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Copepod parasites of marine fishes *Gazza achlamys* (Jordan & Starks, 1917) and *Ariomma indica* (Day, 1871) from Visakhapatnam coast, Andhra Pradesh, India.

Siva Prasad K., Sreeramulu K. and N.V. Prasad*
Department of Zoology, Andhra University, Visakhapatnam-530003, Andhra Pradesh, India.

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Abstract: A survey has been conducted to collect copepod parasites from *Gazza achlamys (Jordan & Starks, 1917) and Ariomma indica (Day, 1871)* off Visakhapatnam coast. Altogether, seven copepod species were identified. They are *Caligus kuroshino (*Shiino, 1960), *Bomolochus decapteri* (Yamaguti, 1936), *Bomolochus nothrus* (Wilson, 1913), *Pseudartacolax lateolabracis* (Yamaguti *et al.,* 1959), *Pumiliopes opisthopteri* (Shen, 1957), *Lernanthropus amphitergum* (Pearse, 1951) and *Lernanthropus ilishae* (Chin, 1948). A list of hosts parasites and brief description of these parasites has given in this paper.

Key words: Copepod parasites; *Gazza achlamys; Aariomma indica;* Visakhapatnam coast; South India.

Introduction

The elasmobranch and teleost fish have attracted the attention of biologists. They are important in commercial fisheries in various parts of the world including India. Some of the species are excellent as human food. Copepods are found in marine and fresh water habitats. Most are free-living and are very important food items for a variety of aquatic organisms. The copepod parasites are commonly found on both elasmobranch and teleost fishes. On fish hosts, copepods attach to the body surface, fins, gills, nasal fossae, branchial cavity and occasionally on eye balls.

Studies on parasitic copepods may be said to have started in 18th century when Linnaeus (1746)[1] reported the records of *Lernaea* and this was followed by the records of *Caligus* by Muller (1785)[2]. However, it was in the 19th century that great strides have been made by scientist. At the turn of this century systematic studies of copepod parasites gained prominence. In India, considerable work on the copepod parasites of food fishes have been attempted. The study received impetus with the work of Bassett–Smith (1899)[3], who in a series of papers described thirty species that were collected at Bombay, Ceylon and Persian Gulf. Kirtisinghe (1934)[4] contributed much to the study of the systematics of copepod parasites of food fishes. Our knowledge of copepod parasites of fishes of the East coast of India is mainly based on the studies of Gnanamuthu (1957)[5].

Some of the investigators who contributed to the knowledge of copepod parasites of Indian waters are, Kurian (1961)[6], Malhotra and Jyothi (1972)[7], and John and Nair (1973)[8]. Uma Devi and Shymasundari (1976)[9] worked on the parasitic copepods from coastal waters of Visakhapatnam. Williams and Bunkley-Williams (1996)[10] reported *Caligus irritans*in and *L. griseus*from from Puerto Rico. Copepod parasites mostly reported after 1980 are; *Caligus* sp., *Lepeopthrius pectoralis, Lernaeocera branchialis*, *Caligus minimus,* and *Lernanthropus kroyeri*[11,12,13]. In the present study, copepod parasites of two marine fishes, *Gazza achlamys* (Jordan & Starks, 1917) a teleost fish, commonly known as naked-toothed ponyfish and *Ariomma indica* (Day, 1871) commonly known as Indian drift fish inhabiting marine benthopalagic fishes of Visakhapatnam coast.

Materials and Methods

Copepod parasites are commonly found on both elasmobranch and teleost fishes. Most of the fishes were obtained from Fishery Survey of India vessels Matsya Shikari and Matsya Darshini operated at Visakhapatnam, and exploratory fishing trawlers of Visakhapatnam coast, Bay of Bengal, at a depth ranges from 25 to 72 meters, and from local fish market. It was not possible to get live fish to examine the parasites. Most parasites were alive even three or four hours after the death of the fish. Most of them were found in the branchial chambers attached to the gill filaments. Some were found attached to the surface of the body and rarely some were found inhabiting the eyes. Those inhabiting the branchial chambers attached to the gill filaments remaining undisturbed even after the death of the host. But attached to the skin of the host were likely to get detached while handling the fishes. So it was necessary to examine the fishes as far as possible soon after they were caught.

