Littoral endolithic fauna of the Central American Isthmus

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Resumen: Esta investigación sobre la fauna endolítica se llevó a cabo en sustratos rocosos en las costas del Pacífico y del Caribe de América Central. En los dos lados del Istmo se encontró comunidades de estos organismos. El sipuncúlido *Phascolosoma antillarum* y el poliqueto *Eunice aphroditois* fueron las especies más abundantes obtenidas en las plataformas rocosas estables de la zona de mareas. En fragmentos de coral muerto se encontró esponjas cliónidas y bivalvos mitílidos en abundancia. *Eunice aphroditois, Palola siciliensis* y *Phascolosoma antillarum* fueron comunes en muestras provenientes de las costas del Océano Pacífico y del Mar Caribe de América Central.

In the tropics limestone habitats dominate many mainland coastlines. The presence of beachrock, coral rock, coral colonies and coral rubble provide infaunal habitats not found in temperate waters. These substrates usually have rugose surfaces that provide shelter for crevice dwelling organisms. The composition of the rock allows boring organisms to use a chemical attack in addition to mechanical rasping, and these substrates are typically riddled with animal burrows. There have been numerous reports describing the endolithic fauna of limestone substrates. Polychaetes of the family Eunicidae are known to be an important component of this fauna (Ebbs, 1966; Hutchings and Wheate, 1977; Kohn and Lloyd, 1973; Pepe, 1983). Sipunculans of the family Phascolosomatidade are also important components of the endolithic fauna (Hutchings and Weate, 1977; Pepe, 1983; Rice and Macintyre, 1972). Eunicids and phascolosomatids inhabiting limestone have been reported from scattered locations throughout the tropics (Fig. 1).

This investigation of the endolithic fauna of Central America was undertaken to determine if a eunicid-phascolosomatid community exists on both sides of the isthmus. The existance of a transisthmian community would lend evidence to the author's theory that a circumtropical community exists that can be predictably found in limestone habitas.

Rocky substrates were sampled in the Caribbean Sea at Cahuita, Costa Rica; at the San Blas Islands, Panama; and on the Pacific Ocean at Playas del Coco, Costa Rica (Fig. 2). Three types of substrates were studied: coral rubble, coral rock, and basalt. Coral rubble was sampled at a well-developed, living coral reef at Isla Perro (San Blas Islands) and at the remains of an extinct coral reef at Playas del Coco. A coral rock platform was sampled at both intertidal and shallow subtidal depths at Cahuita. An intertidal basalt platform was sampled at Playas del Coco. This basalt is somewhat metamorphic, highly weathered, and easily broken. Unlike most basalts, it contains numerous fracture planes, cracks, and crevices which provide shelter for endolithic animals.

The endolithic fauna was sampled by breaking apart the rock and coral and removing the animals, which were fixed in 10% formalin and preserved in 70% ethanol. Polychaetes, bivalves, and sponges were identified by the author at the Allan Hancock Foundation, Los Angeles, California. Sipunculans were identified by Dr. M.E. Rice at the Smithsonian Research Laboratory, Fort Pierce, Florida.

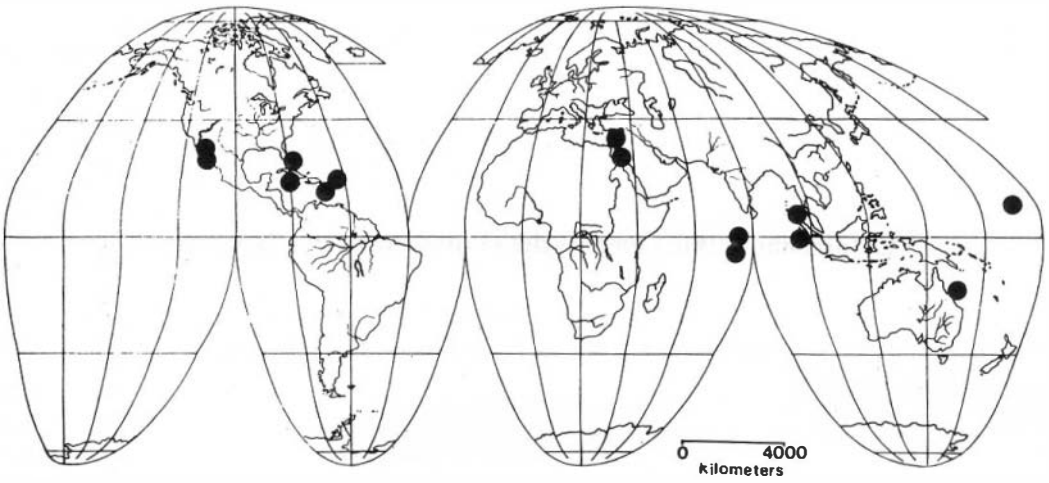

Fig. 1: Locations where eunicid polychaetes or phascolosomatid sipunculans have been reported as major components of the endolithic fauna of limestone substrates.

