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# New remarkable observations on the population of *Podarcis pityusensis* at Ses Margalides (Ibiza/Spain)

MARTEN VAN DEN BERG, MIKE ZAWADZKI and MICHAEL KRONIGER, July 2015.

**Summary**

We report on our visit to the largest of the Ses Margalides islands during our spring 2015 herpetological trip to Ibiza. The island habitat is described, the herpetological history of the *Podarcis pityusensis* population on this island is summarized, and additional data of this population is given. Among this new data are pictures of red bellied green backed lizards, blue lizards, and a description of a light gray color morph, all previously unknown to this population.

**Keywords:** *Podarcis pityusensis hedwigkamerae*, Ses Margalides, new color morphs.

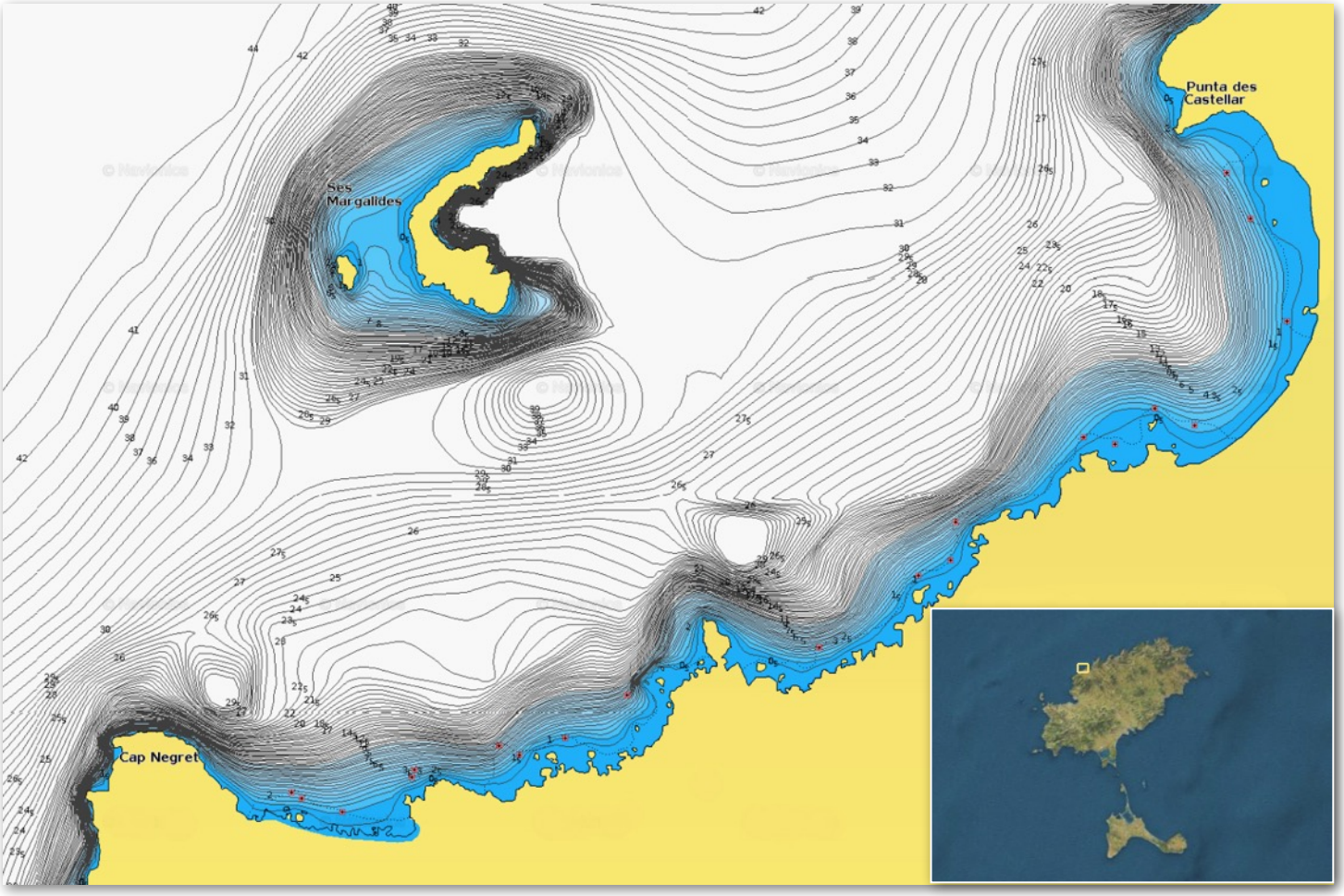
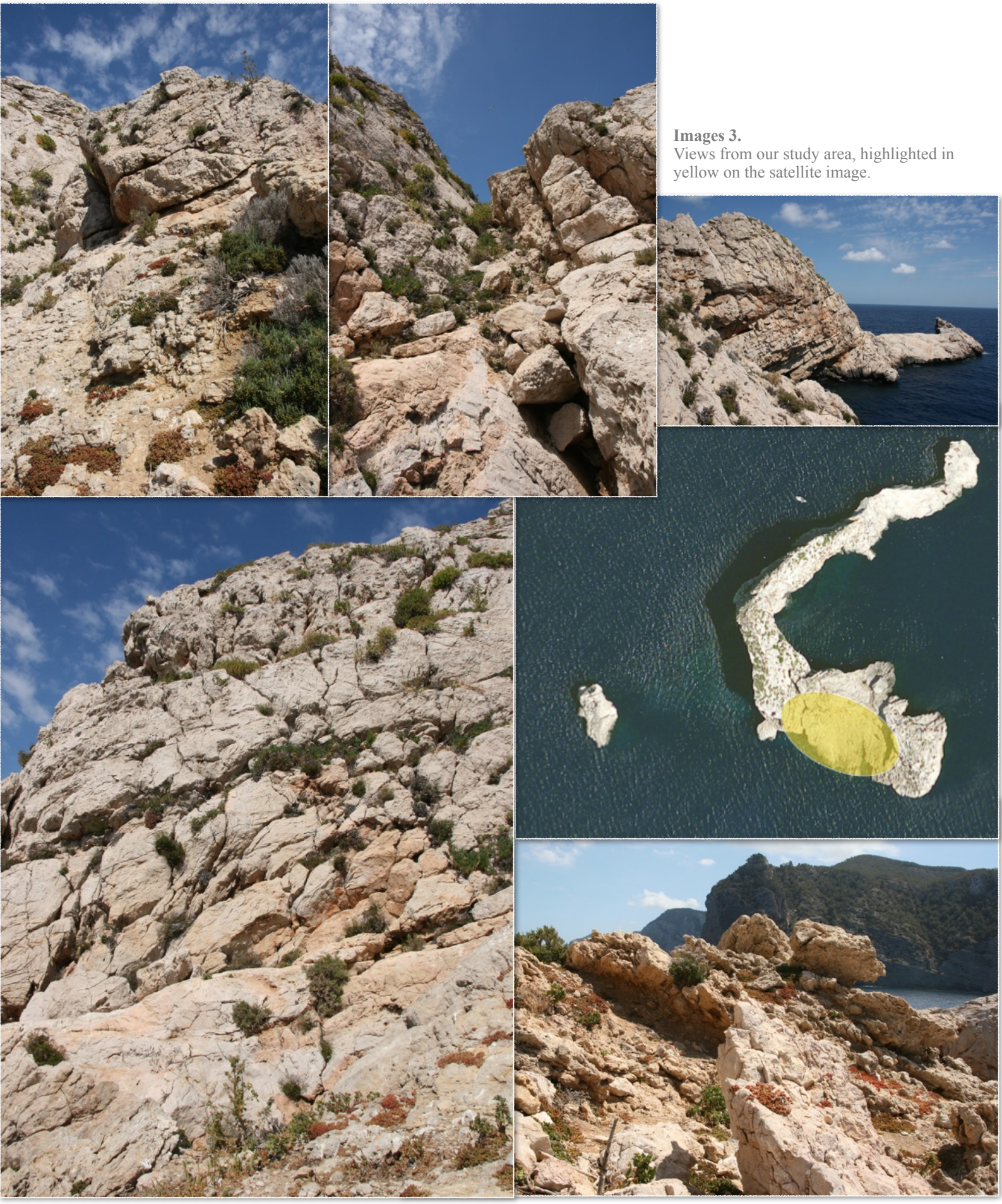



**Image 1.** Ses Margalides islands, off the northwestern coast of Ibiza, with bathymetric lines.

## Introduction

Ses Margalides are two small islands 500 m off the northwestern coast of Ibiza. From now we will refer only to the biggest of the two as Ses Margalides island. It is a limestone cliff-like island with a surface of 13.750 m², a maximum altitude of 44 m (MAYOL 1997), and separated from Ibiza with a shallowest bathymetric depth of 29,2 m, resulting in a estimated divergence time (EDT) from Ibiza of 9325 years before present. The age of Ses Margalides is comparable to the S'Espardell complex (EDT=9350) and the Vedrà complex (EDT=9300), but younger than Tagomago (EDT=9475), the S'Espartar complex (EDT=9525) and the Bledes complex (EDT=10950) (VAN DEN BERG 2015). It is characterized by steep walls, crevices and caves, with a lot of unstable rock formations and loose gravel, which makes this an risky island to climb. During our spring 2015 herpetological trip to Ibiza, in which we collected data for a future revision of the subspecific order of the Ibiza wall lizard *Podarcis pityusensis* (VAN DEN BERG et al. 2015), we were able to study the population of Ses Margalides from 9:15 until 15:45 on Friday the 22nd of May, under blue skies, and with a mean temperature of 25 °C.

