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Rearing without Paternal Help in the Bolivian Owl Monkey *Aotus azarae boliviensis*: A Case Study¹

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Key Words

Aotus azarae boliviensis · Bolivian owl monkey · Carrying behaviour · Alloparental care · Evolution

Introduction

It is well established that in owl monkeys, *Aotus*, the father participates in infant care [1–12]. Generally, all group members participate in infant care, but the adult male owl monkey is the primary infant caregiver [1–3, 6–12]. In contrast to other Neotropical primates living in small family groups, titi monkeys (*Callicebus*) and callitrichids, where the father starts to transport the infant(s) regularly from the first day of life [7, 13–15], as a rule the newborn owl monkey is carried nearly exclusively by its own mother [1–3, 6, 7, 9] in a distinctive ventrolateral position. This well-documented result does not exclude exceptions; either the father [8] or a sibling [9] may be the main carrier from the first day of life. Invariably from the third week of life, however, the father becomes the main caregiver, carrying the infant on the back in a longitudinal position. Considering this well-documented fact, true for different species of this genus, at least in captivity, it makes no sense to separate the father before birth with the consequence of a severe risk for the survival of the infant. Thus, the outcome of an unplanned case study is worth reporting: a very old wild-born male owl monkey died shortly (14 days) after the birth of its last (male) infant who had to be raised by his mother and one older (female) sibling (2.5 years old) without any paternal support. We compare the data with those gained from intact family groups of the same species, and under the same laboratory conditions, and discuss the results from an evolutionary perspective.

¹ Dedicated to Prof. Dr. Heinrich Sprankel on the occasion of his 70th birthday.

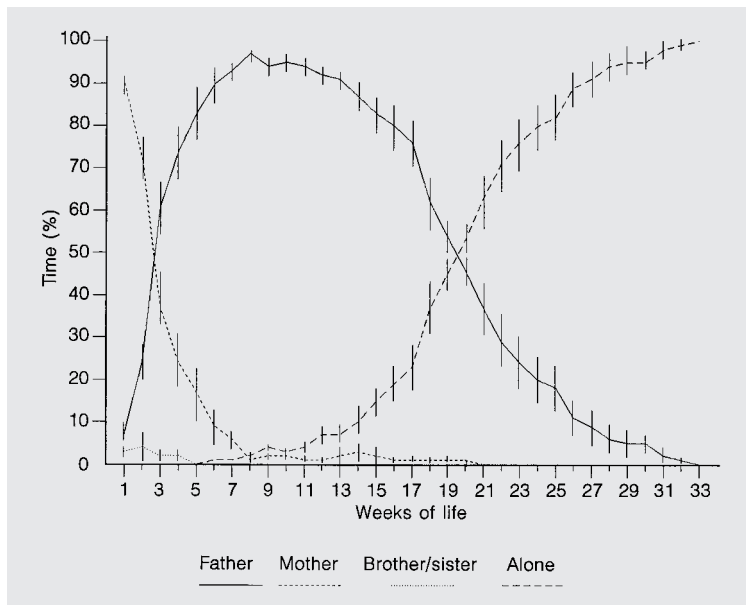


Fig. 1. Carrying behaviour in an intact family group (n = 34).

Material and Methods

According to Hershkovitz [16], the correct species name of the owl monkeys kept at the primate station of Kassel University is *Aotus azarae boliviensis*. The second author imported the (6) founder animals from Bolivia in 1978. It is noteworthy that some of the founder animals are still reproductively active.

The infants were observed daily. Twice a day we recorded the carrying position and the carrier of the infant until the infant was found 14 times alone in succession, i.e. 7 days alone. The data on the carrying performance of the different group members in intact family groups are based on 34 infants. An intact family group consists of father, mother and 1–3 offspring.

Results

In an intact family group the main carrier of the newborn infant is the mother during the first 2 weeks of life (fig. 1). Afterwards (from the third week of life) the father becomes the main carrier of the infant until the infant is independent, irrespective of the number of older siblings present in the group (fig. 1).

