

A review on the distribution of Phylum Phoronida from India with recent observations on *Phoronis psammophila*

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Phoronida is one of the smallest and least familiar phyla. A brief review on the distribution of Phylum Phoronida from India along with current observations on *Phoronis psammophila* is presented in this article. The aim of the study is to document the records of phoronids from Indian coast.

[**Keywords:** *Phoronis psammophila*, Phoronida, distribution, India]

Introduction

Phoronida, comprising of two genera, *Phoronis* and *Phoronopsis* and 11 species are characterized by the absence or presence of an epidermal collar fold at the base of the lophophore^{1,2}. All species have a wide geographical range; most are cosmopolitan. The objective of the present study is to summarize all the available information on distribution of phoronids from India along with description of their habitats. Two species have been recorded along the Indian coast (Figure 1) namely *Phoronis australis* and *Phoronis psammophila*. Additionally, recent observations on the distribution of *P. psammophila* along with its morphology and ecology are also included.

Materials and Methods

For the current study, bottom water samples were collected in duplicate for analyzing various physico-chemical parameters such as depth, water temperature and salinity. Sediment samples were collected by using van Veen grab sampler of 0.04m² area for macrobenthos and texture analyses. The animals retained after sieving the sediment samples through 0.5 mm mesh sieve were fixed in 5% buffered formalin

mixed with Rose Bengal. Phoronids were carefully removed from the tubes with the help of a fine forceps for further taxonomic identification.

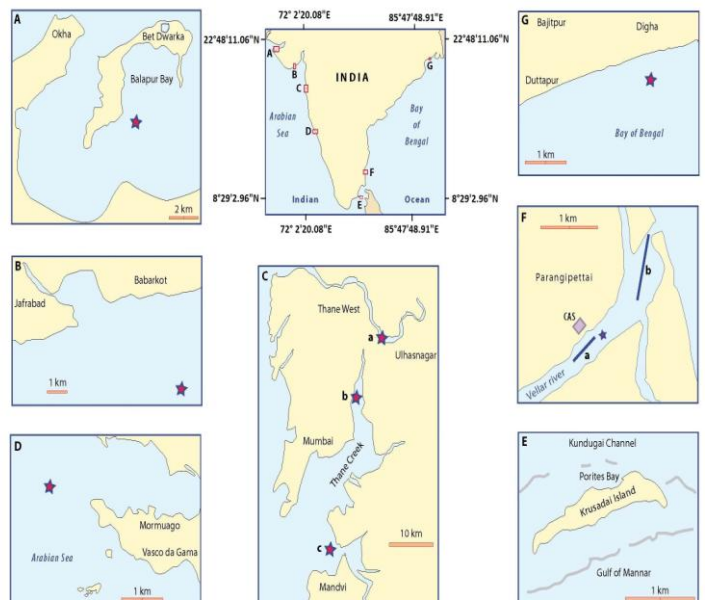


Fig.1- Records of phoronids along the Indian coast

A- Balapur Bay; B- Jafrabad (Gujrat) ; C- a (Ulhas estuary) , b (Thane creek) and c (Amba estuary) ; D; Mormugao Bay, Goa ; E; Krusadai island ; F- Vellar estuary: a (CAS= Center of Advanced Science in marine biology), b (Mouth region); G- Beach of Old Digha

Current observations were made on the occurrence of *Phoronis psammophila* (Figure 2A) at 3 different localities (Figures 1B and 1C). Cross sections (Figure 2B) were made through the muscle layer so as to identify the species.

from the present collection. The description on longitudinal muscle formulae and hydro-sedimentological parameters of the current study sites are detailed in Tables 1 and 2 respectively. Following are the different species of *Phoronis* recorded from the different geographic areas of India.

