A checklist of helminth parasites of Elasmobranchii in Mexico

Aldo Iván Merlo-Serna¹, Luis García-Prieto¹

¹ Laboratorio de Helmintología, Instituto de Biología, Universidad Nacional Autónoma de México, Ap. Postal 70-153, C.P. 04510, México D.F., México

Corresponding author: Luis García-Prieto (luis.garcia@ib.unam.mx)

Academic editor: F. Govedich | Received 29 May 2015 | Accepted 4 December 2015 | Published 15 February 2016

http://zoobank.org/AF6A7738-C8F3-4BD1-A05D-88960C0F300C

Citation: Merlo-Serna AI, García-Prieto L (2016) A checklist of helminth parasites of Elasmobranchii in Mexico. ZooKeys 563: 73–128. doi: 10.3897/zookeys.563.6067

Abstract
A comprehensive and updated summary of the literature and unpublished records contained in scientific collections on the helminth parasites of the elasmobranchs from Mexico is herein presented for the first time. At present, the helminth fauna associated with Elasmobranchii recorded in Mexico is composed of 132 (110 named species and 22 not assigned to species), which belong to 70 genera included in 27 families (plus 4 incertae sedis families of cestodes). These data represent 7.2% of the worldwide species richness. Platyhelminthes is the most widely represented, with 128 taxa: 94 of cestodes, 22 of monogeneans and 12 of trematodes; Nematoda and Annelida: Hirudinea are represented by only 2 taxa each. These records come from 54 localities, pertaining to 15 states; Baja California Sur (17 sampled localities) and Baja California (10), are the states with the highest species richness: 72 and 54 species, respectively. Up to now, 48 elasmobranch species have been recorded as hosts of helminths in Mexico; so, approximately 82% of sharks and 67% of rays distributed in Mexican waters lack helminthological studies. The present list provides the host, distribution (with geographical coordinates), site of infection, accession number in scientific collections, and references for the parasites. A host-parasite list is also provided.

Keywords
Platyhelminthes, Nematoda, Hirudinea, Sharks, Rays, Richness, Selachii, Batoidea

Copyright Aldo Iván Merlo-Serna, Luis García-Prieto. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
Introduction

According to Eschmeyer and Fong (2015), 1338 species of elasmobranchs have been described worldwide (768 rays and 570 sharks). However, Naylor et al. (2012), based on the fact that since 2005 more than 130 new species have been described, considered that more species remain to be discovered. According to these authors, this increase is a result of reassessment of geographic variation; some of the increase represents recognition of subtle morphological variants among congeneric forms that nevertheless exhibit substantial molecular sequence divergence (cryptic species). In Mexico, this group is represented by 204 known species (95 rays and 109 sharks) (Del Moral-Flores and Pérez-Ponce de León 2013) (Table 1); this richness constitutes 15% of the living species in the world. Nonetheless, most of the species recorded in Mexican waters also have been found in international waters, and many of them are cosmopolitan (Espinoza-Pérez et al. 2004).

Elasmobranchs (sharks, skates and rays) are host to a great variety of parasites in nature, particularly helminths. Up to now, more than 1500 helminth species have been recorded in association with these hosts worldwide; cestodes represent the most diverse group, with approximately 1133 species, followed by monogeneans with 226, nematodes with 83, digeneans with 50-60, leeches with 23, and aspidogastreans with 2 (Caira et al. 2012). In addition, 4 species of acanthocephalans have been found only in elasmobranchs (Weaver and Smales 2014). In Mexico, the first record of a helminth parasitizing an elasmobranch was made by Caballero y Caballero (1945), who described the digenean *Staphylorchis pacifica* (=*Petalodistomum pacificum*) from the body cavity of an undetermined shark in the Pacific slope of this country. Since then, a great amount of information has been generated, most of it in the last 2 decades, particularly in the Gulf of California. The main goal of this checklist is to compile and discuss all these data and to establish some patterns of richness, geographical distribution and host spectrum.

Methods

This checklist contains information updated until December, 2015, and comes from two different sources: 1) retrospective bibliographical search, using different databases such as CAB Abstracts, Biological Abstracts, and Zoological Record; 2) Search in databases of national [Colección Nacional de Helminitos (CNHE), Instituto de Biología, UNAM, Mexico City, Mexico] and international [Harold W. Manter Laboratory of Parasitology (HWML), University of Nebraska-Lincoln, USA; National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C., USA, formerly United States National Parasite Collection (USNPC), Beltsville, Maryland, USA] parasite collections.

The checklist is divided into two sections; the first includes a parasite-host list, presented in phylogenetic order, starting with the phylum Platyhelminthes (Trematoda,
Table 1. Species of Elasmobranchii reported from Mexico and richness of associated helminths (modified from Del Moral-Flores and Pérez-Ponce de León 2013).

| Subclass       | Order       | Family                  | Genera | Species | Sampled species | Helminth recorded |
|----------------|-------------|-------------------------|--------|---------|-----------------|-------------------|
| Selachii       | Hexanchiformes | Chlamydoselachidae     | 1      | 1       | 0               | 0                 |
|                |             | Hexanchidae            | 3      | 4       | 1               | 1                 |
|                |             | Echinorhinidae         | 1      | 1       | 0               | 0                 |
|                |             | Squalidae              | 2      | 4       | 0               | 0                 |
|                |             | Centrophoridae         | 1      | 4       | 0               | 0                 |
|                | Squaliformes | Etmopteridae           | 2      | 8       | 0               | 0                 |
|                |             | Somniosidae            | 3      | 3       | 0               | 0                 |
|                |             | Oxynotidae             | 1      | 1       | 0               | 0                 |
|                |             | Dalatiidae             | 4      | 5       | 0               | 0                 |
|                | Squatiniformes | Squatinidae           | 1      | 4       | 1               | 2                 |
|                | Heterodontiformes | Heterodontidae       | 1      | 2       | 2               | 7                 |
|                |             | Gymnoglossomatidae     | 1      | 1       | 1               | 3                 |
|                | Orectolobiformes | Rhicodontidae       | 1      | 1       | 0               | 0                 |
|                |             | Odontaspididae         | 2      | 3       | 0               | 0                 |
|                |             | Pseudocarcharhiidae    | 1      | 1       | 0               | 0                 |
|                |             | Megachasmidae          | 1      | 1       | 0               | 0                 |
|                | Lamniformes   | Alopidae               | 1      | 4       | 2               | 6                 |
|                |             | Cetorhinidae           | 1      | 1       | 0               | 0                 |
|                |             | Lamnidae               | 3      | 4       | 0               | 0                 |
|                |             | Scyliorhinidae         | 6      | 15      | 0               | 0                 |
|                |             | Triakidae              | 3      | 11      | 5               | 9                 |
|                | Carcharhiniformes | Carcharhinidae      | 7      | 25      | 5               | 19                |
|                |             | Sphyridae              | 1      | 6       | 3               | 5                 |
| Batoidea       | Torpediniformes | Torpedinidae          | 1      | 2       | 0               | 0                 |
|                |             | Narcinidae             | 2      | 4       | 2               | 5                 |
|                | Pristiformes  | Pristidae              | 1      | 3       | 0               | 0                 |
|                |             | Rhinobatidae           | 2      | 10      | 5               | 10                |
|                | Rhinobatiformes | Platyrrhinidae       | 1      | 1       | 0               | 0                 |
|                |             | Arhynchobotidae        | 2      | 4       | 0               | 0                 |
| Rajiformes     | Rajidae      | 9                      | 29     | 2       | 2               | 2                 |
|                | Anacanthobotida | 2                      | 4       | 1       | 1                 |
|                | Urotrygonidae | 2                      | 10      | 5       | 27                |
|                | Dasyatidae   | 3                      | 9       | 5       | 26                |
|                | Gymnuridae   | 1                      | 4       | 0       | 0                 |
|                | Myliobatiformes | Myliobatidae     | 3      | 8       | 8               | 38                |
|                |             | Rhinopteridae          | 1      | 2       | 0               | 0                 |
|                |             | Mobulidae              | 2      | 6       | 0               | 0                 |
| TOTALS’        |             | 7                      | 23     | 48      | 109              | 20                | 52                |

* The totals in the table are greater than in the text because some species infect 2 or more host species (sharks and/or rays).
Monogenoidea and Cestoda), and followed by the phyla Nematoda and Annelida (Hirudinea). Each phylum contains families, genera, and species in alphabetical order. The nomenclature and classification for each metazoan group is based on the following references: Trematoda (Gibson et al. 2002; Jones et al. 2005; Bray et al. 2008), Monogenea (Boeger and Kritsky 1993), Cestoda (Caira et al. 2014b), Nematoda (Anderson et al. 1974–1983; Gibbons 2010), and Hirudinea (Sawyer 1986; Davies 1991). The information for each helminth species includes species name, authority, and site of infection. We use “NA” when some data are not available in the original source. Next, we present species distributions, referring to states of the Mexican Republic (in caps) where the record was made as well as the specific locality name, followed by the species of host and the bibliographic references related to records. For specimens deposited in a collection, acronyms are as follows:

**BMNH** The British Museum (Natural History) Collection at the Natural History Museum, London, UK.

**CNHE** Colección Nacional de Helmintos, Instituto de Biología, UNAM, Mexico City, Mexico.

**CPMHUABCS** Colección Parasitológica del Museo de Historia Natural de la Universidad Autónoma de Baja California Sur, La Paz, Baja California Sur, Mexico.

**ECOPA** El Colegio de la Frontera Sur, Chetumal, Quintana Roo, Mexico.

**HWML** Harold W. Manter Laboratory of Parasitology, University of Nebraska-Lincoln, Nebraska, United States.

**IPCAS** Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic.

**LRP** Lawrence R. Penner Collection, Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs CT, USA.

**MNHG-INV or PLAT** Museum of Natural History, Geneva, Switzerland.

**SBMNH** Santa Barbara Museum of Natural History, Santa Barbara, California, United States.

**TINRO** Pacific Fisheries Research Center, Vladivostok, Russian Federation.

**UCLA** Helminthological Collection, Zoology Department, University of California at Los Angeles.

**USNPC** Accession numbers used in this work correspond to those given by United States National Parasite Collection, Beltsville, Maryland, USA, which was recently transferred to the National Museum of Natural History (USMN), Smithsonian Institution, Washington, D.C., USA.

The name of the type locality (TL), type host (TH), and original reference (OR) of the new species described from elasmobranchs recorded in Mexico are indicated with abbreviations of these words in superscript.

The host-parasite list is ordered alphabetically by families of elasmobranchs; each family includes the scientific name of the host and the authority name. Then, the sc-
A checklist of helminth parasites of Elasmobranchii in Mexico

Scientific names of the species of helminths are listed in alphabetical order, indicating in parentheses the parasite group to which they belong. The scientific names of elasmobranchs were updated following Froese and Pauly (2014); higher levels of classification follow Del Moral-Flores and Pérez-Ponce de León (2013).

Results

To date, 48 species of elasmobranchs (20 sharks and 28 rays) have been recorded as host of 132 taxa of helminths (110 named species and 22 not assigned to species); these parasite species belong to 70 genera included in 27 families (plus 4 families of cestodes that are incertae sedis). Platyhelminthes is represented by 128 taxa: 94 taxa of cestodes, 22 taxa of monogeneans and 12 taxa of trematodes; for both Nematoda and Annelida (Hirudinea) only 2 species have been recorded. The 54 sampled sites for helminths are located in 15 states; Baja California Sur (17 localities) and Baja California (10), are the states with the highest species richness (72 and 54, respectively) (Fig. 1). Up to now, no helminths parasitizing elasmobranchs from Mexican waters have been

![Figure 1. Map of Mexico showing the localities that have been sampled for elasmobranchs as hosts of helminth species.](image-url)
reported from the states of Michoacán and Tabasco; for Chiapas, Colima, Tamaulipas and Yucatán, only one record each has been reported. Below, we present the checklist of helminth parasites recorded in elasmobranch species caught in Mexico, which summarizes the current knowledge on this group in the country.

Parasite-host list

Trematoda Rudolphi, 1808
Acanthocolpidae Lühe, 1906

Pleorchis magnipurus Arai, 1962

Site of infection. Intestine.
Locality. BAJA CALIFORNIA SUR: Bahía Magdalena: *Urolophus maculatus* (see Arai 1962). Specimens in collections. UCLA.

Azygiidae Lühe, 1909

Otodistomum veliporum (Creplin, 1837) Stafford, 1904

Site of infection. Body cavity, stomach.
Locality. BAJA CALIFORNIA SUR: Santa Rosalía: *Heterodontus francisci, Heterodontus mexicanus, Mustelus henlei, Squatina californica* (see Curran and Overstreet 2000). Specimens in collections. CNHE (3852).

Bucephalidae Poche, 1907

Prosorhynchus truncatus Verma, 1936

Site of infection. Intestine.
Locality. BAJA CALIFORNIA SUR: El Comitán: *Dasyatis brevis* (see Villarreal-Lizarraga 1995). Specimens in collections. CPMHN-UABCS (20).

Gorgoderidae Looss, 1899

Anaporrhutum euzeti Curran, Blend & Overstreet, 2003
Site of infection. Pericardial and body cavities.
Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: *Dasyatis brevis* (see Curran et al. 2003). BAJA CALIFORNIA SUR: LoretoTL, *Myliobatis longirostrisTH* (see Curran et al. 2003OR). NA: Golfo de California: *Dasyatis longa, Diplobatis ommata, Myliobatis californica, Narcine entemedor, Rhinobatos productus, Urolophus halleri, Urolophus maculatus, Zapteryx exasperata* (see Curran et al. 2013)

**Specimens in collections.** CNHE (4499); HWML (16702); SBMNH (345780).

**Nagmia cisloi** Curran, Blend & Overstreet, 2009

**Site of infection.** Body cavity.
**Locality.** BAJA CALIFORNIA SUR: Bahía de La PazTL: *Mobula thurstoniTH* (see Curran et al. 2009OR).

**Specimens in collections.** CNHE (6198).

**Nagmia rodmani** Curran, Blend & Overstreet, 2009

**Site of infection.** Body cavity.
**Locality.** BAJA CALIFORNIA SUR: LoretoTL: *Narcine entemedorTH* (see Curran et al. 2009OR).

**Specimens in collections.** CNHE (6199); HWML (48889); SBMNH (423115).

**Probolitrema richiardii** (López, 1888) Looss, 1902

**Site of infection.** Body cavity.
**Locality.** BAJA CALIFORNIA: Isla San Esteban: *Urobatis* sp. (see Curran et al. 2009). BAJA CALIFORNIA SUR: Bahía de Santa Inés: *Dasyatis brevis, Mustelus lumulatus, Urolophus maculatus* (see Markell 1956). NA: Golfo de California: *Dasyatis brevis, Dasyatis longa, Myliobatis californica, Myliobatis longirostris, Rhinobatos leucorhynchus* (see Curran et al. 2009)

**Specimens in collections.** CNHE (6200); HWML (48890); SBMNH (423116); USNPC (49354).

**Notes.** The specimens of Bahía de Santa Inés were identified as *Probolitrema mexicana*, but this species is a synonym of *P. richardi* according to Curran et al. (2009).

**Staphylorchis pacifica** (Caballero y Caballero, 1945) Campbell, 2008

**Site of infection.** Body cavity.
**Locality.** COLIMA: ManzanilloTL: “Tiburón no determinadoTH” (see Caballero y Caballero 1945OR). JALISCO: Puerto Vallarta: “Elasmobranchii” (CNHE); NA-
YARIT: Punta Mita: “Tiburón no determinado” (see Bravo-Hollis 1954); San Blás: *Carcharhunus limbatus* (see Lamothe-Argumedo 1969). SINALOA: Mazatlán: *Galeorhinus galeus* (see Winter 1959).

