

## A CHECK LIST OF THE HERPETOFAUNA OF THE ARGO-SARONIC GULF DISTRICT, GREECE

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### ABSTRACT

This survey of the herpetofauna of the Argo-Saronic Gulf is largely based on the author's extensive experience with the region and on data assembled by him since 1962. This is further supplemented by the work of other researchers. In order to gain a broad perspective consideration is given to the contiguous mainland defined as The Inner Argolid. Some extension outside this zone has been allowed in a few instances. Under the species account island localities are fully listed and presented in a Table of Taxa. Both island and mainland locations can be found on the accompanying maps. Some considerable irregularity occurs in distribution patterns amongst the islands and there is an implication that the smaller islands of restricted area and biotope act as natural reserves to some species that otherwise are subjected to competition on larger islands. Here can be named *Algyroides moreoticus*, *Podarcis peloponnesiaca thais* and *Coluber gemonensis*. Access to many of the small islands was only possible by using one's own transport or by enlisting local aid. Since some of the most interesting finds were made on such islands it follows how rash it is to base one's knowledge of the herpetofauna of an island complex only on islands that are readily accessible. Collections made by the author are deposited in the Senckenberg Museum, Frankfurt-am-Main with a smaller number accessioned at the California Academy of Sciences, San Francisco.

### INTRODUCTION

Between 1962 and 1971 I was largely resident in Greece engaged in herpetological research. During this time I used the island of Spetsai as a base. Reports on the reptile life of this region have already been made (Clark 1967 and 1970). The area is also referred to in various other publications dealing with the herpetofauna of Greece (Clark 1963, 1969 and 1972). With some further observations made more recently and the results of earlier visits to the other islands in the region, mostly small and uninhabited, remaining unpublished it seems appropriate to attempt a fuller and more thorough survey and to bring as much information as possible under one publication. Other herpetologists have contributed some useful records but it is evident that this part of Greece has been rather neglected. In checking through the literature there are to be found very few specific references to the Argo-Saronic islands themselves. The most recent work of any relevance is Bringsøe (1985): 'A check list of Peloponnesian amphibians and reptiles'. This report gives some information and is useful in contributing to our knowledge of the fauna of Salamis.

No check list of the Argo-Saronic Gulf can be considered complete without discussion of the related mainland region. In many respects this proved to be the most difficult part of the task not least in deciding the area. After careful deliberation I have set a boundary that encloses the Inner Argolid south of the route from Argos and Nafplion through to Nea Epidavros. Because of the undesirability of being too rigid I have allowed some extension north to take in species recorded from Mycenae up to Korinthos and eastwards to Elefsis and in a limited number of cases I refer to places still further outside the defined area but only when this seems to be pertinent. In the text I have referred to the principle mainland region as "the Inner Argolid". More difficult still was to decide which of the Peloponnesian species should be included in cases where there are no island records. In the end I resolved to include in the Species Account *all* species which have firm locality records from the Inner Argolid so as to make the survey as full as possible. Species totally excluded are those which have not been positively recorded from the Inner Argolid even though it is not impossible, in some instances, that these might subsequently be found. These are the following: *Salamandra salamandra*, *Rana graeca*, *Triturus alpestris*, *Podarcis muralis albanica* and *Podarcis taurica*

*ionica*. In the latter case I have some reservations since it is on record from Mycenae and Tiryns (Boulenger 1920). Bringsøe (1985) gives no localities from the Inner Argolid. The reader should bear in mind that the main thrust of this report is the islands. If I have inadvertently through an over-sight excluded mainland locality records I would be grateful for any information that is relevant.

In the bibliography I have assembled a reference list that sets out to be as useful as possible. I have omitted from the main bibliography papers not available to me although these are quoted in the text. These papers are included in Bringsøe's 1985 work and in citing the authors vicariously I have taken care to do so only in instances where Bringsøe gives precise information as to species and finding places. To avoid ambiguity these publications are listed separately.

The islands of the Argo-Saronic consist of the main islands of Salamis, Aegina, Poros, Hydra and Spetsai, all of which are inhabited and readily accessible from Piraeus by steamer and hydrofoil, and a considerable number of smaller islands and islets, some little more than above water rocks, most of which are uninhabited and which can only be reached by recruiting local aid. Geographically we can divide these island complexes into several groups:

1. Salamis with a few attendant islets and including Prasonisi.
2. The Aegina archipelago consisting of Aegina itself, the satellite island of Angistri and Mōni both of which are well wooded, and a number of small islets such as Lagouses, Diaporja and Ipsili. Except for Aegina itself very little is known of the reptile fauna of this group. Apart from Angistri with two villages all the other islands are uninhabited.
3. Poros, which in reality consists of two islands separated by a narrow isthmus with a causeway. Poros town and the port, only about 300 metres from the Peloponnese mainland, is built on the smaller island which is crowned with a rocky and steep-to pinnacle. The main island is thickly wooded and hilly with small cultivated areas.
4. The Hydra archipelago comprised of Hydra, the large and uninhabited island of Dhokos close to the mainland port of Ermioni and several lesser islands: Stavronissos, Trikkeri, Petassi, Alexandros, Ventza, Karteli and several tiny islets.
5. The Spetsai group consisting of Spetsai, Spetsopoula which is well-wooded and privately owned, the low-lying islet of Agios Ioannis and the steep-to and rocky islet of Petrokaravo.
6. The coastal islands of the Argolid Peninsula running from the Gulf of Nafplion to Portoheli: Tolon (or Romvi)), Plateia and Psili. These are uninhabited.
7. The isolated and uninhabited island of Agios Georgios which lies midway between the easternmost point of Hydra and Cape Sounion. This island is more Cycladean in aspect being largely barren, treeless and waterless. Its fauna relates to that of Attica.

In the main island identification should present no problems. In some cases the smaller islands do not feature on standard maps or if they do are not always named. I am therefore grateful to Achilles Dimitropoulos of the Goulandris Museum, Kifissia Greece for helping to locate these. The island of Psili in the Gulf of Argolis is sometimes named as Ipsili. There is another island also called Ipsili in the Saronic Gulf near to Aegina. To avoid confusion I have retained the name of Psili for the Argolid Gulf island since this is the one more generally used.

