



Plates 1 and 2. Singing Bushlark *Mirafra cantillans*, Sukila Phanta, Nepal, May 1997

## Co-operative breeding by Collared Falconets *Microhierax caerulescens*

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The five species of *Microhierax* falconets are the smallest raptors in the world and show no obvious sexual size or plumage dimorphism (Kemp and Crowe 1994). The species probably replace one another ecologically across their Asian distribution (Clark 1994, Kemp and Crowe 1994). Most species are poorly known but all are reported to occupy the forest canopy and to occur at least sometimes in small groups. All are reported to capture their prey mainly on the wing, either in flight or plucked from foliage. Insects form the bulk of the diet, together with a few small birds and lizards (Clark 1994). Combined hunting behaviour and food sharing has been reported for one species (Kemp and Crowe 1994) and this posed the question of what roles might be performed by group members when breeding.

Observations were made during 10-12 April 1996 at a nest of Collared Falconets *Microhierax caerulescens* found in the Huay Kha Khaeng Wildlife Sanctuary, western Thailand. The nest was about 3 km south-west of the Khao Nang Rum Research Centre, at 15° 36'N 99°19'E. The nest was in one of several larger trees that grew just off the crest of a low ridge in dry deciduous dipterocarp forest. Trees in this forest were only about 15-20 m high but for a few larger emergents. The overall impression of the vegetation was of numerous bare tree trunks up to about 10 m, topped by an uneven and partly open canopy. The

ridge with the nest tree was among the foothills of the Thanon Thongchai mountains, which run north-south down the Thailand-Myanmar border. Adjacent to the ridge was denser, taller bamboo and evergreen forest. Further details of the sanctuary have been described elsewhere (Nakhasathien and Stewart-Cox 1990).

The nest was discovered at 15h00 on 10 April. It was watched from then until dusk at 19h00, from 17h00 to dusk on 11 April and from 06h30 (half an hour after dawn, local sunrise 06h55) to 11h00 on 12 April. The nest was situated about 12 m up in an old woodpecker or barbet hole, near the top of the slender trunk of a live 20 m high *Shorea obtusa* tree with a dbh of 25 cm. A second cavity was evident about a metre below. There were a few streaks of white droppings on the lower rim of the entrance hole. The hole had an estimated diameter of 4 cm, sloped slightly downwards and the entrance tunnel was an estimated 4 cm before the start of the nest cavity.

The nest contained two chicks on the point of fledging. They were attended by five adult birds. The presumed breeding female was most recognizable; her centre pair of rectrices moulted to leave an obvious gap and her underparts always ruffled. She was also obvious because, on emerging from the nest where she spent most of the time, she always preened actively, spread the tail to show

the many white spots, and often pumped the tail up and down. This female also had paler chestnut flanks than the three other birds supplying her with food, presumably males, and she appeared less glossy and black, possibly due to plumage wear. Two of the males had tail feather moult, one a central rectrix and the other an outer rectrix. A fifth bird, which spent much time perched on top of the nest tree, also had paler flanks. It often entered the nest when the breeding female emerged, but it left as soon as she returned. It was presumed to be a second, non-breeding female.

The chicks were fed either directly at the nest by the males or by the breeding female after she had intercepted food brought by the males when she was outside the nest. She would then eat some herself before delivering the rest to the chicks. Once, on the evening of 11 April, one chick flew about 2 m from the nest to perch by the breeding female. The female greeted it with loud calling and spent several minutes allopreening it vigorously before it flew back into the nest. For the rest of the time, the chicks clung just inside the entrance, only one visible at a time, and begged loudly at any adults they could see, especially those that hung below the entrance with food.

At least two of the males, and the breeding female delivered food to the chicks. Food items included three cicadas, two long-horned Orthoptera (probably katydids, or leaves snatched together with a smaller prey item), a large beetle and five unidentified insects. Four strikes at prey were made within 30 m of the nest. Three were over a distance of about 10 m and a descent of 20°, each time crashing into foliage of nearby *Shorea* trees; one was a miss and the other two yielded a beetle and a grasshopper. A male also made a 30 m horizontal dash at a flying insect but missed. Most of the time the adults flew at least 200 m from the nest before starting to hunt.

On both evenings of observation, the breeding female roosted in the nest but the other adults left the nest area at about 17h30, moving off to the west, apparently in different directions. On the one morning watch, the female headed off in the same westerly direction at 07h05, before any other birds had visited the nest and after peering from the nest entrance for some time. The first other adult to visit the nest tree, coming from the west, was at 07h10, before the female had returned. One evening, a male bathed on the track near the nest, in a puddle formed from rain that had fallen the previous evening.

These observations confirm co-operative breeding by *M. caerulescens*, as was predicted from the social hunting behaviour of its very similar congener and sister species, the Black-thighed Falconet *M. fringillarius* (Kemp and Crowe 1994). This was suggested as a consequence of the specialized insectivorous hunting behaviour and diet. It is probably the most complex form of co-operative hunting and breeding yet known for any raptorial bird, involving helpers of both sexes (Bednarz 1987, 1988, Malan and Crowe 1996). It deserves further study among groups of these and other *Microhierax* species, which may include at least 10 individuals (Clark 1994). Factors known to vary

in other co-operative raptors include levels of co-operation, polyandry and kin relationships within groups.

Our few hunting and prey data suggest that insects are also important food for *M. caerulescens*, even when breeding, and that cicadas may be especially important. Larger prey is also taken, as demonstrated by the videotape of an adult catching a recently fledged Striated Swallow *Hirundo striolata*, made near the headquarters of the sanctuary a few months before (Preecha Thannyalax Suntaramat pers. comm.). The relatively great distances which these falconets ranged in search of prey was also noted subjectively, both at this nest and in the vicinity of a nest of the much more sedentary White-rumped Falcon *Polihierax insignis* (Kemp and Vidhidharm in press). Flights of 200–400 m between hunting perches above the canopy were not infrequent. This suggests that individuals might occur at a low density relative to their small size, which may also contribute to their social hunting and food sharing.

The nest entrance was smaller than that used by *P. insignis* but it was not obvious which woodpecker or barbet species had excavated the cavity, although a pair of Lesser Yellownapes *Picus chlorolophus* roosted nearby. It was notable that only the breeding female remained in the nest with the chicks, unlike *P. insignis* where the pair roosted together in the nest cavity (Kemp and Vidhidharm in press). The other *M. caerulescens* adults roosted elsewhere, presumably in other excavated tree holes, as is common for the genus (Kemp and Kemp 1978, Clark 1994), and possibly each in separate holes. This suggests that availability of excavated holes for a whole group may be more of a limiting factor for this species than for territorial pairs of the sympatric *P. insignis*.

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