Valakos, Böhme, Pérez - Mellado, Maragou (eds), (1993)
Lacertids of the Mediterranean region, pp. 173-182

Chapter 11

Food consumption of *Podarcis taurica ionica* (Lehrs, 1902) in the Ionian islands (Greece)

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Introduction

The Balcan Wall Lizard, *Podarcis taurica* (Pallas, 1814) is distributed in a large area of the Balkans, as well as in Hungary, Crimea and a small coastal area of N.W. Asia Minor. It shows a notable geographic variation in colour, pattern and size, and three subspecies have been described so far on the basis of colouration, patterning and the relative leg length (Kopstein and Wettstein, 1920; Cyren, 1933; 1941): *P.t.taurica* (Pallas, 1814), *P.t.thasopoulae* (Kattinger, 1942) and *P.t.ionica* (Lehrs, 1902). *P.t.ionica* distributes in the west part of the Greek mainland and in all the large Ionian islands, except Lefkada, (Chondropoulos, 1983) where is also the dominant lizard species.

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Table 1. Prey items found in the stomachs of *Podarcis taurica* in the examined islands. N: number of examined lizards, M: males, F: females, n: number of prey items, %: percentage of appearance, f: frequency of appearance. Zakynthos I: museum specimens

	Kefalonia N=22, M:10, F:12			Kerkyra N=17, M:7, F:10			Ithaki N=8, M:5, F:3			Zakynthos N=36, M:19, F:17			Zakynthos I N=7		
	n	%	f	n	%	f	n	%	f	n	%	f	n	%	f
Coleoptera	16	29.63	0.590	7	30.43	0.380	4	26.67	0.375	30	34.48	0.540	10	14.49	0.857.
Spiders	11	20.37	0.409	7	30.43	0.380	1	13.33	0.250	15	17.24	0.351	8	11.59	0.714
Larvae	8	14.81	0.318	4	17.39	0.220	4	26.67	0.375	16	18.39	0.378	5	7.25	0.571
Formicidae	12	22.22	0.409	2	8.70	0.110	2	13.33	0.125	13	14.90	0.216	3	4.35	0.285
Diptera	3	5.56	0.090	–	–	–	1	6.67	0.125	6	6.90	0.135	1	1.45	0.142
Orthoptera	1	1.85	0.045	–	–	–	–	–	–	–	–	–	–	–	–
Hemiptera	–	–	–	–	–	–	–	–	–	–	–	–	16	23.19	0.428
Hymenoptera	–	–	–	2	8.70	0.110	–	–	–	–	–	–	1	1.45	0.142
Gastropoda	–	–	–	–	–	–	–	–	–	2	2.30	0.054	1	1.45	0.142
Odonata	–	–	–	–	–	–	–	–	–	1	1.15	0.027	–	–	–
Nevroptera	–	–	–	1	4.35	0.050	–	–	–	–	–	–	–	–	–
Thysanoura	–	–	–	–	–	–	–	–	–	–	–	–	4	5.80	0.482
Dyctioptera	–	–	–	–	–	–	–	–	–	–	–	–	4	5.80	0.142
Isopoda	–	–	–	–	–	–	–	–	–	–	–	–	1	1.45	0.142
Homoptera	–	–	–	–	–	–	–	–	–	–	–	–	1	1.45	0.142
Plants	1	1.85	0.045	–	–	–	1	6.67	0.125	–	–	–	1	1.45	0.142
Aranea	–	–	–	–	–	–	1	6.67	0.125	–	–	–	–	–	–
Tail. resid	1	1.85	0.045	–	–	–	–	–	–	1	1.15	0.027	–	–	–
Stones	–	–	–	–	–	–	–	–	–	–	–	–	2	2.90	0.285
Insecta eggs	–	–	–	–	–	–	–	–	–	–	–	–	10	14.49	0.140
Unit. arth.	1	1.85	0.045	1	4.35	0.050	–	–	–	3	3.45	0.081	1	1.45	0.142

Table 2. Niche breadth according to percentage of appearance (%n) and to frequency to appearance (f).

Kerkyra 1 / D		Kefalonia 1 / D		Ithaki 1 / D		Zakynthos 1 / D	
%n	f	%n	f	%n	f	%n	f
4.64	4.62	4.87	4.98	5.23	5.12	4.72	5.17

The similarity among the four islands is high (Table 3)

Table 3. Similarity values among the four islands

	Kerkyra	Kefalonia	Ithaki	Zakynthos	Zakynthos I
Kerkyra	–				
Kefalonia	0.976	–			
Ithaki	0.859	0.912	–		
Zakynthos	0.826	0.807	0.910	–	
Zakynthos I	0.545	0.285	0.366	0.340	–

As it can be seen in Fig. 1 the dominant groups in the diet of female and male animals do not differ in quality but in quantity. This difference is more notable in the islands of Kerkyra and Ithaki. This is also clear in the overlap