At the time of completing this report the island of Angistri remained uninvestigated. I had the chance to visit Angistri in January 1989 and although little was found due to the season a few observations were made. These are included in a brief appendix.

## SPECIES ACCOUNT

### SALAMANDRIDAE

*Triturus vulgaris graecus* (Wolterstorff 1905)

The recent discovery of eggs assumed to belong to this species at a locality 8km. north of Didyma is interesting (Bringøe 1985 quoting Adema & In den Bosch 1980). If we allow this record as valid this newt might well be present in other parts of the Argolid. Its presence on the islands remains very doubtful.

## RANIDAE

### *Rana ridibunda ridibunda* Pallas 1771

This frog is widely distributed on the mainland in all suitable habitats. On the islands known from Poros (Clark 1967). It is difficult to be certain as to its presence or absence on the larger islands. This frog is very opportunistic and can survive in open rain water cisterns and wells. It is definitely absent on Spetsai where these conditions are not provided. There is only one permanently damp locality on Spetsai, a spring at Zougeria. I never found frogs there and the seasonal streams that offer spawning facilities to *Bufo viridis* are too temporary to support the aquatic life style of *R. ridibunda*.

## BUFONIDAE

### *Bufo bufo* (Linnaeus 1758)

Although this amphibian is considered to be widespread on the mainland I can find no records from the Argolid. Since it is a solitary animal and rather difficult to find it can reasonably safely be predicted to occur there. I can express no opinion on its possible existence on the islands. Mertens & Wermuth (1960), Ondrias (1968) and Malakou, Ravasini & Tsunis (1986) include Greek Common Toads under the subspecies *spinosus* Daudin 1803. Bringsøe (1985) considers the nominate form to be valid.

### *Bufo viridis viridis* Laurenti 1768

Widespread on the mainland. On the islands known from Salamis (Daan 1967) and Spetsai (Clark 1967). To these I can now add Poros from observations of Green Toads in October 1979 made by a colleague. These were found after dark following rain. In all probability present at least on Aegina, Hydra, Dhokos and Spetsopoula since it is a very tenacious species; see Bringsøe (1985) regarding the survival of this toad in the dry conditions prevailing in the Mani. An account of its breeding activity on Spetsai has been presented elsewhere (Clark 1967).

## HYLIDAE

### *Hyla arborea* ssp. (Linnaeus 1758)

Not recorded from the islands. On the mainland known from Didyma and I have found it near Adami in streams in the springtime (Clark unpublished).

## EMYDIDAE

### *Emys orbicularis* Linnaeus 1758

I have excluded this pond tortoise from my Table of Taxa since there are no records from the immediate area. It is known from Myli (Bringsøe 1985 quoting Skovgaards field notes) and Nemea (Ewald 1980).

### *Mauremys caspica rivulata* (Valenciennes 1833)

There are no island records and the absence of suitable biotopes makes its presence unlikely. On the mainland known from Didyma (In den Bosch & Musters 1981) to which I can add Drepanon from observations made in September 1986 where I found this animal living in a stream by the road.

## TESTUDINIDAE

### *Testudo graeca iberica* Pallas 1814

Only recorded from Salamis (Clark 1970, Bringsøe 1985). On the mainland reported from Palea Epidavros (Zimmermann 1982). On the other islands where tortoises occur this species is replaced by *T. marginata*. Earlier identification of this species on Poros and Spetsai (Clark 1963, 1967) proved to be in error (Clark 1970).

### *Testudo marginata* Schoepff 1792

Broadly distributed and on record from Spetsai, Poros, Psili and Tolon (Clark 1967, 1970, 1972) as well as Dhokos and Spetsopoula (Clark unpublished). Bringsøe (1985) further records it from Salamis which means that the Marginated Tortoise and the above species are found on this island. Maybe the Salamis populations need to be re-examined to determine whether in fact both species occur here. So far unknown from Aegina and Hydra. It is particularly common on both Poros and Spetsai in the spring and autumn. On the mainland records exist from the Elefsis and Corinth areas and Didyma (Bringsøe 1985, In den Bosch & Musters 1981). In late August 1986 I found *T. marginata* in the region of Agios Andrea south of

Astros. In recent years the range of this tortoise in Greece has been much extended (Lambourdis & Kattoulas 1982 and Reynolds 1984).

## GEKKONIDAE

*Tenuidactylus kotschy* (Steindachner 1870) (= *Cyrtodactylus kotschy* Underwood 1954).

The present generic designation was made in 1984 by Scherbak and Golubev. Subspeciation is very complex. Naked-fingered geckos from Hydra and Salamis were originally classified under *saronicus* Werner 1937. Recently Beutler & Gruber (1977) give *saronicus* as inhabiting the Cyclades, the Saronic Islands, Ikaria and Antikythira with the form *bibroni* on the Peloponnese. Since the Saronic Islands have no affinities with the Cyclades it seems hard to accept this arrangement. *T. kotschy* is known from Salamis, Aegina, Poros, Hydra and Spetsai from a variety of sources as well as Psili and Ag. Georgios (Clark 1972). To these we can add the following: Spetsopoula, Trikkeri, Alexandros, Ventza, Karteli, Petrokaravo and Agios Ioannis. On the small islets it was very abundant and on a number the only reptile species (Clark unpublished). On Ag. Ioannis it was sympatric with *Ablepharus kitaibelli*. Its ability to exist on many of the small and inhospitable islands of the Cyclades is well known (Wettstein 1953, Gruber & Fuchs 1977). Evidently there is a similar tenacity factor in the Argo-Saronic. On the mainland widespread and firm records exist for Palea Epidavros, Didyma, Argos and Corinth.

