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Cymothoid isopods on coral reef fishes in the near shore marine environment of St. Kitts, Lesser Antilles

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Abstract. Nine species of Cymothoid isopods of the genera *Anilocra* spp. selectively associate with specific West Indian fish species and are location specific. *Anilocra* infestation negatively impacts fish productivity and health. As part of a large scale marine ecosystem survey project of the marine environment (2006-2008), isopod parasitism as a potentially useful marine ecosystem health indicator was monitored during roving diver/snorkel fish species surveys. We report for the first time for St. Kitts the presence of *Anilocra chromis* on brown chromis (*Chromis multilineatus*), but not Blue chromis (*C. cyaneus*), and *Anilocra haemuli* on French grunt (*Haemulon flavolineatum*), Smallmouth grunt (*H. chrysargyum*), Caesar grunt (*H. carbonarium*), and Tomtate grunt (*H. aurolineatum*). Our data supports the previously reported geographic specificity of *Anilocra chromis* infection whereby only Blue or Brown chromis, but never both, are affected within one locality.

Key words: Cymothoid isopods, ectoparasites, coral reef fish, West Indies

Introduction

Cymothoid isopods are permanent ectoparasites of fish. They mostly occur in the near shore coastal marine environment. Cymothoid parasites are protondrous hermaphrodites that attach to the fish surface, mostly around the head region. *Anilocra* infestation is known to impact breeding success, interfere with swimming dynamics, decrease fish size, reduce erythrocyte number, and is known to cause lesions in the host ranging from localized tissue inflammation to underlying bone deformities (Bunkley-Williams and Williams 1998; Adlard and Lester 1995). Nine species of cymothoid isopods (pathogenic parasite) of the genera *Anilocra* spp**.** selectively associate with specific West Indian fish species and are host and site-specific (Bunkley-Williams and Williams 1981).

Material and Methods

St. Kitts (17° 9' N 62° 45' W) is a small Caribbean island of volcanic origin that is part of the Lesser Antilles chain. As part of a large-scale local marine ecosystem survey project, data on cymothoid isopods species, site location, attachment site, number of isopods per fish, and associated marine habitat were collected during roving diver (n=80) /snorkel surveys (n=300) in 2006-2008). When feasible, fish specimens with isopods were photo documented.

Results

In 2007 and 2008, Anilocra chromis on Brown chromis (*Chromis multilineatus*) and *Anilocra haemuli* specimens on French grunts, Smallmouth grunts (*H. chrysargyum*), and Caesar grunts (*H. carbonarium*) were identified during daytime at shallow (< 30 feet) to deep reef sites (> 50 < 100 feet) along the Caribbean side of the island. The associated habitats can be classified as mixed habitat with rubble, coral gardens, gorgonians, and intermittent sea grass beds. Median (min-max) number of isopods observed on coral reef fishes in the marine environment of St. Kitts by survey location is summarized in Table 1.

Anilocra chromis were observed at 93% of the dive sites and at 55% of the snorkel sites. *Anilocra haemuli* on French grunts were observed at 14% of the dive sites and at 77% of the snorkel sites. At none of the dive sites did Caesar and Smallmouth grunts have isopods; however, isopods were present respectively at 22% and 11% of the snorkel sites. Tomtate grunts were affected on 7% of the dive sites and 11% of the snorkel sites. No *Anilocra haemuli* were observed at any of the surveyed sites on other suitable fish hosts such as Coney (*Cephalopholis fulva*), Red hind (*Epinephelus guttatus*), and Graysby (*Cephalopholis cruentatus*). For all fish affected with isopods, the host location of isopods was beneath the eye of host. The observed isopods were of mature size and featured prominently on the face of the hosts. Bilateral isopod association was less common, but not infrequent. We never observed more than one isopod per side.