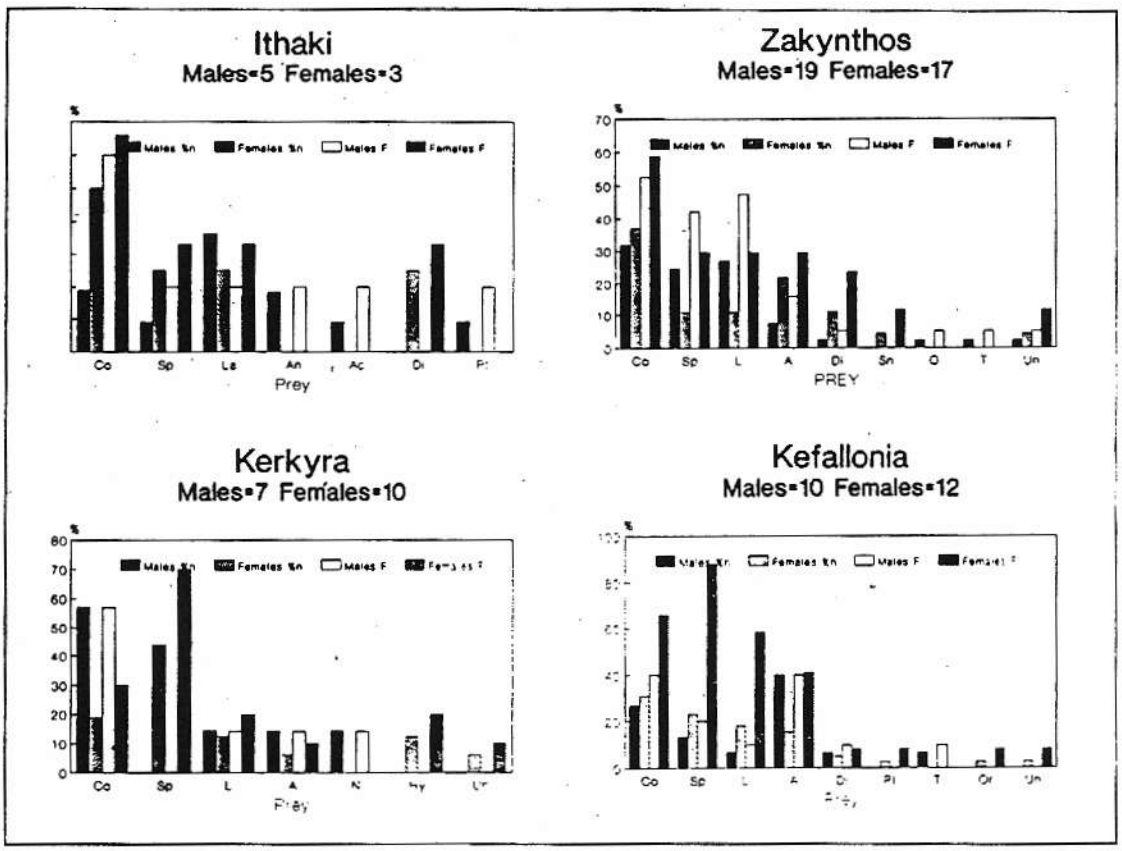

Fig. 1. Prey composition of the two sexes in the examined islands.

values among the two sexes in the four examined islands (Table 4). In Zakynthos and Kefalonia the overlap among the sexes is high; 81% in Kefalonia and 91% in Zakynthos. In the other two islands the overlap is lower.

Table 4. Overlap values among the two sexes in the four islands.

Kerkyra		Kefalonia		Ithaki		Zakynthos	
%n	f	%n	f	%n	f	%n	f
0.417	0.417	0.813	0.813	0.393	0.495	0.570	0.909

Discussion

Podarcis taurica ionica in all of the islands examined, feeds mainly on artropods, as does the majority of lacertids of Europe (Mellado *et al,* 1975; Escarré *et al,* 1983; Valakos, 1986; Mou 1986; Castilla 1991) Coleoptera, spiders and insect larvae are the most important and predominant prey groups. Our results agree fairly well with these from other examined populations of *Podarcis taurica* (Scerbak, 1966; Cruce, 1972). On the other hand, we cannot confirm the common thought that this species feeds preferably on Homoptera (Klingelhoeffer, 1957; Petzold and Wehner, 1965).

The examined populations show an interpopulational homogeneity in their morphological, serological and immunological values (Chondropoulos, 1984). The Ionian islands belong, in the majority of their lowland biotopes where our sample was caught, to the mesomediterranean bioclimatic character and humid bioclimatic floor (Mavromatis, 1978). Hence, we believe that the microhabitats among samples lack any considerable environmental differences since they are from similar type areas and permit us their comparison.

We found lacertid lizard tail residues in the stomachs of males in the islands of Zakynthos and Kefalonia and a large number of the examined animals had broken or regenerated tails. There are not significant sexual differences in tail breaks of *P.taurica*. Hence the tail autotomy must be used, by both sexes, rather as a method of escaping predator attacks, than in intraspecific fights (Chondropoulos and Lykakis, 1983). The estimated density for these homogenous populations was up to 250 individuals/hectare (Chondropoulos, 1984) and could explain the afterwards observed tail consumption since it is a relatively high density for the particular limited and local habitats of the subspecies.