*Hemidactylus turcicus turcicus* (Linnæus 1758)

In contrast to the above species this gecko is exclusively nocturnal. It can be found by day in hiding by turning rocks and piles of debris. Known positively only from Salamis, Aegina and Spetsai but is certainly more widespread than this. I have no mainland localities but can confidently include it amongst the fauna of the Argolid.

## ANGUIDAE

*Ophisaurus apodus thracicus* Obst 1978

Unknown from the islands. On the mainland recorded from Epidavros (Obst 1978), Acro-Corinth (Bringsøe 1985), Nea Kios (Buttle 1987). Ewald (1980) mentions her two sitings from Nemea. Clearly rare in the Argolid and in my years of collecting I never found any specimens here. The single example referred to by Obst would appear to be the only one known from this region.

## LACERTIDAE

*Algyroides moreoticus* Bibron & Bory 1833

On the eastern side of the Peloponnese the only island location known to contain populations of this lizard is Psili (Clark 1972). This is in marked contrast to the successful way this species has established itself on the Ionian islands of Kephallinia, Zakynthos and Ithaca. In the Argolid itself known from Nafplion through to Adam (Clark & Clark 1970) and Didyma (In den Bosch & Musters 1981). Doubtless more generously distributed but difficult to locate due to its reticent nature, small size and drab colouring.

*Lacerta graeca* Bedriaga 1881

Supposedly endemic to the Peloponnese but there one must exercise some caution since the range of this lizard and the fact that it is now known from both montane and littoral localities has been much enlarged. The only mainland locality in the Argolid available to me is Didyma. Just outside the village are two large craters allegedly the result of meteorite impact. One of these, which is set into the hillside, was found to contain a small colony of this lizard during visits there in the 1960s (Clark unpublished). A return visit in August 1986 was not successful in determining whether this population was still extant. I also searched the other crater which is deeper and offers more shade and vegetative cover. The result was also negative. There is another record 8km north of Didyma which Bringsøe thinks is dubious (Adema & In den Bosch, 1980, In den Bosch & Musters 1981). I would rate this as a possible valid siting. Although not known from the islands it is by no means improbable that *L. graeca* may subsequently be found on one or more of the islands in the Gulf of Argolis, bearing in mind the successful penetration of *A. moreoticus* and *Podarcis peloponnesiaca* into Psili.

*Lacerta trilineata trilineata* Bedriaga 1881

The Green Lizard is the most abundant and widespread lacertid in the area. Previously recorded finds include Salamis, Aegina, Poros, Hydra, and Spetsai as well as Psili and Plateia (Clark

1972). I also found it on Dhokos and Spetsopoula and even more interestingly on the small and isolated island of Stavronissos which lies some eight kilometres off the south coast of Hydra (Clark unpublished). It was not seen on Tolon. Extremely common on the mainland. *L. trilineata* is tolerant of a wide range of habitat which includes woodland, where it occurs both on the margins and amongst denser tree cover, open fields, stone walls, embankments, rough scrub and stream margins. Island populations seem to reach a smaller maximum size than those on the mainland (Clark 1967) whereas those from Stavronissos were much darker green in ground colour than those found elsewhere.

*Podarcis erhardii livadiaca* (Werner 1902)

I have already reported on this lizard from Hydra following several visits to this island in the 1960s (Clark 1967, 1970). It also occurs on Ag. Georgios (Clark 1972) and on Petassi (Clark unpublished). Bringsøe (1985) mentions it as occurring on Prassonisi in the Gulf of Salamis. I cannot locate this island on any map and I have excluded it from my Table of Taxa. Although common on Ag. Georgios it is infrequent on Hydra and Petassi. Bearing in mind the sporadic nature of these finding places it is by no means impossible that careful searching would reveal further populations that have until now have been missed. On the mainland it is known from the area of Corinth. Dimitropoulos (1986) mentions a decline in the Attica region as did Werner in the Peloponnese some 50 years ago. Whether or not populations exist in the Inner Argolid is open to speculation.

*Podarcis peloponnesiaca thais* Buchholz 1960

In 1972 I reported on the discovery of this supposedly endemic Peloponnesian species on the island of Psili. Bringsøe (1985 and 1988) still considers this to be the only extra-limital population. From the Peloponnese area under consideration I have records from Brountzeika as well as Galatas (Clark unpublished). The latter find was made in April 1978. Evidently widely but sparsely distributed throughout the Argolid and certainly not as common here as in other parts of its range. This can be seen on the map in Bringsøe's 1988 paper. Localities for the Argolid are: Didyma, Palea Epidavros, Tiryns and a site 25km south of Corinth. I can further add Mycenae from personal experience. I have commented elsewhere (Clark 1970) on Daan's siting of this species on Salamis as being in error (Daan 1967). I still adhere to this view. Three subspecies are currently recognised (Buchholz 1960). *P. peloponnesiaca thais* is the form found in the Argolid.

## SCINCIDAE

*Ablepharus kitaibelli kitaibelli* Bibron & Bory 1833

Widely and abundantly distributed throughout the area. On record from Salamis, Aegina, Poros, Hydra and Spetsai. Also Psili (Clark 1972) as well as Spetsopoula and Ag. Ioannis (Clark unpublished). Can with certainty be reckoned to occur on Dhokos, Tolon and Plateia. Bringsøe (1985) says it is ubiquitous in most habitats. This is indeed so but there is a preference for plant and 'soft' vegetative cover, grassy banks and dampish places. It is especially common on Spetsai in the spring and autumn in such biotopes and this has been my experience on the Cyclades and mainland too.

*Chalcides ocellatus ocellatus* (Forskål 1775)

The Eyed Skink has recently been recorded from Salamis for the first time (Bringsøe 1985). Otherwise known from Aegina, Poros and Hydra (Clark 1967, 1970). Bringsøe's inclusion of this skink in the herpetofauna of Spetsai is in error (Bringsøe pers. comm.). Also known from an island between Aegina and Angistri (Bringsøe 1985, no source reference) but it is unclear exactly which island this is. On the islands it is not common and sitings made by me were few and far between. We could anticipate this skink on Dhokos and maybe Ag. Georgios since records exist from Kea and Makronisos. On the mainland it is known from Corinth (Lindfors 1976). A hitherto unpublished observation by me gives the only record so far from the Inner Argolid, namely Galatas. Two examples were found here in April 1978 amongst the rocks in a drying river bed. In Attica the Eyed Skink is quite common and is even found within Athens itself (Dimitropoulos 1986).

