Niche occupancy of two (congeneric) skinks in an islands environment

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Abstract. Among the scincid lizards inhabiting the Mediterranean region, the Ocellated skink (*Chalcides ocellatus*) and the little-known and endangered Chafarinas' skink (*Chalcides parallelus*) co-occur in sympatry at the Chafarinas Islands (NW Africa). Although both species are present in the archipelago, *C. ocellatus* is spread in the three islands, but *C. parallelus* is present only in one island. What factors influence this distribution, and whether these two species show evidence for syntopy is unknown. In this study, we investigated spatial niche occupancy at the level of microhabitat of both skinks at the Chafarinas Islands. We tested for microhabitat differences between islands and then, we tested the null hypothesis of no differences between microhabitat used by each of these skink species and a set of locations chosen at random from the general habitat. Results showed that the distribution and abundance of available microhabitats were different among islands, thus each island has different spatial niches that may be important in distinguishing the areas occupied by these skinks. Results also revealed that *C. ocellatus* did not use available microhabitats at random, but preferentially selected particular microhabitats. However, *C. parallelus* used microhabitats according to their availability, although it showed some aspects of habitat selection similar to *C. ocellatus*. Our results showed that the inclusion of detailed microhabitat descriptors could be useful for understanding patterns of niche occupancy by these skinks species. Furthermore, to our knowledge this is the first study documenting the spatial niche selection of *C. parallelus* and provides novel ecological information that may be of major importance to develop management strategies that will help to conserve this endangered species.

Keywords: Chafarinas Islands, *Chalcides ocellatus*, *Chalcides parallelus*, conservation, distribution, niche partition, sympatry.

Introduction

Among the 25 species of scincid lizards of the genus *Chalcides* inhabiting the Mediterranean region, two related species co-occur in sympatry in one island at the Chafarinas archipelago (NW Africa): *Chalcides ocellatus* and *C. parallelus* (Carranza et al., 2008; Civantos et al., 2013; García-Roa et al., 2014; Martín et al., 2017). *C. ocellatus* is the most widespread species and occurs in a broad range of habitats across a large

geographical area (Schleich et al., 1996; Anderson, 1999; Kalboussi and Nouira, 2004; Baha Eldin, 2006; Taylor et al., 2012). The Chafarinas' or Doumergue skink (*C. parallelus*) is a little known species that was first time described by Doumergue (1901). Mateo et al. (1995) re-described and named the species as *C. parallelus* from the study of individuals from the Rey Francisco island at Chafarinas archipelago and from the coastal areas of Morocco in front of the archipelago. This species has been found only along a narrow coastal strip of approximately 250 km between Nador in northeastern Morocco and Cape Carbon in northwestern Algeria (Geniez et al., 2008). Thus, the known distribution of this species is limited to a very small area. In the Chafarinas archipelago (Spain), the species has only been found in the Rey Francisco island (Civantos et al., 2013; García-Roa et al., 2014) where it is an abundant species,

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however it is thought to be rare along its narrow coastal range (Geniez et al., 2008). The island and mainland populations are highly related genetically (Martín et al., 2017), probably due to the flow of individuals travelling on floating items over the sea surface between the island and the coastal populations (Thiel and Gutow, 2005). The Chafarinas' skink is considered as Endangered by the IUCN (Geniez et al., 2008), and it is therefore considered to be facing a very high risk of extinction in the wild.

Islands environments are thought to be less complex than mainland ones, with lower numbers of predators and competitors and lower diversity of habitats (Warren et al., 2015). Thus, islands are good study areas to research the mechanisms of co-existence of congeneric species with similar ecological requirements (Schluter, 1988; Warren et al., 2015), which is still an ongoing area of research in ecology. When closely related species occur together, they nearly always separate on at least one of three niches axes: food, time, or space (Pianka, 1974, 1976, 1986). In the case of lizards, species that share the same habitat often have to either differentiate their thermal or diet preferences, or select different microhabitats (Arnold, 1987; Scheers and Van Damme, 2002; Murray et al., 2016). Many reptiles exploit available microhabitats according to their requirements for thermoregulation (Christian et al., 1983; Scheibe, 1987; Paulissen, 1988), foraging (Paulissen, 1988), or predator avoidance (Stamps, 1983). Thus, for example, the selective use of certain microhabitats allows many reptiles to maintain body temperatures within a range that optimizes physiological capacities and ultimately ecological performance (Huey, 1991). In addition, some microhabitats may supply better refuges against predators or provide more or higher-quality food (Martín and Salvador, 1992; Martín and López, 1998), and therefore, microhabitat use may influence survival (Civantos et al., 1999; Civantos and Forsman, 2000).

