

Dietary and energetic traits of an earthworm specialist snake, *Thamnophis scaliger*.

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INTRODUCTION

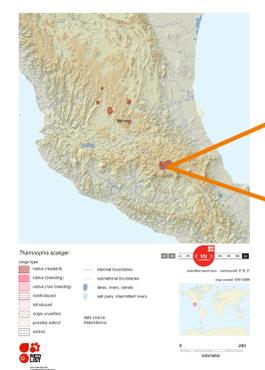
As Optimal Diet Theory predicts, predators optimize energy intake by balancing costs and benefits of foraging. Snakes specializing on small prey present a special case. A diet of low energy prey items could affect biological traits, such as reproduction. We studied the viviparous Mesa Central Blotched Garter Snake, *Thamnophis scaliger*, an earthworm specialist species.

Objetives: 1) to confirm *T. scaliger* diet; 2) to calculate energetic traits of its principal prey, earthworms; 3) to relate dietary specialization and reproductive frequency of the species.



METHOD AND RESULTS

We sampled four localities in drainages of the Rio Lerma in the north-western corner of the state of México. Fecal samples were examined to confirm the principal prey. Later, energetic traits of prey items were compared.

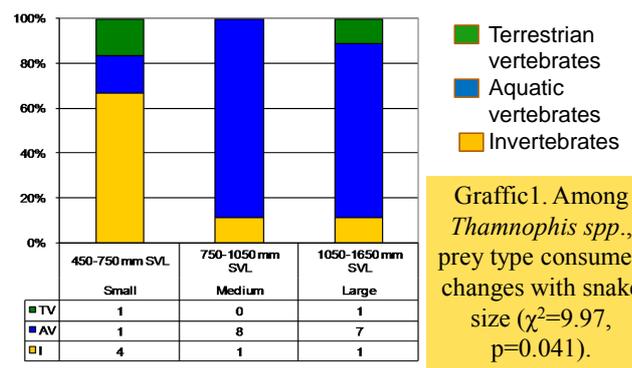


Prey	Prey net weight (g)	Water (%)	Protein (%)	Lipids (%)	Ashes (%)	Kcal /100g
Earthworm	0.82	83.2	44.8	42.8	12.5	94.5
Lizard	7.22	71.29	74.34	10.40	15.97	390.97
Mouse	18.15	70.13	63.24	19.18	11.37	425.62

Table2. Nutritional values of earthworms compared with other types of prey.

	Adult	Adult	Adults	Inmature	Total
Specimens	39 (46.4%)	25 (29.8%)	64 (76.2%)	20 (23.8%)	165
with prey					
Earthworm	34 (40.5%)	23 (27.4%)	57 (67.9%)	19 (22.6%)	76 (90.5%)
Reptile	4 (4.8%)	1 (1.2%)	5 (6.0%)	1 (1.2%)	6 (7.1%)
Both prey	1 (1.2%)	1 (1.2%)	2 (2.4%)	0	2 (2.4%)
Total	39(46.5%)	25(29.8%)	64(76.3%)	20(23.8%)	84

Table1. We did not observe any differences in *T. scaliger* diet between immature and adult snakes ($\chi^2=0.21$, $p=0.54$), between females and males ($\chi^2=0.16$, $p=0.682$) or between gravid and non gravid females ($\chi^2= 0.017$, $p=0.894$).



Graffic1. Among *Thamnophis spp.*, prey type consumed changes with snake size ($\chi^2=9.97$, $p=0.041$).

DISCUSSION

The diet of *T. scaliger* is based on earthworms, a very low energy prey item in comparison with other prey types (Table2). However, earthworms are abundant and easy to hunt. *T. scaliger* is among the smallest of garter snakes, and depends on invertebrate prey, as would be expected (Graffic1). Gravid females continue feeding during pregnancy (44% of gravid females contained recent prey). As such, they behave as capital-income breeders; females containing prey items maintained better body condition after giving birth. We suspect that females typically reproduce biennially, perhaps due to the low energy content of their main prey. Females may require two years of foraging to accumulate sufficient energy reserves to permit reproduction. *T. scaliger* is listed as Vulnerable (IUCN, categories and criteria). The main reason for this is habitat loss caused by human population growth and transformation into corn fields. Furthermore, pesticides and other kind of chemicals may affect *T. scaliger*, through its diet, based on earthworms.