First record of predation of the paper nautilus *Argonauta nouryi* (Cephalopoda: Argonautidae) by the Common Black Hawk *Buteogallus anthracinus* (Accipitriformes: Accipitridae)

Primer registro de depredación del nautilo de papel *Argonauta nouryi* (Cephalopoda: Argonautidae) por el Gavilán Cangrejero *Buteogallus anthracinus* (Accipitriformes: Accipitridae)

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ABSTRACT
Predation of cephalopods by non-marine birds is rare, especially within the Order Accipotriformes. Observations took place *in situ* and identification of *Argonauta nouryi* was entirely based on the shell form. The predation of the paper nautilus, *A. nouryi*, by the Common Black Hawk, *Buteogallus anthracinus*, is reported for the first time at the Murciélago Sector of the Santa Rosa National Park, Guanacaste, Costa Rica. This represents the first known bird predator of this species within the country.

Keywords: Predation, Santa Rosa National Park, Costa Rica, cephalopod, behavior, hawk.

RESUMEN
La depredación de cefalópodos por parte de aves no marinas es rara, sobre todo en aves del orden Accipitriformes. Las observaciones se llevaron a cabo *in situ* y la identificación de *Argonauta nouryi* fue completamente basada en la forma de la concha. Se registra por primera vez la depredación del nautilo de papel, *A. nouryi*, por el Gavilán Cangrejo, *Buteogallus anthracinus*, en el Sector Murciélago del Parque Nacional Santa Rosa, Guanacaste, Costa Rica, lo cual representa la primera ave conocida depredadora de esta especie en el país.

Palabras claves: Depredación, Parque Nacional Santa Rosa, Costa Rica, cefalópodo, comportamiento, gavilán.

INTRODUCTION

In Costa Rica, there are four valid species of the genus *Buteogallus* Lesson, 1830. Stiles & Skutch (2003) report three taxa, *Buteogallus anthracinus* (Deppe, 1830), *Buteogallus urubitinga* (Gmelin, 1788) and *Buteogallus solitarius* (Tshudi, 1844). The last species reported for the genus in the country is *Buteogallus meridionalis* (Latham, 1790) (Obando-Calderón *et al.* 2008).

Regarding *B. anthracinus*, it has been reported to prey mainly on crabs complemented by reptiles, frogs, sea turtle eggs and hatchlings, frogs, snakes,

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crayfish, lizards, large insects, stranded fishes and carrion, always near water such as mangroves, coasts, marshes, and swamps (Stiles & Skutch, 2003; Ferguson-Lees & Christie, 2010).

Regarding the genus *Argonauta* Linnaeus, 1758, and according to Finn (2014), there are four described species in the world and on the Pacific Coast of Costa Rica only two species can be found, *Argonauta argo* Linnaeus, 1758 and *Argonauta nouryi* Lorois, 1852.

The first record of predation of the paper nautilus, *A. nouryi*, by the common black-hawk, *B. anthracinus*, is herein presented.

MATERIALS AND METHODS

Observations by the authors took place in Sortija Beach (10° 55' 36'' N, 85° 49' 07.78'' W), Gulf of Santa Elena, Murciélago Sector, Santa Rosa National Park, Guanacaste province, Costa Rica. Bird species were identified *in situ* using binoculars, following the information proposed by Stiles & Skutch (2003).

Sightings took place on August 3rd, 2011, CST 10:27. The bird was observed several times consuming specimens of *A. nouryi*, dropping their shells to the ground, and piling them up, while remaining perched on a small tree (3 to 4 meters tall) very close to the shore (Fig. 1). After eating them, it left the perch and headed to the sea again to come back to the perch after a while with a new argonaut to consume.

Identification of *A. nouryi* was entirely based on the shell form (Fig. 2), using the information proposed by Finn (2014). The time lapse between observations and the preparation of this report was due to the difficulty to identify the paper nautilus species and the considerable confusion existing for centuries among taxonomists until the recent studies by Finn (2013; 2014). Female shells of *A. nouryi* were collected, right under the perch after being dropped by *B. anthracinus*, and were deposited (specimens MZUCR10424-01) at the Museum of Zoology of *Universidad de Costa Rica*, MZUCR.

DISCUSSION

In Costa Rica reports of cephalopod predation by birds in the literature is rare and only for squids. Stiles & Skutch (2003) reported predation of squids in six marine bird families. Procellariidae, Galapagos Petrel, *Pterodroma phaeopygia* (Salvin, 1876); Phaethontidae, Red-billed Tropicbird, *Phaethon aethereus* Linnaeus, 1758; Stercorariidae, Pomarine Jaeger, *Stercorarius pomarinus* (Temminck, 1815); Sulidae, Blue-footed Booby, *Sula nebouxii* Milne-Edwards, 1882; Fregatidae, Magnificent Frigatebird, *Fregata magnificens* Mathews, 1914 and Great Frigatebird, *Fregata minor* (Gmelin, 1789); Laridae, Sooty Tern, *Onychoprion fuscatus* (Linnaeus, 1766), Bridled Tern, *Onychoprion anaethetus* (Scopoli, 1786) and Sandwich Tern, *Thalasseus sandvicensis* (Latham, 1787).

On the other hand, the genus *Argonauta* has been reported to be consumed by different marine birds within the American continent, but

Fig. 1. *Buteogallus anthracinus* in Sortija Beach, Santa Rosa National Park, Guanacaste, Costa Rica. Perched where it was observed consuming specimens of *Argonauta nouryi* (right). Flying away from the perch to the sea (left)
Fig. 1. *Buteogallus anthracinus* en Playa Sortija, Parque Nacional Santa Rosa, Guanacaste, Costa Rica. Perchado donde fue observado consumiendo especímenes de *Argonauta nouryi* (derecha). Volando desde la percha hacia el mar (izquierda)

Fig. 2. *Argonauta nouryi*. Female shell found under the perch in Sortija Beach, Santa Rosa National Park, Guanacaste, Costa Rica
Fig. 2. *Argonauta nouryi*. Concha de la hembra encontrada debajo de la percha en Playa Sortija, Parque Nacional Santa Rosa, Guanacaste, Costa Rica

none of them present in Costa Rica, such as the species mentioned by Imber (1992), Croxall & Prince (1996), Fonseca *et al.* (2001), Fonseca & Petry (2007) and Pinto *et al*. (2007).

Strandings of argonauts have been reported by Grove (2014) and by Grove & Finn (2014) in Tasmania, but in Sortija beach no strandings or other shells were observed, except for the ones piled up under the perch. This reinforces that *B. anthracinus* was fishing them directly from the sea and not collecting them from the ground of the shore. We consider *B. anthracinus* is an opportunist and the changes in its diet are primarily due to food availability, as affirmed by Rodríguez-Flores *et al.* (2010).

This observation is key to demonstrate the complex trophic interactions between the two species, which were unknown to exist. This observation is also key because no bird species has been reported to consume *A. nouryi* in Costa Rica before and it represents the first record of predation of a cephalopod by a member of the genus *Buteogallus.*

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