

## Tree Dismantling—a Display of Male Macaques at Phu Khieo Wildlife Sanctuary, Thailand

Adult males of two different macaque species from the same primate community (Phu Khieo Wildlife Sanctuary, Thailand) were observed performing a thus far undocumented and complex form of display behavior resulting in partially dismantling of a dead tree. It involved stripping of large portions of bark and breaking of branches. Both components were very noisy and thus possibly served in inter-group communication of a solitary pigtailed macaque but were also employed by an Assamese macaque surrounded by group members.

In monkeys, display behavior has most often been observed in the genera *Macaca* and *Papio* (MODAHL & EATON, 1977; MEHLMAN, 1996) and seems to occur much more frequently in males than in females (WOLFE, 1981). In most cases the episode is brief, composed of stereotypic behavior such as shaking or kicking of a substrate and rapidly tossing or swinging the body. In spite of early reports for macaques (IMANISHI, 1957; ALTMANN, 1962; BERNSTEIN, 1967) the behavior has rarely been quantified (MODAHL & EATON, 1977; WOLFE, 1981; MEHLMAN, 1996). It may occur in various contexts and can be induced by different stimuli. The context seems difficult to discern in Japanese macaques (MODAHL & EATON, 1977). In Barbary macaques it mainly occurs in intra-group contexts and locational signaling has been suggested as an additional function implying that males advertise their location or direction of travel (MEHLMAN, 1996). Here we describe a new male display behavior observed in two macaque species that might function in inter- as well as intra-group communication.

The study site (16°27'N, 101°38'E) is located in Phu Khieo Wildlife Sanctuary, Northeast Thailand, at 600–800 m a.s.l. The vegetation mainly consists of hill evergreen forest (54.0%), dry evergreen forest (20.5%), and dry dipterocarp or mixed pine-dipterocarp forest (16.9%; BORRIES *ET AL.*, 2002). A trail system was established based on existing animal paths. Since October 2000 these trails were walked in search of monkeys. Confirmed primate species are slow loris (*Nycticebus coucang*), Phayre's leaf monkey (*Trachypithecus phayrei*), Assamese macaque (*Macaca assamensis*), pig-tailed macaque (*M. nemestrina*), rhesus macaque (*M. mulatta*), stump-tailed macaque (*M. arctoides*), and white-handed gibbon (*Hylobates lar*). A detailed description of the observations follows.

**First event.**—On Dec. 11, 2002 at 0720 h Mr. Araya Yamee and C.B. heard sounds from about 25 m above the ground. They approached to see an adult male pig-tailed macaque in a dead, standing tree tearing off bark with his hands and mouth, producing loud ripping sounds. Large pieces fell to the ground. The male's movements also caused large branches to break (each several meters long) although it was not clear, how they were actually detached. Thereafter the male, who still appeared agitated, moved about in the dead tree for 4 minutes without causing additional pieces to fall before leaving. Tree dismantling made loud sounds and the whole sequence lasted for 15 minutes. The tree trunk remained standing with several branches still attached. During the whole event the

male was not observed to chew on or to swallow any of the pieces it had broken off. For more than an hour prior to the first sounds we had been moving very quietly through the forest within earshot of the dead tree. There were no signs of primates, thus it is assumed that there were no other macaques within about 500 m. However, 3.5 h later and about 1 km north of the dead tree we encountered a group of pig-tailed macaques moving northeast. During the past few days, pig-tailed macaques had regularly been encountered in this area.

**Second event.**—A similar incidence was observed on August 24, 2002 (G. Preece and A. Pitts, pers. comm.). It involved an adult male Assamese macaque which stripped big chunks of bark from a dead, upright tree using hands and teeth. He too did not chew or swallow any of the pieces. Prior to these observations, there was a lot of noisy activity within the trees with branches falling to the ground and loud vocalizations. The bark stripping sequence lasted for 4 to 6 minutes until the observers were detected. In contrast to the first event, this sequence took place within the group. There were several Assamese macaques within sight and clearly within earshot. However, due to the wildness of the group, the observers tried to stay hidden so that only few behavioral details could be witnessed and the reaction of the surrounding group members remained unclear.

