

Natural prey of the jumping spider *Salticus tricinctus* (Araneae, Salticidae)

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Summary

The natural prey of the jumping spider *Salticus tricinctus* (C. L. Koch, 1846) was studied in Absheron Peninsula, Azerbaijan. The percentage of specimens of *S. tricinctus* found while feeding was low (7.6%), reflecting the short duration of the observations as well as low frequency of feeding. Investigation has shown that *S. tricinctus* is a polyphagous predator feeding on a wide range of arthropods. Representatives of six arthropod orders were found in its diet. The primary food of *S. tricinctus* was Diptera, which accounted for 70.3% of total prey. The length of prey killed by *S. tricinctus* ranged between 1.0 and 9.0 mm (mean 3.4 mm) and constituted from 22.2 to 200.0% (mean 77.2%) of the length of their captors. The most frequently captured prey were arthropods not exceeding the length of the spiders (72.4%).

Introduction

With about 5,000 described species, the family Salticidae is the largest family of spiders (Platnick, 2004). While some aspects of salticid biology, such as silk utilisation, sexual and predatory behaviour, have been relatively well studied (Jackson & Pollard, 1996; Richman & Jackson, 1992), little is known about their natural prey. A survey of spider literature revealed that more or less detailed quantitative data are available for only about a dozen species (Bartos, 2002; Dean *et al.*, 1987; Horner *et al.*, 1988; Jackson, 1977, 1988a, b; Jackson & Blest, 1982; Nyffeler *et al.*, 1990; Richman & Whitcomb, 1981; Wesolowska & Jackson, 2003; Young, 1989; Žabka & Kovac, 1996). Most of these spiders occur in the tropics or Nearctic, and the only Palaearctic species has been studied in this respect only recently (Bartos, 2002).

The present paper dealing with *Salticus tricinctus* (C. L. Koch, 1846) is part of a project undertaken to contribute to the knowledge of natural diets of Palaearctic jumping spiders (Guseinov, 1999). *Salticus tricinctus* is a medium-sized salticid with, characteristic of the genus, zebra-like coloration. This species is known to be distributed in Azerbaijan, Israel, the Middle Asian republics of the former Soviet Union, and Afghanistan (Logunov & Rakov, 1998). In Azerbaijan *S. tricinctus* occurs in arid habitats including semi-deserts, lowland and mountain steppes (Logunov & Guseinov, 2002), where it is commonly found on the bark of shrubs (Guseinov, 2003).

Material and methods

The investigation was carried out in Absheron Peninsula, Azerbaijan. The study site was located near Ganly-Gyol Lake (40° 38' N, 49° 83' E). This habitat was characterised by the shrubs *Elaeagnus angustifolia* D. Sosn. and *Syringa vulgaris* L., with an undergrowth of herbs and short ephemeral grasses, predominantly *Carduus arabicus* Jaqu., *Hirschfeldia incana* (L.), *Erodium cicutarium* (L.), *Medicago littoralis* Rohde, *Poa bulbosa* L., *Hordeum leporinum* Link. and *Bromopsis* sp. *Salticus tricinctus* was found exclusively on shrubs. The prey of the spiders was sampled during four successive years: 1996 (6 May–27 November), 1997 (12 March–17 September), 1998 (9 April–11 September) and 1999 (25 March–17 May). A total of 45 surveys were conducted during these periods which took a total of about 49 hours. About three-quarters of the surveys were conducted from March until mid June (on average once per week), when *S. tricinctus* was most abundant. During other periods the frequency of surveys was lower (on average once per month). All surveys were done in daylight hours between 11:00 and 18:00. During the surveys shrubs were thoroughly searched for *S. tricinctus*, and the mouthparts of each individual found were inspected with a hand-lens of $\times 4$ magnification to

avoid overlooking small prey. Spiders with prey in their chelicerae were captured with a transparent cup, placed in separate vials containing 75% ethyl alcohol, and brought back to the laboratory for measurement and prey identification. Spiders without prey were left in the field.

Results

Altogether, 528 individuals of *S. tricinctus* were observed, 40 of which (7.6%) had prey in their chelicerae. Three spiders seen with prey escaped, so 37 prey items were collected for dietary analysis. These were distributed among six orders of arthropods (Table 1), including five from class Insecta: Diptera, Homoptera, Hymenoptera, Lepidoptera, Psocoptera, and one from class Arachnida: Araneae. The dominant prey order was Diptera, which accounted for 70.3% of total prey. Among the dipterans captured, nematocerans prevailed (84.6%) compared with brachycerans (15.4%). Except for one limoniid midge, all the nematocerans caught were chironomids. The second most abundant prey order was Homoptera, represented exclusively by aphids (five winged and two apterous). The remaining prey included one moth, one male psocopteran, one queen *Messor denticulatus* Lepeletier ant, and one spider.