One interesting aspect of the biogeography of *C. ocellatus* and *C. parallelus* is that, although both species co-occur at the Chafarinas archipelago, *C. ocellatus* is spread in the three islands, but *C. parallelus* is present only in one island (Civantos et al., 2013; García-Roa et al., 2014). What factors influence this distribution, and whether these two species show evidence for syntopy is unknown. Extended observations (Civantos, unpubl. data) suggest that *C. ocellatus* and *C. parallelus* may be very similar in most aspect of their ecology as, for example, their similar diets (Çiçek and Göçmen, 2013; Civantos et al., 2013). We hypothesized that their differential distribution at Chafarinas archipelago could be explained by differences in their spatial niche preferences. To minimize interspecific interactions, sympatric and closely related lizard species can often partition their niche and differentiate their microhabitat use (Huey and Webster, 1976; Harmon et al., 2007; Corbalán et al., 2013). However, both skink species may also simply conserve their respective ancestral habitat selection patterns existing in the mainland populations (Arnold, 1987).

In this study, we investigated spatial niche selection at the microhabitat level of *C. ocellatus* and *C. parallelus* skinks at the Chafarinas Islands. We tested for microhabitats differences between islands and then we tested the null hypothesis of no differences between microhabitat used by each of these skink species and a set of locations chosen at random from the general habitat. We aimed to determine whether differences in microhabitat use may help to understand niche occupancy of these skinks in the archipelago. We also aim to provide novel ecological information about the little known Chafarinas' skink.

Materials and methods

We conducted field work at the Chafarinas Islands (Spain). This archipelago is located in the southern-western area of the Mediterranean sea (35°11'00"N-2°25'35"W), 2.5 nautical miles to the north of the Moroccan coast (Ras el Ma, Morocco) and 27 miles to the east of the Spanish city of

Melilla. It consists of three islands named Congreso, Isabel II (the only inhabited) and Rey Francisco. Congreso is the westernmost, largest (25.6 ha) and the highest island (137 meters above sea level), Isabel II (15.1 ha; 35 m. a.s.l.), located between Congreso (at 1 km) and Rey Francisco (at 175 m) is the most oriental, smallest (13.9 ha) and lowest (31 m. a.s.l.) island of the three. The islands present a Mediterranean dry and warm climate very influenced by the dominant winds from east and west. The vegetation is conditioned by the aridity of the climate (average annual precipitation = 300 mm), the higher salinity and the guano accumulation from numerous seabirds colonies (García et al., 2002). The current vegetation is dominated by plants adapted to the salinity and the drought such as species of *Atriplex*, *Lycium*, *Suaeda* and *Salsola* bushes. In general, the soils of the islands are little developed and immature, and are characterized for a thin layer rich in organic matter, where the vegetation settles, followed, almost directly, by the volcanic original rock (andesite or basalt). Although vegetation is apparently similar between the three islands, there may exist structural and microhabitat differences between each island.

C. ocellatus is a semi-fossorial viviparous skink with small limbs and pointed, narrow head (Pasteur, 1981). This skink is characterised by a snout-to-vent length of over 110 mm for adults, a high head-body ratio, diversely black spotted parietal shields, well-marked dorsal ocelli, usually and transversely separated by two uniformly coloured rows of scales (Mateo et al., 1995). *C. parallelus* is similar but very easy to differentiate visually in the field from *C. ocellatus* by several morphological traits. *C. parallelus* is smaller in body size (SVL < 111 mm), has shorter legs and smaller and more conical head than *C. ocellatus*. The colour pattern on the back is different in this species: *C. parallelus* has 14-16 light longitudinal stripes on a blackish background interrupted by small ocelli (Mateo et al., 1995).

