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FIRST DATA ON THE DIET OF AN ISLAND POPULATION
OF THE THREE-TOED SKINK *CHALCIDES CHALCIDES*
(*Squamata Scincidae*)

SUMMARY

Preliminary data are provided on the diet of the Three-toed skink *Chalcides chalcides* from a locality in the Sicani Mounts (Sicily). The main prey are Araneae (36.3%), followed by Coleoptera (11.3%), Heteroptera and Blattodea (both at 6.8%). The length of prey is mainly between 6 and 10 mm and no differences were found between juveniles and adults in the size of consumed prey.

Key words: trophic ecology, insectivorous lizard, Sicily.

RIASSUNTO

Primi dati sulla dieta di una popolazione insulare di Luscengola Chalcides chalcides (Squamata Scincidae). Vengono forniti dati preliminari sulla dieta della Luscengola *Chalcides chalcides* in una località dei Monti Sicani (Sicilia). Le prede principali sono rappresentate dagli Araneae (36,3%), seguite da Coleoptera (11,3%), Heteroptera e Blattodea (entrambi al 6,8%). La lunghezza della maggior parte delle prede è compresa tra 6 e 10 mm e l'assenza di una correlazione tra la taglia di queste ultime e quella delle luscengole suggerisce che non esistano differenze in termini di preferenze dimensionali tra giovani e adulti della specie.

Parole chiave: ecologia trofica, Sauri insettivori, Sicilia.

INTRODUCTION

The Three-toed skink *Chalcides chalcides* (Linnaeus, 1758) is a polytypic scincid lizard distributed in north-eastern Algeria, the Mediterranean regions of Tunisia and Lybia, the Italian Peninsula with Sicily, Elba, Sardinia

and some surrounding islands (SINDACO & JEREMČENKO, 2008; CAPUTO *et al.*, 2010).

Two subspecies are currently recognized: the nominal one, endemic to Italy including Elba and Sicily, and the ssp. *vittatus* (Leuckart, 1828) from North Africa, but also occurring in Sardinia where it was introduced in historical times; in Sicily and the Italian Peninsula the species should instead have spread since colonization events from North Africa that phylogeographic reconstructions place between the Pliocene and Pleistocene, about 1,800,000 years ago (GIOVANNOTTI *et al.*, 2007; STÖCK *et al.*, 2016).

The Three-toed skink has a typical snake-like habitus with a marked reduction of limb size, whose adaptive significance has been explained as an advantage for locomotion in grasslands (CAPUTO *et al.*, 1995). The preferred habitat of the species are indeed open environments and glades with herbaceous vegetation, generally in hilly or montane areas (CORTI & LO CASCIO, 2002; CAPUTO *et al.*, 2010), where the species reaches even high altitudes (over 2,000 m a.s.l., see DE VIVO *et al.*, 2021). Concerning Sicily, it seems to be relatively common, particularly in inland areas of the island, although with uneven frequency on a regional scale (VACCARO & TURRISI, 2008; RESTIVO *et al.*, 2010).

The Three-toed skink is certainly one of the more poorly-studied species of the Italian herpetofauna from a biological and ecological point of view, due to its markedly elusive behaviour which makes objectively difficult the capture and data collection. In particular, apart from scattered data given in other contributions (CAPIZZI *et al.*, 1998; CAPUTO, 2000), the available information on its trophic ecology concern only populations from continental areas (central and northern Italy, see RUGIERO, 1997; CIRACÌ *et al.*, 2022).

The aim of the present paper is to provide preliminary data on the diet of the species in an island environment, which were obtained by studying a population from the Sicani Mounts (central Sicily). The study was done in full compliance with current regulations and was authorized by the Ministry of the Environment (No. 25436 of 02/12/2016).

MATERIAL AND METHODS

The study site (37.402132 N, 13.160785 E of Greenwich) is located near Chiusa Sclafani (Palermo) at about 650 m a.s.l. The sample area has an approximate size of 150 x 500 m and is characterized by the occurrence of two slopes with moderate inclination, facing NE and S respectively, where the vegetation consists of a mosaic of olive groves, sparse shrubland dominated by *Rhus coriaria* L. with open areas and a small patch of *Quercus virgiliana* (Ten.) Ten.

