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IS THE ASSOCIATION BETWEEN THE GABAR GOSHAWKS AND SOCIAL SPIDERS *STEGODYPHUS* MUTUALISM OR THEFT?

JR Henschel, JM Mendelsohn & R Simmons

Gabar Goshawks *Micronisus gabar* are known to incorporate large nests of the social spiders *Stegodyphus* into their own nests (Kemp & Snelling 1973, Maclean 1985, Kemp 1986, Colebrook-Robjent 1986). The spiders continue to live in and around the bird nest about 3-12 m above the ground, well above the 1 m height of normal *Stegodyphus* webs.

This unusual association between a raptor and a spider can be explained in various ways, but without any empirical evidence: 1) the spider nest is incorporated into the bird nest as lining or padding (Maclean 1985, Kemp 1986, pers. obs.) and the activities of the spiders are merely incidental; 2) the big web of social spiders camouflages the bird nest or nestlings from predators (Steyn 1982, Kemp 1986); 3) the spiders spin silk onto the bird nest, thus strengthening its loose structure, particularly against the ravages of storms; 4) the spiders keep pests of juvenile goshawks at bay by capturing parasitic flies or reducing the insect scavengers on the food remains (extreme spider fans may interpret the conspicuous spider nests as advertisements to prompt Gabars to relocate the spiders to abundant food sources); 5) spiders are brought to the bird nest as food for the adults or juveniles, but some spiders survive in the depths of their tight, silken nest and re-establish themselves at their new locality beneath the Gabar nest (*Stegodyphus* are primarily nocturnal and their spinning activities may remain undetected by the birds).

It remains to be confirmed whether the asso-

ciation is obligatory or facultative for the bird. There are several independent first-hand reports of observations of this association (e.g. Kemp & Snelling 1973, 1976, Colebrook-Robjent 1986, Brown 1986, HC Biggs pers. comm., pers. obs.). Brown (1986) examined two nests without spider silk, but does not mention the phase of the breeding period. We recently observed that a pair of Gabar Goshawks added silk only some time after completing a nest. To our knowledge, there are no reports to confirm the lack of this association for the duration of a Gabar nesting period.

The Dark Chanting Goshawk *Melierax metabates* has also been reported to incorporate social spider nests into its own nest (Maclean 1985, Colebrook-Robjent 1986), but this association is not strongly emphasized. Several observers note the absence of such an association with spiders by the Pale Chanting Goshawk *M. canorus*, even in areas where it coexists with the Gabar (Smeenk & Smeenk-Enserink 1975, Kemp 1986, Colebrook-Robjent 1986, HC Biggs pers. comm.).

There are two social cressid spiders in Africa: *Stegodyphus dumicola* is widespread in southern Africa and *S. mimosarum* occurs in the eastern parts of Africa (Kraus & Kraus, 1988). In Namibia we found *S. dumicola* on Gabar nests. Colonies of 20-600 spiders spin large, dense, globular nests into which they retreat. Many other African species of *Stegodyphus* are solitary (Kraus & Kraus 1988), but even the social species can on occasion be found alone (Henschel in press). To date, most observers stated that the spiders associ-

ated with Gabars were social, but Kemp & Kemp (1976) misidentified a social species as the solitary *S. africanus*. When examining spider nests, recent foraging activities in a healthy colony of spiders can be recognized by the occurrence of loose, untidy, highly adhesive capture webs emanating from the globular nest.

The spiders may have no choice in their relocation by Gabars and it is not known how this affects them. Implicit in several reports is that the spiders remain at the Gabar nests for some time and establish extensive capture webs. Our observations confirm this. Because of vertical stratification in the occurrence of flying insects, we would expect less prey to be available generally at 3-12 m above the ground where the birds nest than at 0.5-2 m where the spiders normally occur. However, the bird nest could attract many parasitic and scavenging insects that the spiders catch. This may explain our observations that spiders maintained a web at one Gabar nest until the birds abandoned, when the spiders also disappeared. Another reason for the spiders to remain at the site may be their reluctance to abandon their nest, which represents a high investment of silk; hungry spiders may experience energetic problems in establishing a new nest and web elsewhere (Tanaka 1989, Henschel & Lubin in press).

We invite ornithologists and arachnologists to contribute specific information towards this ongoing study. Spiders and their nests sampled off Gabar nests would also be appreciated; please preserve the spiders in 70% alcohol and package the spider nests in a sealed plastic bag. Remember to put labels into each specimen container. Please don't send any spiders or their nests if no Gabar nest was seen in the vicinity.

If you find a Gabar nest, kindly fill in the questionnaire and add any other information

that may be useful. Furthermore, if long-term observations are possible, we would appreciate information along the following lines.

Bird-Spider Distribution and Association

Compare distribution of nesting sites with those of *Stegodyphus* spiders. Detailed information on the distribution of *S. dumicola* is not available; Kraus & Kraus (1988) reported the localities where some museum specimens were collected. Other records are known from further collections made for museums and from personal observations. The general distribution of Gabar nests appears to coincide with that of *S. dumicola* in Namibia. This should, however, be examined on a site and habitat specific basis.

Document the occurrence or absence of spiders on all Gabar nests found in relation to the stage of breeding of the birds. Some of these data may be available from previous records. Collect all spider nests found on Gabar nests.

Bird-Spider Relationship

Document when in the Gabar breeding cycle spiders are incorporated into the nest. Observe how Gabars add spiders to their nests and note the distance of relocation and change in the height of the spider nest.

Observe if and how Gabars select spider nests and whether they only take occupied spider nests.

Document precise location and relative size of the spider nest and web on the bird nest.

Note the initial condition of the spider nest, especially to what degree it has been shredded by the birds.

Compare the group sizes of spiders on bird nests with those in the vicinity (sample randomly from the vicinity).

Importance of Spiders

Document differences between natural Gabar nests with and without spider webs, noting the composition of the bird nest; phase in Gabar breeding cycle; spider abundance within 1 km radius; parasite load on Gabar chicks; and chick growth rate and survival.

Remove spider webs from Gabar nests and kill the spiders remaining in the nest with insecticide. Compare differences as above and note if the Gabars reintroduce spiders.

Costs or Benefits to Spider

Compare spiders at bird nests with similar-sized social units at normal positions in the vicinity, noting: prey availability (mount sticky traps for flying insects near spider webs); diet (examine prey remains from spider nest); growth rate (regularly measure carapace width and body length of spiders); dispersal and mortality rate (count live and dead spiders); time of spider maturity and egg production; reproductive output (count number of juveniles vs. number of females).

Experimentally move spider webs onto imitation Gabar nests placed high up in trees or low, at the normal height of spider webs. Monitor the same variables as above.

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