Journal of
Environmental and Applied Bioresearch
Published online June 02, 2015 (http://www.scienceresearchlibrary.com)

ISSN: 2319 8745
Vol. 03, No. 02, pp. 56- 60

Research Article **Open Access**

PARASITES OF THE BRACHYURAN CRAB CARDISOMA ARMATUM FROM BAKANA IN RIVERS STATE, NIGERIA

Ugbomeh*, A.P and Bajor, P.

[1]Department of Animal and Environmental Biology, Rivers State University of Science and Technology, Port Harcourt Nigeria

Received: May 16, 2015 / Accepted : May 25, 2015

Abstract

A study was carried out to investigate the parasites of the land crab *Cardisoma armatum* collected from Bakana in Rivers State of Nigeria and the possible health implications to crab consumers. Live crab specimens were collected between June and July 2014 and transported to the laboratory. The hepatopancreas, gills and cavity of the carapace of each crab were examined for parasites. The overall prevalence of parasites was 100 %. Parasites recovered were rotifers, nematodes and copepods distributed on the gills and in the hepatopancreas. Prevalence in relation to the type of parasite was 100 % for rotifers, 35 % for nematodes and 55 % for copepods. Intensity of parasite in relation to carapace width was 100 % for rotifers in all classes, nematodes were more in the 7 - 7.9 cm range with intensity of 50 % compared to other size classes, and copepods were found in all classes with intensity of 50 - 62.5 %. Organisms isolated were not parasites as there was no tissue damage. It was concluded that *C. armatum* from the Bakana Creek is not infested with parasites of zoonotic importance and could be recommended for human consumption.

Keywords: Land crab,Rotifers, copepods and nematodes

Introduction and Literature Review

Cardisoma armatum the African rainbow crab, is a decapod crustacean. It is a rich source of protein and essential minerals for the local communities in Nigeria. They are land crabs found living along coastal areas because the females must return to the estuary to release their eggs. Some information is available on the parasites of crabs mostly the blue crab *Callinectes amnicola* (Ekanem *et al*. 2008) but there is no report on the parasites of *C. armatum* or of crabs from the New Calabar River and its tributaries. Crabs have been known to have parasites that caused histhpathological alterations to their organs and tissues (Vogan *et al*, 2001). Jeffrey and Overstreet (2003) worked on the blue crab *Callinectes* and observed that the protozoa, helminths and other disease causing agents either caused little or no pathological alteration or considerable alteration and mortalities in the infected crab hosts. Ekanem *et al* (2013) also isolated the ciliate *Trichodina* and some nematodes from the blue crab *C. amnicola* in the Cross River estuary with a total parasite prevalence of 12.38 %. Parasites and diseases of crabs depend on prevailing environmental conditions and therefore will vary from place to place (Anderson, 1992)

The aim of this study is to investigate the helminth parasites associated with the land crab (*C. armatum*) in Port Harcourt, to

*Corresponding authors: ugbomeh.adaobi@ust.edu.ng

determine if there are infective larval stages that can infect man and to ascertain its suitability for human consumption.

Study Area

Crabs used for this study were collected from Iboroma's compound in Bakana, Degema Local Government Area of Rivers state. Bakana is a coastal town in Degema local government area, Rivers State of Nigeria found on 4º44'19" N and 6º57'51.7" E on the shores of the New Calabar River.

Sampling collection

Sampling duration for this study was in two months. Sampling was done once in a month. Samples (20 crabs) were randomly collected for this study. Only mature adult crabs were collected. Samples were tied to a stick and transported to the laboratory for examination and identification.

Examination and identification of parasites.

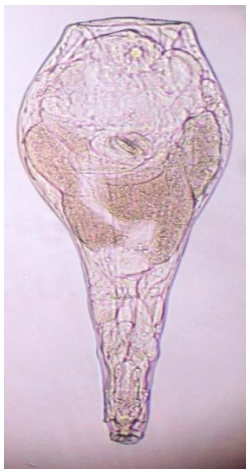
In the laboratory, the crab was dissected by raising the abdomen and pulling it out together with the carapace to reveal the internal organs. The hepatopancreas, gills and cavity of the carapace of each crab were examined for parasites. Observed parasites were counted, picked out using a micropipettee, flattened under a coverslip and fixed in 5 % formol - saline. The specimens were washed free of the fixative and stained with dilute solution of acetocarmine over night. They were examined under light microscopes for identification and photomicrographs using a digital camera of 20 megapixiel attached to the microscope. Each sample was examined independently for parasites. The parasites recovered were later fixed and preserved in 70% alcohol.

