SHORT COMMUNICATION

Feeding encounters between a group of howler monkeys and white-nosed coatis in a small forest fragment in Los Tuxtlas, Mexico

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Interactions between sympatric species are of particular interest for understanding the mechanisms that allow animal coexistence in the ecological community. The mantled howler monkey (*Alouatta palliata* Gray) and the white-nosed coati (*Nasua narica* Linnaeus) are similar-sized mammals with a sympatric distribution in the Neotropics (Nowak 1999). Since these two species are partly frugivorous (howler, Crockett & Eisenberg 1987; coati, Gompper 1997), and fruit is often limited (Laurance *et al.* 2003), howlers and coatis might be observed foraging from the same fruiting tree, but there is no information regarding this possibility. We studied the feeding encounters between these two species in a small forest fragment, and discuss the conditions under which these episodes occur.

The study site was located in Playa Escondida (18°27′–18°36′N, 95°03′–95°03′30′W), a *c.* 40-ha forest fragment located in Los Tuxtlas Biosphere Reserve, in the southern part of the state of Veracruz, Mexico. Observations were carried out as part of a 16-mo study (March 1997–June 1998) on the feeding ecology of an *Alouatta palliata mexicana* Merriam group consisting of 7–8 members (Asensio *et al.* in press).

While following the howler monkey group, all interspecific encounters between howler monkeys and coatis were recorded. An interspecific feeding encounter was considered to occur when both species fed in the same tree at the same time (simultaneous feeding), or when one species arrived at a tree and began to feed after the other departed within a 5-min period (alternating feeding). Tree species, dbh and the number of coatis present at each encounter were recorded.

Over 717 h of observations, a total of 23 encounters were recorded between howler monkeys and coatis, all of them in the middle to high canopy. During five of these episodes, coatis just passed by a non-fruiting tree where the howler group was resting without interacting. The other 18 episodes were feeding encounters where both species foraged on the ripe fruit of individual trees with a mean dbh of 100.9 cm (SD = 49 cm). Most feeding encounters (15) took place in fig trees (*Ficus* spp.). Fifteen occurred between April and mid-June at the end of the dry season and the remaining three in October. Mean coati band size during encounters was 2.5 animals and on 12 occasions only solitary coatis were involved.

Ten of the feeding encounters were simultaneous and the other eight were alternating. Simultaneous encounters took place in trees with a significantly larger dbh than alternating encounters (Mann–Whitney $U_{10,8} = 10.0$, P = 0.008). During one of the simultaneous encounters between the howler group and a solitary coati in a medium-sized *Ficus oerstediana* tree (110 cm dbh, *c.* 20 m high) laden with figs, an adult howler male attacked the coati by biting its tail and the coati left the tree immediately. This was the only overt interaction observed between the two species. During six of the alternating encounters the coatis were already feeding in the tree, and when the howler monkey group arrived the coatis departed, while in the other two, the coatis began to feed on the tree only after the howler monkeys had left. We did not find differences in the number of coatis between alternating and simultaneous feeding encounters ($U_{10,8} = 28.0$, P = 0.257).

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Most feeding encounters took place at the end of the dry season and in fig trees. At this time of the year the litter fauna declines in abundance and becomes more patchily distributed in the tropical forest, which forces coatis to depend mainly on fruits until the arrival of the rainy season (Levings & Windsor 1982, Russell 1982, Valenzuela 1998). On the other hand, fig fruits represent an abundant food source for numerous frugivorous species (Shanahan *et al.* 2001) and represent one of the resources most contested by different species such as *Cebus capucinus*, *Ateles geoffroyi*, *Alouatta palliata* and *Nasua narica* (Gompper 1996, Rose *et al.* 2003). Therefore, the reduction in litter fauna in the dry season plus the presence of highly desirable fruits such as figs favours the feeding encounters between howler monkeys and coatis.

The end of the dry season is also the breeding period for coatis (Gompper 1995, Russell 1982, Valenzuela 1998). During this period mothers forage alone while the non-breeders in the band remain more or less close together and forage over relatively small home ranges (Russell 1982, Valenzuela & Ceballos 2000). This could help to explain the high number of solitary individuals and the overall small size of coati groups observed. The general reduction in home range size during this period plus the higher energetic demands of lactating females would force coatis to feed on the same tree and at the same time as howler monkeys.

In eight alternating feeding encounters coatis either departed from the trees in which they had been feeding when the howler monkeys arrived, or began to feed on the tree only after the howler monkeys left. These observations indicate the potential competition over food between the two species, and suggest that howlers may displace coatis during these episodes. Aggressive encounters over food have been reported during both interspecific and intraspecific encounters (Dias & Strier 2000, Gompper 1996, Rose *et al.* 2003). However, only one aggression event was observed during a feeding encounter between howlers and coatis. Such low levels of aggression could be explained by the fact that most feeding encounters occurred in large fruiting trees. Competition over food is thought to be less intense in large food patches with a small number of competitors (Connell 1983, Rose *et al.* 2003, Stevenson *et al.* 2000, Wahungu 1998). Furthermore, feeding in larger trees would allow coati and howler monkey groups to maintain larger inter-individual distances, which in turn would also decrease interspecific direct competition. In this sense fig trees in which howlers and coatis fed together were large and the two groups were small with respect to the normal sizes of both *A. palliata* (Chapman & Balcomb 1998) and *N. narica* (Gompper 1997). Another sign indicating that larger trees increase interspecific tolerance is that those trees in which howlers and coatis fed simultaneously were larger than those in which they fed alternatingly.

We propose three main factors promoting the observed interspecific feeding encounters especially during the dry season: (1) the decrease in litter fauna (2) the reduction in home range sizes of coatis and (3) the higher energetic demands of lactating coati females during the breeding period. Factors such as high fruit availability, large size of fruiting trees, and small size of both howlers and coatis groups increase interspecific tolerance, reducing interspecific competition over food. Overall, these observations suggest that further research should focus on the nature, extent and implications of each of these factors.

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