Nesting of the Spot-winged Falconet in Monk Parakeet nests

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During a long-term study of the biology of the Monk Parakeet (*Myiopsitta monachus*), we have repeatedly observed the Spot-winged Falconet (*Spiziapteryx circumcinctus*) roosting and breeding in the parakeet's communal nests. Despite this behavior being quite frequent, at least in our study area, the only previous reference we have found is a brief mention made by Hoy (1980).

Our observations were carried out mainly in Córdoba Province, Argentina at the Estancia San Antonio, 8 km east of the town of Arroyito (31°25'S, 62°59'W). The area includes mainly cultivated land with interspersed patches of xerophytic woods. Average annual rainfall is around 700 mm. Complementary observations were made in La Rioja Province near the city of Chamical at the Instituto Nacional de Tecnología Agropecuaria (INTA) Experimental Station (30°30'S, 66°03'W), where xerophytic dry savannah is the predominant vegetation, and annual rainfall is 411 mm.

The Spot-winged Falconet uses the Monk Parakeet's nests for roosting in winter and for breeding in summer (November–December). We have observed small and medium-sized parakeet nests (of less than 0.80 m in diameter and with up to three holes) occupied by the falconet. (Big nests may reach 1.50 m and have 15 holes.) In most cases, falconets preferred nests with only one entrance hole. Nests with more than three entrance holes were not used, although there were many of this size in the area. This may suggest that falconets have a tendency to choose nests with a small population of parakeets, perhaps because these nests are not so vigorously defended by the parakeets. Of a sample of 70 parakeet nests we visited in Córdoba during the summer of 1982–1983, 15 were occupied by falconets.

Falconets flying near always created a state of excitement and alarm in the whole population of parakeets, as described by Straneck and Vasina (1982). When the predator approached the nests, the parakeets reacted by flying away and giving an alarm call that provoked the escape of other birds that were inside the nests (mainly during the breeding season). Activities returned to normal for the distressed birds in about half an hour. In contrast, the parakeets do not appear to be greatly disturbed when a neighboring colony, as close as 5 m, has been occupied by a falconet, even during the breeding season.

The Spot-winged Falconet invades both abandoned and occupied nests. The parakeets are supplanted from active nests, and we have not seen falconets and parakeets sharing the same communal nests.

When entering a parakeet nest, the falconet enlarges the entrance tunnel to a large elliptical hole of about 30 cm wide by 20 cm high in one side. The hole is easy to see from a considerable distance, up to 100 m. The nest chamber is enlarged until it becomes almost spherical, with a diameter of about 30 cm.

We observed two breeding attempts during the summer of 1982–1983 at the Córdoba study area. Both nests were about 16 m high in eucalyptus trees (*Eucalyptus viminalis*) near a house. We checked the nests with an aerial truck crane.

One falconet nest was found on 6 November 1982, when it had two eggs. On 13 November a third egg had been laid. On 20 November the final egg had been added. On 27 November the same number was found. On 4 December one egg had disappeared. The eggs were similar to those described by Dean (1971). On 10 December the nest contained a chick covered with white down and two eggs. On 17 December one egg had disappeared. The nestling had its first feathers, especially on its wing and head, and was able to walk on its tarsi. It displayed against us by moving to the opposite side of the nest, widely opening its bill, and extending its claws. On 23 December the chick was almost completely feathered and was very aggressive toward us. The remaining egg was still in the nest bowl. On our next visit (8 January 1983) the nest was empty. The bird would have been a maximum of 33 days old, and, judging from the development attained on the last visit, we assume that it had fledged. No remains or empty shells were found.

At the second nest three eggs were found on 23 December 1982. On 8 January 1983 the nest was empty (no eggshells remained).

Prey remains found in the first nest indicated that the food of the nestling was mainly insects and birds. Arthropods were generally reduced to small fragments, making identification difficult. We recognized one species of grasshopper (*Tropinotus*) and a cicada (*Quesada gigas*). Bird remains included feathers of a nestling Guira Cuckoo (*Guira guira*) and of adult and nestling Monk Parakeets.

