

Herpetological notes on the islands of Milos and Sifnos (Cyclades, Greece) (Amphibia, Reptilia)

Notizen zur Herpetofauna der Inseln Milos und Sifnos (Kykladen, Griechenland)
(Amphibia, Reptilia)

MARIO F. BROGGI

KURZFASSUNG

In der vorliegenden Arbeit werden vor allem die durch menschliche Aktivitäten zunehmend beeinträchtigten Feuchtlebensräume der griechischen Kykladeninseln Milos und Sifnos untersucht. Die Kleinstpopulationen der hydrophilen Amphibien und Reptilien sind stark gefährdet. So ist *Mauremys rivulata* auf Sifnos wahrscheinlich bereits ausgestorben und sind die einzigen zwei auf Milos beobachteten Vorkommen stark gefährdet. Auch der Seefrosch (*Rana* sp.) muß heute auf Sifnos und Milos als stark gefährdet betrachtet werden.

ABSTRACT

The present study is focused on the wetlands of the islands of Milos and Sifnos (Cyclades, Greece). These wetlands are increasingly being affected by human activities which cause decline of the small populations of hydrophilous amphibians and reptiles. Thus, *Mauremys rivulata* has probably become extinct on Sifnos. We found only two recent populations on Milos which both are seriously threatened. The Green Frogs (*Rana* sp.) of Sifnos and Milos must also be considered to be under serious threat today.

KEY WORDS

Amphibians, reptiles, wetlands on islands, ecology, extinction, and threats to amphibians and reptiles, *Rana* sp., *Mauremys rivulata*, *Macrovipera schweizeri*, Cyclades, Milos, Sifnos, Greece

INTRODUCTION

From a herpetological point of view, the Cyclades are among the most intensively studied islands of Greece. This is also true for Milos and Sifnos (e. g., BEDRIAGA 1882; BIRD 1935; WERNER 1935, 1938; SCHWEIZER 1935; WETTSTEIN 1953; BUCHHOLZ 1955; CLARK 1969; LIEFTINCK 1974; GRILLITSCH & TIEDEMANN 1984; CATTANEO 1984, 1989; CHONDROPOULOS 1986, 1989; BUTTLE 1993; CLAES et al. 1995). The Milos Viper (*Macrovipera schweizeri*), which lives on the islands of the Milos archipelego, and on Sifnos and the Milos Lizard (*Podarcis milensis*) are of special zoogeographical interest.

Milos (151 km²) is the southernmost island in the chain of the western Cyclades. Due to its volcanic origin, it is rich in mineral resources, which have been exploited since ancient times. The bare, hilly island which rises to 751 m a.s.l. is covered by degraded phrygana in parts.

The island of Sifnos (76 km²) is formed by lime-stone and slate outcrops. A distinctive feature of the island is a series of high ridges causing coastal strips which steeply slope towards the sea. The highest peak (680 m a.s.l.) is that of Profitis Illias. In the valleys and their drainage systems there are a few springs that flow permanently and irrigate parts of the valley bottoms during the vegetation period. At the mouth of the largest stream system, behind the sandy beach north of Kamares, there was a larger wet area until very recently. Today, only the few remaining reeds indicate the location of the former wetland area.

The following remarks based on observations made on Milos island from 18 - 24 April 1999 and on Sifnos from 25 - 30 April 1999, focus mainly on their hydrological systems and hydrophilous herpetofauna.

CLIMATE CONDITIONS

There is no weather station on Sifnos, but there is one on Milos (36°44' N, 24° 26' E), and climatic data have been recorded there since 1955 (Source: Hellenic National Meteorological Service, Fax Message 23. June 1999). According to this information, precipitation is scarce during the months of June to September, while most precipitation is registered between

November and February. Mean annual precipitation over the 43 years of observation available is 394 mm. In the 90's, (1990, 1991, 1992, 1994, 1995) precipitation was slightly below average while 1996 was the wettest year (668.9 mm) ever observed.

Statistical evaluation of the temperature data did not reveal trends towards climate warming.

