

Laughing Falcon (*Herpetotheres cachinnans*) Predation on Coral Snakes (*Micrurus nigrocinctus*)¹

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ABSTRACT

Laughing falcon (*Herpetotheres cachinnans*) predation on coral snakes (*Micrurus nigrocinctus*) was recorded in two incidents that illustrate previously unreported variation in predatory behavior. In the first, the falcon held a live coral snake by the posterior end for an extended period of time, rather than decapitating it immediately. In the second, the falcon left a decapitated coral snake in a tree for more than 2 h before returning to recover its prey. A variety of behavioral adaptations may protect laughing falcons from coral snake venom.

RESUMEN

El halcón guaco (*Herpetotheres cachinnans*) fue observado depredando serpientes de coral (*Micrurus nigrocinctus*), en dos incidentes que ilustran una variación en el comportamiento predatorio que hasta ahora no ha sido reportada. En el primer incidente, el halcón sujetó una serpiente de coral viva en la parte posterior por un periodo extendido, en vez de decapitarla inmediatamente. En el segundo incidente, el halcón dejó una serpiente de coral decapitada en un árbol por más de dos horas antes de regresar por su presa. Una variedad de adaptaciones en sus comportamientos podrían proteger al halcón guaco del veneno de las serpientes de coral.

Key words: coral snake predation; *Herpetotheres*; laughing falcon; *Micrurus*; Panamá.

LAUGHING FALCONS (*HERPETOTHERES CACHINNANS*) ARE NEOTROPICAL raptors that prey almost exclusively on snakes. Several reports describe laughing falcons carrying or consuming snakes (Mader 1981, Wetmore 1981, Robbins & Wiedenfeld 1982, Robinson 1994, Skutch 1999), including large and venomous ones (del Hoyo *et al.* 1994). Detailed reports of laughing falcon predation on positively-identified snakes are scarce, however, and the adaptations allowing this species to specialize on potentially dangerous prey are not well known. Here we report two photographically documented observations of laughing falcons feeding on coral snakes (*Micrurus nigrocinctus*), with the expectation that they will contribute to a better understanding of predation on aposematic vertebrates and their mimics (Brodie & Brodie 2004, Greene & McDiarmid in press).

Avian predation on coral snakes is apparently rare, but the majority of such reported incidents involve predation by laughing falcons. Stomach contents of laughing falcons included a *Micrurus* sp. (Howell 1957) and the *Micrurus* mimic *Pliocercus dimidiatus* (= *Urotheca euryzona*, Pough 1964); Wetmore (1981) reported a laughing falcon eating *Erythrolamprus aesculapii*, a rear-fanged

coral snake mimic; and Skutch (1999) noted that one of 35 snakes brought to a laughing falcon nest was a coral snake or coral snake mimic of an undetermined species. Only two other bird species, the white-whiskered puffbird *Malacoptila panamensis* (Smith 1969) and the red-legged seriema *Cariama cristata* (Pueta 2002) have been reported successfully consuming venomous coral snakes. Brugger (1989) cited unsuccessful or incomplete predation attempts by several other raptors and a loggerhead shrike (*Lanius ludovicianus*).

Many potential snake predators seem to avoid coral snakes. Two avian snake predators, turquoise-browed motmots (*Eumomota superciliosa*) and great kiskadees (*Pitangus sulphuratus*), showed an innate aversion to the coloration of coral snakes and coral snake mimics (Smith 1975, 1977). Presentations of clay model snakes in Costa Rican forests further demonstrated lower rates of avian predation on coral snake models than on brown models, though free-ranging avian predators did attack coral snake-ringed models in some of these experiments (Brodie 1993, Brodie & Janzen 1995, Hinman *et al.* 1997). Multiple observations of laughing falcons preying on coral snakes indicate that these raptors are not deterred by aposematic coral snake coloration, and that coral snakes may not have an effective defense against attack by laughing falcons.

