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Research note

Helminths of *Ocyurus chrysurus* from coastal reefs in Veracruz, Mexico

Helmintos de *Ocyurus chrysurus* de los arrecifes de Veracruz, México

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Abstract. This study is a survey of helminths of the yellowtail snapper, *Ocyurus chrysurus*, collected in the islands de Enmedio and Anegada de Afuera reefs, Veracruz, Mexico. Nineteen species were found in fish collected in Anegada de Afuera reef: 9 digeneans (7 adults, and 2 metacercariae); 5 nematodes (2 adults and 3 larvae); 3 monogeneans; 1acanthocephalan (adult) and 1 cestode (larva); while in the Isla de Enmedio reef 15 of these species were recorded. 7 species are new records for this host, increasing from 17 to 24 species known in the Gulf of Mexico and the Caribbean.

Key words: marine fish, parasites.

Resumen. En este estudio se presentan los resultados del análisis helmintológico de la rubia, *Ocyurus chrysurus,* capturados en los arrecifes de las islas de Enmedio y Anegada de Afuera, Veracruz, México. En el arrecife Anegada de Afuera se registraron 19 especies de helmintos: 9 digéneos (7 adultos y 2 metacercarias), 5 nematódos (2 adultos y 3 larvas), 3 monogéneos, un acantocéfalo (adulto) y un céstodo (larva), en tanto, en el arrecife de la Isla de Enmedio se registraron 15 de estas especies. 7 especies son nuevos registros para este hospedero, aumentando de 17 a 24 especies conocidas para la región del golfo de México y el Caribe.

Palabras clave: peces marinos, parásitos.

The biological richness in coastal reefs around the world is remarkable. In a recent series of papers Justine (2010) outlines the richness of helminth parasites found in fish from the Great Australian Barrier Reef, and the continuity of the system enables an homogeneous distribution of hosts and parasites. In America, coral reefs in the Gulf of Mexico also form a barrier running from the Southern Caribbean Sea in Quintana Roo, to the Veracruz coasts (Jordán-Dahlgren and Rodríguez-Martínez, 2003), extending the distribution of species such as the lutjanid fish *Ocyurus crysurus* (Bloch, 1791). This fish is common in this region, and has a total length ranging from 210 to 600 mm (Gutiérrez-Benítez, 2012). Given the increasing interest in producing fingerlings of this species under controlled conditions, wild specimens were examined to survey their parasitic community, in order to improve management practices. Helminth parasites of *O. crysurus* have been reported in the Atlantic coast of the US (Linton, 1910; Chandler, 1935; Manter, 1947; Overstreet, 1969); the Atlantic coast of Central America, Panamá and Bimi Islands (Sogandares-Bernal, 1959; Sogandares-Bernal and McAlister-Sogandares, 1961); Jamaica (Nahhas and Carlson, 1944); Belize (Fischthal, 1977), and Cuba (Zhukov, 1976). However, there are no reports for this species in Mexico.

From July 2011 to March 2012, 54 specimens of *O. crysurus* were examined for helminth parasites. Out of these, 27 fish were captured in the Isla de Enmedio reef (19°16'00" N, 95°56'19" W), and 27 in the Anegada de Afuera reef (19°10'14" N, 95°52'14" W), 10 km away from each other. Fish were caught by hook-and-line and transported alive to the laboratory for immediate helminthological examination. All tissues and organs were reviewed under a stereoscopic microscope. The external examination included skin, scales, fins, gills, eyes, nostrils, mouth and anus. Gills were removed and analyzed separately in Petri dishes filled with seawater, to facilitate the ectoparasites handling. Then, all specimens

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Table 1. Prevalence, mean intensity, and site of infection of helminth parasites of the yellowtail snapper, *Ocyurus chrysurus*, from coastal reefs of Veracruz, Mexico. n, number of hosts infected. Abbreviations for life stages are: *mt*, metacercarie; *p*, plerocercoid; *l*, larva; abbreviations for sites are: f, fins; g, gill; gb, gall bladder; i, intestine; ms, mesenteries; s, stomach