Large parasites like Caligids could be easily located but smaller forms require careful search. They could not be easily distinguished from gill filaments. To avoid this gills were cut and the filament were carefully teased with

***Corresponding Author**:
Dr. N. V. Prasad,
Division of Marine Biology,
Department of Zoology, Andhra University,
Visakhapatnam – 530003, Andhra Pradesh, India.
E-mail: dr.nvprasad@gmail.com

a needle in a petridish. Small quantity of water was added to the residue and examined under a binocular dissection microscope. Bomolochidae and others could be collected in this manner. *Lernanthropus* species remain firmly attached to host with the aid of the bulla. The shape of the bulla is of systematic importance. So, sufficient care was taken to keep the bulla intact while separating the parasite from the fish. The best way to obtain them was to flush the branchial chamber with a pipette and examine the residue in a petridish under a binocular microscope.

Most of the parasites collected from the branchial cavity were covered with mucous. Instead of putting the parasites directly into the fixative it was necessary to remove the adhering mucous with sodium bicarbonate solution. This was done again by repeated gentle flushing with a pipette. After this the parasites were washed in tap water and then put in appropriate fixative. Most often they were preserved in 5% formalin. Each parasite from a definite host was collected and put in a small tube with formalin and plugged with cotton. These small tubes in turn were placed in a wide mouthed bottle containing formalin. With this evaporation of formalin was prevented. For every collection, the following data were maintained: (1) name and family of the host, (2) number of parasites, (3) sex of the parasite, (4) number of infected hosts and (5) number of uninfected hosts.

Formalin makes the copepods opaque thus making examination difficult. Thus, certain amount of clearing is necessary before removing the appendages. For this purpose, various kinds of clearing fluids were employed but from experience it was found that lactic acid proved a best clearing fluid. It penetrates quickly into the tissue. The specimens were kept in cavity blocks with few drops of lactic acid for 3-4 hours. Another advantage of using lactic acid was it readily mixes with water, alcohol and formalin, allowing transfer of fluids from one fluid to another. Temporary mounts could be made and kept for a week to re-examination. Original shape of the parasites could be retained. Due to so many advantages over other clearing fluids, lactic acid was invariably used.

For whole mounts formalin fixation was sufficient. After fixing for few hours, the specimens were washed and put in alum carmine for 12 hours. If they were overstrained they were washed with acid alcohol and later washed with distilled water the parasites were washed in a graded series of alcohols and cleared in xylol or cedar wood oil and then mounted with Canada balsam. All measurements were made to millimeters. Drawings were made with camera lucida. Already known species have been briefly described or re-described where ever necessary. For new species descriptions were given in detail and discussions furnished. For common forms, only salient features were touched. In the synonymy, only important references were made. In all 7 species of copepod parasites belonging to 3 families and 4 genera were obtained from two species of fishes belonging to different families.

Results

G*azza achlamys* (Jordan & Starks, 1917) *and Ariomma indica* (Day, 1871) appears to be a good host for copepod parasites. During the present study, altogether seven copepod species were identified, they are *Caligus kuroshino (*Shiino, 1960), *Bomolochus decapteri* (Yamaguti, 1936), *Bomolochus nothrus* (Wilson, 1913), *Pseudartacolax lateolabracis* (Yamaguti *et al.,* 1959), *Pumiliopes opisthopteri* (Shen, 1957), *Lernanthropus amphitergum* (Pearse, 1951) and *Lernanthropus ilishae* (Chin, 1948). A list of hosts parasitized and the number of parasites obtained is given below. The parasites are described briefly for identification

***Caligus kuroshino* (Shiino, 1960):**

Females were collected from the gills of *Gazza achlamys* from Visakhapatnam coast. The form length 2.98 mm. Carapace circular with wide marginal flange (Figure 1). The frontal plates with large circular lunules. Carapace measure 1.150 x 0.980 mm. The transverse median ridge is placed far back so the cephalic area is longer than thoracic. Fourth thoracic segment triangular with broad posterior end. Abdomen two segmented. The posterior segment is somewhat rectangular. The caudal rami as long as broad with five setae.

