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# The First Report of Micronephthys Sphaerocirrata: Nephtyidae in Sub-Tidal Areas of Chabahar Bay

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**ABSTRACT: This study was conducted to identify *Micronephthys sphaerocirrata* species in sub-tidal areas of Chabahar Bay during the time period from June 2013 to February 2014. The study area is located in south-east of Iran Oman - Sistan and Baluchistan coast. The sampling was performed from Shahid Beheshti, Hafte Tir and Konarak ports. The samples were taken seasonally from each port three times from the depths of 2-10 meters by Van-Veen grab (250 $cm^2$) for identification and one liter of sediment was taken to determine the grain size of the sediment habitat *M. sphaerocirrata*. The samples were sent to the laboratory and the identifications were performed based on the necessary resources and references. Also the environmental factors such as pH, Salinity, temperature in the sample were determined. The results of this study indicated that *M. sphaerocirrata* species had the highest frequency during autumn.**

**Keywords:** Chabahar Bay, Sub- tidal area, *Micronephthys sphaerocirrata*

## INTRODUCTION

One of the main topics of the ecology of the sea is the study of the species in sediments or benthos. The Macro benthos forms a majority of species in the bed that have a larger biomass compared to other benthos (meio-fauna and micro-fauna). Nephtyidae are among the invertebrates living in the sediments that can be found in almost all marine ecosystems (Gopalakrishnan *et al.*, 2008). These organisms having high species richness are among the creatures that have a key role in the ocean food chain (Gregory, 2007). Most of them are benthic and live in sediments or attached to the seabed (Kotpal, 2002). Various scological conditions, such as depth, temperature, season, and the amount of organic matter in the sediment affect their distribution and their distribution changes seasonally (Nybakken, 1993).

The Nephtidae family of *Micronephthys Sphaerocirrata* are small to medium-sized and they are rarely seen in large sizes the largest size that has been detected so far was 10cm (Dnestrovskaya and Jirkov 2010). This family has five known types (Aglaophamus, Dentinephtys, Inermonephtys, Micronephtys and Nephtys) with 186 species, so far there is no genealogy relations and clear evolutionary history for the types Nephtys, Aglaophamus or Micronephtys that is receptive of the species in the Nephtyidae family (Rouse and Pleijel 2001). However, about 30 percent of the species are synonymous.

Nephtyidae is the only sister group of Glyceridae and Goniadidae families. They are distinguishable from other polychaetes by the clear presence of interramal branchiae on the ventral notopodial edge (Fauchald and Rouse 1997, Wilson, 2000). Interramal branchiae have also been called “recurved cirrus” or “interramal cirrus” (Hartman, 1971). They are called by this ancient name because of two pairs of anterior antennae, but the current interpretation is due to the sameness of the pulps and the antenna (Fauchald and Rouse 1997). Generally, they look pale, these Polychaetes have body parts called Chaetigers that are visible by the classification in which the parapodia are linked to these parts. Except the head or prostomium other body parts of the Polychaetes are not different from each other. They are active hunters, with a long snout, strong and muscular, relatively rapid drilling through sand deposits. They can also do swimming with wavy movements (Rizzo and Amaral 2007).

## MATERIALS AND METHODS

Before any sampling according to the type of sampling which was collected from Chabahar Bay beds (Fig. 1) and in sub-tidal areas, the local fishermen were asked and then based on the access to beaches, the geomorphological differences and habitat diversity of the beach, the sampling stations were selected. The geographical coordinates of each station were determined by geographical positioning device. Three stations in order from the most polluted areas to the most pristine regions of Chabahar Gulf were chosen (Table 1).

**Table 1: The features of the sampling station in the area under study.**

| Station | Date | Latitude | Longitude | Depth (m) |
|---|---|---|---|---|
| Hafte tir | June 2013 | 25.295681 | 60.623047 | 1.5 |
| Shahid beheshti | June 2013 | 25.312952 | 60.603764 | 7.5 |
| Konarak | June 2013 | 25.346466 | 60.426701 | 6 |
| Hafte tir | September 2013 | 25.295653 | 60.623056 | 1.5 |
| Shahid beheshti | September 2013 | 25.312932 | 60.603765 | 8 |
| Konarak | September 2013 | 25.346414 | 60.426836 | 6 |
| Hafte tir | December 2013 | 25.295610 | 60.623045 | 1.5 |
| Shahid beheshti | December 2013 | 25.312901 | 60.603785 | 9 |
| Konarak | December 2013 | 25.346485 | 60.426818 | 6 |
| Hafte tir | February 2014 | 25.295648 | 60.623158 | 1.5 |
| Shahid beheshti | February 2014 | 25.313032 | 60.603782 | 8 |
| Konarak | February 2014 | 25.346437 | 60.426869 | 6 |

