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Intergroup Infant Transfer Among Red Howlers, *Alouatta seniculus*, in Venezuela: Adoption or Kidnapping?

Govindasamy Agoramoorthy

Episodes of infant adoptions have been reported in several species of primates (Thierry and Anderson, 1986). Infant kidnapping has also been reported for a number of free-ranging Old World primate species including *Papio anubis* (*v.* Ownes, 1975), *Presbytis entellus* (*v.* Sugiyama, 1965, 1966; Hrdy, 1978; Mohnot, 1980), *Macaca fuscata* (*v.* Itani, 1959), *Macaca radiata* (*v.* Rahamann and Parthasarathy, 1962), *Cercopithecus aethiops* (*v.* Lancaster, 1971), *Pan troglodytes* (*v.* Goodall, 1968), and *Gorilla gorilla* (*v.* Fossey, 1976). Although infant adoptions have been previously reported among howlers (Agoramoorthy and Rudran, 1992), no information is available on the behavior of infant kidnapping and its consequences among group living New World cebids in the wild. A field study on red howler (*Alouatta seniculus*) social behavior was carried out by the author during 1989-94 at Hato Masaguaral, Venezuela (Agoramoorthy, 1994, 1995, 1997) and several cases of male invasions followed by infanticide were observed (Agoramoorthy and Rudran, 1995), as well as three cases of infant adoptions (Agoramoorthy and Rudran, 1992). This paper describes an unusual case of intergroup infant transfer among red howlers.

Two red howler social groups numbered '6' and '7' were neighbors, and their home ranges overlapped. During the first week of April 1994, group 7 was comprised of 11 individuals, with two adult males, three adult females, one subadult female, two large juvenile males, one medium-sized juvenile male, one small juvenile male and one male infant (approximately 3 months old). On 10 April 1994, female #3 of group 7 was captured with her infant (#3.5) using chemical immobilization methods described previously by Agoramoorthy and Rudran (1994). Both mother and infant were marked with color-coded tags on both ears for visual identification. The female was an old adult, aged approximately 11 years. During early April 1994, group 6 was comprised of 12 individuals, with one adult male, four adult females, one large juvenile male, one large juvenile female, two small juvenile males, one small juvenile female, and a pair of approximately four month-old male infant twins. An adult female #4, approximately four years old was observed with these new born twins on 10 December 1993. According to the life history data, the female #3 of group 7 and female #4 of group 6 were not related.

On the morning of 20 April 1994 at 0830, groups 6 and 7 were seen in nearby trees within 20 meters of each other, and howled at each other for 25 minutes. Subsequently individuals of group 6, including female #4 with her infant twins, chased group 7. As a result, group 7 individuals were forced to move away from the area, and group 6 stayed and fed in the tree. The observation ended at midday. On the next morning when group 7 was contacted again, the infant #3.5 of female #3 was missing. After two hours of searching, the infant was found in the neighboring group 6 with female #4. How and why the infant was adopted or kidnapped by female #4 of group 6 was not known. Infant #3.5 was carried dorsally by female #4 of group 6, while her infant twins were carried ventrally. A large juvenile female was also observed to carry the adopted/kidnapped infant on a few occasions. No other individuals of group 6 participated in transporting or handling the infant. Although female #4 allowed the new infant to stay in body contact with her, it was not observed suckling.

From the morning of 21 April, the mother of infant #3.5 was seen wandering alone on the periphery of her group's range but moving towards the direction of group 6. She was not involved in the social activities in her group. On the next day, in the evening, she twice attempted to approach female #4, but she was chased away by the females. On both occasions, female #3 was alone and her group was not in the vicinity. At dusk, group 7 individuals were seen near group 6 and they later settled down to sleep with no apparent aggressive encounters. On the morning of 23 April at 0725, groups 6 and 7 were observed 15 meters apart and howling at each other. Ten minutes later, adult males and females of group 7, led by female #3, approached group 6 individuals and chased them away. A moment later, infant #3.5 was seen unattended by members of group 6 and it was vocalizing mildly. The mother approached the infant, and sniffed its head, body and genitals, and the infant immediately clung to the belly of its mother. It appeared to be weak and had probably been starved for the last two days.

Although it has been suggested that lactating young adult females with infants are most likely to adopt or kidnap infants than females without infants (Silk, 1980), the involvement of a mother of twin infants in adopting or kidnapping has never been reported previously for any nonhuman primate. Several hypotheses have been proposed regarding the causes and function of infant kidnapping, but the costs and benefits of such behavior are almost impossible to measure quantitatively (Hrdy, 1976). A number of benefits, including improved foraging for the mother after losing the infant to the kidnapper were suggested by Hrdy (1976). The female in this study, however, did not evidently gain any extra time for feeding or grooming. In fact, she isolated herself and did not participate in any social activities. This may have been due to psychological trauma and stress after losing her infant. A female long-tailed macaque was also reported to have shown high stress

levels after frequent kidnapping of her infant (Schaik *et al.*, 1991). After losing their infants due to infanticide red howler females have been observed to isolate themselves from other group members (Agoramoorthy and Rudran, 1992, 1995). Furthermore, in rhesus macaques, an adult female became ill after persistent attempts by another female to kidnap her infant (Hinde and Spencer-Booth, 1967). Lack of maternal intervention to retrieve kidnapped infants has been recorded in a number of captive as well as free-ranging primates (Maestripieri, 1993). The red howler female in this study, however, attempted unsuccessfully to retrieve her infant on at least two occasions.

