INT. J. BIOL. BIOTECH., 9 (1-2: 93-97, 2012.

ECTOPARASITE, *NORILECA INDICA* (MILNE EDWARDS, 1840) (CRUSTACEAN, ISOPODA, CYMOTHOIDAE) FROM THE MOUTH CAVITY AND BRANCHIAL CHAMBER OF *RASTRELLIGER KANAGURTA* (CUV, 1817) FROM KARACHI COAST, PAKISTAN

Faheem Ahmed [1] and Muhammed Atiqullah Khan[2]

[1]*Govt.Jamia Millia College Malir City, Karachi, Pakistan.*
[2]*Department of Zoology, University of Karachi, Karachi-75270, Pakistan.*

ABTRACT

The Study was carried out to analyze infestation of isopod parasites in the commercially important fish *Rastrelliger kanagurta*. It was observed that these parasites create serious damage to branchial chamber or buccal cavity and gills. Two hundred ninety four fishes out of Eight hundred sixty two were infected by the parasites. One hundred thirty five male *Rastrelliger kanagurta* out of Four hundred thirty eight and One hundred fifty nine female *Rastrelliger kanagurta* out of Four hundred twenty four . One hundred thirty nine Male isopods and One hundred fifty five Female isopods were identified . The prevalence of infestation varied substantially during April 2010 to March 2011. In male *Rastrelliger kanagurta* the prevalence was maximum in May 2010 (51.85%) and minimum in Sept 2010 (12.50%). In female *Rastrelliger kanagurta* the prevalence was maximum in May 2010 (57.14%) and minimum in June 2010 (20%).

Key Words. *Rastrelliger kanagurta, Norileca indica,* parasitic isopods, Infestation. Prevalence.

INTRODUCTION

Norileca indica is a crustacean isopod which is found in Marine, Fresh water and Terrestrial habitats and also known as pill bug, wood lice or snow bug. The members of family cymothoidae are parasitic isopods on mostly Marine fishes and found on body surface, under operculum attached with gills filaments and also occur in mouth cavity (Ghani, 2003; Ghani and Shaghufta, 1995).

Norileca *indica* lives in gill chambers and directly branchial blood feeder parasites and has a single host. Pathological effects of isopod parasites disturb the physiological functions of host. Association between fish and isopods is important biologically, ecologically and economically but the some isopod specialists and fish parasitologists ignore their importance and biology (Ravichandran *et al*., 2009).

Marine fish Parasitology is a rapidly developing field of Aquatic Science. This is due to growing importance of marine aquaculture, concerns on population effects on fish health and generally increasing interest in marine environmental biology (Moller and Anders, 1986).

Bal and Joshi (1959) described some new isopod parasites on fishes. Pillai (1964) reported the parasitic isopods of family cymothoidae from South Indian fishes .Williams & Williams (1981) described nine new species of isopods of family cymothoidae on the reef fishes from West-Indian Ocean .All Scombrides are highly appreciated fish for their high quality flesh , while *Rastrelliger kanagurta* (Indian mackerel) are marketed fresh, frozen, smoked and salted.

*Rastrelliger kanagurta c*ommercially caught on large scale and used as sea-food and also exported to other countries as a commercial valuable fish. *Rastrelliger kanagurta* is responsible for balance in ecosystem because it is commercially important fish and plays an important ecological role .Therefore present study attempt was made to study *Rastrelliger kanagurta* infestation.

MATERIAL AND METHODS

The *Rastrelliger kanagurta* (Cuv, 1817) were collected from Karachi Fish Harbour West Wharf road Karachi. The specimens were fortnightly collected during April 2010 to March 2011.

The specimens were brought in lab and examined carefully for infesting parasitic isopods, the gill chamber or branchial chamber. Large size parasites were easily recognized from the bulging of branchial chamber. Orientation of parasites on the host, its site of attachment and the number of parasites in each location was recorded.

The fishes were washed with water and parasites removed by forceps from the branchial chamber and found in ventral position and attached on gill filaments after removing isopods washed and preserved in 10% formalin for further study.

