


# Marine fish parasites of Vietnam: a comprehensive review and updated list of species, hosts, and zoogeographical distribution

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**Abstract** – With a long coastline stretching from tropical to subtropical climate zones, and an immense exclusive economic zone with over 4000 islands, the Vietnamese marine waters support a rich and biodiverse parasite fauna. Although the first parasitological record was in 1898, systematic studies of the parasite fauna have increased during the last 50 years. This comprehensive review covers the current state of knowledge of marine fish parasites in Vietnam and lists 498 species found in 225 fish species, and their geographical distribution. In addition, 251 marine parasite species have newly been added to the already known fauna of 247 species since 2006 (more than two-fold increase). The most speciose group was the Digenea, which accounted for 43% of the total parasite species biodiversity, followed by Monogenea (23.5%), Crustacea (11.6%), Nematoda, and Acanthocephala (8.0% each). The shallow and muddy Gulf of Tonkin showed a rich parasite fauna, accounting for 66.3% of the whole marine parasite fauna of Vietnam, with Digenea accounting for 51% of the regional total parasite richness, followed by Monogenea (27%), Acanthocephala (8.8%), and Nematoda (5.8%). Only a few species belonged to Hirudinea, Myxozoa, and Cestoda, suggesting that these taxa may be understudied. Despite significant progress in studies of marine fish parasites in Vietnam since 2006, only about 12% and 13% of the total fish species have been examined for parasites in the whole country and the Gulf of Tonkin, respectively.

**Key words:** Marine fish parasites, Species richness, Diversity, Vietnam, Host, Distribution.

**Résumé** – Parasites des poissons marins du Vietnam : synthèse complète et mise à jour des listes d'espèces, des hôtes et de la distribution zoogéographique. Avec un long littoral s'étendant des zones climatiques tropicales à subtropicales et une immense zone économique exclusive incluant plus de 4 000 îles, les eaux marines vietnamiennes abritent une faune parasitaire abondante et riche en biodiversité. Le premier signalement parasitologique remonte à 1898 et les études systématiques de la faune parasitaire se sont multipliées au cours des 50 dernières années. Cette synthèse complète couvre l'état actuel des connaissances sur les parasites des poissons marins au Vietnam et répertorie 498 espèces trouvées dans 225 espèces de poissons et leur répartition géographique. De plus, 251 espèces de parasites marins ont été nouvellement ajoutées à la faune déjà connue de 247 espèces depuis 2006 (soit une augmentation de plus du double). Le groupe le plus riche en espèces était les Digenea, qui représentaient 43% de la biodiversité totale des espèces de parasites, suivis des Monogenea (23,5 %), des Crustacea (11,6 %), des Nematoda et des Acanthocephala (8,0 % chacun). Le golfe peu profond et boueux du Tonkin a montré une riche faune parasitaire, représentant 66,3 % de l'ensemble de la faune parasitaire marine du Vietnam, avec les Digenea représentant 51 % de la richesse parasitaire totale régionale, suivi des Monogenea (27 %), Acanthocephala (8,8 %) et Nematoda (5,8 %). Seules quelques espèces appartenaient aux Hirudinea, Myxozoa et Cestoda, ce qui suggère que ces taxons pourraient être sous-étudiés. Malgré des progrès significatifs dans les études sur les parasites des poissons marins au Vietnam depuis 2006, seulement 12 % et 13 % des espèces de poissons ont été examinées, respectivement pour les parasites de l'ensemble du pays et du golfe du Tonkin.

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## Introduction

Vietnam has a long coastline of more than 3260 km and an immense exclusive economic zone (one million km<sup>2</sup>), comprising the coastlines of more than 4000 islands and thousands of square kilometers of coral reefs [122, 131]. The Vietnamese Sea stretches from tropical to subtropical climate zones (from the Namzu Islands, 9°40' N, 104°22' E, in the Gulf of Thailand to Daochao Island, 20°50' N, 107°20' E, in the Gulf of Tonkin), opening to the Pacific Ocean and being known for its biodiverse marine ecosystems supporting a rich fauna and flora, including fish parasites. Although Billet [26] recorded the first parasite, *Distomum hypselobagri* (Trematoda), systematic studies of the parasite fauna did not begin until the 1960s (e.g., [69, 71, 82, 97–99], etc.), and the first review was published only 16 years ago [19]. Recently, studies using both molecular [11–13, 16, 20, 24, 25, 36] and morphological methods [12, 13, 20, 24, 92] have been conducted in order to elucidate the systematics of marine parasites in Vietnam.

According to Palm and Bray [103], marine fish parasites are important in ecosystems. In open Hawaiian waters (Pacific Ocean), the authors discovered an average of 2.2 parasite species per marine fish species. In contrast, Klimpel et al. [66] discovered 1.5 metazoan parasite species per deep-sea fish species. According to Palm [102], each fish species in the world harbors up to 3–4 metazoan parasite species on average. In this sense, Arthur and Te [19] reported that the estimated number of parasite species per marine fish species in Vietnamese waters was as high as 3.0. There are currently 1876 species of marine fish reported in Vietnam's marine waters [45]. Despite this, only 247 parasite species infecting 82 marine fish species were documented by 2006, accounting for about 4.4% of the total fish community [19]. Such data demonstrate that the number of parasites known to science is insufficient to provide credible estimates of the local parasite community.

Because of the importance of marine parasites in fisheries, aquaculture, and human health, more research has been conducted recently, focusing on commercially important fish (e.g., [88, 90, 132, 135]). Furthermore, because parasites can be used as a tool for monitoring climate change and environmental health [86, 102, 129], studies regarding these organisms are essential. However, no systematic update pertaining to parasites in marine fish from Vietnam has been published since 2006, and since that date, much has changed in the knowledge of such organisms. However, Poulin [123] asserts that, due to the absence of an adequate method for determining parasite diversity, species richness remains the most straightforward and thus most relevant indicator of diversity. Therefore, the present study is aimed at: (1) shedding more light on the marine parasite richness in Vietnam by listing, correcting, and arranging the latest information, including the host and geographical distribution of parasites of marine fish; and (2) providing a current state of knowledge on parasite research in the Vietnamese marine waters, with particular emphasis on the Gulf of Tonkin (GOT).

## Methods

### Study sites and data collection

Vietnam is a Southeast Asian country divided into three distinct geographical and climatic regions: North, Central, and South Vietnam. The aquaculture industry is vital to the Vietnamese economy, especially brackish and marine fish farming along the country's coastline, particularly in the north [67].

A total of 137 references published between 1901 and 2022 were retrieved to gather knowledge on marine fish parasites and their occurrence in cultured and wild marine fish in Vietnam, focusing on the latest studies. This list was also based on information from the checklists of parasites of fishes in Vietnam [19], and it was expanded to provide a parasite-host list organized on a taxonomic basis, including information about each parasite species, sites of infection, the known geographical distribution in Vietnam, and references. More recently, reviews of individual species of parasites, including morphology, host-parasite distribution, zoogeography, and occasionally molecular analysis have become available; for instance, Amin et al. [2, 8, 14, 15] on *Rhadinorhynchus trachuri* Harada, 1935, *Neoechinorhynchus johnii* Yamaguti, 1939, *Sclerocollum neorubrimaris* Amin, Heckmann, Ha, 2018, respectively and *Serrasentis sagittifer* (Linton, 1889) Linton, 1932. The animal science databases (<https://www.cabi.org/animalscience/disease-health/>), MEDLINE, PubMed, Scopus, Web of Science, and Google Scholar were searched using the keywords: parasite, fish, marine, and Vietnam.

In addition, we included our most recent results from the Gulf of Tonkin, which included 40 *Acanthopagrus latus*, 1 *Acanthocybium solandri*, 7 *Neotrygon kuhlii*, 47 *Protonibea diacanthus*, 37 *Trachinotus blochii*, 7 *Telatrygon zugei*, and 2 *Thynnus* sp. (from 2014 to 2015). The fish were collected in the local fish markets in Ha Long (20°94'96" N, 107°08'23" E) and Cat Ba (20°72'75" N, 107°04'67" E) between 2014 and 2015, kept on ice and transferred to the Fisheries College's laboratory in Bac Ninh (close to Ha Noi). The parasite examination was performed using a Nikon SMZ-1 stereomicroscope and the standard procedures described by Palm [101] and Palm and Bray [103]. For taxonomic identification, permanent mounts were prepared following standard methods for Digenea, Monogenea, Nematoda, Cestoda, Acanthocephala, and Crustacea (Isopoda, Copepoda) according to Riemann [124], Palm [101], Arai et al. [18], Dojiri and Ho [42] and Paladini et al. [100]. The method to identify trichodinid ciliates was modified after Klein [65]. Parasites were identified using an Olympus BX53F DIC microscope based on taxonomic keys and original descriptions. The monogenean identification followed Chisholm and Whittington [39], Dang et al. [41], and Hendrix [51]. The identification of crustaceans was based on Kabata and Margolis [59], Shultz [127], and Dojiri and Ho [42]. The digenean identification followed Bray et al. [32], Gibson et al. [47], Jones et al. [57], and Bray and Justine [30]. The identification of cestodes was based on Khalil [63] and Palm [101]. Identification of nematodes was based on Anderson et al. [17] and Gibbons [46]. The protozoan identification followed Bruno et al. [33], and Lom and Dyková [78].

**Table 1.** The abbreviated names of the municipalities, provinces, and sea or ocean parts where samples were collected.

Municipalities/provinces/sea or ocean parts		Municipalities/provinces/sea or ocean parts	
Full names	Abbreviation	Full names	Abbreviation
Bac Lieu province	BL	Nam Dinh province	ND
Binh Thuan province	BT	Nghe An province	NA
Gulf of Tonkin	GOT	Quang Binh province	QB
Gulf of Thailand	GOTh	Quang Ninh province	QN
Hai Phong city	HP	South China Sea	SCS
Ha Long Bay, Quang Ninh	HL-QN	Thanh Hoa province	TH
Thua Thien Hue province	Hue	Ba ria-Vung tau province	VT
Khanh Hoa province	KH		
Kien Giang province	KG	The Gulf of Tonkin (GOT) includes HP, NA, ND, QB, QN, and TH	

Identification of acanthocephalans was based on Amin [1] and Arai et al. [18]. Other groups of invertebrates retrieved from the literature were identified using methods developed by different authors.

Furthermore, numerous scientific names for recorded hosts from the literature have been amended and corrected following the FishBase database (<https://www.fishbase.in/search.php>; 2021). The scientific names of existing parasites were carefully checked and corrected using various reliable sources, such as the World Register of Marine Species database (<http://www.marinespecies.org/index.php>), Ocean Biodiversity Information System (<https://obis.org/>), and Integrated Taxonomic Information System (<https://www.itis.gov/>).

Vietnam's 3260 km of coastline is home to 25 coastal provinces and three cities by the sea. The following abbreviations are used to denote administrative and oceanic divisions where the parasites have been reported (Table 1).

## Data analysis

The retrieved literature data, such as the reference, study period, study location, site of infection, fish host, taxa, and parasite species studied, were entered into an excel spreadsheet. This analysis only included parasites identified at the species level. In the list, the parasite taxon levels, i.e., subfamilies, genera, and species, were organized alphabetically. For the entire country of Vietnam and the Gulf of Tonkin, parasite species were classified into eight main taxa: Myxozoa (My), Ciliophora (Ci), Monogenea (Mo), Digenea (D), Cestoda (C), Nematoda (N), Acanthocephala (A), and Crustacea (Cr).

In order to have an insight into parasite richness, the total number of parasite species for Vietnam and the GOT was used to calculate the parasite species ratio per fish host. It is determined by dividing the total number of parasite species parasitizing fishes by the number of infected hosts. Microsoft Excel software was used to perform calculations and descriptive analysis of the collected data.

## Results and discussion

### Parasites in marine fish of Vietnam

Table 2 contains information about the parasite and host taxa, the site of infection, geographical localities, and literature sources.

### Abbreviations

- Taxon names:* A: Acanthocephala; C: Cestoda; Ci: Ciliophora; Cr: Crustacea; D: Digenea; H: Hirudinea; Mo: Monogenea; My: Myxozoa; N: Nematoda.
- Sites of infection:* Bc: Body cavity; Bvg: Blood vessel gill; Fi: Fin; Gb: Gall bladder; Gi: Gill; Gic: Gill cavity; Go: Gonad; He: Heart; Ht: Head tissues; In: Intestine; Io: Inner organs; Iw: Intestine wall; K: Kidney; L: Liver; Mu: Muscle; O: Oesophagus; Oe: Orbit of the eye; Op: Operculum; Phc: Pharyngeal cavity; Py: Pyloric caeca; S: Stomach; Sb: Swimming bladder; Sk: Skin; Sw: Stomach wall; Sv: Spiral valve; Ub: Urine bladder; Us: Under scales; Ve: Vitreous eye.
- \*Before 2005, *Epinephelus coioides* was misidentified as *E. tauvina*.

### Parasite richness

A total of 498 parasite species have been recorded from 225 marine fish in Vietnam belonging to the following taxa: Myxozoa and Ciliophora (8 each), Monogenea (117), Digenea (214), Cestoda (17), Nematoda (37), Acanthocephala (37), Hirudinea (2), and Crustacea (58), demonstrating the high diversity of the marine fish parasites inhabiting Vietnamese waters. The current average number of parasite species per fish species was 2.2, which was lower than the previously estimated species richness in Vietnamese (3.0) and German coastal waters (3.1) [19, 104]. This lower species richness appears to be due to a higher proportion of the fish community being investigated compared to 16 years ago (225 species vs. 82 fish species reported in 2006) so that a better prediction of the species richness can be made. It could also be explained by a decline in host species richness and population density, the major universal determinants of variations in parasite species richness [123]. However, the new figure of 2.2 is comparable to that of New Caledonia (1.9), the Indo-West Pacific (1.7), and Hawaii's open Pacific waters (2.2) ([58, 103, 126], respectively). These regions' similar latitudinal patterns could account for their parasite richness [28].

Our findings showed that only 225 of the total 1876 species of marine fish recorded in Vietnam [21] had been investigated for parasite species, accounting for only 12% of the entire fish community; this indicates that the parasite fauna of marine fishes in Vietnam is still poorly known.

**Table 2.** List of marine fish parasites in Vietnamese waters.

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<b>Phylum: Myzozoa Cavalier-Smith &amp; Chao, 2004</b>					
<b>Class: Conoidasida Levine, 1988</b>					
<b>Order: Eucoccidiorida Léger, 1911</b>					
<b>Family: Eimeriidae Minchin, 1903</b>					
<i>Goussia</i> sp.	My	<i>Lates calcarifer</i>	Sw	KH	[122]
<b>Phylum: Cnidaria Hatschek, 1888</b>					
<b>Class: Myxozoa Grassé, 1970</b>					
<b>Subclass: Myxosporea Bütschli, 1881</b>					
<b>Order: Bivavulida Shulman, 1959</b>					
<b>Family: Ceratomyxidea Doflein, 1899</b>					
<i>Ceratomyxa binthuanensis</i> Chinh, Ha, Doanh, Violetta	My	<i>Epinephelus fasciatus</i>	Gb	KH	[38]
<i>Ceratomyxa</i> sp.	My	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i> , <i>Lates calcarifer</i>	Gb	KH, HP, ND	[122, 133, 135]
<b>Family: Meglitschiidae Kovaleva, 1988</b>					
<i>Meglitschia insolita</i> (Meglitsch, 1960)	My	<i>Epinephelus coioides</i>	Gb	KH	[135]
<b>Family: Myxobolidae Thélohan, 1892</b>					
<i>Henneguya cerebralis</i> Pronin, 1972	My	<i>Lates calcarifer</i>	Gi	KH	[122]
<i>Henneguya lata</i> Nguyen, Chinh, Ngo, Van Tuc, Itoh, Yoshinaga, Shirakashi & Doanh, 2021 in [Chinh NN et al. (2021)] <sup>1</sup>	My	<i>Acanthopagrus latus</i>	Gi	QN	[37]
<i>Henneguya</i> sp.	My	<i>Acanthopagrus latus</i>	Gi, Sw	QN	Present study
<i>Myxobolus</i> sp.	My	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. tauvina</i>	K	KH	[135]
<b>Phylum: Ciliophora Doflein, 1901</b>					
<b>Class: Oligohymenophorea, Stein 1859</b>					
<b>Subclass: Peritrichia Stein, 1859</b>					
<b>Order: Mobilida Kahl, 1933</b>					
<b>Family: Trichodinidae Claus, 1951</b>					
<i>Trichodina japonica</i> Imai, Miyazaki & Nomura, 1991	Ci	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i>	Gi	KH	[140]
<i>Trichodina rostrata</i> Kulemina, 1968 <sup>1</sup>	Ci	<i>Lates calcarifer</i>	Gi, Sk	KH	[122]
<i>Trichodina</i> sp.	Ci	<i>Epinephelus bruneus</i> , <i>E. tauvina</i> , <i>E. sexfasciatus</i> , <i>E. coioides</i> , <i>Lutjanus erythropterus</i> , <i>Rachycentron canadum</i> , <i>Sciaenops ocellatus</i>	Gi, Sk	HP, QN, NA, KH, VT	[34, 121, 133, 140]
<b>Order: Sessilida Stein 1933</b>					
<b>Family: Epistylididae Kahl, 1935</b>					
<i>Apiosoma</i> sp.	Ci	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i>	Sk	KH	[135]
<b>Family: Scyphiddidae Kahl, 1935</b>					
<i>Ambiphrya</i> sp.	Ci	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Lates calcarifer</i>	Sk	KH	[140]
<b>Class: Phyllopharyngea de Puytorac, Batisse, Bohatier, Corliss, Deroux, Didier, Dragesco, Fryd-Versavel, Grain, Grollere, Horasse, Mode, Laval, Roque, Savoie &amp; Tuffrau, 1974</b>					
<b>Order: Chlamyodontida Deroux, 1976</b>					
<b>Family: Chilodinellidae Deroux, 1970</b>					
<i>Chilodonella</i> sp.	Ci	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Sk	KH	[135]

(Continued on next page)