The use of the large thorny nests of Monk Parakeets by the Spot-winged Falconet is analogous to the nesting niche of the African Pigmy Falcon (*Polihierax semitorquatus*), which uses the communal nests of Sociable Weaver (*Philetairus socius*). Unlike the African Pigmy Falcon, however, the Spot-winged Falconet preys on it host species. MacLean (1973) proposed that the African Pigmy Falcon nesting in weaver colonies provides protection against predators for the weavers. Our observations suggest that

the Spot-winged Falconet may not benefit the Monk Parakeet in such a manner.

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The Use of Green Plant Material in Bird Nests to Avoid Ectoparasites

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Certain birds characteristically place green plant material in their nests. This greenery is not part of the nest structure proper but is placed haphazardly around the edges or inside the nest. The birds replenish the sprays of green material, often daily, during incubation and the nestling period (Brown and Amadon 1968, Beebe 1976, pers. obs.).

I hypothesize that the plants are placed in the nests to repel or actually kill avian ectoparasites. Plant material may repel or kill ectoparasites because of the secondary compounds it contains. Secondary compounds often function as insect repellents in plants (Levin 1971). The compounds work as olfactory repellents, toxins, or juvenile hormone analogues to deter insects. If the parasite-repellent hypothesis is correct, the plant species chosen should be aromatically repellent, because avian ectoparasites do not ingest these leaves.

The aromatic compounds of plants are hydrocarbons, mainly monoterpenes and isoprene (Rasmussen 1972). In general, trees and long-lived shrubs emit the greatest volume of volatile compounds, whereas annuals emit the lowest volume of these compounds (Rasmussen 1972). Plant volatiles are used as a defense against herbivores but are also used by insects to locate their host plant (Freeland 1980). It has been established that volatile plant compounds can disrupt olfaction in insects by masking the particular chemical cue that the insect uses to find a host (Tahvanainen and Root 1972). If this is true of host-plant location, it may also be true of host-animal location. If my hypothesis is correct, then nest greenery would function in these manners.

There is evidence that infestations of ectoparasites causes nestling mortality in and nest desertion by birds (Webster 1944, Neff 1945, Fitch et al. 1946, Moss and Camin 1970, Feare 1976, Wheelwright and Boersma 1979). In general, the increased mortality due to ectoparasites is caused by the loss of blood, which weakens the host, by viral disease, or by disease caused by noxious endoparasites for which arthropod parasites are vectors (Herman 1955). The groups of ectoparasites most responsible for mortality are dipterans, fleas, ticks, and mites (Herman 1955).

Three predictions follow from the hypothesis that the use of nest greenery evolved to inhibit infestations of ectoparasites. (1) Birds that reuse their nests over successive years should be more prone to the use of foliage than birds that build a new nest each year. Nest reuse is implicated because hippoboscid fly larvae overwinter in nests and emerge about the time the eggs hatch (Bequaert 1953). The larvae are large relative to their hosts. Thus, it does not take many of them to weaken their host significantly. A number of endoparasitic diseases also are transmitted by hippoboscids and simuliid flies (Herman 1955). (2) The incidence of foliage use among birds that prey on higher vertebrates (birds and mammals) should be greater than that among birds that prey on lower vertebrates, because higher vertebrates often harbor large flea populations, as well as some dipterans, ticks, and mites. Parasite transmission occurs when mammals are taken by birds; owls have been found infested with rodent fleas (Rothschild and Clay 1952). (3) The types of greenery used in the nest should be high in volatile secondary compounds.

I used the order Falconiformes in order to test the first two predictions because of the variability in greenery use, nesting habits, and food preferences that members of this order exhibit. To get the most accurate and consistent data base about relative frequency of greenery use for this comparative study, I

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