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OBSERVATIONS ON THE REPTILES OF THE ISLANDS OF ZEMBRA AND ZEMBRETTA

Petites îles de Méditerranée 09

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Observations on the reptiles of the islands of Zembra and Zembretta, June 2009

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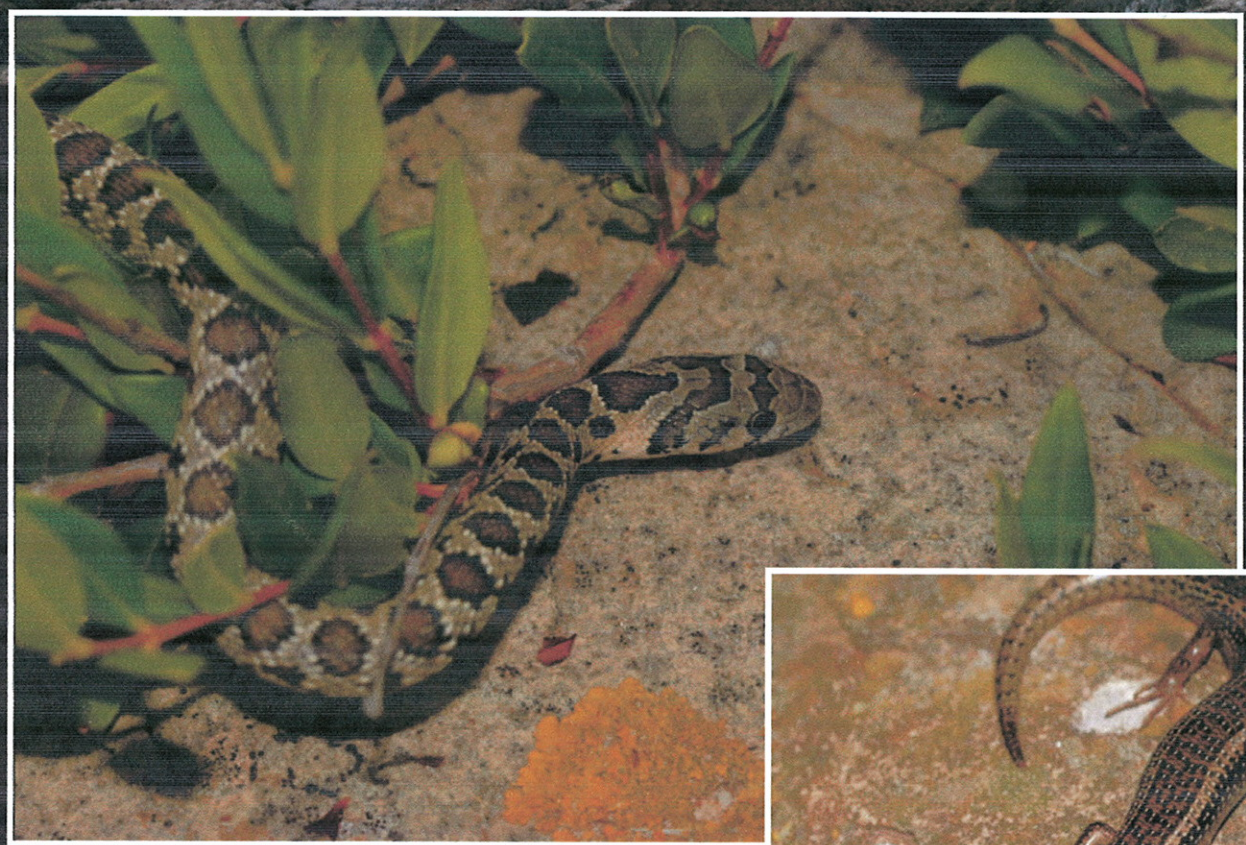


Introduction

During the period 19-23 June 2009, we performed intensive monitoring over the islands of Zembra and Zembretta, to investigate the diversity and the abundance of reptiles. The distribution of reptiles in the two islands and in the islets has been described by Blanc (1998) and by Delaguerre and Ouni (2008). The aims of the monitoring where:

1) Improving the knowledge of the herpetofauna of the islands, to obtain a better picture of the distribution of reptiles
2) Evaluating the abundance of reptiles in the area, and of the environmental factors that can determine their distribution
3) Evaluating the abundance of reptiles in the island of Zembretta. A deratization program is ongoing in Zembretta, and reptiles can benefit of rat removal (Pérez-Mellado et al. 2008). Therefore, an assessment of the abundance of reptiles in Zembretta can help to evaluate if the deratization would improve the situation of reptiles.