			Reef Isla de Enmedio			*Reef Anegada de Afuera*		
Species	*CNHE*	*Site*	*n (% prevalence)*	*Mean intensity (±SD)*	*Range*	*n (% prevalence)*	*Mean intensity (±SD)*	*Range*
Trematoda								
Aponurus laguncula Looss, 1907	9130, 9131	i, s	1 (3.7)	1 ± -	1	12 (44.4)	1 ± 0	1-1
Megasolena sp.*†	9132	i				1 (3.7)	4 ± -	4
Preptetos trulla Linton, 1907†	9133, 9134	i	17 (62.9)	16.8 ± 19.5	1-61	11 (40.7)	84.5 ± 191.3	1-638
Deretrema fusillus Linton, 1910 †‡	9135	i, gb				8 (29.6)	1.6 ± 1.1	1-4
Siphodera vinaledwardsii (Linton, 1901)	9136, 9137	i	1 (3.7)	1 ± -	1	2 (7.4)	4 ± 4.2	1-7
Stephanostomum casum (Linton, 1910)	9138, 9139	i	9 (33.3)	2.8 ± 2.2	1-7	2 (7.4)	1 ± 0	1-1
Lecithochirium floridense (Manter, 1934)	9140, 9141	i, s	4 (18.5)	1 ± 0	1-1	8 (29.6)	1.3 ± 0.5	1-2
Didymozoidae *mt*	9142, 9143	i	1 (3.7)	1 ± -	1	1 (3.7)	3 ± -	3
Trematoda *mt*		f	22 (81.5)	4.1 ± 1.8	1-10	14 (51.9)	2.6 ± 1.2	1-6
Monogenea								
Euryhaliotrema torquecirrus (Zhukov, 1976) †	9144, 9145	g	17 (63)	6.6 ± 6.1	1-24	20 (74)	3.8 ± 2.7	1-11
Haliotrematoides heteracantha (Zhukov, 1976) †	9146, 9147	g	8 (29.6)	3.3 ± 4.1	1-12	3 (11.1)	3.7 ± 0.6	3-4
Microcotyloides incisa (Linton, 1910) *	9148, 9149	g	7 (25.9)	6.6 ± 6.1	1-16	22 (81.5)	3.2 ± 2.6	1-11
Cestoda								
Tetraphyllidea *p*	9150, 9151	i	7 (25.9)	6 ± 6.9	1-17	9 (33.3)	3.8 ± 3.2	1-8
Nematoda								
Dichelyne bonacii González-Solís, Argáez-García and Guillén-Hernández, 2002*	9152, 9153	i	3 (11.1)	1 ± 0	1-1	7 (25.9)	2.1 ± 0.8	1-6
Hysterothylacium reliquens (Norris and Overstreet, 1975) *	9154, 9155	i, ms	1 (3.7)	2 ± -	2	4 (14.8)	1 ± 0	1-1
Contracaecum sp. *l* *	9156, 9157	i, ms	3 (11.1)	1 ± 0	1-1	9 (33.3)	1.3 ± 0.5	1-2
Hysterothylacium sp. *l*	9158, 9159	i	2 (7.4)	2 ± 0	2-2	6 (22.2)	1.3 ± 0.9	1-3
Spirocerca sp.*	9160	i				1 (3.7)	1 ± -	1
Acantocephala								
Rhadinorhynchus dujardini Golvan, 1969*†‡	9161	i				1 (3.7)	1 ± -	1
Total helminth species			**15**			**19**		

* New host records.

† New record for Mexico.

‡ New record for the Gulf of Mexico.

were dissected to perform internal examinations, including mesenteries, liver, kidneys and gonads. The entire digestive system was placed in Petri dishes with saline solution at 0.75% for examination in detail. All parasites found were directly fixed in hot (≈ 90ºC) 4% formalin, and preserved in 70% alcohol.

