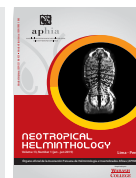




Neotropical Helminthology



ORIGINAL ARTICLE / ARTÍCULO ORIGINAL

FIRST RECORD OF *PENNELLA FILOSA* L. (COPEPODA, SIPHONOSTOMATOIDA, PENNELLIDAE) PARASITISING THE YELLOWFIN TUNA *THUNNUS ALBACARES* (BONNATERRE, 1788) FROM THE MEXICAN PACIFIC COAST

PRIMER REGISTRO DE *PENNELLA FILOSA* L. (COPEPODA, SIPHONOSTOMATOIDA, PENNELLIDAE) PARASITANDO AL ATUN DE ALETA AMARILLA *THUNNUS ALBACARES* (BONNATERRE, 1788) EN LA COSTA DEL PACÍFICO MEXICANO

Cristóbal Román-Reyes José¹; Sofía Ortega-García²; Felipe Galván-Magaña^{2*}
& Mayra I. Grano-Maldonado^{1,3}

¹Facultad de Ciencias del Mar. Universidad Autónoma de Sinaloa. Apartado Postal 610. Mazatlán, Sinaloa, México. C.P. 82000.

²Centro Interdisciplinario de Ciencias Marinas. IPN. Apartado Postal 592. La Paz, Baja California Sur, México. C.P. 23000. Phone number (612-12) 25344. Fax: (612-12) 2 5322.

³Universidad Autónoma de Occidente, Av. del Mar 1200, Flamingos, 82149, Mazatlán, Sinaloa, México

*Corresponding author: E-mail: fgalvan@ipn.mx

ABSTRACT

The aim of this investigation was to describe for the first time the parasitic copepod attached to the skin of the yellowfin tuna fish *Thunnus albacares* (Bonnaterre, 1788) in the state of Sinaloa along the Mexican Pacific coast. Five copepods were identified as *Pennella filosa* L. (Copepoda:Pennellidae), members of this genus are characterized by shape, size and the length of the parasite, type of host, arrangement of cephalothoracic papillae, segmentation of the first and second antenna, and structure of the abdominal plumes among the most important. This study is significant because it is the first time that this copepod of the family Pennellidae is described parasitizing this tuna fish *Thunnus albacares* which is a high-valued fish species that are caught year-round by both the coastal commercial and recreational fishing in Sinaloa, Mexico. Although there are several reports worldwide, locally is a new geographical distribution area for this copepod and thus contributes to our understanding of the biology, the biodiversity and host preference of these parasites.

Keywords: Copepoda – ectoparasites – Tuna – Pacific Ocean – México

RESUMEN

El objetivo de esta investigación fue describir por primera vez al copépodo ectoparásito en la piel del atún aleta amarilla *Thunnus albacares* (Bonnaterre, 1788) en el estado de Sinaloa en las costas del Pacífico mexicano. Se identificaron cinco copépodos *Pennella filosa* L. (Copepoda: Pennellidae), los miembros de este género se caracterizan por la forma, el tamaño y la longitud del parásito, el tipo de hospedero, la disposición de las papilas cefalotorácicas, la segmentación de la primera y la segunda antena, y la estructura de las plumas abdominales. Este estudio es significativo porque es la primera vez que se describe este copépodo de la familia Pennellidae que parasita al atún *Thunnus albacares*, que es considerado una especie de pez de gran valor que se captura todo el año tanto por la pesca costera comercial como por la pesca recreativa en Sinaloa, México. Aunque existen varios informes en todo el mundo, localmente es una nueva área de distribución geográfica para este copépodo y, por lo tanto, contribuye a nuestra comprensión de la Biología, la biodiversidad y la preferencia de hospedadores de estos parásitos.

Palabras clave: Copepoda – ectoparásitos – Atún – Océano Pacífico – México

INTRODUCTION

In the northwestern coasts of Mexico, the yellowfin tuna (*Thunnus albacares*) (Bonnaterre, 1788) (Family Scombridae) is high-valued fish species that are caught year-round by both the coastal commercial and recreational fishing in Mazatlán, Sinaloa (northwest Pacific). *T. albacares* contributes to many national food fisheries (Shomura *et al.*, 1994) and according with the Inter-American Tropical Tuna Commission (IATTC) are the largest and main catches of yellowfin tuna in the Eastern Pacific Ocean which is obtained by the Mexican tuna fleet. The analysis of the parasites species composition in high-valued fish species are of interest because studies have shown that parasites can reduce host density causing that some populations could be endangered to extinction (Dobson & Hudson, 1986). Some parasites have been used as indicators of specific features of host ecology (Konovalov & Butorina, 1985). Parasitological studies in wild animals are important because they lead to a better understanding of the behavioral links between the host and parasite (Lamothe-Argumedo *et al.*, 1997). This knowledge may help in understanding copepod parasite life cycles in marine ecosystems. In the case of *T. albacares* these ectoparasites may have a negative effect on fisheries in economic terms (Rodríguez-Santiago *et al.*, 2015).