In Hanuman langurs at Jodhpur, frequent interactions with neighboring social groups increase the frequency of infant kidnapping in cases where a large part of the groups' home ranges overlap (Mohnot, 1980). All 38 cases of langur infant kidnapping reported by Mohnot (1980) occurred during intergroup interactions in areas of home range overlap. Similar to Hanuman langurs, the home ranges of the red howler groups at Hato Masaguaral also overlap extensively (Agoramoorthy and Rudran, 1992, 1993, 1995), but the frequency of infant kidnapping appears to be low since no cases have been reported previously. This may be due to vigilance by the females, which are observed to defend their infants aggressively from attacking males (Agoramoorthy and Rudran, 1992, 1995; Agoramoorthy, unpubl. data).

A large juvenile female also carried the new infant on a few occasions and probably gained some experience in practicing mothering, an advantage cited for Hanuman langurs (Mohnot, 1980). The adopted/kidnapped infant was not physically harmed by members of group 6, but it was not observed to suckle, and after two days became weak and unable to move properly until it was picked up by its mother. This indicates that the adoptee/kidnapper had neglected the infant. The implications of the adoption/kidnapping described here are difficult to ascertain, but it appears that competition among females between groups may have played a role. Furthermore, in red howlers, both males and females routinely disperse and immigrate into new social groups (Crockett, 1984; Pope, 1992; Agoramoorthy and Rudran, 1993, 1995). Thus competition among females as well as males is severe among red howlers and this might have contributed, and deserves attention for future research.

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An Early Report on Tool Use by Neotropical Primates

Bernardo Urbani

Some of the early reports of tool use in *Cebus*, dating from the 18th and 19th Century, were summarized by Visalberghi (1990). Here I bring attention to probably the earliest report of such behavior, coming from the writings of Gonzalo Fernández de Oviedo y Valdés (1478-1557), born in Madrid, Spain. He first arrived in the New World with the expedition of Pedrarias Dávila (Miranda, 1996) and lived mainly in the Darien region (today Panama and northwestern Colombia). For his services to the Spanish Crown, Fernández de Oviedo was appointed Chronicler of the Indies by King Carlos V, who ordered him to "rest and write". This was a satisfactory arrangement for Fernández de Oviedo who in his retreat in Santo Domingo (today the Dominican Republic) occupied his time writing the "General and Natural History of the Indies" (*Historia General y Natural de Indias*), the first part of which was published in 1535 (Miranda, 1996).

Another, poorly known but no less important, work of his, the "Summary of the Natural History of the Indies" (*Sumario de la Natural Historia de las Indias*), was also written by order of King Carlos V, who requested a book on zoological and botanical aspects of the New World. The first edition was published in Toledo, Spain, on 15 February, 1526, and contains one of the first accounts of neotropical primates in "Chapter XXV. On the little monkey cats" (*Capítulo XXV. De los Gatos Monillos*). In this, he described how monkeys throw objects such as branches and stones at the "Christians", and recounts their variety in colors and shapes, from ones as small as a human hand to some as large as a Great Dane (Fernández de Oviedo, 1996). He also reported that monkeys use tools as follows "Some of these cats (monkeys) are so astute that many things they see men do, they imitate and also do. In particular, there are many that when they see how to smash a nut or a nutpine with a stone, do it in the same way and, when leaving a stone where the cat (monkey) can take it, smash all that are given to them. They also throw a small stone, of the size and weight of their strength, as would be thrown by a man" [*Algunos de estos gatos* (monos) *son tan astutos, que muchas cosas de las que ven hacer a los hombres, las imitan y hacen. En especial hay muchos que así como ven partir una almendra o piñón con una piedra, lo hacen de la misma manera, y parten todos los que les dan, poniéndole una piedra donde el gato* (mono) *la pueda tomar. Asimismo tiran una piedra pequeña, del tamaño y peso que su fuerza basta, como la tiraría un hombre*] (Fernández de Oviedo, 1996).

This is probably the first report (1526) of tool use by New World monkeys. Since Fernández de Oviedo traveled mainly in the Darien region, it would seem likely that the specific reference could have been to *Cebus capucinus*, a neotropical primate of a genus with the greatest potential to manipulate objects. This historic occurrence agrees with recent known examples of tool use by *Cebus* in the wild, including that of Fernandes (1991) to open oysters, and nut-cracking using stones reported by Langguth and Alonso (1997), and specifically for *Cebus capucinus*, with the use of stones to open oyster shells by J. Hernández-Camacho and R. Cooper (in Moynihan, 1976), the use of a club against a snake (Boinski, 1988), and the recent report of object-use for extractive foraging (Panger, 1998).

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