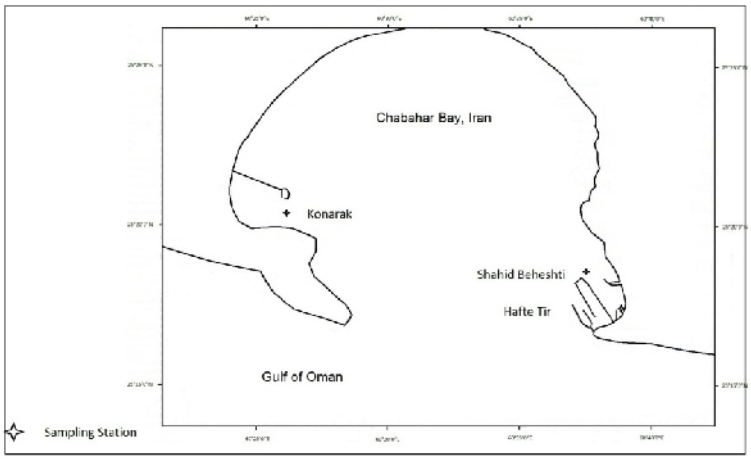


**Fig. 1.** Map of sampling site (Chabahar Bay). 15 × 9 cm (300 ×300 dpi).

Sampling was performed using Van-Veen grab on the boats. Each sample was repeated three times, and a separate sample was taken to determine the grain size and organic matter content of sediment. In the fourth sampling after removing sediments from the grab, the sample was immediately put in the containers of ice and transferred to marine science laboratory of Chabahar Maritime University to be kept in the freezer (to prevent the decomposition of organic matter). The levels of salinity was measured by Salinity Meter devices (Horiba - U10, Japan), the water temperature was measured by mercury thermometer and pH was measured by pH-meter (model: 713 Metrohm, Switzerland) and in each time of sampling.

The sediment samples were transferred to the laboratory and rinsed by 0.5 mm sieve. Then it was stained by rose Bengal and the additional solution was rinsed off. If the samples remain in rose Bengal solution over 5 minutes they get dark red and lose their quality of identification.

They were isolated in the Polychaetes lab by loop (model: Micros Austria) with a magnification of 30 times and after taking their image they were kept in labeled containers.

Further identifications were conducted using available sources (Dnestrovskaya and Jirkov (2010), Ravara *et al.,* (2010), Rouse and Pleijel (2001), Rizzo and Amaral (2007) by microscope (Nikon; Eclipse E100) was performed in 40 times magnification. In order to obtain the desired species the camera (Electronic Eyeplece) was used which can be mounted on a microscope.

Data analysis was performed using SPSS 22 Software. All analysis was performed based on seasonal frequency (based on cubic cm).

In order to determine the grain size, a part of the sediment was dried in the flask the characteristics of which were printed on for 24 hours at 70°C. Then 250 ml of water and 10 ml of sodium hexametaphosphate of 6.2 g/l was added to 25 g of the dries sediments. Sediments were stirred in the stirring device for 15 minutes and it was left to be deposited over the night. The material remained in the sieve was dried in the oven at 70°C and passes through a series of sieves no 2, 1, 0.5, 0.25, 0.125, 0.063 µm. The remained sediment in each sieve was isolated and weighted accurately. So the weight of each grading was determined. The weight percentage of each one was calculated and finally their frequency of distribution was determined.

## RESULTS

The first station, Hafte Tir port; this area according to the history was more polluted than the other areas and it was expected the opportunist species have more room for maneuvering than the other species. But what attracted us was the type of sediment or mud obtained from this location that after a short period of time, a much diluted orange oil leaked out and placed on the sediment in the sample container.

The second station Shahid Beheshti port; This port is under construction and it is not fully operated and the assumption that it is one of the polluted areas might seem irrational but due to construction and dredging carried out, the only species that are capable of drilling and settling in this area are polychaets worms.

