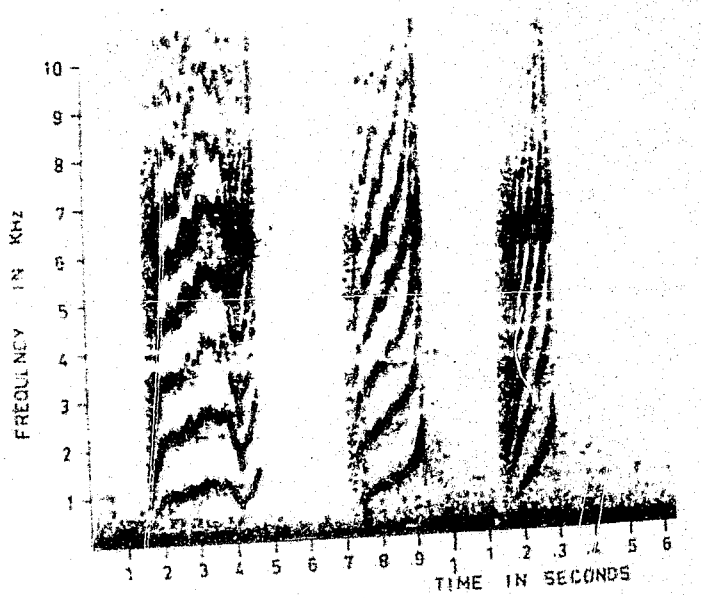
Spit-Grunts frequently occur in infants in response to handling by the observer when the infants are being weighed. They may also be uttered in response to an approach by another infant or juvenile.

6.6.3 Loud Squeaks (See Plate XXXVI fig. b, showing three successive squeaks given by the infant mentioned below)

Loud Squeaks appear to be a high intensity distress call in the infant. One infant of a pair of twins gave these calls at frequent intervals while apparently unsuccessfully attempting to suckle from the mother. The mother did not respond to these calls and the infant subsequently died. (The mother, female C, has a poor maternal record having raised only one out of a total of five infants and it is thought that females would normally respond to these calls.) They have only been recorded in lengthy bouts on one other occasion, viz. Squeaks were uttered by two hand-reared infants when they contracted a gastro-intestinal infection and subsequently died.



a, Crackle.



b, High intensity distress squeake.

PLATE XXXVI. INFANT CALLS.

6.6.4 Soft Squeaks (Nipple notes)

Brief Squeaks are occasionally given by the infant during vigorous grooming of the ano-genital region by the mother and Soft Squeaks have been heard while the infants are under the mother, presumably suckling. (This type of call has been named nipple notes by Grimm, 1967.)

Infants and juveniles are not normally very vocal when left undisturbed in the living cage but when frightened or disturbed, they can utter most of the adult calls. They have not been heard to utter high intensity alarm calls such as the Wuff, Wail and Caw.

6.7 NON-VOCAL AUDITORY SIGNALS

Two non-vocal auditory signals are given by the Lesser Bushbaby in the laboratory but it is uncertain whether or not these would act as signals, in the wild.

The males bite the edges of the ledges making a loud sound. This was heard very frequently when the animals were temporarily housed in mesh cages, where they could see each other. Under these circumstances the biting of the ledges appeared to act as a threat. Animals bite branches, but this does not create a sound thought to be loud enough to be heard at any distance in the wild. The males bite the ledges and branches if these are covered with the urine of other males. It is possible, that, in the mesh cages, the males could smell each other and the biting of the ledges could be a displacement reaction.

The sound the animals make during eating may act as a non-vocal auditory signal. The bushbabies make a very distinctive sound when killing and eating large insects such as locusts or crickets. The head of the insect is bitten four or five times in rapid succession and the sound of the crushing of the head accompanied by beating of wings causes alert responses in cages where insects have not yet been placed. As food-stealing is common (mainly by males from females and by infants from adults) it is possible that the sound of eating in the wild may serve as a clue for the location of a food source.

Although an animal which has been eating meal worms very rapidly may regurgitate and remasticate them, vomiting, although accompanied by a squeaking sound, does not appear to have any signal significance. Sauer and Sauer (1963) report that a galago would vomit its food in their direction as a defensive threat if they advanced on the animal while it was eating. The animals in this study have not been observed to do this. An animal will reject inedible parts of an insect by a quick flicking motion of the head, and these scraps occasionally land on the observer if sufficiently close to an animal, but there has been no indication that this has been directed at the threatening human.