**Image 2.** Approach to Ses Margalides in the early morning.



**Images 3.**
Views from our study area, highlighted in yellow on the satellite image.

## Herpetological history of Ses Margalides

We are afraid that there is not much documentation, neither from collectors, nor from herpetologists, about their visits to Ses Margalides island. Therefore we present a short recapitulation about what was published or could be deduced from literature.

**Image 4.** Herpetological collection ZSM. Insert: LORENZ MÜLLER.

### 1927: HEDWIG KAMER & LORENZ MÜLLER (ZSM)

Because she was the collector of the lizards used by LORENZ MÜLLER in his first description of *Lacerta lilfordi hedwigkamerae* (MÜLLER 1927b) (present name: *Podarcis pityusensis hedwigkamerae*), we may assume that one of the first people catching lizards on Ses Margalides must have been HEDWIG KAMER, probably accompanied by her husband ZENO KAMER. The deposited specimens in the Zoologische Staatssammlung München, Abteilung Herpetologie, were transferred to ZSM by WILHELM SCHREITMÜLLER (MÜLLER 1927b), who was acquainted to the KAMER family, and also did report on their visits to the Balearic islands in 1926 and 1927. It is told that they were able to collect lizards on Ses Margalides island in 1927 (SCHREITMÜLLER 1929).

MÜLLER (1927b) took the effort to describe all 2,3,1 specimens in great detail, both metric and meristic data, which are added to our database, as the description of appearance and coloration. We have to be grateful to MÜLLER for his accuracy, because both type and paratypes did not survive the second world war, and were lost during the allied bombardment on the 25th of April 1944, devastating Munich (FRANZEN & GLAW 2007).

**Image 5.** Description of the type specimen in MÜLLER (1927b).

*Lacerta lilfordi hedwig-kamerae* subsp. nov.

Typus: ♂ erw. Zool. Staatssamml. München Herp. (Samml. L. Müller) Nr. 155. Insel Margalida (Margarita), nordw. Santa Inés auf Ibiza, Pithyusen. Frau Hedwig Kamer leg. 1927.

Beschreibung des Typus: 32 Schuppen von der Kinnschildersymphyse bis zu den Halsbandschildern; 8 Halsbandschilder 63 Schuppen um die Rumpfmitte; 43 Schuppen-Querreihen entsprechen einer Konflänge; 25 Bauchschilder-Querreihen; rechts 21, links 20 Femoralporen; 27 Lamellen unter der vierten Zehe.

Iris bronzegelb. Pileus dunkel olivbraun, dicht schwarz gefleckt. Die Färbung der Rumpfoberseite ist ein schwer zu beschreibendes, sehr dunkles fast schwarz wirkendes Bläulichgrün, durch das die drei schwarzen Fleckenbinden der Dorsalzone, die am Nacken zu einer seitlichen Verschmelzung (Reticulation) neigen, nur ganz schwach hindurchschimmern. Ein Supraciliarstreifen, der jedoch nur am Hals und am Vorderrumpf deutlicher erkennbar ist, hebt sich — nur ein wenig heller — von der düsteren Grundfarbe ab. An den Rumpfseiten schimmert eine schwarze Reticulation schwach durch, zwischen der — besonders an den Halsseiten und in der Achselgegend — leicht aufgehellte, düster bläulichgrüne Flecken stehen. Extremitäten dunkel rotbraun mit schwarzer, nur schwach sich abhebender Zeichnung. Oberseite des Schwanzes schwarz. Auf dem nicht regenerierten Teil desselben stehen zahlreiche metallisch blaugrüne Flecken, so daß er düster grünlich erscheint. Der regenerierte Teil ist braunschwarz und trägt jederseits zwei düster blaugrüne Streifen. Kinnschilder grüngelb. Kehle hell blaugrau, hinten am dunkelsten. Bauch in der vorderen Hälfte hell stahlblau; nach hinten zu geht die Bauchmitte in ein helles, rötlich angehauchtes Ockergelb über. Die äußerste Bauchschilderreihe jederseits ist tief kobaltblau mit schwarzen Flecken; die anstoßende Reihe ist bläulich gelb mit grünblauen Wolkenflecken auf jedem Bauchschild. Unterseite der Extremitäten olivgrau bzw. olivgrün. Schwanzunterseite rötlich gelbgrau mit hellen grünblauen Flecken.

Kopfrumpflänge: 85 mm; Schwanz (reg.): 122 mm; Kopflänge: 20 mm; Kopfbreite: 14 mm; Kopfhöhe: 13 mm; Vorderbein: 29 mm; Hinterbein: 44 mm.

Later LORENZ MÜLLER summarizes the Ses Margalides description as follows: On the dorsal side a melanistic form, without the strong blue tones. The dorsal side is black with greenish shimmer, the ventral side either greenish graphite black or not at all melanistic and then more white gray (MÜLLER 1928).

**1928 and 1930: MARTIN EISENTRAUT** (ZMB)

The second recorded collector on Ses Margalides was MARTIN EISENTRAUT. During his first trip to Ibiza he caught 2,4,0 specimens on 21-07-1928, and during a second trip he collected 2,0,0 specimens on 06-03-1930. Both series of lizards were deposited in the Museum für Naturkunde Berlin (ZMB), and extensively described in EISENTRAUT (1949). What will be a typical characteristic of the melanistic lizards of Ses Margalides, which made them different from all other melanistic populations, are the bright flesh-colored parts on the ventral side, especially in the anal region (EISENTRAUT 1929).

Although in total 8 specimens were deposited, only 7 were listed in his description of the Ses Margalides lizards. These 7 specimens are added to our database, however we have the intention to enhance this dataset with additional data, and inquire for the destiny of lizard number 8.

Both MÜLLER and EISENTRAUT did only describe a melanistic morph, what could be coincidence because of the relative small series of 14 specimens in total. Although we know that both MÜLLER and EISENTRAUT had extensive interactions with SCHOLZE & PÖTZSCHKE (EISENTRAUT 1929 ; MÜLLER 1927a), in the case of other subspecies EISENTRAUT always mentioned the number of living specimens he saw at SCHOLZE & PÖTZSCHKE. For *Podarcis pityusensis hedwigkamerae* this information is not listed (EISENTRAUT 1949), what might imply that the early descriptions actual were made only upon these 14 specimens

**Image 6.** At work in ZMB (Berlin 2011). Insert: MARTIN EISENTRAUT.

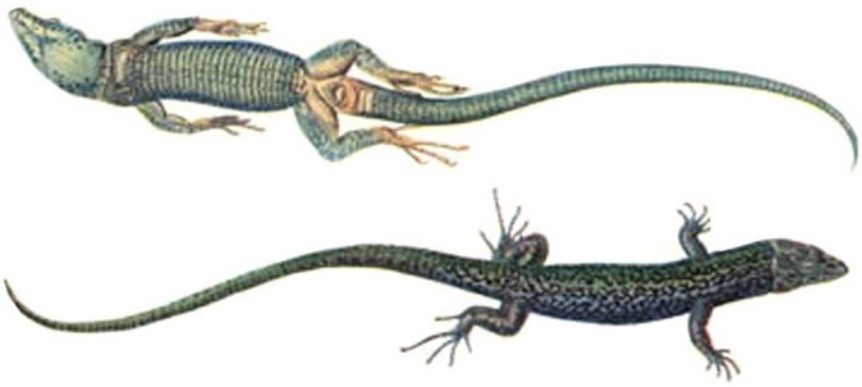


**Image 7.** Ses Margalides lizard in EISENTRAUT (1949).

**Image 8-9.** Typical flesh-colored ventral parts.


**Image 10.** Some of the Ses Margalides lizards in ZFMK, collected by HERMANN GRÜN.

## 1930: HERMANN GRÜN (ZFMK)

The 1,7,0 specimens deposited in the Zoologisches Forschungsmuseum Alexander Koenig at Bonn were collected on Ses Margalides by HERMANN GRÜN on 09-08-1930, and entered in the collection of the ZFMK on 13-08-1930, just a few days later. The postal system really did function in those days. Both SALVADOR (1984) and CIRER (1986) used these specimens in their studies.

