

Prolonged carrying of a dead infant among the golden monkey *Rhinopithecus roxellana* in the Qinling Mountains, China^{*}

LÜ Jiu-Quan^{1,2,3}, ZHAO Da-Peng^{1,2}, LI Bao-Guo^{1**}

1. College of Life Sciences, and Key Laboratory of Resource Biology and Biotechnology in Western China, Ministry of Education, Northwest University, Xi'an 710069, China

2. Department of Geology, Northwest University, Xi'an 710069, China

3. College of Life Sciences, Henan Normal University, Xinxiang 453007, China

秦岭川金丝猴长时间携带死婴行为^{*}

吕九全^{1,2,3} 赵大鹏^{1,2} 李保国^{1**}

1. 西北大学生命科学学院和西部资源生物与现代生物技术省部共建教育部重点实验室, 西安 710069

2. 西北大学地质学系, 西安 710069

3. 河南师范大学生命科学学院, 新乡 453007

摘要 本文首次报道了一例秦岭川金丝猴死婴被其母亲和近亲未成年雌猴长时间携带行为。携带者的行为除正常婴猴中常见的检视、嗅吻、理毛行为外, 还有嘴叼和手抓携带行为, 后者是正常婴猴携带行为中未曾见到过的。对于树栖生活为主的川金丝猴, 与正常婴猴相比, 死婴的携带更加困难, 母亲对死婴的行为方式在一定程度上体现了对婴猴的母爱和照料能力。本文对死婴携带行为发生的原因及其意义进行了初步探讨 [动物学报 53(1): 175–178, 2007]。

关键词 川金丝猴 死婴 携带行为

Key words Sichuan snub-nosed monkey, Dead infant, Carrying behavior

The maternal response to dead infants varies among nonhuman primate species. It has been reported that some primate species still carry their dead infants for several days in free-ranging situations (*Papio cynocephalus*: Altmann, 1980; *Gorilla beringei*: Warren and Williamson, 2004; Schaller, 1963; *Pan troglodytes*: Matsuzawa, 1992; *Papio anubis*: Nash, 1974; *Macaca fuscata*: Mori and Kudo, 1986; *Macaca radiate*: Rahaman and Parthasarathy, 1969) while such behavior is lacking in *Lemur catta* (Nakamichi et al., 1996).

For the Sichuan snub-nosed monkey *Rhinopithecus roxellana*, an arboreal colobine species, the newborn infant always uses its hands to cling to its mother's ventrum when its mother moves (Li et al., 2005). During our study on its social structure in Qinling Mountains in 2005, we observed that a dead infant was carried by its mother and a young female relative. In this report, we will describe this rare phenomenon in detail

and discuss its adaptive significance.

1 Materials and methods

This study was conducted in the Yuhuangmiao region, located in Zhouzhi National Nature Reserve on the northern slope of the Qinling Mountains. The ecology and history of this area have been reported by Li et al. (2000, 1999), Li and Zhao (2005) and Zhang et al. (2003, 2006). There are two groups of Sichuan snub-nosed monkeys at our study site: the eastern ridge group and the western ridge group (Li et al., 2000).

The western ridge group, as our study group, was provisioned with apples, radishes, and corn three times per day (10:00 am, 12:00 pm, and 2:00 pm); approximately 200 g per monkey per day in total. Based on closed distance between 0.5 meters and 50 meters, subjects were individually identified and the presences of OMUs were distinguished by using the method described

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^{**} Corresponding author. E-mail: baoguoli@nwu.edu.cn

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in Zhang et al. (2003).

During studies conducted from March to June in 2005, a dead infant was found in DB unit. This OMU consists of the resident adult male DB, six adult females, four young females, one juvenile and three infants (Table 1). The reproductive history of the dead infant's mother (BB) is shown in Table 2.

Table 1 The makeup of DB unit

Resident male	Adult female	Young female	Juvenile	Infant
DB	AX	NY (5 years, ♀)	ZW (2 years, ♂)	XW
	BTNX	NL (5 years, ♀)		XJ
	BB*	KL (5 years, ♀)		XB**
	FQ	KX (3 years, ♀)		
	JH*			
	WM*			

* Gave birth in 2005. ** Died when we found it.

