EVIDENCE OF TERRESTRIAL FEEDING IN THE 'ARBOREAL' LIZARD *ENYALIUS BILINEATUS* OF EASTERN BRAZIL

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Enyalius bilineatus is a poorly-known polychrotid lizard of the Atlantic rain forest of eastern Brazil (Peters & Donoso-Barros 1970). Very little information is available concerning the ecology and natural history of this species. It has been asserted that members of the genus *Enyalius* are arboreal (Etheridge, 1969). However, Vanzolini (1972) presented evidence from analysis of gut contents of 42 specimens that *E. catenatus* spends much time foraging on the ground, Sazima & Haddad (1992) observed *E. iheringii* both in leaf litter and on tree trunks, and Vitt, Avila-Pires & Zani (1996) reported that *E. leechi* roosts in trees but is also found on the forests floor during the day. In addition, Jackson (1978:35) described *Enyalius* as "a ground-feeder preying on arthropods", but presented no evidence in support of this view. Vanzolini (1972) also reported gut contents of two specimens of *E. bilineatus* but drew no conclusions from this small sample. To our knowledge, Vanzolini's (1972) report is the only published dietary information for *E. bilineatus*. Here we report on the diet of *E. bilineatus*, based on analysis of the gut contents of 48 specimens, and present some observations on habitat use.

Lizards were caught by plantation workers in the remnants of hilly Atlantic rainforest near S'tio Três Marias, municipality of Marechal Floriano, State of Esp'rito Santo, eastern Brazil (ca. 20°24'S, 40°49'W; 600-700 m elevation), from February 1995 to September 1996. In the study area, the climate is seasonal with well defined dry/cold (June-September) and rainy/warm (October-March) seasons (Féboli, 1993). All lizards were killed upon capture, fixed in 10% formalin, and preserved in 70% alcohol. Snout-vent length was recorded from preserved specimens. Stomach contents were removed and prey items were identified to order and counted. Diet composition is described in terms of total numbers of food items and total numbers of stomachs containing particular food types. Length and width of intact and nearly intact prey items were measured with callipers. Incomplete (partly digested) prey was excluded from analyses of prey size. Voucher specimens are deposited in the Coleção Zoológica da Universidade Federal do Esp'rito Santo (ZUFES) and Museu de Zoologia da Universidade de São Paulo (MZUSP).

Of the 48 lizards examined (SVL = 57.9 - 85.0 mm; mean = 72.1; sd = 0.74) only 3 had empty stomachs. A total of 98 prey items representing 9 arthropod orders were identified

(Table 1). Orthoptera represented the most important food item in terms of both total numbers of stomachs, followed by Hymenoptera and Dictyoptera. Coleoptera, Lepidoptera (larvae), Araneae, Diplopoda, Hemiptera, and Homoptera constituted the remainder of the food items. Vanzolini (1972) reported Homoptera in one and Hymenoptera, Dictyoptera, Orthoptera and lizard skin in the other of his two specimens of *E. bilineatus*. The skin was presumably the lizard's own.

The number of prey items per stomach ranged from 1 to 8 (mean - 2.1; sd = 1.5). The length of complete prey (n=54) ranged from 2.0 to 28.2 mm (mean = 9.6; sd = 5.9), and the width ranged from 1.0 to 8.0 mm (mean = 3.5; sd = 1.7). Correlation between the number of prey, length and width of prey, and snout-vent length (SVL) of *E. bilineatus* was not significant (Pearson correlation test; $P > 0.05$).

Stomach content analysis shows that *E. bilineatus* utilises a broad range of arthropod prey types and sizes, and can be considered an arthropod generalist. The diet of lizards can be related to the type of microhabitat, activity time, and foraging strategy (Vrcibradic & Rocha, 1996), and a generalist diet may be related to a sit-and-wait foraging strategy (*sensu* Pianka, 1973), which is the strategy of polychrotid lizards (Vitt, Zani & Durtsche, 1995; Vitt & Zani, 1996). The observations of Sazima & Haddad (1992) on *E. iheringii* are consistent with its use of a sit-and-wait strategy.

Polychrotid lizards are considered a primarily arboreal group, although some species are terrestrial (see Martins, 1991; Duellman, 1987; and Vitt *et al.* 1995 for examples). Most of the prey items found in *E. bilineatus* are considered common inhabitants of leaf litter in neotropical rainforests, and constitute important food resources for small, terrestrial anurans and lizards (Vitt & Caldwell, 1994)). Similar items in the diet of *E. catenatus* (Dictyoptera, coleoptera larvae, Orthoptera, Diplopoda, Chilopoda, Phalangida and Oligochaeta) led Vanzolini (1982) to conclude that this species engaged in terrestrial foraging. Some of the items found in *E. bilineatus* could equally have been obtained through terrestrial or arboreal foraging, but the presence of Diplopoda, which are not generally found on tree trunks provides particularly strong evidence that *E. bilineatus* forages in leaf litter on the ground. In addition, two stomachs contained dry leaf fragments, probably ingested along with arthropod prey on the forest floor.

We observed *E. bilineatus* both on tree trunks and on the ground within the study area but did not observe feeding. The forest floor consists of a layer of leaf litter over decayed humus on clay. The colour of *E. bilineatus* (see Etheridge, 1969 for detailed excellent camouflage (Plate 1). Its stationary sit-and-wait foraging strategy may also protect this lizard against visually oriented predators.

The limited data indicate that species of *Enyalius* exploit both terrestrial (leaf litter) and arboreal habitats and are not strictly arboreal. Indeed, while these data indicate that *Enyalius* species feed in leaf litter there is no clear evidence of feeding in arboreal habitats. It is possible that *Enyalius* species feed in both terrestrial and arboreal habitats and that the diversity of feeding opportunities the two habitats provide partly explains their use of both habitats. Alternatively, arboreal habitats may be used primarily for roosting and for avoiding predators. More data are needed to distinguish between these alternatives. If polychrotid lizards are ancestrally arboreal then there would appear to have been a shift in habitat use in the evolution of *Enyalius*. However, too little is known about the natural history, ecology, and phylogenetic relationships of polychrotid lizards other than anolines to allow firm conclusions on the direction of the shift in habitat use or its specificity to *Enyalius*.

Plate 1: Adult male *Enyalius bilineatus*, showing its cryptic coloration against a typical background of forest floor

Table 1: Summary of the diet of 48 *Enyalius bilineatus* of eastern Brazil

Prey type	Percentage of stomachs	Percentage of items
Empty	6.25	–
Araneae	15.55	9.18
Coleoptera	20.00	11.22
Dictyoptera	24.44	13.26
Diplopoda	13.33	9.18
Hemiptera	13.33	6.12
Homoptera	2.22	1.02
Hymenoptera	24.44	17.34
Lepidoptera	17.88	8.16
Orthoptera	46.66	24.49

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