

Food and Feeding Habits of *Herdmania pallida* (Heller) (Urochordata: Ascidiacea) from Palk Strait, Southeast of India

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Abstract: In the present observation, the food and feeding habit of the simple ascidians, *Herdmania pallida* was carried out during the study period (July 2008 to June 2009). The percentage contribution of food items comprised of 51% of sand particles, 30% of micro flora, 13 % of meio fauna, 2% of macro fauna and 4% of other materials. The percentage of feeding intensity were observed throughout one year as poorly feed 20%, heavy feed 26%, medium 18 %, active 24% and empty 12%, The poorly feed were more recorded in the month of June (32.5%), heavy feed was highly recorded in the month of January (37.5 %), active feed was more reported in the month of February (34.6%), medium feed was more in the month of January (20.2%), empty feed was reported high in the month of July (18.9%).

Key word: Food and feeding % *Herdmania pallida* % Ascidiacea

INTRODUCTION

Despite the knowledge of the mechanisms of feeding little is known of the food itself. Phytoplankton and organic particles in suspension apparently constitute the bulk of the food of many species of ascidians. In *Microcosmus sulcatus* the brachial sac has been found to contain organisms such as bacteria, diatoms and radiolarians, characteristics of water immediately above the substratum [1]. In other species the gut content varies perhaps according to the local water conditions. [2, 3] noted large quantity of mud in the gut of *Ascidia sydneiensis* but the same species may contain algal cells and diatoms with little inorganic matter [4]. Subtle difference, appear to exist in the food of related species living in the same area. In this case, difference in the arrangement of the oral tentacle may be responsible although there might be some variation in the food content of the water since the species occupy some what different ecological niches. Little experimental work has been done on the value and quantity of food required in ascidians in India. All ascidians are ciliary-mucus filter feeders that utilize very small particulate matter primarily in the 0.5-2 μ m range [5-8] although they do take larger particles including their own gametes [9]. When present in large numbers, their high filtration rate can have a dramatic effect on available plankton and suspended organic matter [10, 11, 12]. In this context, the present study was aimed to analyze the food and feeding habits

so the solitary ascidians *Herdmania pallida* which is commonly available in Mandapam coastal area.

MATERIALS AND METHODS

Sampling Procedure: The samples were collected at monthly intervals from Mandapam coast (Lat 9° 17' 05.°N, Long 79° 10' 41.°E) Southeast coast of India. The solitary ascidian *H. Pallida* is distributed from the shore to a 15m depth. Species were collected during low tide by SCUBA divers. The size range of the organisms is 4.5- 8 cm length (cm) and 0.45-0.150 kg weight (kg). A total of 86 specimens of *H. Pallida* were examined during the study period (July 2008 to June 2009). For the gut content analysis specimen was in fresh condition. The total length, gut length and weight of each individual were recorded. The alimentary tract was dissected out and preserved in 5% formaldehyde, [13].

Description of the Species:

Systematic

Phylum	:	Chordata
Sub-Phylum	:	Tunicata or Urochordata
Class	:	Ascidiacea
Order	:	Pleurogona
Sub-Order	:	Stolidobranchita, Lahille 1886
Family	:	Pyuridae
Genus	:	<i>Herdmania</i>
Species	:	<i>Pallida</i> , (Heller)

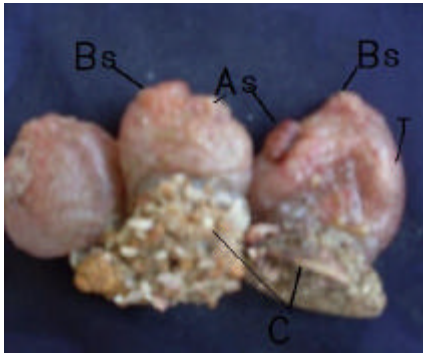


Fig. 1: *Herdmania pallida* (Heller). Bs-inhalant (branchial siphon): As- exhalant (atrial siphon): T- trunk; C- foot.

Herdmania pallid (Fig.1) is a monoascidian fairly common in the Indian seas .It is solitary, fairly large, oblong to pyriform, compressed laterally. Size ranging from 9.5 cm to $\times 7 \text{ cm} \times 4 \text{ cm}$. Siphons more or less prominent, widely separated and cross slit each with four lips. On the East coast of South India, off the tuticorin coast upto about ten miles from the coast and five to twelve fathoms deep, *H. pallida* is found associated with oyster beds of different species including, the pearl oyster (*Pinctata fucata*) and sacred chanks, (*Turbinella pyrum* and *turbinella mrapa*) and also other types of mollusks. The sea bed is sandy in some region and rocky in other region. A general anatomy of *H. pallida* is described by [14]. [15] Has compiled a monograph of *H.pallida* giving the anatomy in great detail, but the development is not given. The histo-chemical study of the egg of *H.pallida* has been done [16].

