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Scorpions Are Part of the Menu of the House Bunting *Emberiza sahari* Levaillant, 1850 (Passeriformes: Emberizidae) in Algerian Sahara

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Abstract: The house bunting is an endemic species for North Africa and Sahara, considered to be granivorous but occasionally consuming invertebrates during the breeding period. Examination of fresh droppings collected from chicks in the Ghardaïa Province reveals, for the first time, that scorpions are part of their diet.

Key words: *Emberiza sahari,* birds, Ghardaïa Province, chicks' diet, scorpion, fresh droppings

Introduction

Scorpions are potential prey of many taxa (Polis et al. 1981) and are part of the diet of at least 312 species, 80% of which are vertebrates (birds, reptiles, amphibians and mammals) (Dupre 2015, Chedad et al. 2021b, Mouane et al. 2022). Birds represent 27% of these scorpion predators (Dupre 2015). Scorpions are preferred prey of many predators for two reasons: first, they are abundant in these specific regions, and second, they are among the largest invertebrates in their community (Polis et al. 1981).

The house bunting *Emberiza sahari* Levaillant, 1850 is an endemic species of North Africa and Sahara (Isenmann & Thévenot 2018, Moulaï 2019). In Algeria, the house bunting nests in the extreme south in the Hoggar and Tassili Regions (Heim de Balsac & Mayaud 1962, Ledant et al. 1981). The nesting are includes a strip in north Sahara, from Béchar Province in the extreme south-west (Hartert 1928, Isenmann & Moali 2000), passing through Laghouat, Ghardaïa, Djelfa Provinces in the centre (Chedad et al. 2021a) to Biskra Province in eastern Algeria (Isenmann & Moali 2000). Their distribution range has expanded northward in the previous century (Ryan 2020) to Algiers, the city of Bordj Bou Arréridj, Tissemsilt (Moulaï 2019) and Tlemcen Province in the north-west of Algeria (Bouhissi et al. 2021). This bird species is partly associated with human settlements (Chedad et al. 2021a), being found in cities, villages and their adjacent vegetation areas as well as in rocky desert environments, generally near water (Beaman & Madge 2010, Ryan 2020).

The diet of the house bunting remains largely unknown. Here, we report the first recorded case of predation on scorpions by the house bunting nesting in northern Algerian Sahara based on observations of scorpion fragments in the faeces of the chicks of this species.

Materials and Methods

Our observations were carried out in the Ghardaïa Region (32°29'39.87'' N, 3°38'43.49''E), located in the centre of Algeria (Fig. 1), at an average altitude of 430 m a.s.l. (Boutmedjet et al. 2022). Eleven fresh faeces from chicks aged five to 15 days (Fig. 2) were collected from four nests of the house bunting during the breeding period (May–June 2023) at three different sites: El-Ateuf, Bounoura and Ben-Yezgen (Ghardaïa Province). At the Zoology Laboratory of the University of Ghardaïa, the faeces were immersed in a Na_2CO_3 solution to dissolve the present mucus and acids as well as to separate the agglomerated food residues as suggested by Orłowski & Czarnecka (2007). After 24 hours, the samples were examined using a microscope with a magnification of ×40. The identification of scorpion fragments was carried out using guides by Vachon (1952, 1973).

Results

The 11 fresh faeces analysed under a microscope revealed the presence of several fragments of juvenile scorpions in 36.4% (4 faeces) of the faecal matter collected from 15-day-old nestlings, i.e. rings, legs and a part of a comb (Fig. 3). The faeces in which scorpion fragments were found had been collected from different nests located in El-Ateuf and Bounoura Regions. These two sites were c. 10 km apart and were characterised by a medium building density. They were situated between the M'zab riverbed, which was rich in vegetation, and a natural environment characterised by rocky mountains, both of which were favourable biotopes for scorpions according to various studies on scorpions conducted in our region (Sadine et al. 2018, 2023) arthropods such as scorpions are understudied, and sufficient information is still lacking regarding their biodiversity. Specimen collection was carried out over 24 months (2016–2017).

The identification of scorpion fragments revealed the presence of the genus *Androctonus* Ehrenberg, 1828 (family Buthidae) represented by *Androctonus* sp. (Fig. 3). This genus was present in the region of Ghardaïa with three species: *Androctonus aeneas* C. L. Koch, 1839*, A. amoreuxi* (Audouin, 1826) and *A. australis* (L., 1758) (Sadine et al. 2018, 2023) arthropods such as scorpions are understudied, and sufficient information is still lacking regarding their biodiversity. Specimen collection was carried out over 24 months (2016–2017), with the most abundant species being *A. amoreuxi*

