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Past avifaunal assemblages as proxies of terrestrial ecosystem evolution in response to Pleistocene climate oscillations

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Current Western Palearctic avifauna is reported in the fossil record since the Early Pleistocene. Bird species have specific needs concerning the habitat, especially in terms of vegetation, and are very sensitive to habitat changes. Hence, changes in composition of avifaunal assemblages can reflect habitat patchiness and evolution of the landscape through time (especially vegetation features) in response to past climatic oscillations.

We present the systematic and taphonomic analysis of the bird fossil remains from the late MIS 3 of two cave deposits in North-Eastern Italy. Buso Doppio del Broion Cave (Vicenza) is located in the Berici Hills, at 150 meters above sea level (m.a.s.l.), while Rio Secco Cave (Pordenone) is situated in the Eastern Carnic Pre-Alps, at 580 m.a.s.l. The two sites provided more than 50 species, all belonging to the extant Western Palearctic avifauna. The ecological requirements of the bird species recovered, suggest the presence of a mosaic of different habitats in the surroundings of the caves during the late MIS 3, represented by open areas like steppe, grasslands and shrublands; conifer or mixed forests; rocky cliffs and wetlands. Within the sedimentary succession of the Buso Doppio Cave, the upward increase of bird taxa typical of open environments hints to the expansion of open areas (e.g., grassland and steppe) in response to the ensuing climate deterioration related to the onset of the Last Glacial Maximum (MIS 2). Furthermore, in the Buso Doppio Cave deposits the presence of two boreal species currently absent from the Italian avifauna (i.e., *Bubo scandiacus* and *Surnia ulula*), along with *Lagopus mutus*, *Lyrurus tetrix, Tetrao urogallus, Pyrrhocorax graculus, Pyrrhocorax pyrrhocorax* and *Prunella collaris* at low heights, represent clear indication of a climate colder than the present one. This paleoenvironmental and paleoclimatic framework completely agrees with the vegetational profile given by the pollen records of the Fimon lake deposits (less than 5 km away from Buso Doppio Cave) and of the Azzano Decimo core, in the Friulian Plain (about 40 km south of Rio Secco Cave).

This work also provided the first Italian fossil record of two species, *Troglodytes troglodytes* and *Phoenicurus ochruros*, and the second Italian Pleistocene fossil record of *Surnia ulula*. The taphonomic analysis of the fossil remains detected the contribution of nocturnal raptors, carnivores and, to a lesser extent, Paleolithic hunter-gatherers groups, in the accumulation of the bird remains.