Methods

Species monitoring

We used a combination of methods to assess the distribution and the abundance of reptiles in Zembra and Zembretta. First, we performed random encounter surveys trying to cover a large number of environments and several areas of both Zembra and Zembretta (Heyer et al. 1994). Due to the higher easy of access, in Zembra we focused mostly on the southern portion of the island (Fig. 1). We performed most visual surveys in daytime, from early morning to the afternoon. We adjusted the timing of surveys depending on the meteorological conditions. We also turned rocks, logs etc. looking for sheltered animals. In the southern areas of the island, we also performed surveys after the dusk looking for nocturnal species.

Furthermore, we surveyed standardized rectangles to evaluate the abundance of reptiles in the different areas. We defined *a priori* the rectangular areas; first, two-three observers performed visual encounter surveys over the area. Subsequently, we turned all large rocks and logs in the area, and we specifically looked in potential shelters. The area of standardized rectangles was measured on the field. In most of cases, the area of rectangles was 200 m^2 (i.e., 20 X 10m). Subsequently, we calculated the abundance of reptiles in each rectangle as N individuals detected / surveyed area. Overall, we surveyed 4 rectangles in Zembretta, and 13 in Zembra (Fig. 1). We recorded

coordinates in the field using a GARMIN Gecko GPS (accuracy: 3m); maps were built using the ArcView GIS software. Species identification followed the available reference books (Schleich et al. 1996). We used a *t* test to compare the abundance of reptiles in Zembra and Zembretta.

