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A Study On Trematodes, Nematodes, Acanthocephalan And Copepod Parasites Of Lates Calcalifer In West Godavari And Krishna Districts Of Andhra Pradesh

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Abstract:

The paper deals with identification of trematode, Nematodes, Acanthocephalan and Copepod parasites of Lates calcalifer collected from west Godavari and Krishna districts of Andhra Pradesh during 2009-2011. Totally one digenean, two nematodes, three acanthocephalans and two copepods were collected and identified.

Key words: *Lates calcalifer, Erilepturus hamati , Raphidascaris sp, Protorhadinorhynchus sp, Rhadinorhynchus africanus, Serrasentis, Lernanthropus latis , Caligus*

1.Introduction

The fish provide nutritive diet for the human beings. To get perfect nutrition it is necessary that fishes must be healthy and free from parasitic infection and other diseases. Parasites are important group of pathogen, which occurs at various stages of development in fish. The parasites invade various tissues and organs of fish, including skin, gills, eye, kidney, liver, intestine, spleen, heart and brain. Parasitic infection tends to decrease the growth rate resulting in stunning of fishes**.** Parasites are metabolically dependent on their host mainly for their nutritional requirements (Marcogliese, 2004). Moreover, parasites may also regulate host population dynamics and influence community structure (Vignon and Sasal, 2010; Anu Prasann et al., (2011). Humphrey et al., (2006) investigated some diseases and parasites of farmed barramundi in the northern territoryahnnt. Ruckert et al., (2008) studied parasite fauna of sea bass (Lates calcarifer) under mariculture conditions in Lampung Bay, Indonesia. Kumaran et al., (2010) made observations on infection and immunization trials of Asian sea bass Lates calcarifer against fish pathogen Vibrio anguillarum.

2.Material And Methods

The collected fish, Lates calcarifer obtained from Bhimavaram and kruthivennu ponds in West Godavari and Krishna districts of Andhra Pradesh, have been regularly examined for a period of two years (2009-2011). A total number of 102 fishes were examined during the period out of which only 20 fishes were infected with metazoan parasites. As soon as the fish were collected they were examined immediately. Parasitic helminthes including mainly Digenea, Nematode, Acanthacephalan, and Copepods were collected, the data was recorded. The fish was cut open with a mid ventral incision for search of endoparasites. Stomach, intestine, rectum, liver and gall bladder were taken in separate Petri dishes filled with a saline solution. The gut contents were dissipated and were decanted many times to remove mucosa and observed under microscope. Helminth parasites are usually actively moving in the gut cavity and can be located easily. A few trematods, nematodes and acanthocephalan were collected in the present study. The obtained trematodes and acanthocephalan were fixed in FAA (Farmalin 10%, alcohol 85% and acetic acid 5%) solution. Pressure is applied for proper flattening of the parasites depending on the size and thickness of the parasites. Later these parasites were thoroughly washed and stained in alum caramine. After proper dehydration in graded alcohol (70%, 90%, 95% and 100%) the parasite were cleared Carboxyolol or Cedor

wood oil and then mounted with Canada balsam or D.P.X mountant. Nematode parasite were fixed in warm 70% alcohol and preserved in a mixer of 70% alcohol and glycerin solution. A glycerin mount is prepared for examination of the parasite. Copepod parasites were fixed in 10% formalin. For clearing and identification they were kept in lactic acid for 12 to 24 hours. Mouth parts and appandages were dissected and diagrams were drawn with the aid of camera lucida and the diagrams are drawn with the aid of camera lucida and measurements were given millimeters unless or otherwise mentioned.

3.Description Of Digenea

3.1.Erilepturus Hamati (Yamaguti, 1934) Manter, 1947

- Host: Lates Calcarifer, Location: Intestine,No. of Parasites: 2, Host infected: 2
- DESCRIPTION: Body elongate, stout, fusiform .Oesophagus is short and broad. Caeca is conspicuous and sinuous, extending in to the ecsoma up to its length. Testes two, post acetabular, round, symmetrical and nearly equal in size. Genital pore is at the posterior ventral margin of the pharynx. Ovary, post-testicular, globular, slightly median. Receptaculum seminis well developed, situated close behind the ovary. Uterus much coiled and muscular and metraterm opens in to the hermaphroditic duct. Eggs small and numerous
- DISCUSSION:In the present study Erilepturus hamati were collected from the intestine of Lates calcarifer. Willis et al., (1966) noticed the species of Erilepturus found from Alectis indica, Rastralliger kanagurta, and Muraenesox cinereus. Rodney et al., (1993) reported Erilepturus hamati from Lutjanus carponotatus, Lizard Island. Abdou (2001) discussed surface topography of Erilepturus hamati Manter, 1947 (Digenea, Family: Hemiuridae) by scanning electron microscopy.