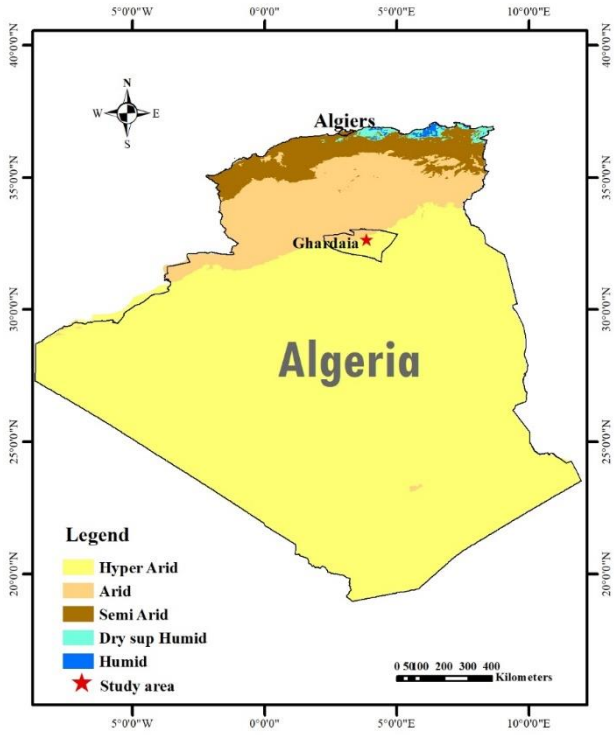

Fig. 1. Location of the study area

(Sadine et al. 2023)arthropods such as scorpions are understudied, and sufficient information is still lacking regarding their biodiversity. Specimen collection was carried out over 24 months (2016–2017).

Discussion

According to the data provided by Chedad et al. (2021b), visual observation of the house bunting shows that this species feeds mainly on seeds of 13 plant species belonging to five families, with the family Poaceae being the most represented with eight species, including *Cynodon dactylon* (L.) Pers., 1805, *Polypogon monspeliensis* (L.) Desf., 1798 and *Phalaris paradoxa* L. 1763. This bird species also feeds on plant-based food remains, especially bread crumbs and, occasionally, on insects, including *Sarcophaga carnaria* L., 1758, *Cadra* spp. and *Messor* spp. They can also occasionally consume flowers, berries and invertebrates during the breeding season. House buntings frequently feed on streets, around houses, inside homes as well as in dumps (Ryan 2020).

In our study area, scorpions were very common in urban zones, especially those of the genus *Androctonus*. Our study period coincided with the active period of these species, which were abundantly present in the region of the study. They can be found almost everywhere, e.g. under rocks, in

Fig. 2. Different age categories studied: a, from 0 to 5 days; b, from 5 to 10 days; c, 10 to 15 days.

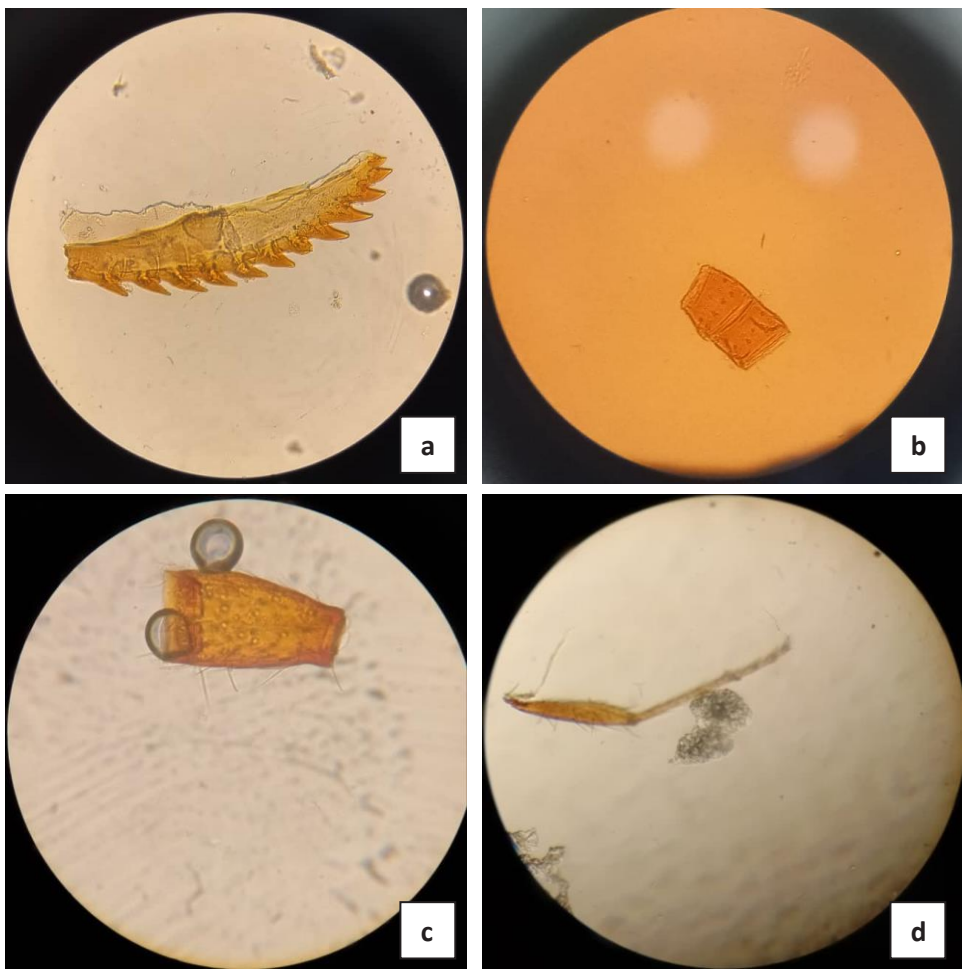

Fig. 3. Fragments of scorpions in faecal matter: a, part of a comb; b, c, rings; d, legs (magnification ×40).

plant debris and in plastic bottles. House buntings probably encounter scorpions, particularly juveniles, while foraging on the ground during their random movements with irregular patterns. Future observations will show if the buntings catch them alive or find them dead on the road or killed in human settlements.

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