**Specimens in collections.** CNHE (921, 1069, 1111, 1585, 3246).

**Notes.** The original description of this species was made under the name *Petalodistomum pacificum* (Caballero y Caballero 1945); later, this species was transferred to *Nagmia* by Markell (1953). This act was accepted by Sogandares-Bernal (1959) and Curran et al. (2009) but rejected by Caballero y Caballero et al. (1956) and Winter (1959). Lamothe-Argumedo (1969) erected *Winteria* to accommodate this species, but this genus was considered a synonym of *Nagmia* (Curran et al. 2009). Pigulevski (1953) divided the genus *Petalodistomum* in 2 subgenera, including the species of *Petalodistomum* described by Caballero y Caballero (1945) in *Petalodistomum (Petalodistomum)*. Currently, this trematode species is accepted as *Staphylorchis pacifica* (see Campbell 2008).

**Opecoelidae Ozaki, 1925**

*Helicometrina nimia* Linton, 1910

**Site of infection.** Stomach.

**Locality.** BAJA CALIFORNIA SUR: Las Barrancas: *Prionace glauca* (see Méndez 2005).

**No specimens in collections.**

**Ptychogonimidae Dollfus, 1937**

*Ptychogonimus megastomum* (Rudolphi, 1819) Lühe, 1900

**Site of infection.** Stomach.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Mustelus californicus* (see Curran and Overstreet 2000); Puertecitos: *Mustelus lunulatus* (see Curran and Overstreet 2000).

**Specimens in collections.** CNHE (3853-4).

**Syncoeliidae Loos, 1899**

*Paronatrema vaginicola* Dollfus, 1937

**Site of infection.** Buccal cavity, cloaca, gills.

**Locality.** BAJA CALIFORNIA SUR: Boca de Álamo: *Alopias pelagicus, Prionace glauca* (see Curran and Overstreet 2000); Puntarena, San Isidro: *Prionace glauca* (see Cur-
ran and Overstreet 2000). SINALOA: Bahía Santa María: Alopias pelagicus (see Curran and Overstreet 2000).

**Specimens in collections.** CNHE (3855); HWML (15263, 15265).

**Syncoelium vermillionensis** Curran & Overstreet, 2000

**Site of infection.** Gills.

**Locality.** BAJA CALIFORNIA SUR: Puntarena: Mobula japonica (see Curran and Overstreet 2000); Santa MaríaTL: Mobula thurstoniTH (see Curran and Overstreet 2000OR).

**Specimens in collections.** CNHE (3850); HWML (15261).

**Monogenoidea Bychowsky, 1937**

**Capsalidae Baird, 1853**

**Benedeniella posterocolpa** (Hargis, 1955) Yamaguti, 1963

**Site of infection.** Skin.

**Locality.** CAMPECHE: Estuario Champotón: Rhinoptera bonasus (see Pulido-Flores and Monks 2005).

**Specimens in collections.** CNHE (4370).

**Listrocephalos guberleti** (Caballero y Caballero & Bravo-Hollis, 1962) Bullard, Payne & Braswell, 2004

**Site of infection.** Gills, skin.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: Urolophus halleri (see Bullard et al. 2004); Isla San Esteban: Urobatis concentricus, Urolophus maculatus, Urobatis sp. (see Bullard et al. 2004). SONORA: Bahía de GuaymasTL: Urolophus halleriTH (see Caballero y Caballero and Bravo-Hollis 1962OR).

**Specimens in collections.** CNHE (34-5); USNPC (94826-8).

**Notes.** This species was described as Entobdella guberleti (Caballero y Caballero and Bravo-Hollis 1962) and transferred to Listrocephalos by Bullard et al. (2004).

**Listrocephalos kearni** Bullard, Payne & Braswell, 2004

**Site of infection.** Skin.

**Locality.** BAJA CALIFORNIA: Bahía de Los ÁngelesTL: Dasyatis brevisTH (see Bullard et al. 2004OR). BAJA CALIFORNIA SUR: Santa Rosalía: Dasyatis brevis (see Bullard et al. 2004).

**Specimens in collections.** CNHE (5021-2); USNPC (94829-34).
Listrocephalos whittingtoni Bullard, Payne & Braswell, 2004

**Site of infection.** Skin.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles$^{\text{TL}}$: *Dasyatis longa$^{\text{TH}}$* (see Bullard et al. 2004$^{\text{OR}}$). BAJA CALIFORNIA SUR: Bahía de La Paz: *Dasyatis longa* (see Bullard et al. 2004).

**Specimens in collections.** CNHE (5023-4); USNPC (94835-9).

Hexabothriidae Price, 1942

*Dasyonchocotyle dasyatis* (Yamaguti, 1968) Boeger & Kritsky, 1989

**Site of infection.** Gills.

**Locality.** SINALOA: Mazatlán: *Dasyatis longa* (see Escorcia-Ignacio et al. 2015).

**Specimens in collections.** CNHE (9361).

Loimoidae Price, 1936

*Loimos winteri* Caballero y Caballero & Bravo-Hollis, 1961

**Site of infection.** Gills.

**Locality.** SONORA: Bahía de Guaymas$^{\text{TL}}$: *Carcharhinus brachyurus$^{\text{TH}}$* (see Caballero y Caballero and Bravo-Hollis 1961$^{\text{OR}}$).

**Specimens in collections.** CNHE (86-7).

*Loimosina parawilsoni* Bravo-Hollis, 1970

**Site of infection.** Gills.

**Locality.** SINALOA: Mazatlán$^{\text{TL}}$: *Sphyrna lewini$^{\text{TH}}$* (see Bravo-Hollis 1970$^{\text{OR}}$).

**Specimens in collections.** CNHE (153-4).

Monocotylidae Taschenberg, 1879

*Anoplocotyloides papillatus* (Doran, 1953) Young, 1967

**Site of infection.** Gills.

**Locality.** SINALOA: Mazatlán: *Rhinobatos glaucostigma* (see Bravo-Hollis 1969).

**Specimens in collection.** CNHE (178).

**Notes.** Based on the morphology of the posterior hooks of the haptor, Neifar et al. (2002) considered that this material is composed of 2 different monocotylideans.
Calicotyle californiensis Bullard & Overstreet, 2000

Site of infection. Body cavity.
Locality. BAJA CALIFORNIA: Bahía de Los Ángeles\textsuperscript{TL}: Mustelus californicus\textsuperscript{TH} (see Bullard and Overstreet 2000\textsuperscript{OR}).
Specimens in collections. CNHE (3907).

Calicotyle kroyeri Diesing, 1850

Site of infection. Cloaca, rectum.
Locality. CAMPECHE: Bancos de Campeche: Anacanthobatis foliostris, Dipturus olseni (see Chisholm et al. 1997).
No specimens in collections.

Calicotyle urobati Bullard & Overstreet, 2000

Site of infection. Cloaca, rectum.
Locality. BAJA CALIFORNIA: Bahía de Los Ángeles\textsuperscript{TL}: Urolophus halleri\textsuperscript{TH}, Urolophus maculatus (see Bullard and Overstreet 2000\textsuperscript{OR}); Bahía de San Franciscoquito: Urolophus halleri (see Bullard and Overstreet 2000); Puertecitos: Urolophus maculatus (see Bullard and Overstreet 2000). BAJA CALIFORNIA SUR: Santa Rosalía: Urolophus halleri, Urolophus maculatus (see Bullard and Overstreet 2000).
Specimens in collections. CNHE (3908-9); HWML (15365-6); USNPC (89777-8).

Dasybatotreminae gen. sp.

Site of infection. Gills.
Locality. GUERRERO: Acapulco: Rhinoptera steindachneri (see Carbajal-Violante 2012).
Specimens in collections. CNHE (8287-8).

Decacotyle floridana (Pratt, 1910) Chisholm & Whittington, 1998

Site of infection. Gills.
Locality. CAMPECHE: Ciudad del Carmen: Aetobatus narinari (CNHE); Estuario Champotón: Aetobatus narinari (see Pulido-Flores and Monks 2005). QUINTANA ROO: Holbox: Aetobatus narinari (see Pulido-Flores and Monks 2005).
Specimens in collections. CNHE (327, 4368).
**Notes.** Specimens from Ciudad del Carmen were identified as *Heterocotyle aetobatis* Hargis, but this species was considered a synonym of *Decacotyle floridana* by Chisholm and Whittington (1998).

**Denarycotyle gardneri** Pulido-Flores, Monks & Violante-González, 2015

**Site of infection.** Gills.
**Locality.** GUERRERO: Acapulco<sup>TL</sup>; *Rhinoptera steindachneri<sup>TH</sup>* (Pulido-Flores et al. 2015<sup>OR</sup>).

**Specimens in collections.** CNHE (9558-9); HWML (75364-7).

**Dendromonocotyle cortesi** Bravo-Hollis, 1969

**Site of infection.** Skin.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles<sup>TL</sup>, Isla Rasa: “Mantarraya gris<sup>TH</sup>” (see Bravo-Hollis 1969<sup>OR</sup>).

**Specimens in collections.** CNHE (149-50).

**Notes.** Valid species according to Chisholm et al. (2004).

**Dendromonocotyle octodiscus** Hargis, 1955

**Site of infection.** Skin.
**Locality.** GOLFO DE MEXICO (Mexico): *Dasyatis americana, Urobatis jamaicensis* (see Fehlauer-Ale and Littlewood 2011). QUINTANA ROO: Blanquizal, Holbox: *Dasyatis americana* (see Pulido-Flores and Monks 2005); El Paso de los Cedros (Cozumel), Ixmapuit (Isla Contoy), Xcalak: *Urobatis jamaicensis* (see Pulido-Flores and Monks 2005). YUCATÁN: Ría Lagartos: *Urobatis jamaicensis* (see Pulido-Flores and Monks 2005).

**Specimens in collections.** CNHE (4362-3, 4366-7); ECOPA (001); USNPC (90353).

**Notes.** Valid species according to Chisholm et al. (2004).

**Euzetia lamothei** Pulido-Flores & Monks, 2008

**Site of infection.** Gills.
**Locality.** CAMPECHE: Ciudad del Carmen<sup>TL</sup>; *Rhinoptera bonasus<sup>TH</sup>* (see Pulido-Flores and Monks 2008<sup>OR</sup>). QUINTANA ROO: Isla Contoy: *Rhinoptera bonasus* (see Pulido-Flores and Monks 2008).

**Specimens in collections.** CNHE (6067-8); HWML (48817); CHE (P00056).
**Heterocotyle sp.**

**Site of infection.** Gills.
**Locality.** GUERRERO: Acapulco: *Rhinoptera steindachneri* (see Carbajal-Violante 2012).
**No specimens in collections.**

**Monocotylidae gen. sp.**

**Site of infection.** Gills.
**Locality.** BAJA CALIFORNIA SUR: Bahía Almejas: *Rhinoptera steindachneri* (see Gómez del Prado-Rosas and Euzet 1997).
**No specimens in collections.**
**Notes.** This material was recorded as *Quadritestis almehensis* n. gen., n. sp., but its description was not published, so that name is a *nomen nudum.*

**Spinuris lophosoma** Doran, 1953

**Site of infection.** Gills.
**Locality.** BAJA CALIFORNIA SUR: Bahía Almejas: *Rhinobatos productus* (see Gómez del Prado-Rosas and Euzet 1999).
**No specimens in collections.**

**Spinuris mexicana** Bravo-Hollis, 1969

**Site of infection.** Gills.
**Locality.** SINALOA: Mazatlán\(^\text{TL}\): *Rhinobatos glaucostigma\(^\text{TH}\)* (see Bravo-Hollis 1969\(^\text{OR}\)).
**Specimens in collections.** CNHE (151-2).

**Spinuris zapterygis** Gómez del Prado-Rosas & Euzet, 1999

**Site of infection.** Gills.
**Locality.** BAJA CALIFORNIA SUR: Bahía Almejas\(^\text{TL}\): *Zapteryx exasperata\(^\text{TH}\)* (see Gómez del Prado-Rosas and Euzet 1999\(^\text{OR}\)).
**Specimens in collections.** BM(NH) (1997.1.28.1); CNHE (2975-6); CPMHN-UABCS (54); MNHN (547HF Tk80); USNPC (87037).
Cestoda Rudolphi, 1808
Anthocephaliidae Ruhnke, Caira & Cox, 2015

**Anthocephalum currani** Ruhnke & Seaman, 2009

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles, Puertecitos: *Dasyatis brevis* (see Ruhnke and Seaman 2009); Bahía de Los Ángeles: *Dasyatis dipterura* (see Ruhnke et al. 2015). BAJA CALIFORNIA SUR: Puntarena<sup>TL</sup>: *Dasyatis brevis<sup>TH</sup>* (see Ruhnke and Seaman 2009<sup>OR</sup>).

**Specimens in collections.** CNHE (6234-5); USNPC (100993).

**Notes.** This species was identified as *Anthocephalum* n. sp. 2. in Olson et al.’s (1999) phylogenetic analysis.

**Anthocephalum duszynskii** Ruhnke, 1994

**Site of infection.** Spiral valve.
**Locality.** SONORA: Puerto Peñasco (Bahía Cholla)<sup>TL</sup>: *Urolophus halleri<sup>TH</sup>* (see Ruhnke 1994<sup>OR</sup>).

**Specimens in collections.** HWML (37095); USNPC (83437).

**Anthocephalum lukei** Ruhnke & Seaman, 2009

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles, Puertecitos<sup>TL</sup>: *Dasyatis longa<sup>TH</sup>* (see Ruhnke and Seaman 2009<sup>OR</sup>). BAJA CALIFORNIA SUR: Bahía de La Paz: *Dasyatis longa* (see Ruhnke and Seaman 2009).

**Specimens in collections.** CNHE (6232-3); USNPC (100995).

**Notes.** This species was identified as *Anthocephalum* n. sp. 1. in the Olson et al.’s (1999) phylogenetic analysis.

**Anthocephalum michaeli** Ruhnke & Seaman, 2009

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Dasyatis longa* (see Ruhnke and Seaman 2009); Isla San Esteban: *Urolophus maculatus* (see Caira et al. 2001). BAJA CALIFORNIA SUR: Bahía de La Paz, Loreto<sup>TL</sup>, Puntarena, San José del Cabo: *Dasyatis longa<sup>TH</sup>* (see Ruhnke and Seaman 2009<sup>OR</sup>).

**Specimens in collections.** CNHE (6230-1); LRP (4232); USNPC (100998-9, 101000).
Notes. Specimens from Isla San Esteban, identified as *A. duszynskii* by Caira et al. (2001), were re-identified as *A. michaeli* by Ruhnke and Seaman (2009).

**Cathetocephalidae Dailey & Overstreet, 1973**

*Cathetocephalus resendezí* Caira, Mega & Ruhnke, 2005

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Carcharhinus leucas* (see Caira et al. 2005). Specimens in collections. CNHE (5300).

*Cathetocephalus thatcheri* Dailey & Overstreet, 1973

**Site of infection.** Spiral valve.
**Locality.** VERACRUZ: Playa Chachalacas: *Carcharhinus leucas* (see Méndez and Dorantes 2013).
**Specimens in collections.** CNHE (6860).

