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ORIGINAL ARTICLE

Microhabitat selection and digging activity in the terrestrial isopod *Hemilepistus reaumurii* as an adaptive response to life in arid environments

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Abstract
Habitat selection of surface dwelling invertebrates represents an adaptation to terrestrial life and may be influenced by biotic and abiotic factors. A field study was conducted monthly to investigate the variation of the biotope and the spatial distribution of *Hemilepistus reaumurii* burrows in the arid region of Bchachma (Tunisia). Results showed that *H. reaumurii* preferred to dig burrows mainly inside the south-eastern part of the small dunes (nebkas). The density of nebkas in this region was estimated to be 432 ± 51 nebkas /ha, month on average. The nebkas density showed a monthly fluctuation depending on environmental conditions (e.g. wind direction) and human actions (trampling, car driving, sheep presence). Human activity appeared also to influence the spatial distribution of *H. reaumurii* burrows.

Keywords Desert isopod · Microhabitat choice · Burrow position · Subsocial · Arid lands

Introduction

The way through which animals choose their habitat shows a pattern that indicates their adaptation to terrestrial life (Edney 1971). The spatial distribution of soil dwelling animals' burrows may depend on biotic and abiotic factors such as wind direction, vegetation, substrate composition and meteorological conditions (Linsenmair 2007). Among mammals, the badger *Meles meles* (Linnaeus, 1758) that colonizes the semi-arid ecosystems of the Mediterranean regions prefers to dig burrows at the level of the dunes which is covered by vegetation (Lara-Romero et al. 2012). The beetle *Parastizopus armaticeps* (Péringuey, 1892) tends to dig burrow at dune level in the Kalahari Desert (Anne and Rasa 1995). These authors observed that biotic and abiotic factors such as sediment and wind can reduce the number of burrows by filling their entrances. In the supralittoral crustaceans, both *Uca spinicarpa* (Rathbun, 1900) and *Uca longisignalis* (Salmon and Atsaides, 1968) crab species tend to dig burrows at the dunes level (Mouton and Felder 1996). These authors suggested that the presence of vegetation and moisture at the level of the dune may explain this trend. In terrestrial isopods, studies on the genus *Porcellio* showed a correlation between the distribution of xeric species and the cover of stones, except for *Porcellio albinus* (Budde-Lund, 1885) which lives only on sandy soils (Linsenmair 1984; Warburg et al. 1984; Fraj et al. 2008; Medini-Bouaziz et al. 2016). Recent studies on the distribution of *P. albinus* in the Zarat region (Gabes, Tunisia) showed that burrows of this species are generally located on the southern side of the nebkas (Fraj et al. 2008; Medini-Bouaziz et al. 2016).

The semelparous burrowing isopod species, *Hemilepistus reaumurii* (Milne Edwards, 1840) which is extremely common in the arid region of North Africa, Middle East and Central Asia (Lincoln 1970) exhibits a daily activity pattern (Nasri-Ammar et al. 2015; Ayari et al. 2017, 2018a, b). To avoid extreme heat and drought individuals spend most of the time with their brood in a self-dug burrow. These isopods affect soil erosion, desalinization and decomposition process by surface deposition of faeces, which contain high amounts of mineral soil and relatively high concentrations of soluble salt and organic carbon (Shachak and Yair 1984). Each burrow is strictly occupied by only one family (one

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