

20. The amphibians and reptiles of the Pityusic Islands

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Introduction

The herpetofauna of the Pityusic Islands first became known through the pioneering studies of Barceló (1876), Boettger (1880, 1881) and Boscá (1883). Other general works published at the beginning of the century were those of Tenenbaum (1915) and Koch (1928). The notes published by Maluquer (1918, 1919) on the tortoises of Formentera were made during this period.

This was followed by the vast number of publications dedicated to the study of the subspecies of *Podarcis pityusensis* (see below), which culminated in the monograph of Eisentraut (1950). The attention of naturalists has been focused, more recently on the geckos (Balcells, 1955; Martínez Rica, 1965a, 1965b, 1974; Rodríguez Ruiz, 1974), on the amphibians (Vidal, 1965, 1966) and on the lizards (Buchholz, 1954; Lilge, 1975; Rodríguez Ruiz, 1977; Cirer, 1980, 1981; Salvador, in press).

Composition of the herpetofauna

The herpetological fauna of the Pityusic Islands is relatively poor as far as the number of species is concerned (Colom, 1978; Alcover & Mayol, in press). The amphibians and reptiles of Mallorca, Menorca, Eivissa and Formentera are compared in Table 1. Snakes are completely absent from Ibiza and Formentera. If we exclude the spiny-footed lizard, *Acanthodactylus erythrurus*, wrongly recorded from Eivissa (Colom, 1978; Compte Sart, 1966), there is only one endemic lacertid, *Podarcis pityusensis*, on the Pityusic Islands. This lizard is also found on the islet of Illetes in the bay of Palma de Mallorca, as well as on the walls of the town, where they were probably introduced by man.

P. pityusensis is considered to be closely related to *P. lilfordi*, a species endemic to Mallorca and Menorca. Bischoff (1973) cross-bred the two species and considers that they may be conspecific. Arnold (1973) considers them to be closely related to a predecessor of *P. muralis*, and Klemmer (1957) classifies

Table 1. Species of amphibians and reptiles found in the Balearic Islands.

	Mallorca	Menorca	Eivissa	Formentera
<i>Bufo viridis</i>	×	×	×	
<i>Rana perezi</i>	×	×	×	×
<i>Hyla meridionalis</i>		×		
<i>Baleaphryne</i> cf. <i>muletensis</i>	×			
<i>Hemidactylus turcicus</i>	×	×	×	×
<i>Tarentola mauritanica</i>	×	×	×	×
<i>Podarcis lilfordi</i>	×	×		
<i>Podarcis pityusensis</i>	×		×	×
<i>Podarcis sicula</i>		×		
<i>Lacerta perspicillata</i>		×		
<i>Testudo hermanni</i>	×	×	×	
<i>Testudo graeca</i>	×			×
<i>Emys orbicularis</i>	×	×		
<i>Natrix naura</i>	×	×		
<i>Elaphe scalaris</i>		×		
<i>Macroprotodon cucullatus</i>	×	×		

them together with *P. hispanica* within the western Mediterranean group.

At all events, the differentiation of *P. pityusensis* enables us to define it as an indigenous species without having to resort to the use of palaeontology. Regarding the geckos, two species are known for the Pityusic Islands: *Tarentola mauritanica* and *Hemidactylus turcicus*. It is difficult to qualify the two species as indigenous or immigrants. There are no palaeontological remains which testify to their having been present on Eivissa and Formentera. We must also take into account the great capacity the geckos has for dispersion (Kluge, 1967) with or without man's help, which makes its zoogeographical analysis difficult.

Previously, *T. mauritanica* was considered to be common and *H. turcicus* to be rare on Eivissa, while the situation on Formentera was exactly the opposite. If this is true, we can assume that both species colonized the archipelago relatively recently. However, the fact that *T. mauritanica* could be found more easily means that it was considered more abundant than *H. turcicus*. Consequently, we believe that this argument has little zoogeographical value.