First antenna is typical of the genus, i.e. the basal part with several large plumose setae and small row beneath the row of plumose setae. The distal segment is large stout and tipped with ten spined setae. Second antenna three segmented. Basal segment has an apically blunt process. Second segment with a pad. Third segment long and curved, claw with a spine. First maxilla long and claw–like with three groups of setae. Second maxilla triangular, palp with one long two spine setae. Second maxilliped with usual pattern, but the basal segment very long and slender sternal fork with broad base. Rami stout and diverging with outer broad flange.

Figure 1: *Caligus kuroshino*

The terminal segment of first leg has three claws. The large seta which is pectinate on upper side only. It has three plumose setae. These plumose setae bear spines at their bases on one side. Endopod of first leg two segmented, apically with two spinnules. The first

endopodal segment of second leg with four strong spines. The claws on the exopod with pectinate margin (claw of third leg straight with pectinate margin). Apron of third leg armed with spines and the basal claw with pectinate margin.

***Bomolochus decapteri* (Yamaguti, 1936):**
Only females were collected from the gills of *Ariomma indica* from Visakhapatnam coast. The form total length, 2.1mm. Cephalothorax much broader than long, rounded on both sides, with prominent frontal, incision and a pair of lateral ones (Figure 2). Second to fourth thoracic segments rapidly narrow posteriorly. Second segment with concavity on posterior side. Third segment slightly narrower than second. Fourth segment transversely oblong. Fifth segment as broad as fourth but longer than as latter with angular lateral margins. The genital segment same as that of *B. selaroides*. Abdomen three segmented. First segment as long as broad, second segment narrower than first. The caudal rami longer than broad. Egg sacs long; extend far beyond the caudal setae.

First antenna six segmented, reaches beyond lateral margin of cephalothorax. Three proximal segments partially fused, with fourteen plumose setae and one strong apically curved chitinised process. In the present species, the first antenna has four modified setae of which one is very small, where as in *B. selaroides* there are three modified setae. There is a group of three setae at about middle of ventral margin as in *B. decapteri*.

Figure 2: *Bomolochus decapteri*

Second antenna similar to that of *B. decapteri*in having five claws. Mandible, maxillas are typical with that of previously described one. Pillai mentioned that the second maxilla with two unequal barbed blades. He did not mention about the presence of spine in addition to that of two blades as in *B. decapteri*.

First leg is similar to that of *B. decapteri*. In the second leg the endopod is broader than expod. Half of the first exopod segment is completely covered with hairs, only it is pustulose at the basal part of the spine in the present specimen. Whereas in *B. selaroides* there are no such hairs. The remaining nature of the spines similar to that of *B. decapteri*. In the case of fourth leg the present species shows difference from that of *B. decapteri*. The terminal segment of the exopod has three spines, of which two are very long, almost reaching to the length of adjacent setae in the present species. Whereas it is not so in *B. decapteri*.

***Bomolochus nothrus* (Wilson, 1913):**
Only females were collected from the gills of *Ariomma indica* from Visakhapatnam coast. The length of specimens, 1.81–1.88mm. Carapace oval, broader than long with a prominent rostrum at the middle (Figure 3). There is a narrow flange around the carapace. The second thoracic segment with concave posterior margin, narrower than carapace, broader than long, with rounded lateral margins. The third segment same as that of second but its posterior margin is convex. The fourth is narrower than third, broader than long. The fifth thoracic segment is broad as fourth which slightly overlaps the anterior part of the genital segment. The genital segment is almost orbicular with round posterior margin, overlapping nearly half of the abdominal segment. Abdomen four segmented, which narrow towards its apex.

Figure 3: *Bomolochus nothrus*

The caudal rami are longer than the broad, each ramous has one seta at its middle of the outer margin, the other at its posterior corner, one seta at mid-dorsal, and the remaining three at its apex. Egg strings are very long with several eggs which extend beyond the tips of the setae. First antenna six segmented. First three segments together have twenty-four plumose setae. Fourth segment with four simple setae, fifth with three whereas sixth tipped with eight setae.