**Echeneibothriidae de Beauchamp, 1905**

*Echeneibothrium sp.*

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Santa Rosalía: *Myliobatis californicus* (see Caira et al. 1999), *Raja velezi* (see Healy et al. 2009).
**Specimens in collections.** LRP (4217).
**Notes.** This material was recorded as *Discobothrium* sp., but according to Euzet (1994), this genus is a synonym of *Echeneibothrium*.

**Echinobothriidae Perrier, 1897**

*Echinobothrium fautleyae* Tyler & Caira, 1999

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Rhinoptera steindachneri* (see Tyler and Caira 1999); Puertecitos: *Myliobates californica, Rhinoptera steindachneri* (see Tyler and Caira 1999). BAJA CALIFORNIA SUR: Loreto: *Rhinoptera steindachneri* (see Tyler and Caira 1999); Puntarena: *Rhinoptera steindachneri*
(see Tyler and Caira 1999); Santa Rosalía: *Myliobates californica, Rhinoptera steindachneri* (see Tyler and Caira 1999).

**Specimens in collections.** CNHE (3340-1); HWML (33910-11); USNPC (88217-19).

**Echinobothrium hoffmanorum** Tyler, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de San Francisquito: *Urolophus halleri, Urolophus maculatus* (see Tyler 2001); Isla San Esteban*: Urolophus maculatus* (see Tyler 2001). BAJA CALIFORNIA SUR: Puntarena: *Urobatis concentricus* (see Tyler 2001).

**Specimens in collections.** CNHE (3916-9).

**Echinobothrium mexicanum** Tyler & Caira, 1999

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles*: Myliobatis longirostris*, *Myliobatis californica* (see Tyler and Caira 1999); Puertecitos: *Myliobatis californica* (see Tyler and Caira 1999). BAJA CALIFORNIA SUR: Loreto: *Myliobatis longirostris, Myliobatis californica* (see Tyler and Caira 1999); Santa Rosalía: *Myliobatis longirostris* (see Tyler and Caira 1999).

**Specimens in collections.** CNHE (3343-5); HWML (33912-14); USNPC (88220-21).

**Echinobothrium rayallemani** Tyler, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles*: Rhinobatos leucorhynchus*, *Rhinobatos leucorhynchus* (see Tyler 2001). BAJA CALIFORNIA SUR: Santa Rosalía: *Rhinobatos leucorhynchus* (see Tyler 2001).

**Specimens in collections.** CNHE (3920-22).

**Escherbothriidae** Ruhnke, Caira & Cox, 2015

**Escherbothrium molinae** Berman & Brooks, 1994

**Site of infection.** Spiral valve.

**Locality.** GUERRERO: Bahía de Acapulco: *Urotrygon sp.* (see Zaragoza-Tapia et al. 2013).

**Specimens in collections.** CNHE (8513-4); HWML (49850-3).
Eutetrarhynchidae Guiart, 1927

*Dollfusiella litocephalus* (Heinz & Dailey, 1974) Beveridge, Neifar & Euzet, 2004

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de San Quintín: *Triakis semifasciata* (see Heinz and Dailey 1974).

**Specimens in collections.** USNPC (072672).

**Notes.** The original denomination of this species was *Eutetrarhynchus litocephalus*, but it was transferred to the genus *Dollfusiella* by Beveridge et al. (2004).

*Dollfusiella cortezensis* (Friggsens & Duszynski, 2005) Schaeffner, 2014

**Site of infection.** Spiral valve.

**Locality.** SONORA: Puerto Peñasco: *Urolophus halleri* (see Friggens and Duszynski 2005). *U. halleri*.

**Specimens in collections.** USNPC (92215).

**Notes.** Notes. Published as *Eutetrarhynchus* sp. in Friggens and Brown (2005). The original denomination of this species was *Eutetrarhynchus cortezensis*, but it was transferred to the genus *Dollfusiella* by Schaeffner (2014).

*Fellicocestus mobulae* Campbell & Beveridge, 2006

**Site of infection.** Gall bladder.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz: *Mobula* sp. (see Campbell and Beveridge 2006a); Puntarena: *Mobula japonica* (see Campbell and Beveridge 2006a). *M. japonica*.

**Specimens in collections.** CNHE (5452); USNPC (97899, 9700).

Eutetrarhynchidae gen. sp.

**Site of infection.** Spiral valve.

**Locality.** VERACRUZ: Playa de Chachalacas: *Carcharhinus leucas* (see Mendez and Dorantes 2013).

**Specimens in collections.** CNHE (6169).

*Hemionchos maior* Campbell & Beveridge, 2006

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\(^\text{TL}\): *Mobula japonica*\(^\text{TH}\) (see Campbell and Beveridge 2006a\(^\text{OR}\)).

**Specimens in collections.** CNHE (5466-7).

---

**Hemionchos mobulae** Campbell & Beveridge, 2006

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\(^\text{TL}\), Puntarena: *Mobula japonica*\(^\text{TH}\) (see Campbell and Beveridge 2006a\(^\text{OR}\)): Loreto, Santa Rosalía: *Mobula munkiana* (see Campbell and Beveridge 2006a).

**Specimens in collections.** CNHE (5465-6); LRP (3961); USNPC (97908-9).

---

**Hemionchos striatus** Campbell & Beveridge, 2006

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\(^\text{TL}\): *Mobula japonica, Mobula thurstoni*\(^\text{TH}\) (see Campbell and Beveridge 2006a\(^\text{OR}\)); Loreto: *Mobula thurstoni, Myliobatis californica* (see Campbell and Beveridge 2006a).

**Specimens in collections.** CNHE (5460); LRP (3948); USNPC (97904-6).

---

**Mecistobothrium myliobati** Heinz & Dailey, 1974

**Site of infection.** Spiral valve.

**Locality.** SONORA: Puerto Peñasco: *Urolophus halleri* (see Friggens and Brown 2005).

**No specimens in collections.**

---

**Mobulocestus lepidoscolex** Campbell & Beveridge, 2006

**Site of infection.** Nephridial system.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\(^\text{TL}\): *Mobula thurstoni*\(^\text{TH}\) (see Campbell and Beveridge 2006a\(^\text{OR}\)).

**Specimens in collections.** CNHE (5458); USNPC (97902).

---

**Mobulocestus mollis** Campbell & Beveridge, 2006

**Site of infection.** Cloaca.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\(^\text{TL}\): *Mobula thurstoni*\(^\text{TH}\) (see Campbell and Beveridge 2006a\(^\text{OR}\)).

**Specimens in collections.** CNHE (5456).
**Mobulocestus nephriditis** Campbell & Beveridge, 2006

**Site of infection.** Nephridial system.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz\textsuperscript{TH}: *Mobula thurstonii*\textsuperscript{TH} (see Campbell and Beveridge 2006\textsuperscript{OR}).

**Specimens in collections.** CNHE (5454); USNPC (97901).

**Oncomegas paulinae** Toth, Campbell & Schmidt, 1992

**Site of infection.** Spiral valve.

**Locality.** SONORA: Puerto Peñasco\textsuperscript{TH}: *Urolophus halleri*\textsuperscript{TH} (see Toth et al. 1992\textsuperscript{OR}).

**Specimens in collections.** BMNH (1991.10.30.1-3); USNPC (082186).

**Parachristianella dimegacantha** Krause, 1959

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Bahía de la Paz: *Dasyatis longa* (see Campbell and Beveridge 2007); Loreto: *Urotrygon simulatrix* (see Campbell and Beveridge 2007); San José del Cabo: *Sphyrna zygaena* (see Campbell and Beveridge 2007).

**Specimens in collections.** USNPC (97925-7).

**Parachristianella parva** Campbell & Beveridge, 2007

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Santa Rosalía\textsuperscript{TH}: *Urolophus maculatus*\textsuperscript{TH} (see Campbell and Beveridge 2007\textsuperscript{OR}).

**Specimens in collections.** CNHE (5472).

**Parachristianella trygoni** Dollfus, 1946

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles\textsuperscript{TH}: *Dasyatis brevis*\textsuperscript{TH} (see Campbell and Beveridge 2007\textsuperscript{OR}). BAJA CALIFORNIA SUR: Loreto: *Mobula munkiana* (see Campbell and Beveridge 2007).

**Specimens in collections.** USNPC (97923-4).
Prochristianella minima Hainz & Daily, 1974

Site of infection. Spiral valve.
Locality. SONORA: Puerto Peñasco: Urolophus halleri (see Friggens and Brown 2005).
Specimens in collections. USNPC (92211, 92216).

Prochristianella multidum Friggens & Duzynski, 2005

Site of infection. Spiral valve.
Locality. SONORA: Puerto Peñasco: Urolophus halleri\(^{\text{TH}}\) (see Friggens and Duzynski 2005\(^{\text{OR}}\)).
Specimens in collections. USNPC (92218-9).

Pseudochristianella elegantissima Campbell & Beveridge, 2006

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA: Puertecitos: Dasyatis brevis (see Campbell and Beveridge 2006b). BAJA CALIFORNIA SUR: Bahía de la Paz\(^{\text{TL}}\): Dasyatis brevis\(^{\text{TH}}\) (see Campbell and Beveridge 2006b\(^{\text{OR}}\)); San José del Cabo: Dasyatis longa (see Campbell and Beveridge 2006b).
Specimens in collections. CNHE (5468); USNPC (97915-6).

Pseudochristianella nudiscula Campbell & Beveridge, 2006

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: Myliobatis longirostris, Rhinobatos productus (see Campbell and Beveridge 2006b). BAJA CALIFORNIA SUR: Santa Rosalía\(^{\text{TL}}\): Zapteryx exasperata, Rhinobatos productus\(^{\text{TH}}\) (see Campbell and Beveridge 2006b\(^{\text{OR}}\)); San José del Cabo: Dasyatis longa (see Campbell and Beveridge 2006b).
Specimens in collections. CNHE (5470); USNPC (97917, 97921-2).

Lacistorhynchidae Guiart, 1927

Callitetrarhynchus gracilis (Rudolphi, 1819)

Site of infection. Spiral valve.
Locality. VERACRUZ: Playa Chachalacas: Carcharhinus leucas (see Méndez and Dorantes 2013).
Specimens in collections. CNHE (6867).
Floriceps caballeroi Cruz-Reyes, 1977

**Site of infection.** Spiral valve.

**Locality.** SONORA: Laguna de Agiabampo\textsuperscript{TL}: *Negaprion brevirostris*\textsuperscript{TH} (see Cruz-Reyes 1977\textsuperscript{OR}).

**Specimens in collections.** CNHE (479-80).

**Notes.** According to Palm (2004), this material is a synonym of *F. saccatus*. However, the poor condition of the type material re-examined during the present study precludes any conclusion about the taxonomic status of this species.

Floriceps saccatus Cuvier, 1817

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: NA: *Notorhynchus cepedianus* (see Heinz and Dailey 1974).

No specimens in collections.

Litobothriidae Dailey, 1969

*Litobothrium aenigmaticum* Caira, Jensen, Waeschenbach & Littlewood, 2014

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Santa María\textsuperscript{TL}, Santa Rosalía: *Alopias pelagicus*\textsuperscript{TH} (see Caira et al. 2014\textsuperscript{aOR}).

**Specimens in collections.** CNHE (8941-4).

*Litobothrium amplifica* (Kurochkin & Slankis, 1973) Euzet, 1994

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Alopias pelagicus* (see Olson and Caira 2001). BAJA CALIFORNIA SUR: Santa Rosalía: *Alopias pelagicus* (see Olson and Caira 2001). OAXACA: Golfo de Tehuantepec\textsuperscript{TL}: *Alopias superciliosus*\textsuperscript{TH} (see Kurochkin and Slankis 1973\textsuperscript{OR}).

**Specimens in collections.** BMNH (2000.3.7.8.10); CNHE (4051); TINRO (72020).

**Notes.** This species was described as a member of the genus *Renyxa*, but Euzet (1994) considered *Renyxa* as a synonym of *Litobothrium*.

*Litobothrium daileyi* Kurochkin & Slankis, 1973

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Alopias pelagicus* (see Olson and Caira 2001). BAJA CALIFORNIA SUR: Santa Rosalía: *Alopias pelagicus* (see Olson and Caira 2001). OAXACA: Golfo de Tehuantepec<sup>TL</sup>: *Alopias superciliosus<sup>TH</sup>* (see Kurochkin and Slankis 1973<sup>OR</sup>).

**Specimens in collections.** CNHE (4050); TINRO (72012).

**Litobothrium janovyi** Olson & Caira, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Santa Rosalía<sup>TL</sup>: *Alopias superciliosus<sup>TH</sup>* (see Olson and Caira 2001<sup>OR</sup>).

**Specimens in collections.** CNHE (4052-3).

**Litobothrium nickoli** Olson & Caira, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles<sup>TL</sup>: *Alopias pelagicus<sup>TH</sup>* (see Olson and Caira 2001<sup>OR</sup>). BAJA CALIFORNIA SUR: Santa Rosalía: *Alopias pelagicus* (see Caira et al. 2014a).

**Specimens in collections.** CNHE (4054-55); LRP (8321).

**Lecanicephalidea incertae sedis** (Family)

**Aberrapex senticosus** Jensen, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Santa Rosalía<sup>TL</sup>: *Myliobatis californica<sup>TH</sup>* (see Jensen 2001<sup>OR</sup>).

**Specimens in collections.** CNHE (4188); HWML (16374); USNPC (91208).

**Notes.** This species appears as *Discobothrium* n. sp. in Caira et al. (1999) and Caira et al. (2001).

**Healyum harenamica** Jensen, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: Punta Arena<sup>TL</sup>: *Mobula japonica<sup>TH</sup>* (see Jensen 2001<sup>OR</sup>).

**Specimens in collections.** CNHE (4186); HWML (16376); USNPC (91212).
Healyum pulvis Jensen, 2001

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA SUR: Punta Arena\textsuperscript{TL}: Mobula japonica\textsuperscript{TH} (see Jensen 2001\textsuperscript{OR}).
Specimens in collections. CNHE (4184); HWML (16377); USNPC (91213).
Notes. This taxon appears as New genus 3 n. sp., in the phylogenetic analysis done by Caira et al. (2001).

Paraberrapex manifestus Jensen, 2001

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA SUR: Santa Rosalía\textsuperscript{TL}: Squatina californica\textsuperscript{TH} (see Jensen 2001\textsuperscript{OR}).
Specimens in collections. CNHE (4179); HWML (16375); USNPC (91209).
Notes. Paraberrapex manifestus was referred to as New genus 2 n. sp. in the phylogenetic analysis done by Caira et al. (2001).

Quadcuspibothrium francisi Jensen, 2001

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA SUR: Punta Arena\textsuperscript{TL}: Mobula japonica\textsuperscript{TH} (see Jensen 2001\textsuperscript{OR}).
Specimens in collections. CNHE (4182); HWML (16378); USNPC (91214).
Notes. This species was referred to as New genus 4 n. sp. in the phylogenetic analysis done by Caira et al. (2001).

TetragONOcephalidae Yamaguti, 1959

Tylocephalum sp.

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: Rhinoptera steindachneri (see Caira et al. 1999). GUERRERO: Bahía de Acapulco: Rhinoptera steindachneri (see Carbajal-Violante 2012).
Specimens in collections. CNHE (8295-8296).
Onchoprotoceopalidea incertae sedis (Family)

*Acanthobothrium bajaensis* Appy & Dailey, 1973

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de San Quintín\textsuperscript{TL}: *Heterodontus francisci*\textsuperscript{TH} (see Appy and Dailey 1973\textsuperscript{OR}).