The gut contents were carefully emptied into a Petri dish and examined with the help of a binocular microscope. For evaluating the preference of food consumed, the different food items were assessed under the categories plenty, common, a few, little and rare and the points 16,8,4,2 and 1 were allotted according to the volume of the items were then summed up and scaled done to percentages to indicate the percentage composition of food items for various methods. Further, the stomach were classified into 'gorged' when they were filled of extent that the stomach wall appeared thin or semitransparent, the stomach was called "Full" when full with wall being thick and intake. They were classified as $\frac{3}{4}$ full, $\frac{1}{2}$ full, $\frac{1}{4}$ full, trace and empty depending upon their relative fullness. The stomach contents were examined separately with an aid of binocular microscope, sorted and classified in to the lowest possible taxon and enumerated.

RESULTS AND DISCUSSION

The *H. Pallida* food items were observed by varying proportions among preys. Microflora (*Coscinodiscus* sp., *Odontella* sp., *Navicula* sp. and *Prorocentrum* sp), Meiofauna (ostracodes, harpacticoid copepod and foraminiferans), Macrofauna (molluscan and amphipods) and sand particles were observed in the stomachs of the simple ascidian (*H. Pallida*) are shown in Table 1 and Fig 2.

The feeding intensity were observed during July 2008 to June 2009 in *H. pallida*, each specimens were examined by five categories are empty, medium, heavy, active feed and poorly feed. The feeding intensity was varied in each month because to adaptation and availability of food items in the live spot.

The percentages of feeding Poorly feed 20%, heavy feed 26%, medium 18%, active 24% and empty 12%, intensity were observed throughout the year. The poorly fed (32.5%) was were more recorded in the month of June, active fed (34.6 %) was more found in the month of February, heavy fed (37.5%) was more recorded in the

Table 1: Composition of food items in *H. pallida* (Heller, 1878)

Food categories	Name of the food items
Macrofauna	Bivalves veliger and Amphipods
Meiofauna	Ostracodes, Harpacticoidcopepod and Foraminiferans
Microflora	Diatoms (<i>coscinodiscus</i> sp.) and algae (<i>Odontella</i> sp., <i>Navicula</i> sp., <i>Prorocentrum</i> sp.)
Soil particles	Sand, Slit and clay materials
others	Dust particles and unidentified

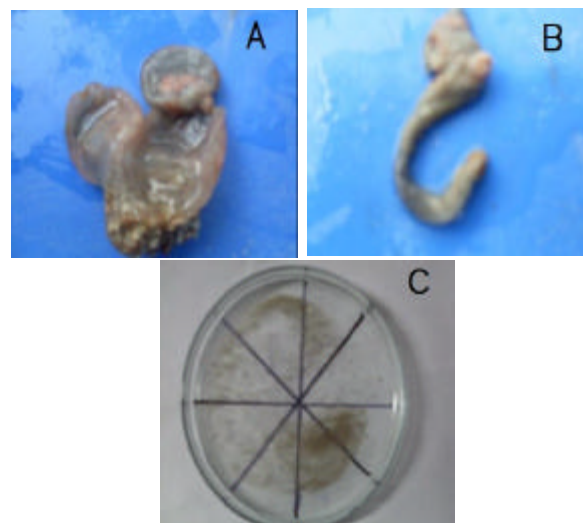


Fig. 2: Figure showed A and B. Internal structure with gut, C. Food contents of (Ascidians)

Table 2: Percentage of feeding intensity of *H. pallida*

Months	Empty	Medium	Heavy	Actively feed	Poorly feed	Total
July	18.9	20.0	15.4	20.4	25.3	100
August	13.1	19.5	22.3	18.0	27.1	100
September	12.2	15.8	24.9	22.0	25.1	100
October	15.2	13.2	23.9	24.9	22.8	100
November	13.2	15.2	30.1	20.1	21.4	100
December	6.1	19.6	30.6	27.7	16.0	100
January	7.2	20.2	37.5	25.0	10.1	100
February	8.8	17.5	31.8	34.6	7.3	100
March	10.4	20.1	31.6	22.3	15.6	100
April	*	*	*	*	*	*
May	*	*	*	*	*	*
June	15.2	13.2	12	27.1	32.5	100

*Species is absent

Table 3: Percentage compositions of various food items of *H. pallida*

Months	Macro fauna	Meio fauna	Micro flora	Sand particles	Others	Total
July	0.0	10.1	22.8	58.3	8.8	100
August	0.3	11.7	27.0	55.1	5.9	100
September	0.8	11.2	28.7	53.3	6.0	100
October	1.8	13.9	29.7	50.3	4.3	100
November	2.2	17.9	32.5	45.3	2.1	100
December	3.3	13.8	35.3	44.4	3.2	100
January	3.6	14.2	36.4	45.1	0.7	100
February	4.2	14.6	38.1	43.1	0.0	100
March	1.3	12.3	30.6	55.3	0.5	100
April	*	*	*	*	*	*
May	*	*	*	*	*	*
June	0	9.3	20.1	60.2	10.4	100

