

METHODOLOGY USED FOR THE STUDY OF EARLY MOTHER-INFANT BEHAVIOUR IN BORNEAN ORANG-UTAN (*PONGO P. PYGMAEUS* LINNAEUS, 1760)

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Orang-utans are endangered and some captive females have failed in rearing their offspring. Because of this a multiparous Bornean female, *Pongo p. pygmaeus*, and her 3-months-old daughter were studied for two weeks (30 hours of observation in all), using exact time, sequential and point sampling methods. Most of the time the infant was in ventro-ventral contact with her mother and when there was no contact, the infant was within the mother's arm reach; the carrying position was side-ventral; proximity between the pair was maintained mainly by the mother; there was little grooming of the infant by the mother, and the infant sucked one nipple as often as the other. After comparing infant-rearing practices in captivity and in the wild, it is concluded that multiparous mothers are better mothers than primiparous ones and that the mother was rearing her infant in the normal way.

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INTRODUCTION

The importance of the mother-infant behaviour, mainly in primates, has been reported by many scientists.

This kind of interaction is related to the formation of nearly all social behaviour and, therefore, is important to the survival of the individual and of the species (KINGSLEY, 1977).

Apes, in general, require special attention not only because they are endangered but because some captive females have failed in rearing their offspring (NADLER, 1974). Therefore studies about maternal care are important for the attainment of a correct breeding program.

The present paper deals with mother-infant behaviour in Bornean orang-utans (*Pongo p. pygmaeus*). In the wild this ape has few social interactions and the infant meets few other orang-utans. Because of this the bond between mother and infant is

all the more complete (MACKINNON, 1974).

In order to know which parameters should be studied, it is useful to know what animals do in the wild. Infant orang-utans that are less than 1 year old generally remain close to the mother and travel by her side. They feed by suckling but show interest in food being eaten by their mothers. Young infants sometimes play by dangling on branches close to the mother when she is resting. Sometimes the mother plays with them tickling and biting them gently. Infants playing near the mother frequently come back to her and touch her, or are embraced by her, then return to their play (MACKINNON, 1974).

Therefore it has been considered convenient to study behaviour concerning the kind of contact between the mother and the infant, proximity, suckling and activities of both individuals comparing, when possible, our data with that available from the wild

Table 1. Bali's breeding history.

Date	No. Borns	Losses	No. Reared
25 Mar 68	1 ♂	3 Months premature	0
15 Apr 71	1 ♀	0	1
17 Mar 75	1 ♂	Killed by the father	0
14 Jun 76	1 ♀	found dead	0
21 Jun 77	1 ♂	0	1
29 May 82	1 ♀	0	1

(MACKINNON, 1974) and in captivity (KINGSLEY, 1977).

MATERIAL AND METHODS

Animals

The subjects of the study were a multiparous Bornean orang-utan (*Pongo p. pygmaeus* Linnaeus, 1760), Bali, and her female infant, Sandokan, resulting from the pairing with another Bornean male, Giles.

Bali was born in 1960, and has been kept at the "Jersey Wildlife Preservation Trust" since 18.3.63. Since then she has been pregnant six times, the last time giving birth to Sandokan. Table 1 shows Bali's Breeding history.

Place and Date

The study was carried out at the "Jersey Wildlife Preservation Trust" between the 20th and the 31st of August 1982, during the third Summer School. The infant was, therefore, 13 and 14 weeks old.

Sampling Method

The observations were made between 09.15 and 12.45.

Exact time was recorded for data concerning grooming and suckling by using a stopwatch.

Patterns of grooming behaviour were recorded by using a sequential method (ALTMANN, 1974).

For the rest of behaviours the point sampling method was employed (ALTMANN, 1974), scoring each 15 seconds, and each check-sheet lasting 8 minutes.

Signs were written on the check-sheet instead of words, in order to score very quickly and collect as much data on the pair as possible.

In all 30 hours of observations were recorded.

Housing

The pair was housed in a cage which included inside and outside enclosures.

Both cages had climbing frames and accessories for the orangs' amusement. They had a "canopy" of frames on the top of the cage. The outside enclosure was separated 1.15 meters from the public.

Hinde's proximity index (HINDE, 1968, 1971).

Difference between the percentage of approaches and the percentage of leavings due to the infant ($\% A_I - \% L_I$).

A negative index indicates that the mother is mainly responsible for maintaining proximity whereas a positive index indicates that the responsibility lies with the infant.

Grooming of infant by mother

The body of the infant was subdivided into 4 parts: head, body, arms and legs.

Table 2. Different type of contact expressed as a percentage of the scores in contact.

V-V	V	Neck	Another
46.33	9.21	14.16	30.30

RESULTS

Contact between the mother and the infant

Percentage of scores in which the infant was in contact with the mother: 91.90%.

Type of contact

V-V: ventro-ventral contact. (Infant's chest against mother's chest or mother's side).

