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Full Length Article

Occurrence of Fish Parasites (Cestode) from west coast of India

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ABSTRACT

Fishes are an important source of protein for millions of people worldwide. Since the early 1970s, 70 to 100 million metric tons of fishes are caught each year for food. People consume about 70 percent of fish caught, and nearly 30 percent are used as animal feed that helps to produce other forms of proteins. Fish protein represents about 25 percent of the total animal protein consumed by the world's population, second only to beef. In addition to protein, it contains carbohydrates, vitamin A and D, iron, calcium and other mineral salts.

Keywords: Fish parasites, cestode, West coast

INTRODUCTION

Coastal zones are fragile and therefore any attempt to deplete them for use may result in irreparable loss of natural systems with serious consequences to the productive potential and economic uses of associated natural systems. Cestodes cause serious disease in fish. Larvae cestodes (plerocercoids), also known as metacestodes (Ruhnke, 1994.), are some of the most damaging parasites to viscera of fish and decrease carcass value if present in muscle. With a complex life cycle that requires one or two intermediate hosts, cestodes are relatively common in fish. Fish can be an intermediate host, definitive host, or both. Coastal fish are found in the waters above the continental shelves that extend from the continental shorelines, and around the coral reefs that surround volcanic islands. The total world shoreline extends for 356,000 km (221,000 mi) (Muraleedharan and Kumar, 1996) and the continental shelves occupy a total area of 24.286 million km^2 (9 376 million sq mt). This is about 4.8% of the world's total area of 510.072 million km^2 (Ducklow et al, 2000).

According to the Food and Agriculture Organization (FAO), the world harvest in 2005 consisted of 93.2 million tonnes captured by commercial fishing in wild fisheries. Of this total, about 45 percent were pelagic fish. Estimates of potential fishery resources from the Exclusive Economic Zone of India (EEZ) are about 3.5 to 4.7 mt (million tonnes). The recent estimates on annual marine landings from the Indian coast show that they fluctuate between 2.2 and 2.8 mt5. Of this, about 73% of the catches originate from the west coast of India. But a close looks at the catch statistics (CMFRI, 1996) shows that the composition of marine landings significantly changes, not only between the east and west coasts, but also within the latter.

Coastal bays and estuaries are productive habitats used by a variety of fishes and other organisms. Almost 60% of the world fish catch is taken from coastal ecosystems (Lie, 1983). A number of marine teleost's congregate in this zone for reproduction, feeding and shelter. Despite this, very little information is available on the fish fauna of the Indian coast, and their seasonal occurrence in bays and estuaries. The objective of the present investigation was to describe species composition, seasonal variation and diversity of cestode populations from west coast of India.

MATERIALS AND METHODS

Collection of host fish species

A monthly average of about 70 specimens of the fish species were brought during January, 2003 to December, 2005 for examination. These fishes were collected from different centers of west coast of India. After collection, these fishes were carried out to the laboratory of Parasitology, Department of Zoology.

Preliminary treatment of the fish

The fishes were first given serial number and then the total length (in cm) and sex of each fish were recorded. The external body surface was examined both macroscopically and microscopically.

Examination of fish for parasites

The external examination was made by the observation of external features of fish. The first examination was started by the observation of the colour of fish as well as the skin was observed by magnifying glass. The presence of cloudness of skin (grey and white), reddening, ragged or torn fins, raised scales, white spots or parasites visible to the naked eye. The ocular reflex was examined by holding the fish in the hand in a normal position and then turning it towards right. The absence of this reflex is a pathological symptom. The anus was examined for any swelling and also the muscle texture was determined by making a cut in the dorsal region to see whether inflammation or ulcer is present.

RESULTS AND DISCUSSION

Acanthobothrium abhayii n. sp.

