

Brood parasitism: the first nest of the Eurasian Oystercatcher in Lazio (Italy) could be an example

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Abstract - During the 2025 monitoring of the Kentish Plover, *Anarhynchus alexandrinus*, population nesting along the Lazio coast, a nest of a Eurasian Oystercatcher, *Haematopus ostralegus*, was found. The first egg was laid on April 30 on a sandy beach with limited and partly forbidden access. This is the first time that the species has nested in Lazio and it also represents the southernmost nesting site in Italy and one of the rare egg-layings along the Tyrrhenian coast. To lay its eggs, the Oystercatcher used an active nest of a Kentish Plover pair from which two eggs were removed. The cause is probably because the male Oystercatcher had a left tarsus without toes, and this may have prevented it from digging in the sand. The eggs were incubated for 24 days and then probably preyed upon by a Canidae. In addition to the Oystercatcher, the Little Ringed Plover, *Charadrius dubius*, and the Kentish Plover were found nesting in the same stretch of beach a few dozen meters away. Eggshells, found near the nest, were collected and used to determine some heavy metals such as chromium, nickel, mercury, manganese, and zinc.

Key words: *Haematopus ostralegus*, breeding, Kentish plover, heavy metals, mercury, eggshell.

Riassunto - Prima nidificazione accertata di Beccaccia di mare nel Lazio e probabile parassitismo di un nido attivo di Fratino.

Durante il monitoraggio annuale della popolazione di Fratino, *Anarhynchus alexandrinus*, nidificante lungo la costa laziale è stato rinvenuto un nido di Beccaccia di mare, *Haematopus ostralegus*. La deposizione del primo uovo è avvenuta il 30 aprile in una spiaggia ad accesso parzialmente interdetto. Si tratta della prima volta che la specie nidifica nel Lazio e inoltre essa rappresenta la nidificazione più a sud in Italia. Per deporre le uova la Beccaccia di mare ha utilizzato un nido attivo di Fratino, dal quale sono state rimosse le uova. La causa probabilmente è da attribuirsi al fatto che il maschio della Beccaccia di mare avesse il tarso sinistro senza le dita e questo potrebbe aver impedito di effettuare lo scavo nella sabbia. Le uova sono state incubate per 24 giorni e poi sono state predate probabilmente da un Canidae. Oltre alla Beccaccia di mare nello stesso tratto di spiaggia sono stati trovati nidificanti, a poche decine di metri, il Corriere piccolo, *Charadrius dubius* e il Fratino. Frammenti

del guscio di un uovo, rinvenuti in prossimità del nido, sono stati utilizzati per determinare alcuni metalli pesanti quali cromo, nichel, mercurio, manganese e zinco.

Parole chiave: *Haematopus ostralegus*, nidificazione, parassitismo, *Anarhynchus alexandrinus*, metalli pesanti, guscio di uovo, mercurio.

INTRODUCTION

In Italy, Eurasian Oystercatcher, *Haematopus ostralegus* is considered a migratory, breeding, and wintering species (Brichetti & Fracasso, 2015), slightly increasing as a breeder with an estimate of 300-400 pairs (BirdLife International, 2017; Scarton, 2022). The maximum concentration (90%) of the breeding pairs is concentrated in the Po Delta area, between the mouths of the Adige and the Bevano rivers, and, after many years, it has started nesting again in the Venice Lagoon (Ninni, 1938; Scarton & Valle, 1996; Brichetti & Fracasso, 2018). Confirming its recent expansion in Italy, it has recently nested in the inland Po valley (Grattini & Mantovani, 2019), in Ancona (Marche) (Felici *et al.*, 2024) and Livorno (Tuscany) (Arcamone *et al.*, 2024), and, in addition, nesting must be confirmed in Sardinia (Arrigoni degli Oddi, 1926; Brichetti & Fracasso, 2018). In Lazio, the species has never nested; it is considered a summer visitor and partially wintering (Brunelli *et al.*, 2019).

In Italy the species is nesting mainly on artificial intertidal islets and inside fishing valleys, but also on the edges of salt marshes and less on sandbars; the recent territorial expansion could currently be sought in the availability of new artificial sites such as artificial islands, seaport or trophic resources (Valle & Scarton, 2019; Scarton, 2022; Arcamone *et al.*, 2024; Felici *et al.*, 2024).

