Common Terns *Sterna hirundo* incubating Common Garden Snail shells *Helix aspersa* on Rockabill Island

Andrew Power[1*], Stephen Newton[2] and Ian O'Connor[1]

** Correspondence author. Email: andrew.power@research.gmit.ie*

[1] *Marine and Freshwater Research Centre, Galway-Mayo Institute of Technology, Dublin Road, Galway, H91 T8NW, Ireland;*

[2] *BirdWatch Ireland, Unit 20, Block D, Bullford Business Campus, Kilcoole, Co. Wicklow, Ireland.*

Many ground-nesting bird species have been observed incubating foreign objects in their nests (Mellink 2002). Pine cones, golf balls, guano, hermit crabs, mammalian bones and many more objects have all been recorded in bird nests (Knight & Erickson 1977; Mellink 2002; Langlois *et al*. 2012). A study by Conover (1985) showed that 10% of Ring-billed Gull *Larus delawarensis* and 6% of California Gull *L. californicus* nests contained a foreign object. These foreign objects were more similar in size and shape to the gull eggs than to randomly selected pebbles. Little Terns *Sterna albifrons* have been observed incubating egg-like pebbles for several weeks on two separate occasions at a breeding colony in Kilcoole, Co. Wicklow, Ireland (Farrelly 1990). Several hypotheses have been put forward to explain this behaviour. Coulter (1980) suggested that foreign objects may act as an incubation stimulus. Many tern and gull species, unlike other birds, have three brood patches not one (Gochfeld 1976; Reid 1987). Coulter (1980) conducted incubation studies of several species of gulls suggesting that birds incubating three eggs sat for longer periods of time, resettled less frequently, have a shorter incubation period and a higher hatching success than birds on either fewer eggs or more. He speculated that gulls are highly adapted for three-egg clutches whereby the foreign objects provide an important stimulus for incubation behaviour when there are less than three eggs (Beer 1961; Beer 1965; Baerends *et al*. 1970; Coulter 1980). Alternatively, the mistaken-food hypothesis suggests that a predatory bird brings a foreign object back to the nest, regurgitates the object and then proceeds to incubate it, mistaking it for one of its own eggs (Sugden 1947; Twomey 1948). A third hypothesis is that the foreign object is mistaken by the bird for one of its own eggs and rolled into the nest, in this scenario the foreign object is likely to have originated from close to the nest (Conover 1985).

Rockabill Island (53°35'N, 6°0'W), a small island 8 km off the north County Dublin coast, is home to approximately 2,000 pairs of Common Terns *Sterna hirundo* during the breeding season from May to August (McKeon *et al*. 2017). Common Terns typically lay between one and three eggs in a clutch (Gochfeld 1976). The mean clutch size for Common Terns nesting on Rockabill Island in 2016 was 2.67 (Burke *et al*. 2016b). On 30 May 2017 approximately 100 nests were checked for the

Figure 1. Common Tern *Sterna hirundo* nest containing two eggs and one Common Garden Snail *Helix aspersa* shell. Photo taken under licence.

presence of foreign objects in a small subsection of the colony. Six Common Tern nests were discovered containing an empty shell of a Common Garden Snail *Helix aspersa*, an abundant species on Rockabill Island. Each of these nests contained at least one Common Tern egg with the snail shell nestled neatly against the other egg(s) in the nest (e.g. Figure 1). Four of these nests contained two eggs and the remaining two nests contained a single egg. Adult Common Garden Snails have a thin calcareous shell approximately 25–40 mm in diameter and 25–35 mm high (Pfleger & Chatfield 1983). The colour pattern of snail shells is also similar to that of a Common Tern egg. Common Tern eggs are similar in size with an average length of 41.3 mm and width of 30.5 mm (Harrison 1975). The nests were monitored until 7 June 2017 and the adult Common Terns were observed incubating the foreign object during that time. The nests were not monitored any further so it is unknown if the adult birds continued to incubate the foreign object or if it was eventually discarded from the nest. This behaviour has been noted on Rockabill Island in 2014, 2015 and 2016 by the wardens working on the island (Brian Burke, pers. comm.). The authors of this note could not find any other examples of Common Terns, or any other seabird, incubating snail shells at any other location.