COMMENTS ON THE WETLANDS

Marshy area near the salt extraction plant of Aliko (Milos).

From its productivity, the national saline plant on Milos is number five in Greece (WIEDENBEIN 1993). When we visited it, it was not in operation. Along the western perimeter, in the area bordering the airport, there is an eutrophic drainage ditch containing a stand of reeds. In this ditch we spotted a specimen of *Mauremys rivulata* and saw a few terrapin traces in the algae carpet. A water frog (*Rana* sp.) also briefly announced itself acoustically. *Cyrtopodion kotschy* and *Podarcis milensis* were seen quite frequently near the embankments of the saline plant; *Elaphe sirtula* crossed a nearby path in the fields. *Natrix natrix* which had been found there in the past could not be observed at this time. The habitat is not well suited for *M. rivulata* since, already by mid April, there were no further water patches present. The population's survival is not guaranteed any longer.

Brackish water lagoon near Achivadolimni (Milos).

In the northern part of the island of Milos there is a lagoon, several hundred meters in diameter, separated from the sea by a sandy beach and a road. In the south along the road and in the southwestern corner of the lagoon we found an area of rich vegetation. Here, beneath a chapel at the foot of the slope, a spring supplies water to a small wet area. In this marsh I found a specimen of *M. rivulata* (carapace length 16 cm). In the canal-shaped, narrow end of the marshland two more sturdy *Mauremys* were seen. We also briefly heard a water frog. *Podarcis milensis* was

frequent in the neighbouring phrygana areas and among the rocks. *Ablepharus kitaibelii* and *Cyrtopodion kotschy* were also observed.

Former pond and marshy area near Kamares (Sifnos).

WERNER (1935) described "a pond that forms the end of a stream that does not reach the sea but rather expands along the sandy banks". GRILLITSCH & TIEDEMANN (1984) still mentioned coastal marshes behind the sandy beach north of Kamares and a tract of still water is shown in the map made by JOHN BIRKETT-SMITH in February 1995 (Map of Sifnos 1:40,000, Somerset [Russel Milne]). In 1999 we still found a few pools behind the sandy beach that were partly covered with tall-growing reeds. Large sections of what is now just a rudimentary coastal marsh have been buried under building rubble. In the stream bed further up we found various spring systems that allowed some sections of the gully to get moisture. A deep basin shortly before the foot of the slope was filled with water. Amphibians or hydrophilous reptiles, however, could not be spotted. At the foot of the slope a water reservoir for Kamares was set up recently.

Once again (see BROGGI 1997; CATTANEO 1998) it must be said that on the smaller Greek islands most of the few wetlands and their inhabitants are seriously threatened. On both Sifnos and Milos there must have been more wetlands once. Thus, BEDRIAGA (1882) refers to "bodies of water on Milo". The habitat descriptions of SCHWEIZER (1935), COUTSIS (1978) and GRILLITSCH & TIEDEMANN (1984) are no longer valid today.

COMMENTS ON INDIVIDUAL SPECIES

According to the literature quoted, the following amphibian and reptile species have been found on Milos and Sifnos (sea turtles excluded).

Milos (12 species)

Rana sp.
Mauremys rivulata
Cyrtopodion kotschy
Hemidactylus turcicus
Ablepharus kitaibelii
Lacerta trilineata
Podarcis milensis
Eryx jaculus
Elaphe situla
Natrix natrix
Telescopus fallax
Macrovipera schweizeri

Sifnos (10 species)

Rana sp.
Mauremys rivulata (?extinct)
Cyrtopodion kotschy
Hemidactylus turcicus
Ablepharus kitaibelii
Lacerta trilineata
Podarcis erhardii
Coluber caspius
Elaphe situla
Macrovipera schweizeri

Water Frog
Rana sp.

The status of the Greek water frogs is still subject to investigations (see e.g., SCHNEIDER et al. 1993; PLOETNER 1998). Pertinent results on the populations of the Cyclades are not yet available.