Sampling methods

The three islands were visited regularly during March and occasionally from May to June 2000. We followed random routes (approx. 100 m/h) during the day between 09:00 and 13:00 h (G.M.T.) searching for adult skinks (recognized by body size differences) of both sexes (no visual differentiation was possible). We used grid cells (100 m²) of the vegetated surface of the islands to select randomly the starting point and direction of one transect at each grid cell. When a skink was observed, we recorded the species and quantified microhabitat structure at the point where the individual was sighted as follow: we took four 4-m transects, one at each of the four cardinal orientations radiating from the point. Using a scored stick held vertically, we recorded the number of contacts with the stick of grass, leaf litter, sand, gravel or rocks at substrate level at 1 m intervals. Rocks were scored by their size as Rock1 (<25 cm diameter), Rock2 (between 25-50 cm), or Rock3 (> 50 cm). Using the same procedure, we recorded plant contacts with the stick at heights of 5, 10, 25, 50, and 100 cm. This procedure provided 16 sample points per individual that allowed us to calculate for each observation the mean values of 12 habitat variables in the

area surrounding the skink (i.e., number of contacts with each substratum and vegetation type, and with vegetation at each height). The sampling of multiple points to characterise surfaces near the skink rather than only measuring the particular point at the skink location allowed a better characterisation of the microhabitat in a skink's home range (for a similar sampling methodology see (Scheibe, 1987). Given that we avoided walking routes taken previously, the probability of repeated sampling on the same individual was close to null. We therefore treated all measurements as independent.

Availability of microhabitats in the three islands was estimated along a series of random transects (3 in each island) located at least 50 m apart from each other and distributed for covering most of the vegetated surface of the islands and the whole general habitat. A sample was taken every 25 m, choosing the transect point as the center of the sampling area and following the same procedure that when encountering a skink. In total 12 points were sampled (about 150 m² of microhabitats) in each island to characterize available microhabitats.

Statistical analyses

We performed principal component analysis (PCA) to reduce the 12 habitat variables (table 1) to a smaller number of independent components. Original data (number of contacts) were normalized by means of square-root transformation. Only factors with eigenvalues larger than one were retained for further analyses, and the initial factorial solutions were rotated by the Varimax procedure (Jolliffe, 2002).

To determine whether skinks used available microhabitats in a non-random fashion, we used analyses of variance (ANOVAs) comparing PC scores among three microhabitat types (used by *C. parallelus*, used by *C. ocellatus*, and available). In addition, we used a series of ANOVAs to compare differences in available microhabitats among the different three islands environments and to determine whether skinks used different microhabitats in different islands. When significant differences were identified with ANOVAs, we used follow-up Tukey's honestly significant difference (HSD) post hoc tests to characterize the differences.

Because the two species do not occur in the same set of islands, we performed separated one-way ANOVA for each species to investigate differences between microhabitats available in the islands where they occur and microhabitats used by the skinks.

We applied a false discovery rate tablewise correction to control for Type I error inflation (Benjamini and Hochberg, 2000; Garcia, 2003; García, 2004).

Results

Principal component analysis (PCA)

The structural characteristics of the microhabitats occupied by skinks and those obtained from

Table 1. Microhabitats measured in the field from randomly determined points and used by *C. ocellatus* and *C. parallelus*. Numbers are means (± 1 SE) of number of contacts. (see methods).

	<i>C. ocellatus</i> <i>n</i> = 47	<i>C. parallelus</i> <i>n</i> = 25	Random <i>n</i> = 36
Ground Level:			
Gravel	1.02 $\pm$ 0.23	1.88 $\pm$ 0.54	2.47 $\pm$ 0.48
Sand	4.95 $\pm$ 0.36	3.48 $\pm$ 0.73	4.61 $\pm$ 0.5
Leaf litter	3.82 $\pm$ 0.38	6.44 $\pm$ 0.74	3.94 $\pm$ 0.67
Grass	2.59 $\pm$ 0.48	0.68 $\pm$ 0.22	1.58 $\pm$ 0.41
Rock1	2.23 $\pm$ 0.32	1.84 $\pm$ 0.46	3.36 $\pm$ 0.4
Rock2	0.85 $\pm$ 0.16	0.32 $\pm$ 0.24	0.33 $\pm$ 0.14
Rock3	0.47 $\pm$ 0.17	0.96 $\pm$ 0.27	0.41 $\pm$ 0.25
Plant cover:			
5 cm height	3.95 $\pm$ 0.38	6.12 $\pm$ 0.56	6.55 $\pm$ 0.56
10 cm height	5.23 $\pm$ 0.36	6 $\pm$ 0.4	6.14 $\pm$ 0.52
25 cm height	5.95 $\pm$ 0.53	6.76 $\pm$ 0.54	6.52 $\pm$ 0.68
50 cm height	3.89 $\pm$ 0.49	3.72 $\pm$ 0.57	3.69 $\pm$ 0.67
100 cm height	2.34 $\pm$ 0.37	0.92 $\pm$ 0.36	1.33 $\pm$ 0.37

