# SCIENTIFIC CONTRIBUTIONS

*African Bat Conservation News publishes brief notes concerning the biology of bats, new geographical distributions (preferably at least 100 km from the nearest previously published record), sparsely annotated species lists resulting from local surveys including roost counts and echolocation and sonograms of bat species occurring on the African continent and adjacent regions, including the Arabian peninsula, Madagascar, and other surrounding islands in the Indian and Atlantic oceans.*

## *ROUSETTUS MADAGASCARIENSIS* GRANDIDIER 1929 FEEDING ON *DIMOCARPUS LONGAN* IN MADAGASCAR

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**Key words:** foraging, litchi, *Rousettus*, seed dispersal, Madagascar

Madagascar's fruit bat community is comprised of three endemic species (*Pteropus rufus* E. Geoffroy St.-Hilaire, 1803, *Eidolon dupreanum* (Schegel, 1867) and *Rousettus madagascariensis* G. Grandidier, 1929). The demand for bushmeat is a well-documented threat to the larger bats, *P. rufus* and *E. dupreanum* (MACKINNON *et al.* 2003), and there is now growing evidence that the small (forearm = 70.5 ± 3.5 mm SD, mass = 63.52 ± 10.1 g SD, n =17) *R. madagascariensis* is also subject to hunting pressure (GOLDEN 2005). The impact of the destruction of native forests on Malagasy fruit bats is not fully understood, and even though all species can use domesticated fruits during some seasons, they all also feed on flowers and fruits of native forest plants (HUTCHEON 2003).

Madagascar's fruit bats provide important ecological services as seed dispersers and pollinators although the role of *R. madagascariensis* has yet to be thoroughly explored in this respect. There are few published observations of foraging by Malagasy fruit bats as most dietary studies have focused on faecal analysis. Some data, however, are available for *P. rufus* and *E. dupreanum* (ANDRIAFIDISON *et al*. 2006; BOLLEN & VAN ELSACKER 2002; RAKOTONIRAINY 2001), but few for *R. madagascariensis.* To our knowledge the only such published data on the diet of this taxon include observations of bats feeding extensively on banana (*Musa*, Musaceae) and litchi (*Litchi chinensis*¸ Sapindaceae) fruits near Tolagnaro in the south-east of the island (GOODMAN 1999).

As part of a study on the ecology of *R. madagascariensis*, we visited Anosibe An'ala (19°23'S, 48° 20'E), Province of Toamasina, in the central east. Our observations, between 20 and 23 February 2006, were made near the village of Vohibola in a landscape with scattered fragments of mid-altitude humid forest, pseudo-steppe and agricultural areas. In addition to rice and various root crops, a wide variety of introduced fruits are also cultivated, such as the Sapindaceae *Litchi chinensis* and *Dimocarpus longan* and four species of Myrtaceae *Syzygium jambolanum* (makoba), *Eugenia jambolana* (rotra), *Syzygium jambos* (jamborzano) and *Psidium cattleianum* (guava).There was no *Nephelium lappaceum* (Sapindaceae, litchi poilu), another cultivated litchi in Madagascar, at the study site. We made a preliminary assessment of bat activity by mist netting *R. madagascariensis* near the base of the fruiting trees. We then directly observed the bats and recorded them with an infrared video camera as they fed on ripe fruits.

*D. longan* is distinct from *L. chinensis* in colouration (Fig.


Figure 1a: Fruit of *Litchi chinensis*.


Figure 1b: Fruit of *Dimocarpus longan*

1), morphology and size (fruit size *D. longan*: mass = 7.0 ± 1.67 g SD, length = 21.8 ± 1.45 mm SD, n = 7; fruit size *L. chinensis*: mass= 20.3 ± 2.01 g SD, length = 33.6 ± 1.45 mm SD, n = 20). We selected one of the *D. longan* trees, which we estimated to have 3,000-4,000 ripe fruits, as our focal sampling unit.

We netted 17 *R. madagascariensis* near two fruiting *D. longan* trees. Bats arrived at the tree around 19:55, approximately 90 minutes after sunset, and observations were made until 04:00 the following morning, approximately 60 minutes before sunrise, when the bats departed for their day roosts. It appeared that peak activity was reached soon after the arrival of the first bats, giving the impression that the bats travelled synchronously from the roost to the feeding site. We located a single roost 18 km from the study site in a dark cave, although the bats that we observed may have travelled from a different roost site. We estimated that 100 *R. madagascariensis* were using the focal trees and they used two main feeding strategies. For the first foraging method, bats would hover near a clump of ripe fruits before removing one with their teeth, placing it in their mouth and flying to a nearby feeding perch, where in an upside down position the fleshy white drupe was swallowed and the seed and husk discarded. The bats dropped some of the fruits before alighting on their perch. At one feeding perch in a mango tree 40 m from the focal *D. longan* tree, we counted 45 discarded seeds (size of measured seeds: n = 7, weight 1.8 ± 0.36 g SD, length = 14.1 ± 1.38 mm SD) in a single night. The second foraging method consisted of the bats landing on a branch, suspended upside down by their feet, and feeding on up to 20 fruits sequentially during a given bout. We counted approximately 800 bat-damaged fruits underneath the tree on the morning of 21 February.

*R. madagascariensis*, which weighs on average 60-70g, carried fruits weighing 11-14% of their body mass, 40 m or more from the fruiting tree. We found seedlings of *D. longan* up to 250 m from the mature trees, possibly indicating the maximum distance covered by a fruit-carrying bat. This mode of seed dispersal has been noted previously for *R. madagascariensis* feeding on *L. chinensis* (GOODMAN 1999). As most studies on the diet of Malagasy pteropodids have relied on the collection of faecal material from under day roosts, or sometimes at nocturnal feeding sites, the dispersal of fruits during short foraging flights has been largely overlooked.

Litchis, largely *L. chinensis*, are an important international export commodity in eastern Madagascar and fruit bats are sometimes persecuted for their perceived role in consuming large numbers of fruits. Although *D. longan* is not an important crop in economic terms on the island, at our study site it provided an important food source for the family that planted the trees in 1984. Up to ten bats per night were killed during the fruiting season by the family to protect their fruits. Given that there appears to be a conflict between human livelihood and bat conservation further studies are needed to quantify the impact of fruit bats on litchis in Madagascar.

**Acknowledgments**

The research was funded by the Disney Wildlife Conservation Fund, BP Conservation Programme and Darwin Initiative. Permission to conduct the research was given by the Department of Waters and Forests, Ministry of the Environment. Thanks to Christophe Rahaingonirina, Sylvèstre Raharimbola, Rado Andriamihaja for assistance in the field and Jimmy Chan for permission to study the *D. longan* trees. Richard Jenkins and Paul Racey made helpful comments on earlier versions of the manuscript. We thank Steven Goodman, Robert Barclay and an anonymous referee for reviewing the article.

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*Submitted: 06 November 2006* *Accepted: 30 November 2006*