Three sites in which water frogs occur were found on Milos: (i) drainage channels east of the airport, (ii) brackish lagoons near Achivadolimni, and (iii) the basin of a stream near Empourios, close to Rivari on the north coast. This small stream basin, stocked with *Typha domingensis*, corresponds exactly to the description by CATTANEO (1989). All three populations are small in size. BEDRIAGA (1882), WERNER (1935), WETTSTEIN (1953), and GRILLITSCH & TIEDEMANN (1984) mentioned

findings of the water frog on the Island of Sifnos. Our search led to a single observation in Potamos Kamaron, above the bypass towards Katavati near Apollonia. However, no traces of water frogs were found in other water-filled sections downstream of this place. A hint in a guide to the Cyclades (FOHRER 1994) mentioning that one can hear the sound of flowing water near Panagia Poulati even in the summer led us to a patch of flowing water including a water-filled stream basin (5 x 5 m² in size). Five frogs were observed calling in the basin. Above and below this spot the stream was bordered by a wide belt of Spanish reed (*Arundo donax*) not offering any further places suited for reproduction. Other sites from where *Rana* has been mentioned in the above literature could not be confirmed.

The water frog populations on Milos and Sifnos seem to be extremely small. Besides anthropogenic effects, dry years may also impede successful reproduction. Moreover, the frog populations are particularly vulnerable as they are extremely isolated within a highly fragmented hydrological system.

Marginated Tortoise

Testudo marginata SCHOEPP, 1782

CATTANEO (1984) reports on the finding of an individual of *Testudo marginata* in the Turla region near Adamas on Milos. CATTANEO doubted, however, its autochthonous status. Despite various inquiries we were unable to obtain any indication on the presence of land tortoises on Milos. Land tortoises as such are known, but mainly as pets of "Atheners" kept in their summer resorts (also on Sifnos). The listing of the Mediterranean Spur-thighed Tortoise (*Testudo graeca*) for Milos in GASC et al. (1997) seems also incorrect. Autochthonous land tortoises are unlikely to occur on both islands.

Caspian Terrapin

Mauremys rivulata (VALENCIENNES, 1833)

The still water pools and the larger stream beds on Milos and Sifnos were ex-

amined systematically. SCHWEIZER (1935) wrote that the Caspian Terrapin "was to be found in great numbers in fresh water areas. I also saw them on the beach in salt-water marshy pools that were surrounded by rushes." The situation has changed dramatically since then. On Milos we only found two sites where we were able to observe terrapins: (i) near Aliko airport (one specimen) and (ii) south-west of Achivadolimni lagoon (three specimens seen). In both cases they must have belonged to very weak populations.

In 1858 ERHARD (cited from GRILLITSCH & TIEDEMANN 1984) wrote that *Mauremys* populations had been said to "be rare in the marshes on Siphnos". Later, the presence of this species was confirmed by BEDRIAGA (1882), SCHWEIZER (1935), and WERNER (1935). Even WETTSTEIN (1953) refers to two juvenile specimens observed at "Sifnos, Lagoon" which is probably identical with the location near Kamares. GRILLITSCH & TIEDEMANN (1985) found no indication of a population of *Mauremys*. Although the Kamares region and many stream systems were intensively searched during our visit, it was no longer possible to confirm the presence of *M. rivulata* on Sifnos.

Loggerhead Turtle

Caretta caretta (LINNAEUS, 1758)

MARGARITOU (1995) described the known nesting places in Greece without mentioning a nesting place on Milos. Nevertheless, local informants told us about nesting places along the rather inaccessible

west coast. Here there are several small sandy bays (e.g., near Mavros, Triades, Ammoudaraki) which would make suitable nesting places. Further investigations are necessary. However, SCHWEIZER (1935) mentioned *C. caretta* from the Milos Archipelago.

