

Ambang Strict Nature Reserve, fairly close to the type locality, has also recently been found (Lee and Riley in press in BirdLife International 2001).

I thank Raf Drijvers, Pamela C. Rasmussen and Frank G. Rozendaal for useful discussion and René W. R. J. Dekker for kind assistance in visiting the collection at the National Museum of Natural History (NNM/Naturalis), Leiden, The Netherlands.

Iwein Mauro, Brouwerijstraat 29, B-9160 Lokeren, Belgium

REFERENCES

- BirdLife International (2001) *Threatened birds of Asia*. Cambridge, U.K.: BirdLife International.
- Coates, B. J. and Bishop, K. D. (1997) *A guide to the birds of Wallacea, Sulawesi, the Moluccas and Lesser Sunda Islands, Indonesia*. Dove Publications. Alderley.
- Mauro, I. (1999) Preliminary report on birds recorded from Wallacea, Sulawesi, Moluccas & Lesser Sundas. 27th June 1998-07th April 1999. Unpublished.
- Rasmussen, P. C. (1999) A new species of hawk-owl from North Sulawesi, Indonesia. *Wilson Bull.* 111: 457-464.

Interactions between the Greater Racket-tailed Drongo *Dicrurus paradiseus* and woodpeckers in a lowland Malaysian rainforest

ALISON R. STYRING and KALAN ICKES

In tropical regions numerous bird species have been documented following mixed-species foraging flocks or other vertebrates and capturing invertebrates flushed by the movement of these animals. Such behaviour is thought to benefit the following species by increasing their foraging efficiency (Croxall 1976, Powell 1985, Rodrigues *et al.* 1994).

Drongos (family Dicruridae) are medium-sized, often glossy black, insectivorous birds found in a range of habitats from Africa to Asia, Australia, and the Solomon Islands (Perrins 1990). Of the approximately 24 species of drongo, 17 have been documented associating with animal species ranging from ants to large mammals (Ali and Ripley 1987, Bannerman 1939, Beehler *et al.* 1986, Boonsong and Round 1991, Coates and Bishop 1997, Croxall 1976, Dickinson *et al.* 1991, Ganesh 1992, Greig-Smith 1978, Herremans and Herremans-Tonnoeyr 1997, Hino 1998, Jeyarajasingam and Pearson 1999, Mackinnon and Phillipps 1995, McClure 1967, Veena and Loksha 1993, Willis 1983, Woodcock 1980, Zimmerman *et al.* 1996). For five species, observers specifically noted that these birds followed other animals to prey on arthropods and small vertebrates flushed by their movements. Studies in Africa and Madagascar have shown that rate of prey capture increased when drongos followed other species compared to when foraging alone (Greig-Smith 1978, Herremans and Herremans-Tonnoeyr 1997, Hino 1998, Veena and Loksha 1993).

The Greater Racket-tailed Drongo *Dicrurus paradiseus* is the most common drongo species resident in lowland forests in West Malaysia. It has been reported as an occasional participant in mixed-species flocks, but its role in these flocks and the species with which they commonly associate have not been identified. McClure (1967) classified this species as a passive, or non-

following, flock attendant, which suggests that it does not use other flock attendants as beaters.

While studying the foraging ecology of woodpeckers in an aseasonal lowland dipterocarp rain forest at Pasoh Forest Reserve in West Malaysia (see Kochummen *et al.* 1990 for a description of the reserve and forest type), we noticed a frequent association among various species of woodpeckers and the Greater Racket-tailed Drongo. Subsequent to observing these apparently common associations, we followed every woodpecker or drongo seen or heard during the course of the field season and recorded the presence of other species and noted behaviour. We were thus able to determine the frequency with which Greater Racket-tailed Drongo and woodpeckers associated with one another and if certain species associated more frequently than others do.