Results

The parasites found in *C. armatum* were rotifers, nematodes and copepods.

These rotifers occurred either singly or in colonies. Large colonies (of up to 50 and 60 in Plate 1) of these rotifers were seen attached to the gills. The least colony seen was a colony of 3.

Developmental stages of the rotifer was also seen as in Plate 2 with a lone egg. The females carrying the egg (one egg per female) lay dormant while movement was observed in the developing egg. Some appeared dead, some were seen decomposing and the eggs were attached to the remnant of female. The developmental stages were observed in the July samples only and not before. This could be assumed as the begining of the reproductive season of these rotifers.



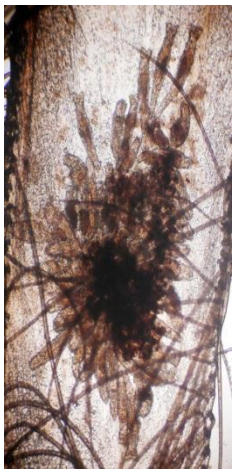
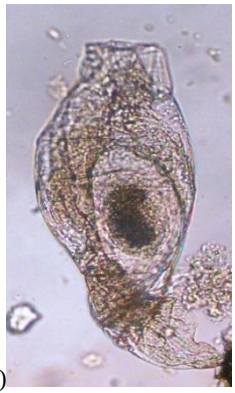


Plate 1. The Bdelloid rotifer. A single individual and a



(a)

(b)

(c)

(d)

Plate 2: Eggs at different stages of development (a) Egg within the female (b) Egg attached to remnant of female and (c and d). egg at advanced stage with internal movement.

The nematode seen was a rhabditiform nematode as it had a bulb before the bulb of the pharynx (the rhabditiform oesophagus). Adult males and females were isolated from the crabs.

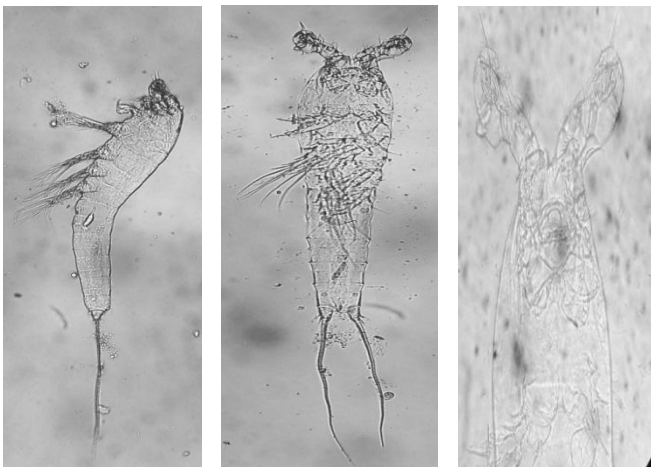
The nematodes were mostly found in the hepatopancreas. Only one specimen was found in the gills of one crab. Some females had eggs.

a) Male b) Females

Plate 3: Showing male and female nematode

The copepod seen was identified as a harpacticoid copepod (Plate 4) because of the presence of a very short pair of first antennae and the characteristic harpacticoid shape. They were seen darting around in the gill and hepatopancreas specimens.

.



a) Lateral view b) Ventral view c) head region showing mouthpart

Plate 4: A harpacticoid copepod.

The prevalence and mean intensity of parasites found in this study are: rotifers had a prevalence rate of 100% with mean intensity of 40.9 per crab, nematodes had a prevalence rate of 35% with mean intensity of 4.0 nematodes per crab, and copepods had a prevalence rate of 55% with mean intensity of 13.1 per crab (Table 1)

Table 2 shows the intensity of parasite in relation to carapace width. In all size classes, the rotifers showed a 100% infection as they were found in all crabs examined. Nematodes were more in the 7 - 7.9 cm range with an intensity of 50% compared to other size classes. Copepods were found in all classes with intensity of 50 - 62.5%. All three parasites were found in each size class.