V: ventral contact. (Infant's chest against another part of the mother's body).

On neck: One hand clings to the hair of the mother's shoulder, the foot holds the hair of her back, the opposite hand and foot hold to the ventral hair so that the infant is on the mother's side behind her arm.

Another: The infant is in another type of contact with the mother.

Table 2 shows the percentage of contact scores in which the infant was in each of the four types of contact.

Transports

Almost all the transports were on the "neck" position. Only one transport was on the mother's left arm, and another on the mother's abdomen.

Without contact

A. Percentage of contact scores in which the mother restrained the infant: 7.07%.

B. Percentage of total scores in which the infant was not in contact: 8.10%.

C. Percentage of scores without contact in which the infant was within the mother's arm reach: 82.84%.

D. Percentage of scores without contact in which the infant was not within the mother's arm reach: 17.16%.

Hinde's proximity index

$$\% A_I - \% L_I = - 38.09 \%$$

Infant's behaviours: (Expressed as a percentage of the total number of scores).

1. Mouth activities: Such as biting, licking and chewing (suckling is not included): 18.41%.
2. Handling: All manual activity which involves grasping or hoisting of objects: 15.87%.
3. Body activities: Jumping, climbing and other actions which imply movements of all the body: 22.37%.
4. Resting: The infant remains without making any movement and maintains its eyes open: 3.47%.
5. Sleeping: 33.48%.

The mother bites gently the infant

Percentage of the total number of scores: 0.28%.

Grooming of infant by mother

The mother could groom with her mouth (by using lips, teeth and tongue), or with her fingers.

Of the 31 intervals (parts of bouts) observed, the mother groomed:

- 22 with her mouth.
- 9 with her fingers.

Of these 31 intervals:

- The head was groomed 0 times.

Table 3. Suckling (total duration expressed in seconds).

Number of Bouts Suckling	Times on nipple		Total duration of suckling		
	Left	Right	Left	Right	Total
87	44	43	2748	3083	5831

- The body was groomed 12 times.
- The arms were groomed 18 times.
- The legs were groomed once.
- Total number of grooming bouts: 13.
- Total number of intervals: 31.
- Total time spent in grooming: 620 seconds, that is the 0.57% of the total time of observation.
- Mean duration of each sequence: 47.69 seconds.
- Mean duration of each interval: 20 seconds.
- Mean number of intervals of each bout (sequence): 2.08.

Suckling

Table 3 shows the suckling behaviour.

Percentage of the total time of observation in which the infant was suckling: 5.39%.
Mean duration of each bout: 67.02 seconds.

DISCUSSION

Before comparing these results with those of KINGSLEY (1977) it is useful to note that she collected data during 5 different periods (08.00 - 10.00 hrs; 10.00 - 12.00 hrs; 12.00 - 14.00 hrs; 14.00 - 16.00 hrs). The present data was collected between 09.15 and 12.45 and, therefore, it may have some bias, due to the daily variation of behaviour.

Kingsley recorded mother-infant behaviour in an orang-utan (Samarinda), whose mother was also Bali, and in a gorilla, N'Pongo.

Contact between mother and infant

During early infancy, close contact with the

mother is of great importance to the protection of the infant, for regulation of body temperature, and it is necessary for nursing (ROGERS & DAVENPORT, 1970).

91.90% of the observation time the infant was in contact with the mother. This percentage is closer to Kingsley's data for Samarinda than for N'Pongo (table 4).

Type of contact

During the first six weeks the apes spend most of the time in ventro-ventral contact with their mothers. This was found in captive conditions (KINGSLEY, 1977) and in nature (SHALLER, 1963; MACKINNON, 1974).

A rapid decline in ventro-ventral contact during the first few weeks seems to be one of the main indications of breakdown in maternal behaviour in captive apes (CLIFT & MARTIN, 1978).

Table 4 shows that in the three individuals only half of the time was spent in ventro-ventral contact, as it can be expected the infants being more than 3 months old.

Nevertheless the Sandokan's data concerning the ventral position is closer to that of the gorilla than to that of the orang-utan (table 4).

Transports

In chimpanzees most of the early transports are on the mother's ventral area: ventro-ventral contact (LAWICK-GOODALL, 1968; SABATER, 1969).

In orang-utans there is no shift in the female carrying-position as is common in

Table 4. Percentage of total time in observation.

	Contact	V	V-V	Within the Mother's Arm reach	Out of the Mother's Arm reach
Samarinda	90.80	27.25	53.85	6.25	2.91
Sandokan	91.90	8.47	42.48	6.70	1.40
N'Pongo	67.51	4.10	50.90	26.66	5.83

terrestrial monkeys and apes. Orang-utan infants are rarely carried in a fully dorsal position. The normal rinding position for young or adult infants is sideventral (that is the "neck" position described above). The effect of this carrying position is that the infant does not get in the way during the tree travel (MACKINNON, 1974).