In the choice of the nesting site, some authors identified factors that seemed to play a fundamental role, such as a predominantly sandy substrate with low or absent vegetation and low human disturbance (Scarton & Valle, 1994; Valle & Scarton, 1996).

In this paper, the first nesting of the Eurasian Oystercatcher along the coast of Lazio, following, probably, a brood parasitism toward an active Kentish Plover, *Anarhynchus alexandrinus* (according to the recently taxonomic nomenclature), is documented. In addition, eggshells were collected and used to analyse the content of some heavy metals: chromium (Cr), nickel (Ni), mercury (Hg), manganese (Mn), and zinc (Zn).

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BREEDING SITE AND METHODS

Breeding site

The nest was found during the annual monitoring of the Kentish Plover's nesting population along the Lazio coast. The breeding site, named "Furbara-Scoglietti", is in the central-northern part of the Lazio coast. The site is characterized by the presence of a sandy beach about 2 km long, which is partially inaccessible to tourists because it is a military area. The limited human impact has allowed the protection of the typical species of the dune, such as the *Crucianella maritima*, *Ammophila arenaria*, *Pancratium maritimum*, and some specimens of *Glaucium flavum*. Along the beach, there are several rocks, and some of these rocks (named Scoglio di Tosi) emerge at about 100 m from the shoreline; they guarantee the existence of a Mussel, *Mytilus galloprovincialis*, colony. Regarding the Eurasian Oystercatcher, along this tract of coast, a migratory and resident individuals overlap during the non-breeding season occurs; for several years the species has been present in the site with small flocks (5-25 individuals) as in the nearby Macchiatonda Nature Reserve where the species showed a stable presence between February-March and September-October, with maximum abundance between May and July (Sergio Muratore, *in verbis*). One of these individuals has no toes in the left tarsus (Fig. 1), and it was regularly observed for at least 2 years.

Methods

Concerning the chemical analysis, eggshell samples were washed with acetone and then with deionised water to remove adherent organic and inorganic pollutants (Burger, 1994). Finally, eggshells were fully dried and stored in dry conditions. Three weighed samples (0.5 g each) were mineralized with 4 mL of 65% nitric acid (Suprapur Merck) for inorganic trace analysis and heated at 120 °C for 1 hour. After the complete acid digestion, solutions were diluted with distilled water up to 10 ml and analyzed as previously described (Pietrelli & Biondi, 2009).

RESULTS AND DISCUSSION

Brood parasitism

On April 30, an egg laid by the Eurasian Oystercatcher was found in a Kentish Plover's nest previously monitored (laid on April 28-29). In particular, two Kentish plover eggs were removed, and in their place, one Eurasian Oystercatcher egg was found. One egg laid by a Kentish Plover was found intact at about 1 m from the nest (Fig. 2). On May 2, a second egg of Eurasian Oystercatcher was found; no lining material or vegetation cover was noticed in the nest, and the female was observed incubating (Figs. 3 and 4). This is the nesting of

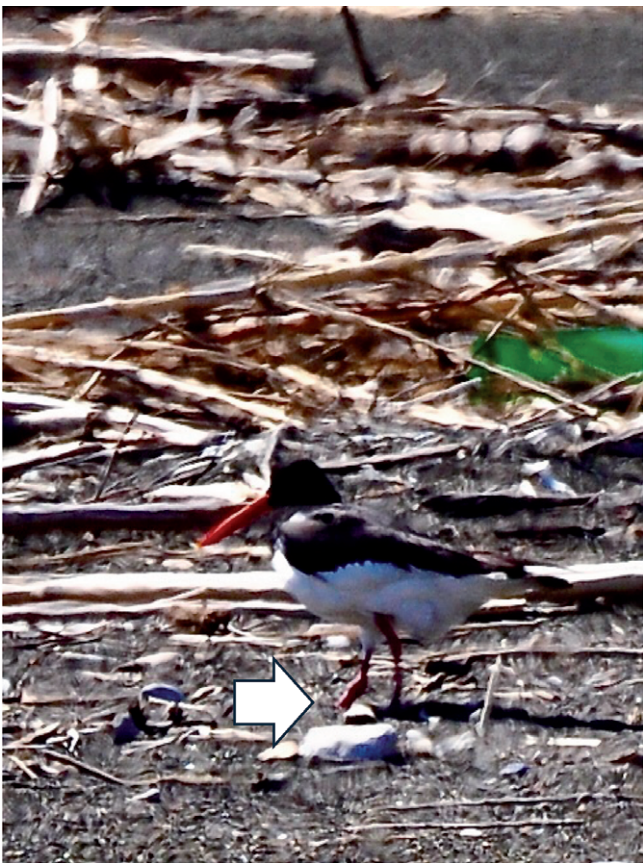


Fig. 1 – The Oystercatcher with the tarsus without toes. / La Beccaccia di mare con la zampa menomata.

