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FEEDING TACTICS OF THE AMERICAN OYSTERCATCHER (*HAEMATOPUS PALLIATUS*) ON MAR CHIQUITA COASTAL LAGOON, ARGENTINA

Silvina Bachmann* & Mariano M. Martínez†

Lab. de Vertebrados, Dep. de Biología, Fac. Cs. Ex. y Nat., Universidad Nacional de Mar del Plata. Funes 3250. (7600) Mar del Plata. Argentina.

*Becaria de CIC, *E-mail:* bachmann@mdp.edu.ar

†Deceased 12 March 1998

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INTRODUCTION

Oystercatchers (Charadriiformes: Haematopodidae) are cosmopolitan shorebirds, all with a long and comprised bill, well adapted for capturing and handling shellfishes (del Hoyo et al. 1996). For handling and opening bivalves, they use two different methods: stabbing (when the mollusc is gaping, they introduce the bill between the valves, severing the adductor muscle with a rapid levering) or hammering (when the prey is tightly close, they hammer the shell with the bill until it breaks) (Norton-Griffiths 1967).

In Mar Chiquita Coastal Lagoon, American Oystercatchers (*Haematopus palliatus*) forage on sand-lime beaches where they feed all the year round on Stout Razor Clams (*Tagelus plebeius*). From September to March, they also capture female crabs (*Cyrtograpsus angulatus*), feeding mainly on their eggs, and sometimes on their viscera (Bachmann & Martínez in prep.). This study describes the tactics used by American Oystercatchers for searching and handling clams and crabs.

STUDY AREA AND METHODS

Study area. The study was performed along the south zone of Mar Chiquita Coastal Lagoon (Prov. Buenos Aires, Argentina) (37°46'S, 57°27'W). Mar Chiquita is a coastal body of brackish water of 46 km², characterized by mudflats with high density of benthic organisms (Olivier *et al.* 1972).

Methods. The study took place from August 1993 to September 1994. Observations were made biweekly for a total of 27 days. Feeding activity was observed by 15-min continuous focal sampling with the use of 10x50 binoculars (Altmann 1974). Each observation was registered on a cassette tape recorder. Recording was obtained for a total of 30 h on 144 oystercatchers (77 birds feeding on clams, 47 on crabs, and 20 on both prey types). The tapes were then played back and transcribed to obtain: tactics of search and handle for

clams and crabs and number of pecks and probes per prey.

Each day, at the end of observation periods, dead crabs and clams shells were collected to register the marks left by the birds on them.

RESULTS AND DISCUSSION

Feeding on clams. When searching for clams, oystercatchers generally walked parallel to the coast line, in a straight way or zigzaging. They made superficial pecks for locating the prey (only the bill tip entered the substrate), and deep probes to capture it (on most occasions, the entire bill entered the substrate and the bird made a rapid up and down movement with the head). Some of the deep probes were unsuccessful and the bird continued pecking for another prey. Two location techniques have been described for oystercatchers feeding on buried preys: "single probe" or "slow pecking" (the prey located by sight) and "stitching" or "rapid pecking" (series of rapid probes in the substrate with the bill partly open) (Hockey 1981, Lauro & Nol 1995). During this study, oystercatchers used only single probe or slow pecking tactics, apparently determining visually the site where to peck, using the clams siphon holes as indication of their presence. On average, they made 11.2 pecks (SD = 9.5, n = 106) and 3.3 probes (SD = 2.9, n: 106) per captured prey, with a mean rate of 9.98 pecks/min of searching (SD = 4.6, range: 3–32) and 3.28 probes/min of searching (SD = 2.01, range: 1–11).

Once the prey captured, they introduced the bill through the lunular margin of the clam, between the gaping valves, raising it from its tunnel and bringing it to the surface. To separate the valves, they used the stabbing method described by Norton-Griffiths (1967) for *H. ostralegus.* The "hammering" method (Norton-Griffiths 1967) was never observed during this study. As the Stout Razor Clam lives buried in the substrate, the only way to obtain this prey is by catching it when gapping. In addition, in this area of the lagoon, there is no hard surfaces where the oystercatchers can hammer the clams. In other regions, oystercatchers were reported feeding only by stabbing, e.g., *Haematopus ostralegus* feeding on Giant Bloody Cockles on soft substrates (Swennen 1990), and *H. moquini* on gaping mussels on rocky shores (Hockey 1981).