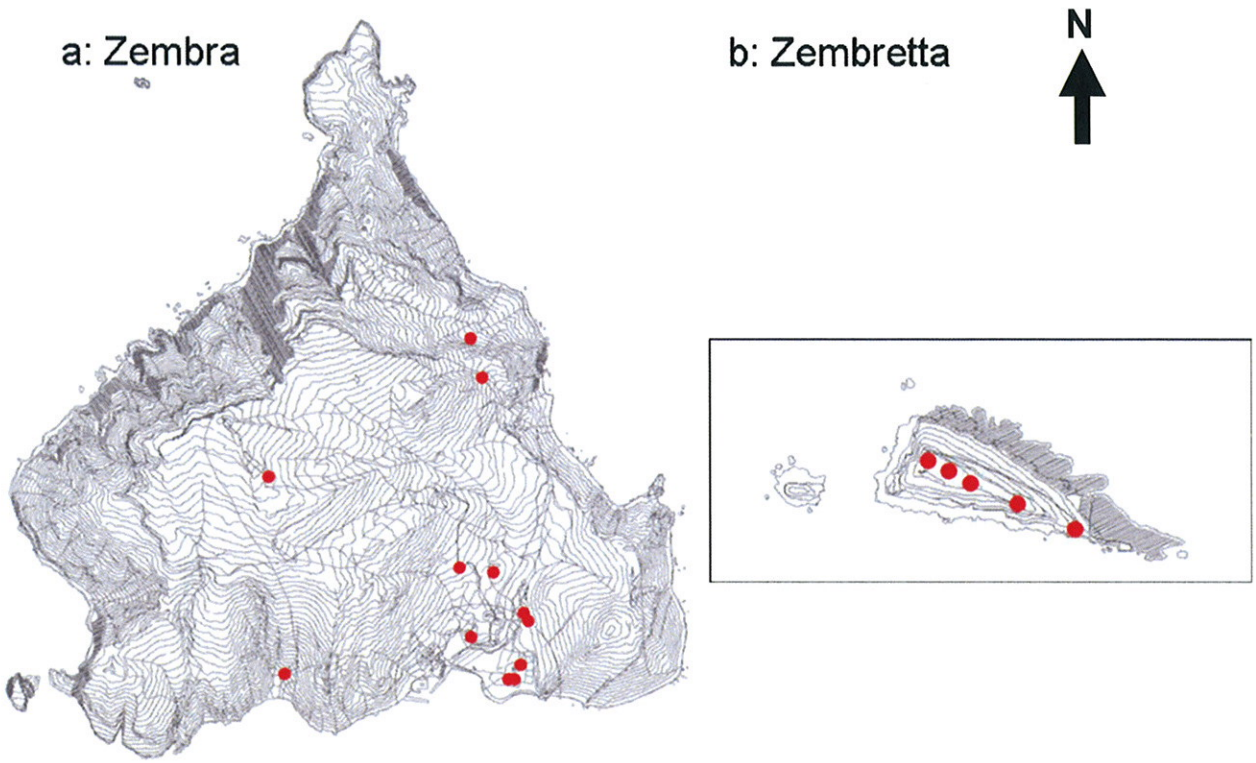


Figure 1. Distribution of standard rectangles surveyed in (a) Zembra and (b) Zembretta.

Marking

A major aim of the mission was evaluating the abundance of reptiles in Zembretta prior the deratization protocol. Therefore, we tried to perform a capture – mark – recapture study, to quantitatively estimate the abundance of species. We captured lizards and skinks (*Psammodromus algirus* and *Chalcides ocellatus*) by hand, and we marked them using non-toxic, permanent colours. Each individual was marked using a unique combination of 1-2 colours (Fig. 2). This marking approach is useful for short time studies. This approach does not have permanent effects on the individuals, as the colour is lost in a few weeks or at the first moulting of skin. For the captured individuals, we recorded several mophometrical parameters that can be used to compare the populations of Zembra and Zembretta with other populations in the Mediterranean. The measured parameters were: snout-vent length, head width, head height, head length.

Capture - mark - recapture studies require performing at least two capture sessions to estimate species abundance. Unfortunately, due to unfavourable climatic conditions, it was possible to perform only one capture session. Therefore, it was impossible to estimate the absolute abundance.