**Specimens in collections.** USNPC (72567-8).

*Acanthobothrium bullardi* Goshroy & Caira, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles\textsuperscript{TL}, Puertecitos: *Dasyatis brevis*\textsuperscript{TH} (see Goshroy and Caira 2001\textsuperscript{OR}). BAJA CALIFORNIA SUR: Santa Rosalía: *Dasyatis brevis* (see Goshroy and Caira 2001).

**Specimens in collections.** CNHE (4045-6); LRP (2060–2062); USNPC (90466-8).

*Acanthobothrium cleofanus* Monks, Brooks & Pérez-Ponce de León, 1996

**Site of infection.** Spiral valve.

**Locality.** JALISCO: Bahía de Chamela\textsuperscript{TL}: *Dasyatis longa*\textsuperscript{TH} (see Monks et al. 1996\textsuperscript{OR}).

**Specimens in collections.** CNHE (2670-1); HWML; MNHG INV.

*Acanthobothrium dasi* Goshroy & Caira, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Puertecitos\textsuperscript{TL}: *Dasyatis brevis*\textsuperscript{TH} (see Goshroy and Caira 2001\textsuperscript{OR}).

**Specimens in collections.** CNHE (4043-4); HWML (15549-51); LRP (2051-4); USNPC (90463-5).

*Acanthobothrium dollyae* Caira & Burge, 2001

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles\textsuperscript{TL}, Isla San Esteban: *Diplobatis ommata*\textsuperscript{TH} (see Caira and Burge 2001\textsuperscript{OR}). BAJA CALIFORNIA SUR: Punta Arena: *Diplobatis ommata* (see Caira and Burge 2001).

**Specimens in collections.** CNHE (4169-70); LRP (2097-2101); USNPC (90837-9).
A checklist of helminth parasites of Elasmobranchii in Mexico

Acanthobothrium maryanskii Caira & Burge, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA SUR: Loreto\textsuperscript{TL}, Punta Arena: Diplobatis ommata\textsuperscript{TH} (see Caira and Burge 2001\textsuperscript{OR}).
**Specimens in collections.** CNHE (4171-2); LRP (2012-3); USNPC (90840-1).

Acanthobothrium olseni Dailey & Mudry, 1968

**Site of infection.** Spiral valve.
**Locality.** Sonora: Puerto Peñasco: Urolophus halleri (see Friggens and Brown 2005).
No specimens in collections.

Acanthobothrium parviuncinatum Young, 1954

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Puertecitos: Urolophus halleri (see Caira et al. 1999). SONORA: Puerto Peñasco: Urolophus halleri (see Friggens and Brown 2005).
**Specimens in collections.** CNHE (4171-2); LRP (2012-3); USNPC (90840-1).

Acanthobothrium puertecitense Caira & Zahner, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Puertecitos: Heterodontus francisci (see Caira and Zahner 2001).
**Specimens in collections.** CNHE (4175-6); LRP (2105-6); USNPC (90843).
**Notes.** Caira et al. (2001) recorded this species as *Acanthobothrium* n. sp. 1.

Acanthobothrium rajivi Goshroy & Caira, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Puertecitos\textsuperscript{TL}: Dasyatis brevis\textsuperscript{TH} (see Goshroy and Caira 2001\textsuperscript{OR}).
**Specimens in collections.** CNHE (4043-4); HWML (15552); LRP (2055-6); USNPC (90461).
Acanthobothrium royi Caira & Burge, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA SUR: Loreto, Punta Arena\(^{TL}\): *Diplobatis ommata*\(^{TH}\) (see Caira and Burge 2001\(^{OR}\)).
**Specimens in collections.** CNHE (4173-4); LRP (2014); USNPC (90842).

Acanthobothrium santarosaliense Caira & Zahner, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA SUR: Santa Rosalía\(^{TL}\): *Heterodontus francisci*\(^{TH}\) (see Caira and Zahner 2001\(^{OR}\)).
**Specimens in collections.** CNHE (4177-78); LRP (2107); USNPC (90844).

Acanthobothrium soberoni Goshroy & Caira, 2001

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles, Puertecitos\(^{TL}\): *Dasyatis brevis*\(^{TH}\) (see Goshroy and Caira 2001\(^{OR}\)). BAJA CALIFORNIA SUR: Loreto: *Dasyatis brevis* (see Goshroy and Caira 2001).
**Specimens in collections.** CNHE (4040-1); HWML (15548); LRP (2057-9); USNPC (90462).

Acanthobothrium sp.

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Urolophus halleri* (see Cair et al. 2001), Puertecitos: *Heterodontus francisci* (see Cair et al. 2001). BAJA CALIFORNIA SUR: Loreto: *Dasyatis brevis* (see Goshroy and Caira 2001). NA: NA: *Dasyatis longa* (see Healy et al. 2009). SONORA: Puerto Peñasco: *Urolophus halleri* (see Friggens and Brown 2005).
**No specimens in collections.**

No specimens in collections

Acanthobothroides sp.

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Dasyatis brevis* (see Goshroy and Caira 2001). BAJA CALIFORNIA SUR: San José del Cabo: *Dasyatis brevis* (see Goshroy and Caira 2001).
Specimens in collections. CNHE (4048); USNPC (90439).

Notes. This material probably represents a new species as it differs from both *A. thorsoni* and *A. pacificus* (see Goshroy and Caira 2001).

**Onchobothrium sp.**

Site of infection. Intestine.

Locality. BAJA CALIFORNIA: Ensenada: *Urolophus halleri* (HWML).

Specimens in collections. HWML (31324).

**Phoreibothrium sp.**

Site of infection. Spiral valve.

Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: *Carcharhinus leucas* (see Caira et al. 2001). NA: Golfo de México (Mexico): *Sphyra mokarran* (see Caira et al. 2001). VE-RACRUZ: Playa Chachalacas: *Carcharhinus leucas* (see Mendez and Dorantes 2013).

Specimens in collections. CNHE (6866).

**Platybothrium angelbahiense** Healy, 2003

Site of infection. Spiral valve.

Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: *Carcharhinus leucas* (see Healy 2003). TL: *Carcharhinus leucas*TH (see Healy 2003OR).

Specimens in collections. CNHE (4727-9); LRP (3213-3215); USNPC (92236).

**Platybothrium auriculatum** Yamaguti, 1952

Site of infection. Intestine, spiral valve, stomach.

Locality. BAJA CALIFORNIA SUR: Bahía de La Paz, San Isidro: *Prionace glauca* (see Healy 2003); Las Barrancas, Punta Abreojos, Punta Belcher: *Prionace glauca* (see Méndez 2005).

Specimens in collections. CNHE (4730).

**Platybothrium sp.**

Site of infection. Spiral valve.

Locality. BAJA CALIFORNIA: Bahía de Los Ángeles: *Carcharhinus leucas* (see Caira et al. 1999).
Specimens in collections. CSMNH.
Notes. Caira et al. (1999) identified this material as Platybothrium cervinum, but according to Healy (2003) these specimens represent an undescribed species.

**Platybothrium tantulum** Healy, 2003

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Sphyrna lewini, Sphyrna cygaena* (see Healy 2003). BAJA CALIFORNIA SUR: San José del Cabo: *Sphyrna lewini* (see Healy 2003).
**Specimens in collections.** CNHE (4731-3).

**Prosobothrium armigerum** Cohn, 1902

**Site of infection.** Intestine, stomach.
**Locality.** BAJA CALIFORNIA SUR: Punta Abreojos, Punta Belcher: *Prionace glauca* (see Méndez 2005).
**No specimens in collections.**

**No specimens in collections**

**Otobothriidae** Dollfus, 1942

**Otobothrium** sp.

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA SUR: San José del Cabo: *Sphyrna zygaena* (see Schaeffner and Beveridge 2013). VERACRUZ: Playa Chachalacas: *Carcharhinus leucas* (see Méndez and Dorantes 2005).
**Specimens in collections.** CNHE (6863-3).

**Phyllobothriidae** Braun, 1900

**Orygmatobothrium** sp.

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Puertecitos: *Mustelus henlei* (see Caira et al. 1999).
**No specimens in collections.**
Paraorygmatobothrium sp.

Site of infection. Spiral valve.
Locality. VERACRUZ: Playa Chachalacas: Carcharhinus leucas (see Méndez and Dorantes 2013).
Specimens in collections. CNHE (6864-5).
Notes. This material was recorded as Paraorygmatobothrium sp. 1 and sp. 2.

Phyllobothrium hallericola Church & Schmidt, 1990

Site of infection. Spiral valve.
Locality. SONORA: Puerto Peñasco\textsuperscript{TL}: Urolophus halleri\textsuperscript{TH} (see Church and Schmidt 1990\textsuperscript{OR}).
Specimens in collections. USNPC (81051-2).
Notes. The accession number published by Church and Schmidt (1990) is wrong.

Phyllobothrium sp.

Site of infection. Intestine, spiral valve, stomach.
Locality. BAJA CALIFORNIA SUR: Las Barrancas, Punta Abreojos, Punta Belcher: Prionace glauca (see Méndez 2005). GUERRERO: Bahía de Acapulco: Rhinoptera steindachneri (see Carbajal-Violante 2012). SONORA: Puerto Peñasco: Urolophus halleri (see Friggens and Brown 2005, Church and Schmidt 1990).
Specimens in collections. CNHE (8291-2); USNPC (81053).
Notes. The accession number published by Church and Schmidt (1990) is wrong.

Pterobothriidae Pintner, 1931

Pterobothrioides carvajali Campbell & Beveridge, 1997

Site of infection. Spiral valve.
Locality. BAJA CALIFORNIA: Puertecitos\textsuperscript{TL}: Dasyatis longa\textsuperscript{TH} (see Campbell and Beveridge 1997\textsuperscript{OR}).
Specimens in collections. CNHE (3142); USNPC (85472).
Rhinebothriidea incertae sedis (Family)

*Serendip danbrooksi* Monks, Zaragoza-Tapia, Pulido-Flores & Violante-González, 2015

**Site of infection.** Spiral valve.

**Locality.** GUERRERO: Bahía de Acapulco\(^{\mathrm{TL}}\): *Rhinoptera steindachneri*\(^{\mathrm{TH}}\) (Monks et al. 2015\(^{\mathrm{OR}}\)). SINALOA: Mazatlán: *Rhinoptera steindachneri* (Monks et al. 2015).

**Specimens in collections.** CNHE (8293-4; 9725-7); HWML (75091-104); MNGH-PLAT (90513-5).

**Notes.** This species appears as *Serendip* sp. in Carbajal-Violante (2012). According to Ruhnke et al. (2015) the genus *Serendip* is clearly a candidate for membership in the Rhinebothriidea; a molecular analysis will be necessary to assign it to family level.

Rhinebothriidae Euzet, 1953

*Glyphobothrium zwerneri* Williams & Campbell, 1977

**Site of infection.** Spiral valve.

**Locality.** CAMPECHE: Ciudad del Carmen: *Rhinoptera bonasus* (see Pulido-Flores and Monks 2014).

**Specimens in collections.** CNHE (8838).

**Notes.** The inclusion of this cestode species in Rhinebothriidae follows Appeltans et al. (2012).

*Rhinebothrium chollaensis* Friggens & Duszynski, 2005

**Site of infection.** Spiral valve.

**Locality.** SONORA: Puerto Peñasco (Bahía Cholla)\(^{\mathrm{TL}}\): *Urolophus halleri*\(^{\mathrm{TH}}\) (see Friggens and Duszynski 2005\(^{\mathrm{OR}}\)).

**Specimens in collections.** USNPC (92213-4).

**Notes.** Published as *Rhinebothrium* sp. in Friggens and Brown (2005).

*Rhinebothrium gravidum* Friggens & Duszynski, 2005

**Site of infection.** Spiral valve.

**Locality.** SONORA: Puerto Peñasco\(^{\mathrm{TL}}\): *Urolophus halleri*\(^{\mathrm{TH}}\) (see Friggens and Duszynski 2005\(^{\mathrm{OR}}\)).

**Specimens in collections.** USNPC (92212).

**Notes.** Published as *Rhinebothrium* sp. in Friggens and Brown (2005).
**Rhinebothrium maccallumi** Linton, 1924

*Site of infection.* Spiral valve.

*Locality.* NA: *Dasyatis americana* (see Healy et al. 2009).

*No specimens in collections.*

*Notes.* Species identification requires verification according to Healy et al. (2009).

**Rhinebothrium sp.**

*Site of infection.* Spiral valve.

*Locality.* BAJA CALIFORNIA: Puertecitos: *Dasyatis brevis* (see Healy et al. 2009).

BAJA CALIFORNIA SUR: Loreto: *Urolophus maculatus* (see Caira et al. 1999); San José del Cabo: *Dasyatis longa* (see Healy et al. 2009).

*Specimens in collections.* LRP (3893, 3896).

*Notes.* The records of Healy et al. (2009) of *D. brevis* and *D. longa* were made as *Rhinebothrium* sp.5 and *Rhinebothrium* sp.6, respectively.

**Rhinebothrium urobatidium** (Young, 1955) Appy & Dailey, 1977

*Site of infection.* Spiral valve.

*Locality.* SONORA: Puerto Peñasco: *Urolophus halleri* (see Friggens and Brown 2005).

*Specimens in collections.* USNPC (92202-5).

**Scalithrium sp.**

*Site of infection.* Spiral valve.

*Locality.* BAJA CALIFORNIA SUR: San José del Cabo: *Dasyatis longa* (see Healy et al. 2009).

*Specimens in collections.* LRP (3895).

*Notes.* This record appears as *Scalithrium* n. sp. in Healy et al. (2009).

**Rhinoptericolidae** Carvajal & Campbell, 1975

**Rhinoptericola megacantha** Carvajal & Campbell, 1975

*Site of infection.* Spiral valve.

*Locality.* GUERRERO: Bahía de Acapulco: *Rhinoptera steindachneri* (see Carbajal-Violante 2012).

*Specimens in collections.* CNHE (8297-8).
Rhinoptericola sp.

**Site of infection.** Stomach.
**Locality.** GUERRERO: Bahía de Acapulco: *Rhinoptera steindachneri* (see Carbajal-Violante 2012).

**Specimens in collections.** CNHE (8299-8300).

Tentaculariidae Poche, 1926

**Nybelinia anthicosum** Heinz & Dailey, 1974

**Site of infection.** Spiral valve, stomach.
**Locality.** BAJA CALIFORNIA: Playa María: *Heterodontus francisci* (see Heinz and Dailey 1974). SONORA: Bahía de San Carlos: *Heterodontus francisci* (see Heinz and Dailey 1974).

**Specimens in collections.** USNPC (72675).

**Nybelinia sp.**

**Site of infection.** Stomach.
**Locality.** BAJA CALIFORNIA SUR: Las Barrancas: *Prionace glauca* (see Méndez 2005).

No specimens in collections.

“Tetraphyllidea” incertae sedis (Family)

**Anthobothrium sp.**

**Site of infection.** Intestine, stomach.
**Locality.** BAJA CALIFORNIA SUR: Punta Abreojos, Punta Belcher, Las Barrancas: *Prionace glauca* (see Méndez 2005).

No specimens in collections.

**Caulobothrium opisthorchis** Riser, 1955

**Site of infection.** Spiral valve.
**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Myliobatis californicus* (see Healy et al. 2009).

**Specimens in collections.** LRP (3910).
Caulobothrium sp.

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Myliobatis californicus* (see Healy et al. 2009).

**Specimens in collections.** LRP (3012).

**Notes.** According to Healy et al. (2009) this material represents an undescribed species; recorded as *Caulobothrium* n. sp. 1 in Caira et al. (1999) and Caira et al. (2001).

