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- form (Type 1) entails an individual, almost always an adult female, sitting still in a normal, non-ritualized, position in a given direction in an apparent solicitation to other group members to follow. The second form (Type 2, Figure 1) is a ritualized posture described in the present note. It is similar to carnivore pointing behavior described by Morris (1986), Ewer (1973), and others (e.g., Shaler, 1895; Scott and Fuller, 1965; Arkwright, 1902; Whitman, 1899; Rine, 1973).
- As described for pointing dogs and wolves by Morris (1986), "The behavior of the pointer on a hunt seems highly artificial, but it is not. When wolves first scent a prey, the leading members of the pack freeze in their tracks and point themselves rigidly in the direction of the scent. There is a pause, until they have all fixated on the odor of the prey, and then they begin the next phase of their hunting operation. It is this wolf-pause that the pointer is performing. The only thing that is strange about the dog example is the way the animal extends the 'frozen moment'." (pp.67).
- I have observed the "frozen moment" in mantled howlers on nine occasions in riparian habitat at Hacienda La Pacifica, Cañas, Guanacaste, Costa Rica. All occurrences took place between 5-7 August 1976 (n= 3) and between 21 February and 10 March 1977 (n= 6). Adult females exhibited Type 2 pointing eight times, a young male, once. In all instances, animals appeared to be searching for food, and changes in direction occurred in group movement, sometimes leading to the formation of subgroups when non-posturing individuals followed females pointing in different directions. Positions of non-posturing individuals often shifted from subgroup to subgroup as they appeared to "decide" which pointer to follow. Males and females generally vocalized continuously during this process which was reminiscent of avian "information centres" described by Ward and Zahavi (1973).
- Ewer (1973) suggested that "vegetarian species" (such as mantled howlers) may be responsive to plant, especially flower, odors, suggesting a relationship between olfactory

POINTING BEHAVIOR IN MANTLED HOWLING MONKEYS, *ALOUATTA PALLIATA*

Clara B. Jones

Stereotyped and ritualized action patterns may produce visual signals oriented to potential receivers (Bradbury and Vehrencamp, 1998). These postures may transmit information to conspecifics and may exhibit "typical intensity" whereby the posture appears "unambiguous" and varies little within and between (closely related) species (Eibl-Eibesfeldt, 1970). Visual signals, thus, tend to be highly conservative evolutionarily (Bradbury and Vehrencamp, 1998).

In this note I report ritualized "pointing" behavior in mantled howler monkeys (*Alouatta palliata* Gray). Pointing in mantled howlers occurs in two forms during foraging. One

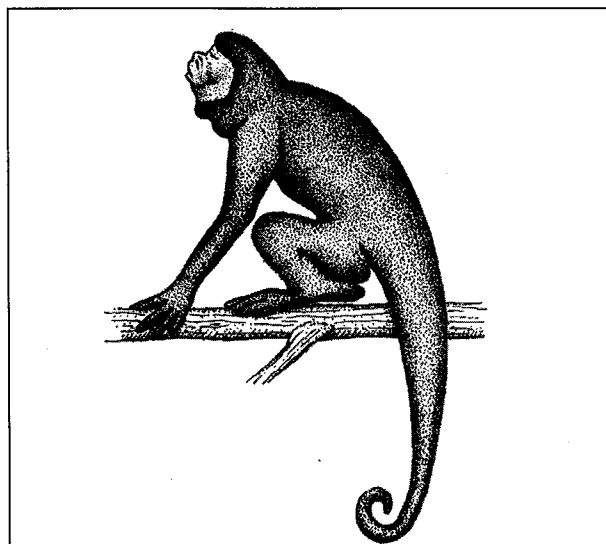


Figure 1. Approximate representation of the ritualized pointing posture (Type 2, see text) of an adult female mantled howler.

sensitivity and "mode of life". In her opinion, the ritualized pointing posture originated from the animal's tendency to extend its neck to smell. Arkwright (1902) makes the intriguing suggestion that hunting by smell may select for "spreading nostrils", a diagnostic trait of New World monkeys.

Ewer also stresses that ritualized pointing in wolves is a silent posture that may occur in association with a "group ceremony", similar to the "greeting ceremony" seen in African hunting dogs. Glander (1975) has described the "greeting ceremony" in mantled howlers, and the "information centre" noted above may be similar in form and function to the wolf and hunting dog ceremonies discussed by Ewer. Such apparent similarities in behavior may represent convergent mammalian patterns.

Discussing pointing dogs, Scott and Fuller (1965) point out that the tendency to crouch is primitive in mammals and make the interesting suggestion that ritualized pointing represents "selection to restrain attack". This view may be generalized to the idea that ritualized pointing indicates a restraint on selfish behavior and the tendency to forage solitarily for maximum individual gain. Social foraging has been described in howlers (Milton, 1980; Glander, 1975; Jones, 1996), and howlers are noted for their communal and non-aggressive tendencies (e.g., Wilson, 1975).

The behavior described in this note is consistent with Milton's (1980) conclusion that foraging in howlers is "goal directed". The pattern of decision-making leading individuals to follow different pointers (both Type 1 and Type 2) to alternative feeding sources may explain patterns of subgrouping and differential assortment of group members. These patterns of behavior and the vocalizations accompanying them require systematic study in the future.

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ADAPTATION TO NATURAL FOOD RESOURCES BY SEMI-FREE COMMON MARMOSETS (*CALLITHRIX JACCHUS*): PRELIMINARY RESULTS

Hartmut Rothe

In 1995, the colony of common marmosets of the Institute of Zoology and Anthropology, University of Göttingen, moved from an air-conditioned and artificially illuminated laboratory to a 6.3 ha outdoor enclosure in the vicinity of Göttingen, Lower Saxony (51°27'N, 10°03'E). A detailed description of the enclosure and the new buildings has been given elsewhere (Rothe, 1996; Rothe *et al.*, 1997). All our marmosets were born in captivity (5th to 8th filial generation). Before their removal to the open-air enclosure the animals had no contact with predators and were not forced to search for food.

From April to July 1995, the marmosets acclimated to the new surroundings and to the Middle European climate (Köppen and Geiger, 1961). During this time each group was housed in a wooden hut (2.7 x 2.7 x 2.4 m) with roofed veranda 1.3 x 2.7 x 2.4 m and adjacent wire-mesh cage (1.3 x 1.3 x 2.6 m). The animals were fed twice daily (details in Ahlborn and Rothe, in press). In July 1995 the marmosets were allowed access to the open-air enclosure. Each social group had a home-range of about 1.0 ha during the first year, and from 1996 it increased to c. 2 ha (details in Ahlborn and Rothe, 1997; Behet and Rothe, in review; Suchi and Rothe, 1999). The animals are fed regularly twice a day; the feeding sites are spread throughout the home-range, including the hut-cage-complex. Depending on the weather, the animals remain in the enclosure until mid-November. During the winter they are again confined to the hut-cage-complex. The data were taken *ad libitum* (Martin and Bateson, 1986).

Preying on Animals

During the first year in their new habitat the marmosets,