randomly determined points are shown in table 1. The PCA for microhabitat characteristics produced five components with eigenvalues greater than 1 that together accounted for 75.47% of the variance (table 2). The first factor (PC1) showed a positive correlation with vegetation at 25, 50, and 100 cm height and leaf litter i.e. it described vegetated areas of 25-100 cm height (perennial bushes of *Atriplex*, *Salsola* and *Lycium*) with abundant leaf litter substrate. The second factor (PC2) showed a positive correlation with 5 and 10 height vegetation cover, i.e. it described areas with a 5-10 cm tall vegetation cover (perennial low shrubs such as *Atriplex*, *Lycium* and *Suaeda*, and herbs such as *Lavatera mauritanica* and *Malva parviflora*). The third factor (PC3) described a gradient of types of substrate from areas with grass to areas with small stones (Rock1). The fourth factor (PC4) described a gradient of substrate from sandy to gravel areas. Finally, the fifth factor (PC5) described areas with big rocks (Rock3).

Islands differences in microhabitat availability

Regarding differences in available microhabitats among islands, ANOVA tests showed that all PC extracted from PCA, except PC-5, were different among the three islands (PC1: $F_{2,33} = 9.42$, $P < 0.01$; PC2: $F_{2,33} = 6.17$, $P <$

0.05; PC3: $F_{2,33} = 21.07$, $P < 0.0001$; PC4: $F_{2,33} = 4.35$, $P < 0.05$; PC5: $F_{2,33} = 3.11$, $P = 0.057$; fig. 1). Tukey's HSD post hoc tests revealed that scores of PC1 were significantly different between Isabel and both Rey Francisco ($P < 0.01$) and Congreso islands ($P < 0.001$), but not between Congreso and Rey Francisco ($P = 0.83$), indicating that the vegetation cover of 25-100 cm height is less abundant in Isabel than in the other islands. Scores of PC2 were significantly different between Isabel and Rey Francisco ($P < 0.01$), but not between Isabel and Congreso ($P = 0.10$) nor between Rey Francisco and Congreso ($P = 0.36$); indicating that Rey Francisco and Congreso have the highest cover of 5-10 cm height vegetation. All three islands differed significantly in scores of PC3 (Isabel-Rey: $P < 0.01$; Isabel-Congreso: $P < 0.0001$; Rey-Congreso: $P = 0.015$), being Isabel the one with the highest values of small stones cover and Rey Francisco and Congreso the ones with the greatest abundance of grass. Scores of PC4 were only significantly different between Isabel and Congreso islands ($P < 0.05$). Indicating that gravel substrate is more abundant in Isabel, whereas sand substrate is more abundant in Congreso and Rey Francisco. Scores of

Table 2. Principal components analysis for randomly determined points and skins microhabitat data.

	PC1	PC2	PC3	PC4	PC5
Ground Level:					
Sand	−0.19	−0.06	0.07	−0.92	−0.12
Gravel	−0.34	−0.03	0.34	0.62	−0.15
Leaf Litter	0.71	0.20	−0.31	0.02	−0.06
Grass	−0.10	0.16	−0.84	0.1	−0.08
Rock1	−0.07	−0.13	0.80	0.21	−0.11
Rock2	−0.04	−0.50	0.28	0.11	0.32
Rock3	−0.03	0.03	−0.05	0.01	0.94
Plant Cover:					
5 cm height	−0.17	0.84	−0.17	0.13	−0.02
10 cm height	0.24	0.85	−0.07	−0.02	0.16
25 cm height	0.74	0.49	0.03	−0.003	0.09
50 cm height	0.91	−0.002	0.24	−0.01	0.08
100 cm height	0.78	−0.30	−0.01	−0.02	−0.13
Eigenvalue	2.77	2.10	1.75	1.33	1.10
% variance	23.11	17.05	14.61	11.06	9.17

PC5 (big rocks) were not significantly different among islands.