Second antenna three segmented, based with one spine seta, distal segment has a strong curved claw in addition to the linguiform process and five spine setae. Mandible with two sub-similar blades. First maxilla with four setae, one of them six times longer than the other two setae. Fourth one is very small. Second maxilla with two sub-similar barbed blades and a small spine. Second segment of maxilliped oblong, third segment curved backwards reaching the posterior of the two setae on the second segment. Its inner border has a row of spines; whereas outer border has two or three spines.

First leg flattened with three segmented rami. Endopod is larger and broader than exopod, its terminal segment

with eight marginal plumose setae. The spines on exopod of second leg gradually increase towards tip. These are setiform and pectinate on one side. The terminal segment of exopod has three claws, with pectinate outer margins. Third leg is similar to second.

Endopod of fourth leg longer than exopod, the third endopod segment has two externally pectinated claws and a very long spine seta with pectinate outer margin. In the fifth leg basal segment with a pectinate seta, distal segment with four pectinate spines and two spiny patches.

***Pseudartacolax lateolabracis* (Yamaguti *et al.*, 1959):**

Only females were collected from the gills of *Gazza achlamys* from Visakhapatnam coast. The length of specimens: 1.05-1.09 mm (Figure 4). The genus was erected by Yamaguti (1963)[14], with a type species *Pseudartacolax cypseluri* (Yamaguti 1953) on *Cypselurus agoo* from Hamazima, Japan. Carapace much broader than long with median deep sinus. Second thoracic segment nearly half of the length of the carapace with rounded lateral margins posteriorly, the posterior margin of it showing concavity. The third thoracic segment similar to the second with rounded lateral margins and slightly overlapping the fourth, the latter broader than long. The fifth narrower than fourth. The genital segment broader than long with bulged lateral margins where the egg sacs arise. Egg string length: 0.70mm. Abdomen three segmented.

Figure 4: *Pseudartacolax lateolabracis*

First antenna six segmented reaching beyond lateral margins. The armature of setae same as that of *P. lateolabracis*. Second antenna three segmented, second segment with long apical seta, distal segment with several rows of spines on the ventral margin. It has a blunt terminal process, two semicircular combs; in addition, it has three setiform claws and two simple setae.

Mandible and first maxilla are similar to those of type species. The second maxilla terminates in a pointed blade, at the base of which is a smaller pectinate palp as in *P. lateolabracis*, whereas the present species has a small spinnule in addition to that of two barbed blades. Maxilliped with a curved, strong claw without any accessory process.

Exopod of first leg incompletely three segmented as in Yamaguti's specimen. The basipod of anterior first leg with a patch of well-developed spines in the present species. Second to fourth legs biramous, each ramous is three segmented. Yamaguti did not describe the nature of legs properly. In the second leg the endopod is larger than exopod. First segment of exopod of second leg with outer longer spine which is much longer than other spines on other segments. The second with outer small spine and inner seta. The terminal segment shows pseudosegmentation. From the outer side, it gives the appearance of having two segments. But it is only slight demarcation and not completes segmentation. It has three spines which gradually increase in length towards tip. The last spine is very long almost reaching the length of the adjacent seta. The outer margin with flange. The endopod segments very long, first and second with one and two plumose setae and two blunt short spines. Third leg similar to that of second.

Fourth legs endopod same as that of second. But the terminal segment with four setae and three spines which increase in length towards tip. The last spine with outer flange. The endopod is very long gradually narrowing towards apex. First two segments of endopod with plumose seta on outer margin and inner hairy margin. The terminal segment with blunt, short spine and an elongate pectinate spine which tappers gradually to a setiform point. Fifth leg agrees with that of Yamaguti's description. Basal with one seta, terminal with three spines and an elongate seta.

***Pumiliopes opisthopteri* (Shen, 1957):**

Only females were collected from the gills of *Ariomma indica* from Visakhapatnam coast. The form length,1.32 -1.38 mm. Cephalothorax roundish, with straight posterior border: frontal plate broader than long, produced anteriorly (Figure 5). Third thoracic segment overlapping anterior part of fourth, fifth quadrate. The fourth, and sometimes the third, too, may be overlapped by the preceding segment and concealed from dorsal view. Genital segment broader than long. Egg sac elliptical and short. Egg sac length 0.40 mm. Abdomen 3-segmented, terminal segment with posterolateral angles protruded. Caudal rami longer than broad.