*Ophiomorus punctatissimus* (Bibron & Bory 1833)

To date unknown from any of the islands. The nearest recorded findings are from Acro-Corinth and Argos (Werner 1930, Anderson & Leviton 1966, Clark & Clark 1970, Bringsøe

1985). All specimens collected by me were found under rocks or stones either in generally rough terrain or in more open ground with isolated boulders. Certainly more common than the few isolated finding places imply. Since this reptile is known to inhabit the island of Kythira we must allow the possibility that it will subsequently be found on some of the Argo-Saronic islands given dedicated attention to its habits and biotope.

#### TYPHLOPIDAE

##### *Typhlops vermicularis* Merrem 1820

The only island locality is Salamis (Werner 1937). This record was overlooked by me in my 1970 report. On the mainland known from Nafplion and Kosta (Clark 1967) and Epidavros (Werner 1985). Recently reported from Vivari (Buttle 1988). As with the aforementioned species its further and more widespread discovery is quite possible.

#### BOIDAE

##### *Eryx jaculus jaculus* (Oliver 1801)

As with *T. vermicularis* very few records exist. The only positive island locality is Spetsai from two specimens (Clark 1967 and Dimitropoulos personal communication). The latter instance refers to an example found under a rock by a visitor to Spetsai in the summer of 1988. In the Argolid but sparsely recorded from Nafplion and Kosta (Clark 1967) and Epidavros (Werner 1937). Some misunderstandings exist on the habits of this snake. Although largely nocturnal it can be found by day in the cooler seasons as I observed on Amorgos in April 1967 when a specimen was found in a field late in the afternoon with the sun low but still well above the horizon.

#### COLUBRIDAE

##### *Coluber caspius* Gmelin 1789

There are but two records for the whole area, a sighting on Spetsai dating from June 1962 (Clark 1967) and one from Aegina made in April of the same year by Roland Skovgaard. This adult snake is deposited in the Zoological Museum, University of Copenhagen (Bringsøe 1985). Steward (1971) includes the whole of the Peloponnese within the range of *C. caspius* whereas Arnold & Burton (1978) do not. To the best of my knowledge there are no records from the Peloponnese at all. The nearest other finding places are Euboia and the northern and western Cyclades. It is hard to account for the presence of this snake on Aegina and Spetsai except as a relic due to range contraction. Since no more specimens have been seen or taken in the last quarter of a century we can only surmise that *C. caspius* must be very rare indeed.

##### *Coluber gemonensis* (Laurenti 1768)

This species has one of the most erratic and unpredictable patterns of distribution of any species found in the area. Over some of the Peloponnese it is abundant in others rare and its distribution can best be described as sporadic. I found it plentiful in the Mani at Pyrgos Dirou south of Areopolis in March (unpublished record) and Bringsøe (1985) lists it mainly from the south: Monemvasia, Mistras, Kalamata and the Mani. Apart from one specimen taken at Mycenae (Clark 1969) I found no other examples in the Argolid. Competition with the Montpellier Snake could well be a factor determining the distribution of *C. gemonensis*. Both species are active and diurnal but the larger size of *Malpolon monspessulanus* together with its aggressiveness and omnivorous diet could well be an obstacle to sympatry. The situation on the islands is intriguing since *C. gemonensis* occurs in large numbers on some and is totally absent on others nearby. So far as is known it exists on Aegina (Wettstein 1953), Psili and Tolon (Clark 1972) and also Stavronissos, Dhokos and Trikkeri (Clark unpublished). At least on the five latter named islands it was found to be very common. Bowles (1988) noted a similar extreme abundance of *Coluber viridiflavus* on the Maltese offshore island of Gozo. *C. gemonensis* is sympatric with *C. najadum dahlia* on Tolon and with *M. monspessulanus* on Psili. It is apparently absent on Salamis, Poros, Hydra and Spetsai all of which have a richer snake fauna. Since this species is known from Gyáros in the Cyclades (*C. gemonensis gyarosensis* Mertens) it is possible that it might also occur in Ag. Georgios. No evidence was however found.

##### *Coluber najadum dahlia* Schinz 1833

Dahl's Whip Snake has been recorded from Salamis, Aegina, Poros, Spetsai and Tolon (Clark

1967, 1970, 1972). As yet unknown from Hydra and Dhokos which could be potential finding places. On Spetsai it is the most abundant snake and is also common on the other islands. From the mainland on record from Kranidi, Epidavros and Nafplion (Clark 1969), Acro-Corinth (Bringsøe 1985) and Vivari (Buttle 1988). Clearly widely distributed throughout the Argolid region.

*Elaphe quatuorlineata quatuorlineata* Lacépède 1789

The only island record is Spetsai (Clark 1967, 1969, 1970 and Bringsøe 1985). Although not actually recorded on Spetsopoula it was reliably described to me by employees working on the Niarchos estate. Poros is another possible location since I found it at Galatas (Clark unpublished). This observation was made in April 1978. Mainland sitings are scarce and date mainly from the 1930s and 1940s. Werner (1937) mentions Epidavros. During the 1960s I travelled extensively in the Argolid and never came across living specimens, road casualties or cast skins. Bringsøe's comment on the frequency of this snake on Spetsai needs clarification. I would reckon it to be rather infrequent. Over a period of several years I took only five specimens and would not rate this snake as being especially common.

