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Food Composition of the Snake-Eyed Lizard, Ophisops elegans Ménétriés, 1832 (Reptilia: Sauria: Lacertidae) from Gökçeada (Imbros), Turkey

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Abstract. The study presents data on the food composition of the snake-eyed lizard (*Ophisops elegans*), from Gökçeada (Imbros), Çanakkale, Turkey. A total of 94 preys were determined in the digestive systems of 20 individuals (10 males, 10 females) examined in the study. Insects (67%) constitute most of its food composition. Major prey groups in the food composition are included in Aranea (13%), Lepidoptera (13%), Coleoptera (19%), and Homoptera (20%) in numeric proportion. No significant difference was observed between sexes considering food composition.

Key words: Snake-eyed lizard, Lacertidae, Fecundity, Food composition, Turkey.

Introduction

The genus *Ophisops* includes 8 valid species distributing from southeastern Europe to North Africa and Asia (KYRIAZI *et al.*, 2008). The snake-eyed lizard, *Ophisops elegans* Ménétriés, 1832, is a small sized lacertid and considered as a Mediterranean species. The species is widely distributed across the eastern Mediterranean region, Southwestern Asia, and North Africa (SCHLEICH *et al.*, 1996; ANDERSON, 1999, SINDACO *et al.*, 2000, ANANJEVA *et al.*, 2006; KYRIAZI *et al.*, 2008). It has been classified as LC category in IUCN Mediterranean Basin Red List (COX *et al.*, 2006) and included in the Appendix II (Strictly Protected Fauna Species) at the Bern Convention (CETS, 1979). The snake-eyed lizard typically inhabits open and arid plains, agricultural fields and stony hillsides with sparse vegetation or low shrubs at elevations of up to 2000 m (BARAN & ATATÜR, 1998; ANDERSON, 1999).

Most of the studies on the snake-eyed lizard in Turkey are concerned with taxonomy of this species (e.g. TOK, 1992; TOK *et al.*, 1997; KYRIAZI *et al.*, 2008); however, there is little research on its ecology, e.g. age structure, (TOK *et al.*, 1997) and feeding biology (AKKAYA & UĞURTAŞ, 2006). The aim of the present study is to present the food composition of the snake-eyed lizard, *Ophisops elegans*, from Gökçeada (Imbros), Çanakkale, Turkey.

Materials and Methods

In the study 20 preserved specimens of the snake-eyed lizard (10 males, 10 females) were examined, which were collected between 4 April and 5 May 2009 from

Gökçeada (Imbros), Çanakkale, Turkey. The material was registered in the Museum of the Faculty of Arts and Sciences, Çanakkale Onsekiz Mart University and incorporated into the collection of ZDEU-ÇOMU (Zoology Department Ege University-Çanakkale Onsekiz Mart University), Turkey.

The snout-vent length (distance from the tip of the snout to the cloaca, SVL) and total length (from the cloaca to the tip of the tail, TL) of the specimens were measured using a caliper to the nearest 0.1 mm and recorded. In addition, the secondary sexual characters were determined. After these procedures, they were dissected and their digestive tracts were removed. The obtained food contents were preserved in 70% ethanol for further analysis. Food contents were identified to the lowest possible taxa. Vegetal materials, sand and little pebbles were also encountered in the food content. However, these materials were most likely ingested accidentally during foraging and thus not considered as food.

The food contents were presented both in numeric proportion (the number of a particular prey item in all preys, N %), frequency of occurrence (the frequency of lizard stomachs containing a particular prey type, F %) and volumetric proportion (the volume of a particular prey item in all preys, V %). The prey volume was calculated using ellipsoid formula (DUNHAM, 1983): $V= 4/3\pi (L/2) (W/2)^2$ [V: prey volume; L: length of prey; W: width of prey]. Trophic niche overlap was measured using Pianka's index (PIANKA, 1973). This index ranges from 0 (no similarity) to 1 (totally similar). Food-niche breadth was determined using Shannon's index (H, , 1948). All niche calculations were made using "EcoSimR vers. 1.0" package (GOTELLI & ELLISON, 2013) in R vers. 3.2.2. Sexes were compared by t-test, and Mann-Whitney U tests performed using Deducer statistical package (FELLOWS, 2012) in R vers. 3.2.2. The alpha level was set at 0.05. The mean values are provided with their standard deviations.