**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<b>Order: Dysteriida Deroux, 1970</b>					
<b>Family: Hartmannulidae Poche, 1913</b>					
<i>Brooklynella hostilis</i> Lom & Nigrelli, 1970	Ci	<i>Epinephelus bleekeri</i> , <i>E. bruneus</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> *	Gi, Sk	QN, KH	[34, 140]
<b>Class: Prostomatea Schewiakoff, 1896</b>					
<b>Order: Prorodontida Corliss, 1974</b>					
<b>Family: Holophryidae Perty, 1852</b>					
<i>Cryptocaryon irritans</i> Brown, 1951	Ci	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Lates calcarifer</i> , <i>Sciaenops ocellatus</i>	Gi, Sk	KH, HP, ND	[133, 140]
<b>Phylum: Platyhelminthes Minot, 1876</b>					
<b>Class: Monogenea Van Beneden, 1858</b>					
<b>Subclass: Monopisthocotylea Odhner, 1912</b>					
<b>Order: Capsalidea Lebedev, 1988</b>					
<b>Family: Capsalidae Baird, 1853</b>					
<i>Allobenedenia epinepheli</i> (Bychowsky & Nagibina, 1967) Yang, Kritsky & Sun, 2004	Mo	<i>Epinephelus coioides</i>	Gi	KH	[140]
<i>Allobenedenia yamagutii</i> (Egorova, 1994) Yang, Kritsky & Sun, 2004	Mo	<i>Hyporthodus nigrinus</i> (Holbrook, 1855)	Gi, Sk	KH, QN	[88, 140]
<i>Benedenia epinepheli</i> (Yamaguti, 1937) Meserve, 1938	Mo	<i>Epinephelus bleekeri</i> , <i>E. bruneus</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> *, <i>Lutjanus argentimaculatus</i>	Sk, Fi	KH, QN	[34, 135]
<i>Benedenia</i> sp.	Mo	<i>Epinephelus bruneus</i> , <i>E. coioides</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> *, <i>Lutjanus erythropterus</i> , <i>Rachycentron canadum</i>	Sk	HP, ND, QN, KH	[34, 133, 140]
<i>Capsala affinis</i> (Mamaev, 1968) Chisholm & Whittington, 2007	Mo	<i>Auxis thazard</i> , <i>Euthynnus affinis</i>	Gi	SCS	[80]
<i>Capsala notosinense</i> (Mamaev, 1968) Chisholm & Whittington, 2007	Mo	<i>Euthynnus affinis</i>	Gi	SCS	[80]
<i>Capsala paucispinosa</i> (Mamaev, 1968) Chisholm & Whittington, 2007	Mo	<i>Euthynnus affinis</i> , <i>Thunnus thynnus</i>	Gi, Sk	SCS	[80]
<i>Capsala</i> sp.	Mo	<i>Thunnus thynnus</i>	Gi	SCS	[80]
<i>Encotyllabe spari</i> Yamaguti, 1934	Mo	<i>Gymnocranius griseus</i> , <i>Plectorhinchus</i> sp.	Gi	GOT	[81]
<i>Megalocotyle lutiani</i> Lebedev, 1970	Mo	<i>Lutjanus lutjanus</i>	Gi	GOT	[73]
<i>Neobenedenia melleni</i> (MacCallum, 1927) Yamaguti, 1963	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Lates calcarifer</i> , <i>Lutjanus argentimaculatus</i>	Sk, Fi	KH	[53, 140]
<i>Neobenedenia</i> sp.	Mo	<i>Rachycentron canadum</i>	Sk	KH	[53]
<i>Sessilorbis limopharynx</i> Mamaev, 1970	Mo	<i>Platax orbicularis</i>	Gi	GOT	[81]
<i>Sprostoniella multitestis</i> Bychowsky & Nagibina, 1967	Mo	<i>Platax orbicularis</i>	Gi	GOT	[81]
<i>Trilobiodiscus lutiani</i> Bychowsky & Nagibina, 1967	Mo	<i>Lutjanus argentimaculatus</i>	–	GOT	[43]
<i>Trochopus antigoniae</i> Egorova & Korotaeva, 1990	Mo	<i>Antigonia rubescens</i>	Gi	SCS	[44]
<b>Order: Dactylogyridea Bychowsky, 1937</b>					
<b>Family: Ancyrocephalidae Bychowsky, 1937</b>					
<i>Ancyrocephalus macrogaster</i> Yamaguti, 1953	Mo	<i>Gerres filamentosus</i>	Gi	GOT	[81]
<i>Ancyrocephalus parspinicirrus</i> Mamaev, 1970	Mo	<i>Drepane punctata</i>	Gi	GOT	[81]

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Ancyrocephalus unicirrus</i> Tripathi, 1959	Mo	<i>Pomadasys argenteus</i>	Gi	GOT	[81]
<i>Haliotrema bilobatum</i> (Yamaguti, 1953) Bychowsky & Nagibina, 1970	Mo	<i>Drepane longimana</i> , <i>D. punctata</i>	Gi	GOT	[81]
<i>Haliotrema cromileptis</i> Young, 1968	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Gi	KH	[41, 135]
<i>Haliotrema epinepheli</i> Yamaguti, 1968	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Gi	KH	[41, 135]
<i>Haliotrema geminatomamula</i> Bychowsky & Nagibina, 1971	Mo	<i>Leiognathus nuchalis</i>	Gi	QN	[88]
<i>Haliotrema spinicirrus</i> (Yamaguti, 1953) Bychowsky & Nagibina, 1970	Mo	<i>Decapterus maruadsi</i> , <i>Drepane punctata</i>	Gi	QN, GOT	[81, 88]
<i>Haliotrema</i> sp.	Mo	<i>Acanthopagrus latus</i> , <i>Epinephelus bruneus</i> , <i>E. bleekeri</i> , <i>E. coioides</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> *	Gi	GOT, KH	[34, 41, 135] Present study
<i>Ligophorus hamulosus</i> Pan & Zhang in Pan 1999	Mo	<i>Moolgarda engeli</i> , <i>M. seheli</i>	Gi	QN	[88]
<i>Metahaliotrema kulkarnii</i> Venkatanarasaiah, 1981	Mo	<i>Scatophagus argus</i>	Gi	GOT	[68]
<i>Metahaliotrema mizellei</i> Venkatanarasaiah, 1981	Mo	<i>Scatophagus argus</i>	Gi	QN, GOTh	[68, 88]
<i>Metahaliotrema scatophagi</i> Yamaguti, 1953	Mo	<i>Scatophagus argus</i>	Gi	QN	[68]
<i>Metahaliotrema simile</i> Kritsky, Nguyen, Ha & Heckman, 2016	Mo	<i>Scatophagus argus</i>	Gi	QN	[68]
<i>Metahaliotrema yamagutii</i> Mizelle & Price, 1964	Mo	<i>Scatophagus argus</i>	Gi	GOTh	[68]
<i>Metahaliotrema ypsilocleithrum</i> Kritsky, Nguyen, Ha & Heckman, 2016	Mo	<i>Scatophagus argus</i>	Gi	QN, GOTh	[68]
<i>Murraytrema pricei</i> Bychowsky & Nagibina, 1977	Mo	<i>Nibea albiflora</i>	Gi	QN	[88]
<i>Paradiplectanotrema trachuri</i> (Kovaleva, 1970) Gerasev, Gayevskaya & Kovaleva, 1987	Mo	<i>Argyrosomus japonicus</i> , <i>Johnius carouna</i>	St	QN	[88]
<i>Platycephalotrema platycephali</i> (Yin & Sproston, 1948) Kritsky & Nitta, 2019	Mo	<i>Platycephalus indicus</i>	Gi	QN	[88]
<i>Protogyrodactylus scapulasser</i> (Mamaev, 1970) Gusev, 1973	Mo	<i>Gerres filamentosus</i>	Gi	GOT	[81]
<b>Family: Diplectanidae Monticelli, 1903</b>					
<i>Calydiscoides flexuosus</i> (Yamaguti, 1953) Young, 1969	Mo	<i>Nemipterus Japonicus</i>	Gi	QN	[88]
<i>Acleotrema nenu</i> (Yamaguti, 1968) Dominques & Boeger, 2007	Mo	<i>Lates calcarifer</i>	Gi, Sk	KH	[122]
<i>Diplectanum</i> sp.	Mo	<i>Plectorhinchus cinctus</i>	Gi	GOT	[81]
<i>Laticola latesi</i> (Tripathi, 1959) Yang, Kritsky, Sun, Zhang, Shi & Agrawal, 2006	Mo	<i>Lates calcarifer</i>	Gi, Sk	KH	[122]
<i>Laticola paralatesi</i> (Nagibina, 1976) Yang, Kritsky, Sun, Zhang, Shi & Agrawal, 2006	Mo	<i>Lates calcarifer</i>	Gi, Sk	KH	[122]
<i>Murraytrema pricei</i> Bychowsky & Nagibina, 1977	Mo	<i>Nibea albiflora</i>	Gi	QN	[88]
<i>Paradiplectanum blairense</i> (Gupta & Khanna, 1974) Domingues & Boeger, 2008	Mo	<i>Sillago japonica</i> , <i>S. sihama</i>	Gi	QN	[88]
<i>Pseudorhabdosynochus coioidesis</i> Bu, Leong, Wong, Woo & Foo, 1999	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i>	Gi	KH	[135]
<i>Pseudorhabdosynochus cupatus</i> (Young, 1969) Kritsky & Beverley-Burton, 1986	Mo	<i>Epinephelus sexfasciatus</i>	Gi	QN	[34]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Pseudorhabdosynochus epinepheli</i> (Yamaguti, 1938) Kritsky & Beverley-Burton, 1986	Mo	<i>Epinephelus bleekeri</i> , <i>E. bruneus</i> , <i>E. coioides</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i>	Gi	QN, KH	[34, 135]
<i>Pseudorhabdosynochus grouperi</i> (Bu, Leong, Wong, Woo & Foo, 1999) Wu, Li, Zhu & Xie, 2005	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i> , <i>Lates calcarifer</i>	Gi	KH	[140]
<i>Pseudorhabdosynochus lantauensis</i> (Beverley-Burton & Suriano, 1981) Kritsky & Beverley-Burton, 1986	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	Gi	KH	[135]
<i>Pseudorhabdosynochus serrani</i> (Yamaguti, 1953) Kritsky & Beverley-Burton, 1986	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i>	Gi	KH	[135]
<i>Pseudorhabdosynochus summanooides</i> Yang, Gibson & Zeng, 2005	Mo	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	Gi	KH	[135]
<i>Pseudorhabdosynochus summanae</i> (Young, 1969) Kritsky & Beverley-Burton, 1986	Mo	<i>Epinephelus coioides</i> , <i>E. bleekeri</i>	Gi	KH	[135]
<i>Pseudorhabdosynochus</i> sp.	Mo	<i>Epinephelus coioides</i>	Gi	QN, HP, ND	[133]
<b>Order: Gyrodactylidea Price, 1943</b>					
<b>Family: Tetraonchoidea Bychowsky, 1951</b>					
<i>Paratetraonchoidea inermis</i> Bychowsky, Gussev & Nagibina, 1965	Mo	<i>Ichthyoscopus lebeck</i>	Gi	GOT	[35]
<i>Pavlovskioides ichthyoscopi</i> Bychowsky, Gussev & Nagibina, 1965	Mo	<i>Ichthyoscopus lebeck</i>	Gi	GOT	[35]
<i>Pavlovskioides litoralis</i> Bychowsky, Gussev & Nagibina, 1965	Mo	<i>Trachinocephalus myops</i>	Gi	GOT	[35]
<i>Pseudotetraonchoidea bleekeriae</i> Bychowsky, Gussev & Nagibina, 1965	Mo	<i>Bleekeria viridianguilla</i>	Gi	GOT	[35]
<b>Subclass: Polyopisthocotylea Odhner, 1912</b>					
<b>Order: Mazocraeidea Bychowsky, 1957</b>					
<b>Family: Allodiscocotylidae Tripathi, 1959</b>					
<i>Allodiscocotyla chorinemi</i> Yamaguti, 1953	Mo	<i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Scomberoides lysan</i>	Gi	GOT, SCS	[73, 76, 118]
<i>Allodiscocotyla diacanthi</i> Unnithan, 1962	Mo	<i>Acanthopagrus pacificus</i> , <i>Decapterus</i> sp.	Gi	QN, GOT, SCS	[73, 76, 93, 118]
<i>Camopia rachycentri</i> Lebedev, 1970	Mo	<i>Rachycentron canadum</i>	Gi	GOT	[74]
<i>Metacamopia chorinemi</i> (Yamaguti, 1953) Lebedev, 1984	Mo	<i>Scomberoides lysan</i> , <i>Selar crumenophthalmus</i>	Gi	GOT, SCS	[73, 76, 118]
<i>Metacamopia lebedevi</i> Nguyen, Nguyen, Ha, Ngoc, Ngoc, Le, Tatonova & Greiman, 2020	Mo	<i>Acanthopagrus pacificus</i>	Gi	QN	[93]
<b>Family: Axinidae Monticelli, 1903</b>					
<i>Alloposeudaxine macrova</i> (Unnithan, 1957) Yamaguti, 1963	Mo	<i>Auxis thazard</i> , <i>Caranx</i> sp.	Gi	SCS	[72, 80]
<i>Loxuroides pricei</i> Nguyen, Nguyen, Bui & Ha, 2016	Mo	<i>Cypselurus naresii</i>	Gi	GOT, QB	[92]
<i>Unnithanaxine naresii</i> Nguyen, Nguyen, Bui & Ha, 2016	Mo	<i>Cypselurus naresii</i>	Gi	GOT, Hue	[92]
<b>Family: Bychowskicotylidae Lebedev, 1969</b>					
<i>Bychowskicotyle plectorhynchi</i> Lebedev, 1969	Mo	<i>Plectorhynchus cinctus</i>	Gi	GOT	[74]

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Yamaguticotyla jucunda</i> (Lebedev, 1972) Lebedev, 1984	Mo	Pomadasyidae gen. sp.	Gi	GOT	[74]
<b>Family: Diclidophoridae Cerfontaine, 1895</b>					
<i>Osphyobothrus bychowskyi</i> Khoche & Chauhan, 1969	Mo	<i>Saurida tumbil</i>	Gi	GOT, SCS	[83, 114]
<b>Family: Gastrocotylidae Price, 1943</b>					
<i>Churavera triangula</i> (Mamaev, 1967) Lebedev, 1986	Mo	<i>Auxis thazard</i>	Gi	SCS	[74, 80]
<i>Engraulicola thrissocles</i> (Tripathi, 1959) Lebedev, 1971	Mo	<i>Anchoviella</i> sp., <i>Thryssa mystax</i>	Gi	GOT	[74]
<i>Gastrocotyle indica</i> Subhadrappa, 1951	Mo	<i>Alepes djedaba</i>		SCS	[74]
<i>Gastrocotyle kurra</i> Unnithan, 1968	Mo	<i>Decapterus</i> sp.	Gi	GOT	[74]
<i>Gastrocotyle trachuri</i> Van Beneden & Hesse, 1863	Mo	<i>Decapterus</i> sp., <i>Selar crumenophthalmus</i> , <i>Trachurus trachurus</i>	Gi	GOT, SCS	[73, 76, 118]
<i>Gastrocotyle</i> sp.	Mo	<i>Alectis indicus</i> , <i>Decapterus</i> sp.	Gi	GOT, SCS	[73, 76, 118]
<i>Pseudaxine bivaginalis</i> Dillon & Hargis, 1965	Mo	<i>Selaroides leptolepis</i>	Gi	GOT	[72]
<i>Pseudaxine trachuri</i> Parona & Perugia, 1890	Mo	<i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp.	Gi	GOT, SCS	[73, 76, 118]
<i>Pseudaxine bychowskyi</i> (Lebedev, 1977) Bouguerche, Tazerouti, Gey & Justine, 2020	Mo	<i>Alepes djedaba</i> , <i>Alepes kleinii</i>	Gi	SCS	[74]
<i>Pseudaxine caballeri</i> (Lebedev, 1977) Bouguerche, Tazerouti, Gey & Justine, 2020	Mo	<i>Alepes djedaba</i> , <i>Alepes kleinii</i>	Gi	SCS	[74]
<i>Pseudaxine</i> sp.	Mo	<i>Alectis indicus</i> , <i>Auxis thazard</i> , <i>Caranx</i> sp., <i>D. muroadsi</i> , <i>Decapterus</i> sp.	Gi	QN, GOT, SCS	[73, 76, 88, 118]
<i>Pseudaxine vietnamensis</i> (Lebedev, Parukhin & Roitman, 1970) Bouguerche, Tazerouti, Gey & Justine, 2020	Mo	<i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Seriola dumerili</i>	Gi	QN, GOT, SCS	[73, 76, 88, 118]
<i>Sibitrema poonui</i> Yamaguti, 1966	Mo	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>T. thynnus</i>	Gi	SCS	[74, 80]
<b>Family: Gotocotylidae Yamaguti, 1963</b>					
<i>Cathucotyle cathuauui</i> Lebedev, 1968	Mo	<i>Scomberomorus commerson</i> , <i>S. guttatus</i> .	Gi	GOT, SCS	[72, 73]
<i>Gotocotyla acanthura</i> (Parona & Perugia, 1896) Meserve, 1938	Mo	<i>Scomberomorus guttatus</i>	Gi	GOT	[73]
<i>Gotocotyla bivaginalis</i> (Ramalingam, 1961) Rohde, 1976	Mo	<i>Scomberomorus commerson</i>	Gi	GOT	[74]
<i>Gotocotyla laticauda</i> Lebedev, 1970	Mo	<i>Scomberomorus commerson</i>	Gi	GOT	[73]
<b>Family: Heteraxinidae Unnithan, 1957</b>					
<i>Bicotyle perpolita</i> Lebedev, 1968	Mo	<i>Pampus argenteus</i> , <i>Parastromateus niger</i>	Gi	GOT, SCS	[69, 81]
<i>Heteraxine heterocerca</i> (Goto, 1894) Yamaguti, 1938	Mo	<i>Caranx</i> sp., <i>Selar crumenophthalmus</i>	Gi, Phc	GOT, SCS	[69, 81]
<i>Kannaphallus virilis</i> Unnithan, 1957	Mo	<i>Alectis indicus</i> , <i>Carangoides malabaricus</i> ,	Gi	SCS, GOT	[73, 76, 118]
<i>Karvolicola ruber</i> Nguyen, Nguyen, Tatonova, 2020	Mo	<i>Otolithes ruber</i>	Gi	QB	[94]
<i>Karvolicola tuyeti</i> Nguyen, Nguyen, Tatonova, 2020	Mo	<i>Nibeia albiflora</i>	Gi	QB	[94]
<i>Lethrinaxine parva</i> Mamaev, 1970	Mo	<i>Gymnocranius griseus</i>	Gi	GOT	[81]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Monaxine formionis</i> Unnithan, 1957	Mo	<i>Parastromateus niger</i>	Gi	GOT	[81]
<b>Family: Heteromicrocotylidae Unnithan, 1961</b>					
<i>Heterapta chorinemi</i> (Tripathi, 1956)	Mo	<i>Acanthopagrus pacificus</i>	Gi	QN	[93]
Unnithan, 1961					
<i>Heteromicrocotyla carangis</i> Yamaguti, 1953	Mo	<i>Carangoides malabaricus</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i> , Carangidae gen. sp.	Gi	GOT, SCS	[69, 73, 76, 118]
<i>Heteromicrocotyla polyorchis</i> Unnithan, 1961	Mo	Carangidae gen. sp.	Gi	GOT, SCS	[73, 76, 118]
<i>Heteromicrocotyla vaginispina</i> Unnithan, 1961	Mo	<i>Carangoides malabaricus</i>	Gi	GOT, SCS	[73, 118]
<i>Heteromicrocotyla</i> sp.	Mo	Carangidae gen. sp., <i>Carangoides malabaricus</i> , <i>Decapterus</i> sp., <i>Selaroides leptolepis</i>	Gi	GOT, SCS	[73, 76, 118]
<b>Family: Hexostomatidae Price, 1936</b>					
<i>Hexostoma thynni</i> (Delaroche, 1811)	Mo	<i>Auxis thazard</i>	Gi	SCS	[80]
Rafinesque, 1815					
<i>Neohexostoma euthynni</i> (Meserve, 1938)	Mo	<i>Auxis thazard</i> , <i>Euthynnus affinis</i>	Gi	SCS	[80]
Price, 1961					
<b>Family: Mazocraeidae Price, 1936</b>					
<i>Neomazocraes dorosomatis</i> (Yamaguti, 1938)	Mo	<i>Clupanodon thrissa</i>	Gi	QN	[88]
Price, 1943					
<i>Paramazocraes thrissocles</i> Tripathi, 1959	Mo	<i>Thrissocles</i> sp.	Gi	GOT	
<b>Family: Microcotylidae Taschenberg, 1879</b>					
<i>Caballeraxine chainanica</i> (Lebedev, Parukhin & Roitman, 1970) Lebedev, 1972	Mo	<i>Carangoides malabaricus</i>	Gi	GOT, SCS	[118]
<i>Diplostamenides sciaenae</i> (Goto, 1894) Mamaev, 1986	Mo	<i>Seriola</i> sp.	Gi	GOT, SCS	[73, 118]
<i>Incisaxine dubia</i> Mamaev, 1970	Mo	<i>Gerres</i> sp.	Gi	GOT	[81]
<i>Intracotyle orientalis</i> Mamaev, 1970	Mo	<i>Pomadasys argenteus</i>	Gi	GOT	[81]
<i>Lutianicola haifonensis</i> Lebedev, 1970	Mo	<i>Lutjanus russellii</i> , <i>L. sebae</i>	Gi	GOT	[73]
<i>Microcotyle</i> sp.	Mo	<i>Carangoides malabaricus</i>	Gi	GOT	[73]
<i>Polylabroides</i> cf. <i>guangdongensis</i> Zhang & Yang, 2000	Mo	<i>Acanthopagrus latus</i>	Gi	QN	Present study
<i>Polylabroides tienyenensis</i> Nguyen, Nguyen, Ha, Ngoc, Ngoc, Le, Tatonova & Greiman, 2020	Mo	<i>Acanthopagrus pacificus</i>	Gi	QN	[93]
<i>Polylabroides tonkinensis</i> Nguyen, Nguyen, Ha, Ngoc, Ngoc, Le, Tatonova & Greiman, 2020	Mo	<i>Acanthopagrus pacificus</i>	Gi	QN	[93]
<i>Tonkinaxine homocerca</i> Lebedev, Parukhin & Roitman, 1970	Mo	<i>Carangoides malabaricus</i> , <i>Seriola dumerili</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i>	Gi	GOT, SCS	[76, 118]
<b>Family: Plectanocotylidae Monticelli, 1903</b>					
<i>Triglicola tonkinensis</i> Mamaev & Parukhin, 1972	Mo	<i>Lepidotrigla</i> sp.	Gi	GOT	[84, 119]
<b>Family: Protomicrocotylidae Johnston &amp; Tiegs, 1922</b>					
<i>Bilaterocotylodes carangis</i> Ramalingam, 1961	Mo	Carangidae gen. sp., <i>Megalaspis cordyla</i>	Gi	GOT, SCS	[73, 118]
<i>Bilaterocotylodes madrasensis</i> Radha, 1966	Mo	<i>Megalaspis cordyla</i>	Gi	GOT	[73, 76, 118]
<i>Vallisiopsis contorta</i> Subhpradha, 1951	Mo	<i>Lactarius lactarius</i>	Gi	GOT, SCS	[74]
<b>Family: Thoracocotylidae Price, 1936</b>					
<i>Pricea multae</i> Chauhan, 1945	Mo	<i>Scomberomorus commerson</i> , <i>S. guttatus</i>	Gi	GOT	[73]