In the pre-war catalogue of ZFMK it can be noted that initially 10 specimens were deposited, instead of the 8 specimens (ZFMK 30065-30072) in the post-war catalogue. It is also our intention to inquire what happened to these two missing specimens, and to add the ZFMK specimens to our database later this year.

**Image 11.** Part of the pre-war ZFMK catalogue.

| Datum | Nr. | Name | Geschlecht | Fundort | Erlegungs-Datum | Verkäufer oder Sammler | Besondere Bemerkungen |
|---|---|---|---|---|---|---|---|
| 1930 15. VII. | 29 | Lacerta Lilfordi | | Marotxk grande | 11. VII. 1930. | leg. H. Grün | 18 St. |
| " " | 30 | " " affin. pithyuensis, Bosca | | Conejo de Formentera | " " " | " | 8 " |
| 24. " | 31 | " " affin. pithyuensis, Bosca | | Purroig. | 20. VII. " | " | 10 " |
| 13. VIII. | 32 | " " frailensis, Eisenh. | | Fraile. | 9. VIII. " | " | 10 " |
| " " | 65-72 ~~33~~ | " " Hedwig Kamrae, Mell. | | Margerita. | " " " | " | 10 " 30.065-30.072 |

### 1930 and 1932: Scholze & Pötzschke

In 1930 and 1932 the animal wholesale company Scholze & Pötzschke offered *Podarcis pityusensis* lizards to their customers. Image 12 shows the availability and prices of these lizards. An increase in subspecies availability from 1930 to 1932 is clearly noticeable. However from Müller (1927a) we can deduce that this company already was active on this market in 1927, and probably before.

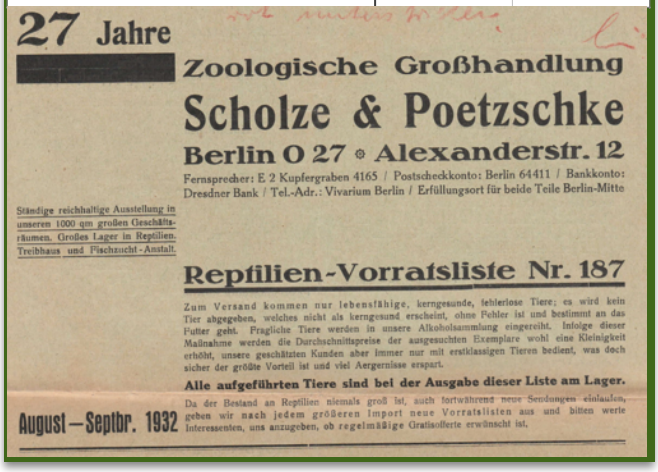
Interactions between both Eisentraut and Müller, and Scholze & Pötzschke are documented (Müller 1927a ; Eisentraut 1929 ; Eisentraut 1949). The collaboration between the subspecies describers and the pet traders had mutual benefits. For the describers it was a convenient way to get access to a big number of live specimens, for Scholze & Pötzschke a high number of different subspecies must have been financially lucrative.

Ses Margalides is represented in both the 1930 and 1932 list, and according the higher price, more scarce or more wanted. Note also the decrease in price of the S'Espartar lizards; must have been a big catch back in 1932.

When we take in consideration that in the nineteen thirties 3 Reichs Mark corresponded to a present value of 10 euro, that most profit usually is made by the vendor, second most profit by the middleman (Martínez-Rica & Cirer 1982), then for the collectors, in most cases local fishermen, there was probably not much left. To make this business a little profitable to them, they needed large captures. And large captures were made, which has been confirmed in the fact that Eisentraut was able to examine about 700 live specimens of *Podarcis lilfordi* and *Podarcis pityusensis* provided by Scholze & Pötzschke (Eisentraut 1929).

Although the pet trade obviously is not very detailed on the whereabouts of their collectors, we have to take into account that, until *Podarcis pityusensis* obtained a protective status, lots of visits on all Pityusic islands, including Ses Margalides, must have occurred, during at least 6 decades.


| "subspecies" from Ibiza | 1930 | 1932 |
|---|---|---|
| *espardellensis* (Espardell) | 3 - 5 Mark | 3 - 5 Mark |
| *formenterae* (Formentera) | 3 - 5 Mark | 3 - 5 Mark |
| *gastabiensis* (Gastbi) | 3 - 5 Mark | 3 - 5 Mark |
| *gorrae* (Bleda Gorra) | 3 - 5 Mark | 3 - 5 Mark |
| *grossae* (La Grossa Sta. Eulalia) | 4 - 8 Mark | 4 - 8 Mark |
| *grueni* (Trocados) | 3 - 6 Mark | 3 - 6 Mark |
| *hedwig kamerae* (Margalida) | 4 - 8 Mark | 4 - 8 Mark |
| *intermedia* (Negra) | 3 - 5 Mark | 3 - 5 Mark |
| *kameriana* (Esparto) | 4 - 7 Mark | 3 - 5 Mark |
| *kochi* (Conejera) | 3 - 6 Mark | 3 - 6 Mark |
| *maluquerorum* | | 3 - 5 Mark |
| *muradae* | | 3 - 5 Mark |
| *pityusensis* | | 3 - 6 Mark |
| *redonae* | | 3 - 5 Mark |
| *schreitmülleri* | | 3 - 5 Mark |
| *tagomagensis* | | 3 - 6 Mark |
| *vedrae* | | 4 - 7 Mark |


27 Jahre

Zoologische Großhandlung

Scholze & Poetzschke

Berlin O 27 ⊛ Alexandersfr. 12

Fernsprecher: E 2 Kupfergraben 4165 / Postscheckkonto: Berlin 64411 / Bankkonto: Dresdner Bank / Tel.-Adr.: Vivarium Berlin / Erfüllungsort für beide Teile Berlin-Mitte

Ständige reichhaltige Ausstellung in unseren 1000 qm großen Geschäftsräumen. Großes Lager in Reptilien. Treibhaus und Fischzucht-Anstalt.

Reptilien-Vorratsliste Nr. 187

Zum Versand kommen nur lebensfähige, kerngesunde, fehlerlose Tiere; es wird kein Tier abgegeben, welches nicht als kerngesund erscheint, ohne Fehler ist und bestimmt an das Futter geht. Fragliche Tiere werden in unsere Alkoholsammlung eingereiht. Infolge dieser Maßnahme werden die Durchschnittspreise der ausgesuchten Exemplare wohl eine Kleinigkeit erhöht, unsere geschätzten Kunden aber immer nur mit erstklassigen Tieren bedient, was doch sicher der größte Vorteil ist und viel Aergernisse erspart.

Alle aufgeführten Tiere sind bei der Ausgabe dieser Liste am Lager.

Da der Bestand an Reptilien niemals groß ist, auch fortwährend neue Sendungen einlaufen, geben wir nach jedem größeren Import neue Vorratslisten aus und bitten werte Interessenten, uns anzugeben, ob regelmäßige Gratisofferte erwünscht ist.

August—Septbr. 1932

**Image 12.**
Price list of Scholze & Pötzschke (Scholze & Pötzschke 1930 ; Scholze & Pötzschke 1932).

**1979: ANTONIA CIRER** (personal collection)

Almost 50 years later, ANTONIA CIRER visited Ses Margalides on 16-09-1979, and collected 0,8,0 specimens (CIRER 1981). She describes how the lizards are living in the high parts of the island, which part, according to her, is completely inaccessible. The lizards can be viewed and captured when they come down for food: ants, grasshoppers and particularly marine crustaceans (CIRER 1981).

The picture she paints is another that we have observed. We encountered lots of lizards on the lower part of the island, clearly moving within their home range. This might be the result of a, nowadays, relaxed predation pressure by humans.

She gives a brief description on the coloration (all females): Melanistic coloration on the back, with two yellow longitudinal stripes. Ultramarine or black belly (CIRER 1981).

In her PhD. dissertation, in which also 12 museum specimens (1,7,0 ZFMK, 1,1,0 SMF, and 0,2,0 ZSM) were included, the following description is given: Population with very melanistic back, though in some individuals clear dorsolateral bands come to differentiate themselves by possessing a lighter yellowish-brown color at the center of the back; flanks always very undifferentiated dark tone, and the belly is dark gray or dark ultramarine blue (CIRER 1986).

The 0,2,0 ZSM specimens CIRER (1986) studied, came as a big surprise to us, because we always thought all the Ses Margalides lizards in Munich were lost. Nice, another museum inquiry to be executed, retrieving the collector and collection date, and at long last add these specimens to our database.

