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Early postnatal development, parental care and interaction in the banded mongoose *Mungos mungo*

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The banded mongoose *Mungos mungo*, has been reported on by Simpson (1964 & 1966), Neal (1970), Michaelis (1972) and Rood (1974 & 1975). However, no comprehensive records have been published of the early physical and behavioural development which is the object of this note. A litter of three (two males and one female) was born in captivity in February 1976. The pups were weighed and measured every day for the first 19 days, thereafter intermittently until Day 43 and once more on Day 86.

Physical and behavioural development

This is summarized in Tables 1 and 2. Increment in hindfoot (c.u.) and ear measurements had reached an asymptote by Day 86. The pups were born at 5,4% of adult mass which was calculated as 1,35 kg from Rood (1975) and Sadie (*pers. comm.*); by Day 86 they had reached 59,7% of adult mass. Mass discrepancies do occur e.g. Simpson (1966) quoted a three-day old mongoose to weigh much less than those in the present study, but it may have been abandoned by the parents particularly as Sadie (pers. comm.) found that wild young were heavier than those hand-reared. In the present study the captive litter, which suckled from the dam, had already reached a mass by Day 86 that Rood (1975) attributes to subadults of six months to a year.

Table 1 Physical development of the banded mongoose, *Mungo mungo*, after the first day (Day 0) (Figures in parenthesis indicate day that the particular development was first noticed).

Ears	(1)	Partly folded back.
Eyes	(4)	Dark line where eyelids part. (8) Eyes of one male open (sex distinguishable by Day 6). (9) All eyes open. (19) Marked improvement in eyesight.
Teeth	(0)	Incisors 1 mm long. (8) Canines break through. (14) First molars appear. (16) Premolars appear. (17) Second molars appear.
Feet	(0)	Well-developed with toes separate.
Hair	(0)	Sparse pelt except on ventral surface of tail; pigmentation bands of adult dorsum visible in skin; vibrissae well-developed. (1) First black band visible on individual hairs. (7) Body hair 11,4 mm long; genal vibrissae 10 mm long; (10) Ventral tail surface now also haired, except close to genitalia. (15) Ventrum well pigmented.
Mobility	(1)	Pups crawl in circles and climb out of a 9 cm scale pan. (9) Increased activity, they bounce around, even lifting the forequarters in forward movement. (10) When held upside down, the tail is circled continuously in righting movement, but circular crawling has disappeared. (12) Movement still awkward; yawn, self-groom, go through handstand climbing action of analmarking. (15) Leave nest at will, follow mother about. (16) Stand on hindlegs in alert posture. (19) Pronounced scratching at ground and at faeces. (21) Jump out of scale pan and bite handler, play vigorously. (28) Rush at one another, climb fence. (30) Tails so strong that it is almost impossible to straighten them for measurement. (33) Sideways component to play, i.e. backing away with body angled 90° at the middle. (35) Chasing component of play prominent. (36) Allo-grooming of parents. (49) Head-rolling.

Table 2 Behavioural development of a litter of three banded mongoose (Figures in parenthesis indicate day that the particular development was first noticed)

Contact	(15)	Continuously climb over adults and play-jump at one another, often followed by a mounting. (21) Play vigorously, wrestling, biting, shaking and often scratching the ground. (26) Allo-groom. (34) Much play consisting of biting, clasping or scratching-one another.
Alarm	(8)	First alarm reactions — growls and alarm chirrups (12) Jerk spit and urinate at sudden movements and adult alarm chirrup, bunch together in scale instead of trying to climb out. Bunching is an adult group alarm reaction (Rood 1975). (16) Take fright at greater distance.
Vocalization	(0)	Squeak incessantly when alone, presumably to call mother; contact 'kuks' when with mother. (6) Contact 'kuks' when hand-held, but whistle (audible from ≥100 m) when put down. (8) Chirrup-quality present in alarm whistle, growl, and low-intensity alarm gurgle; squeak in appeasement towards adults.
Elimination and Marking	(19)	Scratching at faeces followed by defaecation in latrine corner of cage, analdrag. (23) Anal gland secretion of males first seen. (40) Chin-wiping. (49) Head-roll follows chin-wipe.
Feeding	(19)	Scratch at objects and feed on solids. By this time pups accompany adults on short sorties, and scratching is probably as Rasa (1973b) describes for *Helogale*, helpful in turning leaves and debris in search of food. (40) Keep food to themselves, growl.