Two species of tortoises, *Testudo graeca* and *Testudo hermanni*, are also known from the archipelago. The former has been recorded from Formentera (Maluquer, 1918, 1919) and the latter from Eivissa (Wermuth, 1952; Compte Sart, 1966). Palaeontological remains of these two species have not been discovered in Eivissa or Formentera. *T. hermanni* is a Mediterranean species with populations in Corsica, Sardinia, southern France, Italy and the Balkan

Peninsula, for which the subspecies *T. hermanni robertmertensi* Wermuth 1952 has been described for the western Mediterranean, suggesting a certain isolation in this area. It seems more likely that *T. graeca* was introduced by man.

Two species of amphibians are known: *Bufo viridis* and *Rana perezi*. The green toad is absent from Formentera, whereas the common frog lives on both islands. The existence of *B. viridis* on the Balearic Islands has surprised numerous herpetologists, since it is completely absent from the Iberian Peninsula, but is common in Europe and North Africa. Boettger (1880) described the subspecies *B. viridis balearica*, which was rejected by later authors (Vidal, 1966). Nowadays (Hemmer, Kadel & Kadel, in press), both *B. viridis* and *R. perezi* are regarded as having been introduced into the Balearic Islands.

Podarcis pityusensis Boscá 1883 — Eivissa wall lizard

Numerous papers have been devoted to the study of the subspecies of this lizard (Eisentraut, 1928a, 1928b, 1929, 1930, 1950, 1954; L. Müller, 1927a, 1927b, 1928a, 1928b, 1928c, 1928d, 1929; Mertens, 1921, 1927; Wettstein, 1937; Hartmann, 1953; Buchholz, 1954; Lilge, 1975; Rodríguez Ruiz, 1977; Cirer, 1980, 1981; Salvador, in press). However, there is a lack of data on its biology and ecology. There is only a little information in the monograph of Eisentraut (1950). Pérez Mellado and Salvador (in press) have studied the summer activity and thermoregulation, and other data are given in Salvador (in press).

During the period of August 12–19, 1980, we visited more than 40 localities in Eivissa and Formentera with the aim of studying the distribution of the species. Figure 1 gives the results, with those already known from the literature included to provide a complete picture. It indicates that *P. pityusensis* is present throughout the island. With regard to its abundance, it is scarce in the extensive pinewoods and is very common in the scrub vegetation and walls. It also inhabits the majority of the islands and islets with vegetation lying close to Eivissa and Formentera, on some of which it maintains small populations. There is an evident danger of extinction of these small populations (Salvador, in press).

For details of the distribution and variation in the populations of the small islands see the works of Eisentraut (1950), Cirer (1981) and Salvador (in press).

Hemidactylus turcicus (Linnaeus) 1758 — Turkish gecko

First found by Boscá (1883) in the town of Eivissa and a little later in Sant Antoni by Koch (1928). More recent records are those of Martínez Rica (1965), who found it on la Mola and Cap de Barbaría (Formentera). According to this author, the species is common in Formentera and rare in Eivissa. Rodríguez Ruiz (1974) found it on the island of s'Espalmador and Salvador (1979) on the island of Bleda Plana. Figure 2 gives previous records, as well as the four new localities in Eivissa where we found it.

