

Kleptoparasitism of laughingthrushes *Garrulax* by Greater Racket-tailed Drongos *Dicrurus paradiseus* in Myanmar

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Drongos *Dicrurus* of several species are known to occur in mixed-species flocks during the non-breeding season. In India, the Greater Racket-tailed Drongo *Dicrurus paradiseus* has been found in flocks with Greater Yellownapes *Picus flavinucha* (Bates 1952), and the Black Drongo *Dicrurus macrocercus* frequently associates with Common Mynas *Acridotheres tristis* (Dewar 1904, Veenah and Lokesha 1993). In addition, Crested Drongos *Dicrurus forficatus* attend mixed-species foraging flocks in Madagascar (Hino 1998). Other observations of drongos foraging in mixed-species foraging flocks suggest that drongos benefit from enhanced foraging success in flocks by exploiting arthropod prey flushed by flockmates (Bates 1952, Dewar 1904, Veenah and Lokesha 1993) or by kleptoparasitizing flockmates (Hino 1998). We studied Greater Racket-tailed Drongos in Myanmar to determine if we could observe behavioural interactions between drongos and their flock-mates that might explain the basis of their association.

The study was conducted from 16–29 January 1999 at Chatthin Wildlife Sanctuary (23°43'N 95°31'E), located roughly 160 km NNW of Mandalay in Myanmar's Central Dry Zone. The vegetation at the sanctuary is mostly dry deciduous *Indaing* forest dominated by *Dipterocarpus tuberculifer*, but also includes mixed deciduous forest composed of various evergreen and deciduous species (Salter and Sayer 1983, McShea *et al.* 1999, Nay Myo Shwe *et al.* 1999). Bird flocks were located by walking slowly (ca 1.5 km hr⁻¹) through the forest, watching for movement and listening for vocalizations of common flock associates. Once a flock was located, it was followed as long as possible. Observations were conducted with the aid of 8x42 binoculars. Because these flocks occupy home ranges that are fairly stable over time (King and Rappole 2001), and observers avoided revisiting portions of the sanctuary in which drongo flocks had already been followed, we are confident that the observations of drongos described below represent separate individuals.

We encountered Greater Racket-tailed Drongos nine times, once as a single individual, once with another conspecific accompanying a Common Flameback *Dinopium javanense*, and the remaining seven times as single individuals accompanying mixed-species foraging flocks containing laughingthrushes. Up to 40 Greater and Lesser Necklaced Laughingthrushes (*Garrulax pectoralis* and *G. monileger*) (average 17.1 ± 4.14 SE), as well as eight other less common species, together comprising < 15% of all individuals (King and Rappole 2001) were present in these flocks. We observed six attacks by drongos on laughingthrushes during a total of 346 min of observation, (mean time/flock = 58 min ± 16 SE). On 26 January we observed one drongo attacking laughingthrushes five times, and on 28 January

we observed another drongo attack a laughingthrush once. In all of these instances, attacks were initiated from low perches (1–2 m above ground) and delivered at laughingthrushes foraging on the ground. Attacks were followed by chases lasting from a few seconds to over a minute, during which the drongo would either strike the laughingthrush in flight and drive it to the ground, or chase the bird in circuitous flights through the understory or even up into the lower canopy. We were unable to discern with certainty whether or not drongos were successful in stealing food items during these chases, although we did observe one instance in which the laughingthrush being pursued had a large prey item, probably a grasshopper, in its bill. We also observed seven foraging manoeuvres by drongos that were directed at prey not in the possession of laughingthrushes. Of these, three were directed at the ground, and the remainder were directed at airborne prey an average of 7.07 m (± 0.71 SE) above the ground. One successful foraging manoeuvre yielded what appeared to be a large grasshopper.

We heard drongos emit what appeared to be alarm calls on two occasions. During the first instance, on 28 January 1999, a drongo that had been accompanying a mixed-species flock for some time was observed on a perch 1.5 m above the ground, with its neck stretched downward and outer tail feathers flicking outwards, giving a loud, harsh *kraaak kraaak kraaak* evidently at something below it on the ground. As the drongo called, laughingthrushes flew up from where they had been foraging on the ground to low perches nearby. On 29 January 1999 a drongo perched roughly 2 m above the ground dove towards the ground and then banked into a low, horizontal flight away from the observer, while emitting a loud *E-gek-gek-gek*, at which several, nearby laughingthrushes flushed from the ground, and flew off in the same direction as the drongo.

Other authors have suggested that drongos attending foraging flocks benefit from increased availability of prey flushed by flockmates (Dewar 1904, Bates 1952, Veenah and Lokesha 1993). In contrast, we observed that nearly half of drongo foraging manoeuvres were apparent kleptoparasitic attacks on laughingthrushes, suggesting that kleptoparasitism is a potentially important benefit derived by Greater Racket-tailed Drongos from participation in mixed species flocks. Reports of kleptoparasitism in Passeriformes are relatively uncommon (Brockman and Barnard 1979), although Dewar (1904) observed Black Drongos kleptoparasitizing mynas, and Hino (1998) reported that Crested Drongos in mixed-species flocks in Madagascar kleptoparasitize flock mates extensively. The association between Greater Racket-tailed Drongos and laughingthrushes, and perhaps other drongo species and

their flockmates, have several characteristics which favour the evolution of this behaviour, including the propensity to forage in mixed-species flocks, large concentrations of host species, large high-quality food items (grasshoppers), and the acrobatic flying ability of Greater Racket-tailed Drongos (Brockman and Barnard 1979).

Laughingthrushes might benefit from the vigilance of drongos despite their attacks (Veena and Lokesha 1993). The ability of ground-foraging laughingthrushes to maintain effective surveillance for predators may be particularly limited by the deep leaf litter in *Indaing* forest, which is dominated by tree species with exceptionally large leaves. Drongo kleptoparasitic activities require that they stay near laughingthrushes on perches that provide effective sites for monitoring laughingthrush foraging; these perches are incidentally effective sites from which to observe approaching predators (Veena and Lokesha 1993). Our observations that, on two occasions, drongos evidently signalled predator presence by vocalizing, to which laughingthrushes responded by flushing off from the ground, lend some support to this explanation. Other authors have reported the existence of interspecifically effective alarm calls within mixed-species bird flocks (MacDonald and Henderson 1977, Munn and Terborgh 1979, Powell 1985), and it has been suggested that some birds flock preferentially with species that are more vigilant to benefit from their alarm behaviour (Wiley 1971, Greig-Smith 1981, Powell 1985, Hino 1998).

Substantial effort has been expended in the study of the costs and benefits of participation in mixed species flocks. Our observation of Greater Racket-tailed Drongos foraging with laughingthrush flocks provides further insight as to the potential benefits conferred to birds by participating in mixed-species flocks. However, it should be noted that our observations are based on a very small number of birds, studied for a short duration. Further investigations of drongo kleptoparasitism, that include an analysis of the costs and benefits, would provide an important additional step into understanding the contribution this behaviour makes to drongo fitness, and thus, to providing a more general understanding of the evolution of kleptoparasitism in this and other bird species (Brockman and Barnard 1979).

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