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Pseudothoracocotyla ovalis</i> (Tripathi, 1956) Yamaguti, 1963	Mo	<i>Scomberomorus commerson</i> , <i>S. guttatus</i>	Gi	GOT, SCS	[73, 119]
Monogenea gen. sp.	Mo	<i>Abalistes stellaris</i>	Gi	SCS	[119]
<b>Class: Trematoda Rudolphi, 1808</b>					
<b>Subclass: Digenea Carus, 1863</b>					
<b>Order: Diplostomida Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Suborder: Diplostomata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Schistosomatoidea Stiles &amp; Hassall, 1898</b>					
<b>Family: Aporocotylidae Odhner, 1912</b>					
<i>Cardicola congruentus</i> Lebedev & Mamaev, 1968	D	<i>Euthynnus affinis</i>	Bvg	GOT	[75]
<i>Cardicola grandis</i> Lebedev and Mamaev, 1968	D	<i>Makaira</i> sp.	Iw	GOT	[75]
<i>Cardallagium</i> cf. <i>anthicum</i> (Bullard & Overstreet, 2006) Yong, Cutmore, Jones, Gauthier & Cribb, 2017	D	<i>Rachycentron canadum</i>	He	KH	[141]
<b>Order: Plagiorchiida La Rue, 1957</b>					
<b>Suborder: Apocreadiata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Apocreadioidea Skrjabin, 1942</b>					
<b>Family: Apocreadiidae Skrjabin, 1942</b>					
<i>Homalometron</i> sp.	D	<i>Gerres filamentosus</i>	In	GOT	[81]
<i>Schistorchis skrjabini</i> Parukhin, 1963	D	<i>Abalistes stellaris</i> , <i>Triacanthus biaculeatus</i>	In	GOT	[106, 119]
<i>Sphincteristomum acollum</i> Oshmarin et al., 1961	D	<i>Abalistes stellaris</i>	In	GOT	[99, 119]
<b>Suborder: Bivesiculata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Bivesiculoidea Yamaguti, 1934</b>					
<b>Family: Bivesiculidae Yamaguti, 1934</b>					
<i>Bivesicula claviformis</i> Yamaguti, 1934	D	<i>Amphiprion clarckii</i> , <i>A. perideraion</i> ; <i>A. polymmus</i>	S	KH	[27]
<i>Bivesicula</i> sp., Metacercaria	D	<i>Amphiprion clarckii</i> , <i>A. perideraion</i>	In	KH	[142]
<i>Paucivitellosus vietnamensis</i> Atopkin, Besprozvannykh, Ngo, Van Ha, Van Tang, Ermolenko & Beloded, 2016	D	<i>Liza subviridis</i>	In	GOT	[20]
<b>Suborder: Bucephalata La Rue, 1926</b>					
<b>Superfamily: Bucephaloidea Poche, 1907</b>					
<b>Family: Bucephalidae Poche, 1907</b>					
<i>Alcicornis baylisi</i> Nagaty, 1937	D	<i>Carangoides malabaricus</i>	In	SCS	[113]
<i>Alcicornis carangis</i> MacCallum, 1917	D	<i>Caranx</i> sp.	In	GOT, SCS	[71, 73]
<i>Bucephalus fragilis</i> Velasquez, 1959	D	<i>Megalaspis cordyla</i> , <i>Scomberoides lysan</i>	In	SCS	[113]
<i>Bucephalus gorgon</i> (Linton, 1905) Eckmann, 1932	D	<i>Seriolina nigrofasciata</i>	S	GOT	[95]
<i>Bucephalus introversus</i> Manter, 1940	D	<i>Seriolina nigrofasciata</i>	In	SCS	[118]
<i>Bucephalus varicus</i> Manter, 1940	D	<i>Atropus atropos</i> , <i>Atule mate</i> , <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i>	S, In	SCS, GOT	[113, 117, 118]
<i>Bucephalus paraheterotentaculatus</i> Velasquez, 1959	D	<i>Seriola dumerili</i> , <i>Seriolina nigrofasciata</i>	In	SCS	[113, 118]
<i>Bucephalus polymorphus</i> von Baer, 1827	D	<i>Lates calcarifer</i>	In	KH	[140]
<i>Bucephalus</i> sp.	D	<i>Gerres filamentosus</i>	S	SCS, GOT	[81]
<i>Prosorhynchus epinepheli</i> Yamaguti, 1939	D	<i>Epinephelus coioides</i> , <i>E. bleekeri</i> , <i>E. bruneus</i> , <i>E. malabaricus</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> , <i>Lutjanus argentimaculatus</i>	In	KH, QN	[34, 90, 140]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Prosorhynchus pacificus</i> Manter, 1940	D	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	In	KH	[135]
<i>Prosorhynchus luzonicus</i> Velasquez, 1959	D	<i>Epinephelus coioides</i>	S, In, Py	HP, ND, QN, TH	[132]
<i>Prosorhynchus tonkinensis</i> Truong, Palm, Bui, Thuy Ngo & Bray, 2016	D	<i>Epinephelus coioides</i>	S, Py	ND	[132]
<i>Prosorhynchus maternus</i> Bray & Justine, 2006	D	<i>Epinephelus coioides</i>	S	HP	[132]
<i>Prosorhynchus</i> sp. A <sup>2</sup>	D	<i>Epinephelus coioides</i>	S	HP	[132]
<i>Prosorhynchus</i> sp. B <sup>3</sup>	D	<i>Epinephelus coioides</i>	S	HP	[132]
<i>Prosorhynchus</i> sp.	D	<i>Acanthopagrus latus</i> , <i>Auxis thazard</i>	In	NA, QB, QN SCS	[80, 90]; Present study
<i>Rhipidocotyle laruei</i> Velasquez, 1959	D	<i>Psettodes erumei</i>	S, In	SCS, GOT	[114, 119]
<i>Rhipidocotyle pentagonum</i> (Ozaki, 1924) Eckmann, 1932	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Thunnus thynnus</i>	S, In	SCS	[95]
<i>Rhipidocotyle</i> sp.	D	<i>Drepane punctata</i> , <i>Ehippus orbis</i> , <i>Gerres filamentosus</i> , <i>Gymnocranius griseus</i> , <i>Leiognathus equulus</i> , <i>Parastromateus niger</i> , Leiognathidae gen. sp., Sciaenidae gen. sp.	Gi, Go, In, K, Ve	GOT, SCS	[81, 95, 133]
<i>Prosorhynchinae</i> gen. sp.	D	<i>Epinephelus coioides</i>	In	QN	[133]
<b>Superfamily: Gorgoderoidea Looss, 1901</b>					
<b>Family: Callodistomidae Odhner, 1910</b>					
<i>Cholepotes</i> sp.	D	<i>Parupeneus multifasciatus</i>	In	KH	[27]
<b>Superfamily: Gymnophalloidea Odhner, 1905</b>					
<b>Family: Fellodistomidae Nicoll, 1909</b>					
<i>Complexobursa vietnamensis</i> Oshmarin & Mamaev, 1963	D	<i>Terapon theraps</i>	In	GOT	[98]
<i>Lintonium vibex</i> (Linton, 1900) Stunkard & Nigrelli, 1930	D	<i>Abalistes stellaris</i> , <i>Aluterus monoceros</i> , <i>Monacanthus chinensis</i> , <i>Scomberoides lysan</i> , <i>Scomberomorus commerson</i>	In, L	GOT, SCS	[73, 95, 113]
<i>Proctoeces</i> sp.	D	<i>Acanthopagrus latus</i>	In	QN	Present study
<i>Pseudosteringophorus</i> sp.	D	<i>Ehippus orbis</i>	In	GOT	[81]
<i>Tergestia laticollis</i> (Rudolphi, 1819) Stossich, 1899	D	<i>Alepes melanoptera</i> , <i>Decapterus</i> sp., <i>Megalaspis cordyla</i> , <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i>	In	SCS	[118]
<b>Family: Tandanicolidae Johnston, 1927</b>					
<i>Buckleytrema indicum</i> Gupta, 1956	D	<i>Arius</i> sp.	In	GOT	[98]
<i>Monodharmis torpedinis</i> Dollfus, 1937	D	<i>Arius arius</i>	In	HP	[90]
<b>Suborder: Haploporata Pérez-Ponce de León &amp; Hernández-Mena, 2019</b>					
<b>Superfamily: Haploporoidea Nicoll, 1914</b>					
<b>Family: Haploporidae Nicoll, 1914</b>					
<i>Parahaploporus elegantus</i> Atopkin, Besprozvannykh, Ha, Nguyen & Nguyen, 2019	D	<i>Osteomugil cunnesius</i>	In	KH	[23]
<i>Parasaccocoelium mugili</i> Zhukov, 1971	D	<i>Liza haematocheila</i>	In	QN, HP	[23]
<i>Pseudohaploporus vietnamensis</i> Atopkin, Besprozvannykh, Ha, Tang, Nguyen, Nguyen & Chalenko, 2018	D	<i>Moolgarda seheli</i> , <i>Osteomugil engeli</i>	In	GOT	[22]

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Pseudohaploporus planilizum</i> Atopkin, Besprozvannykh, Ha, Nguyen, Nguyen & Chalenko, 2018	D	<i>Planiliza subviridi</i>	In	GOT	[22]
<i>Pseudohaploporus pusitestis</i> Atopkin, Besprozvannykh, Ha, Nguyen & Nguyen, 2019	D	<i>Moolgarda seheli</i>		HP	[23]
<i>Pseudohaploporus</i> sp.	D	<i>Moolgarda seheli</i>	In	GOT	[22]
<i>Skrjabinolecithum spasskii</i> Belous, 1954	D	<i>Liza haematocheila</i> , <i>Mugil cephalus</i>	In	HP	[90]
<b>Suborder: Haplospalanchnata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Haplospalanchnoidea Poche, 1925</b>					
<b>Family: Haplospalanchnidae Poche, 1926</b>					
<i>Haplospalanchnus pachysoma</i> (Eysenhardt, 1829) Looss, 1902	D	<i>Liza engeli</i>	In	QN	[24]
<b>Suborder: Hemiurata Skrjabin &amp; Guschanskaja, 1954</b>					
<b>Superfamily: Hemiuroidea Looss, 1899</b>					
<b>Family: Accacoeliidae Odhner, 1911</b>					
<i>Tetrochetus hansonii</i> (Parukhin, 1964) Hafeezullah, 1982	D	<i>Aluterus monoceros</i>	In	GOT	[107]
<i>Tetrochetus</i> sp.	D	<i>Nemipterus hexodon</i>	S	KH	[27]
<b>Family: Bathycotylidae</b>					
<i>Bathycotyle</i> sp.	D	<i>Pampus argenteus</i>	Gic	GOT	[73]
<b>Family: Deroegenidae Nicoll, 1910</b>					
<i>Deroegenes varicus</i> (Müller, 1784) Looss, 1901	D	<i>Rachycentron canadum</i> , <i>Triacanthus biaculeatus</i>	S, In	GOT	[117, 119]
<i>Gonocercella pacifica</i> Manter, 1940	D	<i>Drepane punctata</i>	In	GOT	[81]
<i>Gonocercella</i> sp.	D	<i>Atropus atropos</i> , <i>Psettodes erumei</i> , <i>Scomberoides lysan</i>	In	GOT, SCS	[113, 118]
<b>Family: Dictysarcidae Skrjabin &amp; Guschanskaja, 1955</b>					
<i>Elongoparorchis pneumatis</i> Rao, 1961	D	<i>Arius</i> sp.	Sb	SCS	[96]
<b>Family: Didymozoidae Monticelli, 1888</b>					
<i>Colocyntotrema auxis</i> Yamaguti, 1951	D	Scombridae gen. sp.	Bc, In	SCS	[80]
<i>Didymodictinus epinepheli</i> (Abdul-Salam, Sreelatha & Farah, 1990) Pozdnyakov, 1994	D	<i>Epinephelus coioides</i>	Mu	KH	[135]
<i>Lobatozoum multisacculatum</i> Ishii, 1935	D	<i>Auxis thazard</i>	Iw, S, Ve	SCS	[80]
<i>Metanematobothrium bivitellatum</i> Mamaev, 1968	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i>	Bc, Bvg, L, K	SCS	[80]
<i>Monilicaecum ventricosum</i> Yamaguti, 1942	D	<i>Abalistes stellaris</i> , <i>Psettodes erumei</i>	Bvg, L	GOT	[119]
<i>Multitubovarium amphibolum</i> Mamaev, 1970	D	<i>Platax orbicularis</i>	Gi, Ht	GOT	[81]
<i>Nematobothrium</i> sp.	D	<i>Euthynnus affinis</i> , <i>Thunnus thynnus</i>	L, Phc	SCS	[80]
<i>Neometadidymozoon polymorphis</i> (Oschmarin & Mamaev, 1963) Yamaguti, 1971	D	<i>Priacanthus tayenus</i>	Bc, Gi, Mu	GOT	[98]
<i>Neometanematobothrioides rachycentri</i> (Parukhin, 1969) Yamaguti, 1971	D	<i>Rachycentron canadum</i>	Bc, Gi	GOT, SCS	[116, 118]
<i>Oesophagocystis dissimilis</i> (Yamaguti, 1938) Yamaguti, 1970	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Thunnus thynnus</i>	O, S, In	SCS	[80]
<i>Torticaecum fenestratum</i> (Linton, 1907) Yamaguti, 1942	D	<i>Psettodes erumei</i> , <i>Triacanthus biaculeatus</i>	Bvg, L	GOT	[119]

(Continued on next page)

