Short Communication

Successful December nesting of a pair of White-throated Dippers (*Cinclus cinclus*) in Northeast Italy: the earliest ever in Europe

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Abstract - A remarkably early nesting of a pair of White-throated Dipper (*Cinclus cinclus*) in December 2021 in northeastern Italy is reported and discussed by considering factors that may have influenced the breeding onset.

Keywords: *Cinclus cinclus*, early breeding, nesting season, phenology, passerines.

Riassunto - Nidificazione con successo a dicembre di una coppia di merlo acquaiolo (*Cinclus cinclus*) nell'Italia nord-orientale: la più precoce in Europa.

Si segnala la nidificazione notevolmente precoce di una coppia di merlo acquaiolo (*Cinclus cinclus*) in Italia nordorientale, discutendola alla luce dei fattori che potrebbero aver favorito una nidificazione così anticipata.

Parole chiave: *Cinclus cinclus*, riproduzione precoce, stagione di nidificazione, fenologia, passeriformi.

INTRODUCTION

The White-throated Dipper (*Cinclus cinclus*) is well known for being amongst the first European passerine species to breed in early spring (Tyler & Ormerod, 1994), with little variation in this pattern across Europe (Shaw, 1978). Several explanations for early breeding in Dippers have been proposed, including the synchronisation between the nestling period and the seasonal peak in their food biomass (Shaw, 1978). Early breeding can also allow the completion of two successful nesting attempts prior to the post-breeding moult in adults (Ormerod & Tyler, 1993).

Across Europe, northwestern (Ireland, Wales, Scotland) and northern (Sweden, Norway) populations breed later than populations in southern regions, such as Spain and Italy (D'Amico *et al*., 2003). In central Europe (Switzerland, Austria, Romania, Germany, and France), first-egg laying occurs from mid-February to late April (D'Amico *et al.*, 2003; Roché & D'Andurain, 1995).

There are very few published studies of Dipper breeding phenology in Italy. According to Brichetti & Fracasso (2007), Italian Dippers lay their eggs from February to July, with earlier nesting in mild winters. In a sample of 127 nests found along the River Posina in the Venetian Prealps (20 km away from the site considered in this paper, at altitudes of 400-600 m s.l.m.), first-egg dates ranged from 2 February to 25 May, with median dates of 9 March (n=72) and 23 April (n=27) for first and second clutches, respectively (Fracasso *et al*., 2000).

Set against these previous data, this note reports a remarkably early nesting in a pair of Dipper, whose clutch was initiated around Christmas Day 2021, making it the earliest nesting record in Europe (Steve Ormerod, pers. com., 6 Feb. 2022).

OBSERVATIONS

The active nest of this Dipper pair was first observed on 2 February 2022 along the River Agno near Brogliano (11°21'10.79'' E; 45°36'6.50'' N, 170 m s.l.m., Vicenza province, NE Italy), at the border with Cornedo Vicentino. The River Agno rises from the Piccole Dolomiti mountains in the municipality of Recoaro Terme, 20 km further northwest, and flows down the Agno valley through Valdagno and Cornedo Vicentino municipalities before reaching the nesting site at Brogliano.

Deciduous trees make up most of the valley's vegetation including black locust (*Robinia pseudoacacia*), black poplar (*Populus nigra*), grey willow (*Salix cinerea*), white willow (*Salix alba*), and common alder (*Alnus glutinosa*). Shrubs include bramble (*Rubus* sp.), dog rose (*Rosa canina*), elder (*Sambucus* sp.), and summer lilac (*Buddleja davidii*).

The stream bottom is dominated by a mixture of sand and gravel derived from the limestone, basalt, dolomite, and phyllite that underly the catchment area and give rise to base-rich and alkaline run-off. During the period 2010-2020, the average pH of the River Agno at the ARPAV station in Cornedo Vicentino was 8.39 (7.9-9) (ARPAV, 2023a). In December 2022 we recorded a pH of 8.32-8.41

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Received for publication: 21 February 2023
Accepted for publication: 19 April 2023
Online publication: 14 December 2023

Fig. 1 - Two young White-throated Dippers still in the nest on 2 February 2022. / Due giovani merli acquaioli ancora nel nido il 2 febbraio 2022. (Photo: / Foto: Piero Rasia).

near the nesting site. The river stretch at this nesting site goes almost or completely dry during the summer.

Macroinvertebrate samples (net-mesh 1 mm) from the River Agno in Brogliano included gastropods (*Physa acuta*, *Radix auricularia*), mayflies (*Baetis*, *Cloeon*, *Ecdyonurus*, *Epeorus*, *Ephemera*, *Ephemerella*, *Serratella*), stoneflies (*Leuctridae*, *Nemouridae*, *Taeniopterygidae*), caddisflies (*Hydropsyche*, *Mystacides*, *Odontocerum*, *Rhyacophila*) and crustaceans (*Asellus aquaticus*, *Gammarus* sp.). All these taxa figure in the prey spectrum of Dipper and provide calcium for egg formation and food for adults and nestlings (Ormerod & Tyler, 1991). Additionally, the fish community in the Agno River includes European bullhead (*Cottus gobio*), Padanian goby (*Padogobius bonelli*), three-spined stickleback (*Gasterosteus aculeatus*), brook barbel (*Barbus caninus*), vairone (*Telestes muticellus*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) that are sometimes preyed upon by the Dipper.

The nest was built in a drainage hole behind the waterfall created by a weir. The brood development was observed from the cycle lane that runs along the high riverbank.

On 2 February 2022, the pair was feeding four young (two of which were still in the nest - Fig. 1). From the following day, 3 February, only three fledged young were seen near the nest (Fig. 2).