4.Description Of Nematode

4.1.Raphidascaris Sp.

- Host: Lates calcarifer, Location: Liver, No. of Parasites: 9, Host infected: 3
- DESCRIPTION: Body small, slender, light brown in colour/tapering towards anterior. Lips without dentigerous ridges and with cuticular expansions particularly developed on sub ventral lips. Oesophagus with an anterior muscular

and a small posterior ventricles from which extends, posterior appendix. Nerve ring at 0.24 distances from the anterior end. Caecum absent. Vulva in the anterior half of the body. Tail conical, 0.09mm long. Body cuticle smooth with fine striations.

- DISCUSSION: Bahram et al., (2000) described rod let cells and other inflammatory cells of Phoxinus phoxinus infected with Raphidascaris acus. Moravec & Nagasawa (2002) redescribed the Japanese species Raphidascaris. Doupé et al., (2003) found that larval anisakid Raphidascaris infections of some tropical fish species from north-west Australia. Li et al., (2011) noticed Raphidascaris (Ichthyascaris) from the intestine and stomach of the marine fish Uroconger lepturus. Yooyen et al., (2011) reported Raphidascaris (Ichthyascaris) from marine catfishes in the Gulf of Thailand.

5.Description Of Acanthocephala

5.1.Protorhadinorhynchus sp.

- Host: *Lates calcarifer,* Location: Intestine, No. of Parasites: 1, Host infected: 1
    - Specimens of *Lates calcarifer* were examined and only male forms were obtained from the intestine of a female host.
- DESCSRIPTION: The body is elongated and almost cylindrical and slightly curved and tapers at its ends. The posterior end is bluntly rounded. At the anterior region of the trunk there are seven circular, rows of spines. Proboscis sheath is long, cylindrical; and double walled. It does not extend to the male genital organ. Brain consists of a ganglionated mass lies near the base of the proboscis sheath. Testis is oval, overlapping one another and situated in the middle third of the body. Cement glands elongate and pyriform and have a common terminal duct dilated at the base of the Saefftingen's pouch. The saeffigne's pouch is very large and voluminous. The bursa copulatrix is fully averted, wide and bell shaped. Genital pore opens terminal end of the posterior part.
- DISCUSSION: The genus *Protorhadinorhynchus* was erected by Petrotschenko in 1956. The following works are worth mentioned Hnath (1969); Parukhin (1970) identified *Protorhadinorhynchus carangis.*

5.2.Rhadinorhynchus africanus Golvan, *et al*., 1963

- Host: *Lates calcarifer*, Location: Intestine, No. of Parasites: 4, Host infected: 3
- DESCRIPTION: The body is elongated, cylindrical and swollen at the region of the proboscis sheath and pointed anteriorly. The proboscis is followed by a short neck. The whole body is covered with spines but in the anterior part of the trunk the spines are thicker and maximum in number. The proboscis sheath is an elongated, cylindrical, double walled muscular sac which hangs from the base of the proboscis. The central nervous system consists of a single ganglion situated at the anterior end of the proboscis sheath. The reproductive system cannot be seen distinctly. The ovary has broken into numerous ovarian balls. The whole pseudocoel is filled with fertilized eggs and ovarian balls. The vagina is muscular, thick walled and opens externally through the vulva. The genital opening is situated sub-terminally on the dorsal side.
- DISCUSSION: Costa *et al.,* (2004) studied prevalence, intensity and abundance of *Rhadinorhynchus pristis* in intestine of *Scomber japonicus*. *Rhadinorhynchus* reported from intestines of marine fishes in Vietnam (Arthur and Te 2006).

5.3.*Serrasentis* Van Cleave, 1923

- Host: *Lates calcarifer*, Location: Intestine, No. of Parasites: 1, Host infected: 1 One pre-adult parasite was collected from the intestine of the fish. This parasite firmly attached to the intestinal wall.
- DESCRIPTION:Body is elongate, cylindrical, thick and creamy white in colour. Proboscis is elongate, club shaped broad in the anterior region, becoming narrow towards the posterior region. Proboscis is followed by a short spineless neck region. Neck is followed by the body proper. Body shows annulations towards left side. The distance between annulations is more in the anterior region, gradually becoming narrower towards the posterior. The size of the spines is also decrease towards the posterior region of the body. Spines are triangular, arrow shaped, strong and covered with cuticular theca. Proboscis sheath single walled, thick, elongate and longer than proboscis measuring 1.23X0.18. Limnisci are as a pair of long filamentous structures hanging from the base of the proboscis.
- DI SCUSSION: George and Nadakal (1978) have been made observations on the intestinal pathology of the marine fish, *Rachycentron canadus* parasitised by the

acanthocephalid worm, Serrasentis nadakali. Fatima and Aly (2005) reported Serracentis manazo from an elasmobranch first Myrmillo manazo of Karachi coast. The Acanthocephalan Serrasentinae and Serrasentis sagittifer is one of most important pathogens parasite, which attach to the digestive system, especially intestine Seyed et al., (2008).