Of the 150 times woodpeckers were followed, Greater Racket-tailed Drongos were observed following them 76 times (50.7% of the observations). We followed drongos 16 times; 13 times (81.3%) they were seen associating with other species and 8 times (61.2%) with woodpeckers. The three times that drongos were seen alone they were in groups of 3 or 4, and were not actively foraging. For 20 additional observations it was impossible to distinguish whether the initial cue was from a woodpecker or a Greater Racket-tailed Drongo (for example, seeing a drongo and hearing a woodpecker tapping at the same time), suggesting that they may be associated more than 50% of the time. Some other animals that the Greater Racket-tailed Drongo foraged with less frequently were malkohas *Phaenicophaeus*, arboreal squirrels (Sciuridae), and leafbirds *Chloropsis*.

While associating with woodpeckers, a drongo frequently perched within 5 m of the individual it was following, often below the bird on an open horizontal perch, and would periodically sally out near the

woodpecker for a flushed arthropod. When a woodpecker moved to another tree, it was usually followed by the drongo. Drongos are aggressive birds, often mobbing larger birds (Maclean and Prys-Jones 1988, Melville 1992, Nash and Nash 1985a, Nash and Nash 1985b), occasionally preying upon smaller bird species (Jayson and Ramachandran 1994, Sridharan and Sivasubramanian 1987, Young 1989), and, in some cases, stealing food from other species (Herremans and Herremans-Tonnoeyr 1997, Beasley 1988). We observed only one foraging agonistic encounter, between a Greater Racket-tailed Drongo and a Checker-throated Woodpecker *Picus mentalis*. During the encounter, the drongo sallied within 10 cm of the woodpecker and beat the cowering woodpecker's head with its wings while catching its prey.

Our observations suggest that Greater Racket-tailed Drongos are frequent followers, and that they often forage on invertebrates flushed by the animals' movements. At Pasoh Forest Reserve, they frequently associated with woodpeckers, which may be particularly good beaters for these large drongos.

We are grateful to Dr. Abdul Razak, Director General of the Forestry Research Institute of Malaysia, for permission to conduct research at Pasoh Forest Reserve. J. V. Remsen, Jr made constructive comments on the manuscript. ARS was funded in part by: the Frank M. Chapman Memorial Fund from the American Museum of Natural History, the Charles M. Fugler Fellowship in Tropical Vertebrate Biology from the Louisiana State University Museum of Natural Science, the LSU Museum of Natural Science Tropical Bird Research Fund, and the LSU Museum of Natural Science Research Award. KI was funded in part by a Grant-in-Aid of Research from the National Academy of Sciences, through Sigma Xi.

