

Prey-to-predator isopod transfer: A previously unrecognized, but very important life cycle strategy in *Cymothoa* spp. and possibly other cymothoids and fish-associated isopods

Ernest H. Williams, Jr. and Lucy Bunkley-Williams, 1827 Paseo Los Robles, Mayagüez, Puerto Rico 00682; ernest.williams1@upr.edu

We believe we have solved 2 fish-parasitic isopod mysteries. Juvenile *Cymothoa* spp. in the mouths of small Caribbean and Pacific fishes are not a dead-end, as has been assumed, but a means of transferring the isopods to appropriate predator hosts. This also explains how fast-swimming pelagic predators are infected by slow swimming *Cymothoa* juveniles. These transfers represent an unrecognized, but common live cycle strategy infecting many commercially important fishes. We described what may have been the first published, natural prey-to-predator transfer of a cymothoid. We have transferred thousands of adult female and juvenile isopods. We have collected many specimens of small anchovies and herrings with *Cymothoa* spp. in their mouths. In Okinawa, we found hundreds of *Cymothoa* sp. in five small species of cardinalfishes. These juvenile isopods barely fit in the fishes' mouths and could never grow large enough for the isopods to mature. In aquaria juvenile *Cymothoa oestrum* infected the mouths of any small fishes. We demonstrated that fish-parasitic juvenile isopods react to an attack on their host with an escape mechanism. If juveniles react to an attack by escaping their brood pouch and isopods often abandon their hosts when captured, then juveniles in the mouths of small fishes may abandon their host and attach in the predator. Infecting slow-swimming anchovies, cardinalfishes, and herrings is relatively easy for free-swimming juvenile *Cymothoa*, as evidenced by an ~5% prevalence. Infecting large, fast swimming, often pelagic, final host directly seems almost impossible.