Microhabitat use by skinks

C. ocellatus was present in the three islands. However, the number of individuals sighted and sampled was different among them. Thus, with a similar searching effort, we found 34 individuals in Congreso, 9 in Isabel and only 4 in Rey Francisco. The pattern of microhabitat selection seems to be different among islands (fig. 2), but due to the low sample size in Isabel and Rey Francisco, we restricted our statistical analyses only to Congreso island. ANOVAs revealed that *C. ocellatus* did not use microhabitats at random; this skink preferred microhabitats with less cover of perennial low shrubs and herbs (PC2) than expected given their average availability in the environment ($F_{1,44} = 13.75$, $P = 0.0029$). There were not significant differences between used and available in the remaining PCs and thus the species used those microhabitats according to their availability in Congreso island ($P > 0.05$ in all cases).

C. parallelus was only present in Rey Francisco island. We found that this species occupied microhabitats in proportion to their availability in this island ($P > 0.05$ in all cases) although tended to use sites with lower cover of vegetation of 5–10 cm height (PC2, fig. 3).

Discussion

Overall our results revealed that our two focal species of skinks inhabiting the Chafarinas archipelago differed in their spatial niche. While *C. ocellatus* did not use available microhabitats at random, *C. parallelus* occupied microhabitats in proportion to their availability. However, both species tended to avoid sites with low cover of vegetation of 5–10 cm height (figs. 2 and 3) which may be indicating similar preferences regarding this type of microhabitat. Because the distribution and abundance of available microhabitats were different among islands, different microhabitat characteristics in each island might be important in distinguishing the areas occupied by these skinks. Our results showed that the inclusion of detailed microhabitat descriptors might be useful for understanding the complex patterns of spatial niche occupancy by lizards.

Figure 1. Boxplot comparing available microhabitats in each island. Tukey's HSD post-hoc tests significant differences between islands are indicated as: * $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$.

Although the general arid habitat of the archipelago seems to be very similar in the three islands, the distribution and abundance of available structural microhabitats were significantly different among them with only one exception, the presence and abundance of large rocks. Isabel has more gravel-small rocks and less vegetation, while Congreso and Rey Francisco have more sandy substrates and more vegetation cover. Furthermore, the three islands

are also different from one another in regards to topography, elevation, soil types and human occupation (García, 2005; García-Roa et al., 2014). For instance, the historical human presence at the Isabel island has modified substantially its habitat compared to the other two islands (Civantos, pers. obs.). We assume that the differential abundance and distribution of the different microhabitat types across the islands may be one of the possible causes that may

Figure 2. Means ($\pm$ SE) of PC scores for microhabitats available and used by *C. ocellatus* within each island.

Figure 3. Means ($\pm$ SE) of PC scores for microhabitats available and used by *C. parallelus*.

have influenced the distribution of the two skink species at the archipelago. But, given that our samples sizes were limited, we do not dismiss that other factors such as biogeographic events might have also influenced skinks current distribution. However, although the biogeographical history of both skink species in the islands, of which there is a lack of data, could have also contributed to explain their current distribution, the habitat requirements seem to be a non-exclusive additional relevant ecological factor modulating the observed islands occupancy by skinks.

Chalcides ocellatus

Results showed that this species did not use microhabitats according to their availability in Congreso island. Ocellated skinks avoided sites dominated by 5-10 cm height vegetation cover (i.e. *Suaeda* sp perennial low shrubs and herbs such as *Lavatera mauritanica* and *Malva parviflora*). Therefore, the type and height of vegetation appeared to be an important factor for spatial niche selection in *C. ocellatus*. The Ocellated skink is a habitat generalist species found in coastal regions and is commonly found near vegetation where moist sand is common (Arnold, 1984; Shenbrot and Krasnov, 1997; Kornilios et al., 2010; Kapsalas et al., 2018). Field observations have shown that the Ocellated skink spends most of its time near cover and will bury into granular or sand substrates to seek refuge from heat and predators (Attum et al., 2007; Sharpe et al., 2015). The fact that in Isabel island there are many buildings remains and abundance of debris (i.e. higher abundance of small rocks) might explain the low number of skinks found. The pavement of surfaces and the construction of buildings directly eliminate the habitat available for semi-fossorial animals (Craul, 1992) and anthropic altered soils are more compact and have more gravel. This habitat would be also avoided by skinks since it does not provide their thermal and refuge requirements (Attum et al., 2007; Sharpe et al., 2015). Why Ocellated skinks avoided sites with

