

Research note

Detection of *Hartmannella sp*, a free-living amoeba from Sungai Setiu, Terengganu

Nakisah Mat Amin, Nurul Najmiah Mustaffa and Norlieyana Md Arshad
Department of Biological Sciences, Faculty of Sciences and Technology,
Kolej Universiti Sains dan Teknologi Malaysia [KUSTEM], Terengganu, Malaysia

Abstract *Hartmannella sp* is one of the free-living amoebae that have the ability to infect animal tissues because it has been found in human's nasal mucosa, dog's bronchial and turkey's intestine. Treatment for diseases inflicted by free-living amoebae is difficult because most of them infect and damage the host's tissues, so preventive measures are better to take rather than to cure the diseases. In this study, water taken from several stations namely Kampung Padang, Kampung Besut, Ibu Bekalan Setiu, Kampung Tasik, Kampung Guntung, Kampung Nyatoh, Kampung Penarik and Kampung Mangkok) along Sungai Setiu, Terengganu was examined for the presence of *Hartmannella sp*. The results of this study indicated that only Ibu Bekalan Setiu station was found positive to have the amoeba. Detail results on the water quality and nutrient contents measured in relation to the distribution of the amoeba at Ibu Bekalan Setiu station are presented and discussed.

Hartmannella sp is one of the free-living amoebae that have the ability to invade animal tissues because it has been found in human's nasal mucosa, dog's bronchial and turkey's intestine (Visvesvara and Stehr-Green, 1990). *In vitro* study on its pathogenicity, the amoeba has shown to be able to inflict damages as done by *Acanthamoeba* to human's cornea (Nakisah, 1995). Treatment for diseases inflicted by free-living amoebae is difficult because most of them damage the host's tissues. Preventive measures, such as targeting at its growth requirements and distribution in the natural environment, are better than to cure

the diseases. In this study the nutritional requirements and distribution of *Hartmannella sp* in Sungai Setiu, Terengganu was investigated.

Water samples were taken at several stations namely Kampung Padang, Kampung Besut, Ibu Bekalan Setiu, Kampung Tasik, Kampung Guntung, Kampung Nyatoh, Kampung Penarik and Kampung Mangkok along Sungai Setiu, Terengganu (Figure 1) to examine for the presence of *Hartmannella sp*. Water physico-chemical parameters such as pH, Dissolved Oxygen and salinity were measured *in situ* whereas Biochemical Oxygen Demand, Ammonia Nitrogen, and nutrient contents (Total Nitrate, Total Nitrite, Total Nitrogen, Orthophosphate, and Chlorophyll- a) were analysed in the laboratory following standard protocols. The amoeba was isolated from the water by membrane filtration technique and its identification was done following Page's descriptions (1988).



Figure 1: Sampling locations along Sungai Setiu, Terengganu. Red arrow indicates Ibu Bekalan Setiu station where *Hartmannella sp* was found

Unlike *Acanthamoeba* which is ubiquitous in nature and was found in all stations in this study, *Hartmannella* was only found at one station (that is at Ibu Bekalan Setiu) along Sungai Setiu (Table 1). Detailed data on water quality and nutrient contents taken from four different locations at this station are shown in Table 2.

Table 1: Detection of *Hartmannella sp* and *Acanthamoeba sp* along Sungai Setiu, Terengganu

Sampling Locations along Sungai Setiu	* The presence of	
	<i>Hartmannella</i>	<i>Acanthamoeba</i>
Kampung Padang	-	+
Kampung Besut	-	+
Ibu Bekalan Setiu	+	+
Kampung Tasik	-	+
Kampung Guntung	-	+
Kampung Nyatoh	-	+
Kampung Penarik	-	+
Kampung Mangkok	-	+

* The detection of amoeba in water was reported qualitatively either + present or - absent

Table 2: Summary of the water physico-chemical parameters and nutrient contents measured at Ibu Bekalan Setiu station, Terengganu

Water parameters	Location 1	Locations 2-4
Temperature (°C)	24.23	24.22-24.27
pH	5.60	5.56-5.77
Salinity (ppt)	0	0
DO (mg/L)	7.39	7.46-7.90
BOD (mg/L)	0.2	0.1-0.2
AN (mg/L)	0.02	0.24-0.25
Total Nitrate (mg/L)	0.31	0.22-0.27
Total Nitrite (mg/L)	0.02	0.74-0.91
Total Nitrogen (mg/L)	3.39	3.39-3.96
Orthophosphate (mg/L)	0.11	0.11-0.13
Chlorophyll-a (mg/L)	1.02	0.96-1.07

The data for water quality and nutrient contents at the four sampling locations at Ibu Bekalan Setiu station observed in this study are similar except for data on Total Nitrate, Total Nitrite and Ammonia Nitrogen (Table 2). The values for these three water parameters were observed to be higher (for Total Nitrate) and lower (for both Total Nitrite and Ammonia Nitrogen) at Location 1, the only location where the amoeba was present, compared with other locations (sampling locations 2-4) at Ibu Bekalan Setiu station.

Results observed in this study indicate that *Hartmannella sp* is not commonly found in the aquatic ecosystem as *Acanthamoeba*. The later amoeba which has been associated to inflict diseases such as keratitis in man can tolerate to a wide range of water quality since it was isolated from all sampling stations at Sungai Setiu. *Hartmannella* on the other hand, only presents at Ibu Bekalan Setiu station (Table 1). The quality of water especially for three

parameters such as Total Nitrate, Total Nitrite and Ammonia Nitrogen seems to be crucial to support growth of this amoeba in the aquatic environment as observed in this study.

These interesting findings require detailed study to be carried out which will include more sampling areas to further verify the environmental requirements for this amoeba. *Hartmannella vermiformis* has been isolated in a contact lens case (Nakisah, 2000) and from other clinical samples. As has been proven in a study conducted by Nakisah (1995), this amoeba had potential to destroy human's cornea *in vitro* and this amoeba could also has potential to cause keratitis as *Acanthamoeba*. Information on its existence, growth requirements and distribution in our environment will help us to take preventive measures to protect diseases which can be inflicted by this amoeba.

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REFERENCES

1. Nakisah, M. A. (1995). *Hartmannella vermiformis*, A possible agents for causing keratitis in man. In Pascasidang Simposium Bioperubatan Kebangsaan Pertama (Eds. Kaswandi *et al.*, 1997). FSKB. UKM. Kuala Lumpur. ISBN 983-9152-37-8. pp 109-116.
2. Nakisah Mat Amin. (2000). Isolation and identification of an amoeba from a contact lense case. *Science International(Lahore)*, **12**: 137-141.
3. Page, F.C. (1988). A new key to freshwater and soil gymnamoebidae, *Freshwater Biological Association, Ambleside, United Kingdom*. 121 pp.
4. Visvesvara, G.S. & J.K. Green Sehrn. (1990). Epidemiology of free-living amoeba infection. *Journal of Protozoology*, **37**: 25S-33S.