Milos Viper

Macrovipera schweizeri (WERNER, 1935)

Systematic status and ecology of the Milos Viper which is endemic to the Milos Archipelago (islands of Milos, Kimolos, Polinos and Sifnos), has been treated in a variety of papers (e.g., BEDRIAGA 1882; MERTENS 1951; RADSPIELER & SCHWEIGER 1989). Since there is no doubt that the population is in rapid decline, STUBBS (1985) called for a biogenetic reserve for the animal in the western part of Milos. Apparent threats to the population of this viper include mining operations (e.g., kaolin, manganese, perlite) in open-cast mines across practically all of the island. These mining areas increase apparently without much planning. However, threat probably comes less from the destruction of the viper's habitat than from the traffic on the relatively dense network of roads interconnecting the mines. We observed that sometimes lorries were continuously in operation 24-hours per day. This means that the viper's habitats become fragmented and the animals may be run-over in moving from one to the next. We ourselves found a Milos Viper that had recently been run-over between Ag. Marina and Achivadolimni.

ACKNOWLEDGMENTS

Our warm thanks to Prof. Dr. K. GERBER (Bern, CH) and L. JÄGER (Schaanwald, FL) for their help with the fieldwork. Many thanks as well are due to Dr. A. KEMPF (WSL - Swiss Federal Institute for Forest, Snow

and Landscape Research, Birmensdorf) for his assistance with the literature search and to Dr. C. HOFFMANN (WSL) for the analysis of the climate data.

REFERENCES

- BEDRIAGA, J. V. (1882): Die Amphibien und Reptilien Griechenlands.- Bull. Soc. Nat., Moscou; 56 (1): 242-310, (2): 43-103, (3): 278-344.
- BIRD, C. G. (1935): Reptiles and Amphibians of the Cyclades.- Ann. Mag. Nat. Hist., London; (N.H.Ser. 10) 16: 274-284.
- BROGGI, M. F. (1997): Feldherpetologische Beobachtungen und Bemerkungen zu schützenswerten Biotopen auf griechischen Inseln (Amphibien, Reptilien, Griechenland).- Herpetozoa, Wien; 7 (1/2): 29-34.
- BUCHHOLZ, K. F. (1955): Herpetologische Ergebnisse zweier Cycladenreisen.- Bonner Zool. Beiträge, Bonn; 6: 95-110.
- BUTTLE, D. (1993): Notes on the herpetofauna of some of the Cyclades islands, Greece.- British Herpetol. Soc. Bull., London; 46: 5-13.