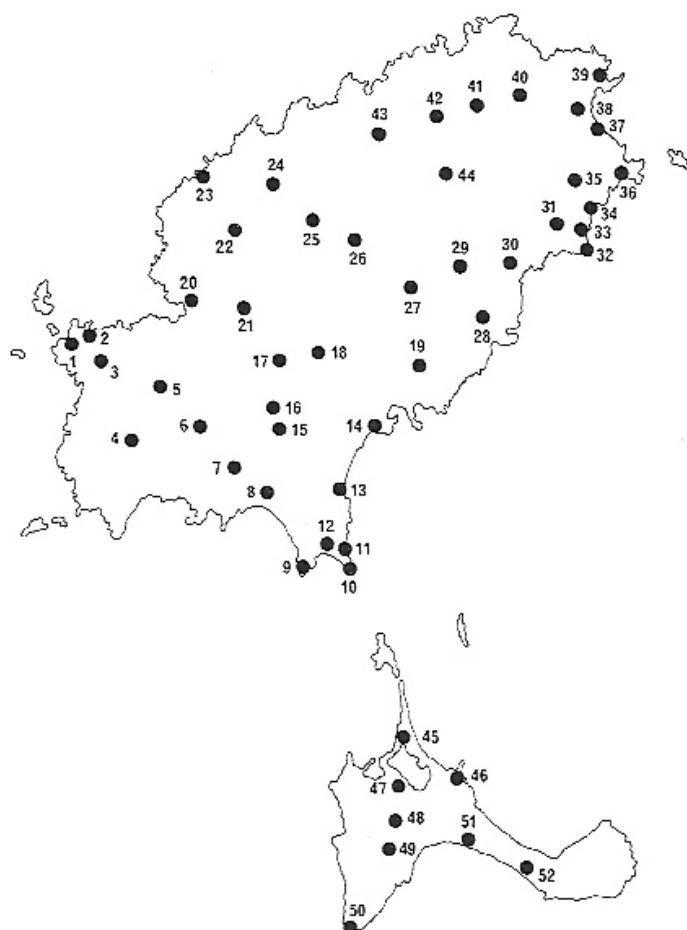


Figure 1. Distribution map of *Podarcis pityusensis* on Eivissa and Formentera.

(1) Cala Comte (Lilge, 1975); (2) Cala Bassa; (3) near intersection Cala Tarida–Cala Comte on the Sant Antoni road; (4) sa Talaia; (5) near Sant Agustí; (6) 1 km on the road from Sant Josep to Eivissa; (7) Cova Santa; (8) es Codolar; (9) Punta de la Rama (Lilge 1975); (10) Punta de ses Portes (Buchholz 1954); (11) Es Cavallet; (12) Sa Canal; (13) Torre de sa Sal Rossa; (14) Ciutat d'Eivissa (Lilge 1975); (15) on the road 4 km SE of Puig Gros; (16) on the road 1 km E of Puig Gros; (17) on the road to Sant Rafel 2 km from Puig Gros; (18) on the road near Torrent des Fornàs; (19) on the road to Santa Eulària 1 km from Jesús; (20) Sant Antoni (Lilge 1975); (21) on the road to Sant Antoni 5 km from San Rafel; (22) on the road to San Rafel 3 km from Santa Agnès; (23) S'Illot in front of ses Margalides; (24) near Sant Matcu; (25) Ca'n Racó; (26) near Santa Gertrudis; (27) near the intersection Portinatx–Eivissa–Sant Antoni–Sant Rafel; (28) near Cala Llonga; (29) near Ca'n Cardona on the Santa Eulària river; (30) mouth of Santa Eulària river; (31) on the road to es Canar near the intersection San Carles–Santa Eulària; (32) Punta Arabí (Lilge 1975); (33) es Canar; (34) Cala Llenya (Lilge 1975); (35) 1 km from Sant Carles on the road to Cala de Sant Vicent; (36) Cala de Boix; (37) es Figuerat beach; (38) near the s'Aigua Blanca intersection on the Cala Sant Vicent–Sant Carles road; (39) Punta Grossa near Cala Sant Vicent–Sant Carles road; (39) Punta Grossa near Cala Sant Vicent; (40) 3 km from Sant Joan on the Cala Sant Vicent road; (41) near the intersection Portinatx–Sant Joan on the San Rafel road; (42) 3 km from Sant Joan on the Sant Miquel road; (43) near Sant Miquel; (44) near the intersection to Sant Llorenç on the Sant Rafel–Portinatx road; (45) la Savina beach (Lilge 1975; Rodríguez Ruiz 1977); (46) Punta Prima (Lilge 1975); (47) on the road to la Savina 1 km from Sant Francesc; (48) on the road to Cap de Barbaria 1 km from Sant Francesc; (49) on the road to Cap de Barbaria at the Cala Saona intersection; (50) Cap de Barbaria (Rodríguez Ruiz 1977); (51) Migjorn beach (Lilge 1975); (52) la Mola (Rodríguez Ruiz 1977).