6.8 GENERAL DISCUSSION

A vocal repertoire of 23 to 25 calls was distinguished for Galago senegalensis moholi. Vocalizations which are obviously intermediate between distinct calls are fairly rare and the overall impression is one of relatively stereotyped (or invariable, the term prefered by Altmann, 1967) calls. This confirms the suggestion by Moynihan (1964, 1967), Marler (1965, 1967) and Altmann (1967) that a repertoire of discrete calls might be expected in nocturnal and arboreal animals.

These calls do not express different messages on a one call-one message basis giving a rigid and limited call system. The repertoire may be broadly

divided into calls with a specific message, and calls which, while they may convey a message when given on their own, also combine with units of other calls to give another mood message.

In diurnal ground dwelling primates the visual signals given at the same time as the acoustical signals may serve as qualifiers making the exact message quite clear. In addition a graded system of intermediates between distinct calls, that has been found for example by Rowell (1962) for the rhesus monkey, can also serve to clarify the message that the animal is giving. Instead of giving a vocalization accompanied and clarified by a visual signal (or vice versa) it appears that, in the case of the nocturnal bushbaby, a vocalization is accompanied by a modificatory set of vocalizations. The bushbaby thus makes extensive use of signals utilizing the acoustical communicatory channel. If one animal, for example, is placed in a cage with a stranger who chases him vigorously in a series of aggressive bouts, the submissive animal will utter a series of calls.

The following example is taken from a series of calls given by a subadult male when chased by an adult male and indicates a medium intensity situation:-

Yap - Explosive Cough - Yap Yap Yap - Explosive Cough - ... (short series given while being chased or during the intervals during chasing while the animal remains on the floor of the cage)

Spits - Spit Chatter - Chatter (fighting) ... (given during actual contact.)

These two series alternated according to the hostile activities of the attacking male.

An animal giving the Yap appears to be 'frightened' either of an aggressive superior or of some other threatening stimulus.

Calls that are commonly mixed with units of the Yap are:-

Explosive Cough - Yap

Sneeze - Yap

Shivering Stutter - Yap

Whistle and Whistle-like variants - Yap

all of which indicate (at least under laboratory conditions) that the animal is less 'frightened' than if bouts of pure Yap units were given, while

Yap - Yap alarm

indicates greater fear, a more intense situation.

In addition the relative amount of each call in the composite mixture can also influence the mood message conveyed:-

Explosive Cough - Yap Yap - Explosive Cough

indicates a less 'frightened' animal than one uttering

Explosive Cough - Yap Yap Yap Yap

Yap Yap - Explosive Cough, etc.

(Degrees of fear have been judged from the overall impression gained from the behaviour of the animal and are mainly based on the various indications such as:-

Amount of time spent on the floor.

Fleeing when the dominant animal approaches.

Trying to come up off the floor if the dominant animal turns away, or not.

Whether the animal will eat.

Amount of time it adopts a cringing posture.

Whether it will attempt to approach the dominant animal, etc.

However, as exact measures have not been obtained the degrees of fear are actually judged on a subjective basis.)

The greatest variety of calls and composite calls having the most complex structure of constituent units, are heard during agonistic encounters. Calls that may be uttered by the inferior in this situation include:-

Spit,

Spit Chatter,

Spit Grunt,

Chatter (fighting) and Single note High Intensity Spit,

Moans (sobs),

Screams,

Sneezes,) Generally occur if aggressor temporarily stops
Shivering Stutter,) chasing the inferior.

Gerwhit,

Cluck,

Explosive Cough,

Whistle and Whistle variants,

Yaps and Plaintive Yaps,

Yap alarm (more rare),

Wuffs and Wails (very rare and only one or two brief units).

The only call uttered by an aggressor is the Rasp and as mentioned previously this occurs very rarely and only under certain conditions in the laboratory.)

Thus a very large number of the calls which make up the repertoire of the Lesser Bushbaby may be uttered during agonistic encounters. However, it is felt that most of the calls that are also heard during alarm situations, viz.

Shivering Stutter,

Gerwhit,

Cluck,

Whistle,

Yap,

Plaintive Yap and Yap alarm,

Wuff and Wails,

may be uttered during agonistic encounters mainly because the cage walls do not permit the submissive animal to flee from the presence of the aggressor and thus terminate the encounter. These calls tend to be heard during the intervals between actual contact in fighting rather than during contactual fighting. If the dominant animal is very aggressive, however, some calls, particularly the Yap, appear to be uttered during contact. This point remains to be clarified in a field study.

Those calls which are not normally heard in conjunction with others and which therefore apparently contain the entire message in themselves, are also those which tend to be directed at the receiver rather than being the undirected, "To-whom-it-may-concern" type of message. (These terms are used by Hockett, 1960 and Altmann, 1967). These calls are as follows:-

Call	Directed at:-
Grunt (Defensive)	Threatening Stimulus.
Soft Hoot	Animal being chased.
Soft Grunt	Animal being contacted.
Coo	By mother to infant.
Clicks and Crackles	By infant to mother.
Loud Squeaks	By infant to mother.
Rasp	Animal being attacked.