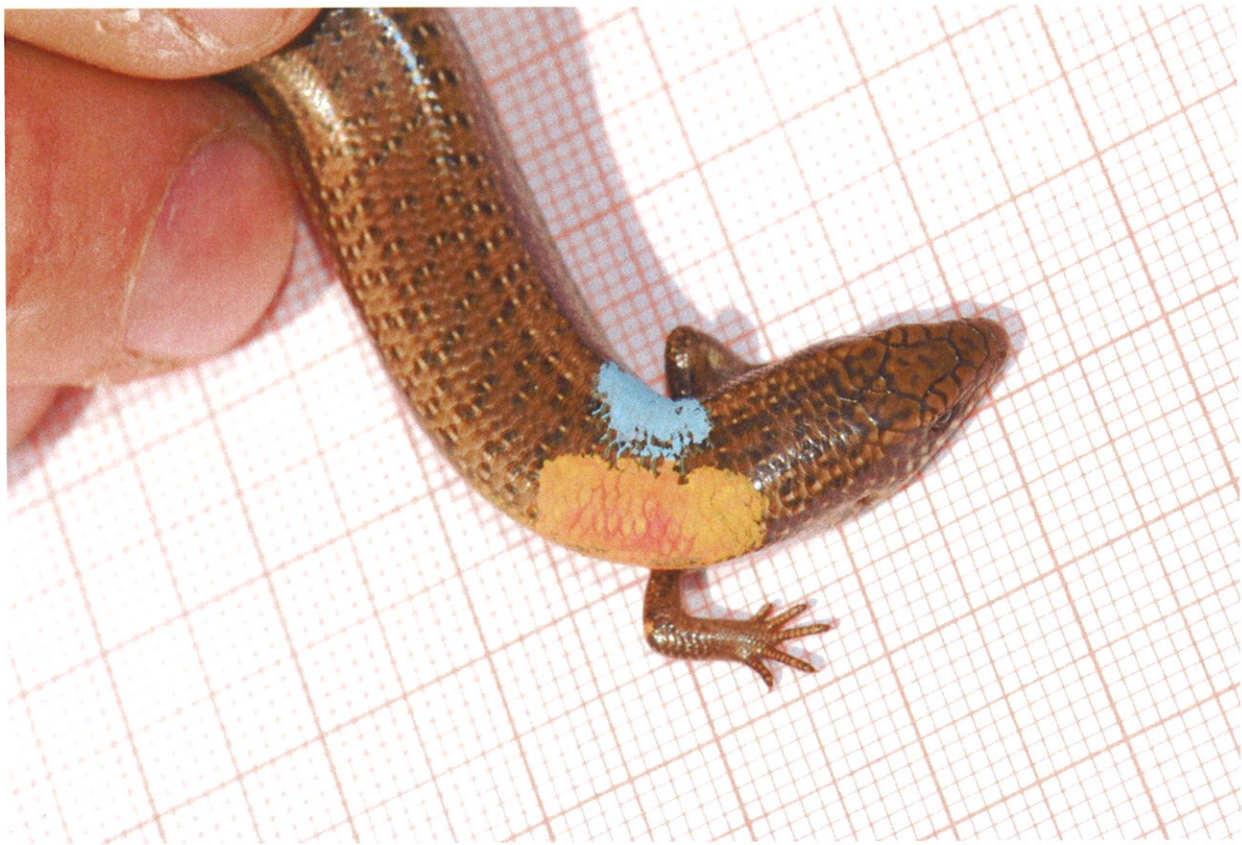


Figure 2. Marked *Chalcides ocellatus*.

Results

In 5 days, we detected the presence of 5 species or reptiles in Zembra (*Hemidactylus turcicus*, *Psammodromus algirus*, *Chalcides ocellatus*, *Malpolon monspessulanus* and *Coluber ippocrepis*), and 3 species of reptiles in Zembretta (*Hemidactylus turcicus*, *Psammodromus algirus*, *Chalcides ocellatus*) (Fig. 3, Fig. 4, Fig. 5, Fig. 6). We did not detect any amphibian, despite repreated searches in the *Oueds* of Zembra in all the potential shelters.

Chalcides ocellatus and *P. algirus* were the reptiles most abundant in both Zembra and Zembretta (Fig. 5); among the snakes, *C. hippocrepis* was the most abundant one, with several individuals (Fig. 6b) and skin remains detected in multiple areas of the islands. *Hemidactylus turcicus* was extremely abundant over the buildings in the village area. *Malpolon monspessulanus* was not observed directly, but one skin was found.