Table 1: Prevalence and mean intensity of parasites in *C. armatum*.

Parasite	Total no of crabs	Number of individuals parasitized	Prevalence rate %	Total no of parasite	Mean intensity of infection
Rotifers	20	20	100	817	40.9
Nematodes	20	7	35	28	4.0
Copepods	20	11	55	144	13.1

Table 2: Intensity of parasites in relation to carapace width

Carapace width(cm)	No and % of crab infection		
	Rotifers	Nematodes	Copepod
5-5.9	10(100)	10(30)	10(60)
6-6.9	8(100)	8(37.5)	8(62.5)
7-7.9	2(100)	2(50)	2(50)

Discussion

The land crab *Cardisoma armatum* (Emmanuel, 2009) is a semi terrestrial crab that looks for moist surface to refresh its gills. It lives in holes but goes back to the estuary to spawn. It also feeds from the substrate. The parasites found in this study were rotifers, nematodes and copepods. Rotifers are microscopic aquatic animals of the phylum Rotifera. They can be found in many freshwater environments and in moist soil, where they inhabit the thin films of water that are formed around the soil particles. The habitat of rotifers may include still water environments, such as lake bottoms, as well as flowing water environments, such as rivers or streams (Rupert *et al*, 2006). Rotifers are also commonly found on mosses, lichens and even on freshwater crustaceans and aquatic insect larvae. (Orstan,1999). Rotifers are filter feeders and are primarily omnivorous, their diet consists most commonly of dead or decomposing organic materials, as well as unicellular algae and some are primary consumers. The rotifers found attached to the gills appeared as commensals living on the gills and feeding on

their own because they had no modification for a parasitic mode of life as they looked just like the free living rotifers.

Most rotifers are solitary, but the sessile ones are usually colonial and the colonies are aggregations of solitary individuals that arise parthenogenetically. The rotifer observed in this study had one egg per female of which the female dies to release the egg. As the egg developed, it was still attached to the remains of the female. These rotifers looked like family Bdelloidea because it has a double germovitellarium as seen in Plate 1. The Bdelloids are suspension feeders so it is possible that they are just around the gills because of the water current that brings in minute food particles from which they feed. Epizoic rotifers live in obligate relationship with other metazoans and maybe parasitic. According to Ruppert *et al* (2006), the marine Bdelloid *Zelinkiella* attaches to the gills of the polychaete worm *Amphitrite* and the tube feet of some brittle stars and sea cucumbers and the freshwater Bdelloid *Embata aparasitica,* lives on the gills and pereopods of amphipods and the gills of crayfish. This study appears to be the first record of Bdelloid rotifers from the land crab *C. armatum.*

In this study, we set out looking for larval helminths in their infective stages that could be harmful to man. The nematode isolated however, appeared to be an adult form in their reproductive stage. This is because berried females and mature males were isolated. It therefore appears that *C. armatum* is the definitive host of this nematode as it allows it to complete its sexual reproductive cycle. This nematode is yet to be identified. However, it looks like a Rhabditiform nematode because of the double bulb of the pharynx. It has a ring-like brain around anterior digestive tract (unique to nematode structure). Nematodes have also been isolated in other crabs for example, in the blue crab *C. amnicola* (Ekanem, *et al,* 2013) with an intensity which poses no health risk to crab consumers. Also an unidentified larval nematode has been isolated from fresh water crabs collected from different parts of Ceylon in Colombo (Fernando, 1960). This unidentified nematode larva reported by Fernando (1960) is now known to belong to the family Spiruridae.

