UNDERWATER KLEPTOPARASITISM ON A HUMAN DIVER BY A GALAPAGOS FLIGHTLESS CORMORANT *NANNOPTERUM HARRISI*

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ABSTRACT

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We describe underwater kleptoparasitism on a human diver by a Galapagos Flightless Cormorant *Nannopterum harrisi*, a behavior that has not been previously described for this species.

Key words: marine predation, *Nannopterum*, foraging behavior, kleptoparasitism, Galápagos Islands, Flightless Cormorant

CASE STUDY AND DISCUSSION

We report a previously undescribed behavior exhibited by Flightless Cormorants *Nannopterum harrisi*. On 02 July 2019 at Punta Espinosa, Fernandina Island, Galápagos, Ecuador (0°15′48″S, 91°26′40″W), a scuba diver (JMÁ-J) was at 5-m-depth, spear fishing White-ringed Damselfish *Stegastes beebei* as part of another study. Maximum length of this species is 15.0 cm standard length (Grove & Lavenberg 1997), making it an ideal prey item for Flightless Cormorants. By 16h00 Álava-Jurado had collected 14 fish and was stalking the final individual for the day. The fish managed to avoid the hand spear twice. As Álava-Jurado prepared to release the spear a third time, he became aware of a dark and slender shape approaching from his left. Focusing on the damselfish, he fired and speared it successfully. At the exact same moment, the shape changed and became bigger, at which time Álava-Jurado recognized it as a Flightless Cormorant opening its wings and splaying out its feet in front of its body. This startled Álava-Jurado, who froze briefly, and in that short space of time, the bird stole the fish from the tip of the hand spear and the cormorant swam away.

With only one observation, interpretation of the Flightless Cormorant's behavior is necessarily speculative. However, it is noteworthy because of its novelty in several respects. First, underwater kleptoparasitism has not been previously reported in Flightless Cormorants and is consistent with other cormorant species, which practice kleptoparasitism both intraspecifically (e.g., Källander 2013) and interspecifically (e.g., Mahendiran & Urfi 2010). It also aligns with a general pugnaciousness recorded for this species. Flightless Cormorants can be belligerent in their pursuit of food, demonstrated by juveniles harassing their parents for fish at the water's surface (Hayward *et al*. 2014). They can, in addition, be aggressive underwater towards human divers, a behavior that has been interpreted as territoriality (C. Valle, pers. com.).

However, perceiving a diver in the act of spearing a fish as a potential target for kleptoparasitism arguably requires a greater degree of processing than simple aggression, either understanding beforehand what is about to occur, or recognizing and being able to act on the brief window of opportunity as it is unfolding. It is not known how long the cormorant had been watching Álava-Jurado stalking the fish, or potentially even observing him capturing several of them over the course of the bird's successive dives. It could well be that the bird understood Álava-Jurados's process well. While the location is remote, this area of the island is a habitual and a well-used study site by divers, suggesting that these extremely long-lived birds (max. age 48 years, mean age 13 years; Valle 1995) have sufficient opportunity to habituate to research divers and their activities. The kleptoparasitism is most likely a learned behavior, and given other fishing activities in the area, it appears likely that they may steal from line and other spear fishers as well.

Equally, the cormorant might simply have been exhibiting the adaptability and opportunism that is well documented in other cormorants. Cormorant behavior has sufficient plasticity to adjust to a variety of situations. Conditional responses have, for instance, been shown in cormorants in Australia, both in habitat use (Dorfman & Kingsford 2001) and foraging behavior (Trayler *et al*. 1989). Either way, this cormorant's lack of hesitation in targeting Álava-Jurado's fish is consistent with this species' comfort in the presence of humans (Townsend 1929). It also aligns with Darwin's observation that animals in locations remote from humans, e.g., oceanic islands, are unafraid of people due to the lack of land predators (Darwin 1839).

Brockmann & Bernard (1979) reviewed bird species that engage in kleptoparasitism, as well as the environmental conditions that should, in theory, lead to its evolution within a species: principally scarce food and/or abundant targets for food piracy. For instance, Laughing Kookaburras *Dacelo novaeguineae* can learn to steal food out of humans' hands (ED pers. obs.). Human-focused kleptoparasitism has been recorded in Magnificent Frigatebirds *Fregata magnificens* (Buckley & Tigler 1983) and Herring Gulls *Larus argentatus* (Deering 2017), the latter using human behavioral cues to locate food (Goumas *et al*. 2020). The stealing of food from plates by gulls, especially those hoisted on the trays carried by unaware servers, has also become a frequent occurrence around the San Francisco Bay waterfront (D. Ainley, pers. obs.). These behaviors are seen where the abundance of humans and their food make kleptoparasitism an easier method to obtain food than wild foraging.

Phalacrocoracids were not listed by Brockmann & Bernard (1979) among species that typically practice kleptoparasitism. Since then, however, research (e.g., Mahendiran & Urfi 2010) supported by video evidence (e.g., Adventuring Dave 2020) has demonstrated this behavior in cormorants. However, the environment at Punta Espinosa does not fit with the theoretical preconditions for kleptoparasitism. Except for El Niño years, food resources are abundant in the localized areas in which this species occurs (Valle & Coulter 1987), and the only target species for this behavior are Galapagos Penguins *Spheniscus mendiculus* and Flightless Cormorants themselves, neither of which are numerous. However, the two species do regularly participate in mixed-species foraging flocks (Mills 1998), and Gentoo Penguins *Pygoscelis papua*, at least, have been demonstrated to engage in intraspecific kleptoparasitism while foraging (Handley & Pistorius 2016).

The behavior of the cormorant at the moment that it seized the fish also warrants mention. The bird could have splayed its feet to create the draft needed to slow itself down sufficiently to connect with the fish on the end of spear. This has not been studied in Flightless Cormorants, but Great Cormorants *P. carbo* tilt the body and tail while diving to control their buoyancy by generating hydrodynamic lift (Ribak *et al*. 2004). Alternatively, the cormorant's behavior could have been a threat display performed to distract or intimidate Álava-Jurado. Whether intentional or not, spreading its wings and feet increased its apparent body size, much as Great Horned Owls *Bubo virginianus* or Frilled Lizards *Chlamydosaurus kingii* do in response to threats, giving the cormorant the advantage it needed. This aspect of the behavior of diving birds has not been studied, and whether it is a common occurrence in Flightless Cormorants is unknown. Further work on their feeding ethology is needed to elucidate this.

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