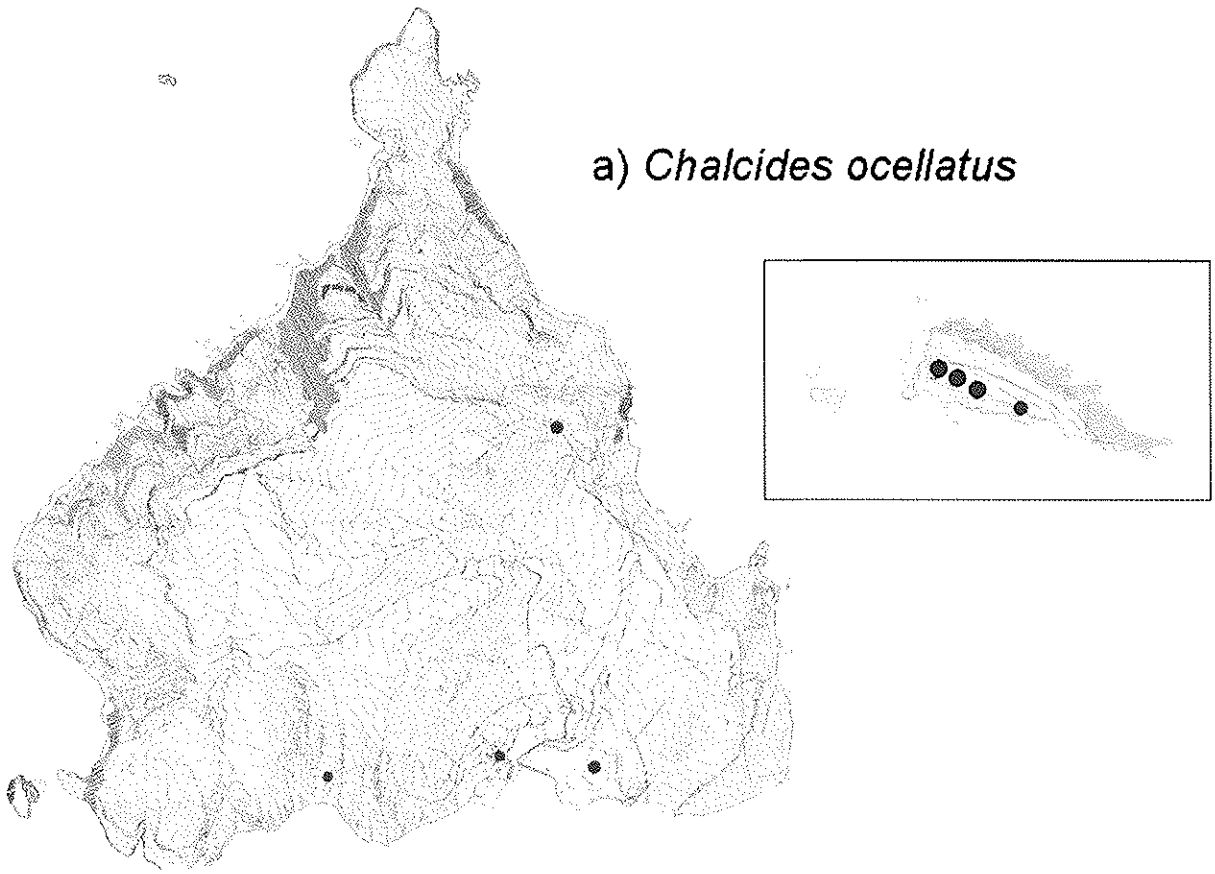
In standard transect, the average abundance of *C. ocellatus* was 3.5 individuals / 100 m^2 in Zembretta, and 0.13 individuals / 100 m^2 in Zembra (Fig. 7). The maximum abundance of *C. ocellatus* was 5.0 individuals / 100 m^2, observed in Zembretta. *Chalcides ocellatus* was significantly more abundant in Zembretta than in Zembra (*t*-test: $P = 0.019$). The morphometric features of *C. ocellatus* measured are reported in Table 1.

The average abundance of *P. algirus* was 1.8 individuals / 100 m^2 in Zembretta and 0.57 individuals / 100 m^2 in Zembra (Fig. 7). The maximum abundance of *P. algirus* was 3.0 individuals / 100 m^2, observed in Zembretta. *Psammodromus algirus* was significantly more abundant in Zembretta than in Zembra (*t*-test: $P = 0.002$).

If all reptiles observed in transects are pooled together, the average abundance in Zembretta was 5.3 individuals / 100 m^2, while the average abundance in Zembra was 0.72 individuals / 100 m^2 (Fig. 7). Overall, the abundance of reptiles observed in standardized rectangles was significantly higher in Zembretta than in Zembra (*t*-test: $P = 0.015$) (Fig. 7).

Figure 3. (a) *Chalcides ocellatus* (Zembra); (b): *Psammodromus algirus* (Zembretta).

Figure 4. (a): *Hemidactylus turcicus* (Zembra); (b): young *Coluber hippocrepis* (Zembra).