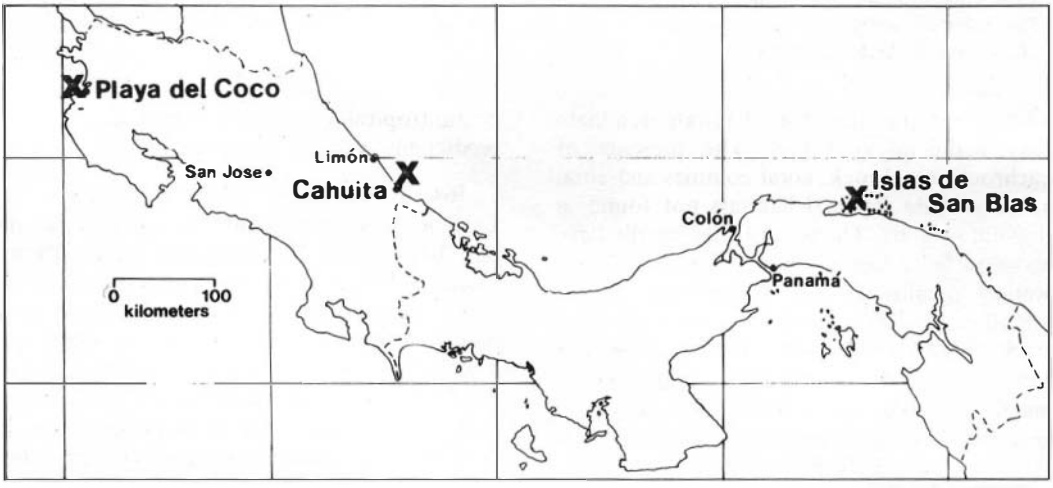

Fig. 2. Locations where rocky substrates were sampled by the author on the Pacific and Caribbean shores of the Central American Isthmus.

Endolithic species from the three substrate types and geographic areas are listed in Table 1. *Eunice aphroditois, Palola siciliensis,* and *Phascolosoma antillarum* were found on both the Pacific and Caribbean coasts of Central America in all of the substrates sampled. *Eunice aphroditois* and *Phascolosoma antillarum* were the most abundant endolithic animals of the stable intertidal platforms. The coral rock at Cahuita and the basalt at Playas del Coco contained an abundant endolithic fauna made up of large as well as small individuals. At Playas del Coco the organism were found in fissures along fracture planes in the basalt. Individual *Eunice aphroditois* up to 45 cm long were collected. Clionid sponges and mytilid bivalves were the most abundant animals in coral rubble. The endolithic fauna of the coral rubble was composed of small individuals. At Playa de Cocos the fauna was dominated by the boring bivalve *Lithophaga aristata,* and at Isla Perro it was dominated by the sponge *Cliona.* Eunicids and sipunculans were present at low densities in coral rubble at both localities.

TABLE 1

The relative abundances of the endolithic species of the littoral waters of the Central American Isthmus. The abundances are listed by study site and substrate type. Crustaces and syllid polychaetes identified from the samples are not listed in the table because their relative abundances were very low. Legend: X = found in the substrate in small numbers and XX = found throughout the substrate in large numbers.

SPECIES	LOCATION and SUBSTRATE					
	Cahuita		Isla Perro	Playas del Coco		
	Coral rock		coral rubble	coral rubble	basalt	
Polychaetes						
Eunice aphroditois	XX		X	X	XX	
Eunice filamentosa	X					
Palola siciliensis	X		X	X	X	X
Marphysa sp.	X					
Lysidice sp.			X			
Sipunculans						
Phascolosoma antillarum	XX	XX	X	X	XX	
Phascolosoma perlucens	X				XX	
Phascolosoma sp.	X		X	X		
Paraspidosiphon steenstrupi			X			
Paraspidosiphon fischeri				X		
Paraspidosiphon sp. 1			X			
Paraspidosiphon sp. 2					X	
Paraspidosiphon sp. 3	X					
Aspidosiphon sp.			X			
Lithacrosiphon sp.	X					
Themiste sp.	X					
Bivalves						
Lithophaga aristata				XX	X	
Sponges						
Cliona sp.			XX	X		

This study demonstrates the existence of a transisthmian endolithic community dominated by eunicid polychaetes and phascolosomatid sipunculans. The development of the community does not appear to be determined by the carbonate content of the substrate. A well-developed fauna was found in the basalt of Playas del Coco as well as in the coral rock of Cahuita. Instead, the stability of the substrate and the availability of crevices appear to be important factors in community development.

The populations of eunicids and phascolosomatids reached much higher densities and contained larger, older individuals in the stable platforms than in the loose coral rubble.

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