Table. 1. Infestation of Isopods in female *R.kanagurta.*

Months	Total Number of fish examined	Number of Female *R.kanagurta*	Prevalence %	Male Isopods	Prevalence %	Female Isopods	Prevalence %
Apr-2010	35	14	40	6	42.85	8	57.14
May-10	35	20	57.14	8	40	12	60
Jun-10	30	6	20	3	50	3	50
Jul-10	20	6	30	2	33.33	4	66.66
Aug-10	35	8	22.85	2	25	6	75
Sep-10	38	9	23.68	3	33.33	6	66.66
Oct-10	31	10	32.25	3	30	7	70
Nov-10	55	20	36.36	9	45	11	55
Dec-10	31	16	51.61	6	37.5	10	62.5
Jan-11	39	15	38.46	6	40	9	60
Feb-11	25	13	52	6	46.15	7	53.84
Mar-11	50	22	44	11	50	11	50
TOTAL	424	159	37.5	65	40.88	94	59.11

Table 2. Infestation of Isopods in male *R.kanagurta*.

Months	Total Number of fish examined	Number of Male R.kanagurta	Prevalence %	Male Isopods	Prevalence %	Female Isopods	Prevalence %
APRL -2010	29	10	34.48	6	60	4	40
May-10	27	14	51.85	7	50	7	50
Jun-10	31	14	45.16	8	57.14	6	42.85
Jul-10	20	7	35	4	57.14	3	42.85
Aug-10	34	6	17.64	5	100	1	20
Sep-10	40	5	12.5	4	80	1	20
Oct-10	39	8	20.51	7	87.5	1	12.5
Nov-10	54	13	24.07	8	61.53	5	38.46
Dec-10	30	13	43.33	6	46.15	7	53.84
Jan-11	39	15	38.46	7	46.66	8	53.33
Feb-11	45	14	31.11	6	42.85	8	57.14
Mar-11	50	16	32	6	37.5	10	62.5
TOTAL	438	135	30.82	74	54.81	61	45.18

RESULTS AND DISCUSSION

Two hundred ninety four fishes were infected out of Eight hundred sixty two. [Males T.L 195 mm to 270mm and Females 175mm to 275mm]. 34.10% were infected with male or female isopods. One hundred thirty five Male *Rastrelliger kanagurta* were infected with Seventy four male isopods and Sixty one female isopods out of total Four hundred thirty eight males. One hundred fifty nine Female *Rastrelliger kanagurta* were infected with Sixty five male isopods and Ninety four female isopods out of total Four hundred twenty four females. Between 30 to 40mm

Table 3. Size wise Infestation of Isopods in male *R. kanagurta.*

Months	T.L	Isopod Male	Isopods Female	Length Range mm	Breadth Range mm	Infested	Male fishes (N)	Average $\bar{X}$	S.DEV
Apr-10	210-230	6	4	M-10-20 F-20-30	0.5-0.8 10-15	10	29	225.172	8.514
May-10	195-230	7	7	M-10-15 F-20-25	0.5 0.8-10	14	27	212.592	7.937
Jun-10	220-255	8	6	M-10-15 F-20-30	0.5 10-15	14	31	236.451	9.092
Jul-10	210-240	4	3	M-10 F-10-25	0.5 0.8-10	7	20	228	5.916
Aug-10	190-240	5	1	M-10 F-25	0.5 10	6	34	226.617	9.958
Sep-10	235-260	4	1	M-10-20 F-0.5-10	0.5 10	5	40	243.250	11.695
Oct-10	200-260	7	1	M-10-15 F-20	0.5 10	8	39	234.487	11.401
Nov-10	200-215	8	5	M-10-20 F-15-25	0.5 10	13	54	208.333	15.732
Dec-10	180-205	6	7	M-15-20 F-30--35	0.5 10-15	13	30	188.166	8.803
Jan-11	195-205	7	8	M-10-20 F-20	0.5 10	15	39	215.526	11.401
Feb-11	225-270	6	8	M-10-25 F-30--40	0.5 10-20	14	45	237.307	11.842
Mar-11	215-250	6	10	M-10-25 F-20-35	0.5-10 10-15	16	50	226.571	10.246
TOTAL		74	61			135	438		

length of female isopods were studies and counting Three hundred and ninety to Four hundred and ten nymphs/larvae in brood pouch. The Prevalence was (30.82%) in male and (37.5%) in female. In male *Rastrelliger kanagurta* the prevalence of male isopod was maximum (100%) in Aug 2010 and minimum (37.5%) in Mar 2011 and prevalence of female isopod was maximum (62.5%) in Mar 2011 and minimum (12.5%) in Oct 2010. In female *Rastrelliger kanagurta* the prevalence of male isopod was maximum (50%) in June 2010 and March 2011 and minimum (25%) in Aug 2010 and prevalence of female isopod was maximum (75%) in Aug 2010 and minimum (50%) in June 2010 and March 2011.