**Image 13.** Difficult, but not completely inaccessible.

**Image 14.** Ses Margalides female.

**Before 1985: ALFREDO SALVADOR** (personal collection)

As usual SALVADOR is not very generous in sharing his material and methods. In the case of the, self appointed (SALVADOR 1986), revision of the complete species (SALVADOR 1984), also the results are without much explanation. Trying to summarize this will be difficult, so here the integral text (image 15).

***Podarcis pityusensis hedwigkamerae* L. Müller 1927**

*Distribution*

Ses Margalides (22).

*Discussion*

I have only examined 1 ♂ and 7 ♀♀, deposited in the ZFMK, from this island. I have only collected one young specimen due to the critical state of the population. The SVL is very great, as L. Müller mentions a male of 85 mm and Eisentraut (1950) a female of 81 mm.

It is a melanistic race, whose dorsum varies between graphite-black and dark green. The reticulated pattern is difficult to see in living specimens. It is a very large form with short pileus and relatively long hindlegs. It is also distinguished by its high number of dorsals. The melanism is more acute than in the population of Illa Murada.

**Image 15.**
Ses Margalides part of SALVADOR (1984).

So, this population is considered as valid subspecies, why, that remains unclear, or he did found something in the number of dorsal scales. In the results given, not much more than some means and standard deviations in 9 metric and meristic characteristics, we couldn't find anything distinguished, nor distinctive. Maybe between some populations, but nothing in general. It is ironic that the Ses Margalides population might be one of the few that can be distinguished from other melanistic populations, and already MÜLLER (1927) described it: The combination of the “usual” (melanistic) ventral dark blue coloration with the “unusual” ventral red coloration. Probably SALVADOR never noticed this, at least not in his examined overaged museum specimens (1,7,0 ZFMK).

What can we learn from SALVADOR (1984)? He visited Ses Margalides at least once, sometime before 1985. The lizards he spotted were melanistic. The population size must have been small, which is plausible, or maybe SALVADOR was just at the wrong place at the wrong time. It is to be appreciated that he didn't collect more than one specimen from a population in such critical state. But why collect a young specimen notwithstanding, and than exclude this specimen from the revision. What a waste!

**Image 16.** Juvenile *Podarcis pityusensis*, probably still living on Ses Margalides.

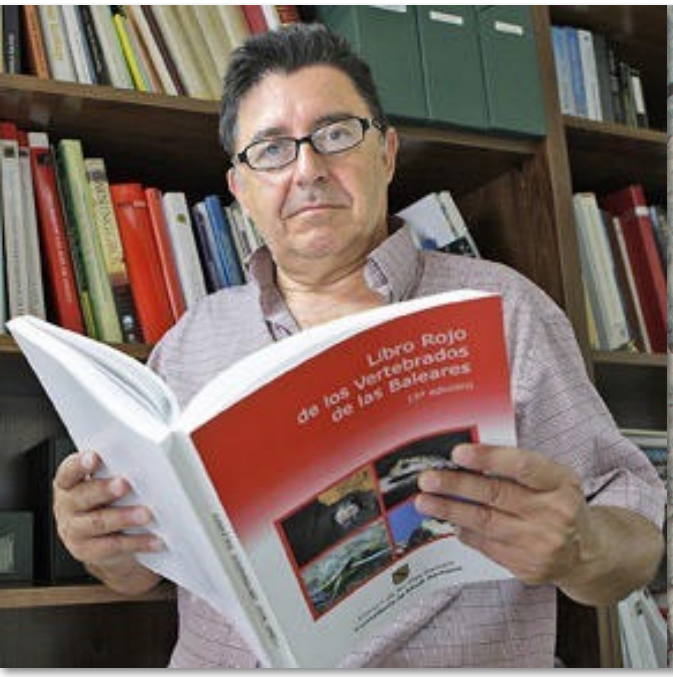



**Image 17.** JOAN MAYOL SERRA. (Foto: M. MASSUTÍ / Diario de Mallorca)

**Image 18.** Green female. Scanned image from UNIDAD DE VIDA SILVESTRE (1984).

**Image 19.** New color morph (right) on Ses Margalides. Scanned image from MAYOL (1985). (Foto: MARTÍ MAYOL)

## 1983: JOAN MAYOL SERRA

We don't know JOAN MAYOL as a person of few words, at least not in his publications. But in this case he only used just a few of them to announce what might be a great discovery in understanding the evolutionary development of *Podarcis pityusensis* : "Example of population variability seen in two specimens from Ses Margalides", used as a subscript to a picture (MAYOL 1985). Sometimes an image tells more than thousand words.

This picture (image 30) was taken by MAYOL's brother MARTÍ on Ses Margalides in 1983 during research on population densities published in UNIDAD DE VIDA SILVESTRE (1984). Actually in this publication the same lizard is already shown (image 18), but due to lack of details in the print, it looked more like a, somewhat lighter, melanistic specimen.

If you think that these images have led to a revival of interest in this population, you will be disappointed. Nothing documented at all until 2013. Only MIKE ZAWADZKI refers to image 19 as a possible case of translocation (ZAWADZKI 2001). But can we be sure?

The comparable image we shot during our visit to Ses Margalides (image 20) shows the back of a greenish female with almost the same coloration and pattern as her 30 years older possible ancestor. Remarkable.

**Image 20.** The two known color morphs of the Ses Margalides population in 2015. Note the similarities in coloration and pattern of both 1983 and 2015 greenish females.

**Image 21.**
VALENTÍN PÉREZ-MELLADO.
(Foto: NATHAN DAPPEN)

## 2010: VALENTÍN PÉREZ-MELLADO

From one of the most active professional herpetologists in the Balearics, VALENTÍN PÉREZ-MELLADO, we could only retrieve one visit to Ses Margalides from literature. This visit, performed in 2010, was one in a series of 37 visits to different sites in the Pityusics, in order to get 74 tail tip samples necessary for the research in RODRÍGUEZ et al. (2013). From the Ses Margalides population just one sample was collected, and the TTCGGATCACTATTAGGCTTATGCTTAATTATTCAAA's deposited at GenBank.

Maybe this is a good moment to document the fact that MIKE ZAWADZKI did visit the Ses Margalides population on the 12th of August 2004 for a short time between 17:00 and 18:00, under sunny, hot, and windy conditions. Due to the weather conditions MIKE was able to spot and photograph only a few lizards: Three juveniles, two melanistic adults, and another adult hiding in a bush with an olive green to greenish brown head and, so far as visible, a greenish back.

Is this all? We really don't know. At least we found out that another two preserved specimens are deposited at the American Museum of Natural History, New York (R-43255 and R-43256). In the case of any omissions, please contact us.

**Image 22.** The two known color morphs of the Ses Margalides population in 2015, ventral view.

**Image 23.**
Same area 11 years earlier, with much drier vegetation due to the time of year.

**Image 24.**
Juvenile back in 2004.

**Image 25.** The endemic *Euphorbia margalidiana,* two *Allium commutatum,* and out of focus *Crithmum maritimum*.

## Material and methods

During our stay on Ses Margalides, our activities were threefold:

1. Getting the big picture of the habitat, and making observations on what might have impact on the lizards.

2. Observing and photographing lizards, with interest in their morphology, behavior and numbers.

3. Catching lizards by trap and by hand in order to perform "on the island" measurements and taking close up images of dorsal head, left- and right lateral head, dorsal body, left- and right lateral body, ventral body, ventral femoral region. Metric body measurements were taken with a ruler and recorded to the nearest mm. Metric head measurements were taken with a caliper and recorded to the nearest 0.1 mm. Bodyweight was weighted with a balance and recorded to the nearest 0.01 g. After this sampling, we removed some mucous tissue from the mouth of the lizards with a small synthetic brush, which we store in a closed and numbered standard PCR tube. These tissue samples are stored at home, for future purpose, in a freezer at -10 °C.

**Image 26.** *Lavatera arborea.*

**Image 27.** Glaucous Glasswort *Arthrocnemum macrostachyum.*

**Image 28.** *Chenopodiastrum murale.*

## Results part 1: Habitat observations

What seems as sparse vegetation, the number of plant species is quite high, especially for such small island. In line with KUHBIER (1978) we found *Arthrocnemum macrostachyum*, *Limonium ebusitanum*, *Lavatera arborea*, *Crithmum maritimum*, *Allium commutatum* and of course the endemic *Euphorbia margalidiana*, only living in the wild on Ses Margalides. In accordance with CONESA et al. (2004) we also found the Nettle-leaved Goosefoot *Chenopodiastrum murale*. This is just a small section of all plant species listed for Ses Margalides, among them even two olive trees, *Olea europaea*, on the northwestern cliff (CONESA et al. 2004). Not mentioned by KUHBIER (1978) nor by CONESA et al. (2004) was the ice plant *Mesembryanthemum nodiflorum*, which is now quite common on the island, and apparently must have appeared more recently.