Duplicibothrium cairae Ruhnke, Curran & Holbert, 2000

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de los Ángeles, Puertecitos: *Rhinoptera steindachneri* (see Ruhnke et al. 2000). BAJA CALIFORNIA SUR: Santa Rosalía: *Rhinoptera steindachneri* (see Ruhnke et al. 2000).

**Specimens in collections.** CNHE (3846-7); HWML (15275, 15276); USNPC (89726-7).

**Notes.** This species was reported as *Duplicibothrium* n. sp. 1 in the phylogenetic analysis done by Olson et al. (1999).

Duplicibothrium paulum Ruhnke, Curran & Holbert, 2000

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de los Ángeles, Puertecitos: *Rhinoptera steindachneri* (see Ruhnke et al. 2000).

**Specimens in collections.** CNHE (3848); HWML (15277, 15278); USNPC (89728-9).

**Notes.** This species was reported as *Duplicibothrium* n. sp. 2 in the phylogenetic analysis done by Olson et al. (1999).

Pedibothrium brevispine Linton, 1909

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA SUR: San José del Cabo: *Ginglymostoma cirratum* (see Caira and Euzet 2001).

**Specimens in collections.** CNHE (4191).

Pedibothrium manteri Caira, 1992

**Site of infection.** Spiral valve.
Locality. BAJA CALIFORNIA SUR: San José del Cabo: *Ginglymostoma cirratum* (see Caira and Euzet 2001).

**Specimens in collections.** CNHE (4190).

*Symcallio evani* (Caira, 1985) Bernot, Caira & Pickering, 2015

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía de Los Ángeles: *Mustelus lunulatus* (see Nasin et al 1997); Puertecitos\(^{TL}\): *Mustelus lunulatus*\(^{TH}\) (see Caira 1985\(^{OR}\)). BAJA CALIFORNIA SUR: San José del Cabo, Santa Rosalía: *Mustelus lunulatus* (see Nasin et al. 1997).

**Specimens in collections.** CNHE (3071); USNPC (78600, 87127).

**Notes.** This species was described as *Calliobothrium evani* and recently transferred to *Symcallio* by Bernot et al. (2015). Type host of *S. evani* was determined by Caira (1985) as “unidentified shark of the family Carcharhinidae”; its accurate specific identity was established by Nasin et al. (1997).

*Symcallio riseri* (Nasin, Caira & Euzet, 1997) Bernot, Caira & Pickering, 2015

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Puertecitos: *Mustelus henlei* (see Caira 1985, Nasin et al. 1997). BAJA CALIFORNIA SUR: Santa Rosalía\(^{TL}\): *Mustelus henlei*\(^{TH}\) (see Nasin et al. 1997\(^{OR}\)).

**Specimens in collections.** CNHE (3068-70); HWML (22537).

**Notes.** Specimens from Puertecitos were identified by Caira (1985) as *Calliobothrium lintoni* Euzet, 1954 and re-identified by Nasin et al. (1997) as *C. riseri*. This species was recently transferred to *Symcallio* by Bernot et al. (2015).

Nematoda Cobb, 1932

Gnathostomatidae Lane, 1923

*Echinocephalus jenzeni* Hoberg, Brooks, Molina & Erbe, 1998

**Site of infection.** Spiral valve.

**Locality.** CHIAPAS: Laguna Mar Muerto: *Himantura pacifica* (see Hoberg et al. 1998).

**Specimens in collections.** CNHE (2642).
*Echinocephalus pseudouncinatus* Millemann, 1951

**Site of infection.** Spiral valve.

**Locality.** BAJA CALIFORNIA: Bahía San Francisquito, Isla Ángel de la Guarda (Puerto Refugio): *Heterodontus francisci* (see Millemann 1963); Bahía San Felipe: *Myliobatis californica* (see Millemann 1963). BAJA CALIFORNIA SUR: Laguna Ojo de Liebre (Guerrero Negro), Punta Abreojos: *Heterodontus francisci* (see Gómez del Prado-Rosas 1984).

**Specimens in collections.** CNHE (2289); USNPC (57448, 57450-2).

---

*Annelida* Lamarck 1809  
*Hirudinea* Lamarck, 1818  
*Piscicilidae* Johnston, 1865

*Piscicilidae* gen. sp.

**Site of infection.** Skin.

**Locality.** BAJA CALIFORNIA: Isla San Esteban: *Zapteryx exasperata* (CNHE).

**Specimens in collections.** CNHE (4027).

**Notes.** This specimen was deposited at the CNHE by Steve Curran as the holotype of the new species *Pseudaustrobdella cairae*, but their description was not published.

---

*Stibarobdella macrothela* (Schmarda, 1861) Llewellyn, 1966

**Site of infection.** Skin.

**Locality.** TAMAULIPAS: Matamoros: *Ginglymostoma cirratum* (CNHE). VERACRUZ: Isla de Sacrificios: Elasmobranquio no determinado (CNHE).

**Specimens in collections.** CNHE (1640, 5572).

---

**Host-parasite list**

*Selachii*  
*ALOPIIIDAE*  
*Alopias pelagicus* Nakamura  
*Litobothrium aeighamaticum* (C)  
*Litobothrium amplifica* (C)  
*Litobothrium daileyi* (C)  
*Litobothrium nickoli* (C)  
*Paronatrema vaginicola* (T)
Alopias superciliosus Lowe
  Litobothrium amplifica (C)
  Litobothrium daleyi (C)
  Litobothrium janovyi (C)

CARCHARHINIDAE

Carcharhinus brachyurus Günther
  Liomos winteri (M)

Carcharhinus leucas (Müller & Henle)
  Cathetocephalus resendezi (C)
  Cathetocephalus thatcheri (C)
  Callitetrarhynchus gracilis (C)
  Eutetrarhynchidae gen. sp. (C)
  Phoreiobothrium sp. (C)
  Platybothrium angeli bahiense (C)
  Platybothrium sp. (C)
  Otobothrium sp. (C)
  Paraorygmatobothrium sp. (C)

Carcharhinus limbatus Müller & Henle
  Staphylorchis pacifica (T)

Negaprion brevirostris (Poey)
  Floriceps caballeroi (C)

Prionace glauca (Linnaeus)
  Anthobothrium sp. (C)
  Helicometrina nimia (T)
  Nybelinia sp. (C)
  Paronatrema vaginicola (T)
  Phyllobothrium sp. (C)
  Platybothrium auriculatum (C)
  Prosobothrium armigerum (C)

GINGLYMOSTOMATIDAE

Ginglymostoma cirratum (Bonnaterre)
  Pedibothrium brevispine (C)
  Pedibothrium manteri (C)
  Stibarobdella macrothela (H)

HETERODONTIDAE

Heterodontus francisci (Girard)
  Acanthobothrium bajaensis (C)
  Acanthobothrium puertecitense (C)
  Acanthobothrium santarosaliense (C)
  Acanthobothrium sp. (C)
  Echinocephalus pseudouncinatus (N)
  Nybelinia anthicosum (C)
Otodistomum veliporum (T)

**Heterodontus mexicanus** Taylor & Castro-Aguirre

  Otodistomum veliporum (T)

**HEXANCHIDAE**

**Notorynchus cepedianus** (Péron)

  Floriceps saccatus (C)

**SPHYRINIDAE**

**Sphyrrna lewini** (Griffith & Smith)

  Loimosina parawilsoni (M)
  Platybothrium tantulum (C)

**Sphyrrna mokarran** (Rüppell)

  Phoreiobothrium sp. (C)

**Sphyrrna zygaena** (L.)

  Otobothrium sp. (C)
  Parachristianella dimegacantha (C)
  Platybothrium tantulum (C)

**SQUATINIDAE**

**Squatina californica** Ayres

  Otodistomum veliporum (T)
  Paraberrapex manifestus (C)

**TRIAKIDAE**

**Galeorhinus galeus** (Linnaeus)

  Staphylorchis pacifica (T)

**Mustelus californicus** Gill

  Calicotre californiensis (M)
  Ptychogonimus megastomum (T)

**Mustelus henlei** (Gill)

  Calliobothrium evani (C)
  Calliobothrium riseri (C)
  Orygmatobothrium sp. (C)
  Otodistomum veliporum (T)

**Mustelus lunulatus** Jordan & Gilbert

  Calliobothrium evani (C)
  Probolitrema richiardii (T)
  Ptychogonimus megastomum (T)

**Triakis semifasciata** Girard

  Dollfusiella litocephalus (C)

**Undetermined shark**

  Staphylorchis pacifica (T)

**Undetermined Elasmobranchii**

  Staphylorchis pacifica (T)
  Stibarobdella macrothela (H)
Batoidea

ANACANTHOBATIDAE

**Anacanthobatis folirostris** Bigelow & Schroeder
  *Calicotrema kroyeri* (M)

DASYATIDAE

**Dasyatis americana** Hildebrand & Schroeder
  *Dendromonocotyle octodiscus* (M)
  *Rhinebothrium maccallumi* (C)

**Dasyatis brevis** (Garman)
  *Acanthobothrium bullardi* (C)
  *Acanthobothrium dasi* (C)
  *Acanthobothrium rajivi* (C)
  *Acanthobothrium soberoni* (C)
  *Acanthobothroides* sp. (C)
  *Anaporrhutum euzeti* (T)
  *Anthocephalum currani* (C)
  *Listrocephalos kearnii* (M)
  *Parachristianella trygonis* (C)
  *Probolitrema richiardii* (T)
  *Prosorhynchus truncatus* (T)
  *Pseudochristianella elegantissima* (C)
  *Rhinebothrium* sp. (C)

**Dasyatis dipterura** (Jordan & Gilbert)
  *Anthocephalum currani* (C)

**Dasyatis longa** (Garman)
  *Acanthobothrium cleofanus* (C)
  *Acanthobothrium* sp. (C)
  *Anaporrhutum euzeti* (T)
  *Anthocephalum lukei* (C)
  *Anthocephalum michaeli* (C)
  *Dasyonchocotyle dasyatis* (M)
  *Listrocephalos wittingtoni* (M)
  *Parachristianella dimegacantha* (C)
  *Probolitrema richiardii* (T)
  *Pseudochristianella elegantissima* (C)
  *Pseudochristianella nudiscula* (C)
  *Pterobothrioides carvajali* (C)
  *Rhinebothrium* sp. (C)
  *Scalithrium* sp. (C)

**Himantura pacifica** Beebe & Tee-Van
  *Echinocephalus jenzeni* (N)
MYLIOBATIDAE

*Aetobatus narinari* Euphrasen
  Decacotyle floridana (M)

*Mobula japonica* (Müller & Henle)
  Fellicocestus mobulae (C)
  Healyum harenamica (C)
  Healyum pulvis (C)
  Hemionchos maior (C)
  Hemionchos mobulae (C)
  Hemionchos striatus (C)
  Quadcuspibothrium francisi (C)
  Syncoelium vermilionense (T)

*Mobula munkiana* Notarbartolo-di-Sciara
  Anaporrhutum euzeti (T)
  Hemionchos mobulae (C)
  Parachristianella trygonis (C)

*Mobula sp.*
  Fellicocestus mobulae (C)

*Mobula thurstoni* (Lloyd)
  Hemionchos striatus (C)
  Mobulocestus lepidoscolex (C)
  Mobulocestus mollis (C)
  Mobulocestus nephriditis (C)
  Nagmia cisloi (T)
  Syncoelium vermilionense (T)

*Myliobatis californica* Gill
  Aberrapex senticosus (C)
  Anaporrhutum euzeti (T)
  Caulobothrium opisthorchis (C)
  Caulobothrium sp. (C)
  Echeneibothrium sp. (C)
  Echinobothrium faustleyae (C)
  Echinobothrium mexicanum (C)
  Echinocephalus pseudouncinatus (N)
  Hemionchos striatus (C)
  Probolitrema richardi (T)

*Myliobatis longirostris* Applegate & Fitch
  Anaporrhutum euzeti (T)
  Echinobothrium mexicanum (C)
  Probolitrema richardi (T)
  Pseudochristianella nudiscula (C)
Rhinoptera bonasus (Mitchill)  
Benedeniella posterocolpa (M)  
Euzetia lamothei (M)  
Glyphobothrium zwerneri (C)

Rhinoptera steindachneri Evermann & Jenkins  
Dasybatotreminae gen. sp. (M)  
Denarycotyle gardneri (M)  
Duplicibothrium caiuae (C)  
Duplicibothrium paulum (C)  
Echinobothrium fautleyae (C)  
Heterocotyle sp. (M)  
Monocotylidae gen. sp. (M)  
Phyllobothrium sp. (C)  
Rhinoptericola megacantha (C)  
Rhinoptericola sp. (C)  
Serendip danbrooksi (C)  
Tylodgehalum sp. (C)

NARCINIDAE

Diplobatis ommata (Jordan & Gilbert)  
Acanthobothrium dollyae (C)  
Acanthobothrium maryanskii (C)  
Acanthobothrium royi (C)  
Anaporrhutum euzeti (T)

Narcine entemedor Jordan & Starks  
Anaporrhutum euzeti (T)  
Nagmia rodmani (T)

RAJIDAE

Dipturus olseni Bigelow & Schroeder  
Calicotyle kroyeri (M)

Raja velezi Chirichigno  
Echeneibothrium sp. (C)

RHINOBATIDAE

Rhinobatos glaucostigma Jordan & Gilbert  
Anoplocotyloides papillatus (M)  
Spinuris mexicana (M)

Rhinobatos lentiginosus Garman  
Paramonilicaecum gen. sp. (T)

Rhinobatos leucorhynchus Günther  
Echinobothrium rayallemani (C)  
Probolitrema richiardii (T)

Rhinobatos productus Ayres  
Anaporrhutum euzeti (T)  
Pseudochristianella nudiscula (C)
A checklist of helminth parasites of Elasmobranchii in Mexico

Spinuris lophosoma (M)

Zapteryx exasperata (Jordan & Gilbert)
  Anaporrhutum euzeti (T)
  Piscicolidae gen. sp. (H)
  Pseudochristianella nudiscula (C)
  Spinuris zapertygis (M)

UROTRYGONIDAE

Urobatis concentricus Osburn & Nichols
  Listrocephalos guberleti (M)
  Echinobothrium hoffmanorum (C)

Urobatis jamaicensis Cuvier
  Dendromonocotyle octodiscus (M)

Urobatis sp.
  Listrocephalos guberleti (M)
  Probolitrema richiardii (T)

Urolophus halleri Cooper
  Acanthobothrium olseni (C)
  Acanthobothrium parviuncinatum (C)
  Acanthobothrium sp. (C)
  Anaporrhutum euzeti (T)
  Anthocephalum duszynskii (C)
  Calicotrema urobati (M)
  Dollfusiella cotezensis (C)
  Echinobothrium hoffmanorum (C)
  Listrocephalos guberleti (M)
  Mecistobothrium myliobati (C)
  Onchobothrium sp. (C)
  Oncomegas paulinae (C)
  Phyllobothrium hallericola (C)
  Phyllobothrium sp. (C)
  Prochristianella minima (C)
  Prochristianella multidum (C)
  Rhinebothrium chollaensis (C)
  Rhinebothrium gravidum (C)
  Rhinebothrium urobatidium (C)

Urolophus maculatus (Garman)
  Acanthobothrium sp. (C)
  Anaporrhutum euzeti (T)
  Anthocephalum michaeli (C)
  Calicotrema urobati (M)
  Echinobothrium hoffmanorum (C)
  Listrocephalos guberleti (M)
  Parachristianella parva (C)
Pleorchis magniporus (T)
Probolitrema richardi (T)
Rhinebothrium sp. (C)

Urotrygon simulatrix Miyake & Eachran
Parachristianella dimegacantha (C)

Urotrygon sp.
Escherbothrium molinae (C)
“Mantarraya gris”
Dendromonocotyle cortesi (M)

Discussion

To date, 132 helminth taxa (110 named species and 22 taxa not assigned to species) have been reported as parasites of elasmobranch species in Mexico. Seventy-three of these taxa are represented by holotypes from Mexican waters. All of these taxa have been collected in the adult stage (132). Thus, the richness of helminth species parasitizing elasmobranchs distributed in Mexican waters represents 7.2% of the worldwide species richness for this group (see Caira et al. 2012).