*Elaphe situla* (Linnæus 1758)

On the islands this species is known from Salamis, Poros and Aegina (Dimitropoulos 1986) and Spetsai (Clark 1967, 1970). The Dimitropolous records are useful since they extend the range of this species in the Argo-Saronic to include all the main islands except Hydra. Although he gives no source for these finds he has personally assured me that they are *bona fide* and reliable. On Spetsai over a period of time I collected two adults and six juveniles. Next to *Coluber najadum dahlii* the Leopard Snake must be rated as the most common snake. Although it can be found in open countryside it often enters houses and outbuildings. All of my Spetsai examples were taken in or around dwellings and in gardens. On the mainland I have personal records from Ermioni, Adami and Argos. The striped morph does not seem to occur in the area. This is in contrast to the position in the eastern Aægean region where striped examples predominate.

*Malpolon monspessulanus insignitus* (Geoffroy 1827)

On the mainland the most commonly encountered snake and road casualties are frequent in the spring and early summer. On the islands rather erratic in its distribution. I have records from Salamis, Poros and Hydra (Clark 1967, 1970). On these islands *C. gemonensis* does not occur. It is sympatric with *C. gemonensis* only on Psili (Clark 1972). Neither species occurs on Spetsai and the Montpellier Snake to date has not been taken from Aegina. All of my examples from Salamis, Hydra and Psili were well under one metre in total length. The single specimen from Poros measured 1235mm in total with approximately one third of the tail missing (Clark 1967, 1970). This is in contrast to examples found on the mainland which were consistently large and up to 1500mm. Whether this demonstrates that the Montpellier Snake on these islands exists in a dwarf form is far from proven but it deserves further consideration.

*Natrix natrix persa* (Pallas 1814)

*Natrix tessellata tessellata* (Laurenti 1768)

These two species can be considered together. There are no records of natracine snakes on any of the islands. The adaptive powers of the former species to dry environments on the Cyclades is well known. Kratzer (1974) is particularly informative. There is no evidence that this propensity is paralleled in the Argo-Saronic. However see Bringsøe (1985) concerning the life style of *Natrix natrix* in the Peloponnese itself. Although there are several places in Argolid peninsula which could support the demands of this snake I have only found it at Galatas in the streams flowing down from the mountains. It seems less probable that *N. tessellata* occurs in the Argolid and certainly not on the islands.

*Telescopus fallax fallax* (Fleischmann 1831)

This snake is broadly distributed on the mainland but I can find no records from the Argolid itself. On the islands known only with any certainty from Spetsai (Clark 1970). This dead example was brought to me by a student at the Anargyrious and Korgialenos College who said he had found the snake locally.

## VIPERIDAE

*Vipera ammodytes meridionalis* (Boulenger 1903)

It seems strange that there are no reports of this viper from the Argo-Saronic islands. Certainly there is no logical zoo-geographical reason for its apparent absence since it is common in Attica and the Peloponnese. Having said this it would appear to be less frequent in the Argolid than in other regions and I have personal records of only four specimens: one from Didyma and three from near Nafplion (Clark 1969). More recently Buttle (1988) found it at Vivari. The islands of Hydra and Dhokos would appear possible finding places and there are sizeable areas on Aegina which look promising. More careful study is needed.

### DISCUSSION ZOOGEOGRAPHY

It is convenient to think of the Argo-saronic islands as a zoogeographical unit. Although from a macroscopic viewpoint this is broadly true the situation is not quite as straightforward as this. The mainland takes in both sides of the Corinth Isthmus and there are some species that would neither be anticipated on Salamis nor the adjacent mainland. These are *P. peloponnesiaca*, *A. moreoticus* and *L. graeca*. The islands of Aegina and Angistri form a natural extension of the Peloponnese through the Methana Peninsula while Salamis can be seen to form a detachment from Gerania and Attica in the region of Elefsis. It is improbable that there was faunal interchange between Aegina and Salamis. The presence of *T. graeca iberica* on Salamis but not on any of the other islands would seem to validate this notion. The island of Ag. Georgios forms an extension of the Attica peninsula and the occurrence there of *P. erhardii livadiaca* suggests it reached Hydra and Petassi via Ag. Georgios and then through to the Peloponnese. The population dilution already mentioned implies a range contraction along this southern arc. Likewise on the northern flank a similar contraction back from the Peloponnese via Prasonisi to northern Attica. So far this lizard has not been found on Salamis itself but the possibility that it exists deserves investigation. There is no connection between the Argo-Saronic islands and the Cyclades. The nearest Cycladean island is Velopoula which can be seen clearly from Spetsai given good visibility. The presence here of *Podarcis milensis* subsp. (Clark 1972) relates Velopoula to the Milos archipelago. There are certain species which inhabit the Argo-Saronic which are typical denizens of coastal islands and the mainland but which do not occur off the continental shelf and are hence absent from the Cyclades. These are *C. najadum dahlia* and *M. monspessulanus insignitus*. *C. ocellatus* also comes into this category but manages to have reached Makronissos and Kea. Although Kea is normally thought of as a member of the Cyclades it is more clearly allied to Attica. This is further proven by the presence of the nominate form of *E. quatuorlineata*. The Four-Lined Snake inhabiting the Cyclades belongs to the distinct form *E. quatuorlineata muenteri* = *praematura* (Clark 1971). Recent attempts to assign the Cycladean race to the nominate form (Gruber 1978) are unacceptable. The fauna of Kea and its southerly neighbour Kythnos is quite distinct.

### SPECIES DISTRIBUTION AND EVALUATION

Distribution in the area is summarised in the Table of Taxa, in which three symbols are used:  
+ = definite record.      ? = no available record but indicates a high level of probability.  
- = no available record and almost certainly absent. Some caution and judgement are needed here.

