THE FEEDING ECOLOGY OF *PODARCIS ERHARDII* (REPTILIA- LACERTIDAE) IN A MAIN INSULAR ECOSYSTEM

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ABSTRACT

Initial data on the feeding ecology (diet, prey size) of the cycladian wall lizard *Podarcis erhardii* (Reptilia-Lacertidae) obtained during the spring and summer of 1983, is referred to in this report.

INTRODUCTION

Research carried out during the last 20 years by several researchers (Pianka, 1966; Schoener, 1971; Huey and Pianka, 1981) on the feeding ecology of lizards, has helped in understanding predation and foraging modes. During the same period, a great deal of data on the diet of the European Lacertidae was also reported by European researchers (Avery, 1966; Pilorge, 1982; Mellado *et al.*, 1982).

Conversely, research on the ecology and the behaviour of the cycladian wall lizard *Podarcis erhardii*, which differentiates (over 25 subspecies) and predominates in most of the insular ecosystems of the north, central and south Aegean Archipelagos, has been minimal. Only four reports refer to the ecology and behaviour of *Podarcis erhardii* (Gruber, 1971; Gruber-Westrum, 1971; Valakos, 1983; Katsadoracis, 1984), and one on its diet (Quayle, 1983). Quayle's reported data on the diet of the *Podarcis erhardii* resulted from 13 specimens which he collected on September 1983 in the harbour of Ios Island.

The initial data on the feeding ecology of the *Podarcis erhardii* reported in the present study, are from specimens collected every month, from March to July, 1983.

LOCALITIES AND METHODS

Eighty-one specimens (51 males and 30 females) were collected from an insular ecosystem located on the eastern part of Naxos Island (the largest of the Cyclades), 6km south of the small village of Moutsouna. The main characteristics of the area are the rocky terrain, the vegetation, which is maquis, and the intense goat grazing. The most predominant plant species is the *Juniperus phoenicea*; however, *Pistacia lentiscus. Olea europea var. sylvestris* are also abundant. There are also some *Quercus coccifera.*

The lizards were collected with either an airgun or a noose, and the date, time, body length (snout-vent), tail length and weight were recorded for each one. Also every lizard was marked by toe clipping and was fixed in 75 per cent alcohol.

The contents of each stomach were examined under a dissecting microscope and every food item was measured and recorded. In the cases where there were only parts of a food item (impossible to measure) only the name of the food item was recorded.

RESULTS

The types and the number of food items found in the stomachs of the 81 *Podarcis erhardii*, are presented in Tables 1 and 2.

A large number of lizards (both sexes and every month) preferred Coleoptera; hence, the percentage of this prey was high (30 per cent).

The second most important food item in the preference of *Podarcis erhardii* was Orthoptera. Consumption of this prey began to increase after May, and the highest percentage appeared in June (A = 25.7%, S = 66%); however, a smaller percentage was found in female lizards (A = 12%, S = 47%). (A and S are defined in the caption of Table 1.) There was also a high percentage of spiders, which was higher in females during May (A = 16%, S = 100) and June A = 15%, S = 53.3%).

We also noted that there was a high content of prey in some groups of food items only during one or two months due to the fact that there was an abundance of these prey items during specific periods (larvlae of insects, Hemiptera, Orthoptera).

In both sexes, there was a stable contribution every month by some groups of food items (snails, coleoptera, ants). There were also some animals present in the prey which lived under stones or were active only at night (pseudoscorpions, chilopoda).

Lizards prefered prey which had a mean length of about 5mm (Fig. 1). There was no correlation between mean prey length and lizard snout — vent length ($r = 0.015$). There were no overall significant differences between males and females in the mean length of prey ($t = 1.02$ $p<0.01$, Table 3). However, during the months of June and July there were some significant differences between males and females in the mean lengths of prey ($t = 3.58$ $p<0.01$, Table 3); whereas, in March, April and May, the differences were insignificant ($t = 0.66$ $p<0.01$, Table 3).