6.DESCRIPTION OF COPEPOD PARASITES

6.1.Lernanthropus Latis Yamaguti, 1963

- Host: *Lates calcarifer,* Location: gills, No. of Parasites: 9, Host infected: 5
- DESCRIPTION: Female: - Cephalothorax longer than broad, roughly rectangular, Antero-lateral lobes rounded, narrower than antennular lobe and not overreaching the latter as long as cephalothorax boardening back warda. Dorsal plate large, anteriorly narrower than anterior division of trunk but suddenly expanding in to a nearly circular lobe. Fourth segment indicated. Fifth segment genital. abdomens short, partially fused with genital segment. Caudal rami longer than abdomen. Basal segment of anntennule swollen rest of the appendage slender. Antenna long and strongly built, basal segment with a large tooth, basal part of distal segment broad,distal part rather stout and grooved. Inner lobe of maxillule with one and outer with three spines. Basal segment of maxillped stout, distal very slender with two spines. Exopode of first leg stout outer claw very stout, second and fourth small, and all the claws rather blunt. Endopod narrows, with small epical spine. Inner spine on basipod barbed. Rami of second leg sub equal in length, exopod with small teeth, endopod with a long spine. Both legs prominently spinulose third legs uniramous, longitudinally folded and fused to the posterio-lateral lobes of the anterior division of the trunk. Fourh leg biramous with distainct peduncular portion. Exopod much shorter than endopod. Fifth leg is very small.
- DISCUSSION:The gills are a favorite site for the attachment of several parasitic copepods.Ho and Kim (2004) reported parasitic copepods on fishes of the Gulf of Thailand, *Lernanthropus corniger*, *L. latis*, and *L. nemipteri*. *Lernanthropus* can often cause pathological effects like desquamation, erosion, and necrosis of the host's gill filaments (Manera and Dezfuli 2003) and, in cases of heavy infection,

may lead to asphyxiation, anemia, and secondary bacterial infections (Tokşen *et al.,*2006; Ho *et al.,* 2008) reported 12 species of *Lernanthropus* from Taiwan. Ho *et al.,* (2011) reported six species of the lernanthropidae from marine fishes of Taiwan.

6.2.*Caligus* Muller (1785)

- Host: *Lates calcarifer,* Location: gills, No. of Parasites: 1, Host infected: 1
- DESCRIPTION Two parasites of pre adult stage of *Caligus* were obtained from the gills of the fish. Lunules well developed. Posterior median lobe projecting than the later lobes. Posterior sinuses narrow. caudal rami small, oblong, inner surface hairy with four normal plumose setae.
- First Antenna: Two segmented, basal segment short and broad with short plumose setae and distal segment long and slender with many long and short naked apical setae.
- Maxilla: two segmented, basal long and narrow, distal long and slender with a pair of unequal claws, upper long and flanged and lower short and pectinated.
- Second Antenna: Two segmented, first segment larger with an external process and second segment curved to a claw.
- Maxilliped: Two segmented, basal segment stout with a small basal process and distal segment long and curved to strong claw with a proximal spine.
- Sternal fork: basal triangual and limbs slender slightly longr than the base diverging and slightly converging terminally.
- Leg-1: basipod one small plumose seta on the inner proximal region. Basal segment of expod long and broad and with one small naked spine on the outer distal corner endopod like small truberance. Distal segment small and with three claws and long spine like setae.
- Leg-2: exopod first two claws long and serrated, first claw bent reaching the base of the second segment and second claw is a straight and present at the inner distal corner. First and second segment are with one long plumose seta each on the inner distal corner. Basal segment of endopod with bunch of sharp spines on the outer margin. Second segment is with two long plumose setae on the inner margin. Distal segment with six long plumose setae terminally.

- Leg-3: basal claw large, strong and curved. All the segments of exopod are with hairy outer margins. Basal segments are with one naked spin on the outer distal corner, and one long plumose setae on the inner distal corner. Second segment is with three small naked spines and four long plumose setae.
- Leg 4: three segmented, basal segment broad and long with one plumose seta on outer distal corner. Outer two segments are with five sub- similar serrated claws.