The 132 taxa parasitize 48 taxa of elasmobranchs (4 of them not assigned to species), within 15 families; Myliobatidae (8 species) and Urotrygonidae (6) being the families with the highest number of species sampled, due to the fact that 100% and 60% respectively of the species of these two families recorded in Mexico, have been studied for helminths. In addition, helminths have been reported from 9 of the 12 orders of elasmobranchs in Mexican waters; no records are available for Squaliformes, Orectolobiformes (Selachii) or Rhinobatiformes (Batoidea). Fifteen of the 23 families of sharks have not been reported as hosts of helminths, as well as half of the families of rays. From the 204 known species of elasmobranchs recorded in Mexican waters, only 26% of them have been studied for helminths; thus, only 18.3% and 32.6% of shark and ray species, respectively, have been examined for, and found to host, helminths (Table 1). This value is similar to that found by Randhawa and Poulin (2010), who established that only 317 species (26%) of this globally distributed group of hosts have been examined for intestinal parasites (specifically tapeworms).

The species of elasmobranchs with the higher parasite species richness are Urolophus halleri (with 19 taxa), Dasyatis longa (14) and Dasyatis brevis (13). However, 8 shark and 9 ray species have been recorded only once as hosting helminths. In total, Batoidea is parasitized by 109 taxa of helminths and Selachii by 52, of which 56% and 61%, respectively, are cestode species. The mean value of species harbored by a host is 2.8 for sharks and 3.8 for rays; these traits are in accordance with the findings reported by Randhawa and Poulin (2010), who noted that, on average, batoids harbor significantly more species of tapeworms than sharks.

Anaporrhutum euzeti and Probolitrema richardi (Trematoda) are the species with the broadest host spectrum; the former species is associated with 11 species of rays.
Table 2. Sampled localities for elasmobranchs as hosts of helminths in Mexico.

| Baja California                | N          | W          |
|-------------------------------|------------|------------|
| 1) Bahía de Los Ángeles       | 28°54'31"  | 113°29'47" |
| 2) Bahía San Felipe           | 28°42'00"  | 112°35'00" |
| 3) Bahía San Franciscoquito   | 29°45'05"  | 114°18'36" |
| 4) Bahía de San Quintín       | 30°27'09"  | 115°56'54" |
| 5) Ensenada                   | 31°51'14"  | 116°37'45" |
| 6) Isla Ángel de la Guarda    | 29°26'26"  | 113°34'25" |
| 7) Isla Rasa                  | 28°49'01"  | 112°58'25" |
| 8) Isla San Esteban           | 28°41'39"  | 112°31'30" |
| 9) Playa María                | 31°52'18"  | 116°39'31" |
| 10) Puerto Citos              | 30°20'59"  | 114°38'27" |

| Baja California Sur           | N          | W          |
|-------------------------------|------------|------------|
| 11) Bahía Almejas             | 24°31'00"  | 111°39'50" |
| 12) Bahía de La Paz           | 24°14'30"  | 110°28'08" |
| 13) Bahía de Santa Inés       | 27°02'55"  | 111°58'37" |
| 14) Bahía Magdalena           | 25°20'00"  | 112°05'00" |
| 15) Boca de Álamo             | 23°53'51"  | 109°48'12" |
| 16) El Comitán                | 24°08'00"  | 110°25'00" |
| 17) Isla Magdalena            | 24°15'00"  | 111°30'00" |
| 18) Laguna Guerrero Negro     | 27°51'21"  | 114°14'28" |
| 19) Las Barrancas             | 26°00'30"  | 112°12'17" |
| 20) Loreto                    | 26°01'00"  | 111°19'50" |
| 21) Punta Abreojos            | 26°27'45"  | 112°43'48" |
| 22) Punta Arena               | 24°04'00"  | 109°50'00" |
| 23) Punta Belcher             | 25°20'00"  | 112°05'00" |
| 24) San Isidro                | 23°53'00"  | 109°47'00" |
| 25) San José del Cabo         | 23°04'49"  | 109°40'49" |
| 26) Santa María               | 27°24'55"  | 112°18'17" |
| 27) Santa Rosalía             | 27°20'04"  | 112°15'35" |

| Campeche                      | N          | W          |
|-------------------------------|------------|------------|
| 28) Bancos de Campeche        | 19°53'03"  | 90°31'43"  |
| 29) Ciudad del Carmen         | 19°51'33"  | 90°31'35"  |
| 30) Estuario Champotón        | 19°20'56"  | 90°41'18"  |

| Chiapas                       | N          | W          |
|-------------------------------|------------|------------|
| 31) Laguna Mar Muerto (El Paredón) | 15°59'00"  | 94°00'00"  |

| Colima                        | N          | W          |
|-------------------------------|------------|------------|
| 32) Manzanillo                | 19°04'54"  | 104°19'31" |

| Guerrero                      | N          | W          |
|-------------------------------|------------|------------|
| 33) Bahía de Acapulco          | 16°49'21"  | 99°52'55"  |

| Jalisco                       | N          | W          |
|-------------------------------|------------|------------|
| 34) Bahía de Chamela           | 19°33'15"  | 105°06'45" |
| 35) Puerto Vallarta            | 20°35'48"  | 105°15'00" |

| Nayarit                       | N          | W          |
|-------------------------------|------------|------------|
| 36) Punta Mita                | 20°46'38"  | 105°30'46" |
| 37) San Blás                   | 21°32'00"  | 105°17'22" |
from three localities, and the latter has been found in 7 species of rays and one shark from three localities. Higher host specificity was shown by cestodes; 62 of the 76 nominal species of this group were specialists for a particular species of elasmobranch. These results are in accordance with Caira and Jensen (2014) who noted that the majority of tapeworm species are extremely host-specific, exhibiting species-specific (i.e., oioxenous) associations with their hosts. However, more conclusive results can be obtained only by increasing the sampling of this group of vertebrates on both coasts of Mexico, through comprehensive studies in which complete necropsies of elasmobranchs are conducted, avoiding partial analysis of a particular site of infection or organ system, which is a common trait of the research in this field according to Caira et al. (2012).

*Dendromonocotyle octodiscus* had the widest geographic distribution, being found in 7 localities; this monogenean is followed by *Echinobothrium fautleyae*, *Anthocepha lum michaeli* and *Staphylorchis pacifica*, which are distributed in 5 localities each, as well as *Symcallio evani* and *Calicotyle urobati*, recorded in 4 locations each. *Acanthobothrium* is the most specious genus, as it is represented by 14 species parasitizing 6 species of elasmobranchs.
Along with the increase in the number of species described worldwide, the number of helminth species parasitizing sharks and rays recorded in Mexico has increased in the past 2 decades, after slow growth from 1945, when Caballero y Caballero (1945) described the first species associated with this group of hosts (*Staphylorchis pacifica*). Between 1945 and 1994, only 20 species were reported in this group of hosts in the country. From 1995 to the present, this number increased more than 400%, rising to 107 species (Figure 2). According to Caira and Jensen (2014), approximately 250 species were erected over the past 2 decades; 36 of them were collected from elasmobranchs inhabiting Mexican waters.

The helminthological record of elasmobranchs distributed in Mexico is asymmetrically constituted in terms of the helminth groups represented, the hosts studied and the geographical distribution of the sampling sites. Cestodes are the most widely represented group, with 76 named species and 18 not assigned to species. The main reasons that explain this asymmetry can be summarized in two points: 1) the great diversity of cestodes associated with elasmobranchs, as nine of the 19 orders included in this Class infect this group of hosts, and eight are even exclusive parasites of them (Caira et al. 2014b); cestodes are by far the most diverse group of metazoan parasites of elasmobranchs, representing more than half of the described species for this host group (Caira et al. 2012); 2) the particular interest of a research team lead by Janine N. Caira from the University of Connecticut to inventory the fauna of tapeworm parasites of sharks and rays distributed in the Gulf of California, through the project “A systematic survey of the metazoan parasites of elasmobranchs from the Sea of Cortez” between 1993 and 1994. As a result of this project, more than 45 species of cestode were recorded in this area of Mexico, 36 of which were described as new species. The most intensively studied host group is Batoidea, with 32% of the species in the country harboring at least 1 species of helminth; on the other hand, only 18% of the species of sharks caught in Mexico have been reported as hosting helminths. To determine if this could represent a bias in sampling and not a reflection of the real richness of the helminths in the different
groups of hosts, more sampling efforts are necessary. Likewise, the specific richness of helminths is concentrated in two states, i.e., Baja California Sur (69 helminth species reported to date) and Baja California (54), both located in the Gulf of California, up to now, the most intensively sampled region of Mexico.

In addition to the 132 helminth taxa recorded so far in elasmobranchs inhabiting Mexican waters, another 8 taxa of helminths were found in this group of hosts: 2 acanthocephalans, *Corynosoma* sp. (Méndez 2005) and *Gorgorhynchoides bullocki* (Monks et al. 2009), and 6 nematodes, *Anisakis simplex*, *Hedruris* sp. (Méndez 2005), *Anisakis* sp., *Hysterothyacium* sp., *Terranova* sp. (Pérez-Ponce de León et al. 1999), and *Mexiconema cichlasomae* (Moravec et al. 1998). However, their presence in elasmobranchs is considered accidental; elasmobranchs can be infected through 2 ways: 1) ingestion of prey acting as intermediate hosts for almost completely developed larvae and 2) ingestion of definitive hosts constituting an accidental, probably postcyclic transmission (Moravec et al. 1998; Anderson 2000; Weaver and Smales 2014).

In spite of the great amount of information generated in the last 20 years, new records of the helminth fauna of Elasmobranchii in Mexico remain scarce and fragmentary. To date, 81.7% of sharks and 67.4% of rays distributed in Mexican waters lack helminthological studies. Completing the helminthological inventory for this group of vertebrates is a major challenge, as recent estimates establish the number of species to be described associated with these hosts at approximately 3600, considering only the tapeworms (Randhawa and Poulin 2010). Only through efforts such as the one conducted by Caira and collaborators in the Gulf of California will a comprehensive understanding of these host-parasite associations be achieved.

**Acknowledgements**

To Georgina Ortega-Leite for providing important bibliographic references; Yokomi Lozano helped us in the elaboration of the map. This manuscript was edited for proper English language, grammar, punctuation, spelling, and overall style by one or more of the highly qualified native English speaking editors at American Journal Experts (certificate 8DDE-F446-2DF0-94C7-90F2).

**References**

Anderson RC (2000) Nematode parasites of vertebrates. Their development and transmission. CAB International, Wallingford, UK, 650 pp. doi: 10.1079/9780851994215.0000

Anderson RC, Chabaud AG, Willmott S (1974–1983) CIH Keys to the nematode parasites of vertebrates. CAB International, Wallingford, UK.

Appy RG, Dailey MD (1973) Two species of *Acanthobothrium* (Cestoda: Tetraphyllidea) from elasmobranchs of the Eastern Pacific. Journal of Parasitology 59: 817–820. doi: 10.2307/3278414
A checklist of helminth parasites of Elasmobranchii in Mexico

Arai HP (1962) Tremátodos digéneos de peces marinos de Baja California, México. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 33: 113–130.

Berman R, Brooks DR (1994) *Escherbothrium molinae* n. gen. et n. sp. (Eucestoda: Tetraphyllidea: Triloculariidae) in *Urotrygon chilensis* (Chondrichthyes: Myliobatiformes: Urolophidae) from the Gulf of Nicoya, Costa Rica. Journal of Parasitology 80: 775–880. doi: 10.2307/3283257

Bernot JP, Caira JN, Pickering M (2015) The dismantling of *Calliobothrium* (Cestoda: Tetraphyllidea) with erection of *Symcallio* n. gen. and description of two new species. Journal of Parasitology 101: 167–181. doi: 10.1645/14-571.1

Beveridge I, Neifar L, Euzet L (2004) Eutetrarhynchid cestodes from Atlantic and Mediterranean elasmobranch fishes with the description of two new species of *Dollfusiella* Campbell and Beveridge, 1994 and redescriptions of *Prochristianella apillifer* (Poyarkoff, 1909) Dollfus, 1957 and *Parachristianella*. Systematic Parasitology 59: 81–102. doi: 10.1023/B:SYPA.0000044426.65921.44

Boeger WA, Kristky DC (1989) Phylogeny, coevolution, and revision of the Hexabothriidae Price, 1942 (Monogenea). International Journal for Parasitology 19: 425–440. doi: 10.1016/0020-7519(89)90099-4

Boeger AW, Kritsky DC (1993) Phylogeny and a revised classification of the Monogenoidea Bychowsky, 1937 (Platyhelminthes). Systematic Parasitology 26: 1–32. doi: 10.1007/BF00009644

Braun M (1900) Cestodes. Klassen und Ordnungen des Thierreichs. Band 4: Vermes. Abteilung I. C.F. Winter’sche Verlagshandlung, Leipzing, 1731 pp.

Bravo-Hollis M (1954) Tremátodos de peces marinos de aguas mexicanas VII. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 25: 219–252.

Bravo-Hollis M (1969) Helminitos de peces del Pacífico mexicano XXX. Descripción de tres monogéneos de la familia Monocotylidae Traschenberg, 1879. Anales del Instituto de Biología, Universidad Nacional Autónoma de México 40: 161–178.

Bravo-Hollis M (1970) Helminitos de peces del Pacífico mexicano XXXI. Descripción de *Loimosina parawilsoni* sp. nov., (Fam. Loimoidae Bychowsky, 1957) de *Sphyra lewini* (Griffith) de Mazatlán, Sinaloa. Anales del Instituto de Biología, Universidad Nacional Autónoma de México 41: 147–152.

Bray RA, Gibson DI, Jones A (Eds) (2008) Keys to the Trematoda. Volume III. CAB International, Wallingford, UK, 824 pp.

Bullard SA, Overstreet RM (2000) *Calicotyle californiensis* n. sp. and *Calicotyle urobati* n. Sp. (Monogenea: Calicotylinae) from elasmobranchs in the Gulf of California. Journal of Parasitology 86: 939–944. doi: 10.2307/3284801

Bullard SA, Payne RR, Braswell JS (2004) New genus with two new species of Capsalid Monogenoans from Dasyatids in the Gulf of California. Journal of Parasitology 90: 1412–1427. doi: 10.1645/GE-304R

Bychowsky BE (1937) Ontogenesis and phylogenetic interrelationships of parasitic flatworms. Izvestiya Akademiya Nauk SSSR, Set. Biologiya 4: 1353–1383.
Caballero y Caballero E (1945) Hallazgo de una especie nueva del género *Petalodistomum* Johnston, 1913 (Trematoda: Gorgoderidae) en los tiburones de las costas de Manzanillo, Colima. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 16: 359–365.