In the next three figures (fig. 2–4) we compare the data on these 34 infants with those obtained from the male infant of the non-intact (fatherless) group. The carrying performance of the mother is nearly identical with the mean performance of all the mothers in intact family groups (fig. 2), but the sister carries her fatherless brother much more than brothers and sisters in normal family groups (fig. 3). From the fourth week of life of the infant she becomes the main carrier. The fatherless infant does not start to become independent earlier than the other 34 infants in intact family groups

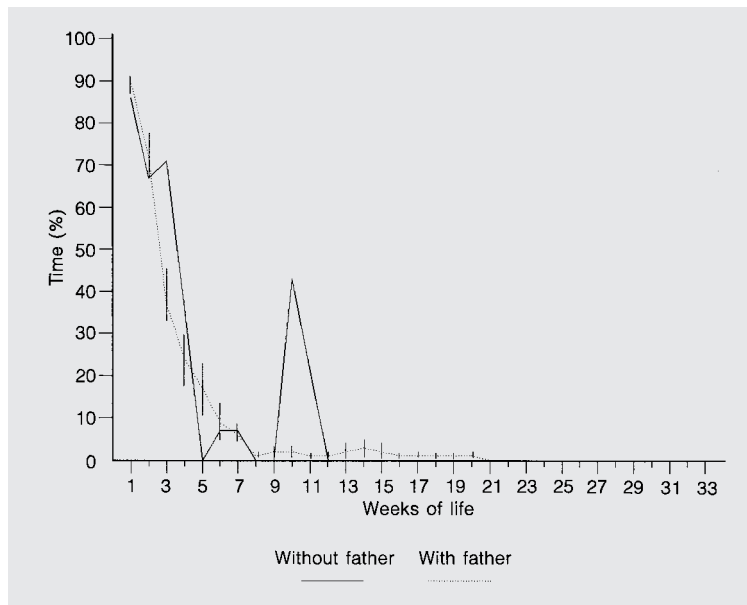


Fig. 2. Carrying performance of the mother.

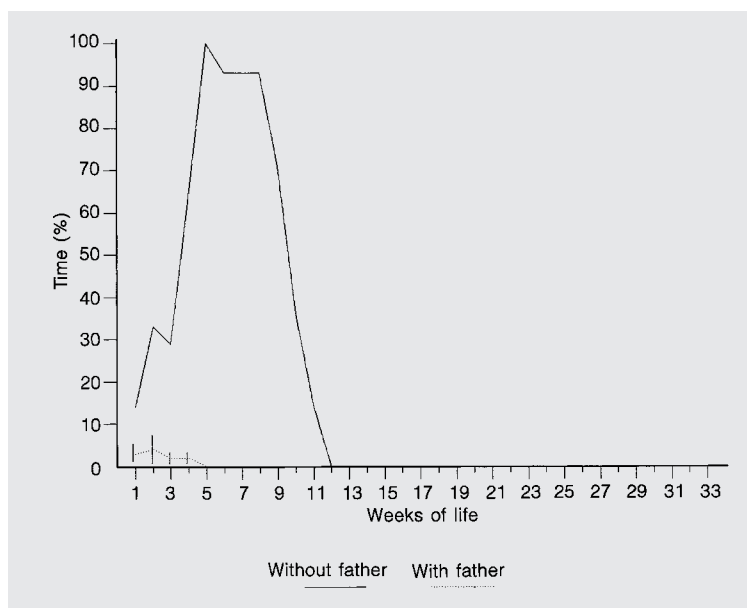


Fig. 3. Carrying performance of the siblings.