Other calls which are also directional but which may be heard in a series with units of other calls are:-

Call	Directed at:-
Spit Grunt	Annoying Stimulus.
Spit and Spit Chatter	Threatening Stimulus.
Fighting Chatter	Aggressive animal.
Moans (sobs)	Aggressive animal.
Screams	Aggressive animal.

In addition, the calls indicating a frightened animal that are heard during both alarm and agonistic encounters are presumably directed at the

aggressor although they may at the same time act as undirected alarm calls to animals that cannot see the caller. Animals in other cages frequently show alarm reactions to these calls (particularly Yaps and Screams) by freezing and remaining motionless in their nest boxes until the call stops. When the other animals can see the fight, fear responses do not occur although the animals may become less active.

During situations of mild anxiety to high alarm, the warning calls are clearly undirectional as is also the territorial spacing call, the Bark.

Directed calls are generally accompanied by a visual or tactile signal (See Table 2.) As all the directed calls are also those that are given in close proximity to the receiver it appears likely that these other signals may serve to emphasize or clarify the auditory signal. (Olfactory signals may also be involved but the observer is not in a position to judge if this is indeed the case.)

Vocal repertoires have been divided by several authors (e.g. Hockett 1960, Marler 1965) into discrete or graded (continuous) types. In the discrete type there are few variations of calls, while in the graded type the variations of one call may grade almost imperceptiably into the variations of another call. If these variations are considered to represent slightly different mood messages then a very large number of slightly different mood messages are

theoretically possible. In the Lesser Bushbaby, as the repertoire consists of relatively discrete calls, a limited or even closed system of messages would be expected. In fact, this apparently small repertoire is very greatly increased by the use of mixed unit messages.

The ability to convey slight differences in intensity of motivation appears to be important in the primate group, particularly amongst the ground dwelling primates (viz. the baboons and macaques.) It has been suggested by Lancaster (1968) that in those species where there is a complex social hierarchy the need to express fine differences in intensity of mood is very great since the smooth functioning of the group cohesion depends on this. Lancaster states "In a complex, enduring social system in which individuals are obliged to make a continuous series of adjustments and accommodations to each other, it is important to be able to express not just that one is aroused or frightened, but also the degree and direction of changes in motivation." In the case of the bushbaby the group is essentially a family one with the parent pair and one of two sets of offspring and there is an absence of a complex social organisation. It would appear that a compromise has arisen between the necessity for discrete signals in order to decrease the chance of ambiguity and the necessity for the ability to express fine differences in mood intensity when contacting conspecifics which is

more easily given by a graded or continuous type of signal repertoire.

Table 5 indicates the size of auditory repertoires reported for various species of primates. In addition Andrew (1963a) gives totals for a large number of primates but in most cases these totals do not appear to be exhaustive. Many of the discrepancies in the totals given by various authors for the same species may arise from differences in the observers' interpretation of the repertoire. Very few calls in the primate repertoire are given under only one specific situation or elicit only one stereotyped response. In addition, in those species where the repertoire is basically of a graded type, the number of classes (or calls) into which the graded continuum is divided is based entirely on the observers' need to break the repertoire into categories in order to be able to describe it.

Andrew (1963a) reports 9 - 10 calls for G. senegalensis. If the number of calls reported in this study are reduced to the lowest total possible by means of lumping together all calls using a similar type of basic unit, or used in similar types of situations, a total of 10 or 11 calls may be arrived at as follows:-

(1) Spit, Spit-Chatter, High intensity Spit, Chatter (fighting), Spit-Grunt, Rasp, Clicks and Crackles.

(2) Screams.

(3) Bark.

(4) Coo, Soft Hoot, Soft Grunt, Grunt (Defensive).

(5) Squeaks, Loud and Soft Squeaks of infants.

(6) Sneezes and Gerwhits.

(7) Cluck, Yap, Plaintive Yap, Yap alarm.

(8) Wuffs and Wuff variation.

(9) Wails and Caws.

(10) Whistle, Whistle variants, Moans (Sobs), Explosive Cough.

(11) Shivering - Stutter.

However, the manner in which the units of these calls are utilized in complex mood messages indicates that restricting the number of calls in this manner does not reflect the true extent of the repertoire. There are three cases in which the splitting of a call into two calls may not be justified and these are:-

(1) The Single-note High Intensity Spit which is similar in structure to a single unit of Chatter (fighting) although it contains a higher total energy content. This call is not very common.