**Image 29.** *Limonium ebusitanum.*

**Image 30.** New kid on the block, the ice plant *Mesembryanthemum nodiflorum.*

**Image 31.**
Eleonora's falcon above Ses Margalides.

Most times visiting an island, the first animals to make themselves known are the yellow-legged gulls (*Larus michahellis*). So was the situation on Ses Margalides. Their omnipresent sound did accompany us the whole day. Suddenly a lot of different cries, and than complete silence. It announced the arrival of three Eleonora's falcons (*Falco eleonorae*). We observed them attacking something on the ground, we suspect a gull chick, but couldn't really see it happening. It was striking that we saw more dead gull chicks than alive ones, what explained the abundant presence of flies, among them *Lucilia sericata*, and at least one other species. Other flying insects we spotted were the hummingbird hawk-moth (*Macroglossum stellatarum*), the painted lady butterfly (*Vanessa cardui*) and a hoverfly (*Merodon sp.*). On the ground bound invertebrates we have not much to tell, we only spotted a few small ants and a possible new invader, the white garden snail *Theba pisana*. This might have consequences to the endemic snail *Xerocrassa ebusitana margaritae*. The Tenebrionid *Alphasida ibicensis ibicensis*, mentioned by CIRER (1986), was not found by us.

According to MAYOL (pers. comm.) the last decades the yellow-legged gull population on and around Ibiza has increased exponential, due to the disused custom by the Eivissencs of gathering gull eggs on large scale. Back in the nineteen eighties there were no gulls breeding on Ses Margalides, now they are, which has had influences on the habitat in fertilizing the soil, what is not always in favor of the indigenous flora, but is a gain to the lizards tropic resources. We assess that these trophic resources nowadays are quite sufficient to sustain a quite large population of omnivorous lizards, what is in contradiction to what was experienced by EISENTRAUT (1949).

**Image 32.** *Larus michahellis* chick.

**Image 33.** At least two fly species, among them *Lucilia sericata*, and many more cadavers.

**Image 34.** *Theba pisana*.

**Image 35.** *Merodon sp*.

**Image 36.** *Macroglossum stellatarum*.

**Image 37.** *Vanessa cardui*.

**Image 38.** Two possible predators.

Concerning predators CIRER (1986) mentioned, as possible culprits, and nesting on the nearby coast of Ibiza, the peregrine falcon (*Falco peregrines*), which is actually a bird eating raptor, the woodchat shrike (*Lanius senator*) and the opportunistic common raven (*Corvus corax*). We only spotted as possible predators the yellow-legged gulls (*Larus michahellis*) and the Eleonora's falcons (*Falco eleonorae*).

We found two empty, but official tagged, small bird nests, made of *Allium* leaves. We don't know their builders, but they are at least of special interest to some ornithologists. In their annual reports they recorded one pallid swift (*Apus pallidus*) (REBASSA et al. 1995), 4 breeding pairs of the European shag (*Phalacrocorax aristotelis*) (GONZÁLEZ et al. 1999), and one immature specimen of the purple heron (*Ardea purpurea*) (SUÁREZ et al. 2004), which could have been an accidental predator on lizards.

Our dataset shows a 75% occurrence of regenerated tails (see table 1). Intraspecific aggression is a well known cause of partial tale loss, but if we look at the male in image 65, which was to our observation the biggest male in our area, we can conclude he must has encountered something even bigger in the recent past. So, as had to be expected, predation on lizards is present on Ses Margalides.

**Image 39.** Melanistic female, same as in image 40 and 41.

## Results part 2: Observations on the lizards

Also on Ses Margalides the best time for observing and photographing adult lizards is during the morning, while they are basking and start to forage. During the hottest hours of the day, 12:00-15:00, most adult lizards confine themselves to sheltered places. The juveniles using this relative safe time span to become more active. In our study area the abundance of lizards was quite normal and comparable to most other island populations.

Unidad de Vida Silvestre (1984) calculated an estimated population size on Ses Margalides of 200 specimens. The bulk of the lizards we spotted looked like the original described melanistic lizards (Müller 1927b ; Eisentraut 1949 ; Cirer 1981 ; Salvador 1984 ; Cirer 1986). Under the prevailing light conditions these melanistic lizards, when wandering around, look blackish, without displaying much of their coloration and pattern details. A nice example how light influences our perception is shown in image 39, 40 and 41, a female, almost at the same moment and place, under three different angles of view.

**Image 40.**
Melanistic female climbing a trap. Under different light conditions she looked much darker (see image 39 and 41).

**Image 41.**
Same melanistic female as in image 39 and 40, looking much darker and less brownish as in the previous image.

**Image 42.** Red bellied greenish male.

**Image 43.** Mixed bellied greenish female.

From the greenish color morph, as shown in MAYOL (1985), we only observed 2,1,1 specimens. However both the males looked like red bellied specimens, in contrary to the mixed bellied female. It is a shame we couldn't catch them, so for now we are unable to compare them with the melanistic males. The female was spotted and caught among the first, so we will describe her later in part 3 of the results. What we think is the juvenile stage of the green color morph is shown in image 47.

In total we could identify 5 different juvenile specimens among our pictures (images 44-48). When we compare these juveniles with juveniles from other populations in our database and life pictures (images 49-61), it is clear that the Ses Margalides melanistic juveniles are different then the juveniles from all other populations, including the Bledes and the S'Espardell de S'Espartar melanistic populations. The green color morph juvenile compares best to some of the juveniles seen on Ibiza, at least in the brownish dorsal background coloration. However the dorsal pattern in the Ses Margalides juvenile is more distinct, and less striped, and shows great similarity with both the greenish males and female.

**Image 44.**

**Image 45.**

**Image 46.** (same specimen as image 16).

Juvenile stage of the melanistic color morph on Ses Margalides, differs from all other melanistic juveniles in our database.

**Image 47.** Juvenile stage of the green color morph.

**Image 48.** Another juvenile.

**Image 49.** Juvenile ZBK 00112, Formentera - Es Pujols.

**Image 50.** Juvenile ZBK 00115, Formentera - Es Pujols.

**Image 51.** Juvenile ZBK 00633, Ibiza - Cala Salada.

**Image 52.** Juvenile ZBK 00649, Bosc de Conillera.

**Image 53.** Juvenile ZBK 00384, Conillera.

**Image 54.** Juvenile ZBK 00382, Conillera.

**Image 55.** Juvenile ZBK 00621, Tagomago.

**Image 56.** Juvenile 14-05-2015, Es Vedrà.

**Image 57.** Juvenile ZBK 00366, Ibiza - Es Figueral.

**Image 58.** Juvenile ZBK 00323, Bleda Na Bosc.

**Image 59.** Juvenile ZBK 00333, Bleda Plana.

**Image 60.** Juvenile 27-05-2014, S'Espardell de S'Espartar.

**Image 61.** Juvenile ZBK 00338, Bleda Plana.

**Image 62.** Another juvenile on Ses Margalides, looking complete different than the green morph- and melanistic juveniles (same specimen as in image 48).

Until now only remarkable results. But there is more. What about the juvenile in image 48 and 62. It doesn't look like the other 4 specimens presented before. It looks more bluish, and it is not coincidental that in the same area also two large bluish male lizards were observed, and this is an observation not documented before.

Although observed during approximately 3 hours, we were unable to catch one of them. Especially the second, and largest male, was not very impressed by these attempts. It seemed he considered himself the big boss in the area, and every attempt to approach him, was answered with a small displacement. No even trying to hide into one of the many crevices. Both bluish males had one close encounter, the first male probably entering the territory of the second male. Nothing aggressive happened, not even an attempt to impress, just like they seemed to be acquainted, and after a short while the first bluish male turned around and moved slowly back to his home range.

Both males were also not interested at all in the apple we tried to offer them. When a melanistic female got trapped inside the trap that was intended for the second bluish male, he showed some interest in the strange noise, but when the control was done, he moved on, probably he had more important matters. This sluggish behavior was not shown by adult melanistic specimens approaching him. On first sight of this bluish male, they turned around in great hurry. Especially the juveniles seemed quite frightened while seeing him, and they even turned and ran faster.