First antenna 9-segmented, not enlarged three basal segments large not fused, bearing a row of setae along anterior border. A pair of maxillary hooks present behind first antennae, but they are modified. Second antenna 4-segmented, non – prehensile and third segment with a row of twelve to fourteen teeth on ventral surface, fourth segment short, tipped with three stout claws and a seta. No setae on first maxilla, paragnathdigitiform. Second segment of maxilliped elongate unlike that of other bomolochids, tipped with a simple claw. Basipods of second to fourth legs not inflated, all rami 2-segmented, except for fourth

endopod, which is 3-segmented, bearing a few setae. Each exopod of second to fourth legs with a stout claw. Fifth leg uniramose, 2–segmented. Male unknown. Parasitic on marine teleosts.

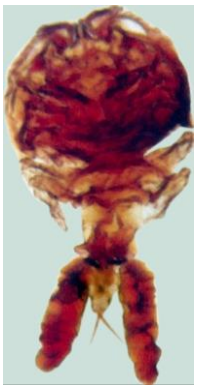

Figure 5: *Pumiliopes opisthopteri*

***Lernanthropus amphitergum* (Pearse, 1951):**
This is a common copepod parasite on the gills of *Gazza achlamys*. Females and males were collected from the gills of *Gazza achlamys* off Visakhapatnam coast (Figure 6). The female form length 1.16- 1.19 mm and 1.04-1.06 mm in male.

Female: Body is demarcated into carapace and trunk. Carapace is somewhat semicircular in outline. Cephalon fused with first thoracic segment forming a cephalothorax, its lateral parts expanded and folded downwards and often forwards. Thoracic segments two to five partially or completely fused, third segment produced backwards as a lobe (dorsal plate) covering the hind part of trunk. The anterior-lateral parts of the carapace highly expanded reaching beyond the antennal lobe and are rounded. The posterior border is somewhat convex and overlaps the trunk. Anterior part of the trunk is broader than long, and longer than carapace. Distal segment very broad and equal with the breadth of anterior division of trunk. The posterior margin is rounded. Genital segment distinct. Abdomen single segmented. Caudal rami large.

Cephalothorax angular, antennal area separated from rest of body by deep marginal sinuses, lateral margins produced into an angular wing on either side. Posterior body covered with a dorsal plate which is prolonged at the posterior corners of the third thorax segment into lobes, and which is more fused along the median line with the dorsal plate of the fourth segment. Fifth and genital segments and abdomen reduced and concealed. Egg strings coiled and elongate, eggs uniseriate, strongly flattened in the space between the dorsal plate and the third and fourth legs and thus entirely concealed.

The first antenna five segmented. Second antenna with a stout, strongly curved, basal segment and a short, strong with one terminal claw, second segment with two claws. Maxilla simple, 3- segmented, tipped with a small seta. Maxilla has an inner lobe provided with a spine and outer lobe with three spines, one of them being large. First maxilliped with a row of denticles along the inner part of distal segment in addition to the spine. Unguis with blunt teeth along the borders. Basal segment of the second maxilliped is stout with a tubercle at its margin. The distal segment is strongly falcate with rugose margin and has two tubercles.

Figure 6: *Lernanthropus amphitergum*

Basipod of first leg with outer seta and inner spine, exopod with five long teeth and endopod with a pectinate spine. Both rami strongly spiny. Second leg is similar to that of first. Third leg with the rami fused and folded. Fourth leg biramous, rami very long and slender. Exopod is one and half times as long as endopod.

First four pairs of legs biramose; rami of first and second pairs rudimentary with single segment, those of third pair lamellar and fused, projecting at right angles of diagonally from the ventral surface, those of fourth pair lamellar, separate, and extending backward, fifth leg uniramose and lamellar, often lacking.

First and second legs much reduced, with single segmented rami; third leg biramose, rami flattened into laminae which cover the ventral surface and reach back to the posterior margin of the body; fourth leg also flattened into laminae reaching the posterior margin, the tips of the rami ending in long flagella.