The diet study is based on faecal remains obtained from 21 individuals

that were caught by hand or using small bottle traps, measured and subsequently released at the capture site during two field sessions (May and June 2018). Snout-to-vent length (SVL) was taken with a “Mauser” digital calliper (accuracy ± 0.1 mm).

The faecal pellets were stored separately in 70% alcohol and examined using a stereoscope (10x40). Examination of their contents allowed the identification of 44 prey at the taxonomic rank of order and/or family (except for two cases); when possible, individual fragments were measured with a micrometer lens in order to calculate the length and biomass of prey according to the regression models proposed by HÓDAR (1997).

Although the data were obtained during two different sessions, the small sample size suggests that it should be considered cumulatively in the analysis of the results. Statistical analysis was performed using the free-software “Past” version 4.03.

RESULTS AND DISCUSSION

In the overall sample of individuals, SVL ranges from 70.4 to 160.8 mm; however, 4 individuals have SVL >91 mm, that according to CAPUTO *et al.* (2010) is the minimum size of adults, and are therefore considered juveniles. For the sampled adults ($N = 17$) mean SVL is 117.3 mm (s.d. 17.49, s.e. 4.24; range: 99.5-160.8 mm), while it was not possible to sex them only from the examination of external characters.

The trophic spectrum includes 11 categories of prey, for which in Table 1 are given the abundance (%) and the relative frequency within the whole sample, indirectly expressed by $\%_p$ values. Data confirm that this species is strictly insectivorous, as found in previous studies (RUGIERO, 1997; CIRACÌ *et al.*, 2022). The diet includes both terrestrial and flying arthropods, as well as relatively sedentary (e.g. larvae) and highly mobile (e.g. spiders and flies) prey types. The most abundant are spiders (36.3%), followed by beetles (11.3%). This is once more emphasized considering the frequency values, where only 5 out of 11 categories are found to be represented with $<10\%$: spiders are the most widely distributed prey within the sample ($\%_p = 69$), a trait of feeding behaviour that reveals a clear preference for prey with a soft body and that seems to be related to the particular dentition structure of the species (CAPUTO, 2004). Most of the consumed beetles, belonging to the families Melyridae and Oedemeridae, also fall into this category. Despite being very common and abundant potential prey in the Mediterranean environments, ants (found only in one item) are poorly represented in the trophic spectrum, as observed for other populations of the species (RUGIERO, 1997; CAPUTO, 2000; CIRACÌ *et al.*, 2022).

Table 1

Taxonomic composition of the diet of *Chalcides chalcides*. Column headings are abbreviated as *n* (number of items), % (percentage of total), *n_p* (number of pellets containing that prey type) and %_{*p*} (percentage of pellets containing a prey type).

Prey	<i>n</i>	%	<i>n_p</i>	% _{<i>p</i>}
unidentified Arthropoda	2	4.5	2	9.5
Crustacea Isopoda	1	2.2	1	4.7
Pseudoscorpionida	1	2.2	1	4.7
Araneae	16	36.3	13	61.9
Blattodea	3	6.8	3	14.2
Orthoptera	2	4.5	2	9.5
Heteroptera	3	6.8	3	14.2
Homoptera	3	6.8	2	9.5
Coleoptera	5	11.3	4	19.0
Diptera	2	4.5	2	9.5
Hymenoptera Formicidae	3	6.8	1	4.7
insect larvae	3	6.8	3	14.2