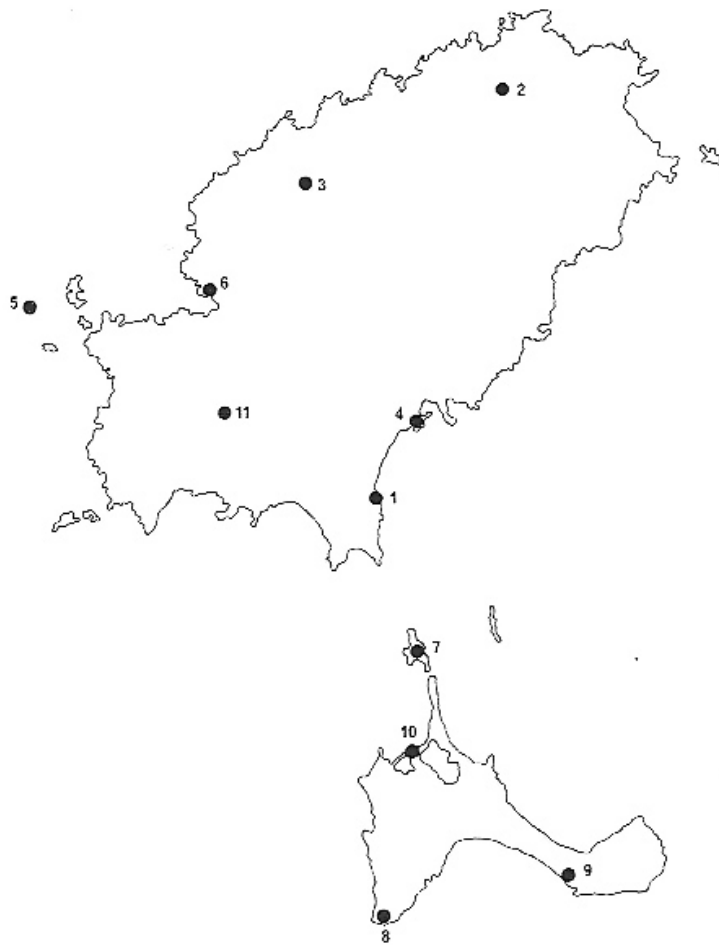


Figure 2. Distribution map of *Hemidactylus turcicus*.

(1) Sal Rossa; (2) near the intersection Portinatx–Cala Sant Vicent on the Eivissa road; (3) near Sant Mateu; (4) Eivissa (Boscá 1883); (5) Bleda Plana island (Salvador 1979); (6) Sant Antoni (Koch 1928); (7) s'Espalmador (Rodríguez Ruiz 1974); (8) Cap de Barbaria (Martínez Rica 1965); (9) la Mola (Martínez Rica 1965); (10) Port de la Savina (Rodríguez Ruiz 1974); (11) near Sant Josep.

A young specimen was caught (locality 2 on the map) under a stone on August 13, 1980 at 6.45 a.m. (sun hour). The ambient temperature was 25.5°C and that of the substrate 27°C. The relative humidity was 62% and the cloacal temperature was 33°C. The specimen collected in Sant Josep was in a stone wall in a small pine wood. Caught at 4.12 p.m. (sun hour) on August 15, 1980, when the relative humidity was 48%, the substrate temperature 31°C and the ambient temperature 30°C; the cloacal temperature was 32.5°C. Near the tower of Sal Rossa we observed one of these geckos sunbathing at 10.45 a.m. (sun hour) on August 17, 1980.

We are of the impression that this species is not rare in Eivissa since we located it at four different places during our daytime sampling in the summer of 1980. More complete information on this species can be found in Salvador (1981).