Regarding Spetsai I think it safe to assume that the herpetofauna is completely known. After such a long period of residence there I doubt if any further species will be added. The other main islands of Salamis, Aegina, Poros and Hydra can be considered to be fairly well documented though there still remain some uncertainties. From the Table one gains the impression that the mainland is much richer in species than the islands. On closer inspection one finds that the shortfall of total number of species on the islands set against the total for the area adds up to only 8 taxa or 9 if we permit the near certainty of 29 for the mainland. In addition there is one species that is not found on the mainland, namely *C. caspius*. This can be summarised thus:

A	B	C	D	E
26(29)	21	1(3)	8(9)	29(30)
A = Mainland	B = Islands	C = Only islands	D = Only mainland	E = Total area

Amongst the islands themselves we notice an uneven dispersion within the main group of Salamis, Aegina, Poros, Hydra and Spetsai. Both Salamis and Spetsai have the highest totals with 12 recorded species. At the same time Salamis has four species not found on Spetsai: *T. graeca iberica*, *C. ocellatus* (also on Poros and Hydra), *T. vermicularis*, *M. monspessulanus* (also on Poros, Hydra and Psili). Spetsai likewise has four species not recorded on Salamis: *E. jaculus*, *C. caspius* (also Aegina), *E. quatuorlineata*, *T. fallax*. Amongst the other islands various species are found which do not occur, so far as is known, on either Salamis or Spetsai: *R. ridibunda* (Poros), *A. moreoticus* and *P. peloponnesiaca* (Psili), *P. erhardii* (Prasonnisi, Hydra, Petassi, Ag. Georgios), *C. gemonensis* (Aegina, Stavronissos, Dhokos, Trikkeri, Psili, Tolon).

There are several ways to account for these vagaries:

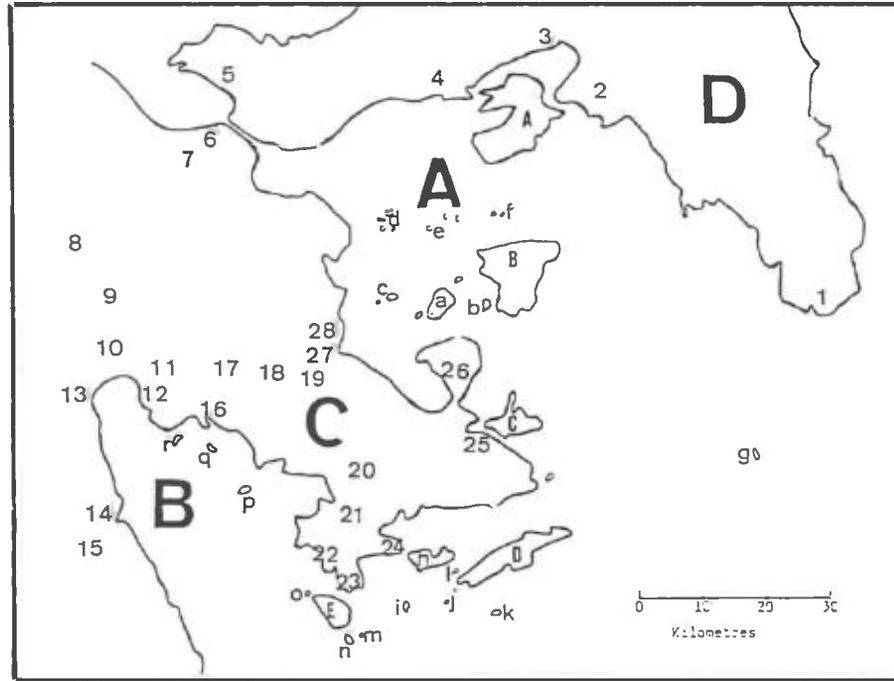
1. the normal random "chance" element whereby in an island's formative process a certain species happens to be in the right place at the right time. One can find just as irregular instances of distribution on the mainland itself.
2. the selecting out process in which some species are successful in maintaining themselves and others less so even though biotopes may be favourable and food supplies adequate.
3. the further process of elimination of the less aggressively assertive species by those that are more opportunistic.
4. inadequate habitat provision for some species that have special requirements and/or preferences. This is especially valid in the case of amphibians, pond tortoises and natracine snakes. The latter two groups are not represented at all and amphibians have a poor representation in the Argo-Saronic.
5. an island's size which in the case of small islands and islets limits the number and type of species that can be supported and heightens the competitive element. It is very difficult to give a ruling on this.
6. more empirical reasons such as inconclusive and inadequate observations. It is clear that a visit of only a day or two is less likely to give positive results than a stay of several weeks. We also have to take into account the time of year. In the spring months intensive searching over a short period will probably give a fairly complete picture of the commoner and more obvious species. The period I spent on Psili, incidentally a very small island (see point 5), in early May was limited to an afternoon and the following morning, having camped overnight. The number of species found was eight which is nearly as many as are known from Aegina, a much larger island which has been visited on many occasions by herpetologists.

It is worth pointing out that the somewhat erratic distribution pattern is more extreme than is found in the Cyclades where with clear cut definition between the different groups of islands the position is much more predictable. If we ignore the Milos group and Siphnos the main differences are no viperids or Four-Lined Snakes on Kythnos and Seriphos, no whip snakes on the central group of Naxos, Paros and Ios and more precise oddities such as no wall lizards on Paros and an endemic species, *Elaphe rechingeri*, on Amorgos. Even if the smaller satellite islands are considered the principle differences are a reduced number of species (see point 5) not anomalies. The offshore islands of the eastern Aegean are likewise more regular, the main feature being the sporadic occurrence of wall lizards represented by *L. danfordi* and *L. oertzeni* and the now-and-then occurrence of *Chamaeleo chamaeleon*. Without losing sight of the broad perspective it is clear that the Argo-Saronic area is one of high interest to the herpetologist and one that would repay even more detailed work.