For the taxonomical study, trematodes, monogeneans, cestodes and acanthocephalans were treated with Mayer paracarmine, Gömöri trichrome and/or Erlich's hematoxyline staining techniques, based on the following steps: dehydration in alcohol series, clarification with clove oil, and mounting in total preparations with Canada balsam. Nematodes were studied in temporary slides, and clarified with pure glycerin to be later preserved in 70% alcohol. Some monogeneans specimens were fixed in temporary preparations with ammonium picrate, in order to analyze their sclerotized structures (Vidal-Martínez et al., 2001). Voucher parasite specimens were deposited at the Colección Nacional de Helmintos (CNHE), Instituto de Biología, UNAM, México D. F. Prevalence (percentage of infected hosts) and mean intensity of infection (mean number of parasites per infected fish), were calculated following Bush et al. (1997).

Total length of 27 *O. crysurus* examined from Isla de Enmedio reef ranged from 233 to 450 mm (306 ± 730 mm), while the weight range was 110 to 857 g (320.8 ± 237.8 g). In Anegada de Afuera reef, the 27 fish were largest, with measures from 355 to 535 mm (462 ± 560 mm), and from 428 to 1363 g (909.3 ± 308 g). All examined fish were more than 1 year old. The helminth parasites inventory of sampled hosts included 19 species, as follows: 9 are digeneans (7 adults, 2 metacercariae), 5 nematodes (2 adults, 3 larvae), 3 monogeneans, 1acanthocephalan (adult) and 1 cestode (larva) (Table I). In general, samples from both reefs included the same species, with the exception of 4 species absent in Isla de Enmedio: the trematodes *Deretrema fusillus* and *Megasolena* sp., the nematode *Spirocerca* sp., and the acathocephalan *Rhadinorhynchus dujardini*, collected in larger fish from the Anegada de Afuera reef.

The monogenean *Euryhalitrema torquecirrus* showed the highest prevalence in both sites (69%). A second monogenean species, *Microcotyloides incisa* exhibits high prevalence (53%), with higher values in Anegada de Afuera reef. Other species with high prevalence in one site or the other were adults of trematodes *Aponurus laguncula* and *Preptetos trulla*. Table I displays prevalence of all remaining species which vary from 3.7% (a single fish infected in the sample) to 33.3%. The highest intensity was for *P. trulla*, with 638 trematodes found in a single fish from Anegada de Afuera reef. This trematode exhibits high prevalence and abundance in both locations. Most helminths found in this study had been previously registered in other lutjanid fish from the Gulf of Mexico and the Caribbean, including *Lutjanus apodus* (Walbaum, 1792), *L. cyanopterus* (Cuvier, 1828), *L. griseus* (Linnaeus, 1758), *L. purpureus* (Poey, 1866) and *L. synagris* (Linnaeus, 1758) (Vélez, 1987; Bunkley-Williams et al., 1996; Dyer et al., 1998; Fuentes et al., 2003; Cortés et al., 2009; Argáez-García et al., 2010). However, *O. crysurus* is a new host record for 7 species. It should be noted that 1 unidentified metacercariae was also recovered with high prevalences in both localities, but was higher in Isla de Enmedio fish (81.5%), than in those from Anegada de Afuera (51.9%).

These data show that for a highly vagile fish as *O. crysurus*, composition and abundance of helminth parasites in 2 nearby localities are similar; and differences may be explained by intrinsic host factors and local conditions of each reef system, mainly associated to size and feeding habits. A significant underlying factor to the parasites presence may be the relevance of intermediate host distribution and abundance, as fish feed on the most abundant prey. This study reveals, on one hand, that *O. crysurus* in the Veracruz reef systems, have a rich parasitic community, with potential interchange with other sympatric Lutjaniid species; and, on the other hand, that parasite transmission strategies in reef conditions are highly effective, as most hosts are infected.

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