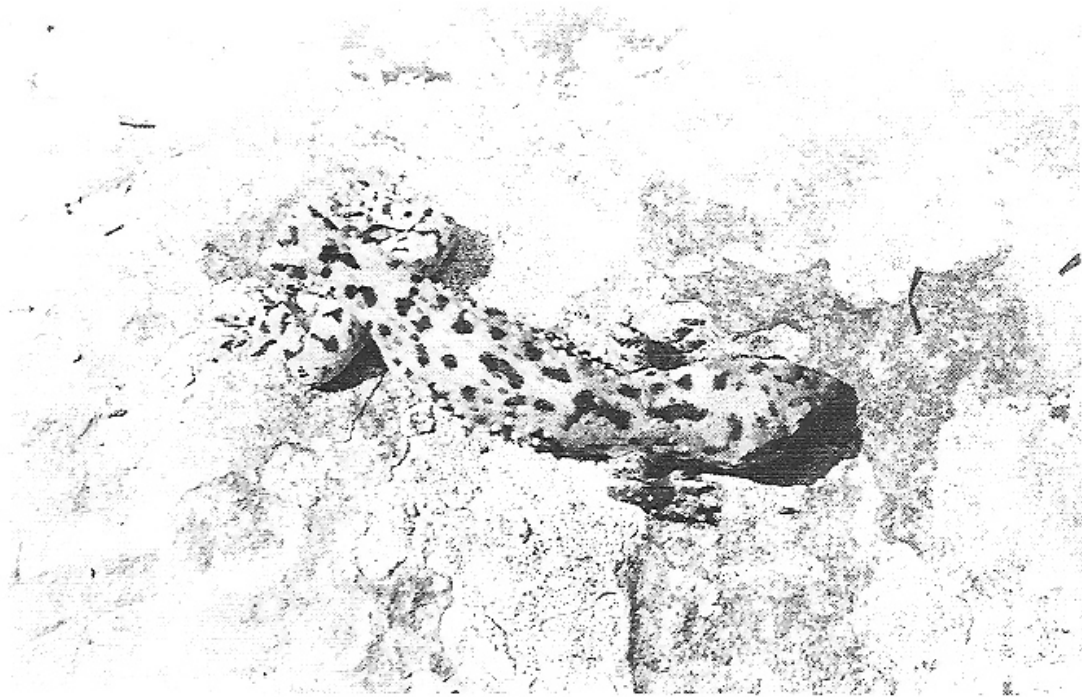


Figure 3. *Hemidactylus turcicus* male, No. 1143. Collected near Sant Mateu, Eivissa on August 15, 1980 (J. Carbonell).

Tarentola mauritanica (Linnaeus) 1758 — Moorish gecko

An abundant species in Eivissa (Martínez Rica, 1965a, 1965b, 1974), *T. mauritanica* was considered to be absent from Formentera until it was found recently by Rodríguez Ruiz (1974) in the harbour of Cala Savina. We were able to verify its presence and abundance in Eivissa during the sampling period of August 12–19, 1980.

This gecko was encountered in 18 localities throughout the island. According to previous works (Balcells, 1955; Martínez Rica, 1965a, 1965b) it is also found on the islands of Redona of Santa Eulària, Negra, es Penjats and s'Espartar. We were able to verify its presence in these islands as well as on the following: Canar, Santa Eulària and Malví Gros. All the hitherto known localities are shown in Figure 4.

During the sampling period we measured the cloacal temperature of 22 specimens in addition to the ambient and substrate temperatures, this having enabled us to obtain data on thermoregulation which we think is of interest to include here. The collecting period was from 6.34 a.m. to 8.27 p.m. (sun hour) (Table 2).