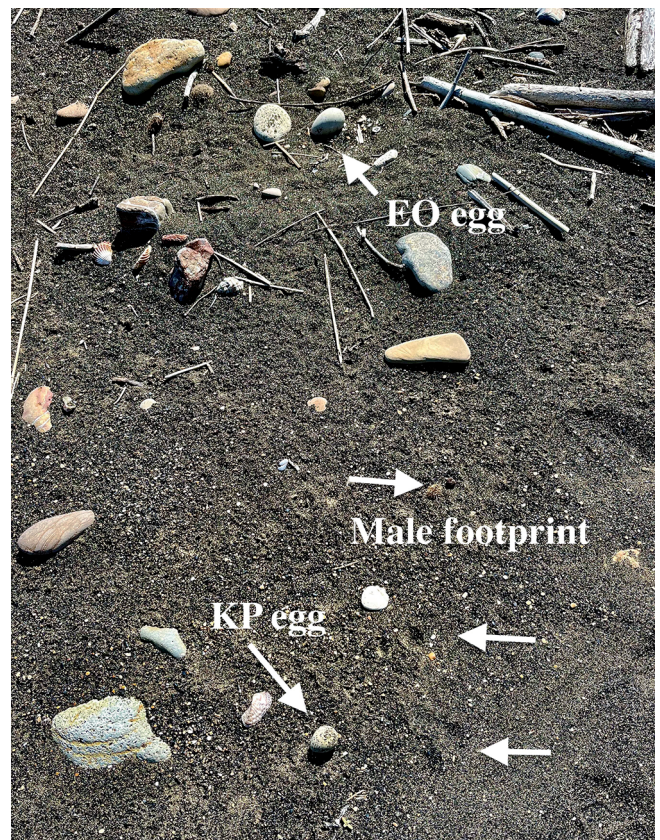


Fig. 2 – The Oystercatcher (EO) and Kentish plover (KP) eggs and footprints as they have been found on sand. / Uova e impronte di Beccaccia di mare (EO) e Frattino (KP) trovate sulla sabbia.

this species further south in Italy and the 2nd along the Tyrrhenian coasts, considering that its reproduction was reported by Caterini (1932) and only recently by Arcamone *et al.* (2024), always along the Tuscan coast. A new nest of Kentish Plover and a pair were found about 1 km away from the previous site; it was the same pair that moved to lay a new nest.

Birds that occupy the nests of other species typically do so through a behavior called “brood parasitism”, such as for Common Cuckoo, *Cuculus canorus*; moreover, some birds also physically take over or reuse nests built by other birds, such as House Sparrow, *Passer domesticus*. Eggs or chicks can also be evicted from the nest. A similar behavior for the Eurasian Oystercatcher seems to have never been observed and described in scientific literature, even though an Oystercatcher was breeding in an abandoned Great Cormorant nest (Ardamatskaya, 2000). A plausible explanation concerns the fact that the left tarsus of the male does not have toes (Fig. 1). Usually, the nest is a scrape on the ground, lined or not, and it is placed to provide good all-round visibility, and the scrape is made mainly by the male (Cramp & Simmons, 1983); therefore, in our case probably the male would have some difficulty digging in the sand and therefore preferred “to steal” an already active nest.

During the monitoring survey, it was observed that the pair were often highly aggressive towards gulls and crows close to the nest, dive-bombing (sometimes making contact) and screeching. An intense mobbing activity was observed against a Red Kite, *Milvus milvus*, flying over the nest area. Contrary to what some authors have reported (Cramp & Simmons, 1983), they have not undertaken distraction displays on the ground in defense of eggs.