COFFEY (1971) reported that Bali carried, at first, the infant on the ventral side close to the breast and face. Then, from the age of two months, the infant was carried across the shoulder.

During the observations almost all of the transports were on the "side-ventral" position, as it is usual. Therefore the mother was carrying her infant in the normal manner.

Without contact

Referring to the percentage of time spent by the infant within and out of the mother's arm reach, table 4 shows that Sandokan's data agrees with that of Kingsley for Samarinda, and that the three individuals spent more time within the mother's arm reach.

Hinde's proximity index

HINDE (1968, 1971) found that in the rhesus monkey, for several months the infant left the mother more frequently than he approached her, i. e. there was a negative proximity index. Later the index increased to zero at about week 15 and from week 20 to 2 years the infant approached his mother more than he left her.

KINGSLEY (1977) gave an index of 4.0% for the orang-utan, and 1.7% for the gorilla, when both infants were between 17 and 19 weeks old.

Unfortunately Sandokan and Bali's data belongs to a previous period and it would expect to find a lower index, as indeed it was found. The index found is - 38.09%, which shows that the mother was mainly responsible for maintaining proximity.

Infant's activities

During 56.65% of the observation time the infant was "handling", doing "oral" activities or "body" movements (see definitions in Results), and during 26.95% of the total time the infant was resting or sleeping.

COFFEY (1971) reported that the 3.5-months-old orang-utan which he observed started to chew some banana skin, and this agrees with the present observations.

Coffey also saw that the infant climbed the bars of the cage and made independent locomotion at this age. This behaviour was also noticed in the present study.

Sandokan was able to focus on distant objects, to be aware of their movement and to follow them (as COFFEY (1971) reported in the 2.5-months-old orang-utan).

The mother used to encourage Sandokan to move away from her by placing its hands on the cage bars so that the infant could climb away.

Grooming of the infant by the mother

Wild gorillas and orangs do not spend a large

proportion of their time grooming each other (SHALLER, 1963; MACKINNON, 1974; KINGSLEY, 1977).

This was also observed in Bali, which spent 0.57% of the observation time grooming.

Bali used the mouth more than the hands as a tool to groom her infant, and the most of the grooming actions were directed towards the arms and the perianal zone.

Suckling

As far as sucking behaviour is concerned, the infant was seen performing this behaviour during 5.39% of the total time of observation, sucking one nipple as often as the other.

CONCLUSION

The first infant to be reared by Bali was badly reared. The staff had to teach Bali how to suckle her infant (COFFEY, 1971).

Since the behaviour exhibited by Bali and Sandokan were similar to that found in wild (MACKINNON, 1974) and captive orangs (KINGSLEY, 1977), it may conclude that:

First: As it is well-known multiparous mothers are better mothers than primiparous ones.

Second: Bali was rearing her infant in the normal manner.

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RÉSUMÉ

La relation mère-fils est la plus importante dans la vie des Primates et elle est la base pour la formation de presque tout lien social.

Les Pongidae est une Famille dont les représentants sont en danger d'extinction et, étant donné que quelques femelles captives n'ont pas réussi à allaiter leurs nourrissons de façon correcte, les études sur le comportement maternelle sont d'une importance vitale pour aider à la survie de la dite Famille. À cet effet on a étudié les premières étapes de la relation mère-fils en orang-outans du Borné, *Pongo pygmaeus pygmaeus* Linnaeus, 1760. Pour cela on s'est servi d'une femelle multipare, dont les premiers fils étaient mort par des causes différentes, et sa fille âgée de 3 mois. Le travail fut réalisé dans le "Jersey Wildlife Preservation Trust", du 20 au 31 d'août 1982 et de 09.15 à 12.45 heures.

On a prit note du genre de rapport entre la mère et le nourrisson, activité de ce dernier, genre de transport, "grooming", allaitement et responsabilité de toutes les deux dans le maintien du contact. Pour cela on a appliqué 3 méthodes: (selon le comportement observé) évaluation exacte du temps, séquentiel et contrôle ponctuel. En tout on a noté 30 heures d'observation.

On a détecté que:

1. Le 91.90% du temps d'observation, mère et fille étaient en contact, étant celui-ci la plupart du temps ventro-ventral.
2. Quand la mère n'était en contact avec le nourrisson, celui-ci demeurait à la portée du bras maternelle étant la mère la première responsable dans la prise de contact.
3. Le transport du nourrisson par sa mère fut du genre "lateroventral".
4. La mère nettoyait très peu sa fille (0.57% du temps d'observation).
5. La fille tétait pendant 5.39% du temps total d'observation, le même temps aux deux mamelles.

Après avoir comparé les résultats avec d'autres travaux réalisés autant en conditions naturelles qu'en celles de captivité, on est arrivé à la conclusion que, en 1er lieu, les mères multipares sont meilleures mères que les mères primipares et, en 2^o lieu, la mère qu'on a étudié était soignant correctement sa fille.

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