Male: carapace semicircular, broad anteriorly to form the antennal lobe. Body is demarcated into carapace and trunk. Cephalothorax a little wider than posterior body. Antennal area projecting as in female. First antenna 7- segmented. Second antennae joined at the base across the midline by a chitinous knob. Maxillae and maxillipeds larger than in female, otherwise similar. First and second legs rudimentary, consisting of a basal process and three protuberances; third pair with a single ramus in form of a long cylindrical flagellum. Fourth leg like those of female, each ramous consisting of a basal lamina and terminal flagellum, exopod with an accessory flagellum. Genital segment and abdomen not covered, visible in dorsal view. Parasitic on marine teleosts.

***Lernanthropus ilishae* (Chin, 1948):**
Only male forms were collected from the gills of *Ariomma indica* and *Gazza achlamys* from Visakhapatnam coast. The male form length, 1.39-1.42 mm. Elongated

and cylindrical body. Head fused with first thorax segment, resulting cephalothorax oblong, carapace margins turned down ventrally (Figure 7). Carapace pyriform, narrow anteriorly to form the antennal lobe. Trunk oblong with distinct anterior part. Abdomen is distinct. The caudal rami longer than the abdomen, caudal rami claviform, tapering posteriorly. Carapace with flat margins, other thoracic and genital segments fused into oblong distinct trunk without dorsal plate. Abdomen single segment, visible in dorsal view. Caudal rami claviform. Basipod of first leg with outer seta and inner spine, expod with five long teeth and endopod with a pectinate spine. Both rami strongly spiny. Second leg is similar to that of first. Third leg is long, steadily narrowing towards the apex, with wavy margin. Fourth leg nearly three times longer than third with wavy margins.

Figure 7: *Lernanthropus ilishae*

First antenna six-segmented, claviform and fused. Second antennae joined at the base across the midline by a chitinous knob with claws and forward anteriorly. Second and third thorax segments are free, but usually fused, and not covered with a dorsal plate, which is prolonged backwards over the genital segment and abdomen. Genital segment large, with convex sides. Posterior body not covered with dorsal plate. Mandible styliform, teethed on inner margin. Maxillae and maxillipeds larger than in female. Maxilla palp-like. First and second maxillipeds prehensile, uncinate.

First four pairs of legs biramose; rami of first and second pairs rudimentary with single segment, those of third and fourth legs fused pair lamellar and fused, but always extending backward; fifth legs uniramose and lamellar, often lacking. First and second legs rudimentary, consisting of a basal process and three protuberances; third pair with a single ramus in form of a long cylindrical flagellum. Each ramous consisting of a basal lamina and terminal flagellum, exopod with an accessory flagellum. Genital segment and abdomen not covered, visible in dorsal view. Parasitic on marine teleosts.

Discussion and Conclusion

Altogether seven copepod species were identified, they are *Caligus kuroshino* (Shiino, 1960), *Bomolochus decapteri* (Yamaguti, 1936), *Bomolochus nothrus* (Wilson, 1913), *Pseudartacolax lateolabracis* (Yamaguti *et al.,* 1959), *Pumiliopes opisthopteri* (Shen, 1957), *Lernanthropus amphitergum* (Pearse, 1951) and *Lernanthropus ilishae* (Chin, 1948).

Caligus kuroshino was erected by shiino (1960)[15]. Umadevi and Shyamsundari (1976)[9] has described from the host *Euthynnus affinis*. Shiino (1960)[15] mentioned the genital segment being broader in the middle and narrower towards the ends. According to Pillai (1967)[16] it has a triangular segment with broad posterior end. The present specimen agrees with Pillai's description. It is clear that plumose setae bear spines at their base on one side. But in the present specimens the last two setae bear two spines on each, the remaining setae without any spiny armature. In the present study specimens, have been collected from *Gazza achlamys* from east coast of India. It is a new host record.