Thanks to the favorable characteristics and due to similar habitat preferences, the breeding territory overlaps with other Charadriiformes such as Little Ringed Plover, *Charadrius dubius*, and Kentish Plover; the species nested a few dozen meters away from each other. In particular, the nest was positioned 84 m away from the shoreline, 36 m from the Little Ringed Plover and 85 m from another Kentish Plover nest; in comparison, the range distance of 8-79 m for Kentish Plovers was found within an association of four Charadriiformes species nesting on the barrier islands of the Po Delta (Valle & Scarton, 1999).

The incubation period is 27-28 days (van de Pol *et al.*, 2014), but unfortunately, after 24 days of incubation, the eggs were presumably preyed upon by a Canidae, judging by the footprints observed around the nest. After all,



Fig. 3 – Eggs of Oystercatcher. / Uova deposte dalla Beccaccia di mare.

a relatively high level of predation by mammals is reported (McDonald & Bolton, 2008; Ens & Underhill, 2014). According to Cramp & Simmons (1983), the replacement clutch after egg loss did not happen. Some fragments of an egg found near the nest were collected to be analysed and to determine the content of heavy metals.

Even though the beach for a long stretch (2 km) borders cultivated and partially uncultivated fields, the Oystercatchers that stop at the site have never been sighted feeding in the fields: it is assumed that they do not feed on terrestrial prey.

Heavy metals content in eggshell

Environmental pollutants could pose a great threat to the health of shorebirds throughout their dynamic life cycle, leading to further population declines (Ma *et al.*, 2022). In the breeding season, foraging of Eurasian Oystercatcher takes place in relatively small distances (Becker *et al.*, 2003) and is specialized in eating worms, insect larvae, or shellfish species (van de Pol *et al.*, 2010; Ens & Underhill, 2014). The Oystercatcher, like other birds, produces its eggs from substances stored in the body over time (Dittmann *et al.*, 2011). Considering that the species frequents the site for a few months before

nesting, eggshells can be considered a good indicator of local exposure (Becker *et al.*, 2003; Pietrelli & Biondi, 2009; Barwisch *et al.*, 2024), using them as samples to analyze; eggs, chicks, and adults were not collected, thus avoiding ethical concerns.

The chemical analyses of the eggshells gave the following results: Cr=5.14±0.15 mg/g, Ni=102.43±0.52 mg/g, Hg=82.45±0.13 mg/g, Mn=8.32±0.21 mg/g and Zn=27.47±0.36 mg/g.

Considering that there are no data on the content of heavy metals in the shell of the Oystercatcher's eggs, it is difficult to compare the results of the analyses. Some trace metals were determined in the eggshells of American Oystercatchers, *Haematopus palliatus*, from the Bahía Blanca estuary, Argentina; data are of the same order of magnitude for Cr and Zn except for Ni, which is much lower (6.05±0.89 mg/g) (Simonetti *et al.*, 2015). Some data about pollutants associated with Oystercatcher are related to the organochlorine compounds, cadmium, and copper in the blood, in the feathers, in the liver, and in the kidneys (Ma *et al.*, 2022).

Regarding mercury, the comparison with the shells of the Egret's eggs sampled a few km further North is similar: a range between 0.026 and 0.200 mg/g dry weight was found (Pietrelli & Biondi, 2009). Mercury is a metal



Fig. 4 – Oystercatcher incubating. / La Beccaccia di mare in cova.

that can exist in a range of organic and inorganic forms with varying degrees of toxicity, particularly in aquatic organisms. A very important factor in the impacts of mercury on the environment is its ability to build up in the organisms and along the food chain.

CONCLUSIONS

Considering that the anthropogenic habitat loss is widely recognized as a primary environmental concern, the presence of new species pairs breeding along the Tyrrhenian coasts indicates that in Lazio, there are still stretches of coast capable of hosting species sensitive to great anthropogenic changes. Therefore, actions associated with improving local planning laws and overlays for the purpose of regulating development in sensitive shorebird areas should have the highest priority yet carried out so far in neighbouring areas (coastal wetland of Torre Flavia), where the Kentish Plover and Little Ringed Plover nest and where a series of operational management actions have been undertaken in recent decades (Battisti *et al.*, 2022).

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Ethical approval

All experiments and protocols performed in this study comply with current Italian legislation.

Competing interests

The author declares no competing interests.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

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