Table 2 The birth history of BB

Birth sequence	Birth date	Offspring name	Offspring gender	Notes
1	Mar. 24, 2002	KX	Female	nulliparous
2	Apr. 11, 2003	ZW	Male	still alive in DB unit
3	Apr. 03, 2005	XB	Male	died when we found it

The dead infant was first observed on April 3 and the corpse disappeared on May 7–10. During this period, as soon as we found the dead infant, the carrier and its behavior directed toward dead infant were recorded with the method of *ad libitum* (Martin and Bateson, 1993). In the present study we report data on infant carrying behavior collected between April 3rd and May 6th in 2005.

2 Results

On the morning of Apr. 03, 2005, we found female



Fig.1 The dead infant was carried by its mother when moving

BB carrying a dead infant which was named XB. BB had not been observed to give birth. However, based on our previous observations (Li et al., 2005), we thought it likely that BB was the mother of this dead infant.

From that morning, BB carried the dead infant all along regardless of eating, moving or resting. She always carried the corpse with one forelimb and held it to her chest when moving (Fig.1). This gesture is very similar to normal carrying behavior for a live infant that is just a few days old. During resting, BB groomed, nuzzled and sniffed the dead infant. However, less and less of these behavioral categories occurred over time. The dead infant's body had become desiccated by April 16, 2005.

The young female KX, the BB's 3-years offspring, still followed BB and tried to carry the dead infant several times. On May 1st, 2005, KX was firstly found to handle the dead infant. Like her mother, she also sniffed, nuzzled and groomed the corpse when resting. Moreover, she clutched (Fig.2), even carried the infant's corpse with her mouth (Fig.3) when moving and climbing.

This clutching behavior was also seen when BB carried the corpse moving on the ground (Fig.4) and in the branches (Fig.5) respectively. This kind of behavior is not usually displayed during the normal interactions with living infants (Li et al., 2005).

We have not observed the dead infant carriers nuzzling or sniffing the corpse since May 1st. They only groomed the corpse occasionally. During our observations on the corpse and its carriers, we did not find any interactions between other members of the unit and the dead infant. They kept away from BB when she approached them with the dead infant during the first 15 days. Then other members within DB unit stopped avoiding the mother but showed no interest in the dead infant. During our observations, we did not see any interaction between the adult male and the dead infant.



Fig.2 The corpse was held by the young female, KX



Fig.3 The young female KX is carrying the corpse with its mouth



Fig.4 The dead infant was clutched by its mother moving on the ground



Fig.5 The dead infant was clutched by its mother moving on the branch

From May 7th to May 10th, we lost contact with the study group. When we re-established contact with the group on May 11th, BB, KX and other unit members were no longer observed to carry the dead infant. The corpse had disappeared for unknown reasons.

3 Discussion

Studies of mother-infant recognition in primates suggest that the first few days of the postpartum period represent a sensitive period for maternal motivation (Maestripieri, 2001). During this period, primate mothers are highly attracted to infants and motivated to take care of them (Maestripieri, 2001). For example, the frequency of infant-directed behavior in pigtail macaques *Macaca nemestrina* increases significantly during pregnancy and lactation affected by hormonal changes (Maestripieri and Wallen, 1995). In our study, the mother show intense maternal attachment to the dead infant during the first few days and treated the corpse as if

it was a living infant. The occurrence and reduction over time of these behaviors may due to the postpartum hormonal, as well as experiential, factors.

Interest in newborn infants by females other than the mother is typically high in Colobines (McKenna, 1979). For *R. roxellana*, infant caretaking by other unit-members is ubiquitous in both captive (Ren et al., 2000) and wild conditions (Li et al., 2005). During these observations, only the mother's young female offspring (KX) tried to carry the dead infant and succeeded in doing so while other female members of the DB unit kept far away from BB and showed no interest in the corpse. This active behavior showed by KX supports the kin selection hypothesis (Riedman, 1982) as infant handling is often directed at closely related infants (Nicolson, 1987).

The results of this study provides initial data on dead infant carrying in wild Sichuan snub-nosed monkeys and suggest that there are strong mother-infant bonds and kin

selection. Further research is required to evaluate the generality and possible significance of this carrying behaviour in this species.

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