The observed differences between the two sexes in the islands of Kerkyra and Ithaki can be explained by the fact that the examined sample from these islands is relatively low.

The diet selection depends on the food availability, the activity, the habitat the species lives in, the model of predation and other physiological aspects of

the animals (Pianka, 1986). *Podarcis taurica ionica* is a diurnal and heliothermic ground dwelling lizard, living in open sunny and even grounded lowland biotopes with grass-ford-shrub vegetation, that preys upon arthropods that are also diurnaly active on the ground surface and on low vegetation. The variable percentage of some groups agrees with the opinion that the diet of the species varies slightly with the season of the year and the island (Scerbak, 1966; Kabisch and Engelmann 1970; Cruce, 1972). However, this has been observed in other lizard populations as well (Valakos, 1990). Coleoptera and spiders are the most common arthropods in the open areas and the clearings of the Mediterranean type ecosystems (Parashi, 1988) our sample was collected and are also two of the most mobile groups.

Lacertid lizards have been observed to raise the amount of eaten ants during the hot period of the year, in areas of low and unpredictable trophic resources where ants are an abundant and clumped prey group (Pérez-Mellado, 1992). This is the case of *P.erhardii*, in the Aegean archipelago, that also preys upon ants but only during the dry period of the year (Valakos, 1990), when the arthropod populations are low (Karamaouna, 1989). Ants are also the most common arthropods in the habitats preferred by *Podarcis taurica* (Legakis, pers.communication). However, in the same habitats, durind spring months, all the arthropods groups exhibit their maximum in abundance and mobility (Magioris, 1990; Karamaouna, 1989). Therefore, the consumption of ants cannot be due to the low food availability during the period our sample was collected, but rather due to their spatial distribution that reduces the energy costs of pursuit. The Ionian archipelago is more wet than the Aegean archipelago (Mavromatis, 1978). Moreover, a high percentage of ants in the diet of *Podarcis taurica* has also been mentioned by Scerbak (1966). Hence, the consumption of ants is caused by quite different causes in the two species. One should note the absence of Hemiptera from the prey, regardless of the fact that this order is very common during these months. On the other hand, larvae articipate with high values in the lizard's diet although we know that they have a cryptic behaviour. These should indicate that *Podarcis taurica* actually searches for its prey.

The main differences that presents the diet of *Podarcis erhardii* are the steady consumption of Gastropoda throughout the year (n=8%; in the wet season n=11.17%; and in the dry season n=6%) and the presence of Orthoptera and Hymenoptera (Valakos, 1986; 1990). The maximum niche breadth of *P.erhardii* is 5.55 in the dry season and 6.42 during the wet season (Valakos, 1990). *Podarcis taurica ionica* seems to be a more stenofagus species. That confirms the known expansion of the trophic niche in drier and hotter ecosystems, since the Ionian islands are decisively more wet than the Aegean

ones (Mavromatis, 1978). Even the summer sample from Zakynthos has a broader trophic niche compared to the spring one.

Finally, the study of the diet of *Podarcis taurica* in the Ionian islands, reveals no differences between the insular and the mainland populations of this species. This could be attributed to the proximity of the examined islands to each other and to the mainland, to the similarity of their ecosystems to these of western Greece and to the short period of separation between the Ionian islands and the mainland. These islands formed a part of the mainland until 18,000 years ago (van Andel and Sacleton, 1982). Moreover, no substancial differences between the insular and the mainland populations of this subspecies have been observed (Chondropoulos, 1984). However, a further study of the Ionian islands is needed, in order to have more data on their populations and be able to form a clear picture of their status.

Summary

The Ionian islands lay at the west coast of Greece and include six big islands and over seven islets. The food consumption of *Podarcis taurica*, the most common lacertid of the Ionian, was studied in four of the biggest Ionian islands (Zakynthos, Kefalonia, Kerkyra and Ithaki). The sample was a part of the collection of the Zoological Museum of the University of Patras. The animals were collected between April and June in a variety of typical biotops.

Podarcis taurica is a diurnal and heliothermic ground dwelling lizard, living in open sunny and even grounded lowland biotopes with grass-ford-shrub vegetation.

From the 200 stomachs examined, 103 contained a total of 21 prey groups. The majority of the prey consists of arthropods; however plant and tail residues were found, as well as stones. The presence of tails in the stomachs of male animals agrees with the high persentage of regenerate tails mentioned in the populations of *Podarcis taurica*.

Coleoptera, Aranea, larvae and ants were the most common prey. This structure of the diet confirms the ground dwelling character of the species. There is a similarity between the islands during the spring. From the analysis of the food data it seems that *P.taurica ionica* is a stenofagous lizard compared to *Podarcis erhardii*, the coresponding species of the Aegean archipelago. Moreover, the feeding strategy and the differences between the sexes are discussed.

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