7.Discussion

Caligus multispinosus was reported to cause gill congestion, other damage, and mucous proliferation (Lin et al., 1994). Ho et al., (2004) reported on the Caligus menace to fish cultured in Japan. Likewise, in the Philippines, caligids have been found from marine cultured and wild fish (Ho et al., 2004, Venmathi Maran 2007, Venmathi et al., (2009). Caligus species were found in the highest number and infected nine marine fish species (Purivirojkul and Areechon, 2008). Stewart et al., (2011) noticed Caligus species.

Figure 1: Micro photograph of Erilepturus hamati

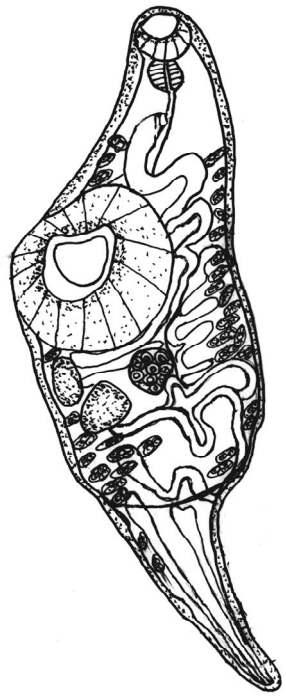

Figure 2: Line diagram of Erilepturus hamati

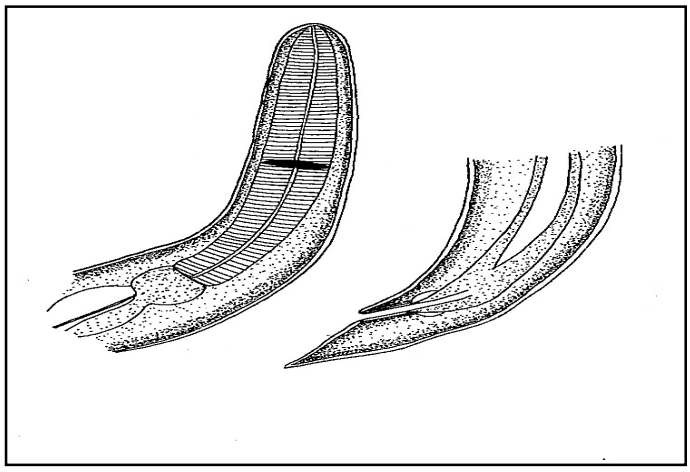

Figure 3: Line diagram of Raphidascaries sp

Figure 4: Micro photograph of Protorhadinorhynchus sp

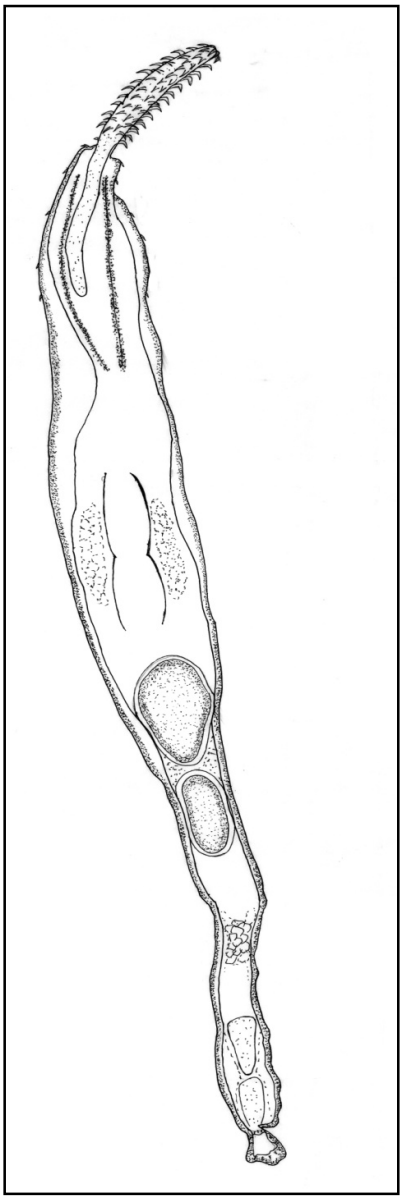

Figure 5: Line diagram of Protorhadinorhynchus sp

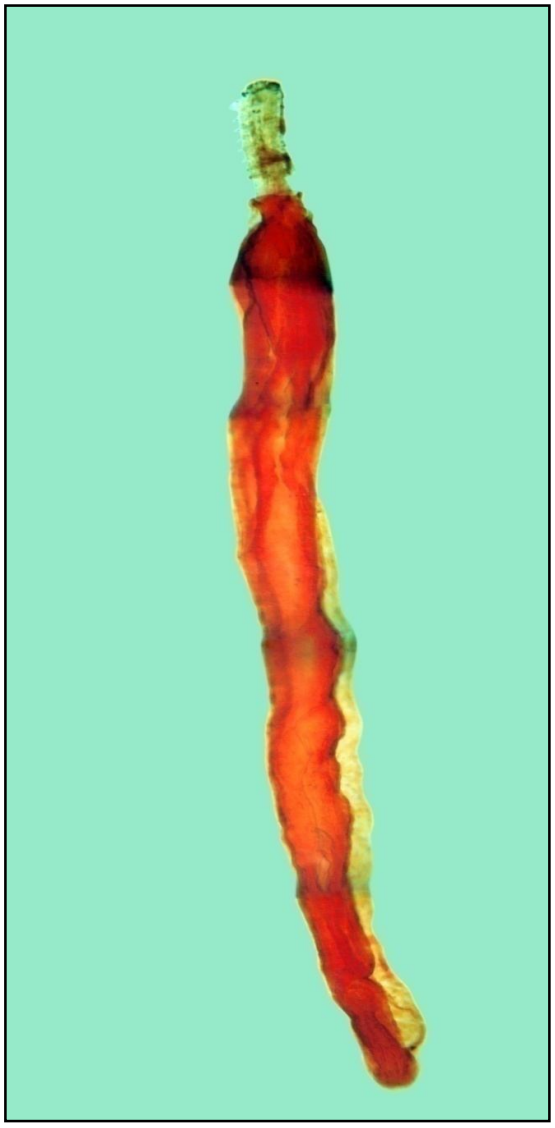

Figure 6: Micro photograph of Rhadinorhynchus africanus

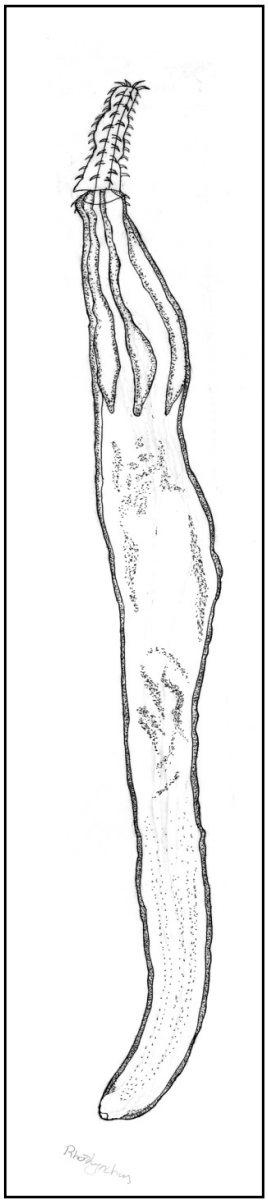

Figure 7: Line diagram of Rhadinorhynchus africanus

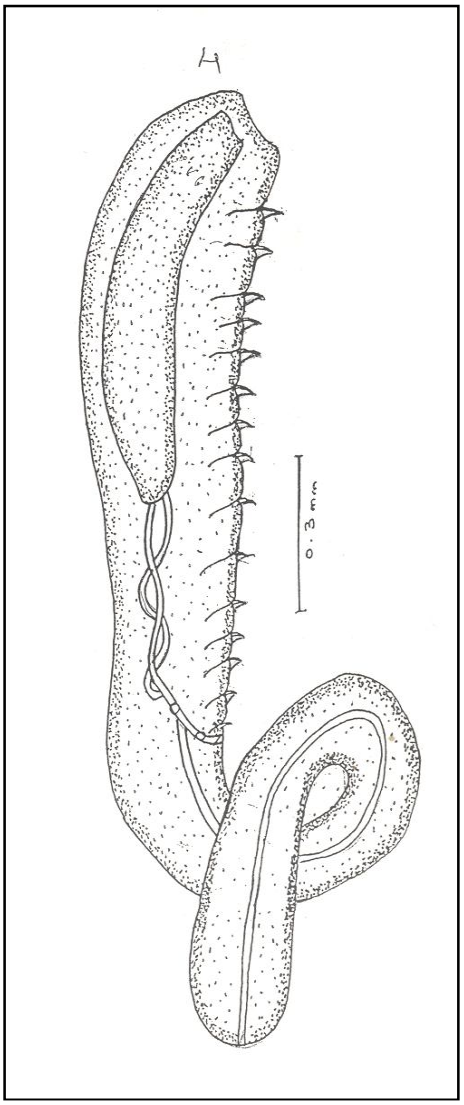

Figure 8: Line diagram of Serrasentis

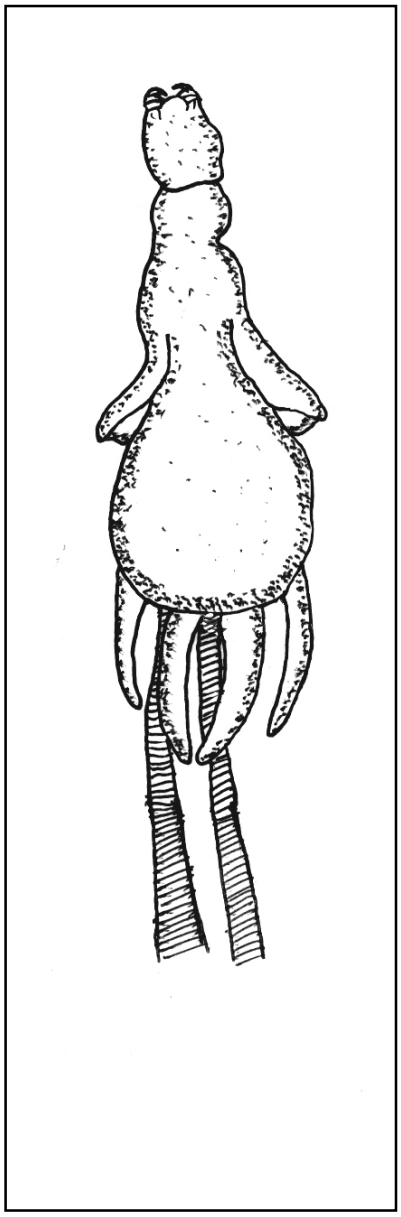

Figure 9: Line diagram of Lernanthropus latis

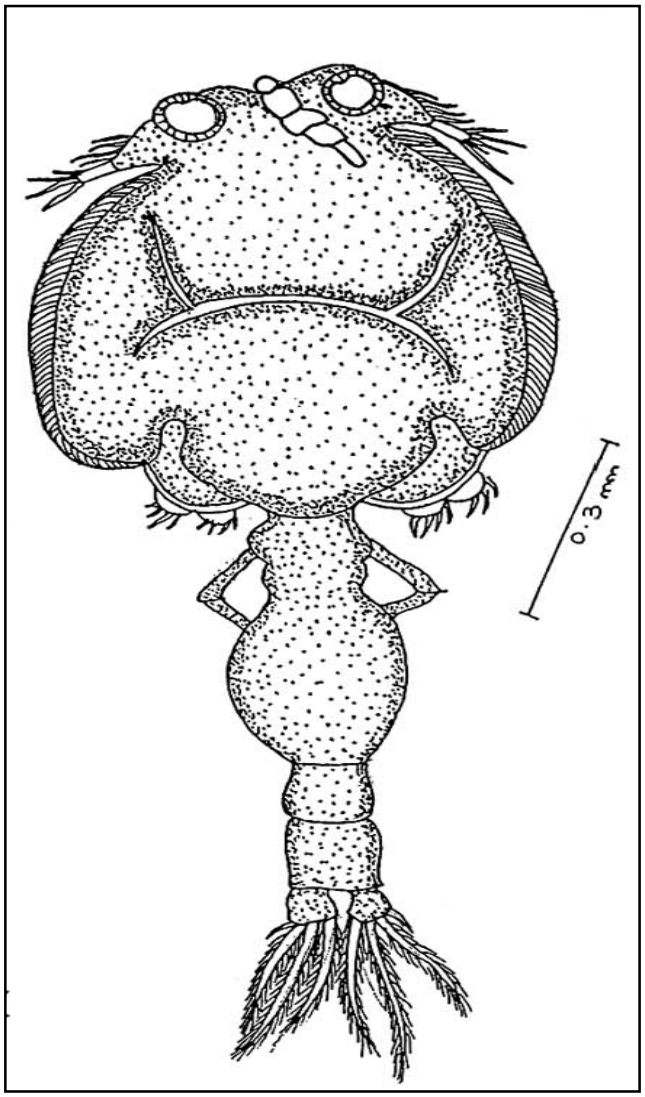

Figure 10: Line diagram of Caligus

8.Reference