**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
Didymozoidae gen. sp.	D	<i>Atule mate</i> , <i>Auxis thazard</i> , <i>Carangoides malabaricus</i> , <i>Echeneis naucrates</i> , <i>Epinephelus coioides</i> , <i>Euthynnus affinis</i> , <i>Leiognathus equulus</i> , <i>Psetodes erumei</i> , <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i> , <i>Seriolina nigrofasciata</i> , <i>Thunnus thynnus</i> , Leiognathidae gen. sp.	Bc, Ve, Gi, In, K, L	GOT, SCS	[80, 81, 113, 115, 117, 133]
<b>Family: Hemiuridae Looss, 1899</b>					
<i>Allostomachicola secundus</i> (Srivastava, 1939) Yamaguti, 1958	D	<i>Chirocentrus dorab</i>	S	GOT	[81]
<i>Aphanurus mugilus</i> Tang 1981	D	<i>Moolgarda engeli</i>	I	HP	[21]
<i>Aphanurus stossichii</i> (Monticelli, 1891) Looss, 1907	D	<i>Drepane punctata</i> , <i>Ehippus orbis</i> , <i>Pampus argenteus</i> , <i>Thunnus thynnus</i>	S, In	GOT, SCS	[73, 80, 81]
<i>Aphanurus</i> sp.	D	<i>Mugil</i> sp.	In	GOT	[90]
<i>Dinurus euthynni</i> Yamaguti, 1934	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Thunnus</i> sp.		SCS	[80]
<i>Dinurus longisinus</i> Looss, 1907	D	<i>Carangoides malabaricus</i>	S	GOT	[113, 118]
<i>Dinurus selari</i> Parukhin, 1966	D	<i>Atropus atropos</i> , <i>Atule mate</i> , <i>Carangoides malabaricus</i> , <i>Decapterus</i> sp., <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , Carangidae gen. sp.	S, In	GOT, SCS	[19, 111, 113, 118]
<i>Dinurus</i> sp.	D	<i>Mene maculata</i>	S	GOT	[81]
<i>Ectenurus selari</i> (Parukhin, 1966) Yamaguti, 1971	D	<i>Atule mate</i> , <i>Caranx</i> sp., <i>Epinephelus bruneus</i> , <i>E. coioides</i> , <i>E. sexfasciatus</i> , <i>E. tauvina</i> *, <i>Megalaspis cordyla</i> , <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , Carangidae gen. sp.	S, In	GOT, SCS	[34, 73, 112, 113, 118, 121]
<i>Ectenurus theraponae</i> Oshmarin, 1965	D	<i>Terapon theraps</i>	S	GOT	[95]
<i>Ectenurus trachuri</i> (Yamaguti, 1934) Yamaguti, 1970	D	<i>Caranx</i> sp., <i>Selar crumenophthalmus</i> , Carangidae gen. sp.	S	GOT, SCS	[71, 73]
<i>Ectenurus</i> sp.	D	<i>Selar crumenophthalmus</i>	S	GOT	[95]
<i>Erilepturus formosae</i> Reid, Coil & Kuntz, 1966	D	<i>Decapterus</i> sp., <i>Dussumieria elopsoides</i>	S	GOT	[73, 81]
<i>Erilepturus hamati</i> (Yamaguti, 1934) Manter, 1947	D	<i>Eleutheronema tetradactylum</i> , <i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Platycephalus indicus</i> , <i>Nibea albiflora</i> ,	In	NA	[90, 138]
<i>Erilepturus neopacificus</i> (Velasquez, 1962) Gupta & Jain, 1992	D	<i>Lates calcarifer</i>	Gi	KH	[122]
<i>Erilepturus</i> sp.	D	<i>Acanthopagrus latus</i> , Sciaenidae gen. sp.	S	GOT, HL	[95]; Present study
<i>Elytrophalloides</i> sp.	D	<i>Thryssa mystax</i>	S	ND	[90]
<i>Hemiurus arelisci</i> Yamaguti, 1938	D	<i>Scomberoides lysan</i>	S	QN, ND	[88, 90]
<i>Lecithochirium alectis</i> Yamaguti, 1970	D	<i>Nibea albiflora</i>	In	QN, ND	[88, 90]
<i>Lecithochirium imocavum</i> (Looss, 1907) Skrjabin & Guschanskaja, 1955	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Ilisha</i> sp., <i>Thunnus thynnus</i> , <i>Thunnus</i> sp.	S	GOT	[80, 81]
<i>Lecithochirium magnaporum</i> Manter, 1940	D	<i>Atropus atropos</i>	S	SCS	[113]
<i>Lecithochirium microstomum</i> Chandler, 1935	D	<i>Atropus atropos</i>	S	SCS	[113]

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Lecithochirium monticellii</i> (Linton, 1898) Skrjabin & Guschanskaja, 1955	D	<i>Amphiprion clarkia</i> , <i>Atropus atropos</i> , <i>Echeneis naucrates</i> , <i>Selar crumenophthalmus</i>	S	KH, SCS	[27, 113, 115]
<i>Lecithochirium</i> sp.	D	<i>Mene maculata</i> , <i>Seriolina nigrofasciata</i>	S	GOT, SCS	[81, 113]
<i>Lecithocladium apolecti</i> Velasquez, 1962	D	<i>Ephippus orbis</i> , <i>Gerres filamentosus</i> , <i>Parastromateus</i> <i>niger</i> , <i>Rastrelliger kanagurta</i> , <i>Leiognathidae</i> gen. sp.	S, In	GOT	[73, 81]
<i>Lecithocladium excisiforme</i> Cohn, 1902	D	<i>Alepes melanoptera</i> , <i>Caranx</i> sp., <i>Selaroides leptolepis</i>	S	GOT, SCS	[118]
<i>Lecithocladium excisum</i> (Rudolphi, 1819) Lühe, 1901	D	<i>Alepes melanoptera</i> , <i>Caranx</i> sp., <i>Decapterus maruadsi</i> , <i>Decapterus</i> sp., <i>Elentheronema tetradactylum</i> , <i>Sardinella</i> sp., <i>Selar crumenophthalmus</i> , <i>Scomberoides lysan</i>	S	GOT, SCS	[73, 81, 88, 118]
<i>Lecithocladium harpodontis</i> Srivastava, 1942	D	<i>Atropus atropos</i> , <i>Decapterus</i> sp., <i>Dussumieria elopsoides</i> , <i>Ilisha</i> sp., <i>Selar crumenophthalmus</i>	S	GOT, SCS	[81, 113, 118]
<i>Lecithocladium megalaspis</i> Yamaguti, 1953	D	<i>Megalaspis cordyla</i>	S, In	SCS	[113]
<i>Lecithocladium pampi</i> Lebedev, 1968	D	<i>Pampus argenteus</i>	In	GOT, SCS	[70, 73]
<i>Lecithocladium seriolellae</i> Manter, 1954	D	<i>Carangoides malabaricus</i> , <i>Selar crumenophthalmus</i>	S, In	SCS	[113, 118]
<i>Lecithocladium</i> sp.	D	<i>Mene maculata</i>	S	GOT	[81]
<i>Merlucciotrema praeclarum</i> (Manter, 1934) Yamaguti, 1971	D	<i>Platycephalus indicus</i> , <i>Eleutheronema tetradactylum</i>	S, In	QN, ND	[90]
<i>Parahemiurus clupei</i> Yamaguti, 1953	D	<i>Herklotsichthys quadrimaculatus</i>	S	KH	[64]
<i>Parahemiurus merus</i> (Linton, 1910) Manter, 1940	D	<i>Atropus atropos</i> , <i>Decapterus</i> sp., <i>Sardinella</i> sp., <i>Scomberoides lysan</i>	S, In	GOT, SCS	[81, 118]
<i>Parahemiurus</i> sp.	D	<i>Alepes kleinii</i>	S	QN	[88]
<i>Plerurus digitatus</i> (Looss, 1899) Looss, 1907	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Thunnus</i> sp., <i>Carangidae</i> gen. sp.	D	GOT, SCS	[80, 113, 118]
<i>Stomachicola muraenesocis</i> Yamaguti, 1934	D	<i>Congresox talabonoides</i>	S	QN (QB)	[88, 90]
<i>Tubulovesicula angusticauda</i> (Nicoll, 1915) Yamaguti, 1934	D	<i>Epinephelus merra</i> , <i>Rachycentron canadum</i> , <i>Trachinocephalus</i> sp.	S, In	GOT, SCS	[64, 95, 118]
<i>Tubulovesicula lindbergi</i> (Layman, 1930) Yamaguti, 1934	D	<i>Echeneis naucrates</i> , <i>Psettodes erumei</i> , <i>Carangidae</i> gen. sp.	S	GOT, SCS	[115, 118, 119]
<i>Tubulovesicula marsupialia</i> Oshmarin, 1965	D	<i>Saurida tumbil</i>	In	GOT	[95]
<i>Tubulovesicula</i> sp.	D	<i>Trachinocephalus myops</i>	S, In	KH	[27]
Hemiuridae gen. sp.	D	<i>Euthynnus affinis</i> , <i>Thunnus thynnus</i> , <i>Thunnus</i> sp.		SCS	[80]
<b>Family: Hirudinellidae Dollfus, 1932</b>					
<i>Hirudinella ventricosa</i> (Pallas, 1774) Baird, 1853	D	<i>Euthynnus affinis</i> , <i>Seriolina nigrofasciata</i> , <i>Thunnus thynnus</i>	S	SCS	[80, 113]
<b>Family: Lecithasteridae Odhner, 1905</b>					
<i>Aponurus carangis</i> Yamaguti, 1952	D	<i>Decapterus</i> sp., <i>Rachycentron canadum</i> , <i>Selar</i> <i>crumenophthalmus</i>	S, In	GOT, SCS	[73, 113, 118]
<i>Aponurus laguncula</i> Looss, 1907	D	<i>Amphiprion polymnus</i> , <i>Atropus atropos</i> , <i>Drepane</i> <i>punctata</i> , <i>Dussumieria elopsoides</i> , <i>Ilisha</i> sp., <i>Leiognathus</i> sp., <i>Megalaspis cordyla</i> , <i>Parastromateus</i> <i>niger</i> , <i>Sardinella</i> sp., <i>Selar crumenophthalmus</i> , <i>Seriolina</i> <i>nigrofasciata</i> , <i>Thunnus</i> sp., <i>Carangidae</i> gen. sp.	In, S	GOT, SCS	[80, 81, 113, 118, 142]
<i>Aponurus pyriformis</i> (Linton, 1910) Overstreet, 1973	D	<i>Amphiprion clarkii</i> , <i>Parastromateus niger</i> , <i>Platax orbicularis</i>	In, S	GOT, KH	[81, 142]
<i>Aponurus</i> sp.	D	<i>Epinephelus coioides</i>	S	GOT	[133]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Hysterolecitha nahaensis</i> Yamaguti, 1942	D	<i>Amphiprion clarckii</i> , <i>A. frenatus</i> , <i>A. perideraion</i> , <i>A. polymnus</i> , <i>Dascyllus trimaculatus</i>	S	SCS	[64, 142]
<i>Lecithaster mugilis</i> Yamaguti, 1970	D	<i>Moolgarda engeli</i> , <i>M. seheli</i> , <i>Liza subviridis</i>	In	GOT	[25]
<i>Lecithaster stellatus</i> Looss, 1907	D	<i>Seriolina nigrofasciata</i>	S	SCS	[113]
<i>Trifoliovarium triacanthi</i> (Parukhin, 1964) Bray & Cribb, 2000	D	<i>Triacanthus biaculeatus</i>	In	GOT	[108]
<b>Family: Sclerodistomidae Odhner, 1927</b>					
<i>Prosogonotrema bilabiatum</i> Vigueras, 1940	D	<i>Abalistes stellaris</i> , <i>Ephippus orbis</i> , <i>Platax orbicularis</i>	S	GOT	[81, 107, 119]
<i>Prosogonotrema symmetricum</i> Oshmarin, 1965	D	<i>Lutjanus</i> sp., <i>Pristipomoides typus</i>	S	GOT	[95, 118]
<i>Prosorchis chainanensis</i> Lebedev, 1970	D	<i>Ephippus orbis</i> , <i>Pampus argenteus</i> , <i>Parastromateus niger</i>	S	GOT	[73, 81]
Hemiuroidea gen. sp.	D	<i>Alectis indicus</i> , <i>Gnathanodon speciosus</i> , <i>Megalaspis cordyla</i> , <i>Rachycentron canadum</i> , <i>Seriolina nigrofasciata</i> , <i>Terapon theraps</i> , Carangidae gen. sp.	In	GOT, SCS	[95, 113, 117]
<b>Suborder: Lepocreadiata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Lepocreadioidea Odhner, 1905</b>					
<b>Family: Aephnidiogenidae Yamaguti, 1934</b>					
<i>Aephnidiogenes barbarus</i> Nicoll, 1915	D	<i>Pomadasys argenteus</i>	In	GOT	[81]
<b>Family: Gyliauchenidae Fukui, 1929</b>					
<i>Gyliauchen tarachodes</i> Nicoll, 1915	D	<i>Siganus fuscescens</i>	In	HP	[90]
<b>Family: Lepocreadiidae Odhner, 1905</b>					
<i>Diploproctia drepani</i> Mamaev, 1970	D	<i>Drepane punctata</i>	In	GOT	[81, 90]
<i>Diploproctodaem haustrum</i> (MacCallum, 1919) La Rue, 1926	D	<i>Aluterus monoceros</i>	In	QB	[90]
<i>Diploproctodaeoides longipygum</i> (Oshmarin, Mamaev & Parukhin, 1961) Reimer, 1981	D	<i>Abalistes stellaris</i>	In	GOTh, GOT	[99]
<i>Diploproctodaem macracetabulum</i> Oshmarin, Mamaev & Parukhin, 1961	D	<i>Abalistes stellaris</i> , <i>Triacanthus biaculeatus</i>	In	GOTh, GOT	[99]
<i>Diploproctodaem plataxi</i> Mamaev, 1970	D	<i>Platax orbicularis</i>	In	GOT	[81]
<i>Diploproctodaem rutellum</i> (Mamaev, 1970) Bray, Cribb & Barker, 1996	D	<i>Ephippus orbis</i> , <i>Platax orbicularis</i>	In	GOT	[81]
<i>Echeneidocoelium indicum</i> Simha & Pershad, 1964	D	<i>Echeneis naucrates</i> , <i>Psettodes erumei</i>	In, S	GOT, SCS	[112, 119]
<i>Hypocreadium cavum</i> Bray & Cribb, 1966	D	<i>Abalistes stellaris</i>	In	GOT	[95]
<i>Hypocreadium scaphosomum</i> (Manter, 1940) Bravo Hollis & Manter, 1957	D	<i>Abalistes stellaris</i> , <i>Aluterus monoceros</i> , <i>Triacanthus biaculeatus</i>	In	GOTh, GOT	[119]
<i>Hypocreadium</i> sp.	D	<i>Abalistes stellaris</i>		GOTh	[119]
<i>Lepidapedon megalaspi</i> Parukhin, 1966	D	<i>Carangoides malabaricus</i> , <i>Decapterus</i> sp., <i>Megalaspis cordyla</i> , <i>Rachycentron canadum</i>	In	GOT, SCS	[112, 113]
<i>Lepocreadium</i> sp.	D	<i>Ephippus orbis</i> , <i>Triacanthus biaculeatus</i>	In	GOT	[81, 119]
<i>Multitestis magnacetabulum</i> Mamaev, 1970	D	<i>Ephippus orbis</i> , <i>Platax orbicularis</i>	In	GOT	[81]
<i>Neallololepidapedon fistulariae</i> (Oshmarin, 1965) Yamaguti, 1965	D	<i>Fistularia petimba</i>	S	GOT	[96]
<i>Opechona formiae</i> Oshmarin, 1965	D	<i>Pampus argenteus</i> , <i>Parastromateus niger</i> , Leiognathidae gen. sp.	S, In	GOT	[73, 95]