Yellowfin tuna is an important fishing species with worldwide distribution and few parasitological

studies on this fish from the Eastern Pacific Ocean have been published, some of them recorded only trematodes endoparasites species (Nikolaeva, 1985; Kazachenko & Titov, 1985) also few copepods (Rodríguez-Santiago *et al.*, 2015). The ectoparasite *Pennella filosa* Linnaeus, 1758 was described by Pollock (1994) from the pectoral fin of an albacore tuna *Thunnus alalunga* and from the pelvic fin and dorsal surface of 2 out of 20 swordfish *Xiphias gladius* Linnaeus, 1758. Also, Tanrikul & Akyol (2011) described specimens of *Pennella filosa* on swordfish from the Turkish Aegean sea. Other parasitic studies on tuna *Thunnus thynnus* Linnaeus, 1758 and amberjack *Seriola dumerili* (Risso, 1810) aquaculture in Turkey (Tuncer *et al.*, 2010; Toksen *et al.*, 2012). In the mediterranean some works have been focused on ecological aspects of *P. filosa* from *Coryphaena hippurus* Linnaeus, 1758. These authors revealed a possible transmission factor during the migratory period from the strait of Gibraltar to the Balearic Islands (Alboran Sea) where squid and cuttlefishes are abundant. According to Kabata (1979, 1981) cephalopods may be intermediate hosts in *Penella* sp. Oken, 1815 life cycle.

Other authors, like Bullard *et al.*, (2015) characterized lesion-associated capsaline infections (*Capsala biparasiticum*) (Goto, 1894) Price, 1938 on *T. albacares* in the Gulf of Mexico, and other records in the Pacific showed that mako shark *Isurus oxyrinchus* Rafinesque, 1810 is parasitized by the copepod *Dinemoura producta* (Müller, 1785) and striped marlin *Kajikia audax*

(Philippi, 1887) by *P. filosa* (González-Armas *et al.*, 2013). Furthermore, other authors described the acanthocephalan *Echinorhynchus* Müller, 1776 sp. infection of *T. albacares* from India (Sakthivel *et al.*, 2014). In this context, there are no records of the occurrence of the specie *P. filosa* in yellowfin tuna in Mexico. This fish is an important economic resource for both consumption and fishing activities. The knowledge of a parasite contributes to understand essential links between them and its host, and to the basic knowledge on the copepod biology.

MATERIAL AND METHODS

The fish host was a large yellowfin tuna (94.3 cm fork length and 14.5 kg weight), that had been caught during the summer by a sport fishing boats, at least 300 miles west off Mazatlan, Sinaloa Port in Mexico (106° 24.5' N y 23° 12.5' W) (Fig.1). Ectoparasites were attached mainly to the dorsolateral anterior and posterior muscular tissue (Fig. 2). The fish was washed with freshwater *in situ* and the washed material was transported in individual plastic bags in a cool box to the laboratory. The examination of copepods on the body surface of the fish was performed under good illumination in a Petri dish using a Leica MZ9.5 stereomicroscope. The plastic bag contents were also examined for the presence of detached copepods. Parasites found on the fish were preserved in labeled vials with 70% ethanol and then glycerol. The identification of the parasitic copepods was based on the morphometrical similar features described by Kabata (1979), Hogans (1987, 1987), Grabda (1991), Benz & Hogans (1993) and Abaunza *et al.* (2001).

Ethic aspects: Animal care and handling were carried out in accordance with Mexican laws (NOM-033-ZOO-1995).

RESULTS AND DISCUSSION

Five ectoparasites (12.3-15.8 cm; mean 14 cm) were identified as the ectoparasitic *P. filosa* (Copepoda: Pennellidae) collected from the skin of the tuna fish *T. albacares* in Mazatlán, Sinaloa in

the northwest of the Pacific coast. These ectoparasites were attached mainly to the dorsolateral anterior and posterior muscular tissue (Fig. 2). Parasitic copepods are the second and third largest group on Neotropical marine and freshwater fishes, respectively (Luque & Poulin 2008). In accordance with Boxshall (2013), most of the copepods infecting teleost fish and elasmobranchs are mainly members of the order Siphonostomatoida, which consist of 39 families. Copepods from the genus *Pennella* Oken, 1816 have been recorded as large parasites found in the flesh of a wide range of marine hosts (Kabata, 1992), and *P. filosa* is one species found on large fishes (Scombridae, Molidae) (Hogans, 1987); however, reports of occurrence of this parasitic specie on yellowfin tuna are not documented in Mexico.

