Hermit crab behaviour has been widely studied, including aspects related to reproduction, olfactory attractants, association with other species, daily movements and migrations, clustering and, profusely, shell selection and utilization (Bertness, 1980, 1981; Hazlett, 1981; Gherardi & Vannini, 1989; Gherardi, 1990; Gherardi et al., 1991; Turra & Leite, 2000; Calado et al., 2006). Studies have focussed mainly on the intertidal zones, because of both accessibility and the role that this changing environment plays in behavioural adaptations. Intertidal species have to have physiological tolerance to extreme changes of salinity, temperature and air exposure in short periods of time. Also, the intertidal habitat is a high-risk zone, because of predation from marine and terrestrial predators (Vanini & Chelazzi, 1985). Hermit crabs are one of the most successful groups in the intertidal zone, probably due to the shell association that provides them with movable shelter, offers protection from physical stress and helps to maintain micro-climatic conditions (Reese, 1969; Hazlett, 1981). Shells also play an important role in the social structure of hermit crabs (Hazlett, 1966; Gherardi et al., 1994). The dependence association between hermit crabs and shell has strongly extended into almost all aspects of their biology (Hazlett, 1981); for this reason there are numerous works studying the relation between hermit crabs and gastropod shells and the behaviour related with shell selection and utilization (García & Mantelatto, 2001 and references herein).

The present work reports a new behaviour related to shell care by the intertidal hermit crab *Clibanarius erythropus* (Latreille, 1818), observed in an ongoing study of this species in the Cadiz Bay (SW Europe).

*Clibanarius erythropus* is a hermit crab of the family Diogenidae with an Atlantic and Mediterranean distribution. In the Atlantic coasts have been reported from the southwest of the U.K., France, Iberian Peninsula, and Morocco to the
Azores. In the Mediterranean, *C. erythropus* is present from the Alboran Sea to the Black Sea (d’Udekem d’Acoz, 1999). This species inhabits both rocky shores and *Posidonia* meadows in the intertidal and subtidal zones, presenting populations with a high number of individuals distributed in scattered patches (contagious distribution), and rarely solitary specimens. Previous studies on general biology, ecology and behaviour of this species are scarce and mainly focus on Mediterranean populations (see Gherardi, 1990, 1991), although there are some studies from the Atlantic (Botelho & Costa, 2000), and a comparative study between Mediterranean and Atlantic populations (Benvenuto & Gherardi, 2001).

In the present ongoing investigation, several populations of *C. erythropus* from the Gulf of Cadiz (Santibañez, La Caleta, Rota and Torregorda beaches) have been studied from April 2014 onwards. Sampling, carried out in the context of these studies, allowed us many hours of observation of this species in the field. During the low tides, individuals of *C. erythropus* have been observed in two main distribution patterns: (a) clustered individuals under stones (fig. 1A), which was the most frequent pattern, that has also been reported by several authors for this and other hermit crab species (Gherardi & Vanini, 1989; Turra & Leite, 2000); and (b) scattered individuals separate from each other and likely inactive over rocks and stones (fig. 1B). Scattered individuals can present two positions: with the shell aperture turned downward or upward (fig. 1C). This last behaviour has also been reported in *C. erythropus* and other species of the same genus (Gherardi & Vanini, 1989; Turra & Leite, 2000). However, while response to risk of desiccation, exchange of shells, social interactions and reproductive grouping have been suggested as explanations for clustering behaviour (Gherardi & Vanini, 1992, 1993), scattered individuals have only been reported as inactive hermit crabs exposed to air out of refuges and retired inside their shells to avoid desiccation (Gherardi, 1991; Turra & Leite, 2000).

Clusters are formed under rocks and stones, in both submerged and air-exposed intertidal zones. Scattered individuals are always found over rocks and stones.

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**Fig. 1.** A, cluster of *Clibanarius erythropus* (Latreille, 1818) under a stone in the intertidal area of Torregorda beach (stone was carefully removed to take the picture); B, intertidal area of Santibañez beach, showing rocks and stones covered by scattered individuals of *Clibanarius erythropus*; C, detail of one stone with a group of *Clibanarius erythropus* “sunbathing” in the two observed positions: majority of hermit crabs with shell aperture downward and some of them with shell aperture upward (point out by arrows); D, nocturnal photography taken at La Caleta beach showing hermit crabs scattered over stones; E, specimen of *Pagurus anachoretus* Risso, 1827 at La Caleta beach with shell covers by green algae; F, specimen of *Pagurus anachoretus* at La Caleta beach with shell covers by calcareous concretions and Polychaeta. This figure is published in colour in the online edition of this journal, which can be accessed via [http://booksandjournals.brillonline.com/content/journals/15685403](http://booksandjournals.brillonline.com/content/journals/15685403).