The mean number of prey per faecal pellet is 2.09 ± 0.49 (range: 1-4). Prey size was determined in 36% ($n = 16$) of the total sample of consumed items and ranges from 6 to 20 mm. A size distribution peak results at >10 mm (Fig. 1). No correlation was found between the length of individuals and that of the consumed prey ($r = 0.332$, $P = 0.2$) tested through a linear regression with log-transformed measures. Although it should be considered as a preliminary result, body size (and consequently age) of lizards thus does not seem to play a role in the choice of prey, confirming the apparent absence of ontogenetic shift found for this species by CIRACÌ *et al.* (2022), as well as for other skinks (JAMES & LOSOS, 1991; ROCHA *et al.*, 2009); on the contrary, remarkable differences in the trophic preferences between juveniles and adults (or related to the body size) are known for several extra-European members of this family (DUFFIELD & BULD, 1998; ROCHA *et al.*, 2004; SHEA *et al.*, 2009; CAICEDO-PORTILLA *et al.*, 2010; NGO *et al.*, 2020).

Despite the limited sample, the above are the first insights on the diet of the Three-toed skink in an island environment, and specifically in Sicily, adding to a relatively wide picture of available information at regional-scale on the trophic ecology of lizard populations (DI PALMA, 1984; SORCI, 1990; LUISELLI *et al.*, 2004; BOMBI *et al.*, 2005; LO CASCIO & PASTA, 2006; LO CASCIO *et al.*, 2006, 2008, 2014; LO CASCIO & CORTI, 2008; CARRETERO *et al.*, 2010; LO CASCIO & CAPULA, 2011; FARAONE *et al.*, 2017).

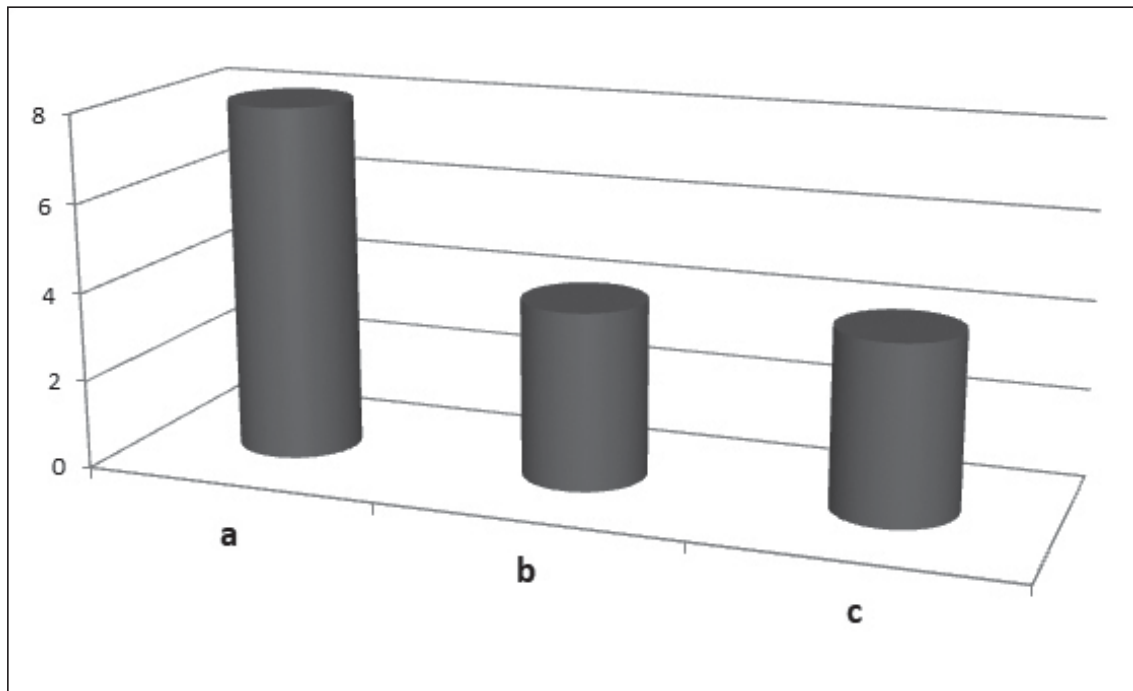


Fig. 1 — Prey size distribution inferred from faecal pellets of *Chalcides chalcides*. Size categories are a) >10 mm, b) 10-15 mm, c) <15 mm.

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