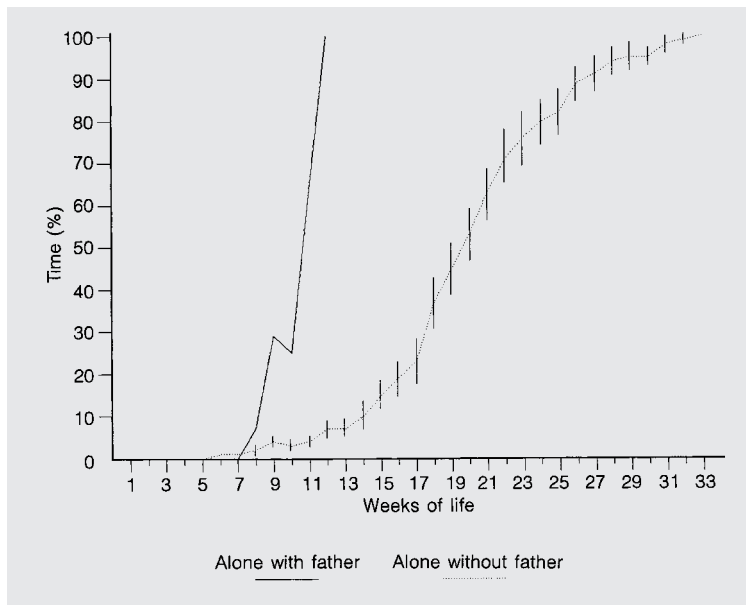


Fig. 4. Time of independence of the fatherless infant and the 34 infants in the intact family groups.

(fig. 4). Afterwards the curves are dramatically different. In the ninth week of life the infant is alone for one third of all records (normal infant: 17–18 weeks of life); from the 12th week of life, no more carrying episodes can be recorded (normal infant: 33 weeks of life). In other words, at the age of 3 months, where normal infants are found alone for one tenth of all the records, the fatherless owl monkey is already independent of any carrying support.

Discussion

According to Hershkovitz [16], most of the available information on infant development in the owl monkey is based on *Aotus lemurinus griseimembra*. This is especially true for the detailed studies of Dixson et al. [6] and Dixson and Fleming [7]. The present study on *A. azarae boliviensis* is in good accordance with these earlier results. Independently of the well-documented fact that the father is the main carrier, we also confirm ‘that carrying by siblings is infrequent and subject to individual variation’ [7, p. 33]. This allows us to speculate that the results of both studies may be generalized for the whole genus *Aotus*. The small differences between the two studies may be caused by different methods of data collection [9].

The reported case study allows us to speculate on the advantages of paternal care in this species. Moynihan has already mentioned ‘that the carrying of young by males may be primitive among platyrrhine and/or an indication of close phylogenetic relationship between night monkeys and marmosets and tamarins... In any case, such

behaviour must be adaptive. Its principal advantage may be sharing of labor. When the male carries the young part of the time, neither parent will become as exhausted and “run-down” ... as the female would be likely to become if she did all the work herself’ [1, p. 64]. Welker et al. stressed the point that ‘the carrying behaviour ... seems to have evolved from the “parking behaviour” of the Prosimiae. It is not a highly evolved but, rather, a basic behaviour as compared to other simian species’ [14, p. 201]. ‘The helper system in the callitrichids, *Aotus*, and *Callicebus* seems to be a good model for an intermediate stage between the parking behaviour of the primate ancestors and the close mother-child relation of higher primates’ [9, p. 472].

Wright also discusses the similarities between ‘parking’ of an infant and alloparental care. ‘It is clear that the costs of reproduction are high for small primate females, and sharing the burden of infant care with the father is to the female’s advantage’ [8, p. 70]. ‘The prosimians cache their infants in nests, while the small monkeys exhibit extensive male care and assistance in infant carrying by siblings’ [10, p. 97]. ‘The species with the most rapid infant weight gain park the infants and/or exhibit the most extensive paternal care’ [10, p. 99].

Welker et al. are convinced ‘that rejection by the mother seems to be the most important reason why other group members participate as caregivers’ [9, p. 471] and ask the question ‘why other group members “help” the mother, do they help to support the mother, or do they help only because the mother rejects the infants?’ [9, p. 471]. The present study of the fatherless infant gives one important example to answer this question. Obviously, the owl monkey mother is unwilling to give more support to the infant than mothers in the presence of the father. As a consequence the sibling in the group ‘helps’ much more than usually observable in owl monkey groups, but the female sibling is less tolerant than owl monkey fathers and also rejects the infant, with the consequence of earlier independence. Without any question, in a natural environment, the small owl monkey would have a lower survival chance than a carried infant. The result of this study makes it clear that the father and further siblings do not help the mother but help the infant to survive. If we speculate that the owl monkeys are derived from ancestors where the mother was the only carrier, and where the infant became parked by the mother, the advantage of paternal support is obvious. Any male who supports his own offspring increases the chance for the infant to survive; by this support he increases his Darwinian fitness more than other males who do not participate in carrying. In a population where paternal support is uncommon, this behaviour pattern seems to be the more evolved and more successful strategy. This strategy will become widespread within this population.

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