The copepods in the *C. armatum* were found in the gills and hepatopancreas and they were harpacticoid copepods. It may be assumed that these copepods are commensals. Further identification is however needed. *Chiniosphaera indica* is a copepod parasitic on the crab *Neptunus sp* (Gnanamuthu, 1954). In the king crab *Paralithodes camtschaticus* from the Barents Sea, Dvoretsky and Dvoretsky, (2013) observed nine species of copepodsthat were classified as either pelagic copepod (*Calanus finmarchicus*, *Microcalanus pusillus*),harpacticoid copepod (*Micrastella norvigeca),* benthopelagic harpacticoid copepod (*Ectinosoma normani, Tisbe furcate, Harpacticus uniremis,* and *Dactylopusia vulgaris*) and the *cyclopoid copepod (Cyclopina gracilis),* or as benthic species (*Zaus abbreviatus).* They found the benthopelagic harpacticoid copepods *Tisbe, Harpacticus,* and *Dactylopusia* to be the most abundant, with high prevalence and mean intensities of infection, and classified them as commensals. Colonization of crabs in general maybe beneficial for the copepod species and the rotifers because it helps them in food acquisition, offers some form of protection from predators and provides a means of moving from one place to another. The benefit of this association to the crab is not obvious and Dvoretsky and Dvoretsky, (2013) have suggested that it may have negative effects on the crab host due to a decrease in respiratory function. Similar effects were established for barnacles attached to the gills of the blue crab *Callinectes pallidus* (Gannon and Wheatly, 1992). Other studies found the copepod *Tisbe sp* on larger red king crabs in the Varanger-fjord area of Northern Norway (Haugen *et al,* 1998*).* There are no data for comparisons on copepod occurences, infestation indices, on the crab *C. armatum* in Nigeria.

In conclusion, parasites isolated from the *C. armatum* were normal interstitial fauna of aquatic animals. These were rotifer (Phylum; Rotifera), copepods (Phylum; Crustacea) and nematodes (Phylum;Nematoda). The rotifers showed a prevalence rate of 100 %, nematodes 35 % and copepods 55 %. The infective larval stage of the nematode which was the primary interest in this study was not found. This suggests that this crab is the definitive host of this nematode as adult male and females were observed. No infective larval stage was observed implies that *C. armatum* from the Bakana Creek was not infested with parasites of zoonotic importance and are therefore suitable for consumption.

Acknowledgment:

We want to thank Prof M.S.O Aisien for his assistance in this study and for the Rivers State University of Science and Technology, Nkpolu Port Harcourt for enabling the project..

References

Anderson RC. 1992. Nematode parasites of verterbrates, their developm ent and transmission. *C.A.B International*, Willingford, 9 9pp

Childers RK, Reno PW and Olson RE. 1996. Prevalence and geographi c range of *Nadelspora canceri* (Microspora) in Dungenes s crab *Cancer magister*. *Cross Rivers Web of Science*, 24, 135–142.

Dvoretsky AG and Dvoretsky VG. 2013. Copepods associated with the red king crab *Paralithodes camtschaticus* (Tilesius, 1815) in Barents Sea. *Zoological studies*, **52,** 17.

Ekanem AP, Eyo VO, Imaobong EE and Bassey BO. 2013. Parasites of Blue Crab (*Callinectes amnicola*) in the Cross River Estu ary, Nigeria. *International Journal of Fisheries and Aqua tic Studies*, **1**(1), 18-21.

Emmanuel BE. 2009. Assessment of crab trap selectivity and efficiency in a tropical riparian swamp. African Journal of Biotechn ology 8(18): 4680 – 4684. DOI 10:5897/AJB09.469.

Fernando CH. 1960. The Ceylonese fresh water crabs (Potamidae). *Ceyl on Journal of Biological Sciences*, **3,** 191-222.

Gnanamuthu CP. 1954. *Choniosphaer indica*, a copepod parasitic on the crab *Neptunus sp*. *Parasitology*, **44,** 371-378.

Haugen E, Bristow GA and Jansen PA. (1998) Parasites of the red king crab, *Paralithodes camtschaticus* from the Varanger – fjo rd area, North Norway. In: Anonymous (Ed) Proceedings and Abstracts of the fourth International Crustacean Cong ress. Balkema, Amsterdam, 192.

Jeffrey SD and Overstreet RM. 2003. "The Blue Crab: Diseases, Parasit es and Other Symbionts" (2003). Faculty Publications fro m the Harold W. Manter Laboratory of Parasitology, 426.

Ruppert EE, Fox RS and Barnes RD. (2006*) Invertebrate Zoology. A fu nctional evolutional approach*, 7th Edition, Ed. Nancy El gin.

Vogan CL, Coasta-Ramos C, and Rowley AF. (2001) A historical study of shell disease syndrome in the edible crab *Cancer pagu rus*. *Diseases of Aquatic Organisms*, **47**, 209-217.