Description of male isopod: Body is slender, straight and consist of segments (pereonites). Cephalon with large eyes antenna is segmented. Mandible consists three segmented palp. All segments are equal in size. All segments and legs (pereopods) without spines. All pereopods are segmented , hooked and curved helpful for attachment. Telson is triangular in shape. Colour of male isopods White or Yellowish in fresh condition.

Size range Length 10-to-20mm Width 0.5-to-10mm

Description of female isopod: Body is long, widest in middle, twisted and segmented. Cephalon with large eyes. First pereonite is projecting to the level of eyes. Antenna are segmented and two in number. One of them is eight and second is nine segmented with setae. Mandible consists three segmented palp. All pereopods are without spines, segmented and

Table 4. Size wise infestation of Isopods in female *R.kanagurta*.

Months	T.L	Isopod Male	Isopod Female	Length Range mm	Breadth Range mm	Infested	Female Fishes(N)	Average ¯X	S.Dev
Apr-10	220-240	6	8	M-10-20 F-20-30	0.5 10-15	14	35	5.185	10.246
May-10	210-235	8	12	M-10-20 F-20-25	0.5 0.5-10	20	35	213.710	9.660
Jun-10	220-240	3	3	M-10 F-20	0.5 10	6	30	234.160	11.940
Jul-10	225-240	2	4	M-10 F-15-20	0.5 0.5-10	6	20	445.710	6.916
Aug-10	230-260	2	6	M-10 F-20-25	0.5 10	8	35	235	10.246
Sep-10	220-260	3	6	M-10 F-20-25	0.5 10	9	38	472.820	11.113
Oct-10	200-260	3	7	M-10 F-15-25	0.5 10	10	31	462.812	9.092
Nov-10	200-215	9	11	M-10-20 F-20-25	0.5-10 10	20	55	208	16.020
Dec-10	175-205	6	10	M-15 F-20-35	0.5 0.5-15	16	31	187.419	9.092
Jan-11	200-235	6	9	M-10-15 F-20-35	0.5 0.5-15	15	39	213.947	11.380
Feb-11	225-275	6	7	M-10-25 F-15-35	0.5-10 10-20	13	25	230.600	7.359
Mar-11	210-235	11	11	M-10-20 F-30-35	0.5-10 15	22	50	226.857	10.246
TOTAL		65	94			159	424		

hooked for attachment. Telson is triangular in some mostly broad and oval in shape. Colour of female Reddish, Greenish and Yellowish in fresh condition. Brood pouch made by five pairs of Oostegites which are arise from anterior side of sternites 1 to 4 and 6. Oostegites 1 are small and not overlapping. 2 and 4 are increase in size and overlap. 6 are large and overlapping to each other and made marsupium / Brood pouch for young ones.

Size range: Length= 20-to- 40mm Width= 10-to-20mm

Parasitic crustacean isopods damages the buccal cavity and branchial chamber through attachment to gills and due to blood feeding creates serious infections and problems in host either directly and indirectly effect the physiological functions of host and affect the efficiency of respiration and normal growth of *Rastrelliger kanagurta* such as age, size, sexual maturity, feeding, breeding and life cycle. The prevalence of infestation higher (37.50%) in females and (30.82%) in males. Its means that the parasites was found more in females than in males.

Norileca indica was previously reported as *Livoneca (or Lironeca) indica* Milne-Edwards,1840 or *Livoneca ornata* Heller, 1868 but it has been currently assigned to the present genus which was erected by Bruce (1990).The species is known to widely occur in the Indo-West Pacific region (see Trilles, 1976; Bruce, 1990 for the old literature), including Sumatra (type locality), Indonesia, New Guinea, Australia (Avdeev, 1978; Bruce, 1990, 1991) the Philippine (Yamauchi et al., 2005), China (Yu and Li, 2003), and Mozambique (Rokicki, 1982).

Five species of marine teleosts so far have been reported as hosts for Norileca indica;

1- (bigeye scad) *Selar crumenophthalmus* (Bloch)

2- (blackfin scad *Aleps melanoptera* (Swainson)(as Atule malam)
3- (smallmouth scad *Aleps apercna* (Grant)(Perciformes:carangidae)
4- (Indian mackerel *Rastrelliger kanagurta* (Cuvier)(Perciformes:Scombridae)
5- Unidentified herring *Herklotsichthys* sp. (as *Herklotichthyes* sp.)(clupeiformes ; clupeidae) (Avdeev, 1978; Rokicki, 1982; Bruce, 1990, 1991; Yu and Li, 2003).