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Trigonotrema alatum</i> Goto & Ozaki, 1929	D	<i>Brachistegus japonicus</i> , <i>Drepane longimana</i> , <i>D. punctata</i> , <i>Ephippus orbis</i>	In, S	GOT	[95]
Lepocreadiidae gen. sp.	D	<i>Plectorhinchus cinctus</i>	In	GOT	[81]
<b>Suborder: Monorchhiata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Monorchioidea Odhner, 1911</b>					
<b>Family: Monorchhiidae Odhner, 1911</b>					
<i>Alloinfundiburictus cacuminatus</i> (Nicoll, 1915) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Pomadasys argenteus</i>	In, S	GOT	[95]
<i>Alloinfundiburictus cryptostoma</i> (Oshmarin, 1966) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Pomadasys argenteus</i>	In, S	GOT	[81]
<i>Ancylocoelium tropicum</i> (Manter, 1940) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Carangoides malabaricus</i> , <i>Megalaspis cordyla</i>	In	GOT	[81]
<i>Hurleytrematoides chaetodoni</i> (Manter, 1942) Yamaguti, 1954	D	<i>Chaetodon</i> sp.	In	GOT	[81]
<i>Huridostomum formionis</i> Mamaev, 1970	D	<i>Parastromateus niger</i>	In	GOT	[81]
<i>Infundiburictus chaetodipteri</i> (Thomas, 1959) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Pomadasys argenteus</i>	In, S	GOT	[81]
<i>Leiomonorchis mamaevi</i> Madhavi, 2008	D	<i>Leiognathus equulus</i> , <i>Parastromateus niger</i> , <i>Leiognathidae</i> gen. sp.	In	GOT	[81]
<i>Monorcheides diplorchis</i> Odhner, 1905	D	<i>Scolopsis taeniopterus</i>	I	KH	[27]
<i>Monorchis diplovarium</i> Mamaev, 1970	D	<i>Pomadasys argenteus</i>	In	GOT	[81]
<i>Opisthomonorcheides decapteri</i> Parukhin, 1966	D	<i>Atule mate</i> , <i>Decapterus</i> sp.	In	GOT, SCS	[112, 113]
<i>Opisthomonorcheides ovacutus</i> (Mamaev, 1970) Machida, 2011	D	<i>Parastromateus niger</i>	In	GOT	[81]
<i>Opisthomonorchis carangis</i> Yamaguti, 1952	D	<i>Carangoides malabaricus</i> , <i>Carangidae</i> gen. sp.	In	GOT, SCS	[118]
<i>Paralasiotocus macrorchis</i> (Yamaguti, 1934) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Plectorhinchus cinctus</i> , <i>Plectorhinchus</i> sp.	In	GOT	[81]
<i>Proctotrema</i> sp.	D	<i>Pomadasys argenteus</i> , <i>Selar crumenophthalmus</i>	In	GOT, SCS	[95, 113, 119]
<i>Sinistroporomonorchis lizae</i> (Liu, 2002) Wee, Cutmore, Pérez-del-Olmo & Cribb, 2020	D	<i>Moolgarda cunnesius</i> , <i>Liza engeli</i> , <i>L. longimanus</i> , <i>L. subviridis</i> , <i>Valamugil seheli</i>	In	GOT	[20]
<b>Suborder: Opisthorchiata La Rue, 1957</b>					
<b>Superfamily: Opisthorchioidea Looss, 1899</b>					
<b>Family: Cryptogonimidae Ward, 1917</b>					
<i>Beluesca plectorhyncha</i> (Mamaev, 1970) Miller & Cribb, 2007	D	<i>Plectorhinchus cinctus</i>	In	GOT	[81]
<i>Metadena eurystoma</i> Oshmarin, 1965	D	<i>Sciaenidae</i> gen. sp.	In	GOT	[95]
<i>Metadena longa</i> (Oshmarin, Mamaev & Parukhin, 1961) Miller & Cribb, 2008	D	<i>Pristipomoides typus</i>	In	GOT	[99]
<i>Metadena</i> sp.	D	<i>Lutjanus russellii</i>	In	QB	[90]
<i>Neometadena ovata</i> (Yamaguti, 1952) Miller & Cribb, 2008	D	<i>Lutjanus russellii</i>	In	QB	[90]
<i>Pseudometadena celebesensis</i> Yamaguti, 1952	D	<i>Lates calcarifer</i>	In	KH	[140]
<i>Siphoderina echinostomus</i> (Oshmarin, Mamaev & Parukhin, 1961) Miller & Cribb, 2008	D	<i>Pristipomoides typus</i>	In	GOT	[99]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Siphoderina morosovi</i> (Parukhin, 1965) Miller & Cribb, 2008	D	<i>Rachycentron canadum</i>	In	GOT, SCS	[110, 118]
<i>Siphoderina</i> sp.	D	<i>Lutjanus argentimaculatus</i>	In	QB	[90]
<b>Family: Heterophyidae Leiper, 1909</b>					
<i>Centrocestus</i> sp.	D	<i>Epinephelus coioides</i>	Mu, Fi	GOT	[133]
<i>Heterophyopsis continua</i> (Onji & Nishio, 1916) Price, 1940	D	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Mu, Fi	KH	[130, 135, 137]
<i>Procerovum varium</i> Onji & Nishio, 1916	D	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Mu, Fi	KH	[135]
Heterophyidae gen. sp.	D	<i>Epinephelus coioides</i> , <i>Protonibea dicanthus</i> , <i>Sardinella</i> sp.	In	GOT, SCS	[81, 133]; Present study
<b>Suborder: Pronocephalata Skrjabin, 1955</b>					
<b>Superfamily: Paramphistomoidea Fiscoeder, 1901</b>					
<b>Family: Cladorchiidae Fiscoeder, 1901</b>					
<i>Cleptodiscus</i> sp.	D	<i>Triacanthus biaculeatus</i>	In	GOT	[119]
<b>Suborder: Transversotremata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Transversotrematoidea Witenberg, 1944</b>					
<b>Family: Transversotrematidae Witenberg, 1944</b>					
<i>Transversotrema patialense</i> (Soparkar, 1924) Cruz & Sathananthan, 1960	D	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Us	KH, ND	[133, 140]
<b>Suborder: Xiphidiata Olson, Cribb, Tkach, Bray &amp; Littlewood, 2003</b>					
<b>Superfamily: Brachycladioidea Odhner, 1905</b>					
<b>Family: Acanthocolpidae Lühe, 1906</b>					
<i>Acanthocolpus liodorus</i> Lühe, 1906	D	<i>Chirocentrus dorab</i> , <i>Ilisha</i> sp., <i>Sardinella</i> sp.	Ve	GOT	[82]
<i>Pleorchis hainanensis</i> Shen, 1983	D	<i>Johnius carouna</i> , <i>Nibea albiflora</i> , <i>Pennahia argentata</i>	In	QN, QB	[90]
<i>Pleorchis sciaenae</i> Yamaguti, 1938	D	<i>Acanthopagrus berda</i> , <i>Nibea albiflora</i> , Sciaenidae gen. sp.	In	QN, HP	[90, 95]
<i>Stephanostomum bicoronatum</i> (Stossich, 1883) Fuhrmann, 1928	D	<i>Johnius carouna</i>	In	QN, ND	[88]
<i>Stephanostomum ditrematis</i> (Yamaguti, 1939) Manter, 1947	D	<i>Scomberoides lysan</i> , <i>Seriola dumerili</i> , <i>Seriolina nigrofasciata</i>	In	SCS, QN, ND	[49, 113]
<i>Stephanostomum fistulariae</i> (Yamaguti, 1940) Manter & Van Cleave, 1951	D	<i>Fistularia petimba</i> , <i>Harpadon nehereus</i>	In	GOT, HP	[90, 95]
<i>Stephanostomum hispidum</i> (Yamaguti, 1934) Manter, 1940	D	<i>Seriolina nigrofasciata</i>	In	SCS	[113]
<i>Stephanostomum imparispine</i> (Linton, 1905) Manter, 1940	D	<i>Abalistes stellaris</i> , <i>Aluterus monoceros</i> , <i>Echeneis naucrates</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Seriolina nigrofasciata</i> , <i>Triacanthus biaculeatus</i>	Bc, Gi, In	GOT, GOTh, SCS	[113, 114, 119]
<i>Stephanostomum orientale</i> (Srivastava, 1939) Madhavi, 1976	D	<i>Seriola dumerili</i> , <i>Seriolina nigrofasciata</i>	In	SCS	[113]
<i>Stephanostomum tenue</i> (Linton, 1898) Linton, 1934	D	<i>Chirocentrus dorab</i>	S	GOT	[84]
<i>Stephanostomum</i> sp.	D	<i>Ephippus orbis</i> , <i>Epinephelus coioides</i> , Sciaenidae gen. sp.	In	GOT	[81, 114, 133]
<i>Tormopsolus carangi</i> Parukhin, 1976	D	<i>Carangoides malabaricus</i>	In, S	SCS	[118]

(Continued on next page)

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Tormopsolus filiformis</i> Sogandares-Bernal & Hutton, 1958	D	<i>Carangoides malabaricus</i> , <i>Rachycentron canadum</i>	In	GOT, SCS	[113, 119]
<i>Tormopsolus orientalis</i> Yamaguti, 1934	D	<i>Carangoides malabaricus</i>	S	GOT, SCS	[71, 73, 113]
<b>Superfamily: Opecoelioidea Ozaki, 1925</b>					
<b>Family: Opecoelidae Ozaki, 1925</b>					
<i>Allopodocotyle epinepheli</i> (Yamaguti, 1942) Pritchard, 1966	D	<i>Drepane punctata</i>	In	GOT	[81]
<i>Allopodocotyle</i> sp.	D	<i>Epinephelus coioides</i>	In	QN, HP	[133]
<i>Cainocreadium labracis</i> (Dujardin, 1845) Nicoll, 1909	D	<i>Scorpaenopsis cacopsis</i> , <i>Synodus variegatus</i>	S	KH	[27]
<i>Coitocaecum gymnophallum</i> Nicoll, 1915	D	<i>Acanthopagrus berda</i> , <i>A. latus</i>	In	QN, HP	[90], Present study
<i>Helicometra fasciata</i> (Rudolphi, 1819) Odhner, 1902	D	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. quoyanus</i> , <i>E. sexfasciatus</i>	In	GOT, KH	[34, 90, 139]
<i>Helicometra pisodonophi</i> Nguyen Van Ha, 2012 <sup>3</sup>	D	<i>Pisodonophis cancrivorus</i>	In	QN, HP	[48]
<i>Helicometrina nimia</i> Linton, 1910	D	<i>Epinephelus sexfasciatus</i>	In	QB	
<i>Helicometra</i> sp.	D	<i>Acanthopagrus latus</i> , <i>Epinephelus coioides</i>	In	QN	[133]; Present study
<i>Macvicaria</i> sp.	D	<i>Amphiprion clarckii</i>	In	KH	[142]
<i>Neonotoporus decapteri</i> Parukhin, 1966	D	<i>Decapterus</i> sp.	In	SCS, GOT	[112, 113]
<i>Opegaster brevifistula</i> Ozaki, 1928	D	<i>Sillago sihama</i>	In	GOT	[90]
<i>Opecoelus haduyngoi</i> Nguyen Van Ha, 2012	D	<i>Acanthopagrus berda</i>	In	QN, HP	[48]
<i>Opecoelus pterois</i> Shen, 1986	D	<i>Pennahia argentata</i>	In	QN, HP	[88, 90]
<i>Opecoelus sphaericus</i> Ozaki, 1925	D	<i>Ephippus orbis</i> , <i>Platax orbicularis</i>	In	GOT	[81]
<i>Opecoelus</i> sp.	D	<i>Megalaspis cordyla</i>	In	SCS	[113]
<i>Opecoelina vixiintestina</i> Oshmarin, 1965	D	<i>Terapon theraps</i>	In, S	GOT	[95]
<i>Opecoelina</i> sp.	D	<i>Epinephelus amblycephalus</i>	In	QB	[90]
<i>Opegaster paraprismatis</i> Yamaguti, 1934	D	<i>Gerres filamentosus</i>	In	GOT	[81]
<i>Opistholebes amplicaelus</i> Nicoll, 1915	D	<i>Lagocephalus lunaris</i>	In	HP	[90]
<i>Podocotyloides petalophallus</i> Yamaguti, 1934	D	<i>Plectorhinchus cinctus</i> , <i>Plectorhinchus</i> sp.	In	GOT	[81]
<i>Pseudopecoeloides carangis</i> (Yamaguti, 1938) Yamaguti, 1940	D	<i>Alectis indicus</i> , <i>Megalaspis cordyla</i>	In	SCS	[113]
<i>Pseudopecoeloides</i> sp.	D	<i>Atropus atropus</i>	In	HP	[90]
<i>Phyllotrema</i> sp.	D	<i>Pinjalo pinjalo</i>	In	QB	[90]
<i>Pycnadenoides pagrosomi</i> Yamaguti, 1938	D	Sciaenidae gen. sp.	In	GOT	[95]
<i>Vesicocoelium solenophagum</i> Tang, Hsu, Huang & Lu, 1975	D	<i>Gerres limbatus</i>	In	QB	[90]
<b>Superfamily: Gorgoderoidea Looss, 1901</b>					
<b>Family: Gorgoderidae Looss, 1899</b>					
<i>Phyllodistomum carangis</i> (MacCallum, 1913) Cutmore & Cribb, 2018	D	<i>Scomberoides lysan</i>	In	QN, HP, SCS	[90, 113]
<i>Phyllodistomum lancea</i> Mamaev, 1968	D	<i>Auxis thazard</i> , <i>Euthynnus affinis</i>	In	SCS	[80]
<i>Phyllodistomum notosinicum</i> Lebedev, 1970	D	<i>Scomberomorus</i> sp., <i>Rastrelliger brachysoma</i>	In	GOT, SCS	[73, 90]
<i>Phyllodistomum parukhini</i> Yamaguti, 1971	D	<i>Rachycentron canadum</i>	K, Ub	GOT, SCS	[106]
<i>Phyllodistomum psettodi</i> Parukhin, 1966	D	<i>Psettodes erumei</i>	Ub	GOT	[112]
<i>Phyllodistomum strictum</i> Oshmarin, 1965	D	<i>Parastromateus niger</i>	In	GOT	[95]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Phyllodistomum</i> sp.	D	<i>Nibeia albiflora</i>	Ub	QN, HP	[88, 90]
<i>Xystretrum abalisti</i> Parukhin, 1963	D	<i>Triacanthus biaculeatus</i>	Ub	GOT	[119]
<b>Superfamily: Microphalloidea Ward, 1901</b>					
<b>Family: Faustulidae Poche, 1926</b>					
<i>Paradiscogaster drepane</i> Mamaev, 1970	D	<i>Drepane longimana</i> , <i>D. punctata</i>	In	GOT	[81]
<b>Family: Microphallidae Ward, 1901</b>					
<i>Microphallus</i> sp.	D	<i>Parupeneus multifasciatus</i>	In	KH	[27]
<b>Family: Zoogonidae Odhner, 1902</b>					
<i>Plectognathotrema ovatum</i> Parukhin, 1964	D	<i>Aluterus monoceros</i>	In	GOT, SCS	[107, 119]
Digenea gen. sp.	D	<i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>A. oreolatus</i> , <i>Atule mate</i> , <i>Carangoides chrysophrys</i> , <i>C. malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Echeneis naucrates</i> , <i>Epinephelus coioides</i> , <i>Gnathanodon speciosus</i> , <i>Megalaspis cordyla</i> , <i>Pomadasys argenteus</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Scomberoides lysan</i> , <i>Selar crumenophthalmus</i> , <i>S. crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Seriola dumerili</i> , <i>Seriolina nigrofasciata</i> , <i>Carangidae</i> gen. sp.	Bc, Ve, Mu, In, S	SCS, GOT	[19, 34, 133]
<b>Class: Cestoda Rudolphi, 1808</b>					
<b>Subclass: Eucestoda Southwell, 1930</b>					
<b>Order: Bothriocephalidea Kuchta, Scholz, Brabec &amp; Bray, 2008</b>					
<b>Family: Bothriocephalidae Blanchard, 1849</b>					
<i>Bothriocephalus manubriformis</i> (Linton, 1889) Ariola, 1900	C	<i>Makaira</i> sp.	In	GOT	[73]
<b>Order: Diphylobothriidea Kuchta, Scholz, Brabec &amp; Bray, 2008</b>					
<b>Family: Diphylobothriidae Lühe, 1910</b>					
<i>Diphylobothrium</i> sp.	C	<i>Alepes melanoptera</i> , <i>Atule mate</i>	In, Mu	SCS	[113]
<b>Order: Lecanicephalidea Hyman, 1951</b>					
<b>Family: Cephalobothriidae Pintner, 1928</b>					
<i>Tylocephalum</i> sp.	C	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Lates calcarifer</i>	In	KH	[140]
<b>Order: Onchoproteocephalidea Caira, Jensen, Waeschenbach, Olson &amp; Littlewood, 2014</b>					
<b>Family: Proteocephalidae La Rue, 1911</b>					
<i>Proteocephalus</i> sp.	C	<i>Lates calcarifer</i>	In	KH	[122]
<b>Order: Tetracystida Carus, 1863</b>					
<b>Family: Tetracystidae <i>incertae sedis</i></b>					
<i>Scolex</i> sp.	C	<i>Auxis thazard</i> , <i>Thunnus</i> sp.	Bc, L	SCS	[80]
Tetracystidae gen. sp. plerocercoid	C	<i>Abalistes stellaris</i> , <i>Acanthocephala limbata</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus muroadsi</i> , <i>Decapterus</i> sp., <i>Drepane punctata</i> , <i>Echeneis naucrates</i> , <i>Epinephelus coioides</i> , <i>Mene maculata</i> , <i>Parastromateus niger</i> , <i>Protonibea diacanthus</i> , <i>Selar crumenophthalmus</i> , <i>Carangidae</i> gen. sp.	Bc, Gb, In, S	GOT, SCS	[19, 73, 81, 119, 133]; Present study

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<b>Order: Trypanorhyncha Diesing, 1863</b>					
<b>Suborder: Trypanobatoidea Olson, Caira, Jensen, Overstreet, Palm &amp; Beveridge, 2010</b>					
<b>Superfamily: Tentacularioidea Poche, 1926</b>					
<b>Family: Tentaculariidae Poche, 1926</b>					
<i>Nybelinia</i> sp.	C	<i>Alectis indicus</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Cepola schlegelii</i> , <i>Decapterus muroadsi</i> , <i>Decapterus</i> sp., <i>Leiognathus</i> sp., <i>Megalaspis cordyla</i> , <i>Mene maculata</i> , <i>Parastromateus niger</i> , <i>Platax orbicularis</i> , <i>Pomadasys</i> <i>argenteus</i> , <i>Rastrelliger kanagurta</i> , <i>Scomberoides lysan</i> , <i>Scomberomorus commerson</i> , <i>S. guttatus</i> , <i>Scorpaenodes</i> sp., <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Selaroides</i> sp., <i>Seriola</i> <i>dumerili</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i> , <i>Triacanthus biaculeatus</i> , Carangidae gen. sp., Leiognathidae gen. sp., Scombridae gen. sp.	Bc, Go, In, K, L, S	GOT, SCS	[73, 81, 119, 143]
<i>Tentacularia coryphaenae</i> Bosc, 1802	C	<i>Acanthocybium solandri</i>	SW	HP	Present study
<b>Superfamily: Eutetrarhynchoidea Guiart, 1927</b>					
<b>Family: Eutetrarhynchidae Guiart, 1927</b>					
<i>Dollfusiella</i> sp. A <sup>4</sup>	C	<i>Telatrygon zugei</i>	Sv	HP	Present study
<i>Dollfusiella</i> sp. B	C	<i>Neotrygon kuhlii</i>	Sv	HP	Present study
<i>Oncomegas wagneri</i> (Linton, 1890)	C	<i>Acanthocephala limbata</i> , <i>Cepola schlegelii</i> , <i>Cepola</i> sp.	Bc	GOT	[81]
Dollfus, 1929					
<i>Prochristianella</i> sp.	C	<i>Telatrygon zugei</i>	Sv	HP	Present study
Eutetrarhynchidae gen. sp.	C	<i>Chirocentrus dorab</i> , <i>Ilisha</i> sp.	Bc	GOT	[81]
<b>Family: Rhinoptercolidae Carvajal &amp; Campbell, 1975</b>					
<i>Shirleyrhynchus</i> cf. <i>butlerae</i> Beveridge & Campbell, 1988	C	<i>Neotrygon kuhlii</i> , <i>Telatrygon zugei</i>	Sv	HP	Present study
<b>Suborder: Trypanoselachoida Olson, Caira, Jensen, Overstreet, Palm &amp; Beveridge, 2010</b>					
<b>Superfamily: Lacistorhynchoidea Guiart, 1927</b>					
<b>Family: Pterobothriidae Pintner, 1931</b>					
<i>Pterobothrium platycephalum</i> (Shiple & Hornell, 1906) Dollfus, 1930	C	<i>Mene maculata</i> , <i>Parastromateus niger</i> , <i>Platax orbicularis</i>	Bc	GOT	[81]
<b>Family: Lacistorhynchidae Guiart, 1937</b>					
<i>Grillotia</i> sp.	C	<i>Drepane punctata</i> , <i>Platax orbicularis</i>	Bc	GOT	[81]
<b>Superfamily: Otobothrioidea Dollfus, 1942</b>					
<b>Family: Lacistorhynchidae Guiart 1937</b>					
<i>Callitetrarhynchus gracilis</i> (Rudolphi, 1819) Pintner, 1931	C	<i>Auxis thazard</i> , <i>Epinephelus coioides</i> , <i>E. malabaricus</i> , <i>Euthynnus affinis</i> , <i>Thunnus thynnus</i> , <i>Thunnus</i> sp.	S	SCS, KH	[80, 140]
<b>Family: Otobothriidae Dollfus, 1942</b>					
<i>Otobothrium</i> sp.	C	<i>Abalistes stellaris</i> , <i>Aluterus monoceros</i> , <i>Auxis thazard</i> , <i>Cepola</i> <i>schlegelii</i> , <i>Cepola</i> sp., <i>Drepane punctata</i> , <i>Ephippus orbis</i> , <i>Gymnocranius griseus</i> , <i>Leiognathus equula</i> , <i>Leiognathus</i> sp., <i>Parastromateus niger</i> , <i>Platax orbicularis</i> , <i>Pomadasys</i> <i>argenteus</i> , Leiognathidae gen. sp.	Bc, Sw, In	GOT	[80, 81, 119]