Results

The mean body length (SVL) was 51.3±2.19 (46.0–70.0) mm for males and 51.5±1.94 (49.0–55.0) mm for females. The mean total length (TL) was determined as 147.1±10.25 (131.0–160.0) mm in males and 142.3±8.26 (130.0–150.0) mm in females. No statistically significant difference was observed between sexes in terms of their sizes (SVL, t=0.94 P=0.926; TL, t=0.86, P=0.413).

In the stomach contents of 20 individuals, 94 prey items, with body lengths ranging from 2 to 15 mm, were determined with a median (±SD) number of 5±1.81 (range=2-9). The number of median prey items was 3.5±1.27 (2-6) in males, and 5±1.45 (5-9) in females. There was a significant difference between males and females (Mann-Whitney U test, Z=10.0, P=0.002). Males consumed fewer preys than females did. Aranea (n%=13%), Homoptera (20%), Coleoptera (19%) and Lepidoptera (14%) were important prey groups in the food content. Among the prey taxa shown in Table 1, Coleoptera (f%=60%), Aranea (55%), and Homoptera (50%) were frequently consumed by the lizards. More active preys like non-formicid Hymenoptera, Orthoptera and Diptera were less encountered in the food content (Table 1). The larval preys were 18% in number, 35% in frequency and 33% in volume of the food contents. The largest volume in the food composition belonged to Coleoptera (v%=37%), Aranea (21%), Homoptera (18%) and Orthoptera (11%). The contribution of the remaining groups was less than 10%.

According to the Pianka's niche overlap index, food compositions of sexes were mostly similar (males vs. females = 0.87). This indicates that feeding habit does not change with sex and both sexes use similar microhabitat for foraging. Food niche breadth (Shannon's index) was 1.65 in males and 1.63 in females. Both sexes have similar niche breadth and food spectrum of the species is rather limited according to the index value.

Table 1. Food composition of 20 (10 males and 10 females) Snake eyed lizard, *Ophisops elegans* from Gökçeada. M: males, F: females, N (%): Numeric proportion, N (%): Frequency of occurrence, V (%): Volumetric proportion.

