First records of egg-capping in Dippers

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214. 'Capped' Dipper *Cinclus cinclus* egg, River Lea, Biscay, Basque Country, Spain, April 2023.

While studying Dippers *Cinclus cinclus* in northern Spain (see Galarza *et al.* 2023), we found two cases of egg-capping out of 343 broods checked (0.6% of the broods). Egg-capping is the attachment of the empty shell of a hatched egg to an unhatched one. (Tinbergen 1963; Derrickson & Warkentin 1991). The hatched shell may slip over an unhatched egg forming a double shell layer causing the death of the embryo in the unhatched egg by interfering with gas exchange or making the hatching process difficult (Derrickson & Warkentin 1991).

In both observed cases for Dippers in northern Spain, the embryo in the unhatched egg was fully formed and had attempted unsuccessfully to break through the double layer of eggshell.

Egg-capping is rarely reported upon, despite it having been observed in a wide range of species, mostly in birds that construct open nest cups (e.g. Tinbergen *et al.* 1962, Arnold 1992, Sandercock 1996, Hauber 2003, Schreven 2012) and more rarely in those that nest in cavities (Carstens 2014). The Dipper builds a dome-shaped nest made of moss, grass and leaves within which is an inner cup open to the outside through a hole that faces downwards, usually over running water. It lays up to seven eggs consecutively and the young hatch almost synchronously, since incubation is usually initiated just after the laying of the penultimate egg (Tyler & Ormerod 1994). Soon after the chicks have hatched, Dippers remove the eggshells by throwing them into the water that runs under the nest (pers. obs.). Eggshell removal from the nest is a common trait amongst many bird species, and prevention of egg-capping has been considered as one of several possible reasons for this behaviour (Tinbergen 1963).

Although the recorded percentage of egg-capping events in the studied population was low, it should be considered as a minimum owing to the low probability of detection, since nest-checking must coincide with the short period of time between the first egg hatching and adults removing shells of hatched eggs and any eggs that have failed to hatch.

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