(2) The Soft Hoot and the Soft Grunt (Contact). (The possibility that these similar calls should be taken as a single call has previously been discussed.)

(3) Wails and Caws. These are not very commonly heard in the laboratory and the recorded samples are few and may reflect an idiosyncrasy on the part of the male who utters them the most frequently.

It is interesting to compare the repertoire found in Galago senegalensis moholi with that of the Aotus trivirgatus as Moynihan (1964) has stated that, "The type of repertory possessed by adult Night Monkeys may be another (partly indirect) adaptation to nocturnality." This monkey does not utter intermediate notes when motivated by a complex combination of tendencies but rather a series of different types of notes each one of which expresses only one or two tendencies. The Lesser Bushbaby also utters a mixture of units of different calls in a rapidly changing series, especially during intraspecific agonistic encounters.

Moynihan (1964) argues, that infant and juvenile Aotus trivirgatus have a repertoire that includes relatively more intermediate notes than that of the adults, because tactile or visual signals may supplement their vocal signals. These infants remain in very close proximity to the parents. In the Lesser Bushbaby the infants are not frequently carried by parents but generally left alone in the nest while the parents are foraging, and they also become relatively independent very rapidly. Intermediate notes are not heard more frequently for these infants. However, as the infants are protected by the adults they are seldom heard to utter calls under undisturbed conditions in the laboratory (e.g., when not handled for weighing purposes by the observer.)

The calls found can be broadly divided into loud and soft calls.

Loud	Soft
Caws	Sneeze
Wails	Clicks and Crackles
Yap Alarm	Shivering Stutter
Yap and Plaintive Yap	Grunts (defensive)
Wuff	Contact Grunts
Screams	Coo
Bark	Soft Hoots
Explosive Cough	Squeaks
Whistle	Spits and Spit-Chatter
Clucks, Gerwhits	Spit-Grunt
Moans (Sobs)	High Intensity Spit
Rasp	Fighting Chatter

The vocal signals apparently used for long range communications are all loud and are mostly tonal calls. Even the non-tonal Plaintive Yap, in its unit structure of tonal and non-tonal sound, shows the tendency for sounds that are used for communication over large distance to be tonal calls (Marler 1965). Those calls used in friendly situations are tonal while those uttered in agonistic situations are, for the most part, non-tonal.

Comparison of the calls heard under the conditions of this study with those reported by Lowther (1940), Sauer and Sauer (1963) and Andrew (1963a, 1964) reveal a repertoire larger than that found by

these authors, but most of the calls mentioned by them can be tentatively identified with those found in this study.

Lowther (1940) lists eight calls.

(1) The Alarm-note ("shrill, high-pitched and terminating in a whistle") may correspond to the Wails and Caws of this study. The whistle does not necessarily terminate the call but units of Whistles are often heard in conjunction with Caws.

(2) A piercing noise maintained for an hour or more with two pitches (high and low) and during which activities are continued, appears to correspond with the Yap or Yap duet of this study.

(3) The sex-note used by the male when pursuing a mate described as a "soft-questioning sound of two notes" clearly corresponds to the Soft Hoot (chasing call) of this study while,

(4) the "conversation-note", softer than the sex-note but with the same two pitches is the Soft Grunt (Contact).

(5) The "chattering-note" used by the female when annoyed by the attentions of the male is the Spit-Grunt or Spit-Chatter while it appears that,

(6) the "low-clucking of annoyance" is a slow Spit-Grunt or Grunt.

(7) The "maternal note", a soft caressing sound, is the Coo and,

(8) the Squeak of the new born young corresponds to

the call of the same name in this study.

Sauer and Sauer (1963) mention several calls in their study. The "long-lasting series of more and more penetrating sounds", mentioned by these authors, given by the males, during which animals may continue to look for food, may correspond with the Bark while the "angry version of this call" which may continue for an hour or even longer may be the Yap call of the present study.

The hissing notes given while the animal adopts its "typical defense posture" correspond to the Spit. It is not clear what call the "series of burst-notes" corresponds to, although this may be the Spit-Chatter or Chatter (fighting). These authors mention that boundary disputes between two males are initiated by hissing notes and these are given by both males during fighting. In the fights observed in the laboratory in this study, only the inferior, submissive animals vocalised during fights. Males involved in serious fights were completely silent and this has been reported for Aotus trivirgatus (Moynihan 1964) and Lemur fulvus (Andrew 1963a). Vocalizations are common in encounters between mature males and strange females, juvenile or young maturing males, and as the sex of the animals is difficult to distinguish, it is possible that some of the encounters observed by Sauer and Sauer were not between rival males defending territories.

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