1. Abdou Nel, S. 2001. Surface topography of Erilepturus hamati Manter, 1947 (Digenea, Family: Hemiuridae) by scanning electron microscopy. J Egypt Soc Parasitol., 31(1):199-212.
2. Anu Prasann Vankara, Mani, G and Vijayalakshmi., C. 2011. Metazoan parasite infracommunities of the freshwater eel, Mastacembelus armatus lacepede, 1800 from river Godavari, India. International Journal of Zoological research 7 (1): 19-33.
3. Arthur J.R., Te B.Q. 2006. Check list of parasites of fishes of Vietnam. FAO Fisheries Technical Paper, 369/2, 123.
4. Bahram Sayyaf Dezfuli, Edi Simoni, Remigio Rossi, Maurizio Manera. 2000. Rodlet cells and other inflammatory cells of Phoxinus phoxinus infected with Raphidascaris acus (Nematoda) Dis Aquat Org., 43: 61–69.
5. Costa G., Pontes T., Rego A.A. 2004. Prevalence, intensity and abundance of Rhadinorhynchus pristis (Acanthocephala, Rhadinorhynchidae) in chub mackerel, Scomber japonicus (Pisces, Scombridae) from Madeira Island. Acta Parasitologica., 49(1): 41-44.
6. Doupé, R.G., Lymbery,A.J., Wong, S and Hobbs, R.P. 2003. Larval anisakid infections of some tropical fish species from north-west Australia. Journal of Helminthology., 77 : 363-365.
7. Fatima Mujib Bilqees and Aly Khan. 2005. Two New Helminth Parasites from Pakistan, with Redescription of the Acanthocephalan Centrorhynchus fasciatum (Westrumb, 1821) Pakistan J. Zool., 37(4): 257-263.