Oystercatchers could handle buried clams or take them out of their tunnel and open them under the water or on the mud. When the clam was taken out, they placed it with its ventral side up and always handled it through its posterior margin. Once the prey was opened, they extracted the greater proportion of its flesh at once, in a single movement. In most cases, they washed the flesh before eating. Sometimes, in one or two attempts, they took a bit more flesh from the same prey.

To open the clams, oystercatchers sometimes broke the posterior margin of the valves. Some 65% (n: 449) of the clams had a breaking mark on their posterior margin; 53% of them had only one broken valve (without differences between right or left valve) and 47% had both valves broken.

Feeding on crabs. Searching for crabs, oystercatchers walked into the water parallel to the coast line, detecting them mainly by sight. They did not make probes (as they did when looking for clams), but sometimes made a kind of lateral sweep with the bill through the mud surface, possibly for detecting the presence of semi-buried crabs. They sometimes made a rapid chase with the head or a short run. They mainly captured females (89.1% of the crabs collected), and less frequently (3.3%) males of *Cyrtograpsus angulatus,* and a few *Chasmagnathus granulata* (7.3 %).

When a crab was captured, they generally took it by a leg to a drier zone to handle it.

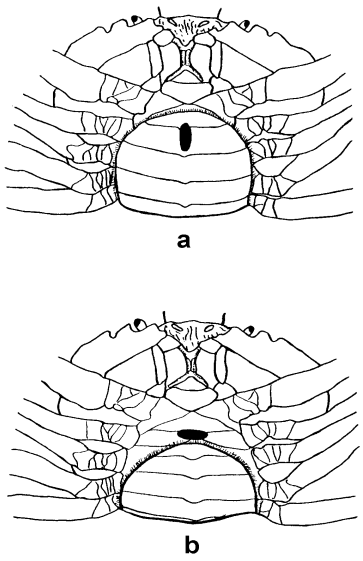

FIG. 1. Position of the mark left by the American Oystercarcher (*Haematopus palliatus*) on the ventral side of the female crab *Cyrtograpsus angulatus*: a) on the pleon, b) under it.

Then, they turn the crab upside down and, with a rapid up and down movement of the head, they stabbed their bill in the ventral part of the crab. With this precise stabbing, the crab's appendages became immobile**,** so the posterior handling and eggs extraction got easier. In 96% of the cases, this type of handling left a characteristic mark on the ventral side of the crab (Fig. 1). The birds stab always penetrated the crab body in a specific point. In 98% of the crabs, the mark was located between the 6th and 7th segments of the pleon; in other cases (2%), it was between 4th and 5th segments. In addition, in 94.3% of the crabs, the mark was just in the centre of the pleon, or under it, but in the centre; in the remaining cases (5.7%), it was lateral. The stabbing zone selected by oystercatchers coincides with the thorax ganglion, which innervates mainly the legs (Brusca & Brusca 1990). The same marks were observed on *Chasmagnathus granulata* in Punta Rasa (Buenos Aires) (pers. observ.). A similar method for handling crabs was described for *H. ostralegus* which stabs the supra-esophageal ganglion through the mouth, then removing the soft parts from the thorax (Hulscher 1996).

The marks left on the crabs by oystercatchers could be on the pleon (43.5%), or under it in the same area (56.5%), and oriented vertically or horizontally (Fig. 1). The marks on the pleon were mainly vertical (59%) but the ones under it were mainly horizontal (77%). These differences suggest two different methods used by the oystercatchers for stabbing the crabs. One was stabbing with the pleon down, the bird's head aligned with the antero-posterior line of the crab, leaving a vertical mark. The other tactic was to raise the pleon a bit and stab under it, with the head turned sideways or aligned with the lateral line of the crab, so the mark was generally horizontal.

Sometimes, when oystercatchers captured a crab, they also fed on their viscera (14.1% of the crabs collected). They extracted the viscera by handling the crab dorsally, raising the carapace with a sever movement of the bill. They removed the viscera but left the gills. Removing viscera took more time (83 s) for the birds than extracting the eggs (43 s) (Bachmann & Martínez in prep.).

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