Maternal behaviour

Eight days before parturition the female became lethargic and ceased her consistent chasing of the male from the food and he ceased to be afraid of her. After parturition, both parents frequently vocalized and carried the pups around by the scruff of the neck. However, the female, with low soft 'kuks' and intermittent high, loud screams, did most of the retrieving, reacting immediately to pup screams. When the mother gave soft 'kuks', the pups responded in the same manner. When taken away from her young, she gave a raucous growl and on return, again gave the contact-seeking 'kuk', interspersed with loud bird-like screams. She had difficulty in carrying the pups from Day 20, and when unsuccessful, allogroomed the neck instead. She was unable to carry them after Day 35 by which time the young could accompany adults on all day excursions (Rood 1975). The female did most of the allogrooming, especially concentrating on the smallest male, and from Day 34 − 47 she (in contrast to the adult male) groomed them in 89% of the allogrooming bouts (n = 56). Neckgrooming often led to carrying. During this period the contact of the young with the female consisted mainly of climbing over or lying on her. When a pup growled at the female, she reacted by turning her head away. Head-turning has been described for civets by Ewer (1968) as an appeasement behaviour and was probably also the case here.

Paternal behaviour

The focal adult in play was mostly the father, whereas the mother was the centre of pup attention in alarm situations. The male was highly protective of the young from the first day, consistently anal-dragging, squirting fluid from the anal glands or urinating over them and sometimes even 'jealously' keeping the female away from them by screaming at her. Between Days 34 and 47 he was the centre of pup attention twice as frequently as the female. He often took a pup's head in his mouth and displayed head-rolling (after Day 26). Head-rolling on the ground and scratching at objects often initiated play. Rasa (1973) also believes head-rolling is an invitation to play in *Helogale*. This was subsequently seen in conjunction with foodplay by the adult male which attracted the pups to a food source. He would take a piece of hard food in his mouth, turn on his side, eventually even sometimes on his back and with head jerks and high-pitched squeaks or chirrups, hands and feet often bunched, entice the young to join in play, to which they would respond immediately, in particular to his calls rather than his actions. Whilst he was on his back, the young would sometimes crawl over his anal glands and stomach whilst he clutched them, thus spreading his smell over them.

Male/female interaction

From Day 5 the female again commenced to assert her dominance at the food source over her male partner, which caused him to mark immediately by anal-dragging and squirting (ejecting a clear yellow fluid from the anal glands) in the nestbox. Simpson (1966) mentions marking as a displacement activity but none of the previous reports mention anal-squirting which was only seen in the adult male. This squirting also occurred when the adult male was handled and very agitated. By Day 8 the female's aggression had increased even further, this was at the time that the pups became more independent (eyes now open). The adult pair now also often exhibited sexual behaviour: they lay on their sides, either naso-nasally or-anally, sometimes turning right onto their backs and rolling their heads on the ground and at the same time uttering a gurgling call interspersed with high-pitched screams. The male also head-rolled and chin-wiped as part of appeasement behaviour towards the female. On Day 27 the male and female sniffed one another continuously, scuffled around together in the nestbox for prolonged periods and the pups stayed away from them, which was unusual. The pups were at this stage reasonably independent, ate solid food and the adult pair almost certainly mated again as the female's vulva was red and swollen.

In summary it can be said that the young are highly dependant on parental care, such as retrieval (mainly by the mother) and learning to search for food and socialization (mainly the father). Rood (1974) noted that any member of the pack would transport the young and that the male has an important role in looking after the crèche. This strong parental care of the young is also evident in other social viverrids such as the suricate, *Suricata suricatta* (Wemmer & Fleming 1974) where the sire is the focal individual around whom juvenile interaction evolves, and frequency of play interactions with the female is minimal. They stress the point that until weaning, additional maternal energy expenditure could be critical to the female's and her litter's survival.

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