	N (%)			F (%)			V (%)		
Prey taxa	**M**	**F**	**Overall**	**M**	**F**	**Overall**	**M**	**F**	**Overall**
Arachnida	5 (0.14)	7 (0.12)	12 (0.13)	4 (0.40)	7 (0.70)	11 (0.55)	112.73 (0.11)	366.44 (0.29)	479.16 (0.21)
Aranea	5 (0.14)	7 (0.12)	12 (0.13)	4 (0.40)	7 (0.70)	11 (0.55)	112.73 (0.11)	366.44 (0.29)	479.16 (0.21)
Insecta	30 (0.86)	33 (0.56)	63 (0.67)	9 (0.90)	9 (0.90)	18 (0.90)	909.96 (0.89)	895.84 (0.71)	1805.81 (0.79)
Heteroptera	1 (0.03)	2 (0.03)	3 (0.03)	1 (0.10)	1 (0.10)	2 (0.10)	16.96 (0.02)	33.91 (0.03)	50.87 (0.02)
Pentatomidae, *Pentatoma* sp.	1 (0.03)	2 (0.03)	3 (0.03)	1 (0.10)	1 (0.10)	2 (0.10)	16.96 (0.02)	33.91 (0.03)	50.87 (0.02)
Homoptera	12 (0.34)	7 (0.12)	19 (0.20)	6 (0.60)	4 (0.40)	10 (0.50)	294.85 (0.29)	115.87 (0.09)	410.71 (0.18)
Cicadellidae, *Cicada* sp.	12 (0.34)	7 (0.12)	19 (0.20)	6 (0.60)	4 (0.40)	10 (0.50	294.85 (0.29)	115.87 (0.09)	410.71 (0.18)
Hymenoptera	2 (0.06)	2 (0.03)	4 (0.04)	1 (0.10)	2 (0.20)	3 (0.15)	28.26 (0.03)	28.26 (0.02)	56.52 (0.02)
Formicidae	2 (0.06)	2 (0.03)	4 (0.04)	1 (0.10)	2 (0.20)	3 (0.15)	28.26 (0.03)	28.26 (0.02)	56.52 (0.02)
Coleoptera	7 (0.20)	11 (0.19)	18 (0.19)	4 (0.40)	8 (0.80)	12 (0.60)	270.35 (0.26)	575.25 (0.46)	845.59 (0.37)
Larvae	2 (0.06)	-	2 (0.02)	1 (0.10)	3 (0.30)	4 (0.20)	130.62 (0.13)	433.32 (0.34)	563.94 (0.25)
Carabidae	-	3 (0.05)	3 (0.03)	-	1 (0.10)	1 (0.05)	-	16.96 (0.01)	16.96 (0.01)
Coccinellidae, *Coccinella* sp.	1 (0.03)	3 (0.05)	4 (0.04)	1 (0.10)	2 (0.20)	3 (0.15)	11.30 (0.01)	33.91 (0.03)	45.22 (0.02)
Curculionidae	2 (0.06)	4 (0.07)	6 (0.06)	1 (0.10)	1 (0.10)	2 (0.10)	17.89 (0.02)	35.80 (0.03)	53.69 (0.02)
Tenebrionidae	2 (0.06)	1 (0.02)	3 (0.03)	1 (0.10)	1 (0.10)	2 (0.10)	110.53 (0.11)	55.26 (0.04)	165.79 (0.07)
Diptera	1 (0.03)	-	1 (0.01)	1 (0.10)	-	1 (0.05)	-	16.96 (0.01)	16.96 (0.01)
Tabanidae	1 (0.03)	-	1 (0.01)	1 (0.10)	-	1 (0.05)	-	16.96 (0.01)	16.96 (0.01)
Lepidoptera	5 (0.14)	8 (0.14)	13 (0.14)	3 (0.30)	-	3 (0.15)	184.00 (0.18)	-	184.00 (0.08)
Larvae	5 (0.14)	8 (0.14)	13 (0.14)	3 (0.30)	-	3 (0.15)	184.00 (0.18)	-	184.00 (0.08)
Orthoptera	2 (0.06)	3 (0.05)	5 (0.05)	2 (0.20)	2 (0.20)	4 (0.20)	115.55 (0.11)	125.60 (0.10)	241.15 (0.11)
Total number of prey items	35	59	94				1022.7	1262.3	2285.0

Discussion

Our study revealed that snake-eyed lizardmostly consumed spiders (f%=55%) and insects (90%), especially Coleoptera and Homoptera. The food content consists mainly (n%>10%) of Aranea, Homoptera, Coleoptera and Lepidoptera. The flying preys including non-formicid Hymenopetara, Diptera and Orthoptera were less encountered in the food composition. In previous studies on the species, Isopoda, Opilionida, Aranea, Pseudoscorpionida, Chilopoda, Colembolla, Orthoptera, Blattodea, Mantodea, Homoptera, Heteroptera, Hymenoptera (especially Formicidae), Diptera and Lepidoptera were reported in the food content (PÉREZ-MELLADO *et al.*, 1993; ANDERSON, 1999; AKKAYA & UĞURTAŞ, 2006). Aranea and insect larvae are particularly important food sources for the snake-eyed lizard (PÉREZ-MELLADO *et al.*, 1993; AKKAYA & UĞURTAŞ, 2006).

The snake-eyed lizard is considered as an opportunistic predator which eats any prey abundant in its environment (AKKAYA & UĞURTAŞ, 2006). Actively foraging predators encounter and consume mostly non-moving types of prey items (PIANKA, 1966). PERRY & PIANKA (1997) stated that actively foraging species used their visual and smelling senses while foraging; and food niche breadth is rather narrow. The snake-eyed lizard actively searches for suitable prey (PÉREZ-MELLADO *et al.*, 1993), which generally includes insects and other arthropods (PÉREZ-MELLADO *et al.*, 1993; ANDERSON, 1996; AKKAYA & UĞURTAŞ, 2006). Our results confirm that due to the limited prey range of the snake-eyed lizard and less active preys in the food composition, it could be included in the active foragers.

In conclusion, the food composition of the snake-eyed lizardis mostly composed of slow-moving arthropods. Therefore, more active and flying preys were less encountered in the food composition. The species mainly feed on spiders, homopterans and coleopterans.

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