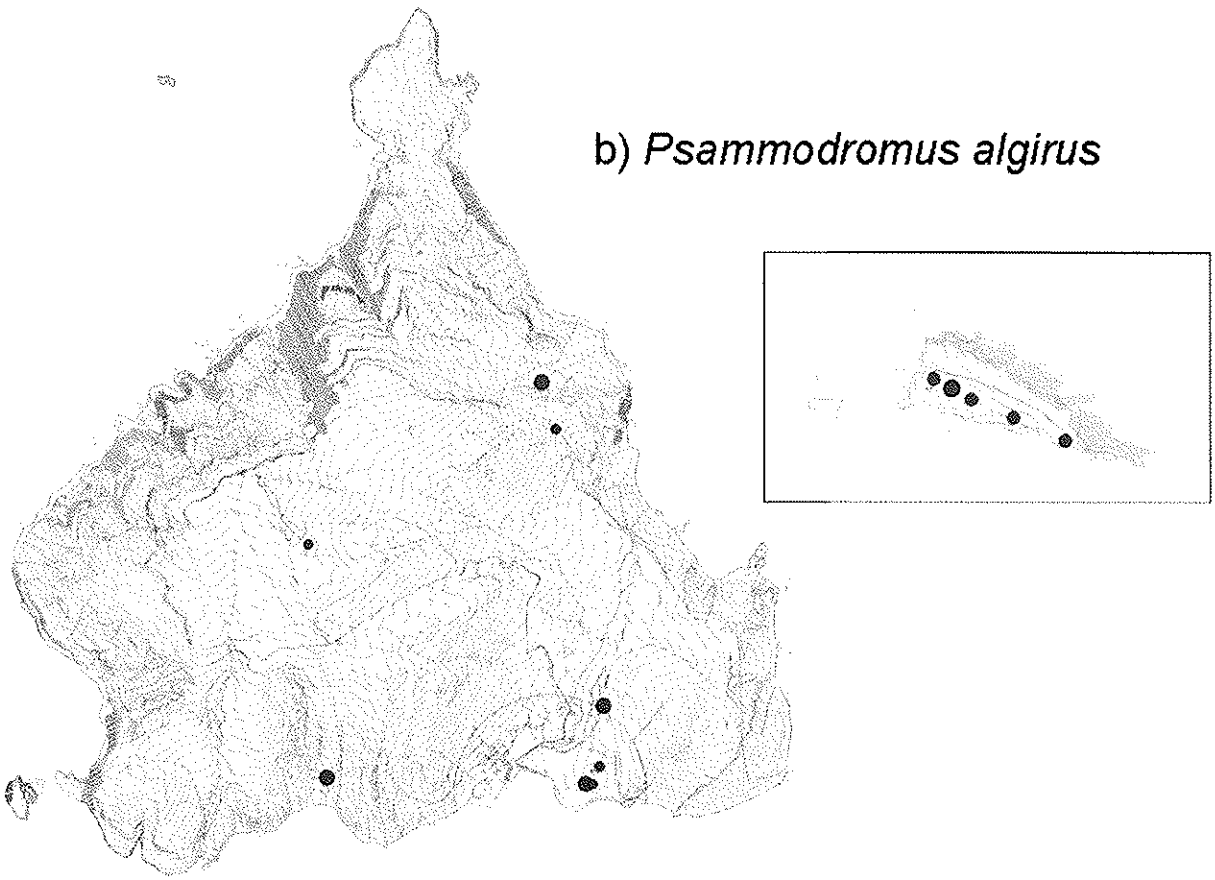


Figure 5. Records of (a) *Chalcides ocellatus* and (b) *Psammodromus algirus* in Zembra and Zembretta. Larger dots represent a larger number of individuals detected.