Food category	N = 81	n	A	S	N = 51 ♂	n	A	S	N = 30 ♀	n	A	S
Gastropoda		34	8.5	33		19	8	33		15	10	33
Spiders		50	12.4	48		28	9.7	45		22	14.5	53
Pseudoscorpions		2	0.5	2.5		2	0.9	4		—	—	—
Harvestmen		3	0.7	2.5		1	0.4	2		2	1.3	3.3
Chilopoda		2	0.5	2.5		2	0.9	2		—	—	—
Coleoptera		124	31	78		77	34	80		47	31	73
Orthoptera		65	16	49		41	18	53		24	16	47
Diptera		10	2.5	11		7	3	14		3	2	10
Hemiptera		24	6	28		5	2	11		19	12.5	27
Ants		30	7	25		16	7	24		14	9	27
Hymenoptera		22	5	19		10	4	16		12	8	27
Mantidae		5	1	5		4	2	6		1	0.7	3
Blattidae		1	0.2	1		1	0.4	2		—	—	—
Lepidoptera		1	0.2	1		1	0.4	2		—	—	—
Neuroptera		1	0.2	1		1	0.4	2		—	—	—
Larvae of insects		28	7	33		12	5	24		16	11	53
TOTAL		402				227				150		

TABLE 1: Food items found in stomachs of 81 (30 ♀, 51 ♂) *P. erhardii* collected from March to July of 1983. The symbols represent: N = number of lizards, n = number of prey, A = % of total number of prey, S = % of lizards containing the food category. (A = number of specimens containing of food category/total number of specimens x 100, S = Lizards containing the food category/total number of lizards x 100).

Food category	March		April		May		June		July	
	A	S	A	S	A	S	A	S	A	S
Gastropoda	13	31	7	30	6	32	9	34	11	34
Spiders	11	31	17	80	17	84	8	31	10	34
Coleoptera	39	62	33	90	33	90	23	68	36	100
Ants	8	23	4	21	8	29	8	22	15	44
Larvae	21	54	14	60	5	37	5	20	4	22
Hymenoptera	—	—	—	—	10	37	6	23	2	11
Orthoptera	—	—	—	—	14	52	26	66	15	77

TABLE 2: Main food items found in stomachs of 81 *P. erhardii* during March, April, May, June, July 1983. A and S as Table 1.

	N	n	x (prey)	Sx	t	P
MARCH-APRIL-MAY-JUNE-JULY 1983						
Males	43	219	5.27	3.89	2.02	<0.01
Females	30	183	4.54	3.19		
MARCH-APRIL-MAY 1983						
Males	22	111	4.71	3.17	0.66	<0.01
Females	12	95	4.37	2.27		
JUNE-JULY 1983						
Males	21	108	5.85	4.46	3.58	<0.01
Females	18	86	4.38	3.25		

TABLE 3: Mean prey lengths for male and female lizards during the months: March, April, May, June, July — March, April, May — June, July, 1983, and probabilities of significant differences by t-test. N = number of lizards. n = number of prey. x = mean prey length mm. Sx = s.d. P = probability.

Food category	Podarcis erhardii	Lacerta lepida	Podarcis hispanika	Acantho-dactylus erythrurus	Lacerta manticola	Lacerta viridis	Psamodromus algirus
Coleoptera	29.74	47.6	13.3	33	28.1	60	21.5
Orthoptera	15.6	3	1.7	0.6	3.03	8	8.1
Hymenoptera	5.28	10.8	22	22	8.65	—	7
Ants	7.2	—	—	—	3.03	4	—
Hemiptera	5.75	1.9	13.7	14	5.61	—	18.6
Larvae	7	2.4	5.2	14	—	—	31.4
Spiders	12	0.8	26	8	21.2	—	8.1
Gastropoda	8.15	14.4	—	0.3	—	—	—
Author	Valakos	Escarre	Escarre	Escarre	P. Mellado	Bruno	Escarre
Year	1985	1983	1983	1983	1982	1970	1983

TABLE 4: Food items found in stomachs of some Lacertidae. Numbers are the per cent of total number of prey.