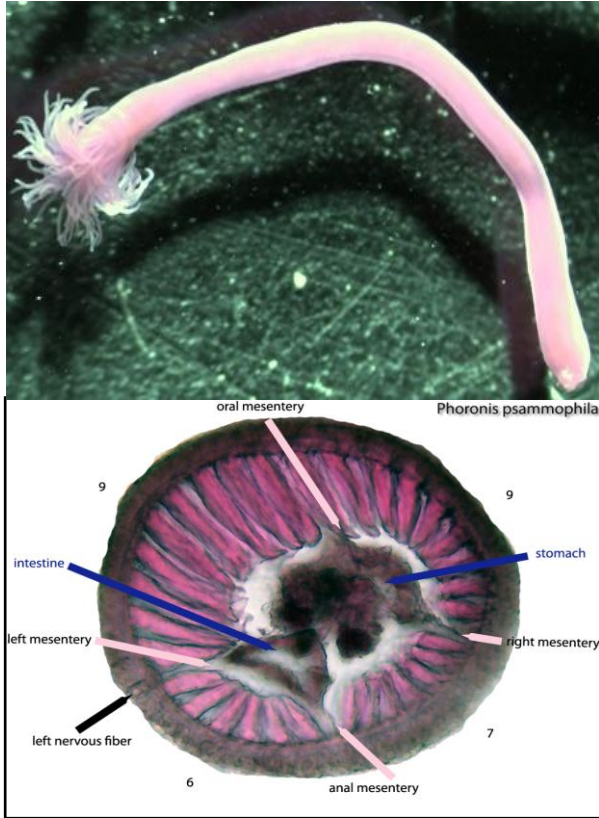


Fig. 2- (A) *Phoronis psammophila* removed from its tube and (B) Cross section through *P. psammophila*

Phoronis sp.

A single specimen of *Phoronis* sp. was described by Gravely³ from Porites Bay in Krusadai island (Figure 1E). Nair⁴ had recorded actinotrocha, the phoronid larvae, along the east coast of India during 1974. Recently (2011), Sivadas *et al.*⁵ had recorded phoronids in the Mormugao Bay, Goa (Figure 1D).

Phoronis australis.

Nair and Shaw⁶ described *Phoronis australis* in association with cerianthids at Beyet island (today Bet Dwarka) in Balapur Bay at shallow depths. One specimen collected by Haldar⁷ from the same locality (Figure 1A) from sandy bottom where temperature ranged between 20-30°C and salinity 35.4 to 36.7 psu was identified as *P. australis* (by C. Emig on behalf of P. Haldar). Ganguly and Majumdar⁸ had described a new phoronid species as *Phoronis bhadurii* which was considered as synonym of *P. australis* by Emig¹. The specimens were collected from the beach of Old Digha in a shelly muddy sediment (Figure 1G).

Results and Discussion

Many specimens of *Phoronis psammophila* (identified by Emig) were obtained

Table 1- Longitudinal muscle formulae of *Phoronis psammophila* from Indian waters. N= number of specimens examined.

Locality	Latitude & Longitude	N	No. of individuals/m ²	Mean	General Formula
Jafrabad-coastal (Gujarat)	20°50'06.0"N 71°25'48.0"E	7	200	33 = $\frac{10 10}{6 7}$	$\frac{9-11 9-11}{5-8 5-8}$ [31-36]
Ulhas estuary (Thane)	19°12'02.3"N 73°01'34.0"E	1	800	31 = $\frac{9 9}{6 7}$	-
Thane creek (Thane)	19°06'04.5"N 72°58'14.3"E	3	1131	35 = $\frac{10 10}{7 8}$	$\frac{10-10 9-10}{7-8 7-8}$ [33-36]
Amba estuary (Rewas)	18°50'11.8"N 72°54'42.5"E	1	6	28 = $\frac{9 9}{5 5}$	-

Table 2- Hydrosedimentological parameters of current study sites

Locality	Date of collection	Depth (m)	Water Temperature (°C)	Salinity (psu)	Texture
Jafrabad- coastal (Gujarat)	November 2011	17	28.9-29.0	34.8-35.0	Sandy Silt
Ulhas estuary (Thane)	May 2013	14	32.6-32.8	17.1-17.3	Sandy Silt
Thane creek (Thane)	October 2010	10	31.0-31.1	28.5-28.7	Sandy Clay
Amba estuary (Rewas)	December 2013	6	28.6-28.7	34.0-34.2	Sandy Silt

Phoronis psammophila.

In the Vellar estuary (Figure 1F), the phoronid specimens were identified as *Phoronis architecta* (a synonym of *psammophila*) by Balasubrahmanyam⁹ at 3-4 m depth. He also noted that actinotrochs were quite common in the plankton samples. Balasubrahmanyam¹⁰ during a preliminary survey in the same estuary, observed *Phoronis psammophila* (density 24 ind./m² on a global density of 60) at 1.8 m depth from sandy mud. Actinotroch larvae of Phylum Phoronida were recorded from the mouth of the Vellar estuary by Subbaraju and Krishnamurthy¹¹.

Khan *et al.*¹² recorded *Phoronis* sp., from two areas of the Vellar estuary (Figure 1F): (a) from Jetty to Biological Station (today Center of Advanced Study in Marine Biology, Annamalai University, Perrangipettai – former Porto Novo); and (b) situated near the mouth in a marine zone¹³. Sampling was carried out by using a Petersen grab along 5 transects (10 stations) in sandy sediment at 3-4 m depth where temperature ranged between 26-32°C and salinity 28-32 psu. A subsequent study by Murugesan *et al.*¹⁴ did not record any phoronid specimen during the survey in the Vellar estuary. The *Phoronis* sp. were considered as crustaceans by Khan *et al.*¹².

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