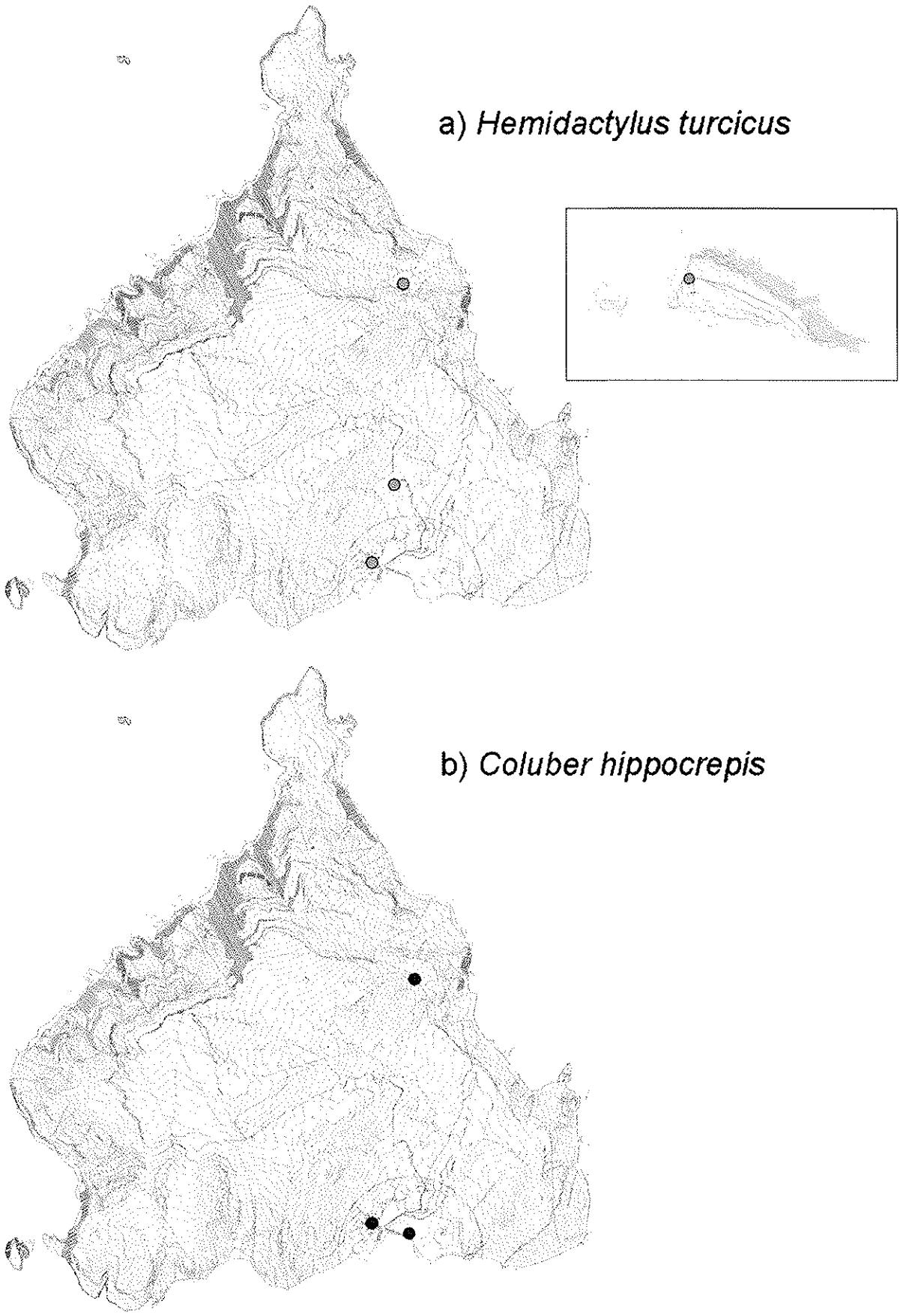


Figure 6 . Records of (a) *Hemidactylus turcicus* and (b) *Coluber hippocrepis* observed in Zembra and Zembretta.