Both *B. selaroides* Pillai from *Selaroides leptolepis* (Cuvier) and *B. decapteri* from *Decapterus maruadsi* were alike in all respects. The present species collected from *Gazza aclamys* is similar to the above two. Pillai mentioned in his remarks that *B. selaroides* closely resembles *B. decapteri*[17] even in details, but in *B. decapteri* the body is more robust and comparatively short and the egg sacs almost oblong. Due to the robust, short nature of Yamaguti's specimen[16] erected *B. selaroides* as a new species but these specific characters do not warrant for the erection of new species. The present species resembles *B. selaroides* as well as *B. decapteri*. So, in the present study *B. selaroides* and *B. decapteri* are synonymised.

Bomolochus nothrus was erected by Wilson, (1913)[18] from *Oncocephalus vespertilio*, Texas coast. The present specimen was similar with *B. achirus*[19] on Trinectes maculates; *B. acutus*[5] on *Dussumieria acuta*; India; *B. concinnus*[18] on Mugil cephalus; Beaufort; *B. gazzae* Shen, (1957) on *Gazza minuta*, China; *B. leptoscari*, (1953) on *Leptoscarus japonicus*, Japan; *B. megaceros* Heller, (1868) on *Stromateus niger*, Bombay; *B. nitidus* Wilson, (1911) on *Mugil cephalus*, Beaufort; *B. nothrus* Wilson, (1913) came to conclusion, this is a new species. In the present study, the specimen has been collected from the host, *Ariomma indica*. It is a new host record.

Pseudartacolax lateolabracis was erected by Yamaguti (1953)[20] from *Lateolabrax japanicus* Inland Sea, Japan. Umadevi and Syamasundari (1976)[9] collected from the Waltair coast. Present specimens somewhat resemble to its shape and morphological characters with *P. cypseluri*[20] collected from *Cypselurus agoo*; Hamazima, Japan. Other species: *P. gibber*[21], *Tylosurus gigateus*; Owase (Japan). *P. hyprohamphi*[22], *hyporhamphus sajori*, *Tylosurus Scapanorhynchus*; Inland Sea, Japan. *P. monody*[23] on *Tetraodon Laevigatus*; Mauritania. *P. saetiger*[24] on *Cypselurus callopterus*. *P. scomberesocis*[25] on scomberesox; Atlantic. In the present study, the specimens have been collected from *Gazza achlamys* from Visakhapatnam coast. It is a new host recorded.

Pumiliopes opisthopteri was erected by Shen, (1957)[26] from *Opisthopteru stardoore*: Haniman I., China. The present specimen is similarly with *B. gazae*. In the present study, the specimens have been collected from the host, *Ariomma indica* from Visakhapatnam coast. It is a new host recorded.

The present species was erected by Pearse, in 1951. He collected it from A*nisotremus virginicus* at Texas coast. The present specimen has the closest resemblance in the general shape of the body and in all the appendages to *L. kroyeri*[27]. He collected males and females from the gills of Labrax lupus off European waters. The *L. amphitergum* and *L. kroyeri* are similar, though they are found on different hosts. There is every possibility of two different genera of hosts getting infected by the same parasite because they belong to a single family. The finding of male and female ones now establishes that it belongs to *L. amphitergum*. So, in the present work both are synonymised. In the present study, the specimens have been collected from the host, *Gazza achlamys* from Visakhapatnam coast. It is a new host recorded.

The species was erected by Chin[28]. He collected it from *Ilishae elongate* at chu-san. The present specimen has the closest later resemblance in the general shape of the body and in all the appendages to *L. opisthopteri*[16]. He collected only females but not males from the gills of *Opisthopterus tardoore* (Cuvier). The *L. opisthopteri* and *L. ilishae* are similar, though they are found on different hosts. There is every possibility of two different genera of hosts getting infected by the same parasite because they belong to a single family. Here this has happened, because of non-availability of male, Pillai came to the conclusion that it is definitely a new species. The finding of male now establishes that it belongs to *L. ilishae*. So, in the present work both are synonymised. Pillai (1964)[16] could not record the male of *L. opisthopteri*, so he most probably described the female and erected it as a new species. In the present study, the specimens have been collected from the hosts, *Ariomma indica*and *Gazza achlamys* from Visakhapatnam coast. It is a new host recorded.

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