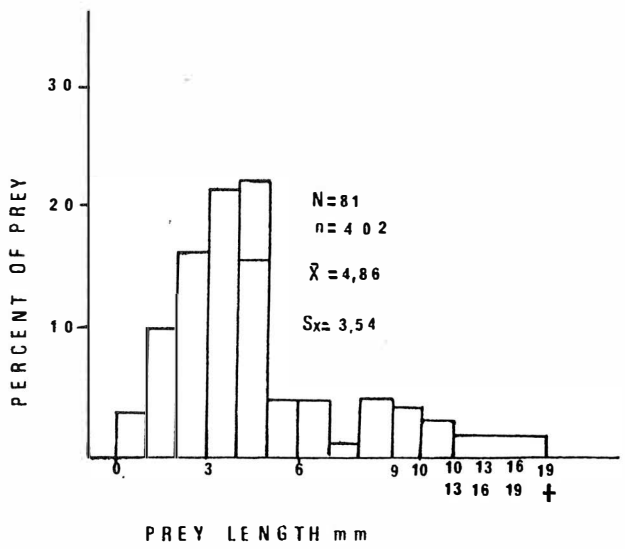

Fig. 1 Size frequency of food items. N = number of lizards, n = number of food items, $\bar{x}$ = mean prey length, Sx = s.d.

DISCUSSION

Just as is the case with other Lacertidae of Europe (Table 4), *Podarcis erhardii* feeds mainly on arthropoda. The groups of food items in the prey of *Podarcis erhardii* are almost the same as those of *P. hispanica, Lacerta lepida, Psammodromus algirus, Acanthodactylus erythrurus* (Escarre and Verica, 1983), *L. vivipara* (Pilorge, 1982), *Lacerta* monticola (Mellado, 1982).

The most predominant group in the food of the *Podarcis erhardii* was coleoptera. Coleoptera is also the most predominant group in the food of the lizards referred to in Table 4.

The opinion that ants are predominant in the food of *Podarcis erhardii* on Ios Island (Quayle, 1983) is in contrast with the results of this report; perhaps however, this is because the lizards were collected from the harbour of Ios Island and the number was small (13 specimens). The percentage of ants is small in the European lizards referred to in Table 4. *P. erhardii* is not a completely opportunist feeder because the abundance of some of the groups of food items found was smaller than their abundance in the biotope (ants, hemiptera, diptera). The same preference appears in *Uta stansburiana* (Best and Gennaro, 1984). *Podarcis erhardii* is mainly a widely foraging predator because there were several sedentary animals (snails, pseudo-scorpions, etc.) in its prey and also it used many different types of prey (Huey and Planka, 1981).

Podarcis erhardii preferred prey with a mean length of about 5mm (although it ate prey with lengths up to 20mm). The same lengths of prey are preferred by *Lacerta vivipara* (Pilorge, 1982), as well as by other lizards which have the same length as the *P. erhardii* (*Sceloporus graciosus* snout-vent length = 60-70mm and x prey = 5mm; Rose, 1976).

The significant difference in mean prey lengths between males and females in June and July probably occurs because, due to the presence of eggs during this time, the females eat small prey as the volume of their stomachs is smaller than that of the males (Valakos, 1983). Many researchers have found that there is a positive correlation between size and prey length, e.g. in *Anolis* (Schoener, 1968). On the contrary, there was no correlation between the size of the *P. erhardii* and the prey length. The same happens with *Sceloporus graciosus and Sceloporus occientalis* (Rose, 1976). Rose assumes that the correlation between the lizard size and the prey size occurs only in the sit-wait predators like *Anolis* (Rose, 1976).

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