Parasites and bacteria isolated from ctenophore invaders, Mnemiopsis leidyi and Beroe ovata

Saeedi, A.A.¹; Pourgholam,R.¹; Shohreh, P.²*; Mehdizadeh Mood, S.³; Moghimi, M.²; Nasrollahzadeh, H.¹; Zahedi, A.¹; Safari, R.¹; Habibi, F.¹

> Received: April 2012 Accepted: August 2012

- 1-Department of Aquatic Health and Diseases, Caspian Sea Ecological Research Institute, Sari, Iran
- 2-Department of Aquatic Animal Health. Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
- 3-Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
- * Corresponding author's email: poulin shohreh@ut.ac.ir

Keyword: Parasites, Bacteria, Beroe ovata, Mnemiopsis leidyi

Mnemiopsis leidyi (Comb Jelly) is an exotic species which has not been reported from the Caspian Sea till 1999, but it was observed and reported from the southern coasts of Caspian Sea in 1999 (Esmaili Sari, 1999). Invasion of the Mnemiopsis leidyi to the Caspian Sea pelagic ecosystem has been one of the main difficulties in the past decade (Parafkandeh Haghighi and Kaymaram, 2011). Mnemiopsis leidyi has been brought from the Black Sea to the Caspian Sea by ballast water of ships and it has settled in the Caspian Sea through southern time. There is a little information regarding the microbial flora in comb jelly (Estes et al., 1997) but a large number of comb jelly carry natural flora and pathogens located in the coastal waters such as Aeromonas and Vibrio. However, it might have been entered into the Caspian Sea many years ago, but it has recently caused execessive reduction in kilka fish stocks because it is considered as a food competitors for them. The comb jelly may also carry some new

microrganisms like parasites and microbial flora to the Caspian Sea. This study was carried out to investigate the parasites and bacterial flora of B. ovata and M. leidyi as probable dangers for the Caspian Sea ecosystem.

12(3) 733-736

During one year investigation (2003-2004), sea water specimens and M. leidyi were obtained from the southern Caspian Sea. In order to detect the parasite, all of the specimens were collected randomly by the plankton net (mesh size 90- 100 µm). A total of 2160 specimens of M. leidyi from the Caspian Sea and 47 specimens of B. ovata from the Marmara and Black Sea were investigated. Parasite specimens were sedimented by centrifuge (1000-1500 rpm) and then were invesigated by light microscope. Trichodina species was identified using silver nitrate impregnation. For Microbial flora 36 specimens of M. leidyi and 10 specimens of B. ovata were studied. Specimens were first homogenized in sterile normal saline and, then, were inoculated on tryptic soya agar at 30°C for 72 h. The morphological, physiological and biochemical characteristics of the grown bacteria from the second passages on tryptic soya agar were studied using standard bacteriological examinations.

No parasites were isolated from *M. leidyi* in the Caspian Sea.However, 73% and 64% of *B. ovata* from Marmara and

Black Seas (Table 1) were parasitized with Trichodina ctenophorii, respectively. Significant differences were found between infestation rates (%) in the different salinities (P<0.02; $X^2=9.309$)(Table 2). The intensity of infestation increased with the rise of salinity. In lower salinity (12.6- 14.9 ppt) the intensity of Infestation was reduced.

Table 1: Percentage and intensity of infection with T. ctenophorii in M. leidyi and Beroe ovata

Place of	Ctenophore species	Number of	Infestation rate (%)	Intensity of
Sampling		specimens		Infestation
South Caspian Sea	M. leidyi	2160	0	0
Marmara Sea	B. ovata	22	73	420-2100

Table 2: infestation rate and intensity of T. ctenephorii in Beroe ovata in different salinities of black Sea

Salinity (ppt)	No. of specimens	No. of specimens	Infestation rate (%)	Intensity of infestation
12.6	5	2	40.0%	130
14.9	6	4	66.7%	250
19	6	4	66.7%	140-500
21.6	8	6	75.0%	260-1050

14 bacterial isolates including gram negative and gram positive bacteria were recognized (shown in Table 3). *Micrococcus* sp., *Aeromonas* sp. and *Bacillus coagulans* were isolated from both ctenophora. Some other bacteria such

as Agromobacterium sp., Chromobacterium sp., Shewanella sp., Vibrio harveyi and Bacillus linens were only isolated from B. ovata. The most common pathogenic isolated bacteria were Micrococcus sp. and Vibrio sp.

Table 3: Isolated bacteria from M.leidyi and Beroe ovata in this study

Ctenophora	Isolated bacteria			
B. ovata	Agromobacterium tumefaciens ,Aeromonas sp. , Choromobacterium			
	violacceom, Bacillus linens, Shewanella sp. Micrococcus sp. , Bacillus coagulans, Vibrio harveyi			
	depth of Body Micrococcus sp., Staphilococcus sp.,			
M.leidyi	Vibrio metschinokovii,Burkholderia mallei, Aeromonas s			
	surfce of Body Bacilus circulans, B. sphrericoccus, B. coagulans,			
	Micrococcus sp. , M. kristinae , Vibrio metschinokovii			
	,Enterobacteriaceae, Vibrio sp.,			
	Streptobacillus sp., Cytophaga sp.			