*Species is absent

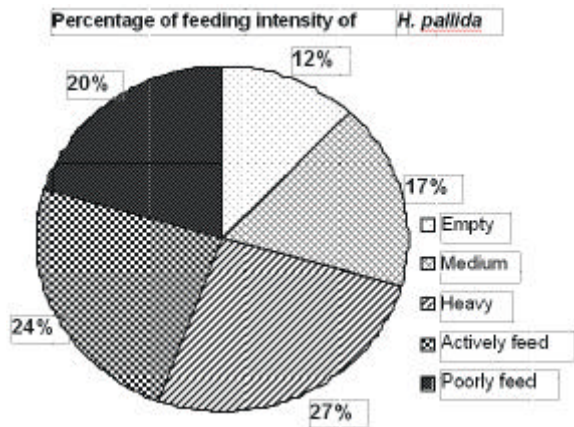


Fig. 3: Percentage of feeding intensity of *H. Pallida*

month of January, medium fed (20.2%) was more in the month of January, Empty fed (18.9%) was found high in the month of July in (Table 2 and Fig. 3.) and April and May organisms is absent due to sea is a very heavy rough reported.

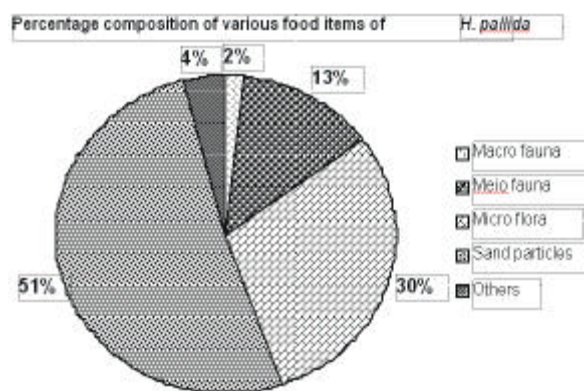


Fig. 4: Percentage composition of various food items of *H. pallida*

The sand particles rich (60.2%) in feed materials was observed in the month of June, the micro flora (38.1%) are richly recorded in the month of February, the meio (17.9 %) fauna were higher in November, the macro fauna (4.2 %) were observed higher in the month of February

and other decomposed material (10.4 %) were observed higher in the month of June. The percentage of food categories are varied throughout the study period. The percentage of contribution observed from 51 % of sand particles, 30% of micro flora, 13% of meio fauna, 2 % of macro fauna, 4 % of other materials in Table 3 and Fig.4.

H.pallida is feed pumps water in through the oral aperture, strains the food particles through the branchial filter and pumps the filtered water out through the atrial aperture [17]. The pore size on the ascidians mucus sheet covering the branchial filter is approximately 0.2 μm [18] small enough to remove bacteria and organic molecules [19]. The alimentary canal in *H. pallida* is U-shaped. From the posterior end of the branchial sac a narrow oesophagus begins and leads into a stomach which is bulging in most cases. The later leads into the midgut which passes into an intestine turning upwards and ending at the atrial region. The fecal matter is expelled out through atrial siphon by the water current and also by the pressure of the body contraction.

The food particles enter the branchial sac through the water current produced by the action of the cilia. The tentacles act as filters to prevent coarse particles from entering. The food particles get entangled in the mucus sheet and they are lashed out by the flagella from the endostylar groove to the branchial sac. From there they are passed on to the dorsal lamina and along the later reach the oesophagus. The food in the digestive canal is moved on by cilia which are found in different regions of the system. The digestion is extracellular. In digestion amylase, invertase and lipase are highly active while protease is weak [20, 21, 23, 24]. The role of the pyloric gland is not yet completely understood. It may have either a digestive function or an excretory function, or both. It also speculated that the pyloric gland performs the function of ionic regulation of the blood or the control of pH in the alimentary canal. The pyloric secretion also appears to soften the food cord which is wrapped in mucus.

H. Pallida has been found to be an unselective suspension filter feeder which mainly found upon large quantity of mud and micro flora (*coscinodiscus* sp, *odontella* sp, *Navicula* sp and *prorocentrum* sp). Macro fauna were found less frequently than meio fauna. As stated by [3]. [25] has reported that the gut content of *Phallusia nigra* contained many amphipods, copepods, along with planktons and the presence of various body parts of crustaceans was also reported. Hence it is concluded that *H. Pallida* is a Diatoms (*coscinodiscus* sp) - algae (*Navicula* sp and *prorocentrum* sp) - ostracodes -

Harpacticoidcopepod-Foraminifera's-amphipods-Bivalves veliger feeder and the ascidians changes its food habits with the change in season.

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