Description: (based on whole mounts of 6 mature worms, 1immature worm, cross-sections of mature proglottids of 1 worm, 4 scoleces examined and whole mounts of their vouchers, and the scoleces and posterior portion of the strobila of 2 hologenophores): Worms 3.95– 7.1 mm long; greatest width at level of scolex; 14–20 proglottids per worm; euapolytic; genital pores marginal, irregularly alternating, 62–71% of proglottid length from posterior end Figs. A-D,. Scolex was consisting of scolex proper and conspicuous cephalic peduncle. Scolex proper was with 4 bothridia. Bothridia free posteriorly, each with 3 loculi and specialised anterior region in form of muscular pad; bearing apical sucker and 1 pair of hooks below posterior margin, triangular in shape, with conspicuous apical thickening, posterior margins pronounced; loculus length ratio (anterior: middle: posterior) 1:0.22– 0.36: 0.32–0.48; maximum width of scolex at level of middle loculus.

Velum present between medial margins of adjacent bothridia at mid-level of middle loculus. Hooks bipronged, hollow, with tubercle on proximal surface of axial prong; internal channels of axial and abaxial prongs continuous, smooth; abaxial prongs slightly longer than axial prongs; lateral and medial hooks approximately equal in size. Bases of lateral and medial hooks were approximately equal in length; base of lateral hook overlapping and slightly narrower than medial hook base. Bases of hooks embedded in musculature of bothridial pad. Cephalic peduncle was 328–450 long by 77–159 wide at mid-level. Apical pad (Fig. 1) and distal bothridial surfaces covered with short filitriches. Proximal bothridial surfaces with blade-like spinitriches (A) interspersed with long filitriches throughout. Bothridial margins with long filitriches. Cephalic peduncle covered with densely arranged blade-like spinitriches (B) interspersed with relatively long filitriches.

Proglottids are acraspedote, protandrous. Immature proglottids were 13–18 in number; mature proglottid 1–2 in number. Length: width ratio 4.2–7.4:1. Gravid proglottids not observed. Testes irregularly oval in dorsal or ventral view, arranged in 2 regular columns anterior and posterior to ovarian isthmus, 1 layer deep, 37–50 in total number, 5–9 in postporal field, 7–11 posterior to ovarian isthmus, conspicuous in mature proglottids. Cirrus sac ovoid, tilted slightly posteriorly, containing coiled cirrus; cirrus expanded slightly at base; base and some of length of cirrus covered with spinitriches. Vagina thick-walled, sinuous, extending from ootype along medial line of proglottid to anterior margin of cirrus sac then laterally following anterior margin of cirrus sac to common genital atrium; vaginal sphincter present; seminal receptacle not seen. Ovary was occupying posterior two-thirds of proglottid, H-shaped in frontal view, bilobed in cross-section, weakly lobed, conspicuously asymmetrical; reaching well anterior to cirrus sac; reaching posterior margin of cirrus sac; ovarian isthmus posterior to midpoint of ovary. Mehlis' gland posterior to ovarian isthmus. Vitellarium follicular, consisting of 2 lateral bands; each band consisting of 2 columns of relatively small follicles,

extending from near anterior margin of proglottid to near posterior margin of proglottid,interrupted by vagina and cirrus sac, not interrupted by ovary; vitelline follicles irregularly shaped. Uterus is thick-walled, sacciform, extending from near anterior margin of proglottid to near posterior margin of proglottid. Excretory ducts lateral, in one dorsal and one ventral pair. Eggs not observed.

Type host: *Himantura* sp. (Rajiformes: Dasyatidae).

Type locality: West Coast of India (Ratnagiri) **Date of collection:** November 2005.

Type material: Holotype, 2 paratypes, 2

Etymology: This species is named after the name of researcher.