- CHONDROPOULOS, B. P. (1986): A checklist of Greek reptiles. I. The lizards.- *Amphibia-Reptilia*, Leiden; 7: 217-235.
- CHONDROPOULOS, B. P. (1989): A checklist of Greek reptiles. II. The snakes.- *Herpetozoa*, Wien; 2 (1/2): 3-36.
- CLAES, A. & GORAU, N. & DIMITRIOPOULOS, A. & IOANNIDES, Y. (1995): Conservation of the Milos Viper (*Macrovipera schweizeri*, syn. *Vipera lebetina schweizeri*). Preliminary report.- *Ann. Mus. Goulandris Athens*; 9: 245-252.
- CLARK, R. J. (1969): A collection of snakes from Greece. *British J. Herpetol.*, London; 4 (3): 45-48.
- COUTSIS, J. (1978): Spring butterflies on the Greek Island of Sifnos.- *Entomologists Record*, London; 90 (11): 300-301.
- CATTANEO, A. (1984): Reperti erpetologici nelle Cicladi Occidentali: *Testudo marginata* a Milos, *Hemidactylus turcicus* ed *Elaphe situla* a Sifnos.- *Natura - Soc. Italiana Sci. nat., Mus. civ. Stor. nat. e Acquario civ.*, Milano; 75 (1-4): 75-78.
- CATTANEO, A. (1989): Note erpetologiche sulle isole greche di Serifos, Sifnos e Milos (Cicladi occidentali).- *Atti Soc. Italiana Sci. Nat. Mus. Civ. Stor. Nat.*, Milano; 130, 2: 57-76.
- CATTANEO, A. (1998): Gli anfibia; Rettili delle isole greche di Skyros, Skopelos e Alonissos. - *Atti Soc. Italiana Sci. Nat. Mus. Civ. Stor. Nat.*, Milano; 139 (2): 127-149.
- FOHRER, E. (1994): Kykladen. Erlangen (Michael Müller), 575 pp.
- GASC, J.-P. & CABELA, A. & CROBRNJA-ISAILOVIC, J. & DOLMEN, D. & GROSSENBACHER, K. & HAFFNER, P. & LESCURE, J. & MARTENS, H. & MARTINEZ-RICA, J. P. & MAURIN, H. & OLIVEIRA, M. E. & SOFIANIDOU, T. S. & VEITH, M. & ZUIDERWIJK, A. (Eds.) (1997): *Atlas of Amphibians and Reptiles in Europe*.- *Societas Europaea Herpetologica & Museum National d'Histoire Naturelle (IEGB/SPN)*, Paris; 496 pp.
- GRILLITSCH, H. & TIEDEMANN, F. (1984): Zur Herpetofauna der griechischen Inseln Kea, Spanopoula, Kithnos, Sifnos, Kitriani (Cycladen), Alonissos und Piperi (Nördliche Sporaden).- *Ann. Naturhist. Mus. Wien*; (B) 86: 7-28.
- LIEFTINCK, E. (1974): Waarnemingen aan reptielen op Amorgos, Thira en Milos (Griekenland).- *Lacerta*; 32 (8): 129-132.
- MARGARITOULIS, D. (1995): The Status of Marine Turtles in Greece, pp 123-137. In: *Red Data Book on Mediterranean Chelonians*. Bologna (Edagricole).
- MERTENS, R. (1951): Die Levante-Otter der Cycladen.- *Senckenbergiana Biol.*, Frankfurt/M.; 32 (5/6): 297-299.
- PLÖTNER, J. (1998): Genetic diversity in mitochondrial 12S rDNA of western Palearctic water frogs (Anura, Ranidae) and implications for their systematics.- *J. Zool. Syst. Evol. Research*, Blackwell; 36: 191-201.
- RADSPIELER, C. & SCHWEIGER, M. (1989): Die Levanteotter *Daboia* (Synonym *Vipera lebetina* (LINNAEUS, 1758)).- *Herpetofauna*, Weinstadt; 11 (62): 29-34.
- SINSCH, U. & EBLENKAMP, B. (1994): Allozyme variation among *Rana balcanica*, *Rana levantina*, and *Rana ridibunda* (Amphibia: Anura). Genetic differentiation corroborates the bioacoustically detected species status.- *J. Zool. Syst. Evolut.-forsch.*, Berlin; 32: 35-43.
- SCHWEIZER, H. (1935): Beitrag zur Reptilienfauna der Inselgruppe von Milos.- *Blätter Aquarien- und Terrarienkunde*, Magdeburg; 46: 8-15.
- STUBBS, D. (1985): Biogenetic reserve assessment for *Vipera lebetina schweizeri* and *Podarcis milensis milensis* in the Western Cyclades.- *Contractual report for the Council of Europe on behalf of the Societas Europaea Herpetologica*.
- WERNER, F. (1935): Reptilien der Ägäischen Inseln.- *Sitz.-Ber. Österreichischen Akad. Wiss. Wien, math.-naturwiss. Kl., Abt. I*, Wien; 144: 81-117.
- WERNER, F. (1938): Die Amphibien und Reptilien Griechenlands.- *Zoologica*, Stuttgart; vol. 35, fasc. 94, 116 pp. (Schweizerbart'sche Verlagsbuchhandlung).
- WETTSTEIN, O. (1953): *Hepetologia aegaea*.- *Sitz.-Ber. . Akad. Wiss., Wien, math.-naturwiss. Kl. Abt. I*, Wien; 166 (3/4): 123-164
- WIEDENBEIN, F. W. (1993): Die geogenen Ressourcen der Kykladeninsel Milos und die Geschichte ihrer Nutzung.- *Salzburger geographische Arbeiten*, Salzburg; 22: 117-143.

DATE OF SUBMISSION:

Corresponding editor: Werner Mayer