### ENVIRONMENTAL CONCERNS

What effect the growth of the tourist industry in Greece over the last 15 years or so has had on reptile life is hard to estimate. On Spetsai, to take one example, there has been marked habitat destruction in the area of the Old Harbour on the lighthouse peninsula. In the 1960s this was a natural wilderness of scrub, stone walls and a few derelict buildings. Today it is a congestion of villas. This used to be a good finding place for *L. trilineata*, *T. kotschyi*, *H. turcicus* and *C. najadum dahlii*. Salamis has also seen a lot of land taken over for building

MAP OF ARGO-SARONIC GULF



**A** Saronic Gulf, **B** Gulf of Argolis, **C** Inner Argolid, **D** Attica

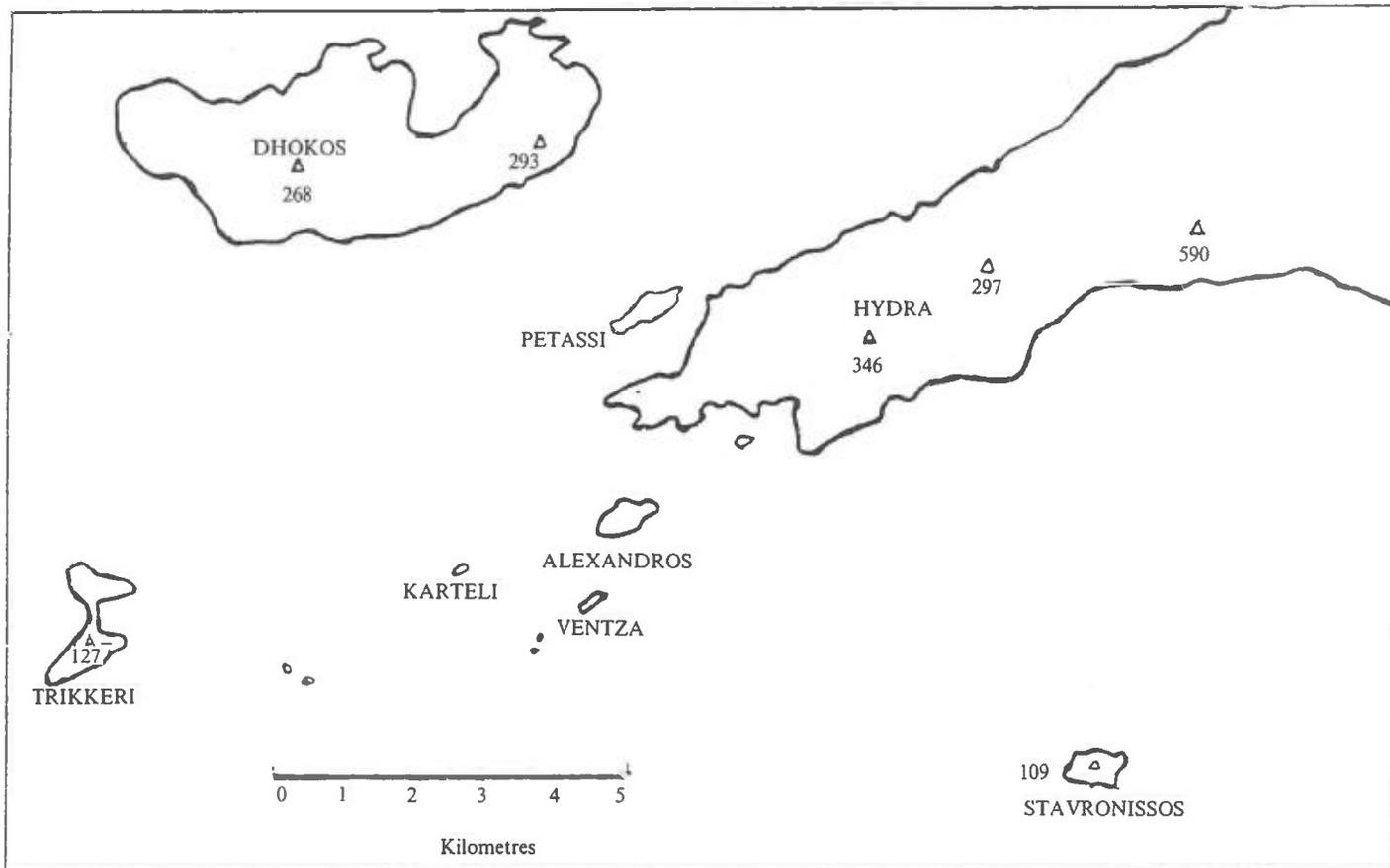
KEY TO LOCALITIES - MAINLAND

1 Cape Sounion, 2 Athens, 3 Elefsis, 4 Megara, 5 Loutraki, 6 Corinth, 7 Acro-Corinth, 8 Nemea, 9 Mycenae, 10 Argos, 11 Tiryns, 12 Nafplion, 13 Myli, 14 Astros, 15 Ag. Andrea, 16 Drepanon & Vivari, 17 Brountzeika, 18 Ligourion, 19 Adami and Epidavros Theatre, 20 Didyma, 21 Kranidi, 22 Portoheli, 23 Kosta, 24 Ermioni, 25 Galatas, 26 Methana, 27 Palea Epidavros

