Summary

Feeding ecology of three frugivorous civets in Borneo

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Background

In this study, I investigated feeding ecology of three sympatric species of frugivorous civets, namely the common palm civet *Paradoxurus hermaphroditus*, the small-toothed palm civet *Arctogalidia trivirgata*, and the binturong *Arctictis binturong* in Bornean rainforests. They possess typical carnivorous dental morphology such as sharp canines and carnassial teeth, and noticeably short gastrointestinal guts which are suitable for carnivory. Due to these morphological constraints on frugivory, frugivorous civets seem to confront with a difficulty in effective digestion of fruits. Morpho-physiological disadvantage is inevitable for them, and then, they may exhibit behavioural adaptation to frugivory. Evaluating feeding ecology of the tree civet species, I discussed the characteristics of their feeding ecology and the coexistence mechanism of the three sympatric civet species

Methods

I investigated feeding ecologies of the three civet species in terms of their diets and habitat preferences by intensive field study and laboratory works. I researched on their diet, physical and nutritional characteristic of food fruits, and fruit preference in inter-species and intra-tree level. Additionally, I studied on horizontal and vertical habitat uses. After I described them, I evaluated the characteristics of frugivorous civets by comparing their feeding behaviours in fruiting trees and fruit type they feed on with those of other

frugivorous animals; three primate species and two hornbill species. Regarding coexistence mechanism of three sympatric civet species, I compared the diet and habitat preference of each species.

Results and Discussion

The results indicate that all the frugivorous civets feed on sugar-rich soft-pulped fruits rather than lipid-rich soft-pulped fruits at night, and figs are predominant diet in the binturong. The wide and short gut of the frugivorous civets occasions low surface area/ gut volume ratio, restricting absorption of lipid. Conversely, absorption of simple soluble sugars may be more efficient. All frugivores such as primates and hornbills in Borneo can be competitors of the frugivorous civets because they consume the same fruit types, yet contest competition to food resources could be avoided by the differences in active time. These habits may enable them to maintain their population even though they possess disadvantageous morphology to frugivory.

The results also indicate that the three frugivorous civet species inhabit the same area, yet they have different diets and habitat preferences. The binturong largely depended on fig fruits even though fig trees were not so common. Although the two species of palm civets have similarity in their foods and habitat preferences as both of them preferentially use fruits of pioneer plants and forests around canopy openings in their active time, the common palm civet feeds on sugar-rich fruits whilst the small-toothed palm civet does unripe fruits, floral nectar, and bark sap besides sugar-rich fruits. In addition, only the common palm civet forages on the ground. These differences in diet and habitat use may enable them to coexist even in a small scale.