**Image 63.**
MARTEN trying to catch one of the bluish males.

**Image 64.** First spotted bluish male on Ses Margalides.

**Image 65.** Second spotted bluish male on Ses Margalides.

| New Record... | id | location | date | g | L | SVL | TL | NTat | TL/SVL | HL | HW | HH | HL/SVL | HW/SVL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1850 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00924* | ♂ | 126 | 88 | 38 | 116 | 43 % | 22.1 | 13.3 | 11.3 | 25 % | 15 % |
| | 1851 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00925* | ♂ | 196 | 83 | 113 | 96 | 136 % | 21.3 | 12.8 | 10.7 | 26 % | 15 % |
| | 1852 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00926* | ♀ | 177 | 73 | 104 | 84 | 142 % | 16.4 | 9.3 | 7.6 | 22 % | 13 % |
| | 1853 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00927* | ♀ | 175 | 75 | 100 | 101 | 133 % | 16.8 | 9.8 | 8.2 | 22 % | 13 % |
| | 1854 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00928* | ♂ | 117 | 81 | 36 | 103 | 44 % | 19.8 | 12.4 | 10.5 | 24 % | 15 % |
| | 1855 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00929* | ♀ | 146 | 79 | 67 | 128 | 85 % | 17.1 | 10.0 | 7.8 | 22 % | 13 % |
| | 1856 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00930* | ♀ | 194 | 80 | 114 | 120 | 143 % | 18.0 | 10.2 | 8.9 | 23 % | 13 % |
| | 1857 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00931* | ♂ | 204 | 83 | 121 | | 146 % | 20.8 | 13.2 | 11.7 | 25 % | 16 % |
| | 1858 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00932* | ♀ | 193 | 78 | 115 | | 147 % | 16.4 | 9.8 | 8.2 | 21 % | 13 % |
| | 1859 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00933* | ♀ | 221 | 77 | 144 | | 187 % | 17.1 | 10.0 | 8.5 | 22 % | 13 % |
| | 1860 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00934* | ♀ | 166 | 68 | 98 | 80 | 144 % | 14.8 | 8.7 | 7.2 | 22 % | 13 % |
| | 1861 | Ses Margalides *P. p. hedwigkamerae* | 2015-05-22 *ZBK 00935* | ♂ | 142 | 79 | 63 | 95 | 80 % | 20.1 | 11.1 | 9.9 | 25 % | 14 % |

**Table 1.** Data collected on the caught specimens on Ses Margalides. Continued on page 115, best viewed in two page mode.
Legend: L = Total length, SVL = Snout-Vent length, TL = Tail length, NTat = New Tail at, HL = Head length, HW = Head width, HH = Head height. HL/SVL = Head length by Snout-Vent length, HW/SVL = Head width by Snout-Vent length.

**Image 66.**
Impression of a fourth color morph on Ses Margalides.

For a single visit to an island, that was remarkable enough. But there is still one more thing, at the same time our biggest miss. Just after entering Ses Margalides, on the first round of putting out the traps, we saw something with the size and shape of a female lizard, but of light gray coloration, with some reduced pattern. Although we placed two traps on both sides of her, we were not able to catch her, and later on she was not seen, nor photographed any more. Image 66 is an (not very artistic) impression of how she looked against the background.

## Results part 3: Data from the lizards we caught

The measurements of the 5,7,0 specimens caught are listed in table 1, which is a screen dump of those results in our database, free accessible online at www.pityusensis.nl. Images of the accompanying lizards, as well as some comments, can be viewed by clicking on one of the small images.

The pattern description of each of the caught and following lizards is actually better represented by their photos. We limit ourselves by giving some annotations to the, most times, cryptic coloration of these lizards.

| HH/SVL | Hvol/SVL | Weight | W/SVL | Masseteric | | rMAS | Ventralia | Dorsalia | Sub-max. | | Supra-lab. | | Sub-lab. | | Gularia | Colaria | Preanalia | Femoralia | | Lamellae | | col |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 % | 1887 | 15.39 | 17.49 | | | | 26 | 64 | 6 | 5 | 4 | 4 | 6 | 7 | 34 | 11 | 6 | 24 | 23 | | | |
| 13 % | 1757 | 14.46 | 17.42 | | | | 27-26 | 63 | 5 | 5 | 4 | 4 | 6 | 6 | 34 | 10 | 6 | 24 | 24 | | | |
| 10 % | 794 | 9.10 | 12.47 | | | | 29 | 60 | 5 | 5 | 4 | 4 | 6 | 6 | 30 | 10 | 6 | 23 | 21 | | | |
| 11 % | 900 | 10.91 | 14.55 | | | | 31-30 | 64 | 5 | 5 | 4 | 4 | 6 | 5 | 32 | 11 | 8 | 20 | 20 | | | |
| 13 % | 1591 | 13.45 | 16.60 | | | | 25-24 | 61 | 5 | 5 | 4 | 4 | 6 | 6 | 29 | 13 | 6 | 24 | 23 | | | |
| 10 % | 844 | 7.99 | 10.11 | | | | 29 | 64 | 6 | 6 | 4 | 4 | 6 | 6 | 34 | 9 | 7 | 20 | 21 | | | |
| 11 % | 1021 | 11.96 | 14.95 | | | | 30-28 | 62 | 5 | 5 | 5 | 4 | 6 | 6 | 34 | 10 | 6 | 23 | 23 | | | |
| 14 % | 1935 | 15.35 | 18.49 | | | | 26 | 65 | 5 | 5 | 4 | 4 | 6 | 6 | 35 | 10 | 6 | 22 | 21 | | | |
| 11 % | 845 | 12.57 | 16.12 | | | | 28 | 66 | 5 | 6 | 5 | 4 | 6 | 7 | 32 | 11 | 7 | 23 | 24 | | | |
| 11 % | 944 | 10.63 | 13.81 | | | | 29 | 68 | 5 | 5 | 4 | 4 | 6 | 6 | 30 | 10 | 6 | 21 | 21 | | | |
| 11 % | 682 | 7.24 | 10.65 | | | | 27 | 58 | 5 | 5 | 4 | 4 | 6 | 6 | 31 | 10 | 6 | 22 | 23 | | | |
| 13 % | 1398 | | | | | | 27 | 69 | 5 | 5 | 4 | 4 | 5 | 6 | 30 | 10 | 6 | 23 | 24 | | | |

**Table 1.** continued from page 114, best viewed in two page mode.
Legend: HH/SVL = Head height by Snout-Vent length, Hvol/SVL = Head volume by Snout-Vent length, W/SVL = Weight by Snout-Vent length.

**Male ZBK 00924**

Dorsal: Most black scales "uncovered". Central dorsal colored scales green, dorsolateral lines blue.

Lateral: Colored scales blue with some reddish brown scales.

Ventral: First two submaxilaria dark blue, other and ventralia much lighter, "as if" they are about to shed. Gularia the same, but with high number of reddish brown scales. Typical red coloration on front- and hind legs, but not very abundant.

**Male ZBK 00925**

Dorsal: Most black scales "covered", as if there is a thin blue reflecting iridophore layer on top. Central dorsal colored scales green, dorsolateral lines probably with less xanthophores resulting in a grayish look.

Lateral: Like dorsolateral lines.

Ventral: Same composition as ZBK 00924, but without the reddish coloration. Some black gular scales instead. Also less typical red coloration on the legs.

**Female ZBK 00926**

Dorsal: No "covered" black scales. Central colored scales green, without the "usual" intense darkening influence of melanophores. Behind the head also dark brown scales. Dorsolateral lines light brown with very few green scales.

Lateral: Some parts dark brown, other light brown and green. Supralabialia and parts of the chin light blue.

Ventral: Mainly light reddish, with some light blue and black spots.

**Female ZBK 00927**

Dorsal: Most black scales “covered”. Central colored scales mostly green, some blue. Dorsolateral lines blue.

Lateral: Like dorsolateral lines blue.

Ventral: Submaxillaria and ventralia mostly dark blue, gularia lighter blue with some black spots. The grayish appearance is less present. Also less typical red coloration on the legs, and where it occurs it is lighter.

**Male ZBK 000928**

Dorsal: Most black scales “uncovered”. Central colored scales green, dorsolateral lines blue and green.

Lateral: Mainly green, but darker than dorsal, almost looking brown at some parts. Some clear blue scales behind the head.

Ventral: Dark to lighter blue with some black spots on the gularia. Reduced typical red coloration on the legs.

**Female ZBK 000929**

Dorsal: Most black scales “covered”. Central colored scales green and blue, dorsolateral lines blue, with three yellowish brown scales.

Lateral: Mainly black.

Ventral: Dark blue ventralia with some black spots. Light blue gularia also with black spots. Typical red coloration on the legs and behind the colaria.

**Female ZBK 000930**

Dorsal: Black scales “uncovered”. Central colored scales green, dorsolateral lines green.

Lateral: Colored scales mainly brown, some green.

Ventral: Brown background with bluish green spots on the ventralia. Same on the gularia but with some clear blue spots. Typical red coloration everywhere.

**Male ZBK 000931**

Dorsal: Most black scales “covered”. Central colored scales green, dorsolateral lines blue.

Lateral: Colored scales blue.

Ventral: Grayish blue. Almost no typical red coloration on the legs.

**Female ZBK 000932**

Dorsal: Most black scales “uncovered”. Central colored scales and dorsolateral lines blue.

Lateral: Most colored scales blue.