11 of the 22 specimens were found clinging to the underside of stones which thus acted as a substrate. There is a positive and statistically significant correlation between the body t and substrate t , as well as between the body and ambient t , but the values of the said correlation are relatively low in both cases:

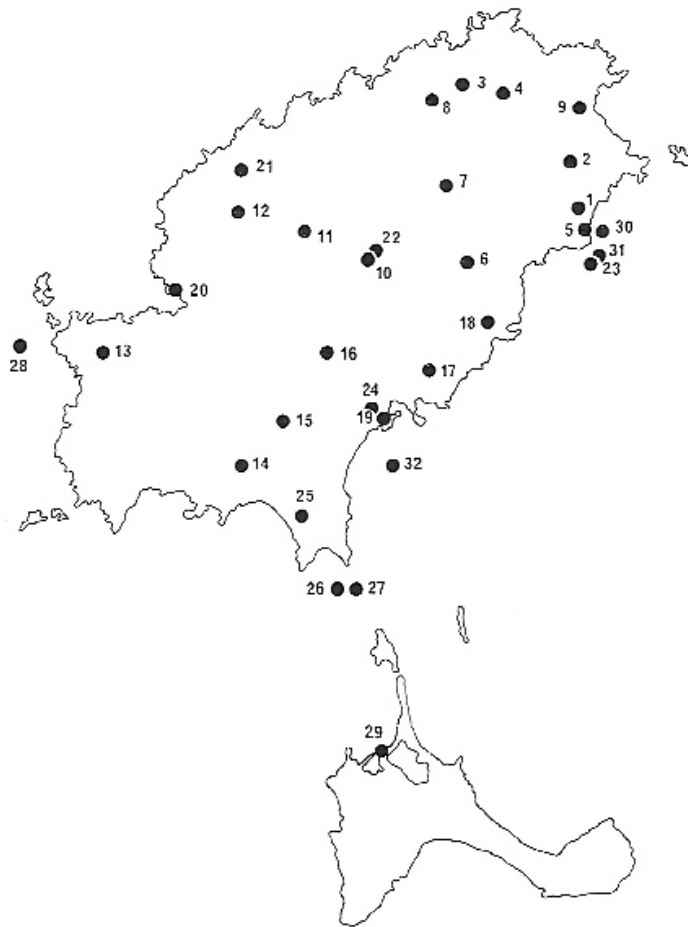


Figure 4. Distribution map of *Tarentola mauritanica*.

(1) near the intersection Sant Carles–Santa Eulària on the road to es Canar; (2) on the road to Cala de Sant Vicent 1 km from Sant Carles; (3) near the intersection Portinatx–Sant Joan on the San Rafel road; (4) 3 km from Sant Joan on the Cala de Sant Vicente road; (5) es Canar; (6) Santa Eulària river, near C'an Cardona; (7) near the intersection to Sant Llorenç on the Sant Rafel–Portinatx road; (8) 3 km from Sant Joan on the Sant Miquel road; (9) near the s'Aigua Blanca intersection on the Cala de Sant Vicent–Sant Carles road; (10) near Santa Gertrudis; (11) C'an Racó; (12) on the road to Sant Rafel 3 km from Santa Agnès; (13) near the intersection Cala Tarida–Cala Comte on the Sant Antoni road; (14) near Cova Santa; (15) 4 km SE of Puig Gros, on the road; (16) on the road near Torrent des Fornàs; (17) on the road to Santa Eulària 1 km from Jesús; (18) near Cala Llonga; (19) Eivissa (Balcells 1955); (20) Sant Antoni (Balcells, 1955). (21) Santa Agnès (Balcells 1955). (22) Santa Gertrudis (Balcells 1955); (23) Illa Redona de Santa Eulària (Balcells 1955); (24) Puig des Molins, near Eivissa (Martínez Rica 1965); (25) Salines d'Eivissa (Martínez Rica 1965); (26) Illes Negres, near es Penjats (Martínez Rica 1965); (27) Penjats (Martínez Rica 1965); (28) s'Espartar (Martínez Rica 1965); (29) la Savina harbour (Rodríguez Ruiz 1974); (30) es Canar island; (31) Santa Eulària island; (32) Malvi Gros island.