Ctenophora are a host for several parasites such as Trematodes (Stunkard, 1980), amphipoda (Harbison et al., 1977), and unicellulars (Crowell, 1976). The most variety of unicellular and multicellular parasites have been reported in M. mccradyi (Martorelli, 2001; Moss et al., 2001). It seems that there are many differences between the comb jellies of Black Sea and the Caspian Sea from ecological point of view, especially salinity of the two regions . When the comb jelly from the Black Sea with the salinity of 24 ppt enters into the Caspian Sea via Volga Canal by ships ballast water, it passes several salinity changes that caused high changes in osmotic pressure. In this case most of the parasites particularly unicellular parasites are destroyed. In fact the comb jelly was devoid of any parasite. On the other hand, comb jelly invaded the Caspian Sea some years ago (Esmaili Sari, 1999), so it could be a new host for the Caspian Sea parasitic fauna if they adapt themselves to the physiological and anatomical condition of comb jelly tissues. Nowadays, the final salinity in the Caspian Sea is estimated less than 14.9 ppt resulting in high reduction in Trichodina population while in salinity of 12.6 ppt they are going to be destroyed. It means that if even the B. ovata adapts itself to the Caspian Sea water its parasitic fauna due to the high reduction of salinity would be eliminated.So it is considered as a good biological control agents for M. leidyi which finally would lead to reduction in m. leidvi stocks. The most common pathogenic bacteria which were isolated including Micrococcus sp. and Vibrio sp. Many bacteria are common in B. ovata and

M. leidyi, except for Chromobacterium sp., Agromobacterium sp., Shewanella sp. and Bucillus linens. Five genus of gram negative bacilli and one genus of gram positive coccus plus a gram positive bacillus have been isolated from B. ovata. In a comparison between microbial flora of B. ovata and M. leiydi, V. harveyi, B. Agromobacterium sp., linens. Chromobacterium sp. and Shewanella sp. were not isolated in M. leiydi. But Aeromonas sp., Micrococcus sp. and Bacillus coagolance were observed in both of them. Of course Agrobacterium and Chromobacterium were recently reported in the Caspian Sea but none of them were known to be pathogens. All the isolated bacteria are presently called as natural flora of sea water (Austin, 1989). Bacterial flora usually can be easily transferred from a place to another by ballast water of ships, ships body and aquatic migratory birds. In this case each liter of ballast water can trasfer about 240000 bacteria. In a fiveyear study from 1995 to 1999 on water, sediments in the Black Sea, the following pathogenic viruses were recognized: Coxsackievirus **B**1 and B2, human Poliovirus type 2, Hepatitis A virus (HAV) and Rota & Reo and Adeno virus (Stepanova, 2001). If the ballast water is not changed, these groups of virus can be transferred by ships ballast water. Hence the transfer of such microrganisms from the Black Sea to the Caspian Sea, should be prevented. Since Beroe ovata is considered as a biological control agent, before transferring B. ovata from the Black Sea to the Caspian Sea using antibiotics and anti-parasitic baths are required. Virological assessment on B.

ovata should confidently be done for transferring the *B. ovata*.

References

- **Austin, B., 1989.** Diagnosis and control of diseases in fish farms. *Endeavour*, 13(1), 20-24.
- Crowell, S., 1976. An *Edwardsiid* larva parasitic in *Mnemiopsis* in G.O Mackie, ed. Coelenterate ecology and behavior.NewYork. Plenum Press. pp. 247-250.
- Esmaili Sari, A., Khodabandeh, S., Abtahi, B., Sifabadi, J. and Arshad, H., 1999. First report on occurrence of a comb Jelly in the Caspian Sea. Environ. Sci. Tech. J., 3: 63-69.
- Estes, A. M., Reyonlds, B. S. and Moss, A. G., 1997. *Trichodina ctenophorii*, a novel symbiont of ctenophores of the northern coast of the Gulf of Mexico. *Journal of Eukaryotic Microbiology*, 44(5),420-426.
- Harbison, G. R., Biggs, D. C. and Madin,
 L. P., 1977. The associations of

 Amphipoda hyperiidea with
 gelatinous zooplankton II.

 Associations with Cnidaria,

- Ctenophora, and Radiolaria. *Deep-Sea Research*, 2, 465-488.
- **Martorelli, S. R., 2001.** Digenea parasites of jellyfish and ctenophores of the southern Atlantic. *Hydrobiologia*, 451, 305-310.
- Moss, A. G., Estes, A. M., Muellnor, L. A. and Morgan, D. D., 2001. Protistan epibionts of the ctenophore *Mnemiopsis mccradyi* mayer. *Hydrobiologia*, 451, 295-304.
- Parafkandeh Haghighi, F. and Kaymaram, F., 2011. Significant changes in pelagic fish stocks of Clupeonella spp. in the south Caspian Sea. Iranian Journal of Fisheries Sciences, 11(3), 559-569.
- **Stepanova, O. A., 2001.** Marine bacteria and viruses in the water and bottom sediments of Sevastopol bays. *Russian Journal of Ecology*, 32(1), 56-57.
- Stunkard, H. W., 1980. The morphology, life cycle, and taxonomic relations of *Lepocreadium* areolatum (Trematoda: Digenea). The *Biological Bulletin*, 158, 154-163.