Ventral: Grayish blue ventralia with black and some reddish spots. Lighter blue gularia with a few black scales. Typical red coloration on the legs.

**Female ZBK 000933**

Dorsal: Most black scales “uncovered”. Central colored scales green, dorsolateral lines blue. In the rear and continued in the tail some reddish spots

Lateral: Mostly black with some blue spots.

Ventral: clear and greenish blue, with black spots. Typical red coloration on the legs.

**Female ZBK 000934**

Dorsal: Most black scales “covered”. Central colored scales blue, dorsolateral lines blue.

Lateral: Mostly black with some blue spots.

Ventral: clear and greenish blue, with a few black spots. Typical red coloration on the legs.

**Male ZBK 000935**

Dorsal: Most black scales “uncovered”. Central colored scales blue, dorsolateral lines green and blue.

Lateral: Black and grayish blue.

Ventral: Grayish blue. Typical red coloration on the legs.

When we compare the greenish female to the melanistic females, at least in the pattern lots of similarities are still visible (see image 67).

Comparison of the Ses Margalides belly coloration with the other populations with an ancient separation from Ibiza (see image 70), show that from the 8, as what we classify as blue colored bellies, 6 are of a grayish blue coloration not seen in other populations, and 2 are of a light blue coloration resembling some of, for instance, S’Espartar. The 3 mixed colored bellies of the melanistic lizards are also unique, not seen elsewhere, and especially female ZBK 00930 displays the combination of grayish blue with abundant reddish brown highlights. It is not surprising that seeing the belly of this female (image 68 and 69) put a big smile on our faces, and made us exclaim: What the heck is this…?

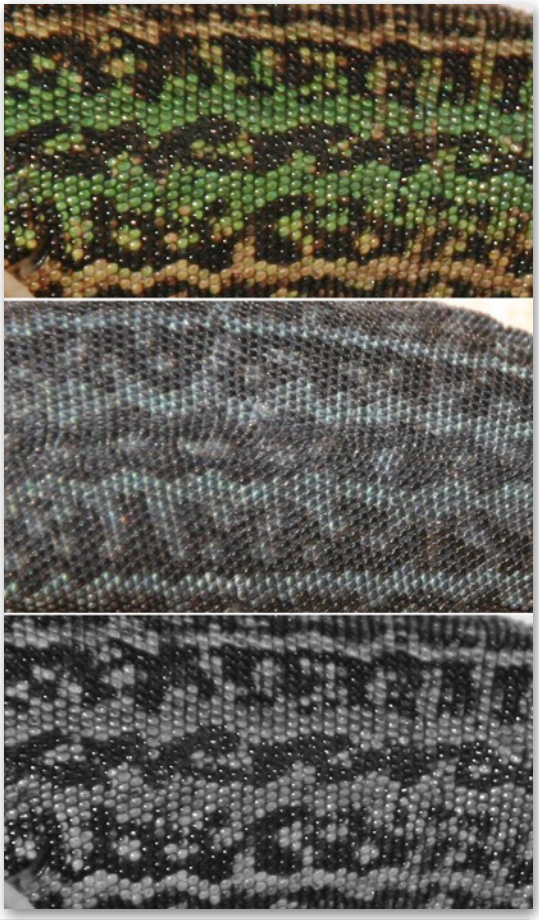


**Image 67.** Dorsal comparison between female ZBK 00926 (top image, in full color, bottom image, reduced to gray scale) and female ZBK 00933 (middle image, in full color).

**Image 68 and 69.** Extraordinary mixed belly coloration in female ZBK 00930.

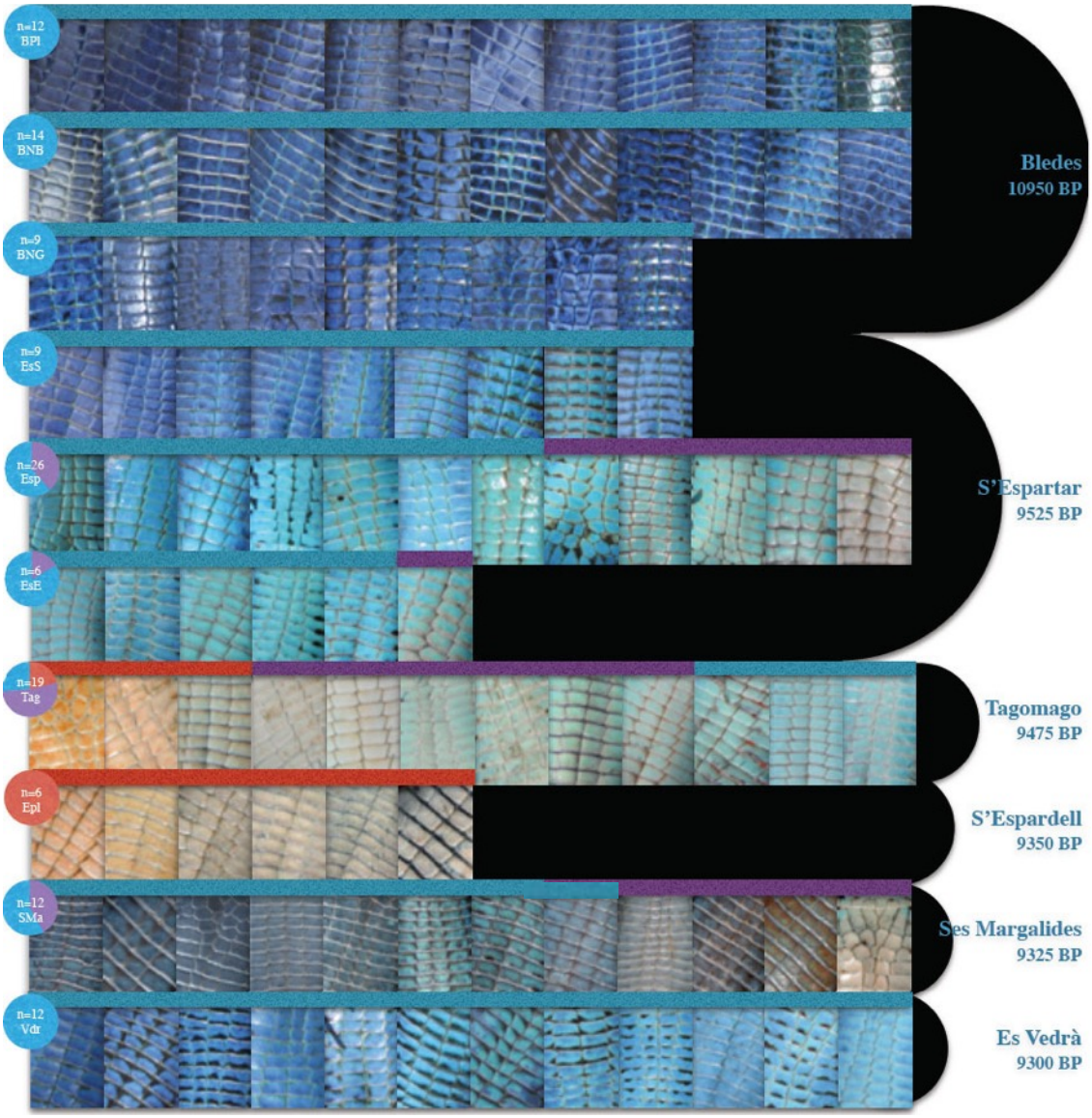



**Image 70.** Comparison of belly coloration in the 6 longest from Ibiza separated (group of) islands. Introduction of the used classification of belly coloration (red, mixed and blue) can be found in VAN DEN BERG et al. (2014), and the most recent results are from VAN DEN BERG et al. (2015). Below the name of the (group of) islands the estimated divergence time (EDT), in years before present (BP), is shown (VAN DEN BERG 2015).