$r=0.79$ between cloacal t and substrate t , and $r=0.63$ between cloacal t and ambient t . As can be seen, the correlation is greater between the cloacal and substrate t , which underlines the importance of the stony substrate and the mode of thermoregulation by tigmotaxis when the gecko's belly is facing upwards.

Table 2. Temperatures in 22 specimens.

	Substrate t	Ambient t	Cloacal t
X	29.6	28.8	33.5
Int.	24.5–34.5	25–33.5	27.5–41
S.D.	3.25	3.64	3.85

As far as the differences observed are concerned we have calculated the Student's t-distribution between the cloacal and substrate t values on the one hand, and the cloacal and ambient t values on the other. The differences are statistically significant in both cases which indicates that here, too, there is an efficient thermoregulation. The values measured were $t: -7.26$ with 20° of freedom ($n=21$) for the comparison between cloacal and substrate t ($p=0.01$), and $t: -6.18$ with 20° of freedom ($n=21$) between cloacal and ambient t ($p=0.01$).

Testudo graeca Linnaeus 1758 — Spur-thighed tortoise

Since the papers of Maluquer (1918, 1919), which record the capture of five specimens of this species in Formentera, no further information has been obtained. López Jurado et al. (1979) does not mention this problem in his work.

Testudo hermanni Gmelin 1789 — Hermann's tortoise

Wermuth (1952) includes Eivissa in the area of distribution of the subspecies *T. hermanni robertmertensi*, but does not give any details on specimens or localities. Compte Sart (1966) obtained a specimen of this species from Es Clot Vermell near the town of Eivissa, affirming that it is the indigenous species.

We, for our part, have information on the existence of populations of tortoises in the Serra of Puig Gros, although we have not seen any specimens and so do not even know which species is involved. It is apparent that the information which exists on the tortoises of the Pityusic Islands is scanty and of a highly speculative nature.

Bufo viridis Laurenti 1768 — Green toad

This toad is only found on Eivissa. It is absent from Formentera. A few scarce notes concerning this species in the Pityusic Islands are given in Barceló (1876), Boettger (1880, 1881), Boscá (1883), Margalef (1951), Balcells (1955) and Compte Sart (1966). Vidal (1965, 1966) studied in detail the biology, taxonomy, ecology and distribution of the green toad in Eivissa. For further information consult the works published by this author.

Rana perezi Seoane 1885 — Common frog

The common frog is found on Eivissa and Formentera. Limited information on this species also appears in the literature cited under *B. viridis*. Thanks to the papers of Vidal (1965, 1966) we know the distribution, biology and ecology of this species on the Pityusic Islands.

Anfibios y reptiles de las islas Pitiusas

En este trabajo se resume la información existente sobre la fauna herpetológica de las islas Pitiusas completándola con datos recogidos recientemente.

En primer lugar se compara la composición faunística de Mallorca, Menorca, Eivissa y Formentera, llegando a la conclusión de que Ibiza y Formentera tienen un número de especies relativamente bajo. Una de las peculiaridades de las islas Pitiusas es la total ausencia de ofidios.

Hay actualmente tres especies de saurios en las islas: *Podarcis pityusensis*, *Tarentola mauritanica* y *Hemidactylus turcicus*. En este trabajo se presta especial atención a la distribución de estas tres especies en Eivissa, comprobándose que *H. turcicus* no es tan raro como se creía. También se señala la presencia de *T. mauritanica* en varios islotes no citados anteriormente.

Se incluye información complementaria sobre termorregulación estival en las dos especies de salamangueras. Dos tortugas, *Testudo graeca* y *Testudo hermanni*, han sido citadas de las islas Pitiusas pero la información de que se dispone sobre ellas es muy vaga. Dos especies de anfibios, *Rana perezi* y *Bufo viridis*, viven en las Pitiusas. Muy probablemente ambas han sido introducidas por el hombre.

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