Parasitic isopods are also present on skin of hosts between pectoral and pelvic fins and attached due to hook like legs and due to sucking of blood (oxygen and nutrients) hosts becomes weak and wounds of skin help to pathogens and different bacterial growth and caused lesions and diseases. (Ghani, 2003).

Acknowledgement

Authors are thankful to the Chairperson, Department of Zoology, and also thankful to Dean, Faculty of Science, University of Karachi, for providing funding, facilities and encouragement. I wish to express my appreciation to Mrs. Abida Parveen and Mrs. Shagufta Riaz for their faithful help and co-operation at various stages during compilation our manuscript.

REFERENCES

Avdeev, V. V. (1978). Notes on the distribution of marine Cymothoidae (Isopoda, Crustacea) in the Australian-New Zealand region. *Folia parasit*., 25: 281—283.

Bal, D.V. and U.N. Joshi (1959). Some new isopod parasites on fishes. Journal *of the Bombay Natural History Society*, 56: 563—569.

Bruce, N.L. (1990). The genera *Catoessa, Elthusa, Enispa, Ichthyoxenus*, *Idusa, Livoneca* and *Norileca* n.gn. , (Isopoda, Cymothoidae), crustacean parasites of marine fishes, with descriptions of Eastern Australian species. *Records of the Australian Museum* 42(3): 247—300.

Bruce, N.L. (1991). Two new species of *Rocinela* from the tropical Australian coast (Isopoda. Cymothoidae). Crustacean parasites of marine fishes. Beagle, 8(1): 159—168.

Ghani, N. (2003). Isopod parasites of marine fishes of Pakistan. *Proc. Pakistan Congr. Zool*., vol. 23 pp 217-221.

Ghani, N. and B. Shagufta (1995). Two new records of parasitic isopods from Karachi coast. *Proc. Of Parasitology* 20: 19-30. 1995.

Heller, C. (1868). Zur naheron Kenntniss der in den sussen Gewassen des sudlichen Europa vorkommenden Meerescrustaceen. Zeitschrifft fur wissensch. *Zool.,* 19: 156-162.

Milne-Edwards, H. (1840). Histoire naturelle des Crustaces comprenent I'anatomie Ia physiologie et la classification de ces animaux. III, pp. 1-605 Munro . Ian. S. R . 1955. *The marine and fresh water fishes of Ceylon.* Pub. Dep. Ext. Affairs Canberra: 1-351, pls 1-56.

Moller, H. and K. Anders, (1986). Diseases and parasites of Marine fish. Kiel: Moller, pp: 365.

Nagasawa, K. and N. Petchsupa (2009). *Norileca indica* (Isopoda, Cymothoidae) Parasitic on Bigeye Scad *Selar crumenophthalmus* in Thailand. *Biogeography,* 11. 131—133. Aug. 20, 2009.

Pillai, N.K. (1964). Parasitic isopods of family Cymothoidae from South Indian fishes. *Parasitology* 54: 211—223.

Ravichandran, S., G. Rameshkumar, B. Mahesh babu and K. Kumaravel (2009). Infestation of *Rastrelliger kanagurta*, with Cymothoid Isopod, *Joryma brachysoma* in the Colachal Environment of Suothwest Coast of India. *World Journal Fish and Marine Sciences* 1 (2): 80—84.

Rokicki, J. (1982). *Lironeca indica* Edwards 1840 (Crustacea, Isopoda) from *Selar crumenophthalmus* (Bloch). Wiad. *Parazyt*., 28: 205—206, 2 pls.

Trilles, J. P. (1976). Les Cymothoidae (Isopoda, Flabelifera) des collections du Muse'um National d'Hisstorie Naturelle de Paris. IV. Les Lironecinae Schioedte et Meinert, 1884. *Bull. Mus. Natn.Hist. Paris* (3, se'r. 390, Zool.), (272): 773—800.

Williams, E. H.Jr. and L.B. Williams (1981). Nine new species of *Anilocra (*Crustacea: Isopoda: Cymothoidae) external parasites of West Indian coral reef fishes. *Proceeding of the Biological Society of Washington*, 94: 1005—1047.

Yamauchi, T., S. Ohtsuka and K. Nagasawa (2005). Ectoparasitic isopod, *Norileca indica* (Crustacea, Isopoda, Cymothoidae), obtain from the stomach of *Coryphaena hippurus* (Perciformes, Coryphaenidae) in the Philippines. *Biogeography*, 7: 25—27.

Yu, H. and X Li (2003). Study on the Cymothoidae from Chinese waters. *Studia Mar. Sin.,* 45: 223—238(in Chinese with English abstract).

(*Accepted for publication June, 2012*)