5-10 cm height vegetation at Congreso island might be explained because this type of vegetation cover may not allow an equilibrium between maintaining the humidity in the substrate and sun exposure (Schoener, 1974; Carretero et al., 2016). Also this low vegetation grows denser (Civantos, pers. obs.), and, as a consequence, its root system may also be denser, and this feature might not allow efficient burrowing for semi-fossorial skinks. Moreover, other ecological requirements for the species such as prey availability and predator refuge might not be provided by this type of vegetation. The abundance of seabird colonies in Congreso and Rey Francisco islands, but not in Isabel, may increase predator pressure on skinks (Piorno et al., 2016) and low cover herbs vegetation may not provide enough predator refuge.

Regarding the low number of Ocellated skinks found in Rey Francisco island, we do not have a clear explanation. Due to our small sample size, we were not able to statistically test for differences between used and available microhabitats in this island. However, results showed that Rey Francisco and Congreso are very similar in spatial niche availability, with only one exception: Rey Francisco has a higher cover of small stones than Congreso. One possible explanation is that given the small size of the islands the suitable spatial niche for *C. ocellatus* would be restricted to only a few places in Rey Francisco. Because of the differences in skink's body size, it is unlikely that the low abundance of *C. ocellatus* is due to direct competition with *C. parallelus* for available space.

Chalcides parallelus

To our knowledge this is the first study documenting the spatial niche selection of *C. parallelus*, one of the less known skink species (Geniez et al., 2008). Its distribution at Chafarinas archipelago is restricted to the Rey Francisco island where the densities are very high (Civantos et al., 2013; García-Roa et al., 2014). *C. parallelus* occupied microhabitats in proportion to their availability. This result may be indicating

that this island is the only one with microhabitat characteristics suitable for this species, but also its distribution at the Chafarinas Islands may be due to other factors such as biogeographic history, past climate events, sea level rises or even accidental transport. Spatial niche occupancy of *C. parallelus* is very similar to the pattern found for Ocellated skinks. *C. ocellatus* and *C. parallelus* are closely related species (Carranza et al., 2008; Martín et al., 2017), and they may be very similar in most aspects of their ecology such as diet and thermal preferences, which would explain their similar use of microhabitats. *C. ocellatus* is larger and more robust than *C. parallelus*, and when both species co-occur probably *C. ocellatus* compete successfully for resources forcing *C. parallelus* to use microhabitats not used by *C. ocellatus*. The potential similitude of diet between these skink species (Çiçek and Göçmen, 2013; Civantos et al., 2013) may increase niche overlap and competition, although the differences found in microhabitat selection may confer some ecological segregation. Thus, although both species can be considered sympatric in the Chafarinas Islands, at Rey Francisco island the two skinks are syntopic. Areas of syntopy are of interest because they allow to study how similar species may coexist without outcompeting each other (Schoener, 1974). Habitat partitioning can maintain the coexistence of species with very similar ecological traits (Schoener, 1974; Arnold, 1987; Chesson, 2000; Finke and Snyder, 2008).

The Chafarinas skink is considered as Endangered by the IUCN (Geniez et al., 2008), and its conservation may suffer from many problems associated to the human-induced progressive loss of quality of its habitat in the North African coast. The restricted geographical distribution of this species makes the population of the Chafarinas Islands deserving of special protection. Although the island population is located in a well-protected and managed nature reserve area, it may be threatened even

by random accidental events. Unfortunately, islands are among the most fragile and endangered ecosystems, being particularly vulnerable to the impacts of habitat loss, fragmentation, and invasive species. Understanding which factors influence its habitat use patterns may be of major importance to evaluate the threatened status of the species, but also to develop management strategies that will help to conserve *C. parallelus* spatial niche requirements in North Africa. However, future studies aimed to deepen the ecological requirements of this species are required. Finally, it could be extremely interesting to perform regular surveys controlling for potential negative effects on this population. This will permit to establish optimal management techniques that ensure the conservation of *C. parallelus* at Chafarinas Islands.

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