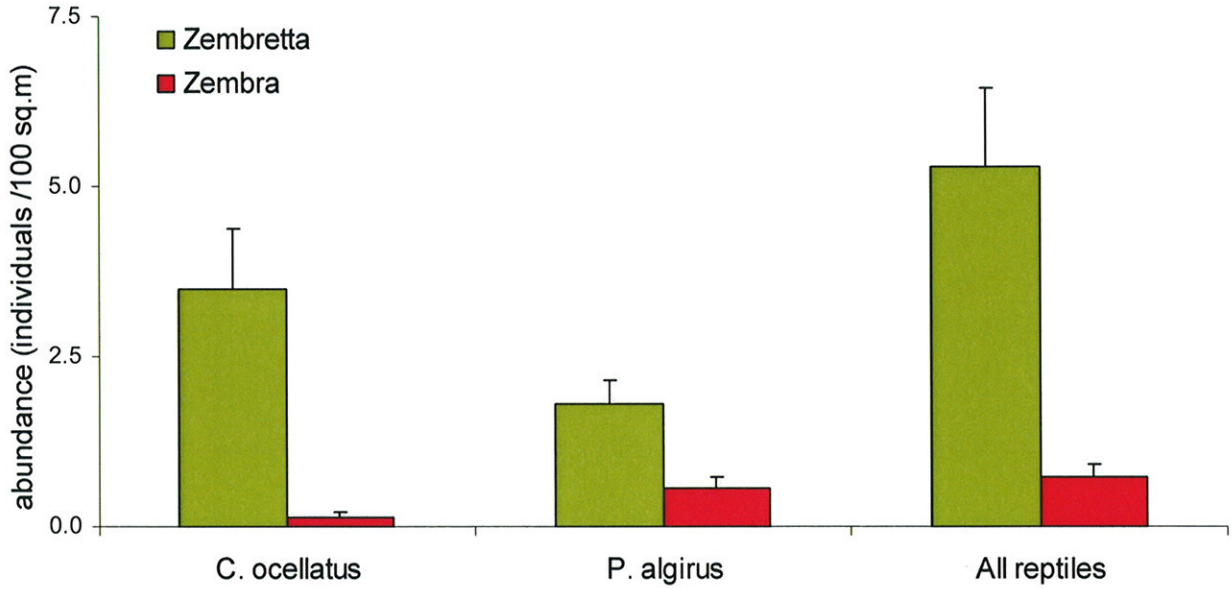


Figure 7. Average abundance of reptiles in standardized rectangles in Zembretta (green) and Zembra (red). Error bars are standard errors of the mean.

Island	Date	SVL	HW	HH	HL
Zembretta	20/06/2009	1048	111	88	148
Zembretta	20/06/2009	178	77	78	100
Zembretta	20/06/2009	920	97	79	72
Zembretta	20/06/2009	709	81	56	105
Zembretta	20/06/2009	832	98	72	173
Zembretta	20/06/2009	700	89	62	108
Zembretta	20/06/2009	720	85	53	108
Zembretta	20/06/2009	905	106	74	135
Zembretta	20/06/2009	660	85	51	99
Zembretta	20/06/2009	1065	108	78	139
Zembretta	20/06/2009	595	71	41	93
Zembretta	20/06/2009	994	121	75	149
Zembretta	20/06/2009	720	80	56	100
Zembretta	20/06/2009	998	109	71	129
Zembretta	20/06/2009	878	108	63	122
Zembra	22/06/2009	650	73	42	100
Zembra	23/01/1900	1270	146	101	192

Table 1. Morphometrical features of *Chalcides ocellatus* measured. SVL: snout-vent lengt; HW: head width; HH: head height; HL: head length. *: regenerated tails.

Discussion and conclusion

Despite performed under suboptimal weather conditions, our survey confirmed earlier reports on the species composition of the herpetofauna of Zembra and Zembretta (Blanc 1998; Delaguerre and Ouni 2008), and provided information on the abundance of two species of reptiles. We did not detected directly the snake *Macroprotodon cucullatus*, observed by previous studies in Zembra (Blanc 1998; Delaguerre and Ouni 2008). The fossorial and nocturnal activity of this snake can determine a low detectability, and is a likely explanation of the lack of observations.

A remarkable result is that abundances of lizard (both *Chalcides occellatus* and *Psammodromus algirus*) was much lower in Zembra than in Zembretta (Fig. 7). Zembretta lacks important predators of lizards (i.e., large snakes: *C. hippocrepis* and *M. monspessolanus*). Other studies showed that predation by snakes and other predators may be a factor that substantially reduces the abundance of lizard in small island (Buckley and Jetz 2007). Our results are similar to previous studies performed in the archipelago of Pelagie (Padoa-Schioppa and Massa 2001), in the Maltese islands and in the Cyclades archipelago (E. Padoa-Schioppa, unpublished results). Snakes absence in Zembretta is therefore a possible explanation the highest abundance of lizards. Other factors that influence reptile abundance can be the presence of rats (Pérez-Mellado et al. 2008) and other potential predators of lizard, as well as habitat differences. Indeed, in Zembra there are cats and rats, whike in Zembretta rats are particularly abundant and cats are absent; the abundance of rats in Zembretta may contribute to lower the abundance of lizard.

In Zembretta, the density of *C. ocellatus* and *P. algirus* are high even in presence of high densities of rats. Alien invasive species can strongly reduce the abundance of reptiles on islands (Pérez-Mellado et al. 2008; Rebelo et al. 2007). It is likely that rat eradication of would improve the status of reptiles in Zembretta, and perhaps increase the density of reptiles. Further monitoring would be required to evaluate changes in density after rat eradication.

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