The observations reported here were made in 2000 and 2003 on Isla Boca Brava, a 3000-ha island in the Gulf of Chiriquí, Panamá

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(8° 12'N, 82° 12'W). The site is a 46-ha area of secondary growth dry tropical forest which hosts snakes of many species, including *Boa constrictor*, *Spilotes pullatus*, *Oxybelis aeneus*, *Oxybelis fulgidus*, *M. nigrocinctus*, *Clelia* sp., and *Leptodeira annulata*. Laughing falcons have been seen occasionally on the site during a March–July field season every year from 2000 to 2004, and have performed duet vocalizations, which suggest that a reproductively active pair lives in the area. The reported incidents are the only two observations of laughing falcon predation recorded on this site.

On 10 May 2000, at 0730 h, we observed a laughing falcon perched 10–15 m high in an exposed tree with a live coral snake grasped with one foot. The falcon held the snake roughly 20 cm from the posterior end and made no attempt to subdue motions of the snake's head, which appeared intact (Fig. 1). Elapid snakes generally lack the muscular strength to reverse and bite when suspended by the tail, and accordingly, the snake seemed unable to lift its head far toward the feet of the laughing falcon, although it continued to move in apparent attempts to do so for at least 15 min. The falcon occasionally picked at the posterior end of the snake, but did not consume it during the time that we observed. We photographed the bird and later identified the snake as *M. nigrocinctus* (Museum



FIGURE 1. A perched laughing falcon holding a live coral snake (*Micrurus nigrocinctus*) by the posterior end.

of Vertebrate Zoology archives, image # 8547). The snake was approximately 60–65 cm long, as estimated by comparison to the average size of a laughing falcon (Ridgely & Gwynne 1989), and thus of small adult size. This observation is unusual in that the falcon did not remove the snake's head upon capture (Stiles & Skutch 1989). Howell (1957) reported a *Micrurus* sp. eaten posterior to anterior by a laughing falcon, but he recovered the specimen from the falcon's crop and stomach without the head, which the falcon apparently severed and discarded.

On 11 April 2003, at 1045 h, we discovered a large coral snake (65–70 cm long and 1.5 cm in diameter) draped over the leaning trunk of a tree, approximately 2 m off the ground, with the head severed and missing. Blood was still fresh on the wound, and the snake had two bloodless puncture marks on its side, approximately 40 cm apart. The head was bitten off in a red band, and the snake hung with the brighter belly region facing upward. An elongated posterior bulge probably indicated an egg clutch near-ready for laying. As we investigated the snake, a laughing falcon vocalized repeatedly for approximately 1 min from a perch 20 m to the south, then flew off to the north. We videotaped the snake's body and wounds, then set the camera on a tripod 8 m from the snake, and remained quietly in the area (30 m away, but within view of the snake) for an hour-and-a-half more to complete unrelated observational work. During this time, we detected no additional signs of laughing falcon activity in the area. When we examined the snake again at 1230 h, the blood had congealed and was drying in the anterior wound. We left the area, and the camera recorded a laughing falcon returning to the site at 1308 h. The bird flew in from the southwest and landed at least 1.5 m below the snake on the leaning tree trunk, out of view of the camera. After 20 s, the bird moved toward the snake and grasped it with one foot. The bird paused and briefly surveyed the area, then flew away to the southwest carrying the snake. The snake had been left unattended for at least 2 h 23 min. We identified the snake from the videotape as *M. nigrocinctus* (Cornell Lab of Ornithology Macaulay Library VIDEO#21661-21664).

These observations reveal previously unreported variation in laughing falcon predatory behavior. We do not know whether the falcon observed in 2003 left its prey voluntarily or because it was startled by our initial approach to the area, but this observation demonstrates that laughing falcons remember the location of abandoned or cached prey items and return to recover them at a later time. The 2000 observation indicates that laughing falcons do not always decapitate snakes, even venomous ones, immediately upon capture. These reports suggest that there may be unreported variation in how laughing falcons handle venomous snakes, and that behavioral or physiological mechanisms, in addition to prey decapitation, may protect laughing falcons from coral snake venom.

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