(Continued on next page)

**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<b>Family: Pseudotbothriidae Palm, 1995</b>					
<i>Parotbothrium balli</i> (Southwell, 1929) Palm, 2004	C	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	S	KH	[135]
Trypanorhyncha gen. sp.	C	<i>Abalistes stellaris</i> , <i>Acanthocephala limbata</i> , <i>Alepes melanoptera</i> , <i>Aluterus monoceros</i> , <i>Atule mate</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Cepola schlegelii</i> , <i>Decapterus</i> sp., <i>Echeneis</i> <i>naucrates</i> , <i>Ehippus orbis</i> , <i>Gymnocranius griseus</i> , <i>Mene</i> <i>maculata</i> , <i>Parastromateus niger</i> , <i>Pomadasys argenteus</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Selaroides</i> <i>leptolepis</i> , Carangidae gen. sp.	Bc, Gi, In, Mu	GOT, GOTh, SCS	[19, 81, 109, 113, 115, 117, 119]
Cestoda gen. sp.	C	<i>Abalistes stellaris</i> , <i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>A. oreolatus</i> , <i>Atule mate</i> , <i>Carangoides</i> <i>chrysophrys</i> , <i>C. malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Echeneis naucrates</i> , <i>Epinephelus coioides</i> , <i>Gnathanodon</i> <i>speciosus</i> , <i>Megalaspis cordyla</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Seriola dumerili</i> , <i>Seriolina</i> <i>nigrofasciata</i> , Carangidae gen. sp.		GOT	[19, 109, 133]
<b>Phylum: Nematoda Rudolphi, 1808</b>					
<b>Class: Chromadorea Inglis, 1983</b>					
<b>Order: Rhabditida Chitwood, 1933</b>					
<b>Suborder: Spirurina Railliet &amp; Henry, 1915</b>					
<b>Infraorder: Ascaridomorpha De Ley &amp; Blaxter, 2002</b>					
<b>Superfamily: Ascaridoidea Baird, 1853</b>					
<b>Family: Anisakidae Railliet &amp; Henry, 1912</b>					
<i>Anisakis</i> sp. Larvae	N	<i>Abalistes stellaris</i> , <i>Acanthocephala limbata</i> , <i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>A. oreolatus</i> , <i>Atule mate</i> , <i>Auxis thazard</i> , <i>Carangoides chrysophrys</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Cepola schlegelii</i> , <i>Cepola</i> sp., <i>Chirocentrus dorab</i> , <i>Decapterus muroadsi</i> , <i>Decapterus</i> sp., <i>Drepane longimana</i> , <i>D. punctata</i> , <i>Dussumieria elpsoides</i> , <i>Echeneis naucrates</i> , <i>Ehippus orbis</i> , <i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Euthynnus affinis</i> , <i>Gerres filamentosus</i> , <i>Gerres</i> sp., <i>Gymnocranius griseus</i> , <i>Ilisha</i> sp., <i>Leiognathus</i> <i>equulus</i> , <i>Leiognathus</i> sp., <i>Lutjanus russellii</i> , <i>L. sebae</i> , <i>Makaira</i> sp., <i>Megalaspis cordyla</i> , <i>Mene maculata</i> , <i>Pampus</i> <i>argenteus</i> , <i>Parastromateus niger</i> , <i>Platax orbicularis</i> , <i>Pomadasys</i> <i>argenteus</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Rastrelliger</i> <i>kanagurta</i> , <i>Sardinella</i> sp., <i>Scomberoides lysan</i> , <i>Scomberomorus</i> <i>commerson</i> , <i>S. guttatus</i> , <i>Scomberomorus</i> sp., <i>Selar</i> <i>crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Selaroides</i> sp., <i>Seriola</i> <i>dumerili</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i> , <i>Thunnus thynnus</i> , <i>Xiphias</i> sp., Carangidae gen. sp., Chaetodontidae gen. sp., Scombridae gen. sp., Leiognathidae gen. sp.	Bc, Sw, In,	GOT, SCS, GOTh	[19, 73, 80, 113, 118, 119, 140]

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Contracaecum</i> sp.	N	<i>Abalistes stellaris</i> , <i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>Atule mate</i> , <i>Auxis thazard</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Echeneis naucrates</i> , <i>Euthynnus affinis</i> , <i>Lutjanus russellii</i> , <i>L. sebae</i> , <i>Makaira</i> sp., <i>Megalaspis cordyla</i> , <i>Mene maculata</i> , <i>Pampus argenteus</i> , <i>Parastromateus niger</i> , <i>Platax orbicularis</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Rastrelliger kanagurta</i> , <i>Sardinella</i> sp., <i>Scomberoides lysan</i> , <i>Scomberomorus commerson</i> , <i>S. guttatus</i> , <i>Scomberomorus</i> sp., <i>Selar crumenophthalmus</i> , <i>Selar</i> sp., <i>Selaroides leptolepis</i> , <i>Selaroides</i> sp., <i>Seriola dumerili</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i> , <i>Thunnus thynnus</i> , <i>Xiphias</i> sp., Carangidae gen. sp., Scombridae gen. sp.	Bc, Sw, In, K	GOT, SCS, GOTh	[19, 73, 113, 118, 119, 140]
<b>Family: Ascarididae Baird, 1853</b>					
<i>Porrocaecum</i> sp.	N	<i>Abalistes stellaris</i> , <i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>Atule mate</i> , <i>Carangoides chrysophrys</i> , <i>C. malabaricus</i> , <i>Caranx</i> sp., <i>Chirocentrus dorab</i> , <i>Decapterus muroadsi</i> , <i>Decapterus</i> sp., <i>Dussumieria elopsoides</i> , <i>Echeneis naucrates</i> , <i>Gnathanodon speciosus</i> , <i>Ilisha</i> sp., <i>Lutjanus lutjanus</i> , <i>L. russellii</i> , <i>L. sebae</i> , <i>Megalaspis cordyla</i> , <i>Pampus argenteus</i> , <i>Psettodes erumei</i> , <i>Rastrelliger kanagurta</i> , <i>Sardinella</i> sp., <i>Scomberoides lysan</i> , <i>Scomberomorus commerson</i> , <i>S. guttatus</i> , <i>Scomberomorus</i> sp., <i>Selar crumenophthalmus</i> , <i>Selaroides leptolepis</i> , <i>Selaroides</i> sp., <i>Seriola dumerili</i> , <i>Seriola</i> sp., <i>Seriolina nigrofasciata</i> , <i>Triacanthus biaculeatus</i> , Carangidae gen. sp., Scombridae gen. sp.	Bc, In	GOT, GOTh, SCS	[73, 81, 109, 113, 119]
<b>Family: Raphidascarididae Hartwich, 1954</b>					
<i>Hysterothylacium aduncum</i> (Rudolphi, 1802)	N	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	Sw	KH	[135]
<i>Hysterothylacium chorinemi</i> (Parukhin, 1966) Bruce & Cannon, 1989	N	<i>Atule mate</i> , <i>Scomberoides lysan</i>	In	SCS	[113]
<i>Hysterothylacium incurvum</i> (Rudolphi, 1819) Deardorff & Overstreet, 1980	N	<i>Xiphias</i> sp.	In	GOT	[73]
<i>Hysterothylacium saba</i> (Yamaguti, 1941) Deardorff & Overstreet, 1980	N	Scombridae gen. sp.	In	GOT	[73]
<i>Hysterothylacium</i> sp.	N	<i>Amphiprion clarckii</i> , <i>A. frenatus</i> , <i>A. polymnus</i>	L	KH	[142]
<i>Iheringascaris inquires</i> (Linton, 1901) Deardorff & Overstreet, 1980	N	<i>Rachycentron canadum</i>	In	GOT, SCS	[118]
<i>Raphidascaris</i> sp. (Larva)	N	<i>Echeneis naucrates</i> , <i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>		SCS	[115, 135]
<b>Superfamily: Seuratoidea Hall, 1916</b>					
<b>Family: Cucullanidae Cobbold, 1864</b>					
<i>Cucullanus decapteri</i> Parukhin, 1966	N	<i>Decapterus</i> sp.	In	SCS	[113]
<i>Cucullanus heterochrous</i> Rudolphi, 1802	N	<i>Psettodes erumei</i>	In	SCS	[114]

(Continued on next page)

**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Cucullanus</i> sp.	N	<i>Drepane punctata</i> , <i>Gymnocranius griseus</i>	In	GOT	[81]
<b>Infraorder: Gnathostomatomorpha De Ley &amp; Blaxter, 2002</b>					
<b>Superfamily: Gnathostomatoidea Railliet, 1895</b>					
<b>Family: Gnathostomatidae Railliet, 1895</b>					
<i>Echinocephalus spinosissimus</i> (von Linstow in Shipley et Hornell, 1905)	N	<i>Abalistes stellaris</i> , <i>Echeneis naucrates</i>	Io	SCS, GOT	[118, 119]
<i>Echinocephalus</i> sp.	N	<i>Acanthopagrus latus</i> , <i>Echeneis naucrates</i> , <i>Ilisha</i> sp., <i>Triacanthus biaculeatus</i> ,	In	GOT, SCS	[81, 115, 119] Present study
<b>Infraorder: Spirurina incertae sedis</b>					
<b>Superfamily: Dracunculoidea Stiles, 1907</b>					
<b>Family: Philometridae Baylis &amp; Daubney, 1926</b>					
<i>Buckleyella buckleyi</i> Rasheed, 1963	N	<i>Scomberoides lysan</i>	Py	SCS	[111, 118]
<i>Philometra balistii</i> (Rasheed, 1963) Vidal-Martínez, Aguirre- Macedo & Moravec, 1995	N	<i>Abalistes stellaris</i>	Oe	GOT, SCS	[116, 119]
<i>Philometra spinosa</i> Vo, 2010 <sup>5</sup>	N	<i>Epinephelus coioides</i>	Fi	KH	[135]
<i>Philometra</i> sp.	N	<i>Abalistes stellaris</i> , <i>Carangoides malabaricus</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp., <i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Megalaspis cordyla</i> , <i>Parastromateus niger</i> , <i>Psettodes erumei</i> , <i>Sardinella</i> sp., <i>Triacanthus biaculeatus</i> , <i>Leiognathidae</i> gen. sp	Op, Fi	GOT, SCS, QN, KH	[19, 71, 73, 117–119]
<i>Philometra</i> sp. 1 <sup>6</sup>	N	<i>Epinephelus coioides</i>	Fi	ND	[133]
<i>Philometra</i> sp. 2	N	<i>Epinephelus coioides</i>	eyes	HP	[133]
<i>Philometroides atropi</i> (Parukhin, 1966) Moravec & Ergens, 1970	N	<i>Atropus atropus</i>	Bc	GOT, SCS	[112, 113]
<i>Philometroides</i> sp.	N	<i>Euthynnus affinis</i> , <i>Rachycentron canadum</i>	Bc	GOT	[117]
<b>Infraorder: Spiruromorpha De Ley &amp; Blaxter, 2002</b>					
<b>Superfamily: Camallanoidea Travassos, 1920</b>					
<b>Family: Camallanidae Railliet &amp; Henry, 1915</b>					
<i>Camallanus</i> sp.	N	<i>Echeneis naucrates</i> , <i>Psettodes erumei</i>	In	GOT, SCS	[114, 115]
<i>Procamallanus (Spirocamallanus) guttatusi</i> (Andrade-Salas, Pineda-López & García-Magaña, 1994)	N	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i>	In	KH	[140]
<i>Procamallanus istiblenni</i> (Noble, 1966) Moravec & Sey, 1988	N	<i>Amphiprion clarckii</i> , <i>A. frenatus</i> , <i>A. perideraion</i> , <i>A. polymnus</i>	In	KH	[142]
<b>Superfamily: Habronematoidea Ivaschkin, 1961</b>					
<b>Family: Cystidicolidae Skrjabin, 1946</b>					
<i>Ascarophis</i> sp.	N	<i>Echeneis naucrates</i> , <i>Epinephelus malabaricus</i> , <i>Gymnocranius griseus</i>	In	GOT, SCS	[81, 114, 115, 140]
<i>Ctenascarophis gastricus</i> Mamaev, 1968	N	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> ,	In	SCS	[80]
<i>Prospinitectus mollis</i> (Mamaev, 1968) Petter, 1979	N	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>Thunnus thynnus</i> ,	In	SCS	[80]
<i>Spinitectus echenei</i> Parukhin, 1967	N	<i>Echeneis naucrates</i>	In	SCS	[115]
<i>Spinitectus</i> sp.	N	<i>Auxis thazard</i>	In	SCS	[80]

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Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<b>Superfamily: Physalopteroidea Railliet, 1893</b>					
<b>Family: Physalopteridae Railliet, 1893</b>					
<i>Cestocephalus petterae</i> (Le-Van-Hoa, Pham-Ngoc-Khue & Nguyen-Thi-Lien, 1972) Moravec & Justine, 2018	N	<i>Polynemus plebeius</i>	In	SCS	[52]
<i>Rasheedea deblocki</i> (Le-Van-Hoa, Pham-Ngoc-Khue & Nguyen-Thi-Lien, 1972) Moravec & Justine, 2018	N	<i>Eleutheronema tetradactylum</i>	In	SCS	[52]
<b>Superfamily: Thelazioidea Skrjabin, 1915</b>					
<b>Family: Rhabdochoniidae Skrjabin, 1946</b>					
<i>Heptochona dorabi</i> (Mamaev, 1968) Moravec, 1975	N	<i>Chirocentrus dorab</i>	In	GOT	[81]
<b>Class: Enoplea Inglis, 1983</b>					
<b>Subclass: Dorylaimia Inglis, 1983</b>					
<b>Order: Trichinellida Hall, 1916</b>					
<b>Superfamily: Trichinelloidea Ward, 1907</b>					
<b>Family: Capillariidae Railliet, 1915</b>					
<i>Capillaria ariusi</i> (Parukhin, 1989) Arthur & Te, 2006	N	<i>Arius</i> sp.	In	GOTh	[119]
<i>Capillaria</i> sp.	N	<i>Acanthopagrus latus</i> , <i>Epinephelus coioides</i> , <i>Gerres filamentosus</i>	In	GOT, SCS	[81] Present study
<i>Pseudocapillaria (Pseudocapillaria) echenei</i> (Parukhin, 1967) Moravec, 1982	N	<i>Echeneis naucrates</i>	In	SCS	[115, 119]
Nematoda gen. sp.	N	<i>Alectis indicus</i> , <i>Alepes melanoptera</i> , <i>Atropus atropos</i> , <i>A. oreolatus</i> , <i>Atule mate</i> , <i>Carangoides chrysophrys</i> , <i>C. malabaricus</i> , <i>Caranx</i> sp., <i>Chirocentrus dorab</i> , <i>Decapterus muroadsi</i> , <i>Decapterus</i> sp., <i>Echeneis naucrates</i> , <i>Gnathanodon speciosus</i> , <i>Megalaspis cordyla</i> , <i>Psettodes erumei</i> , <i>Rachycentron canadum</i> , <i>Selar crumenophthalmus</i> , <i>Selar</i> sp., <i>Selaroides leptolepis</i> , <i>Seriola dumerili</i> , <i>Seriolina nigrofasciata</i> , <i>Carangidae</i> gen. sp.		GOT, SCS	[19, 114, 119]
<b>Phylum: Acanthocephala Kohlreuther, 1771</b>					
<b>Class: Eoacanthocephala Van Cleave, 1936</b>					
<b>Order: Neoechinorhynchida Ward, 1917</b>					
<b>Family: Neoechinorhynchidae Ward, 1917</b>					
<i>Neoechinorhynchus ampullata</i> Amin, Ha & Ha, 2011A	A	<i>Megalops cyprinoides</i>	In	GOT	[4]
<i>Neoechinorhynchus (Neoechinorhynchus) ascus</i> Amin, Ha & Ha, 2011	A	<i>Moolgarda sehely</i>	In	GOT	[4]
<i>Neoechinorhynchus (Neoechinorhynchus) dimorphospinus</i> Amin & Sey, 1996	A	<i>Liza subviridis</i>	In	KG	[14]
<i>Neoechinorhynchus (Neoechinorhynchus) johnii</i> Yamaguti, 1939	A	<i>Eleutheronema tetradactylum</i> , <i>Johnius carouna</i> , <i>Johnius</i> sp. <i>Otolithes ruber</i> ,	In	VT, BL, KH, QN, QB	[11]
<i>Neoechinorhynchus (Neoechinorhynchus) longinucleatus</i> Amin, Ha & Ha, 2011	A	<i>Strongylura strongylura</i>	In	GOT	[4]
<i>Neoechinorhynchus (Neoechinorhynchus) manubrianus</i> Amin, Ha & Ha, 2011	A	<i>Johnius carouna</i> , <i>Nibea albiflora</i>	In	GOT	[4]