Twenty-nine prey items were measured. Their length varied from 1.0 to 9.0 mm (mean \pm SD: 3.41 \pm 2.12 mm) and constituted from 22.2 to 200.0% (77.2 \pm 46.3%) of the length of their captors, which ranged from 3.50 to 5.75 mm (4.47 \pm 0.59 mm). The size distribution of the prey in relation to the sizes of their captors is shown in Fig. 1. Most of the prey did not exceed the length of their captors (21, =72.4%), with small (not exceeding half the size of the spiders) and medium-sized (from 50–100% of spider body length) prey being about equally common (10, =34.5%, and 11, =37.9%, respectively). Among the large prey, exceeding the length of the spiders, only two items (6.9%) were larger than 150% of spider body length.

Prey	N	%
Insecta		
Diptera	[26]	[70.3]
Brachycera		
Calliphoridae	1	2.7
Tachinidae	1	2.7
Others	2	5.4
Nematocera		
Chironomidae	21	56.8
Limoniidae	1	2.7
Homoptera		
Aphidinea	7	18.9
Hymenoptera		
Formicoidea		
<i>Messor denticulatus</i>	1	2.7
Lepidoptera	1	2.7
Psocoptera	1	2.7
Arachnida		
Araneae	1	2.7
Total	37	100.0

Table 1: Prey composition of *Salticus tricinctus*.

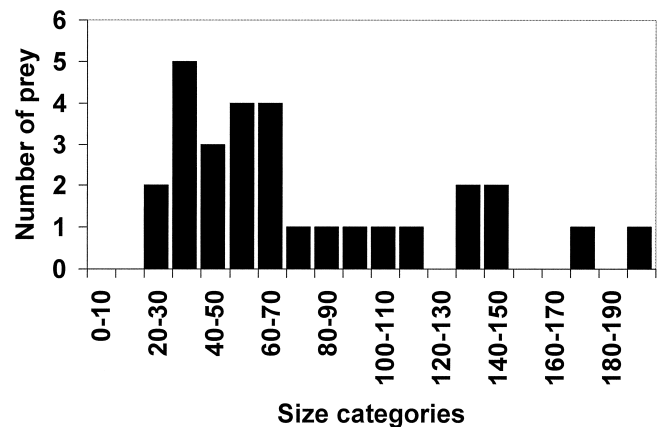


Fig. 1: Distribution of prey in different size categories (body lengths of prey expressed as percentages of the body lengths of their captors).

Discussion

The percentage of specimens of *S. tricinctus* found while feeding was low (<10%), reflecting the short duration of the observations as well as a low frequency of feeding that is typical of cursorial spiders (Nentwig, 1986; Nyffeler *et al.*, 1994) and salticids in particular (Dean *et al.*, 1987; Jackson, 1977; Young, 1989). The low frequency of observation of prey capture together with the low population density of *S. tricinctus* was responsible for the relatively small prey sample. However, this sample clearly indicates that this species is a generalist predator, feeding on a wide range of arthropods. Polyphagy is characteristic of jumping spiders (Nyffeler, 1999), with the exception of *Portia fimbriata* (Doleschall, 1859) which was observed to feed almost exclusively on spiders (Clark & Jackson, 2000; Jackson & Blest, 1982). The prevalence of nematoceran prey in the diet of *S. tricinctus* is probably related to the vicinity of its habitat to water. Similarly, nematocerans (mostly chironomid midges) constituted a major part of the food of *Salticus austinensis* Gertsch, 1936 which occupied stone walls not far from permanent water (Horner *et al.*, 1988). It should also be noted that winged insects prevailed among the prey of *S. tricinctus* (91.9%). This fact is probably related to the arboreal habitat of *S. tricinctus*, while epigeic jumping spiders feed primarily on crawling arthropods (Guseinov, 1999). Unlike some species of salticids, which specialise in catching such dangerous prey as worker ants or web-building spiders (Li & Jackson, 1996), *S. tricinctus* captured exclusively soft-bodied, safe arthropods. The only ant caught by this species was a queen of *Messor denticulatus*. Unlike workers, reproductive individuals of ants are virtually defenceless and are readily captured by jumping spiders (Edwards *et al.*, 1974).

Laboratory tests on prey-size preference of spiders have shown that most cursorial spiders, including the salticid *Evarcha arcuata* (Clerck, 1757), do not capture prey larger than 150% of their own body length, with the most preferred range being 50–80% (Nentwig & Wissel, 1986). Similarly, Jackson (1977) pointed out that the prey of *Phidippus johnsoni* (Peckham & Peckham, 1883) consisted mainly of arthropods between one-quarter and

three-quarters of the size of the spider, and most of the prey of *Yllenus arenarius* Menge, 1868 (83%) had body lengths from 20–80% of that of the spider (Bartos, 2002). My findings agree with these observations. Most of the prey of *S. tricinctus* (72.4%) did not exceed the length of their captors, with 62.1% of the prey captured being between 20–70% of the length of the spider.

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