These two events of tree dismantling are most likely not part of feeding or foraging behavior because no pieces were chewed or swallowed. Both events were indeed very noisy. It is therefore likely that they functioned as displays. However, display behaviors reported for macaques (MODAHL & EATON, 1977; MEHLMAN, 1996) have usually been of short duration and performed in a stereotypic fashion (MODAHL & EATON, 1977). In contrast, tree dismantling seems to last much longer and to be less stereotypic. To the best of our knowledge ripping of bark or tossing of branches has not been described. Only branch breaking is reported for Barbary macaques (MEHLMAN, 1996). Our observations, thus, add a complex behavioral sequence to the catalogue of macaque display behavior.

Tree dismantling is loud and most likely can be heard from far; it could, therefore, be used in inter-group communication. The behavior of the solitary pigtail male supports this idea although we do not know how far the pigtail group was at the time of the display and whether he was aware of its presence. The Assamese male performed the tree dismantling surrounded by group members so that the display might have served in intra-group communication. Intra- as well as inter-group communication is in accordance with the location advertisement function proposed for displays by MEHLMAN (1996). Furthermore, because the behavior does not seem to occur in other macaque populations, tree dismantling could potentially be a local tradition (VAN SCHAİK *ET AL.*, 2003). Further research is required to analyze the function and spread of this behavior.

**Acknowledgments.**— We thank the National Research Council of Thailand and the Royal Forest Department for permission as well as Mr. Jarupol Pharnasuk (superintendent, PKWS), Mr. Tosaporn Naknakled (former chief, PKWS), Mr. Kitti Kreetiyutanont (Natural Resource Management Section, PKWS and Chief of Phu Luang Wildlife Research Station), Dr. Kanjana Nitaya (Wildlife Conservation Division), Dr. Naris Bhumpakphan (Department of Forest Biology, Kasetsart University), and Dr. Warren Brockelman (Center for Conservation Biology, Mahidol University) for support and cooperation. Financial support by the L.S.B. Leakey Foundation, National Geographic Society (7246-02), the National Science Foundation (BCS-0215542), and Stony Brook University is gratefully acknowledged.

## REFERENCES

- ALTMANN, S. A. 1962. A field study of the sociobiology of rhesus monkeys, *Macaca mulatta*. *Annals of the New York Academy of Science* 102: 338–435.
- BERNSTEIN, I. S. 1967. A field study of the pigtail monkey (*Macaca nemestrina*). *Primates* 8: 217–228.
- BORRIES, C., E. LARNEY, K. KRETIYUTANONT, AND A. KOENIG. 2002. The diurnal primate community in a dry evergreen forest in Phu Khieo Wildlife Sanctuary, Northeast Thailand. *Nat. Hist. Bull. Siam Soc.* 50: 75–88.
- IMANISHI, K. 1957. Social behavior in Japanese monkeys, *Macaca fuscata*. *Psychologia* 1: 47–54.
- MEHLMAN, P. T. 1996. Branch shaking and related displays in wild Barbary macaques. Pages 503–526 in J. E. Fa and D. G. Lindburg (eds.) *Evolution and Ecology of Macaque Societies*. Cambridge University Press, Cambridge.
- MODAHL, K. B., AND G. G. EATON. 1977. Display behaviour in a confined troop of Japanese macaques (*Macaca fuscata*). *Animal Behav.* 25: 525–535.
- VAN SCHAIK, C. P., M. ANCRENAZ, G. BORGAN, B. GALDIKAS, C. D. KNOTT, I. SINGLETON, A. SUZUKI, S. S. UTAMI, AND M. MERRILL. 2003. Orangutan cultures and the evolution of material culture. *Science* 299: 102–105.
- WOLFE, L. D. 1981. Display behavior of three troops of Japanese monkeys (*Macaca fuscata*). *Primates* 22: 24–32.

**Carola Borries**

**Andreas Koenig**

Department of Anthropology

Stony Brook University

Stony Brook, NY 11794-4363, USA

Email: cborries@notes.cc.sunysb.edu