It is possible that Common Terns are adding snail shells to their egg clutches to serve as an incubation stimulus. Shells were not found in any clutches containing three eggs or more which does support this hypothesis. No other foreign objects were found within the nests. Coulter (1980) examined 422 Common Tern nests and noted the number of eggs and foreign objects for each clutch. He found that between 15% and 20% of clutches with one or two eggs had stones, whereas less than 2.5% of clutches with three eggs contained stones. This may indicate that terns with clutches of fewer than three eggs are stimulated to add foreign objects to their nests. The increased clutch of eggs and foreign objects acts as stimulus affecting incubation behaviour, just like a full clutch of eggs. However, it is possible that terns without a full clutch may be more likely to mistake a neighbouring egg or foreign object as one of their own eggs.

It has been shown that some tern species are able to recognise their own eggs (Buckley & Buckley 1972) but Common Terns probably do not possess this ability (Saino & Fasola 1993). There have been many recorded instances of Common Terns, on Rockabill Island, actively recruiting eggs from nearby nests into their own (Burke *et al*. 2016a). Common Terns use their bill to roll eggs from one location to another (Marshall 1943). Clutches containing eight and nine eggs have been recorded on Rockabill Island as well as clutches containing eggs of a different species, the Roseate Tern *S. dougallii* (Burke *et al*. 2016a). In some instances the nesting material surrounding the neighbouring clutches had been broken through thus allowing the eggs to be rolled into the new host nest. These nests were usually on exposed concrete footpaths where very light dried plant material is used to try and contain the eggs.

Regardless of whether or not Common Terns have the ability to recognise their own eggs they may still adopt these foreign objects as very little is lost in reproductive fitness if a tern mistakenly brings a foreign object into its nest (Buckley & Buckley 1972). If a Common Tern mistakenly leaves an egg outside the nest owing to a failure to recognise it, the tern's loss in reproductive fitness would be more substantial. However, if a bird species incubates a foreign egg with no real eggs present in the nest it may also cause a loss in reproductive output as the breeding pair involved would not be stimulated to lay a replacement clutch, but this was not observed on Rockabill Island.

Garden Snails are terrestrial so it is unlikely that the terns are gathering them as food items as they hunt in aquatic environments. However Common Terns are known to ingest mollusc shells during the egg laying period; Nisbet (1997) observed female Common Terns frequently gather shell fragments from Common Slipper Shells *Crepidula fornicata* and Common Jingle Shells *Anomia simplex*. The shell fragments were collected near the nest territory on the ground by the adult terns and it is thought that this may help the adult female regain calcium lost during eggshell formation (Nisbet 1997). It is possible that they collect the snail shells for this purpose and once the shells are brought back to the nest they are mistaken for their own eggs. No other foreign objects were found inside Common Tern nests that would support the mistaken-food hypothesis. However in 2015 the wardens noted a Common Tern incubating a bottle cap alongside two eggs. The number of egg-like objects near the nests was not examined and snail shells may be the most common egg-like object in the area. Without further study it is difficult to determine which hypothesis is the most likely to explain Common Terns incubating eggshells.

As this behaviour has been observed frequently on Rockabill Island it is recommended that nests containing foreign objects are monitored for the duration of the breeding season in future projects. During this study only a small proportion of Common Tern nests were checked for the presence of foreign objects during a single day. Wardens on the island conduct daily nest checks on several sections of the island and it is recommended that checking for foreign objects be incorporated into the wardens routine in future years. Nest manipulation experiments could be

undertaken where the snail shell is moved outside of the nest to see if it is brought back into the nest by the adult birds. More intensive monitoring coupled with these experiments could help determine if snail shells are mistaken for eggs or brought into the nest deliberately as an incubation stimulus.

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