8. Garcia,. 1988.Dose-dependent spawning response of mature female sea bass, Lates calcarifer (Bloch), to pelleted luteinizing hormone-releasing hormone analogue (LHRHa)
9. George, P. V. and Nadakal, A. M. 1978. Observations on the intestinal pathology of the marine fish, Rachycentron canadus (Gunther) infected with the Acanthocephalid worm, Serrasentis nadakali. Hydrobiologia., 78 (1): 59-62.
10. Golvan Y.J., 1969. Systematique des acanthocephales (Acanthocephala, Rudolphi 1801). L.ordre des Palaeacanthocephala Meyer 1931. La superfamille des Echinorhynchoidea (Cobbold 1876) Golvan et Houin, 1963. Mémoires du Museum National d'Histoire Naturelle, Série A, Zoologie, 57, 1-373.

11. Hnath J.G. 1969. Transfer of an adult acanthocephalan from one fish host ot another. Trans.Am.Fish.Soc. 98: 332.
12. Ho J.S, IH Kim. 2004. Lernanthropid copepods (Siphonostomatoida) parasitic on fishes of the Gulf of Thailand. Syst. Parasitol. 58: 17-21.
13. Ho J.S, WC Liu, CL Lin. 2008. Six species of lernanthropid copepods (Siphonostomatoida) parasitic on marine fishes of Taiwan. J. Fish. Soc. Taiwan 35: 251-280.
14. Ho, J.S. and C.-L. Lin., 2004. Caligus planktonis Pilla (Copepoda: Siphonostomatoida) Parasitic on the largescale mullet of Taiwan, Crustaceana, 76(10): 1201-1209.（SCI.
15. Humphrey, J.D. 2006. Some diseases and parasites of farmed Barramundi in the northern territoryahnnt - AHNNT - Issue 41. 6.