Pennellidae family shows a two-host cycle, and some teleosteans and cephalopods have been reported as intermediate host (Grabda, 1991). Approximately 700 species of 173 genera of parasitic copepods on marine fishes have been recorded in the Pacific Ocean, and only 60 were reported in the Eastern Pacific Ocean (Kazachenko & Titar, 1985; Rodríguez-Santiago *et al.*, 2015). These records increased the existing information concerning the parasitic fauna associated to yellowfin tuna in the Eastern Pacific Ocean, and according with Carbonell *et al.* (1999), *P. filosa* is potentially useful as a biological tag for studying their migratory movements and stock differentiation. Also these large, and very easily seen ectoparasite produce a prominent scar after their death. This finding allowed the existing information concerning the parasitic fauna of yellowfin tuna in the Pacific Ocean to be extended. Further studies on parasites are required for characterization of ecto and endoparasites, in order to understand the transmission, life cycle, pathology and possible control treatments. Several reports are available on parasites from fish species in different parts of the world, however, this work shows the presence of *P. filosa* in specific part of the Mexican coast and that could be useful to conduct the comparative studies with other ectoparasites mainly copepods on fish and other aquatic systems. This information could be of particular interest by parasitologist groups working on diseases, infections, transmission, ecological factors, and migration in marine fish.

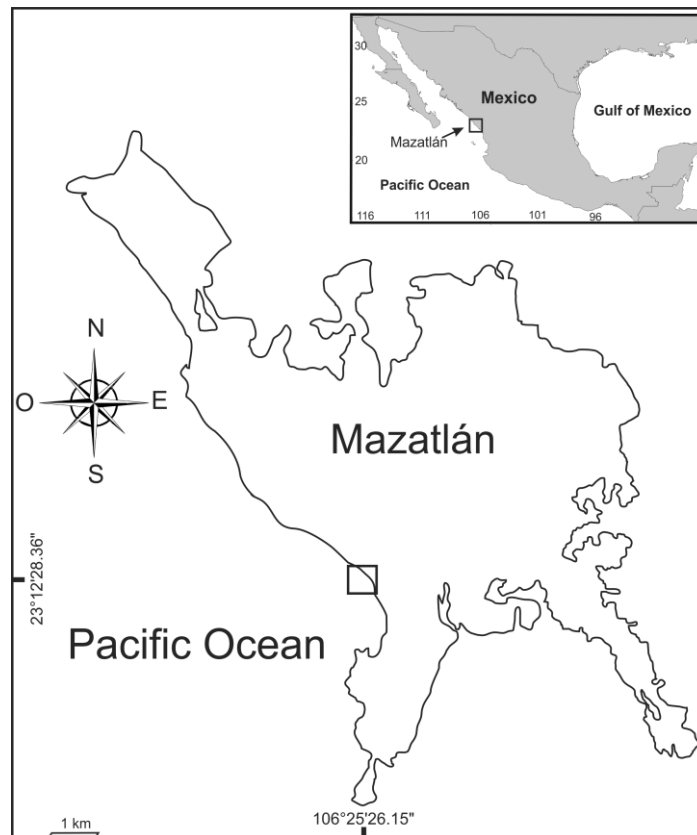


Figure 1. Map location of the coastal waters of Mazatlán, Sin. Mexico.

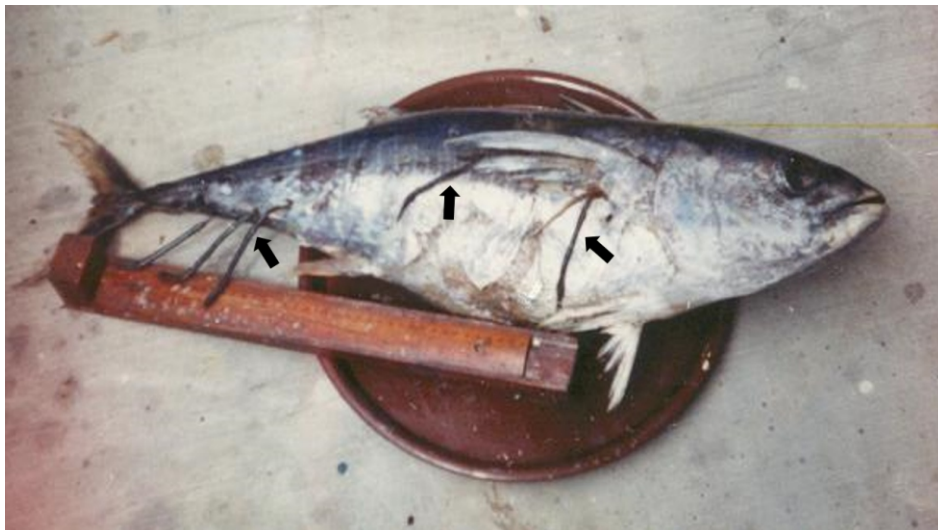


Figure 2. Yellowfin tuna infected with *Pennella filosa* (Copepoda: Pennellidae) in coastal waters of Mazatlán, Sin. Mexico.

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