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The Diet of *Pisania tincta* (Gastropoda: Buccinidae) in Eastern Florida

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Introduction

Pisania tincta (Conrad, 1846) is a small (to 35 mm) buccinid occurring intertidally throughout the western Atlantic from the southeastern United States to Brazil. During a recent visit to the Smithsonian Marine Station at Link Port (Fort Pierce, Florida), we had the opportunity to collect these mollusks and to study their diet.

Materials and Methods

Snails were collected at low tide in April 1991, on boulders composing an artificial embankment on the northern shore of Sebastian Inlet, Brevard County, Florida. The animals were frozen at −80°C within an hour of collection to prevent defecation and later transferred to 70% ethanol. Several specimens were fixed without freezing for dissections and histological examination.

Shells of 40 individuals (12.8–32.0 mm in length, mean = 25.6 mm) were dissolved in 8% nitric acid, their stomachs dissected, and stomach contents mounted in glycerin on individual glass slides. Proboscides of two specimens were embedded in paraffin, sectioned, and stained with Masson's triple stain. Two specimens were dissected for studies of gross anatomy.

Results and Discussion

Of the 40 individuals examined for stomach contents, 27 (67.5%) were females. Seven stomachs were empty, all others contained remnants of the barnacles *Tetraclita stalactifera* (Lamarck, 1818) and *Chthamalus fragilis* Darwin, 1854. Most of the stomachs contained tissues of the mantle cavity lining as well as ovaries with eggs. Limbs were found only in three cases. Sand grains and fragments of barnacle shell were also usually present. Barnacles constituted the only recognizable prey item of *P. tincta* at this locality.

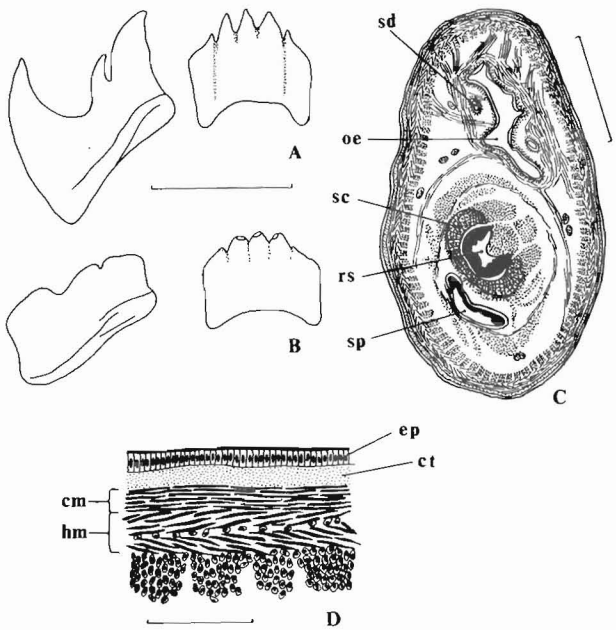

Figure 1

A, B. Half of the radular row of *P. tincta* (A. from the central part of the ribbon; B. from the anterior, rasping part of the ribbon); C. Transverse section through the anterior part of the proboscis; D. Enlargement of the transverse section through the proboscis wall.
Scale bars: A, B-0.25 mm; C-0.5 mm; D-0.1 mm.
Abbreviations: cm, circular muscle layer; ct, connective tissue layer; ep, epithelium; hm, helical muscle layer; lm, longitudinal muscle layer; oe, oesophagus; rs, radular sac; sc, subradular cartilages; sd, salivary duct; sp, sublingual pouch.

The anterior (functional) portions of the radulae of all specimens examined were extremely worn (Figure 1B), with the anteriormost 5–11 rows of teeth showing greatest signs of wear. Although we did not observe feeding, the extreme radular wear as well as the presence of barnacle shell fragments in the stomach suggests that the radula is employed in the mechanical penetration of the barnacle's shell.

The gross anatomy of the anterior alimentary system of *P. tincta* conforms to the typical buccinid pattern (Ponder, 1973), consisting of a long pleurembolic proboscis, paired acinous salivary glands, a medium-sized long gland of Leiblein, and a poorly differentiated valve of Leiblein.

Table 1

Comparative data on the diet of *Pisania tincta* in different regions of Florida.

Prey	Frequency in diet – % of total prey	
	Pigeon Key*	Sebastian Inlet
Spiroglyphus annulatus	83.9	0
Isognomon bicolor and *I. radiatus*	8.1	0
Barnacles (*Tetraclita stalactifera* and *Chthamalus fragilis*)	0	100
Other	8.0	0
Total observations	263	40

* Data from Ingham & Zischke, 1977.

The structure of the proboscis wall differs from that reported for other Buccinidae studied to date (Medinskaya, 1992). In *Neptunea* and *Buccinum,* the proboscis wall consists of layers of circular and longitudinal muscles interspersed with connective tissue layers, but lacks a helical muscle layer. The proboscis wall of *P. tincta* consists of an outer layer of connective tissue, as well as moderately thick layers of circular, helical and longitudinal muscles (Figure 1D). The presence of a helical muscle layer greatly increases the mobility of the proboscis, as its contraction causes bending and/or torsion of the proboscis along its long axis. The proboscis wall of *P. tincta* is thus more similar to that of *Tritia fratercula* (Dunker, 1860) (Nassariidae) from the Sea of Japan (Medinskaya, 1992). *Tritia fratercula* occupies a similar habitat (rocky intertidal zone) and has a similar diet (Crustacea). The musculature of the proboscis wall thus appears to reflect similarities in diet and feeding mechanism rather than phylogenetic relationships.

The diets of tropical representatives of Buccinidae are relatively poorly known. The few species studied to date appear to be generalists, feeding on polychaetes (e.g., *Engina mendicaria, E. alveolata, E. zonalis*), gastropods (e.g., *Pisania striata*), or both types of prey (e.g., *Buccinulum corneum, Cantharus dorbignyana, C. undosus, C. fumosus, Engina bicolor*) (Taylor, 1987).

The present study on the diet of *P. tincta* reveals this species to be a specialist at this site. Surprisingly, the diet of this species differs dramatically at different localities (Table 1). Ingham & Zischke (1977) reported that, in the Florida Keys, *P. tincta* fed primarily upon the vermetid gastropod *Spiroglyphus annulatus* (Daudin, 1800), while barnacles, which were rare (0.2% relative abundance), were not consumed at all. In our study area, where vermetids were absent, barnacles comprised the only recognized food item. This suggests that *P. tincta* is a specialized predator of sessile organisms with hard exoskeletons. The local availability of suitable prey, however, appears to determine the diets of individual populations, which may vary greatly even between nearby localities.

This is contribution number 336 of the Smithsonian Marine Station at Link Port.

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