16. Kumaran, S., Deivasigamani, B., Alagappan K.M. and Sakthive, M. 2010. Infection and immunization trials of Asian seabass (Lates calcarifer) against fish pathogen Vibrio anguillarum Journal of Environmental Biology. 31, 539-541.
17. Lakshmi, B. B. 2000a. Procamallanus kakinadensis n. sp. (Nematoda: Camallanidae) from the intestine of a marine fish Nibea soldado from Kakinada,A.P.,India. Uttar Pradesh J Zool 20:137-142.
18. Li L, Liu YY, Liu BC, Zhang LP. 2011. Morphological and molecular evidence for a new species of the genus Raphidascaris (Nematoda: Anisakidae) from marine fishes from the South China Sea. Parasitol Res.
19. Lin CL, J.S Ho, SN Chen. 1994. Two species of Caligus (Copepoda: Caligidae) parasitic on black sea bream (Acanthopagrus schlegeli) cultured in Taiwan. Fish Pathol. 29: 253-264.
20. Manera M, B.S Dezfuli. 2003. Lernanthropus kroyeri infections in farmed sea bass Dicentrachus labrax: pathological features. Dis. Aquat. Org. 57: 177-180.
21. Manter, H. W., 1947. The digenetic trematodes of marine fishes of Tortugas, Florida. The American Midland Naturalist 38: 257-416.
22. Marcogliese, D.J., 2004. Parasites: Small players with crucial roles in the ecological theatre. Ecohealth, 1: 151-164.
23. Moravec, F. & Nagasawa, K. (2002) Redescription of Raphidascaris gigi Fujita, 1928 (Nematoda: Anisakidae), a parasite of freshwater fishes in Japan. Systematic Parasitology, 52, 193–198.