Location	BC	FG	C	SM	T
Anchors Away (D)	1				
Ballast Bay (S)	9	5 (2-5)	1		
Banana Bay (S)		2 (1-2)			1
Brimstone (D)	10 (2-14)				
Challenger (D)	20				
Cockleshell Beach (S)					
Coconut Reef (D)	3				
Corinthian (D)		1			1
Green Point (D)	3				
Majors Bay (S)	6	(4-9)			
Monkey Shoals (D)	(10-26)	2			
Nags Head (D)	15				
Paradise Reef (D)	8				
Pinney's Beach* (S)	18				
River Taw (D)	(2-12)				
The Rocks (D)	(1-3)				
South Friars (S)		5 (1-20)	2 (1-5)	1 (1-2)	
Shipping Lane (D)	21				
Shitten Bay (S)	30	4			
St. Peter's Reef (D)	3 (1-12)				
Timothy Beach (S)		5 (1-6)			
West Farm (D)	14.5 (1-30)				
Whitehouse Bay (S)	(12-14)	5 (4-10)			

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Table 1: Median (min-max) number of isopods observed on coral reef fishes in the marine environment of St. Kitts by survey location. D indicates dive site; S indicates snorkel site.

Discussion

We report for the first time for St. Kitts the presence of *Anilocra chromis* (Williams and Williams 1981) on brown chromis, but not blue chromis (*Chromis cyaneus*), and *Anilocra haemuli* on French grunts, Smallmouth grunts, Caesar grunts, and Tomtate grunts. Previous reported distribution for *Anilocra chromis* on brown chromis has included the northeastern West Indies, namely Puerto Rico, Mona Island, and the British and US Virgin Islands. Blue chromis have been affected in the Bahamas and Dominican Republic (Williams and Williams 1981). Our data supports the previously reported geographic specificity of *Anilocra chromis* infection whereby only blue or brown chromis but never both are affected within one locality (Williams and Williams 1981; 1982). Isopod attachment as previously described by Bunkley-Williams and Williams (1981) for *Anilocra chromis* and *A. haemuli* is beneath the eye of host (Fig. 1). Affected grunts appeared depressed. We did not measure body size, but no obvious size differences were apparent in affected versus unaffected hosts. Recent work with cardinal fish suggests that *Anilocra* parasitism has significant energetic consequences for the host (Ostlund-Nilsson et al 2005).

Our data indicates subtle geographic differences in cymothoid isopods presence in the marine environment of St. Kitts. *Anilocra chromis* were mostly observed at the dive sites. *Chromis* are preferentially found between 35-80 feet. Thus our results probably reflect their habitat choices. We also observed distinct differences for *Anilocra haemuli* between dive and snorkel sites despite the commonness of grunts at these different depths. In addition, although other fish species (i.e. Coney, Red hind, Graysby) known to be parasitized by *A. haemuli* are present at the snorkel and dive sites, only grunts were affected.

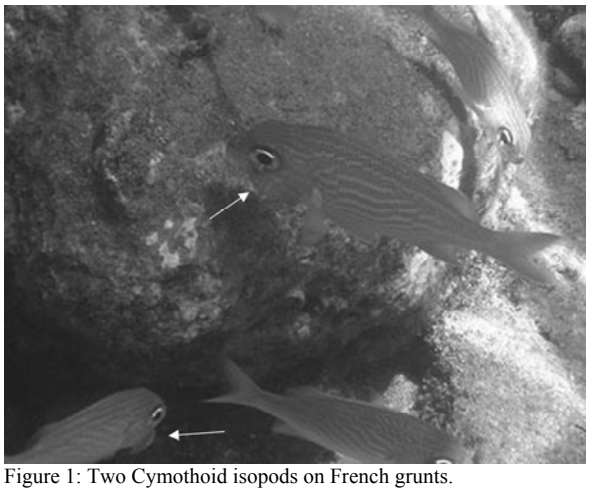

Figure 1: Two Cymothoid isopods on French grunts.

We do not know what environmental and ecological factors (i.e. fish aggregates versus solitary fish, seawater temperature, ocean currents, algae, low light levels, cleaner density) are contributing to the observed geographic differences in cymothoid isopod parasitism. Our preliminary data suggests that there is no difference in presence of cleaner fish between the near shore versus deep sites (Sullivan and Stimmelmayr unpubl. data). Increased fecundity of *Anilocra* spp. in the Mediterranean is linked to warmer water temperature during the summer months (Varvarigos 2003). We did not measure water temperature; however, based on long-term local marine stakeholder observations, seasonal local seawater temperature increases have been occurring earlier and lasting longer. Further studies are needed, including water quality measurements, nutrient content, and temperature monitoring to get a better understanding of the ecological constraints affecting cymothoid isopods in the tropical marine environment. *Anilocra* spp. infestation has a potential to be a useful

marine ecosystem health indicator in a changing environment.

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