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**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>pennahia</i> Amin, Ha & Ha, 2011	A	<i>Pennahia argentata</i>	In	GOT	[4]
<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>plaquensis</i> Amin, Ha & Ha, 2011	A	<i>Clupanodon thrissa</i>	In	HP	[90]
<b>Order: Gyraacanthocephala Van Cleave, 1936</b>					
<b>Family: Quadrigyridae Van Cleave, 1920</b>					
<i>Acanthogyrus</i> ( <i>Acanthosentis</i> ) <i>fusiformis</i> Amin, Chaudhary, Heckmann, Ha & Singh, 2019	A	<i>Arius</i> sp.	In	SCS, BL	[10]
<i>Acanthogyrus</i> ( <i>Acanthosentis</i> ) <i>indicus</i> Tripathi, 1959	A	<i>Pomadasys argenteus</i> ,	In	GOT	[81]
<b>Class: Palaeacanthocephala Meyer, 1931</b>					
<b>Order: Echinorhynchida Southwell &amp; Macfie, 1925</b>					
<b>Family: Arhythmacanthidae Yamaguti, 1935</b>					
<i>Heterosentis holospinus</i> Amin, Heckman & Ha, 2011	A	<i>Plotosus lineatus</i>	In	QN	[5]
<i>Heterosentis mongcai</i> Amin, Heckmann & Ha, 2014	A	<i>Acreichthys</i> sp., <i>Epinephelus</i> sp.	In	QN	[7]
<i>Heterosentis paraholospinus</i> Amin, Heckmann & Ha, 2018	A	<i>Leiognathus equulus</i> , <i>Megalaspis cordyla</i> , <i>Nuchequula flavaxilla</i>	In	BT, KH, QN	[9]
<b>Family: Cavisomidae Meyer, 1932</b>					
<i>Filisoma indicum</i> Van Cleave, 1928	A	<i>Scatophagus argus</i>	In	KG	[7]
<i>Neorhadiorhynchus atypicalis</i> Amin & Ha, 2011	A	<i>Siganus fuscescens</i>	In	QN	[3]
<i>Neorhadiorhynchus nudum</i> (Harada, 1938) Yamaguti, 1939	A	<i>Auxis thazard</i> , <i>Decapterus</i> sp., <i>Euthynnus affinis</i> , <i>Thunnus thynnus</i>	In	KH, SCS	[9, 80, 119]
<b>Family: Echinorhynchidae Cobbold, 1879</b>					
<i>Echinorhynchus</i> sp.	A	<i>Amphiprion clarckii</i>	In	KH	[142]
<b>Family: Paracanthocephalidae Golvan, 1960</b>					
<i>Acanthocephalus halongensis</i> Amin & Ha, 2011	A	<i>Decapterus kurroides</i>	In	NA	[3]
<b>Family: Rhadinorhynchidae Lühe, 1912</b>					
<i>Australorhynchus multispinosus</i> Amin, Heckmann & Ha, 2018	A	<i>Fistularia petimba</i>	In	KH	[12]
<i>Cathayacanthus spinitruncatus</i> Amin, Heckmann & Ha, 2014	A	<i>Leiognathus equulus</i> , <i>Nuchequula flavaxilla</i>	In	HP, QN	[50]
<i>Gorgorhynchus medius</i> (Linton, 1908) Chandler, 1934	A	<i>Selar crumenophthalmus</i>	Bc, Io	GOT	[118]
<i>Gorgorhynchus tonkinensis</i> Amin & Ha, 2011	A	<i>Decapterus kurroides</i>	In	QN	[3]
<i>Gorgorhynchus</i> sp.	A	<i>Abalistes stellaris</i>	In	GOT	[119]
<i>Micracanthorhynchina kuwaitensis</i> Amin & Sey, 1996	A	<i>Strongylura strongylura</i>	In	QN	[3]
<i>Rhadiorhynchus carangis</i> Yamaguti, 1939	A	<i>Carangoides malabaricus</i>	In	GOT, SCS	[73, 118]
<i>Rhadiorhynchus circumspinus</i> Amin, Rubtsova & Nguyen, 2019	A	<i>Triacanthus biaculeatus</i>	In	HP	[13]
<i>Rhadiorhynchus ditrematis</i> Yamaguti, 1939	A	<i>Decapterus</i> sp.	In	GOT, GOTH, SCS	[71, 73]
<i>Rhadiorhynchus dorsoventrospinosus</i> Amin, Heckmann & Nguyen Van Ha, 2011	A	<i>Decapterus maruadsi</i>	In	QN	[6]

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Rhadinorhynchus hiansi</i> Soota & Bhattacharya, 1981	A	<i>Sarda orientalis</i>	–	KH	[16]
<i>Rhadinorhynchus johnstoni</i> Golvan, 1969	A	<i>Cypselurus hexazona</i>	–	QB	[7]
<i>Rhadinorhynchus laterospinosus</i> Amin, Heckmann & Nguyen Van Ha, 2011	A	<i>Alectis ciliaris</i> , <i>Auxis rochei</i> , <i>A. thazard</i> , <i>Balistes</i> sp., <i>Harpadon nehereus</i> , <i>Leiognathus equulus</i> , <i>Lutjanus bitaeniatus</i> , <i>Megalaspis cordyla</i> , <i>Nuchequula flavaxilla</i> , <i>Tylosurus</i> sp.	In	QN, HP, BT	[6, 15]
<i>Rhadinorhynchus multispinosus</i> Amin, Rubtsova & Ha, 2019	A	<i>Decapterus maruadsi</i>	In	HP	[13]
<i>Rhadinorhynchus pacificus</i> Amin, Rubtsova & Ha, 2019	A	<i>Auxis thazard</i>	In	HP	[13]
<i>Rhadinorhynchus pristis</i> (Rudolphi, 1802) Lühe, 1911	A	<i>Carangoides malabaricus</i>	In	GOT, SCS	[73, 118]
<i>Rhadinorhynchus trachuri</i> Harada, 1935	A	<i>Auxis thazard</i> , <i>Megalaspis cordyla</i> , <i>Tylosurus</i> sp	In	KH, BT	[2]
<b>Family: Transvenidae Pichelin &amp; Cribb, 2001</b>					
<i>Pararhadinorhynchus magnus</i> Van Ha, Amin, Ngo & Heckmann, 2018	A	<i>Scatophagus argus</i>	In	GOT	[50]
<i>Sclerocollum neorubrimaris</i> Amin, Heckmann & Ha, 2018	A	<i>Siganus guttatus</i>	In	KH	[12]
<b>Family: Isthmosacanthidae Smales, 2012</b>					
<i>Serrasentis sagittifer</i> (Linton, 1889) Linton, 1932	A	<i>Abalistes stellaris</i> , <i>Atropus atropos</i> , <i>Carangoides malabaricus</i> , <i>Echeneis naucrates</i> , <i>Euthynnus affinis</i> , <i>Gerres filamentosus</i> , <i>Gerres</i> sp., <i>Gymnocranius griseus</i> , <i>Lutjanus russellii</i> , <i>Pomadasys argenteus</i> , <i>Rachycentron cacadum</i> , <i>Sardinella</i> sp., <i>Scomberoides lysan</i> , <i>Trachurus declivis</i> , <i>Triacanthus biaculeatus</i>	Py, In, Bc	GOT, GOTh, SCS	[71, 73, 80, 81, 113, 118, 119]
<i>Acanthocephala</i> gen. sp.	A	<i>Echeneis naucrates</i> , <i>Psettodes erumei</i>		GOT	[109]
<b>Phylum: Annelida Lamarck, 1809</b>					
<b>Class: Clitellata Michaelsen, 1919</b>					
<b>Subclass: Hirudinea Savigny, 1822</b>					
<b>Order: Rhynchobdellida Blanchard, 1894</b>					
<b>Family: Piscicolidae Johnston, 1865</b>					
<i>Piscicola</i> sp.	H	<i>Lates calcarifer</i>	Gi, Sk	KH	[122]
<i>Zeylanicobdella arugamensis</i> de Silva, 1963	H	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>Lates calcarifer</i> , <i>Lutjanus argentimaculatus</i>	Sk	KH	[139]
<b>Phylum: Arthropoda von Siebold, 1848</b>					
<b>Subphylum: Crustacea Brünnich, 1772</b>					
<b>Class: Hexanauplia Oakley, Wolfe, Lindgren &amp; Zaharof, 2013</b>					
<b>Subclass: Copepoda Milne Edwards, 1840</b>					
<b>Order: Cyclopoida Burmeister, 1834</b>					
<b>Family: Ergasilidae Burmeister, 1835</b>					
<i>Ergasilus</i> sp.	Cr	<i>Epinephelus coioides</i> , <i>E. malabaricus</i>	Gi	KH	[139]
<b>Order: Siphonostomatoida Burmeister, 1835</b>					
<b>Family: Caligididae Burmeister, 1835</b>					
<i>Abasia</i> sp.	Cr	<i>Saurida tumbil</i>	Gi	GOT	[61]
<i>Anuretes branchialis</i> Rangnekar, 1953	Cr	<i>Sarda</i> sp.	–	–	[61]

(Continued on next page)

**Table 2.** (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Caligus arii</i> Bassett-Smith, 1898	Cr	<i>Arius</i> sp	–	–	[60]
<i>Caligus bonito</i> Wilson, 1905	Cr	<i>Euthynnus affinis</i>	–	–	[61]
<i>Caligus confusus</i> Pillai, 1961	Cr	<i>Abalistes stellatus</i> , <i>Decapterus</i> sp.	Gi	GOT	[61]
<i>Caligus constrictus</i> Heller, 1865	Cr	<i>Decapterus</i> sp.	Gi	GOT	[61]
<i>Caligus epidemicus</i> Hewitt, 1971	Cr	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i> , <i>Lates calcarifer</i>	Sk	KH	[122, 136]
<i>Caligus fortis</i> Kabata, 1965	Cr	<i>Abalistes stellatus</i>	–	–	[61]
<i>Caligus multispinosus</i> Shen, 1957	Cr	<i>Pampus argenteus</i>	–	–	[61]
<i>Caligus pelamydis</i> Krøyer, 1863	Cr	<i>Sphyraena jello</i>	–	–	[61]
<i>Caligus robustus</i> Bassett-Smith, 1898	Cr	<i>Decapterus</i> sp.	Gi	GOT	[61]
<i>Caligus stromatei</i> Krøyer, 1863	Cr	<i>Epinephelus bleekeri</i> , <i>E. coioides</i> , <i>E. malabaricus</i> , <i>E. tauvina</i> , <i>Lates calcarifer</i>	Gi	KH	[122, 136]
<i>Caligus</i> sp.	Cr	<i>Acanthopagrus latus</i> , <i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Gi	KH, QN	[133, 140] Present study
<i>Caligodes laciniatus</i> (Krøyer, 1863)	Cr	<i>Ablennes hians</i>	–	–	[61]
<i>Hermilius pyrivertris</i> Heller, 1865	Cr	Unidentified Marine catfish	–	–	[61]
<i>Mappates plataxus</i> Rangnekar, 1958	Cr	<i>Platax teira</i> , <i>Sarda</i> sp.	–	–	[61]
<i>Lepeophtheirus atypicus</i> Lin, Ho & Chen, 1996	Cr	<i>Siganus fuscescens</i>	–	–	[61]
<i>Lepeophtheirus longipalpus</i> Bassett-Smith, 1898	Cr	<i>Arius acutirostris</i>	–	–	[61]
<i>Lepeophtheirus</i> sp.	Cr	<i>Epinephelus tauvina</i> *	Sk	GOT	[34]
<i>Parapetalus hirsutus</i> (Bassett-Smith, 1898)	Cr	<i>Eleutheronema tetradactylum</i>	–	–	[61]
<i>Parapetalus occidentalis</i> Wilson, 1908	Cr	<i>Sphyraena jello</i>	–	–	[61]
<i>Sinocaligus formicoides</i> (Redkar, Rangnekar et Murti, 1949)	Cr	<i>Dussumieria elopsoides</i>	–	–	[61]
<i>Synestius caliginus</i> Steenstrup et Lutken, 1861	Cr	<i>Parastromateus niger</i>	–	–	[61]
<i>Parapetalus</i> sp.	Cr	<i>Rachycentron canadum</i>	Gi	KH	[53]
<b>Family: Hatschekiidae Kabata, 1979</b>					
<i>Hatschekia foliolata</i> Redkar, Rangnekar & Murti, 1950	Cr	<i>Parastromateus niger</i> , <i>Nemipterus peronii</i>			[61]
<i>Hatschekia hanguyenvani</i> Kovaleva, Nguyen et Ngo, 2017	Cr		Gi	GOT	[62]
<i>Hatschekia rotundigenitalis</i> Yamaguti, 1939	Cr	Unidentified marine host	–	–	[61]
<i>Hatschekia</i> sp.	Cr	<i>Amphiprion polymnus</i>	Gi	KH	[142]
<i>Pseudocongericola</i> sp.	Cr	<i>Congresox talabonoides</i>	–	–	[61]
<b>Family: Kroyeriidae Kabata, 1979</b>					
<i>Kroyeria spatulata</i> Pearse, 1948	Cr	<i>Carcharhinus sorrah</i>	–	–	[61]
<b>Family: Lernaopodidae Milne Edwards, 1840</b>					
<i>Charopinopsis quaternia</i> (Wilson C.B., 1935)	Cr	<i>Scomberoides lysan</i>	–	–	[61]
<i>Parabrachiella trichiuri</i> (Yamaguti, 1939)	Cr	<i>Lutjanus erythropterus</i>	Gi	GOT	[61]
<i>Neobrachiella</i> sp.	Cr	<i>Valamugil engeli</i>	–	–	[61]
<i>Naobranchia</i> sp.	Cr	<i>Gerres filamentosus</i>	–	–	[61]
<b>Family: Lernanthropidae Kabata, 1979</b>					
<i>Chauvanium chauvani</i> Kazatchenko, Kovaleva, Nguyen and Ngo, 2017	Cr	<i>Alepes melanoptera</i>	Gi	GOT	[61]

Table 2. (Continued)

Parasite	Taxa	Hosts	Site of infection	Locality/ies	References
<i>Lernanthropus alatus</i> Pillai, 1964	Cr	<i>Alepes melanoptera</i> , <i>Caranx</i> sp., <i>Decapterus</i> sp.	–	–	[61]
<i>Lernanthropus carangis</i> Pillai, 1964	Cr	<i>Upeneus sulfureus</i>	–	–	[61]
<i>Lernanthropus chirocentrosus</i> Tripathi, 1959	Cr	<i>Chirocentrus dorab</i>	–	–	[61]
<i>Lernanthropus cornutus</i> Kirtisinghe, 1937	Cr	<i>Ablennes hians</i>	–	–	[61]
<i>Lernanthropus francai</i> Nunes-Ruivo, 1962	Cr	<i>Larimichthys croceus</i>	–	–	[61]
<i>Lernanthropus latis</i> Yamaguti, 1954	Cr	<i>Lates calcarifer</i>	Gi	KH	[140]
<i>Lernanthropus lappaceus</i> Wilson, 1912	Cr	<i>Eleutheronema tetradactylum</i> , <i>Arius maculatus</i>	–	–	[61]
<i>Lernanthropus opisthopteri</i> Pillai, 1964	Cr	<i>Ilisha elongata</i>	–	–	[61]
<i>Lernanthropus otolithi</i> Pillai, 1963	Cr	<i>Johnius carouna</i>	–	–	[61]
<i>Lernanthropus polynemi</i> Richiardi, 1881	Cr	Unidentified host	–	–	[61]
<i>Lernanthropus sanguineus</i> Song, 1976.	Cr	<i>Lutjanus johnii</i>	–	–	[61]
<i>Lernanthropus trifoliatus</i> Bassett-Smith, 1898	Cr	<i>Arius maculatus</i> , <i>Arius</i> sp., <i>Polydactylus sextarius</i>	–	–	[61]
<i>Lernanthropus villiersi</i> Delamare-Deboutteville et Nunes-Ruivo, 1954	Cr	<i>Gerres filamentosus</i>	–	–	[61]
<i>Lernanthropinus decapteri</i> (Pillai, 1964) Pillai, 1967	Cr	<i>Decapterus maruadsi</i> , <i>Elisha filigera</i>	–	–	[61]
<i>Lernanthropinus gibbosus</i> (Pillai, 1964)	Cr	<i>Saurida tumbil</i>	–	–	[61]
<i>Lernanthropinus sphyraenae</i> (Yamaguti et Yamasu, 1959)	Cr	<i>Mene maculata</i>	–	–	[61]
<i>Sagum sanguineus</i> (Song, 1976)	Cr	<i>Lutjanus johnii</i>	–	–	[61]
<i>Sagum vietnamiensis</i> Kazatchenko, Kovaleva, Nguyen and Ngo, 2017	Cr	–	Gi	GOT	[61]
<b>Family: Pseudocycnidae Wilson C.B., 1922</b>					
<i>Cybicola armatus</i> (Bassett-Smith, 1898) Kensley et Grindley, 1973	Cr	<i>Sphyraena jello</i> , <i>Euthynnus alleteratus</i> , <i>Scomberomorus commerson</i>	–	–	[61]
<i>Pseudocycnus appendiculatus</i> Heller, 1865	Cr	<i>Auxis thazard</i> , <i>Euthynnus affinis</i> , <i>E. alleteratus</i>	–	–	[61]
<b>Family: Trebiidae Wilson C.B., 1905</b>					
<i>Trebius elongatus</i> Capart, 1953	Cr	<i>Taeniura meyeri</i>	–	–	[61]
<b>Class: Malacostraca Latreille, 1802</b>					
<b>Order: Isopoda Latreille, 1817</b>					
<b>Family: Corallanidae Hansen, 1890</b>					
<i>Alcirona</i> sp.	Cr	<i>Epinephelus coioides</i>	Sk	QN, HP	[133]
<i>Corallana</i> sp.	Cr	<i>Epinephelus tauvina</i> *	Sk	GOT	[34]
<b>Family: Cymothoidae Leach, 1818</b>					
<i>Ceratothoa verrucosa</i> (Schioedte & Meinert, 1883)	Cr	<i>Epinephelus coioides</i>	Gi	KH	[135]
<b>Family: Gnathiidae Leach, 1814</b>					
<i>Gnathia</i> sp.	Cr	<i>Epinephelus bleekeri</i> , <i>E. coioides</i>	Gi	KH	[133, 140]
Gnathiidae gen. sp.	Cr	<i>Epinephelus coioides</i>	Gi	GOT	[133]

<sup>1</sup> This species has not been registered in WoRMS and not confirmed by international experts.

<sup>2</sup> *Prosorhynchus* sp. A & *Prosorhynchus* sp. B have not been identified, but they are distinct based on some morphological characters.

<sup>3</sup> This species has not been confirmed by international experts.

<sup>4</sup> *Dollfusiella* sp. A and B were not identified to species level, but it was possible to distinguish them based on morphology.

<sup>5</sup> Temporary name: This species has not been registered in WoRMS and not confirmed by international experts.

<sup>6</sup> *Philometra* sp. 1 and 2 were not fully identified, but it was possible to distinguish them based on morphology.

## Parasite composition and proportion in marine fish of Vietnam

The present results showed that the proportion of marine fish parasites observed in Vietnam is similar to that previously described in Hawaiian waters ([103]; Fig. 2b). As mentioned, the proximity of the latitudinal range between Vietnam and Hawaii might be the reason for such similarities in the proportion of the parasite taxa.