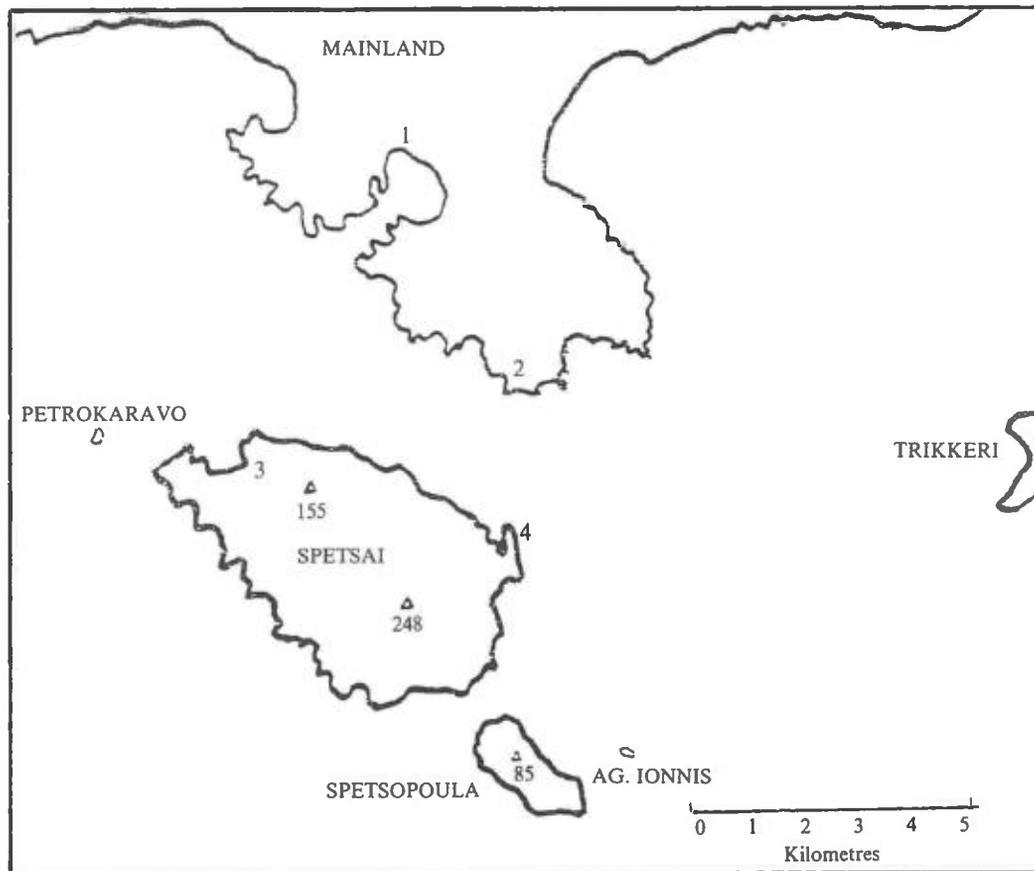
KEY TO LOCALITIES - ISLANDS

A Salamis, B Aegina, C Poros, D Hydra, E Spetsai, a Angistri, b Moni, c Kira, d Diaporja, e Ipsili, f Laousses, g Ag. Georgios, h Dhokos, i Trikkeri, j Alexandros, k Stavronissos, l Petassi, m Ag. Ioannis, n Spetsopoula, o Petrokaravo, p Psili, q Plateia, r Tolon (Romvi)

MAP OF HYDRA ARCHIPELAGO - ALTITUDES IN METRES



MAP OF SPETSAI AND ATTENDANT ISLANDS



KEY

- 1 Portocheli
- 2 Kosta
- 3 Zougeria
- 4 Lighthouse peninsula
- △ Altitude in metres



TABLE OF TAXA (2)

	Ag. Ioannis	Petrokaravo	Karteji	Ventza	Alexandros	Petassi	Tolon (Romvi)	Plateia	Psili	Spetsopoula	Trikeri	Dhokos	Slavronissos	Ag. Georgios	MAINLAND	Spetsai	Hydra	Poros	Aegina	Salamis	
SAURIA																					
Tenuidactylus kotschy	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hemidactylus turcicus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ophisaurus apodus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Algyroides moreoticus	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-
Lacerta graeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Lacerta trilineata	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Podarcis erhardii	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-
Podarcis peloponnesiaca	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-
Ablepharus kitaibelli	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
Chalcides ocellatus	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
Ophiomorus punctatissimus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

TABLE OF TAXA (3)

	Ag. Ioannis	Petrokaravo	Karveli	Ventza	Alexandros	Pelassi	Tolon (Romvi)	Platea	Psili	Spetsopoula	Trikkeri	Dhokos	Siavronissos	Ag. Georgios	MAINLAND	Spetsai	Hydra	Poros	Aegina	Salamis	
SERPENTES																					
<i>Typhlops vermicularis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+
<i>Eryx jaculus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
<i>Coluber caspius</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
<i>Coluber gemonensis</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Coluber najadum</i>	.	.	.	.	.	.	.	.	?	?	.	?	.	.	.	.	.	.	.	.	.
<i>Elaphe quatuorlineata</i>	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
<i>Elaphe situla</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Malpolon monspessulanus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Natrix natrix</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Telescopus fallax</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Vipera ammodytes</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Number of taxa +	12	9	10	6	12	26	2	2	3	2	2	3	2	2	2	2	3	2	1	1	
Number of taxa ?	1	1	2	3	-	3	2	2	5	3	-	5	2	2	3	2	3	2	1	1	

and development but in the main there seems to have been relatively little effect on the fauna and such as there has is limited to certain coastal sites. The main body of Hydra, for example, does not lend itself to development because of its rugged and wild nature which does not attract land exploiters. On the mainland the problem is more acute. From Tolon along the coast and round to Ermioni, hotels, tourist villages and complexes have claimed large tracts of countryside. Away from the coast land has been bought up and fenced off and it is only a question of time before this too becomes built over. Probably a more serious problem is the reclaiming of land for agricultural purposes such as the planting of citrus orchards, vineyards and olives under EEC incentives and the inevitable consequence of the use of sprays and pesticides which destroy food chains, notably insect life. Birds too are very vulnerable to toxic sprays. Increased human activity increases the fire hazard in the prevailing tinder dry summer conditions. One can also point to the habitat destruction along the coast from Athens through Elefsis to Megara. This is particularly severe since almost the entire stretch is now given over to heavy industries such as factories, oil refineries and cement works. It is important to point out that at the present time these ravages are of relatively small extent compared with the area as a whole. However at a local level they are certainly significant and cause for genuine anxiety and concern.

#### APPENDIX

In January 1989 I visited Greece and made some observations on reptile activity at this season. On January 21st I made a day trip to the island of Angistri which is accessible from the port of Aegina. Two species were found: *Ablepharus k. kitaibelli* (two examples) and *Lacerta t. trilineata* (three juveniles). No adults or subadults were observed despite a considerable amount of stone and rock turning. Amongst a pile of rocks a cast colubrid slough was found but it was not possible to ascertain to what species this belonged since it was in very poor condition. More detailed work is needed to establish the herpetofaunal content of this island which so far seems to have escaped the attention of herpetologists. A report on the results of this winter excursion has been compiled and will appear in one of the 1989 issues of "The Herptile".

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