24. Muller, O.F., 1785. Entomostraca, seu Insecta testacea quae in aquis Daniae et Norvegiae reperit, descripsit, et iconibus illustravit. Leipzig and Copenhagen.
25. Parukhin, A. M.1970. Acamhocepahala of fish in southern seas. Uchenye Zapiski gorkov. gos. pedagog. Inst. 114: 17-24.
26. Petrotschenko, V.I., 1956. Acanthocephala of domestic and wild animals. Vol. 1. Moscow, 435 p (In Russian).
27. Rodney A. Bray, Thomas H. Cribb and Stephen C. Barker. 1993. Hemiuridae (Digenea) from marine fishes of the Great Barrier Reef, Queensland, Australia Systematic Parasitology., 25(1): 37-62.
28. Ruckert S., Palm H. W and Klimpel, S. 2008. Parasite fauna of seabass (Lates calcarifer) under mariculture conditions in Lampung Bay, Indonesia J. Appl. Ichthyol. 24 : 321–327.
29. Seyed Saeid Ghaem Maghami , Majid Khanmohammadi and Mahnaz Kerdeghari , 2008. Serrasentis Sagittifer (Acanthocephala: Rhadinorhynchidae) from the Japanese Thread Fin Bream, Nemipterus japonicus, in Bushehr Waters of Persian Gulf. Journal of Animal and Veterinary Advances, 7: 1430-1433.
30. Stewart C. Johnson, Jim W. Treasurer, Sandra Bravo, Kazuya Nagasawa, and Zbigniew Kabata. 2011. A Review of the Impact of Parasitic Copepods on Marine Aquaculture Zoological Studies., 43(2): 229-243.
31. Tokşen E, H Çağirgan, TT Tanrikul, H Saygi. 2006. The effect of emamectin benzoate in the control of Lernanthropus kroyeri (van Beneden, 1851) (Lernanthropidae) investigation in cultured sea bass, Dicengtrarchus labrax (Linnaeus, 1758). Turk. J. Vet. Anim. Sci. 30: 405-409.
32. Van Cleave, H. J. 1923. Telosentis, a new genus of Acan-thocephala from southern Europe. J. Parasit. 9: 174-175.
33. Venmathi Maran B. A., Leong Tak Seng, Susumu Ohtsuka, and Kazuya Nagasawa. 2009. Records of Caligus (Crustacea: Copepoda: Caligidae) from Marine Fish Cultured in Floating Cages in Malaysia with a Redescription of the Male of Caligus longipedis Bassett-Smith, 1898 Zoological Studies 48(6): 797-807.
34. Venmathi Maran BA. 2007. Studies on caligiform copepods (Crustacea: Copepoda: Siphonostomatoida) parasitic on fishes in the West Pacific, with a special reference to the taxonomic, microbiological and toxicological aspects. PhD dissertation, Hiroshima University, Japan.

35. Vignon, M & Sasal, P. 2010. The use of geometric morphometrics in understanding shape variability of sclerotized haptoral structures of monogeneans (Platyhelminthes) with insights into biogeographic variability. Parasitology International, vol. 59, pp. 183- 191.
36. Watchariya Purivirojkul and Nontawith Areechon. 2008. A Survey of Parasitic Copepods in Marine Fishes from the Gulf of Thailand, Chon Buri Province Kasetsart J. Nat. Sci. 42: 40 – 48.
37. Willis A. Reid, William H. Coil, Robert E. Kuntz. 1966. Hemiurid Trematodes of Formosan Marine Fishes. I. Subfamilies Dinurinae and Stomachicolinae The Journal of Parasitology, 52 (1): 39-45.
38. Yamaguti, S 1934. Studies on the Helminth Fauna of Japan. Part 4. Cestodes of Fishes. Jap. J. Zool., 6: 1-112.
39. Yamaguti, S., 1963. Systema helmithum. Vol, V. Acanthocephala Inerscience Publishers, New York, London, 423 p.
40. Yooyen, T., Moravec, F. Wongsawad C. 2011. Raphidascaris (Ichthyascaris) arii sp. n. (Nematoda: Anisakidae), a new ascaridoid nematode from marine catfishes in the Gulf of Thailand. Helminthologia, 48, 4: 262 – 267.