Remarks: *Acanthobothrium abhayii* sp. n. is a category 2 species according to the categories of *Acanthobothrium* species established by Ghoshroy and Caira (2001) (i.e., <15 mm in total length, <50 proglottids, <80 testes, with asymmetrical ovary). It is the only category 2 species that possesses post-ovarian testes. It conspicuously differs from the category 1 species *A. foulki, A. larsoni, A. marymichaelorum, A. saliki,* and *A. southwelli,* in its lack of post-ovarian testes. It further differs from these and the following additional category 1 species in that its genital pore is distinctly posterior in position (i.e., 34–45% from the posterior of the proglottid rather than being located at the middle or in the anterior half of the proglottid): *A. asnihae, A. clarkeae, A. dollyae, A. gnomus, A. himanturi, A. laurenbrownae, A. lepidum, A. lineatum, A. lintoni, A. martini, A.minusculus, A. monksi, A. nicoyaense, A. oceanharvestae, A. paulum, A. royi,* and *A. zainali.* With respect to the remaining category 1 species, it possesses a genital pore that is anterior, rather than lateral, to the ovary as in *A. fogeli.* It is a longer worm than *A. bartonae* and *A. rohdei* (4–7.1 vs. 1.56–2.38 and 2.1 mm, respectively). It also possesses a greater number of proglottids than *A. rohdei* (17–24 vs. 4–6) and a greater number of testes than *A. bartonae* (34–53 vs. 26–29). *Acanthobothrium romanowi* sp. n. is shorter in total length than both *A. urolophi* and *A. mathiasi* (4– 7.1 vs. 8–9.5 and 10–20 mm, respectively) and lacks the distinctive elongate hair-like microtriches seen on the cephalic peduncle of *A. odonaghuei.* It differs from *A. guptai* in that its mature proglottids are distinctly longer than broad, rather than broader than long. Whereas the 3 loculi of the scolex of *A. pearsoni* Williams, 1962 are of equal size, the anterior loculus of *A. romanowi* sp. n. is distinctly longer than either of the posterior 2 loculi; the former species also possesses hooks that are much more robust than those seen in the latter species. *Acanthobothrium romanowi* sp. n. closely resembles *A. marplatensis,* but is readily distinguished from the latter species in that its cirrus sac is distinctly oval, rather than curving conspicuously anteriorly.

This is probably because helminthes mainly infect the internal organs, predominantly the gastrointestinal tract which, for humans, does not comprise the edible portion of the fish. Although fishermen and anglers regularly encounter encysted “grubs” in the skin and muscles of fish, they regard them as just a nuisance, notwithstanding the biological and economic impact they may have on the fish species. Only few *cestodes* or tapeworms in man are known to be transmitted by fish. However, the broad fish tapeworm *Acanthobothrium* is a common human parasite found prominently in west coast of India. This parasite has a micro crustacean as first intermediate host and marine fish are required as second intermediate host. The related species *Acanthobothrium* is transmitted by marine fish and commonly occurs in coastal regions of Peru, Chile and Japan where raw fish preparations are common. Only a few studies on cestode and trematode parasites of fish in some part of west coast have been documented hence present study is having its own importance, While there is much need to understand the interactions between fish and other animals in the transmission of helminth infections, only a few parasitological studies in India are documented.

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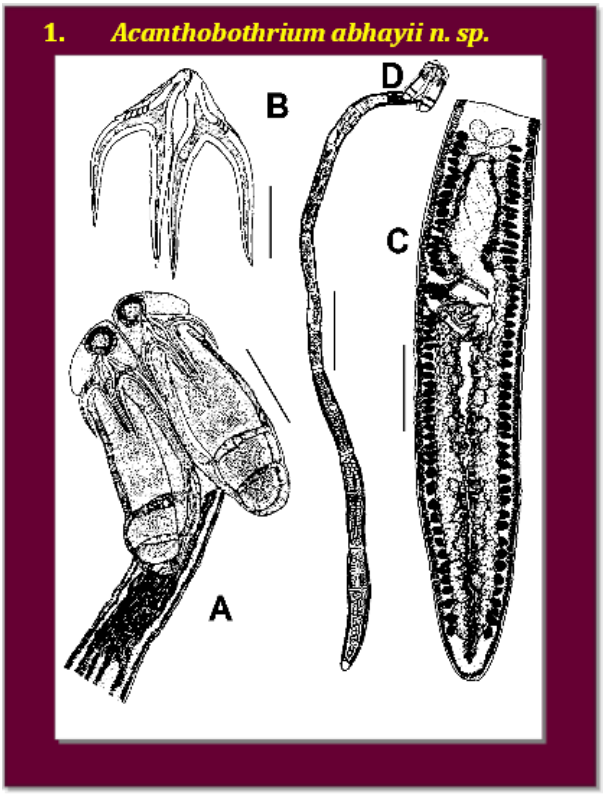

Figure. 1. A. Scolex. **B** Hooks. **C.** Terminal proglottid. Arrowhead indicates location of cross-section. **D** Whole worm

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