Caballero y Caballero E, Bravo-Hollis M (1961) Tremátodos de peces de aguas mexicanas del Pacífico XX. Tres especies de Monogenoidea Bychowsky, 1937. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 32: 201–217.

Caballero y Caballero E, Bravo-Hollis M (1962) Trematóodos de peces de aguas Mexicanas del Pacífico. XXII. Algunos monogeneoideos de la costa Sonorense del Golfo de California. Anales del Instituto de Biología, Universidad Nacional Autónoma de México 33: 57–77.

Caballero y Caballero E, Flores-Barroeta L, Grocott RG (1956) Helmíntos de la República de Panamá V. Redescripciones de algunos tremátodos ya conocidos pero nuevos en la fauna helmintológica de este país. Revista de Biología Tropical 4: 161–177.

Caira NJ (1985) *Callibothrium evani* sp. n. (Tetraphyllidea: Onchobothriidae) from the Gulf of California, with a redescription of the hooks of *C. lintoni* and a proposal for Onchobothriid hook terminology. Proceedings of the Helminthological Society of Washington 52: 166–174.

Caira JN, Burge AN (2001) Three new species of *Acanthobothrium* (Cestoda: Tetraphyllidea) from the ocelled electric ray, *Diplobatis ommata*, in the Gulf of California, Mexico. Comparative Parasitology 68: 52–65.

Caira JN, Euzet L (2001) Age of association between the nurse shark, *Gynoglymostoma cirratum*, and tapeworms of the genus *Pedibothrium* (Tetraphyllidea: Onchobothriidae): implications from geography. Biological Journal of the Linnean Society 72: 609–614. doi: 10.1111/j.1095-8312.2001.tb01341.x

Caira JN, Jensen K (2014) A Digest of Elasmobranch Tapeworms. Journal of Parasitology 100: 373–391. doi: 10.1645/14-516.1

Caira JN, Zahner SD (2001) Two new species of *Acanthobothrium* Beneden, 1849 (Tetraphyllidea: Onchobothriidae) from horn sharks in the Gulf of California, Mexico. Systematic Parasitology 50: 219–229. doi: 10.1023/A:1012241913722

Caira JN, Healy CJ, Jensen K (2012) An updated look at elasmobranchs as hosts of metazoan parasites. In: Carrier JC, Musick JA, Heithaus MR (Eds) Biology of sharks and their relatives. CRC Press, Boca Raton, Florida, 547–578. doi: 10.1201/b11867-22

Caira JN, Jensen K, Healy CJ (1999) On the phylogenetic relationships among tetraphyllidean, lecanicephalidean and diphyllidean tapeworm genera. Systematic Parasitology 42: 77–151. doi: 10.1023/A:1006192603349

Caira JN, Jensen K, Healy CJ (2001) Interrelationships among tetraphyllidean and lecanicephallidean cestodes. In: Littlewood DTJ, Bray RA (Eds) Interrelationships of the Platyhelminthes. Taylor and Francis, London, 135–158.

Caira JN, Mega J, Ruhnke TR (2005) An unusual blood sequestering tapeworm (*Sanguilevator yearsleyi* n. gen., n. sp.) from Borneo with description of *Cathetocephalus resendezi* n. sp. from Mexico and molecular support for the recognition of the order Cathetocephalidea (Platyhelminthes: Eucestoda). International Journal for Parasitology 35: 1135–1152. doi: 10.1016/j.ijpara.2005.03.014
Caira JN, Jensen K, Waeshencach A, Littlewood DTJ (2014a) An enigmatic new tapeworm, *Litobothrium aenigmaticum*, sp. nov. (Platyhelminthes: Cestoda: Litobothriidea), from the pelagic thresher shark with comments on development of known *Litobothrium* species. Invertebrate Systematics 28: 231–243. doi: 10.1071/IS13047

Caira JN, Jensen K, Waeschenbach A, Olson PD, Littlewood DTJ (2014b) Orders out of chaos – molecular phylogenetics reveals the complexity of shark and stingray tapeworm relationships. International Journal for Parasitology 44: 55–73. doi: 10.1016/j.ijpara.2013.10.004

Campbell RA (2008) Family Gorgoderidae Looss, 1899. In: Bray RA, Gibson DI, Jones A (Eds) Keys to the Trematoda Volume III. CAB International, Wallingford, UK, 191–213.

Campbell RA, Beveridge I (1997) *Pterobothrioides*, a new genus of tapeworm (Cestoda: Trypanorhyncha: Pterobothriidae) from dasyatid stingrays in the Eastern Atlantic and Pacific. Systematic Parasitology 38: 81–91. doi: 10.1023/A:1005805005267

Campbell RA, Beveridge I (2006a) Three new genera and seven new species of trypanorhynch cestodes (family Eutetrarhynchidae) from manta rays, *Mobula* spp. (Mobulidae) from the Gulf of California, Mexico. Folia Parasitologica 53: 255–275. doi: 10.14411/fp.2006.033

Campbell RA, Beveridge I (2006b) Two new species of *Pseudochristianella* Campbell and Beveridge, 1990 (Cestoda: Trypanorhynch) from elasmobranch fishes from the Gulf of California, Mexico. Parasite 13: 275–281. doi: 10.1051/parasite/2006134275

Campbell RA, Beveridge I (2007) A new species and new records of *Parachristianella* Dollfus, 1946 (Cestoda: Trypanorhynch) from the Gulf of California, Mexico. Comparative Parasitology 74: 218–228. doi: 10.1654/4261.1

Carbajal-Violante J (2012) Análisis de la comunidad de parásitos de la raya *Rhinoptera steindachneri* y algunos aspectos importantes de su biología en la Bahía de Acapulco, Guerrero, México. BS thesis, Universidad Autónoma de Guerrero, Acapulco, Mexico.

Carvajal J, Campbell RA (1975) A revision of some trypanorhynchs from the western North Atlantic described by Edwin Linton. Journal of Parasitology 61: 1016–1022. doi: 10.2307/3279367

Chisholm LA, Whittington ID (1998) Revision of Decacotylinae Chisholm, Wheeler and Beverley Burton, 1995 (Monogenea: Monocotylidae), including the synonymy of *Papillicotyle* Young, 1967 with *Decacotyle* Young, 1967 and a description of a new species from Australia. Systematic Parasitology 41: 9–20. doi: 10.1023/A:1006095219012

Chisholm LA, Whittington ID, Fischer ABP (2004) A review of *Dendromonocotyle* (Monogenea: Monocotylidae) from the skin of stingrays and their control in public aquaria. Folia Parasitologica 50: 123–130. doi: 10.14411/fp.2004.017

Chisholm LA, Hansknecht TJ, Whittington ID, Overstreet RM (1997) A revision of Calicotylinae Monticelli, 1903 (Monogenea: Monocotylidae). Systematic Parasitology 38: 159–183. doi: 10.1023/A:1005844306178

Church C, Schmidt GD (1990) *Phyllobothrium hallericola* n. sp. (Cestoidea: Phyllobothriidae) from a round stingray, *Urolophus hallieri*, in the Sea of Cortez. Journal of Parasitology 76: 468–469. doi: 10.2307/3282823

Cobb NA (1932) *The English Word “Nema“. Journal of the American Medical Association* 98: 75.

Creplin FCH (1837) Distoma. In: Ersch JS, Gruber JG (Eds) Allgemeine Encyclopädie der Wissenschaften und Künste, 309–329.
Cruz-Reyes A (1977) Céstodos de peces de México II. Descripción de una nueva especie del género *Floriceps* Cuvier, 1817 (Trypanorhyncha: Dasyrynchidae Dollfus, 1935). In: Villa RB (Ed.) Excerta Parasitológica en Memoria del Dr. Eduardo Caballero y Caballero. Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico, 343–355.

Curran SS, Overstreet RM (2000) *Syncoelium vermilionensis* sp. n. (Hemiuroidea: Syncoeliidae) and new records of members of Azygiidae, Psychogonimidae, and Syncoeliidae parasitizing elasmobranchs in the Gulf of California. In: Salgado-Maldonado G, García-Aldrete A, Vidal-Martínez VM (Eds) Metazoan parasites in the neotropics: A systematic and ecological perspective. Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico, 117–133.

Curran SS, Blend CK, Overstreet RM (2003) *Anaporrhutum euzeti* sp. n. (Gorgoderidae: Anaporrhutinae) from rays in the Gulf of California, Mexico. In: Combes C, Jourdane J (Eds) Taxonomy, ecology and evolution of metazoan parasites (Livre hommage à Louis Euzet) Tome I. Université de Perpignan Press, Perpignan, Francia, 225–234.

Curran SS, Blend CK, Overstreet RM (2009) *Nagmia rodmani* n. sp., *Nagmia cisloi* n. sp., and *Probolitrema richardii* (López, 1888) (Gorgoderidae: Anaporrhutinae) from Elasmobranchs in the Gulf of California, Mexico. Comparative Parasitology 76: 6–18. doi: 10.1654/4356.1

Dailey MD (1969) *Litobothrium alopias* and *L. coniformis*, two new cestodes representing a new order from elasmobranch fishes. Proceedings of the Helminthological Society of Washington 36: 218–224.

Dailey MD, Overstreet RM (1973) *Cathetocephalus thatcheri* gen. et sp. n. (Tetraphyllidea: Cathetocephalidae fam. n.) from the bull shark: a species demonstrating multistrobilization. Journal of Parasitology 59: 469–473. doi: 10.2307/3278775

Davies RW (1991) Annelida: leeches, polychaetes, and acanthobdellids. In: Thorp JH, Covich AP (Eds) Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, California, 437–479.

Del Moral-Flores LF, Pérez-Ponce de León G (2013) Tiburones, rayas y quimeras de México. Biodiversitas 111: 1–6.

Diesing KM (1850) Systema helminthum 1. Vindobonae.

Dollfus RP (1937) Trématodes Digenea des sélaeiens (Plagiostomes). Catalogue par hôte, distribution géographique. Annales de Parasitologie Humaine et Comparée 15: 5–73.

Dollfus RP (1942) Etudes critiques sur les tétrarhynques du Muséum de Paris. Archives du Muséum National d’Histoire Naturelle 6: 1–466.

Doran DJ (1953) New monogenetic trematodes from the shovelnose guitarfish, *Rhinobatos productus* (Ayres). Journal of Parasitology 39: 145–151. doi: 10.2307/3274109

Escorcia-Ignacio R, Pulido-Flores G, Monks S (2015) Distribution extension of *Dasyonchocotyle dasyatis* (Yamaguti, 1968) Boeger and Kritsky, 1989 (Monogenea: Hexabothriidae) in *Dasyatis longa* (Garman, 1880) (Myliobatiformes: Dasyatidae) from Sinaloa, México. Checklist 11: article 1528. doi: 10.15560/11.1.1528

Eschmeyer WN, Fong JD (2015) Species by family/subfamily. Department of Ichthyology, California Academy of Sciences. www.calacademy.org/research.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp
A checklist of helminth parasites of Elasmobranchii in Mexico

Espinoza-Pérez H, Castro-Aguirre JL, Huidobro-Campos L (2004) Listados Faunísticos de México IX. Catálogo sistemático de tiburones (Elasmobranchii: Selachimorpha). Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, 134 pp.

Euzet L (1953) Suggestions pour une nouvelle classification des Cestodes Tétraphyllides. XIV International Congress of Zoology, Copenhagen, 347–349.

Euzet L (1994) Order Tetraphyllidea Carus, 1863. In: Khalil L, Jones A, Bray R (Eds) Keys to the cestode parasites of vertebrates. CAB International, Wallingford, UK, 149–194.

Fehlauer-Ale KH, Littlewood DTJ (2011) Molecular phylogeny of Potamotrygononcotre (Monogenea, Monocotylidae) challenges the validity of some of its species. Zoologica Scripta 40: 638–658. doi: 10.1111/j.1463-6409.2011.00496.x

Friggens MM, Brown JH (2005) Niche partitioning in the cestode communities of two elasmobranchs. Oikos 108: 76–84. doi: 10.1111/j.0030-1299.2005.13275.x

Friggens MM, Duszynski DW (2005) Four new cestode species from the spiral intestine of the round stingray, *Urobatis halleri*, in the Northern Gulf of California, Mexico. Comparative Parasitology 72: 136–149. doi: 10.1654/4121

Froese R, Pauly D (Eds) (2014) FishBase. www.fishbase.org

Ghoshroy S, Caira JN (2001) Four new species of *Acanthobothrium* (Cestoda: Tetraphyllidea) from the whiptail stingray *Dasylatis brevis* in the Gulf of California, Mexico. Journal of Parasitology 87: 354–372. doi: 10.1645/0022-3395(2001)087[0354:FNSOAC]2.0.CO;2

Gibbons LM (2010) Keys to the Nematode parasite of vertebrates supplementary volume. CAB International, Wallingford, 416 pp.

Gibson DI, Jones A, Bray RA (Eds) (2002) Keys to the Trematoda, Volume I. CAB Publishing, Wallingford, UK, 521 pp.

Gómez del Prado-Rosas M del C (1984) Presencia de *Echinocephalus pseudouncinatus* (Nematoda: Gnathostomidae) en *Heterodontus francisci* (Pisces: Elasmobranchii), en Baja California Sur, México. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Série Zoológia 55: 13–28.

Gómez del Prado-Rosas M del C, Euzet L (1997) *Quadristesi almehensis* n.g., n.sp. (Monogenea: Monocotylidae, Quadristestinae n. subfam.) Gill parasite of *Rhinoptera steindachneri* (Myliobatiformes: Rhinopteridae) from the Pacific coast of Baja California Sur (Mexico). In: III International Symposium on Monogenea. Academy of Sciences of the Czech Republic, Praha, 17.

Gómez del Prado-Rosas M del C, Euzet L (1999) New species of *Spinuris* (Monogenea: Monocotylidae) from *Zapteryx exasperata* (Site of infection. Rhinobatidae) from Baja California Sur, Mexico. Journal of Parasitology 85: 705–708. doi: 10.2307/3285746

Guiart J (1927) Classification des Tétrarhynques. Comptes rendus de la 50. Session de l’Association Francaise pour l’Avancement des Science, Lyon, 397–401.

Hargis WJ (1955) Monogenetic Trematodes of Gulf of Mexico Fishes. Part V. The Superfamily Capsaloidea. Transactions of the American Microscopical Society 74: 203–225. doi: 10.2307/3224093

Healy CJ (2003) A revision of *Platybothrium* Linton, 1890 (Tetraphyllidea: Onchobothriidae), with a phylogenetic analysis and comments on host-parasite associations. Systematic Parasitology 56: 85–139. doi: 10.1023/A:1026135528505
Healy CJ, Caira JN, Jensen K, Webster BL, Littlewood DTJ (2009) Proposal for a new tape-worm order, Rhinebothriidea. International Journal of Parasitology 39: 497–511. doi: 10.1016/j.ijpara.2008.09.002

Heinz LM, Dailey MD (1974) The Trypanorhyncha (Cestoda) of Elasmobranch Fishes from Southern California and Northern Mexico. Proceedings of the Helminthological Society of Washington 41: 161–169.

Hoberg EP, Brooks DR, Molina H, Erbe E (1998) Echinocephalus janzeni n. sp. (Nematoda: Gnathostomatidae) in Himantura pacifica (Chondrichthyes: Myliobatiformes) from the Pacific coast of Costa Rica and Mexico, with historical biogeographical analysis of the genus. Journal of Parasitology 84: 571–581. doi: 10.2307/3284726

Jensen K (2001) Four new genera and five new species of Lecanicephalideans (Cestoda: Lecanicephalidea) from elasmobranchs in the Gulf of California, Mexico. Journal of Parasitology 87: 845–861. doi: 10.2307/3285145

Jones A, Bray RA, Gibson DI (Eds) (2005) Keys to the Trematoda, Volume II. CABI Publishing, Wallingford, UK, 768 pp.