REFERENCES

- Ali, S. and Ripley, S. D. (1987) *Compact handbook of the birds of India and Pakistan*. Oxford: Oxford University Press.
- Perrins, C. M. (1990) *The illustrated encyclopedia of birds: the definitive reference to birds of the world*. J. Elphick (ed.). London: Marshall Editions Developments, Ltd.
- Bannerman, D. A. (1939) *The birds of tropical West Africa: with special reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria*. London: The Crown Agents for the Colonies.
- Beasley, A. (1988) Fork-tailed Drongo robbing hoopoe of food. *Honeyguide* 34: 126.
- Beehler, B., Pratt, T.K. and Zimmerman, D. A. (1986) *Birds of New Guinea*. Princeton: Princeton University Press.
- Boonsong Lekagul and Round, P. D. (1991) *A guide to the birds of Thailand*. Bangkok: Saha Karn Bhaet.
- Coates, B. J. and Bishop, K. D. (1997) *A guide to the birds of Wallacea: Sulawesi, the Moluccas and Lesser Sunda Islands, Indonesia*. Alderley: Dove Publications.
- Croxall, J. P. (1976) The composition and behaviour of some mixed-species bird flocks in Sarawak. *Ibis* 118: 333-346.
- Dickinson, E. C., Kennedy, R. S. and Parkes, K. C. (1991) *The birds of the Philippines*. Tring: British Ornithologists' Union (Checklist No. 12).
- Ganesh, T. (1992) A silent association. *J. Bombay Nat. Hist. Soc.* 89: 374.
- Greig-Smith, P. W. (1978) The formation, structure and function of mixed-species insectivorous bird flocks in West African savanna woodland. *Ibis* 120: 284-297.
- Herremans, M. and Herremans-Tonnoeyr, D. (1997) Social foraging in the Forktailed Drongo *Dicrurus forficatus*: beater effect or kleptoparasitism? *Bird Behaviour* 12: 41-45.
- Hino, T. (1998) Mutualistic and commensal organization of avian mixed-species foraging flocks in a forest of western Madagascar. *J. Avian Biol.* 29: 17-24.
- Jayson, E. A. and Ramachandran, K. K. (1994) Indian Black Drongo *Dicrurus adsimilis* (Bechstein) feeding on a small bird. *J. Bombay Nat. Hist. Soc.* 91: 320.
- Jeyarajasingam, A. and Pearson, A. (1999) *A field guide to the birds of West Malaysia and Singapore*. Oxford: Oxford University Press.
- Kochummen, K. M., LaFrankie, J. V. and Manokaran, N. (1990) Floristic composition of Pasoh Forest Reserve, a lowland rain forest in Peninsular Malaysia. *J. Trop. Forest Sci.* 3: 1-13.
- McClure, H. E. (1967) The composition of mixed species flocks in lowland and sub-montane forests of Malaya. *Wilson Bull.* 79: 131-154.
- Mackinnon, J. and Phillipps, K. (1995) *A field guide to the birds of Borneo, Sumatra, Java, and Bali*. Oxford: Oxford University Press.
- Maclean, G. L. and Prys-Jones, R. P. (1988) Kleptoparasitism in three species of passerine birds. *Ostrich*. 59: 45-47.
- Melville, D. S. (1992) Intense mobbing by a Black Drongo *Dicrurus macrocerus*. *J. Bombay Nat. Hist. Soc.* 88: 285.
- Nash, A. D. and Nash, S. V. (1985a) An extreme example of aggression displayed by Greater Racket-tailed Drongo *Dicrurus paradiseus*. *Kukila* 2: 7.
- Nash, A. D. and Nash, S. V. (1985b) Large Frogmouth *Batrachostomus auritus*, mobbed by a Greater Racket-tailed Drongo *Dicrurus paradiseus*. *Kukila* 2: 67.
- Powell, G. V. N. (1985) Sociobiology and adaptive significance of interspecific foraging flocks in the Neotropics. *Ornithol. Monogr.* 36: 713-732.
- Rodrigues, M., Machado, C. G., Alvares, S. M. R. and Galetti, M. (1994) Association of the Black-goggled Tanager (*Trichothraupis melanops*) with flushers. *Biotropica* 26: 472-475.
- Sridharan, U. and Sivasubramanian, C. (1987) Additional records of the Black Drongo (*Dicrurus adsimilis*) feeding on birds. *J. Bombay Nat. Hist. Soc.* 83: 212-213.
- Veena, T. and Lokesh, R. (1993) Association of drongos with myna flocks: are drongos benefited? *J. Biosci.* 18: 111-119.
- Willis, E. O. (1983) Flycatchers, cotingas and drongos (Tyrannidae, Muscicapidae, Cotingidae and Dicruridae) as ant followers. *Le Gerfaut* 73: 265-280.
- Woodcock, M. (1980) *Collins handguide to the birds of the Indian sub-continent: including India, Pakistan, Bangladesh, Sri Lanka and Nepal*. London: Collins.
- Young, L. (1989) Black Drongo taking wren-warbler sp. at Mai Po. *Hong Kong Bird Report* 1988: 118-120.
- Zimmerman, D. A., Turner, D. A. and Pearson, D. J. (1996) *Birds of Kenya and Northern Tanzania*. Princeton: Princeton University Press.

Alison R. Styring, Louisiana State University Museum of Natural Science and Department of Biological Sciences, 119 Foster Hall, Baton Rouge, Louisiana, 70803, U.S.A.; email: astyrin@unix1.sncc.lsu.edu

Kalan Ickes, Louisiana State University Department of Biological Sciences, Baton Rouge, Louisiana, 70803, U.S.A.