The third station, Konarak port; the selection of the station in this area was performed with almost about one kilometer distance from the port to the south side arm in the Penaeidae family shrimp habitat which is an intact areaway from environmental pollutants.

**Dispersion and Stability:** during sample collection within 1 year in three station of Chabahar Bay a total of 3056 samples were collected and observed among which 25 samples were related to M. sphaerocirrata (0.82%) and the rest was related to other polychaetes and carnivorous predators such as Pilargidae, Glyceridae, Hesionidae, Philodocidae. The identification of this type was done using direct observation under a microscope and taking pictures of body parts and compliance with credible sources. The image of the desired species is presented in Fig. 1.

Nephtyidae Grube 1850.

Type genus:

Micronephthys Friedrich, 1939

*Micronephthys sphaerocirrata*


**Fig. 2.** *Micronephthys sphaerocirrata*. Anterior part of polychaets worm with everted pharynx that has terminal papillae, prostomium including antenna and pulp, the abdominal cirri and neck that are linked to the prostomium. (Drawings: Esmail Dehani).

## CONCLUSION

Morphological specifications: prostomium is reduced, quite square with four longitudinal grooves and two equal sized antennas and a pair of pulp (Fig. 3). It has fine eye spots without lens. The body is flattened as abdominal back body. Lengths up to 14 mm (most samples are typically smaller) and has a maximum of 34 Chaetiger. Muscular pharynx with the ability to collapse (Fig. 2), it has am end loop with papilla and there are a row of papilla under the pharynx, around the areas of naked pharynx and may have papilla that give it a granular form. It has multiple hair-like cirri in any part of the body (Fig. 3). The long body is divided by the ring-like contractions (Annuli) in the outside and divided by a wall inside (Fig. 3), which are suitable for symmetric bilateral movement. The mouth is under the head and the colon is recognizable as gray in the middle part of the body. The parapodia of anterior parts have surrounded the mouth. The first Chaetiger is smaller than the next one and the rest parts are the same. Unlike many Polychaetes the body surface area (cross-section) is specifically square and all parapodia have two branche and have back and abdominal cirri. The pygidum narrows down gradually and the anal and the tail has a long individual lash there are no rings on the abdomen.

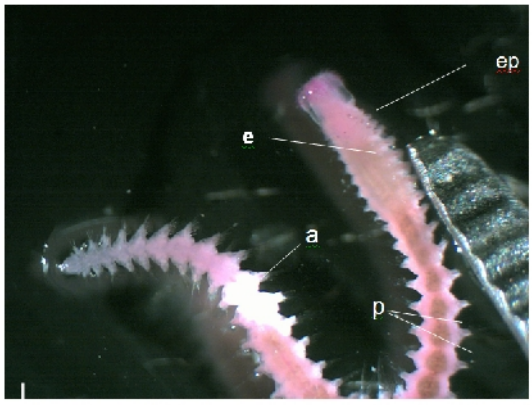


**Fig. 3.** *Micronephthys sphaerocirrata.*(Polychaets worm in full size (a: Annuli, p: Parapodia, ep: back pharynx with terminal papilla, e: the eye not combined with lens) Material examined. Chahbahar: (60.603720-25.312932) very fin sand sediment 8 m, holotype (ZUCMU.2013.020.0119), Van Veen : Scale bar: 500 µm. (photo Esmail Dehani). 11.93 × 15.93 mm (96 × 96 dpi).

**Physical and chemical factors of habitat:** The highest temperature is related to spring season with the average temperature of 28.73°C and the highest rate was related to Shahid Beheshti Port with an average of 30°C. The lowest temperature is related to winter season with the average temperature of 25.67 the lowest rate of which is related to Hfte Tir Port with an average of 25°C.

The maximum salinity was observed in spring with and average of 34.97(PPt). The highest amount was related to Hfte Tir Port with an average of 36.80(PPt). The minimum salinity was observed in winter with and average of 31.67(PPt). The lowest amount was related to Konarak Port with an average of 31.00 (PPt). pH varied between 8.26.% ±0.2. The total percentage of depositions in different seasons was estimated within the range 1.39-8.22 the lowest percentage of organic matter was in spring and the highest amount was in winter (Table 1). Generally in all seasons the highest frequency of *M. sphaerocirrata* was related to autumn with the rate of 3.7± 0. 89 ind. 288c $m^{-2}$ and there was no trace of this sample in spring.

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