Kurochkin BY, Slankis AJ (1973) New representative and the composition of the order Litobothridae Dailey, 1969 (Eucestoda). Parazitologiya 7: 502–508.

Lamothe-Argumedo RA (1969) Tremátodos de peces IV. Registro de cuatro especies de trematódodos parásitos de peces marinos de las costas del Pacífico mexicano. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoologia 40: 179–194.

Lane C (1923) Some Strongylata. Parasitology 15: 348–364. doi: 10.1017/S0031182000014876

Linton E (1910) Helminth fauna of the Dry Tortugas, II. Trematodes. Carnegie Institution of Washington Publications 133: 1–98.

Llewellyn LC (1966) Pontobdellinae (Piscicolidae: Hirudinea) in the British Museum (Natural History) with a review of the subfamily. Bulletin of the British Museum of Natural History 14: 389–439.

López C (1888) Un distoma probabilmente nuovo. Atti della Societa Toscani di Scienze Naturali Residente in Pisa, Processi Verbali 6: 137–138.

Looss A (1899) Weitere Beiträge zur Kenntnis der Trematoden-fauna Aegyptens, zugleich Versuch einer natürlichen Gliederung des Genus Distomum Retzius. Zoologische Jahrbücher 12: 521–784.

Looss A (1902) Ueber neue und bekannte Trematoden aus Seeschildkröten. Nebst Erörterungen zur Systematik und Nomenclatur. Zoologischen Jahrbüchern Abtheilung für Systematik, Geographie und Biologie der Thiere 16: 411–894.

Lühe M (1900) Über die Gattung Podocotyle (Duj.). Zoologischer Anzeiger 23: 487–492.

Lühe M (1906) Report on the trematode parasites from the marine fishes of Ceylon. The Royal Society Report on the Pearl Oyster Fisheries 5: 97–108.

Lühe M (1909) Parasitische Plattwürmer. I. Trematodes. Die Süßwasserfauna Deutschlands 17: 1–217.

Markell EK (1953) Nagmia floridensis, n. sp., an anaporrhutine trematode from the coelom of the sting ray Amphotistius sabinus. Journal of Parasitology 39: 45–51. doi: 10.2307/3274058

Markell EK (1956) Probolitrema mexicana, n. sp., an Anaporrhutine trematode from elasmo-branches of Baja California. Journal of Parasitology 42: 56–59. doi: 10.2307/3274623
Méndez O (2005) Infracomunidades helmínticas del tiburón Prionace glauca (Linnaeus, 1758) de la costa occidental de Baja California Sur, México. MSc thesis, Instituto Politécnico Nacional, Mexico City, Mexico.

Méndez O, Dorantes GMA (2013) Céstodos del tiburón toro Carcharhinus leucas en Playa Chachalacas, Veracruz, México. Neotropical Helminthology 7: 167–171.

Millemann RE (1951) Echinocephalus pseudouncinatus n. sp., a nematode parasite of the abalone. Journal of Parasitology 37: 435–439. doi: 10.2307/3273250

Millemann RE (1963) Studies on the taxonomy and life history of Echinocephalid worms (Nematoda: Spiruroidea) with a complete description of Echinocephalus pseudouncinatus Millemann, 1951. Journal of Parasitology 49: 754–764. doi: 10.2307/3275919

Monks S, Brook DR, Pérez-Ponce de León G (1996) A new species of Acanthobothrium Van Beneden, 1849 (Euestoda: Tetraphyllidea: Onchobothriidae) in Dasyatis longus Garman (Chondrichthyes: Myliobatidae) from Chamela Bay, Jalisco, México. Journal of Parasitology 82: 484–488. doi: 10.2307/3284090

Monks S, Avilés-Torres S, Pulido-Flores G (2009) Gorgorhynchoides bullocki (Acanthocephala: Rhadinorhynchidae) in fish from Bahía de Chetumal and the Laguna Río Huach System, Quintana Roo, Mexico. Comparative Parasitology 76: 105–109. doi: 10.1654/4290.1

Monks S, Zaragoza- Tapia F, Pulido-Flores G, Violante-González J (2015) A New Species of Serendip (Cestoda: Tetraphyllidea: Serendipeidae) in Rhinoptera steindachneri (Chondrichthyes: Myliobatidae) from the Pacific Coast of Mexico. Comparative Parasitology 82: 262–268. doi: 10.1654/4745.1

Moravec F, Jiménez-García I, Salgado-Maldonado G (1998) New observations on Mexiconema cichlasomae (Nematoda: Dracunculoidea) from fishes in Mexico. Parasite 5: 289–293. doi: 10.1051/parasite/1998053289

Nasin CS, Caira JN, Euzet L (1997) Analysis of Callibothrium (Tetraphyllidea: Onchobothriidae) with descriptions of three new species and erection of a new genus. Journal of Parasitology 83: 714–733. doi: 10.2307/3284252

Neifar L, Euzet L, Ben Hassine OK (2002) Une nouvelle espèce de Monocotylidae (Monogenea) parasite branchial de Rhinobatos cemiculus (Euselachii, Rhinobatidae), avec proposition d’un nouveau genre et d’un amendement à la diagnose des Monocotylidae. Zoosystema 24: 699–706.

Neylor GJP, Caira JN, Jensen K, Rosana KAM, Straube N, Lakner C (2012) Elasmobranch phylogeny: A mitochondrial estimate based on 595 species. In: Carrier JC, Musick JA, Heithaus MR (Eds) Biology of sharks and their relatives. CRC Press, Boca Raton, Florida, 31–56. doi: 10.1201/b11867-4

Olson PD, Caira JN (2001) Two new species of Litobothrium Dailey, 1969 (Cestoda: Litobothriidea) from threshers sharks in the Gulf of California, Mexico, with redescriptions of two species in the genus. Systematic Parasitology 48: 159–177. doi: 10.1023/A:1006422419580

Olson PD, Ruhnke T, Sanney J, Hudson T (1999) Evidence for host-specific clades of tetraphyllidean tapeworms (Platyhelminthes: Euestoda) revealed by analysis of 18S srDNA. International Journal for Parasitology 29: 1465–1476. doi: 10.1016/S0020-7519(99)00106-X

Ozaki Y (1925) Preliminary notes on a trematode with anus. Journal of Parasitology 12: 51–53. doi: 10.2307/3271059
Palm HW (2004) The Trypanorhyncha Diesing, 1863. PKSPL-IPB Press, Bogor, 710 pp.
Pérez-Ponce de León G, García-Prieto L, Mendoza-Garfias B, León-Regagnon V, Pulido-Flores G, Aranda-Cruz C, García-Vargas F (1999) Listados Faunísticos de México IX. Biodiversidad de Helmintos parásitos de peces marinos y estuarinos de la Bahía de Chamela, Jalisco. Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, 51 pp.
Perrier E (1897) Traité de Zoologie. Masson et Cie, Paris, 2136 pp.
Pigulevsky SV (1953) Family Gorgoderidae Looss, 1901 (Subfamily Phyllodistomatinae, Pigulevsky, 1952 and Plesiochorinae Pigulevsky, 1952). In: Skrjabin KI (Ed.) Trematodes and Animals and Man Volume VII. Izdatel'stvo Akademii Nauk, Moscow, Russia, 253–615.
Pintner T (1931) Vorarbeiten zueiner Monographie der Tetrarhynchoideen. Sitzungsberichten der österreische Akademie der Wissenschaften Mathematik- Naturwissenschaftliche Klasse 122: 171–254.
Pratt HS (1910) *Monocotyle floridana*, a new monogenetic trematode. Carnegie Institution of Washington Publication 133: 1–9.
Price EW (1936) North American monogenetic trematodes. The George Washington University Bulletin, Summaries of Doctoral Theses, 1934-36: 10–13.
Price EW (1942) North American monogenetic trematodes. V. The family Hexabothriidae, n. n. (Polystomatoidea). Proceedings of the Helminthological Society of Washington 9: 39–56.
Poche F (1907) Einige Bemerkungen zur Nomenklatur der Trematoden. Zoologischer Anzeiger 31: 124–126.
Poche F (1926) Das System der Platodaria. Archives für Naturgeschichte 91: 241–459.
Pulido-Flores G, Monks S (2005) Monogenean parasites of some elasmobranchs (Chondrichthytes) from the Yucatán Peninsula, Mexico. Comparative Parasitology 72: 69–74. doi: 10.1654/4049
Pulido-Flores G, Monks S (2008) A new species of *Euzetia* (Monogenea: Monocotylidae) on the gills of *Rhinoptera bonasus* (Rhinopteridae) from Ciudad del Carmen, Campeche, Mexico. Revista Mexicana de Biodiversidad 79S: 83–88.
Pulido-Flores G, Monks S (2014) Distribution extension of *Glyphobothrium zwerneri* Williams and Campbell, 1977 (Tetraphyllidea: Serendipeidae) from the cownose ray *Rhinoptera bonasus* (Mitchill, 1815) (Myliobatiformes: Myliobatidae) from Campeche, México. Checklist 10: 211–212. doi: 10.15560/2.1.211
Pulido-Flores G, Monks S, Violante-González J (2015) *Denarycotyle gardneri* n. gen., n. sp. (Monogenea: Monocotylidae: Euzetiinae), from the gills of *Rhinoptera steindachneri* (Rhinopteridae) from Acapulco, Guerrero, Mexico. Revista Mexicana de Biodiversidad 86: 582–589. doi: 10.1016/j.rmb.2015.05.006
Randhawa HS, Poulin R (2010) Determinants of tapeworm species richness in elasmobranch fishes: untangling environmental and phylogenetic influences. Ecography 33: 866–877. doi: 10.1111/j.1600-0587.2010.06169.x
Rudolphi CA (1808) Entozoorum sive vermium intestinalium: historia naturalis. 1. Amstelaedami, 527 pp. doi: 10.5962/bhl.title.14422
Rudolphi CA (1819) Entozoorum synopsis cui accedunt mantissa duplex et indices locupletissimi. Verol, 811 pp. doi: 10.5962/bhl.title.9157
Runhke RT (1994) Resurrection of *Anthocephalum* Linton, 1890 (Cestoda: Tetraphyllidea) and taxonomic information of five proposed members. Systematic Parasitology 29: 159–176. doi: 10.1007/BF00009673

Runhke RT, Seaman HB (2009) Three new species of *Anthocephalum* Linton, 1890 (Cestoda: Tetraphyllidea) from dasyatid stingrays of the Gulf of California. Systematic Parasitology 72: 81–95. doi: 10.1007/s11230-008-9170-6

Runhke RT, Caira JN, Cox A (2015) The cestode order Rhinebothriidea no longer family-less: A molecular phylogenetic investigation with erection of two new families and description of eight new species of *Anthocephalum*. Zootaxa 3904: 51–81. doi: 10.11646/zootaxa.3904.1.3

Runhke RT, Curran SS, Holbert T (2000) Two new species of *Duplicibothrium* Williams and Campbell, 1978 (Tetraphyllidea: Serendipidae) from the Pacific cownose ray *Rhinoptera steindachneri*. Systematic Parasitology 47: 135–143. doi: 10.1023/A:1006456722682

Schaeffner BC (2014) Review of the genus *Eutetrarhynchus* Pintner, 1913 (Trypanorhyncha: Eutetrarhynchidae), with the description of *Eutetrarhynchus beveridgei* n. sp. Systematic Parasitology 87: 219–229. doi: 10.1007/s11230-014-9476-5

Sawyer RT (1986) Leech Biology and Behaviour. Vol. II Feeding Biology, Ecology, and Systematics. Clarendon Press, Oxford, 375 pp.

Schaeffner BC, Beveridge I (2013) Redescription and new records of species of *Otobothrium* Linton, 1890 (Cestoda: Trypanorhyncha). Systematic Parasitology 84: 17–55. doi: 10.1007/s11230-012-9388-1

Schmarda LK (1861) Neue Turbellarien, Rotatorien und Anneliden beobachtet und gesammelt auf einer Reise um die Erde 1853. Leipzig 1: 1–161.

Sogandares-Bernal F (1959) Digenean trematodes of marine fishes from the Gulf of Panama and Bimini, British West Indies. Tulane Studies in Zoology and Botany 7: 71–117.

Stafford J (1904) Trematodes from Canadian fishes. Zoologischer Anzeiger 27: 481–495.

Taschenberg EO (1879) Zur Systematik der monogenetischen Trematoden. Zeitschrift fur Naturwissenschaften 52: 232–265.

Toth ML, Campbell RA, Schmidt GD (1992) A revision of *Oncomegas* Dollfus, 1929 (Cestoda: Trypanorhyncha: Eutetrarhynchidae), the description of two new species and comments on its classification. Systematic Parasitology 22: 167–187. doi: 10.1007/BF00009664

Tyler GA (2001) Diphyllidean cestodes of the Gulf of California, México with descriptions of two new species of *Echinobothrium* (Cestoda: Diphyllidea). Journal of Parasitology 87: 173–184. doi: 10.1645/0022-3395(2001)087[0173:DCOTGIO]2.0.CO;2

Tyler AG, Caira JN (1999) Two new species of *Echinobothrium* (Cestoidea: Diphyllidea) from Myliobatiform Elasmobranchs in the Gulf of California, México. Journal of Parasitology 85: 32–335. doi: 10.2307/3285643

Verma SC (1936) Studies on the family Bucephalidae (Gastrostomata) II. Descriptions of two new forms from Indian marine fishes. Proceedings of the National Academy of India 6: 252–260.

Villarreal-Lizárraga A (1995) Descripción taxonómica de tremátodos (Platyhelminthes) en peces de importancia comercial de la Bahía de la Paz, Baja California Sur, México. BS thesis, Universidad Autónoma de Baja California Sur, La Paz, Mexico.
Weaver HJ, Smales LR (2014) Two Species of Acanthocephala (Rhadinorhynchidae and Transvenidae) from Elasmobranchs from Australia. Comparative Parasitology 81: 110–113. doi: 10.1654/4654.1

Winter HA (1959) Algunos tremátodos digéneos de peces marinos de aguas del Océano Pacífico del sur de California, U.S.A., y del litoral mexicano. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 30: 183–208.

Yamaguti S (1959) Systema Helminthum. Vol. II. The Cestodes of Vertebrates. Interscience Publishers, New York, 860 pp.

Yamaguti S (1963) Systema Helminthum Volume IV. Monogenea and Aspidocotylea. Interscience Publishers, New York, 699 pp.

Yamaguti S (1968) Monogenetic trematodes of Hawaiian fishes. University of Hawaii Press, Honolulu, 287 pp.

Young PC (1967) A taxonomic revision of the subfamilies Monocotylinae Gamble, 1896 and Dendromonocotylinae Hargis, 1955 (Monogenoidea: Monocotylidae). Journal of Zoology 153: 381–422. doi: 10.1111/j.1469-7998.1967.tb04070.x

Zaragoza-Tapia F, Monks S, Pulido-Flores G, Violante-González J (2013) Distribution extension of Escherbothrium molinae Berman and Brooks, 1994 (Cestoda: Tetraphyllidea: Triloculariidae) in Urotrygon sp. from the Pacific Coast of México. Check List 9: 1124–1125. doi: 10.15560/11.4.1707