Digenea and Monogenea were the most common taxa, accounting for 43% and 23.5% of Vietnam's total marine fish parasite fauna, respectively. The overall taxon proportions are similar to those found in Hawaii, except for Nematoda and Acanthocephala, which were higher in Vietnam than in Hawaii (7.4% and 7.4% in Vietnam vs. 3.1% and 1.4% in Hawaii, respectively). Many factors can influence the richness of these two parasite taxa, e.g., the zooplankton (e.g., Copepoda, Amphipoda), which may act as intermediate hosts for Nematoda and Acanthocephala and were reported to be more diverse and abundant in Vietnam than in Hawaii [56, 87]. Furthermore, since acanthocephalans use amphipods or ostracods more frequently as intermediate hosts, they are abundant in shallow waters in Ha Long Bay but not on the Hawaiian coast [56, 87]; these parasites are typically found in benthic and benthopelagic fish final hosts [54]. As a result, when compared to the 2006 list, 29 additional acanthocephalans have been added to the current local list [3–13, 50], 22 of which are new parasite species that have never been recorded anywhere other than Vietnam. Those 22 species are *Acanthocephalus halongensis* Amin & Ha, 2011; *Acanthogyrus (Acanthosentis) fusiformis* Amin, Chaudhary, Heckmann, Ha & Singh, 2019; *Neoechinorhynchus ampullata* Amin, Ha & Ha, 2011; *Neoechinorhynchus ascus* Amin, Ha & Ha, 2011; *Neoechinorhynchus longinucleatus* Amin, Ha & Ha, 2011; *Neoechinorhynchus manubrianus* Amin, Ha & Ha, 2011; *Neoechinorhynchus pennahia* Amin, Ha & Ha, 2011; *Neoechinorhynchus plaquensis* Amin, Ha & Ha, 2011; *Heterosentis holospinus* Amin, Heckmann & Ha, 2011; *Heterosentis mongcai* Amin, Heckmann & Ha, 2014; *Heterosentis paraholospinus* Amin, Heckmann & Ha, 2018; *Australorhynchus multispinosus* Amin, Heckmann & Ha, 2018; *Cathayacanthus spinitruncatus* Amin, Heckmann & Ha, 2014; *Rhadinorhynchus circumspinus* Amin, Rubtsova & Nguyen, 2019; *Rhadinorhynchus dorsoventrospinosus* Amin, Heckmann & Ha, 2011; *Rhadinorhynchus laterospinosus* Amin, Heckmann & Ha, 2011; *Rhadinorhynchus pacificus* Amin, Rubtsova & Ha, 2019; *Rhadinorhynchus multispinosus* Amin, Rubtsova & Ha, 2019; *Neorhadinorhynchus atypicalis* Amin & Ha, 2011, *Pararhadinorhynchus magnus* Ha et al., 2018; *Gorgorhynchus tonkinensis* Amin & Ha, 2011, and *Sclerocollum neorubrimaris* Amin, Heckmann & Ha, 2018. These findings suggest that prior to 2006, acanthocephalans were neglected in the parasitological studies regarding marine fish from Vietnam.

To date, it is known that the Cestoda, particularly the orders Trypanorhyncha and Tetrphyllidea, are found in a wide range of marine fish species worldwide [101, 103]. They are tapeworms from elasmobranchs that have been considered excellent indicators of host ecology [105]. In Vietnam, cestodes accounted for only 3.4% of the total parasite fauna in marine fish (17 out of 498 species; Fig. 2a), a much lower proportion

than in Hawaii (9.2% represented by 60 species; [103]; Fig. 2b); this could be because of a lack of definitive hosts (elasmobranchs) due to shallow waters or, more likely, a lack of research interest in these parasites in Vietnam.

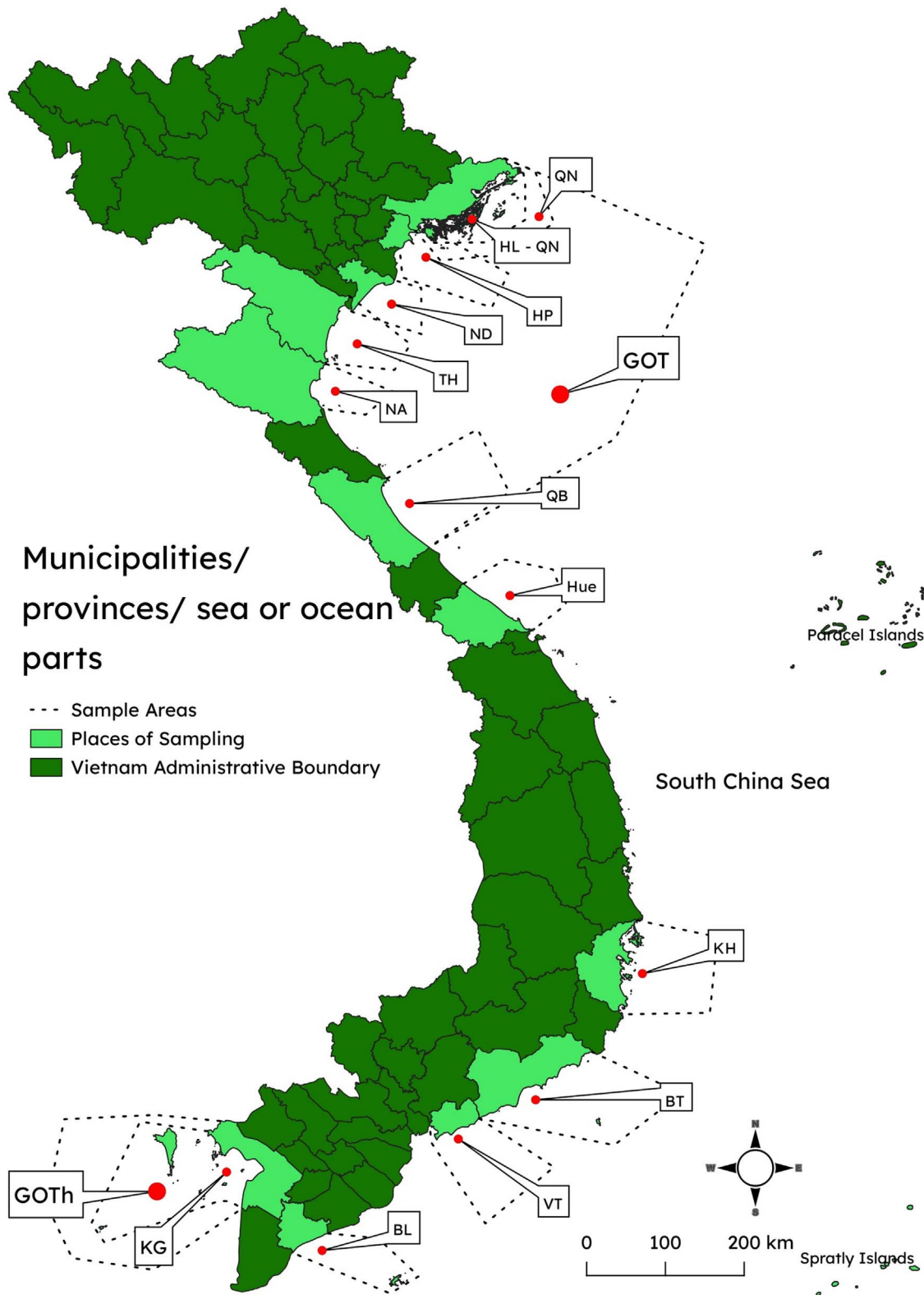
The hirudinean parasites were in very low proportion compared to other parasite taxa. These annelids have one of the largest body sizes among the groups of parasites in marine fish and are well known to be pathogenic in farmed finfish [40]. Moreover, hirudineans occur mainly in freshwater [134] which may explain their low proportion of occurrence in marine fish observed here (0.4%; Fig. 2a). This low proportion was also observed by Palm and Bray [103] in Hawaiian waters (0.5%; Fig. 2b).

In comparison to data from Hawaii [103], Crustacea were found in similar proportions in Vietnamese marine fish (11.6% vs. 10.3%; Fig. 2a), but Myxozoa proportions were higher (1.6% vs. 0.9%), and no Ciliophora were found in Hawaii, while there was 1.6% in Vietnam. However, myxozoans have recently been reported in a low proportion in Vietnamese marine waters (0.09% equal to 2 species) when compared to other groups. However, Mackenzie and Kalavati [79] reported 223 myxosporean parasites from North Pacific marine fish, identifying them as one of the most common parasite groups in marine fish [79]. Thus, the true diversity of myxozoans in Vietnam is expected to be much higher than the current findings. The lack of information and data for this group could be attributed to rudimentary sampling methods and a lack of well-trained personnel to investigate this parasite group. Similarly, the Ciliophora, a worldwide distributed parasite of aquatic teleosts, was only found in small numbers. Depending on their host species, this taxon can range from harmless ecto-commensals to dangerous parasites in fish aquaculture [79]. Bui [34] and Phan [121] reported Ciliophora as parasites causing disease in Vietnam's finfish mariculture. These parasites that infected marine fish in Vietnam were most likely reported as multi-species groups (e.g., *Trichodina* spp.), making identification difficult. This means that the actual number of ciliates in Vietnamese marine waters may be much higher than the eight species found so far.

Parasitic crustacean species accounted for 11.6% of total marine fish parasites reported in Vietnam thus far, slightly higher than the figure found in Hawaiian marine waters (10.3%; Fig. 2). This parasite group has been identified as the most diverse and widespread subphylum of arthropods in marine fish [29, 126]. They have also been identified as critical pathogenic agents of cultured marine fish in the Asian-Pacific region [77]. Given the critical role that disease control plays in ensuring the success of aquaculture, further research on parasites is both necessary and warranted.

## Parasite composition and proportion in the Gulf of Tonkin

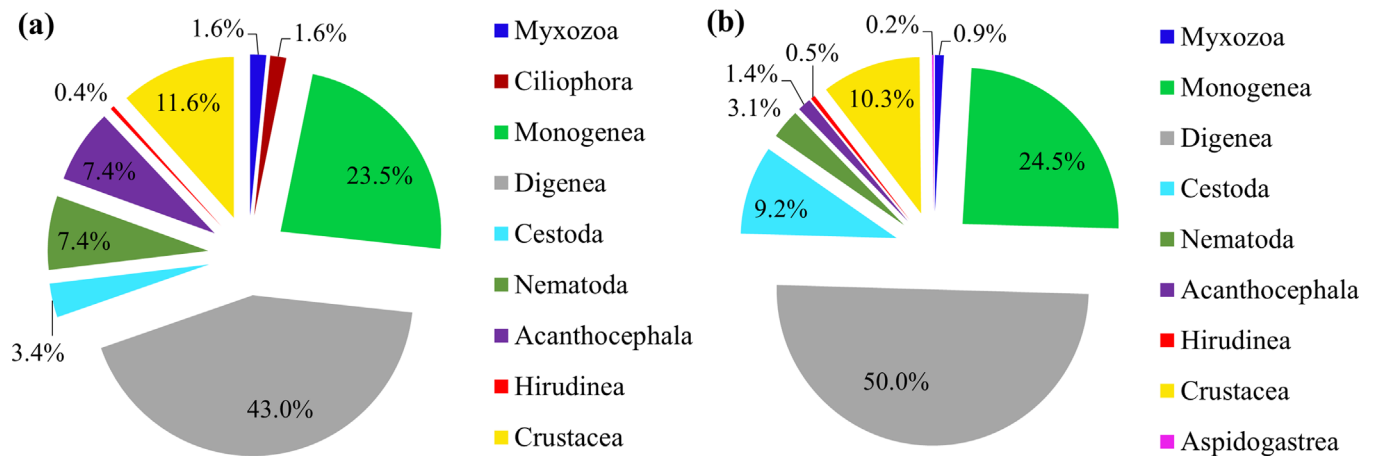
The current study presents 330 marine fish parasite species in the GOT. They are classified into eight taxa, Myxozoa (3), Ciliophora (3), Monogenea (89), Digenea (168), Cestoda (11), Nematoda (19), Acanthocephala (29), and Crustacea (8), demonstrating a high number and rich species composition in the GOT. The parasite richness in the GOT may be influenced



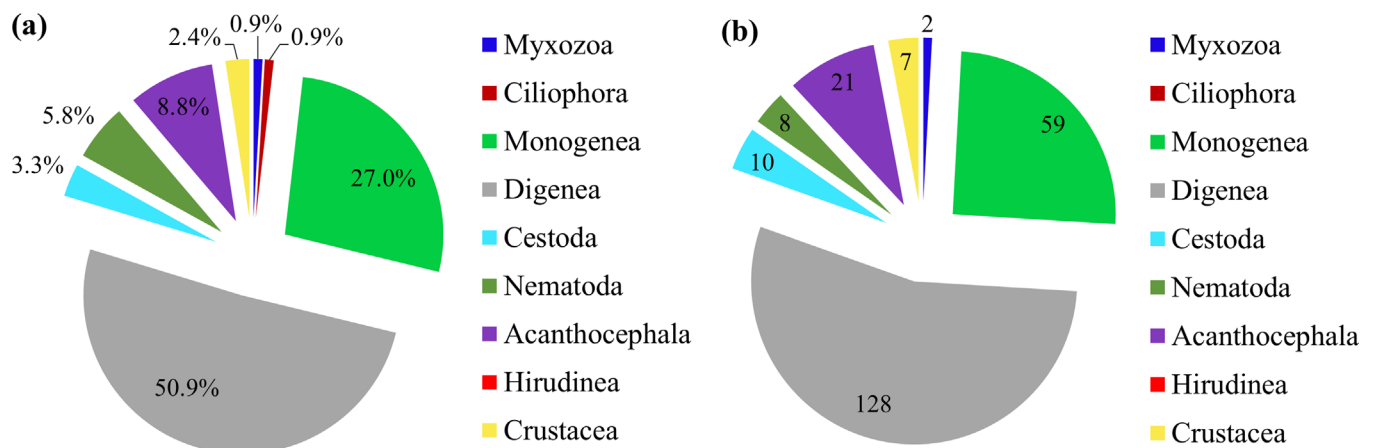
**Figure 1.** A map of Vietnam with abbreviated names of municipalities, provinces, and sea or ocean areas where samples were collected.

by several factors, including geographical latitude, the environment, and the availability of intermediate hosts [55, 85]. The GOT is in South-East Asia, a region with a diverse range of parasites and hosts [125, 126], including the first intermediate

host, mollusks [91], which may be the primary factor affecting endoparasite diversity, such as the digeneans (168 species) we discovered here. However, the GOT's shallow water depth and muddy sediment limit the distribution of open-water



**Figure 2.** Proportion (%) of (a) the recorded fish parasite species in Vietnam (498 species, present study), and (b) fish parasites species in Hawaii (652 species [103]).



**Figure 3.** Marine fish parasites in the Gulf of Tonkin: (a) Proportion of the total recorded fish parasite species (%), and (b) Composition (species richness) of parasite species only found in the Gulf of Tonkin.

elasmobranchs (e.g., sharks and rays), the expected final hosts of marine Cestoda, particularly Trypanorhyncha (Fig. 3). As a result, only seven Trypanorhyncha species have been identified in the GOT so far.

Most of the recorded marine parasite species in Vietnam (66.3%) have been found in the GOT, indicating that the GOT is a hotspot for interested collectors and institutions supporting research due to its high parasite biodiversity. However, apart from its natural biodiversity, most parasitological research may be concentrated in the GOT due to the urgency of fish disease research serving the high-density aquaculture area in the GOT or because conducting research here is more convenient than in other regions. The composition related to the parasite fauna in the GOT was generally similar to that of all Vietnamese marine environments (Figs. 2a and 3a). Digenea were proportionally the taxon in the GOT with the highest species richness (51%; Fig. 3a). This proportion in the GOT was higher than that observed for the whole of Vietnam (this study; Fig. 2a) and similar to that reported in Hawaii ([103], Fig. 2b). A possible explanation for the previous results relates to the environmental features of the GOT, i.e., muddy and shallow waters with rocky and limestone substrates [89, 120]

which support an abundant fauna of mollusks that act as intermediate hosts for digenetic trematodes. This is also consistent with the findings of Sujatha and Madhavi [128] and Bray et al. [31], which indicated that the Digenea were typically shallow-water parasites.

Other major parasite groups in the GOT reported in this study (Fig. 3a) include Monogenea (27%), Acanthocephala (8.8%), Nematoda (5.8%), Cestoda (3.3%), Crustacea (2.4%), Ciliophora (0.9%), and Myxozoa (0.9%). It is worth noting that, of the 330 species of marine fish parasites discovered in the GOT, up to 235 species (71%) are found only here and nowhere else in Vietnam (Fig. 3b). For example, the current effort revealed that up to 21/29 acanthocephalans are found only in the GOT (Fig. 3b), suggesting that they are GOT native species.

The parasite-host ratio of 2.7 was calculated based on a total of 330 parasite species that have been recorded in 122 marine fish species in the GOT. This ratio is higher than the average for Vietnamese marine water (2.2), Hawaii (2.2), New Caledonia (1.9), and the Indo-West Pacific (1.7) [58, 103, 126]. Since the GOT is thought to have around 928 marine fish species [144], only a tiny portion of the fish species has been

examined for parasites (13.1%), indicating that more attention needs to be paid to exploring the region's high diversity of marine fish parasites.

## Conclusions

This is a comprehensive review to understand the diversity and richness of Vietnam's marine parasite fauna. In 225 fish species, 498 marine fish parasite species have been identified, compared to 247 parasites in 82 fish species in 2006. Digenea (43%) and Monogenea (23.5%) had the highest levels of species richness. According to the data currently available, most parasites in Vietnamese fish come from the GOT (330 species, equivalent to 66.3%).

In Vietnam, the estimated marine parasite richness decreased from 3.0 in 2006 to 2.2 in 2022. Only 12% of the marine fish species have been studied for parasites, so a large part of the fish community still needs to be studied to evaluate and predict better parasite richness and diversity in this tropical-subtropical country. This compilation of parasite records shows significant progress in studying marine fish parasites in Vietnam over the last 16 years. However, it is still in its infancy, leaving a sizable task for the future, as species classification is the first critical step in characterizing any ecosystem. It is a challenging but fascinating task to learn about evolutionary biology and the history of nature, while discovering the true diversity of these marine ecosystems. Understanding pathogenic threats is critical for Vietnam's growing finfish mariculture industry. Recent research shows that parasites can be used to study climate change and the environment. Thus, studying marine fish parasites in Vietnam is urgently needed in the future, especially using molecular data to characterize and classify the fauna.

The findings of this study will help create a database for marine fish parasites in Vietnam. Additionally, it promotes aquaculture success in Vietnam, reduces the risk of fish disease transmission between countries, and reduces the risk of consuming parasite-infected fishery and aquaculture products in Vietnam and elsewhere.

## Author contributions

Truong, T.V.: Conceptualization, writing-original draft, editing, investigation, resources, methodology, software, analysis, visualization; Ngo, H.T.T.: Conceptualization, writing-review, and editing, investigation, methodology, software, analysis, visualization; Bui, T.Q.: Analytical tools, investigation; Palm, H.W.: Conceptualization, investigation, and editing; Bray, R.A.: writing-review and editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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