Fig. 2 - Three young White-throated Dippers and an adult on the weir over the nest on 3 February 2022. / Tre giovani merli acquaioli e un adulto sulla briglia sopra il nido il 3 febbraio 2022. (Photo: / Foto: Jessica Peruzzo).

According to a large nest record sample (Shaw, 1978), the laying date of the first egg can be back-calculated assuming a clutch-size of four eggs, a fledging period of 22 days, incubation of 16 days (12-18) from the penultimate egg, and a one-day laying interval per egg. As the brood probably fledged between 2 and 3 February, the incubation began around 12 January from eggs laid from 23-29 December with incubation likely to have started close to 27 December 2021. On 18 February, soon after the successful rearing of the three young, the pair started to collect moss and leaves to repair the old nest and began to feed a second brood on 20 March. The adults ceased feeding the young on 10 April. On 19 April, we observed the adults bringing nest material to another drainage hole in the same weir, but we could not verify whether this third nesting attempt was successful.

DISCUSSION

Environmental factors such as low air and water temperatures, high altitude, heavy winter rainfall, impaired water quality, reduced food availability and low river pH may delay laying in Dippers (D'Amico *et al.*, 2003; Tyler & Ormerod, 1994). Mild winters appear to advance laying (Tyler & Ormerod, 1994), as well as high water discharge during the winter months prior to the breeding season (Nilsson *et al.*, 2020). Yearly differences in temperature can lead to time shifts of up to 30 days in the start of laying (Hrčková *et al*., 2014). Earlier breeding in Dipper also seems to be a response to climate change (Nilsson *et al.*, 2020).

The average air temperature recorded in 2021 at the ARPAV station in Valdagno was 13.1°C (min. -5.5°C in February, max 35.9°C in August), in line with the annual averages of the 10 previous years (13.5°C) (ARPAV, 2023b). Autumn and winter temperatures were likewise in line, with an average temperature of 12.5°C in October, 8.3°C in November, 3.8°C in December, and 2.4°C in January 2022 (ARPAV, 2023b).

Water temperature of the River Agno in 2021 was not available, as this parameter was not sampled by ARPAV in that year. ARPAV (2023a) data from 2010 to 2020 show an average water temperature of 12.4°C (2.1-23.2°C). The mean temperature we recorded in December 2022 was 5.1°C.

In 2021, the ARPAV station in Valdagno recorded 1,396.6 mm of rainfall in 83 days, with a maximum of 277.0 mm in November, resulting in a slightly dry year compared to the previous 10 years (2011-2020 average of 1,605.1 mm in 103 days) (ARPAV, 2023b).

These weather conditions appear to be in line with the annual averages and therefore they do not seem to be an explanation for the early laying of this Dipper pair. Moreover, other pairs of Dippers along the Agno valley laid their eggs on the usual dates (8 pairs were building their nests on 9 February 2022, and adults were first feeding their nestlings from 9 March).

The river stretch at this nesting site is subject to various discharge variations during the year, so it is possible that these variations play a role in conditioning the breeding onset, as the water levels, velocity and turbidity could influence Dipper foraging success during winter (Faragó & Hangya, 2012; Nilsson *et al*., 2020).

Also high population density can lead to earlier breeding (Nilsson, 2019). Indeed, the density of Dippers along the River Agno is extremely high in comparison to European and Alpine averages: for example, 2.56 pairs/km in Germany (Schmidt, 1985) or 1.44-1.52 pairs/km along the nearby River Posina (Fracasso *et al*., 2000). Indeed, over a 4-km stretch of the River Agno in Valdagno (20.1 m/km steep), we calculated a density of 4.10 pairs/km, with a minimum distance between nests of 200 m. In a 4-km stretch of the River Agno from Cornedo Vicentino to Brogliano (2.7 m/km steep), we found a density of 1.25 pairs/km, and a minimum distance between nests of 600 m. The nesting site described here was at the southernmost point of this stretch. Along the lower stretches of the River Agno the density of Dippers becomes very low until it almost vanishes when the river changes its name in "Guà", in Arzignano city, and becomes a larger and slower river.

White-throated Dipper is regarded as indicator of excellent water quality (Lachenmayer *et al*., 1985, Ormerod & Tyler, 1987, 1994). Given the relatively high Dipper density, a plentiful supply of prey and a wide availability of nesting sites, the upper and middle stretches of the River Agno offer a very favourable habitat for breeding pairs. One hypothesis is that the early nesting of this Dipper pair was favoured by relative isolation from other pairs settled further upstream, resulting in less competition in a highly favourable environment with optimal yearly weather conditions. Behavioural factors conducive to pair formation, such as individual quality, age and experience, would also contribute to explain this advanced laying. Actually, time of breeding in birds appears to be mainly controlled by photoperiod, and the exact combination of individual factors and environmental quality that brought such early laying remains unclear (Verhulst & Nilsson, 2008).

On 10 November 2022, a Dipper pair started to bring moss to the same nesting site, but a river flooding probably washed the nest away. On 30 January 2023, a fully feathered young Dipper was seen along the River Brenta near Bassano del Grappa, a Prealpine site 35 km north-east from Brogliano (Fabio Moretto, pers. com., 9 Feb. 2023).

We suggest to monitor the Dipper breeding populations and their habitat to better understand this phenomenon, at both local and continental scale. We also suggest further investigating whether this altered time of breeding in Dippers is related to climate change that may affect either directly the birds or their prey.

Acknowledgments

Piero Rasia first saw and reported the young Dippers in Brogliano. Steve Ormerod and an anonymous referee provided useful information, comments and suggestions.

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