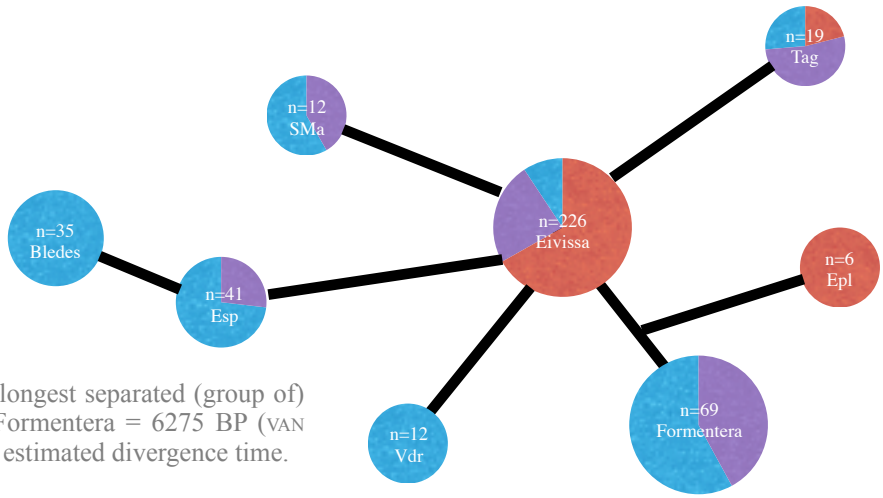
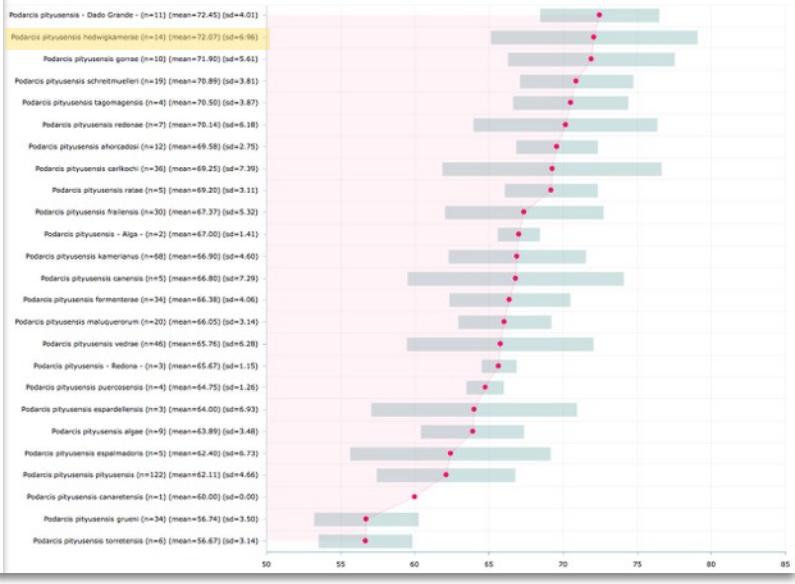



**Image 71.** Schematic view of the longest separated (group of) islands. EDT between Ibiza and Formentera = 6275 BP (VAN DEN BERG 2015). Bars representing estimated divergence time.

**Graph 1.** Adult male's **SVL**.
Aggregated values: (n=695) (mean=73.77).
click to enlarge



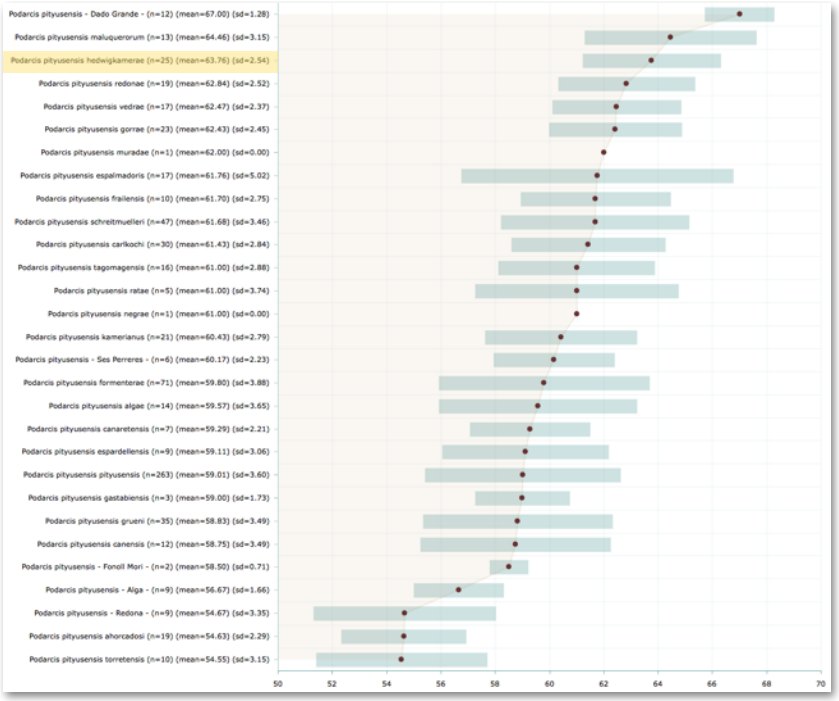
**Graph 2.** Adult female's **SVL**.
Aggregated values: (n=510) (mean=65.49).
click to enlarge

To illustrate some of the more interesting comparisons with other populations in metric and meristic values, we show the graphs of snout-vent length (SVL), relative head size (Hvol/SVL) and the number of latitudinal dorsal scales around mid body (Dorsalia), the latter clustered for both sexes, because in our data there is no evidence of sexual dimorphism in this character.

In both sexes the Ses Margalides population is concerning the snout-vent length amongst the populations with the longest specimens, in the females only beaten by the artificial population of Dau Gran. In relative head size both sexes of the Ses Margalides population are the top of the list.

**Graph 3.** Adult male's **Hvol/SVL**.
Aggregated values: (n=436) (mean=1261.83).
click to enlarge

**Graph 4.** Adult female's **Hvol/SVL**.
Aggregated values: (n=263) (mean=669.69).
click to enlarge




**Graph 5.** All genders and age groups **Dorsalia**.
Aggregated values: (n=726) (mean=60.00).
click to enlarge

We show the Dorsalia graph from our dataset as further illustration that this is not really a key character in discriminating between populations. Only between the top listed- and the bottom listed populations there is some significant difference to be expected. However, the counting of these scales is far from easy, and we don't think data from different assessors are usual comparable. In our own dataset we know that, in the case of recaptured lizards, the dorsal scale count was not always conform previous measurements, and that is with the same assessor.

## Discussion

We see at least two other color morphs in a population of predominant melanistic lizards with an unique melanistic ventral coloration. The occurrence of these two other color morphs can only be explained by:

1. Multiple translocations.
2. Evolution.

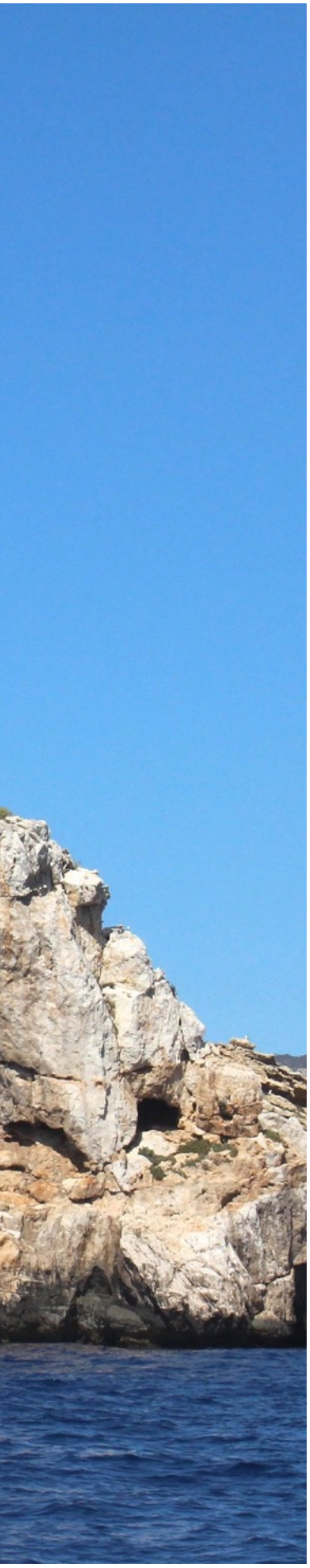
Accidental translocations are not very likely, because the relative inaccessibility of the island. People entering Ses Margalides must have a good reason to do so. It is not to be expected a tourist would choose this island for a picnic. Then only remains deliberate translocations, in which case we have to think of an EISENTRAUT (1930) copycat around the nineteen eighties. Probably a little far fetched.

More appealing, both in probability and charm, is the idea of witnessing evolution in progress. This might be a unique chance to learn more about the origin of diversity in coloration among the different populations of *Podarcis pityusensis*.

The only conclusion at this moment is that we have to get back on Ses Margalides to gather much more data. Subsequently we will continue this, what might become a very interesting, discussion.

**Image 72.** The release.

**Acknowledgment:** We want to express our gratitude to IVAN RAMOS TORRES (Servei de Protecció d'Espècies / Govern de les Illes Balears) for making the first arrangements necessary to this trip, including the CEP (02-04/2015) permits. We are also grateful to DENNIS RÖDDER and URSULA BOTT (ZFMK) for recommending us and for quick assistance to every request we made and RUUD BANKS for his assistance in discussing the taxonomic questions around *Xerocrassa ebusitana margaritae*. Also many thanks to JOAN MAYOL SERRA (Director of Servei de Protecció d'Espècies / Govern de les Illes Balears) for his assistance with some parts of the story, and CHEMA RAMON for bringing us to this amazing island.



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